ORIGINAL NEW APPLICATION

0000094924

ORIGINAL

BEFORE THE ARIZONA POWER PLANT AND TRANSMISSION LINE SITING COMMITTEE

IN THE MATTER OF THE APPLICATION OF THE SOUTHWEST TRANSMISSION COOPERATIVE, INC., OR ITS ASSIGNEES, FOR A CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY FOR THE SAN MANUEL INTERCONNECT PROJECT LOCATED IN THE VICINITY OF SAN MANUEL IN PINAL COUNTY, ARIZONA	Docket No. L-00000CC-09-0158-00142
	Case No. 142

Arizona Corporation Commission
DOCKETED
MAR 27 2009
DOCKETED BY

Prepared by

SWCA Environmental Consultants

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March 2009

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2.0 Name, Address, and Telephone Number of a Representative of the Applicant Who Has Access to Technical Knowledge and Background Information Concerning the Application in Question and Who Will Be Available to Answer Questions or Furnish Additional Information 1

3.0 State Each Date on Which Applicant Has Filed a Ten-Year Plan in Compliance with ARS § 40-360.02 and Designate Each Such Filing in Which the Facilities for Which this Application is Made Were Described. If They Have Not Been Previously Described in a Ten-Year Plan, State the Reasons Therefore 1

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b. With respect to a proposed transmission line: 2

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Attachment 1

APPLICATION REQUIREMENTS

1.0 Name and Address of Applicant

Southwest Transmission Cooperative, Inc.
P.O. Box 2195
1000 South Highway 80
Benson, Arizona 85602
(520) 586-5195

2.0 Name, Address, and Telephone Number of a Representative of the Applicant Who Has Access to Technical Knowledge and Background Information Concerning the Application in Question and Who Will Be Available to Answer Questions or Furnish Additional Information

James Burson
Manager of Transmission Engineering
Southwest Transmission Cooperative, Inc.
P.O. Box 2195
Benson, Arizona 85602
(520) 586-5219

3.0 State Each Date on Which Applicant Has Filed a Ten-Year Plan in Compliance with ARS § 40-360.02 and Designate Each Such Filing in Which the Facilities for Which this Application is Made Were Described. If They Have Not Been Previously Described in a Ten-Year Plan, State the Reasons Therefore

In compliance with A.R.S. § 40-360.02, Southwest Transmission Cooperative, Inc. ("SWTC") or its predecessor, the Arizona Electric Power Cooperative, Inc. ("AEPCO"), has filed a 10-year plan each year from the inception of the statutory requirement through 2008. The San Manuel Interconnect Project was described in the January 31, 2004, January 31, 2008, and January 29, 2009 plan filings.

4.0 Description of the Proposed Facility

a. With respect to an electric generating plant:

Not applicable.

b. *With respect to a proposed transmission line:*

i. Nominal voltage for which the line is designed; description of the proposed structures and switchyards or substations associated therewith; and purpose for constructing said transmission line.

Nominal Voltage for the Line Design

The proposed new transmission line is a double-circuit 230-kV line (using davit arms and 230-kV suspension insulators) which initially will be energized at 115 kV. This 230-kV transmission line will extend approximately 4.5 miles primarily on property owned by BHP Copper, Inc. ("BHP"). It will originate at the existing SWTC Apache to Hayden 115-kV transmission line and will terminate at the existing Arizona Public Service ("APS") San Manuel Substation. In order to connect to the San Manuel Substation, SWTC will acquire two bays from APS. Along approximately 3 miles of the 4.5-mile-long transmission line, SWTC will hang a 46-kV line for BHP's use—built to 69-kV standards—on the new structures. SWTC will remove the existing BHP 46-kV line following installation of this new 46-kV line.

Description of the Proposed Structures

The 230-kV line will be supported by new steel monopole double-circuit structures extending approximately 115 feet above ground level (See Exhibit H-1). Monopole structures will be placed approximately every 1,000 feet along the transmission line route for a total of approximately 25 poles. The structures are made of self-weathering steel and conductors are aluminum conductor steel reinforced, which are 1,272 kcmil (thousand circular mil, or about 1.345 inches) in diameter. Six main conductor wires will be attached to the structure insulators and there will be two ¾-inch ground wires. Figure 4-1 depicts a typical monopole structure constructed as a double-circuit transmission line.

Purpose of the Transmission Line

SWTC is a nonprofit transmission cooperative that operates and maintains a roughly 600-mile transmission system. The system generally extends north, east, and west from the southeastern part of Arizona at AEPCO's Apache Generating Station in Cochise County. In combination with the generation and purchasing role of AEPCO, SWTC primarily transmits electricity at wholesale to its six Class A members. The Class A members are nonprofit distribution cooperatives that deliver power to retail customers in rural Arizona and other parts of the Southwest. One of SWTC's member systems is the Trico Electric Cooperative, Inc. ("Trico"). Trico needs to receive increased quantities of power from the SWTC system to support the load growth taking place in southeastern Pinal County. Therefore, in order to deliver electricity to meet those increased demands, SWTC needs to establish a second interconnection point with the APS 115-kV system at the San Manuel Substation.

Currently, SWTC delivers electricity to one of Trico's substations over the APS 115-kV system. However, SWTC has only one interconnection with APS, which is at the Westwing Substation in the Phoenix area. The Westwing transmission path provides service to Trico, but APS has indicated that its ability to wheel power from the Westwing Substation to southeastern Pinal County is limited and will be constrained in the future. This San Manuel Interconnect Project will provide a very essential second interconnection with APS to reduce those Westwing constraints and to allow SWTC to continue to reliably provide power to the Trico service area. Further, BHP is actively marketing their non-operating mining real estate in the area of this project as property suitable for a solar generation facility or facilities. The San Manuel Interconnect Project will encourage the development of these renewable resources and likely will qualify and is intended to be designated as a renewable transmission project as discussed at pages 7–8 of Decision

No. 70635. Additionally, the new interconnection at the APS San Manuel Substation will provide a direct transmission path from AEPCO's Apache Generating Station to southeastern Pinal County for the first time, which is important for both economic supply and reliability purposes. Finally, the new interconnection will also benefit APS and its customers in the towns of Bisbee and Douglas, Arizona by allowing it to continue service during certain emergency conditions.

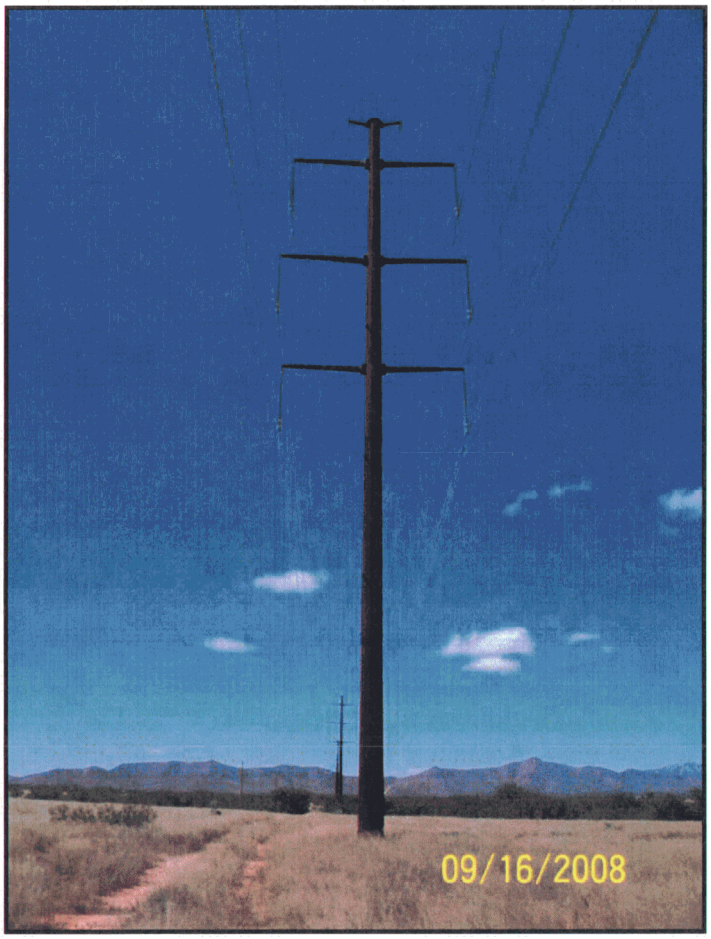


Figure 4-1. Typical monopole structure with a double-circuit transmission line.

ii. Description of geographical points between which the transmission line will run, the straight-line distance between such points and the length of the transmission line for each alternative route for which the application is made.

The proposed transmission line route is located in the vicinity of San Manuel, Arizona. East to west, the line will extend from the existing Apache to Hayden 115-kV transmission line to the existing San Manuel Substation. Elevations range from approximately 3,200 feet above mean sea level ("amsl") at the San Manuel Substation (the highest point) to approximately 2,500 feet amsl where the line crosses the San Pedro River floodplain (the lowest point). Exhibit A-1 ("Project Vicinity Map") depicts the location of the project. The straight-line distance is approximately 4.4 miles and the length of the transmission line is approximately 4.5 miles.

iii. Nominal width of the right-of-way required, nominal length of spans, maximum height of supporting structures, and minimum height of conductor above ground.

SWTC has applied for an easement from the Bureau of Land Management ("BLM"), the Arizona State Land Department ("ASLD") and BHP. The nominal length of the spans is 1,000 feet and the maximum height of the new monopole structures is 140 feet. The minimum height of the conductors above ground along the 230-kV line is 24.9 feet (as required by Rural Utilities Service standards), except where the line crosses the San Manuel Arizona Railroad, which is owned by BHP. Here, the clearance height is 32.9 feet. For the 46-kV line, the minimum clearance is 21.7 feet and it is 29.7 feet where the line crosses the railroad tracks.

iv. To the extent available, the estimated costs of proposed transmission line and route, stated separately. (If application contains alternative routes, furnish an estimate for each route and a brief description of the reasons for any variations in estimates.)

The estimated costs of the San Manuel Interconnect Project (including transmission line installation and access road construction) and right-of-way (ROW) are as follows:

Total Cost of the Project:	**$6,700,000**
Estimated Cost of ROW:	**$185,000**

v. Description of proposed route and switchyard locations. (If application contains alternative routes, list routes in order of applicant's preference with a summary of reasons for such order of preference and any changes such alternative routes would require in the plans reflected in (i) through (iv) hereof.)

The project route is shown in Exhibits A-1 and A-2. The 230-kV transmission line will provide an interconnection between the existing SWTC Apache to Hayden 115-kV transmission line, which is located in the foothills of the Galiuro Mountains, and the existing APS San Manuel Substation. From the Apache to Hayden 115-kV transmission line, the new line will extend about 1.0 mile in a southwesterly direction to River Road, on the east side of the San Pedro River floodplain. The line then runs approximately 1.0 mile across the San Pedro River floodplain to BHP property and then 2.5 miles to the San Manuel Substation, which is north of the town of San Manuel.

Advantages of the project route include:

- It avoids environmentally sensitive lands (including the potentially jurisdictional waters of the United States [WUS] and certain archaeological sites).
- It reduces impacts to the southwestern willow flycatcher critical habitat.
- There are fewer structures required for this route and, therefore, reduced visual impacts associated with it.
- The project route also maximizes the use of private land; 82% of the project is on private land.

SWTC did consider, but rejected two alternative alignments during the siting process. One of the two alternatives (Alternate Route 2) is not included in the Environmental Assessment, which is Exhibit B. These two alternatives, and the reasons for their elimination, are described below. Both alternatives are depicted in Exhibit A-3.

Alternate Route 1 (Clark Wash). SWTC considered constructing the eastern portion of the 230-kV transmission line along Clark Wash. Starting from the San Manuel Substation, this alignment would have followed the proposed route to a point immediately east of the active channel of the San Pedro River, where it would have turned north to Clark Wash and then northeast along Clark

Wash to the existing Apache to Hayden 115-kV transmission line. This route would have required structures to be placed in the Clark Wash drainage, a potentially jurisdictional WUS. There also are more archaeological sites along the Clark Wash drainage and greater potential impacts to southwestern willow flycatcher critical habitat than along the proposed route. Furthermore, this rejected alternative would have required two angle structures—each redirecting the line approximately 90 degrees—and also a greater number of structures because of its increased length. The dirt road would also require extensive upgrading to facilitate construction access. Based on these considerations, SWTC determined that this alternative (1) is too costly (because of the need for angle structures and more total structures and conductor); (2) is potentially more environmentally damaging (because of the presence of Clark Wash and more extensive impacts to southwestern willow flycatcher critical habitat); (3) would require more time to obtain permits and construct (because of the presence of potentially jurisdictional WUS and more archaeological sites); and (4) is less feasible because of engineering constraints (associated with the placement of structures and upgrading of the access road in Clark Wash).

Alternate Route 2 (Northern Route). SWTC also considered a route that would have bypassed the large tailings piles on the BHP property. This alignment would have paralleled the existing BHP 115-kV line from the San Manuel Substation and followed the San Manuel Arizona Railroad tracks to a point just west of the northwest corner of the tailings piles. At this point, the line would have turned northeast generally along the base of the tailings piles, then east across the San Pedro River and finally northeast to join the Clark Wash alignment (see Alternative 1). SWTC eliminated this alternative from more detailed consideration for the same reasons as stated for Alternative 1.

vi. For each alternative route for which the application is made, list the ownership percentages of land traversed by the entire route (federal, state, Indian, private, etc.).

Only one route is proposed. The project route crosses a combination of federal, state and private land. The land ownership is as follows: private land (82.2%, or 3.70 miles), ASLD land (16.5%, or 0.74 mile), and BLM land (1.3%, or 0.06 mile). The majority of the private land in the project area is owned by BHP. Land ownership is shown in Exhibit A-2.

5.0 List the Areas of Jurisdiction [As Defined in ARS § 40-360(1)] Affected by Each Alternative Site or Route and Designate Those Proposed Sites or Routes, if Any, Which Are Contrary to the Zoning Ordinances or Master Plans of Any Such Areas of Jurisdiction

The proposed transmission line crosses federal, state and private lands in Pinal County, Arizona. The federal land is administered by BLM. The transmission line will cross only about 360 feet of BLM land. The majority of the transmission line alignment crosses private land owned by BHP, which is under Pinal County jurisdiction. The proposed project is not inconsistent with any Pinal County zoning ordinance or master plan. The transmission line also crosses undeveloped state land administered by the ASLD. ASLD does not currently have a Comprehensive Management Plan for lands in the vicinity of the project area and, therefore, the proposed project is not inconsistent with ASLD plans. The majority of state land in the project area is leased for grazing and it is not expected that this land use will change in the immediate future.

Land Use Plans

The project is subject to the BLM *Final Safford Resource Management Plan and Environmental Impact Statement* ("RMP/FEIS") and was reviewed for conformance to the land use plan terms and conditions as required by 43 Code of Federal Regulations ("CFR") 1610.5, BLM Manual §1617.3. The BLM parcel in

question has been identified for retention per land tenure decisions in the RMP/FEIS. The proposed project conforms to the RMP/EIS, which states, "Land Use Authorizations Rights-of-way, leases and permits will be considered on a case-by-case basis, in accordance with the decisions of this Resource Management Plan."

In February 2007, the Pinal County Board of Supervisors approved the *Pinal County Comprehensive Plan* ("Plan"). A draft of the Plan was made available for public review in July 2008. According to the Plan, private land along the San Pedro River in the project vicinity is currently identified as Open Space. The remainder of the private land in the project area has not been zoned or otherwise identified for specific land uses. The open space designation is compatible with the proposed transmission line. The project would adhere to all land use plans and requirements of Pinal County.

6.0 Describe Any Environmental Studies Applicant Has Performed or Caused to Be Performed in Connection with this Application or Intends to Perform or Cause to Be Performed in Such Connection, Including the Contemplated Date of Completion

Table 6.1. This table summarizes Regulations, Authorizations and Environmental Studies for the proposed project.

Agency	Regulation/ Authorization	Environmental Studies and/or Reports	Date Completed or Projected	Application Exhibit
Bureau of Land Management	National Environmental Policy Act	Environmental Assessment	August 2008	Exhibit B
U.S. Army Corps of Engineers	Clean Water Act, Section 404; Nationwide Permit 12	Section 404/401 Compliance Package	May 2009	
U.S. Fish and Wildlife Service	Endangered Species Act, Section 7 consultation	Biological Assessment of Impacts to Southwestern Willow Flycatcher and Lesser Long-nosed Bat	July 2009	Exhibit D
Arizona Department of Environmental Quality	Clean Water Act, Section 402; Arizona Pollutant Discharge Elimination System Permit; Section 401 Water Quality Certification	Storm Water Pollution Prevention Plan; Spill Prevention Countermeasure Control Plan; Water Quality Certification	Prior to construction	
Arizona State Historic Preservation Office	Consultation and concurrence	Class III Cultural Resources Survey Report	May 2009	Exhibit E
Arizona State Land Department	Grant of ROW	Class III Cultural Resources Survey Report	September 2008	Exhibit E
Arizona State Land Department	Permit to remove natural products	Native Plant Inventory	August 2009	
Pinal County	Road crossing permit	Construction Plan	Prior to construction	
Not Applicable	Internal reports	Biological Evaluation/ Southwestern Willow Flycatcher Survey Reports	July 2008	Exhibit C

Attachment 1

APPLICANT AUTHORIZATION

Respectfully submitted this 13 day of March, 2009

By _____
Larry D. Huff
Senior Vice President and Chief Operating Officer
Southwest Transmission Cooperative, Inc.

Exhibit A

PROJECT LOCATION MAPS

Exhibit A-1

PROJECT VICINITY MAP

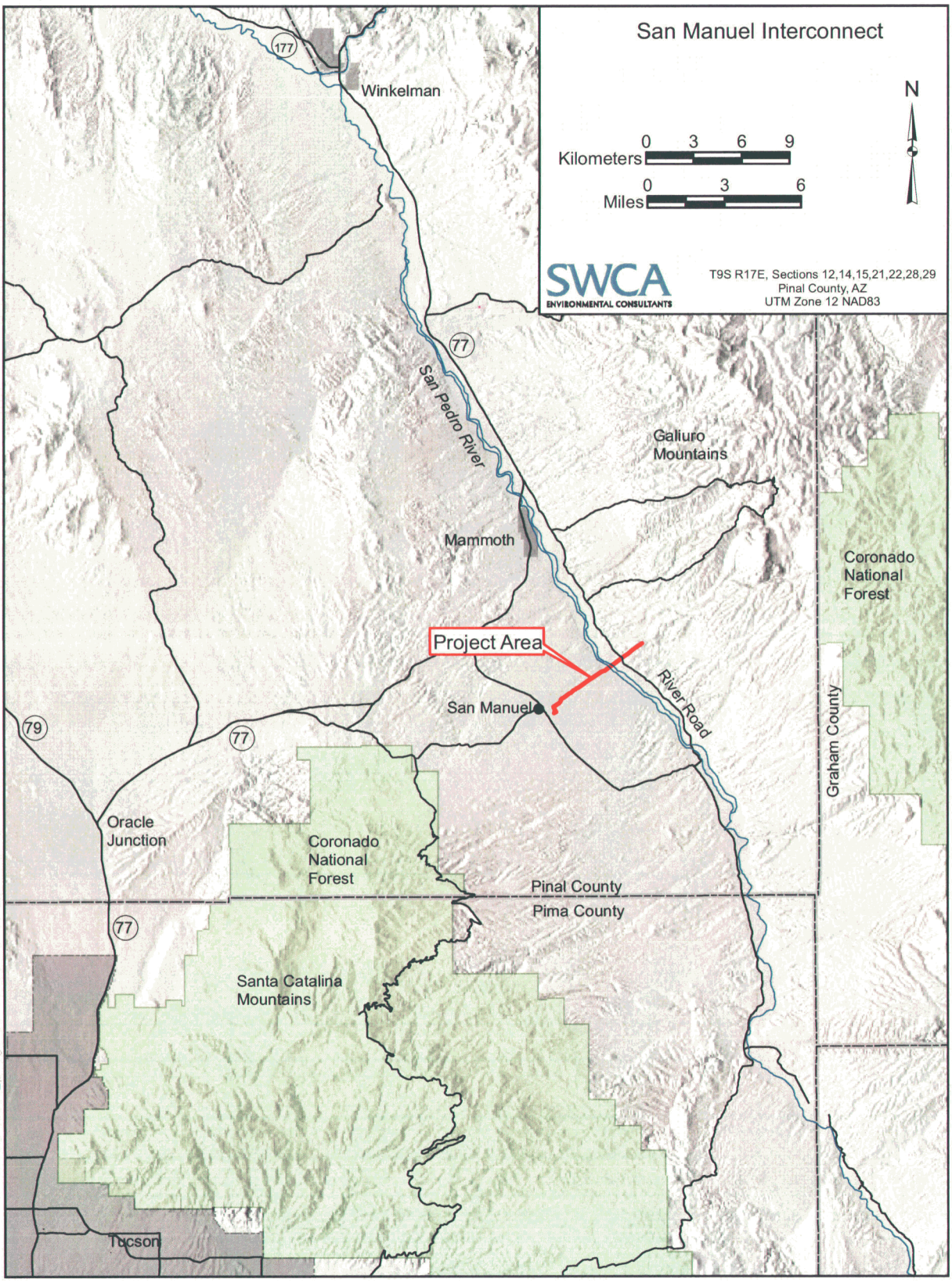
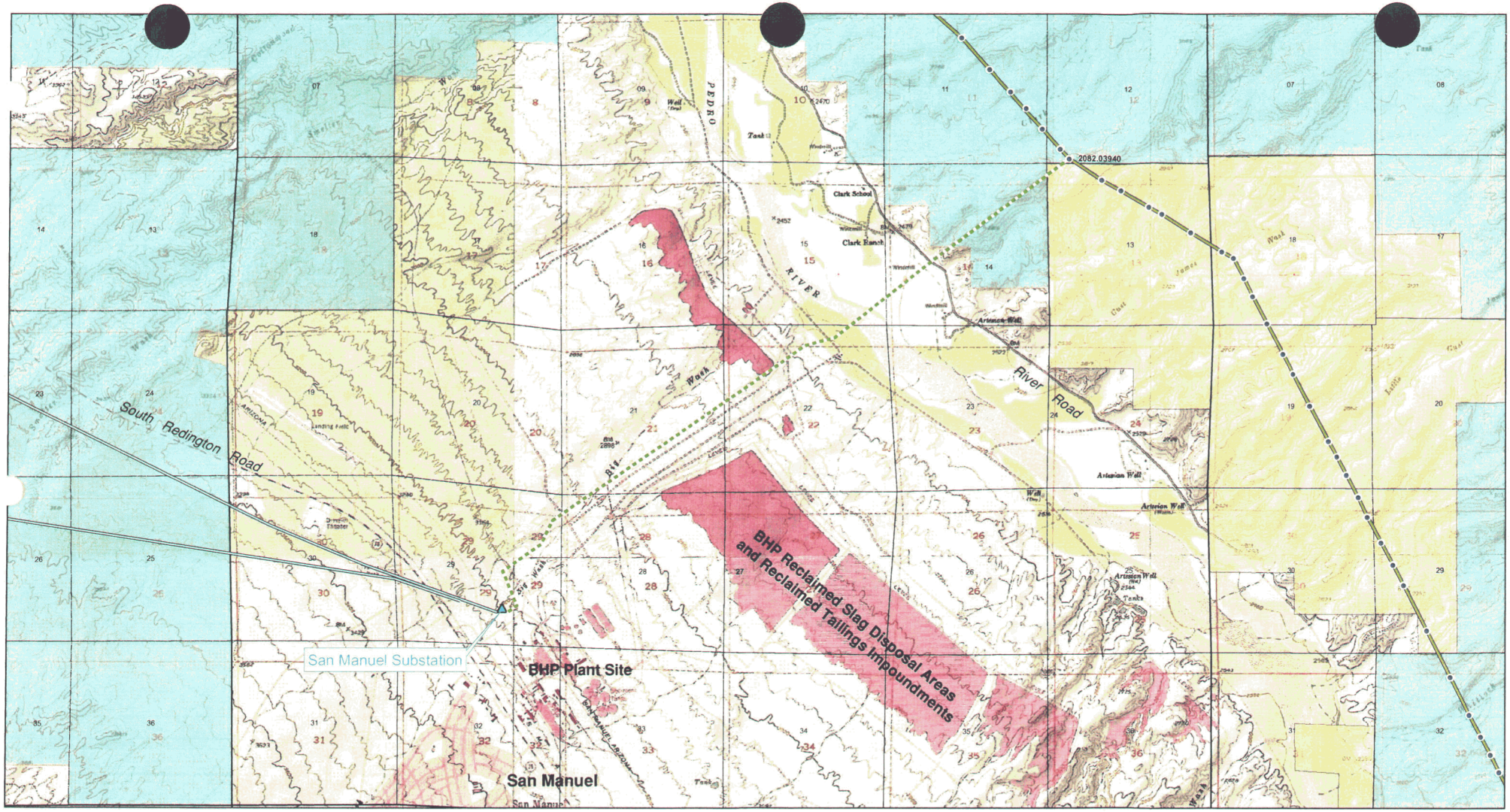


Exhibit A-1. Project vicinity map.

Exhibit A-2

LAND OWNERSHIP–LAND JURISDICTION MAP



San Manuel Interconnect (230kV Line) Project

Township/Range
Section
APS_Substation
Existing APS Transmission Lines
Existing SWTC Structures
Existing SWTC Transmission Line
Proposed New SWTC Transmission Line

Land Ownership
CATEGORY
BLM
State Trust
Private

N
W E
S

Miles
0 0.25 0.5 1

San Manuel Interconnect (230kV Line) Project

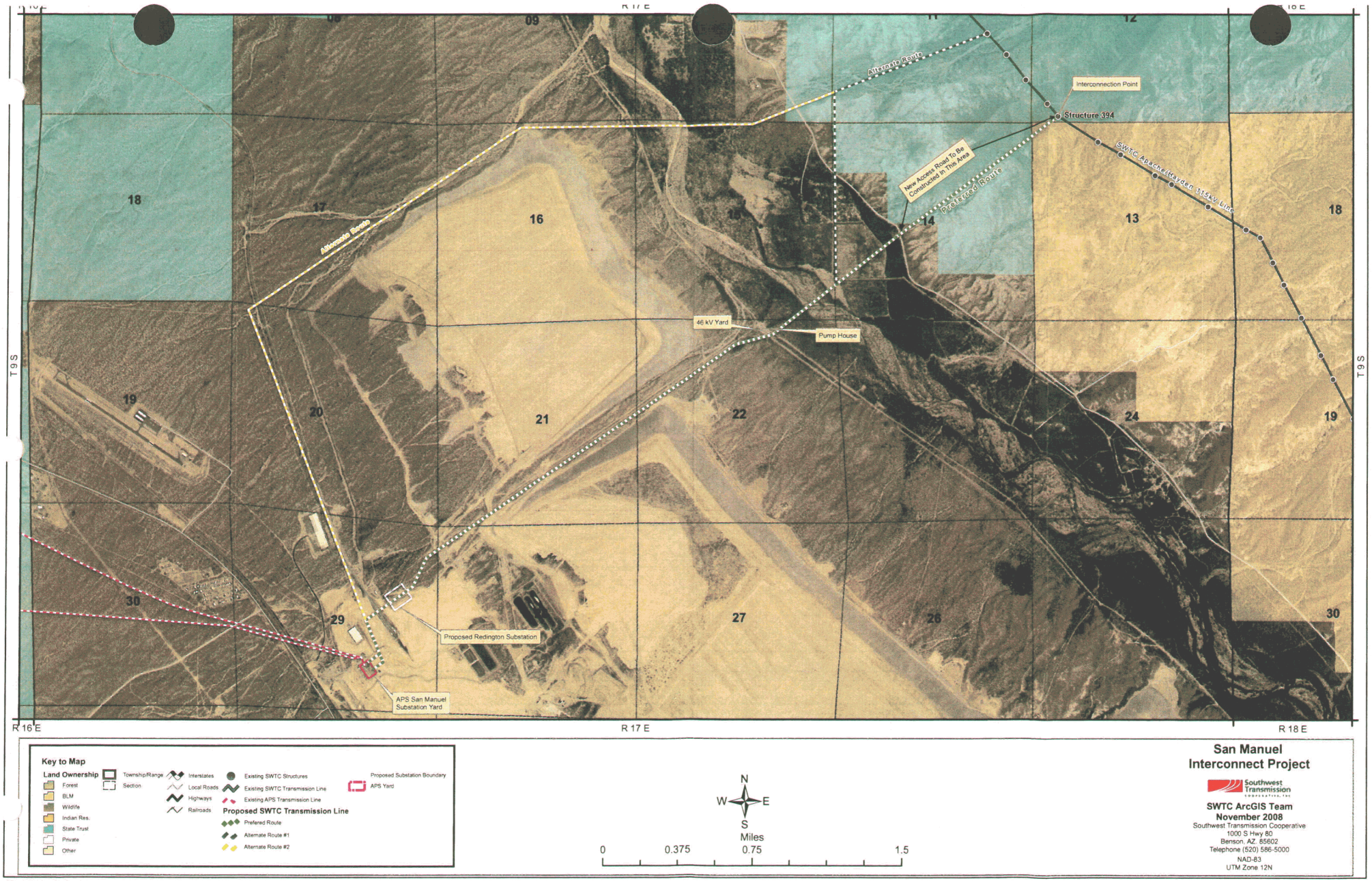
Southwest Transmission Cooperative, Inc.

SWTC ArcGIS Team
October 2007
Southwest Transmission Cooperative
1000 S Hwy 80
Benson, AZ. 85602
Telephone (520) 586-5000
NAD-83
UTM Zone 12N

Exhibit A-2. Land Ownership/Land Jurisdiction.

Exhibit A-3

ALTERNATIVES ELIMINATED FROM FURTHER ANALYSIS



Key to Map

Land Ownership
- Forest
- BLM
- Wildlife
- Indian Res.
- State Trust
- Private
- Other

- Township/Range
- Section

- Interstates
- Local Roads
- Highways
- Railroads

- Existing SWTC Structures
- Existing SWTC Transmission Line
- Existing APS Transmission Line

Proposed SWTC Transmission Line
- Prefered Route
- Alternate Route #1
- Alternate Route #2

- Proposed Substation Boundary
- APS Yard

N
W E
S

Miles
0 0.375 0.75 1.5

San Manuel Interconnect Project

Southwest Transmission Cooperative, Inc.

SWTC ArcGIS Team
November 2008
Southwest Transmission Cooperative
1000 S Hwy 80
Benson, AZ 85602
Telephone (520) 586-5000

NAD-83
UTM Zone 12N

Exhibit A-3. Alternatives eliminated from further analysis

Exhibit B

ENVIRONMENTAL ASSESSMENT

In order to construct the transmission line between the existing Apache to Hayden 115-kV line and the San Manuel Substation, Southwest Transmission Cooperative, Inc. (SWTC), is applying to the Bureau of Land Management (BLM) for a right-of-way (ROW) grant in the Tucson Field Office management area. The ROW grant application is for a 50-foot-wide ROW for transmission line and access road construction across approximately 360 feet of BLM land in Section 13, Township 9 South, Range 17 East. SWCA Environmental Consultants was contracted by SWTC to assist the BLM in preparing the attached Environmental Assessment to comply with the National Environmental Policy Act.

Environmental Assessment

San Manuel Interconnect Project in Pinal County, Arizona

Prepared for

U.S. Department of the Interior

On behalf of

Southwest Transmission Cooperative, Inc.

Prepared by

SWCA Environmental Consultants

August 2008

ENVIRONMENTAL ASSESSMENT

SAN MANUEL INTERCONNECT PROJECT IN PINAL COUNTY, ARIZONA

Prepared for

U.S. Department of the Interior
Bureau of Land Management
12661 East Broadway Boulevard
Tucson, Arizona 85748

On behalf of

Southwest Transmission Cooperative, Inc.
P.O. Box 2195
Benson, Arizona 85602
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SWCA Project No. 13793

August 2008

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Chapter 1

INTRODUCTION

1.1 LEGAL DESCRIPTION AND MAP NAMES

Southwest Transmission Cooperative, Inc. (SWTC), is proposing the San Manuel Interconnect Project near San Manuel, Pinal County, Arizona (Figure 1). The project would consist of the following major components:

1. A double-circuit 230-kV transmission line;
2. Approximately 1.69 miles (8,910 feet) of new access roads; and
3. Removal of an existing 46-kV line and support structures.

The new 230-kV transmission line would extend approximately 4.5 miles, originating at the existing SWTC Apache to Hayden 115-kV transmission line in the SW ¼ of Section 12, Township 9 South, Range 17 East, extending through Sections 13–15, 21, 22, and 28, Township 9 South, Range 17 East, and terminating at the Arizona Public Service (APS) San Manuel Substation in Section 29, Township 9 South, Range 17 East (Figure 2). Land ownership in the project area includes Bureau of Land Management (BLM), Arizona State Land Department (ASLD), and private lands owned by BHP Copper, Inc. (BHP). ASLD land is located in Sections 12 and 14, and BLM land is located in Section 13. The land west of River Road is currently owned by BHP and formerly was used for agriculture (portions of the San Pedro River floodplain) and copper processing (areas east of the San Pedro River floodplain). The area is covered on the USGS 7.5-minute Clark Ranch and Peppersauce Wash, Arizona, quadrangles.

1.2 PROJECT BACKGROUND

SWTC is applying to BLM for a right-of-way (ROW) grant to construct an access road and install a transmission line structure in the Tucson Field Office management area. The ROW grant application is for a 50-foot-wide ROW across approximately 364 feet of BLM land in Section 13 (see Figure 2). The proposed permanent ROW acquisition on BLM land would include the following:

NW ¼ of the NW ¼ of Section 13, Township 9 South, Range 17 East, Gila and Salt River Baseline and Meridian

SWCA Environmental Consultants (SWCA) was contracted by SWTC to assist the BLM in the preparation of an environmental assessment (EA) to comply with the National Environmental Policy Act (NEPA). As a condition of the ROW grant, SWTC is currently in the process of acquiring ROW authorization from other landowners in the project area, including ASLD and BHP.

1.3 PURPOSE AND NEED FOR THE PROPOSAL

SWTC is a rural electric cooperative that operates and maintains a 603-mile-long transmission system that extends north and west from the southeastern part of Arizona at the Apache Generating Station in Cochise County to the Bullhead City area along the Colorado River. There is rapid growth in the area of Pinal County, which SWTC supports through delivery of electricity to one of its member systems, Trico Electric Cooperative, Inc. (Trico). Trico needs to import and export power into the SWTC system to

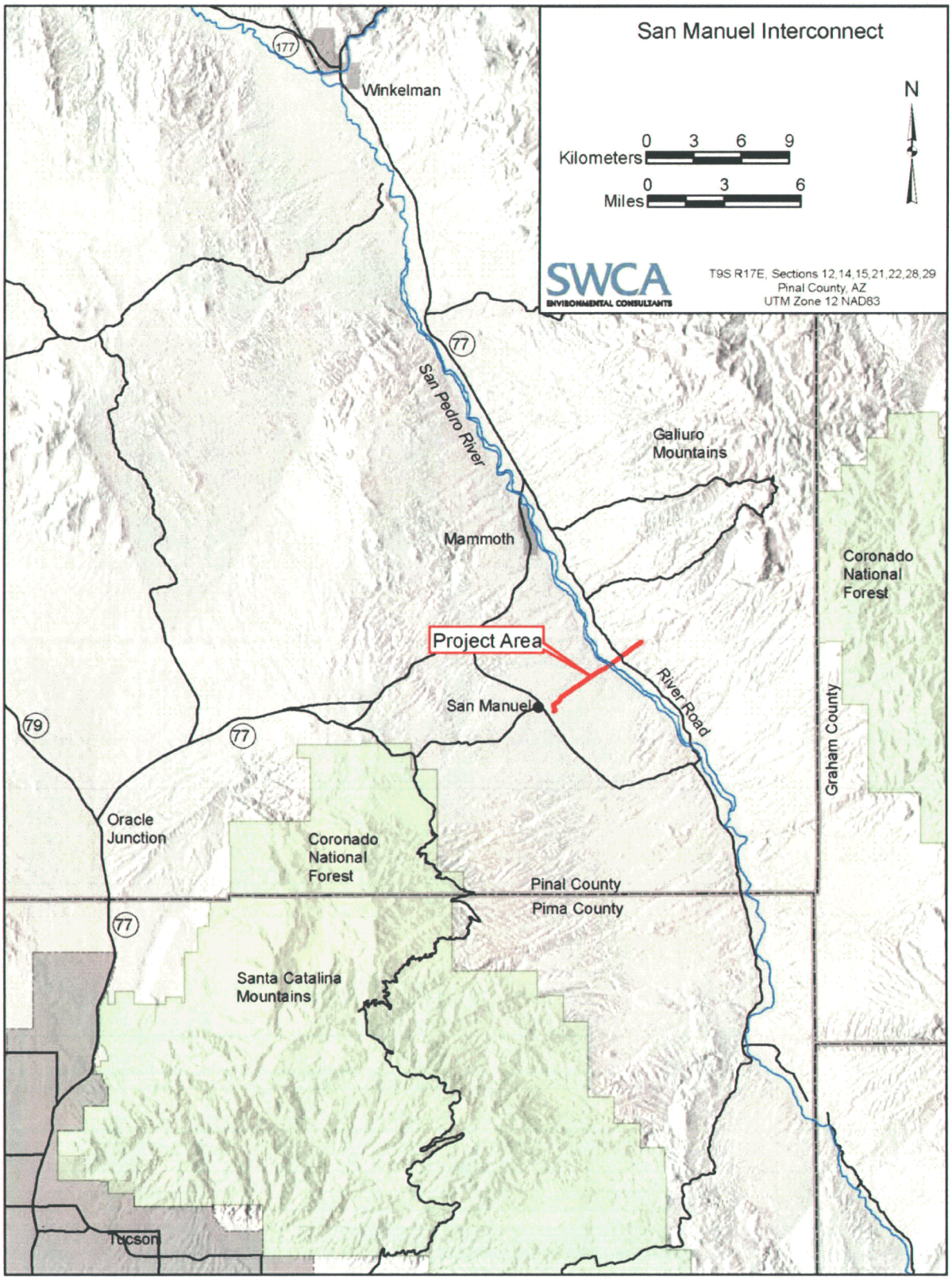

Figure 1. Project location.

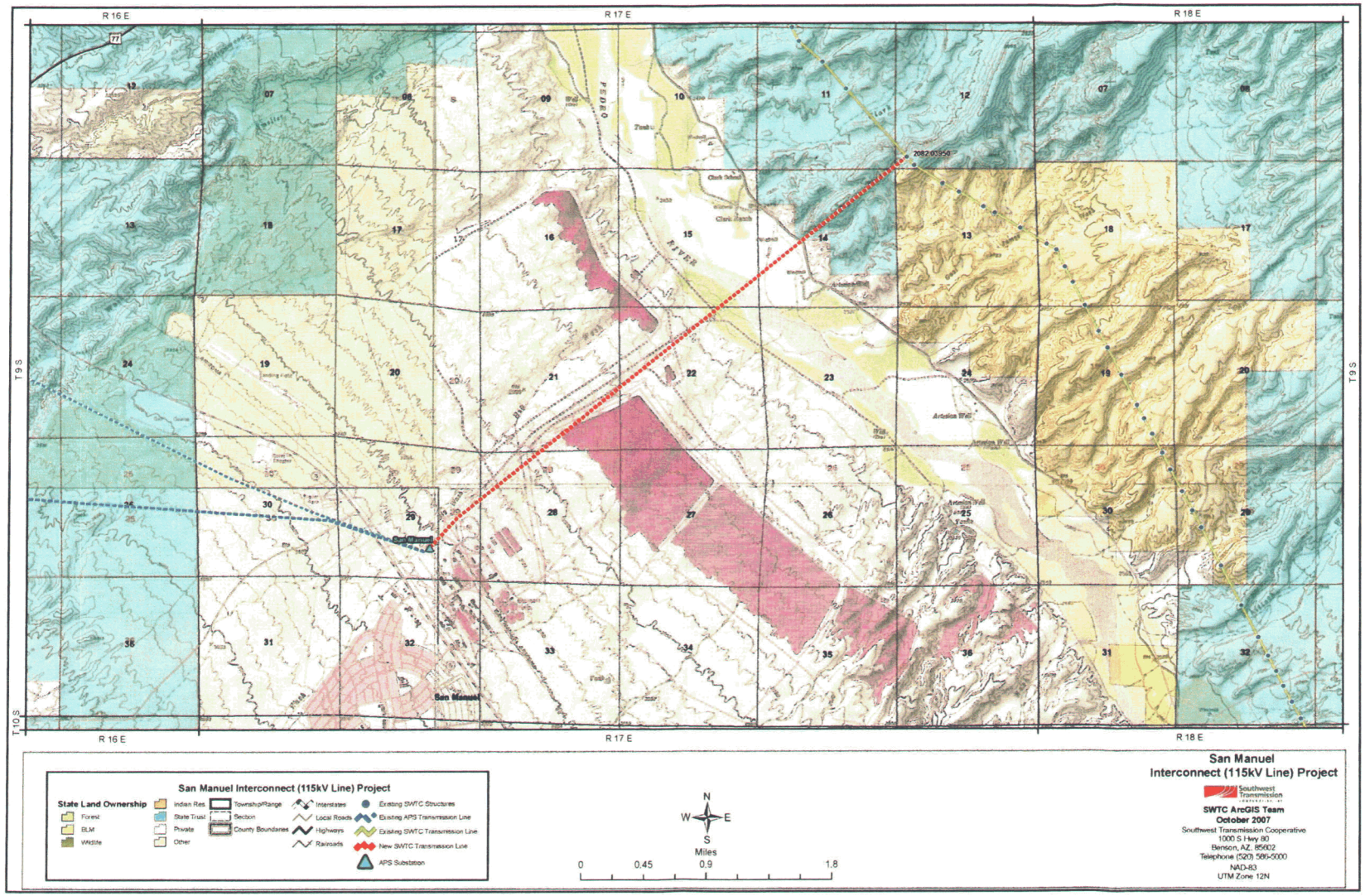

Figure 2. San Manuel Interconnect project detail.

support the increased loads in southeastern Pinal County. To provide (i.e., wheel) power to the APS transmission system, it is necessary for SWTC to tie in to the existing APS 115-kV system at the San Manuel Substation.

Several SWTC and Trico substations are served by the APS 115-kV system. However, SWTC has only one existing interconnection with APS: at the Westwing Substation, located in the Phoenix area. The Westwing transmission path provides service to the majority of SWTC's remote Class A Members. APS has indicated that their ability to wheel power from the Westwing Substation to southeastern Pinal County is limited and may be constrained sometime in 2008. The proposed project provides a very necessary second interconnection with APS to reduce the Westwing constraints. Additionally, the interconnection at San Manuel Substation provides a direct transmission path from the Apache Generating Station to southeastern Pinal County while using only a small portion of the APS 115-kV system as a wheeling path. Finally, the proposed project would also benefit APS under certain emergency conditions by providing service to Bisbee and Douglas.

1.4 CONFORMANCE WITH LAND USE PLAN

The Proposed Action is subject to the BLM *Final Safford Resource Management Plan and Environmental Impact Statement* (RMP/FEIS) (BLM 1991). It has been reviewed for conformance to the land use plan terms and conditions as required by 43 Code of Federal Regulations (CFR) 1610.5, BLM Manual §1617.3. The Proposed Action is in conformance with the RMP/EIS, which states, "Land Use *Authorizations* Rights-of-way, leases and permits will be considered on a case-by-case basis, in accordance with the decisions of this Resource Management Plan" (BLM 1991:22). The BLM parcel in question has been identified for retention per land tenure decisions in the RMP/FEIS. There are no designated BLM utility corridors in the project area.

1.5 RELATIONSHIP TO STATUTES, REGULATIONS, OR OTHER PLANS OR POLICIES

The BLM may issue ROW Grants pursuant to Title V of the Federal Land Policy Management Act of October 21, 1976, as amended, and Title 43, CFR 2800. The BLM decision only authorizes use of BLM land. Use of non-BLM land (e.g., ASLD and private land) is subject to the permission of the appropriate agency or landowner.

Authorizing actions required before the Proposed Action can be implemented include compliance with the Clean Water Act (CWA), Arizona Department of Agriculture (ADA) Native Plant Law, Section 106 of the National Historic Preservation Act (NHPA), and the Endangered Species Act (ESA).

Chapter 2

PROPOSED ACTION AND ALTERNATIVES

2.1 DESCRIPTION OF THE PROPOSED ACTION

The proposed new transmission line would be a double-circuit 230-kV line (using 230-kV post insulators) initially energized at 115 kV. The project would be constructed with federal funds provided by the Rural Utilities Service (RUS), an agency of the U.S. Department of Agriculture (USDA), and the transmission line and structures would be designed to the specifications of RUS and National Safety Electric Codes.

The line would use davit arm construction and would be supported by self-weathering steel structures that would extend approximately 115 feet above ground level (Figure 3). A total of 17 structures would be required to complete the line. Structure pads would measure approximately 50 × 25 feet. In order to connect to the San Manuel Substation, SWTC would acquire two bays from APS. In addition, along approximately 3 miles of the 4.5-mile-long transmission line (from the pump house to the San Manuel Substation, all on BHP property on the west side of the San Pedro River), SWTC would hang an additional 46-kV line on the new structures. SWTC would remove and dispose of the existing BHP 46-kV line following installation of the new 46-kV line. Installation of the new 230-kV transmission line would require access across ASLD, BLM, and BHP lands.

Three access roads would be required for project construction and future maintenance. At the east end of the project area, a 7,560-foot-long access road would be constructed to link the existing Apache to Hayden 115-kV transmission line, located in the foothills of the Galiuro Mountains, with River Road. The disturbance footprint associated with this road would vary in width from 14 to 50 feet, depending on the terrain. The remaining two road segments would be located west of River Road in mesquite woodland. These roads would be 14 feet wide, with an additional 5-foot-wide buffer on either side where vegetation would be manually trimmed. The access road on the east side of the San Pedro River, which would measure approximately 500 feet long, would provide access from River Road to an existing BHP farm road. The road on the west side of the San Pedro River, which would be approximately 850 feet long, would provide access to an existing BHP mine road from a transmission structure located east of the main channel of the San Pedro River.

Construction. Project construction is expected to begin on February 1, 2009 and last approximately 6 months. The construction process would begin by clearing and grading the access roads and structure pads using a bulldozer. Where necessary, the contractor also would clear a narrow path along the proposed project centerline for the conductor wire pull line. This typically involves the use of a small bulldozer or other all-terrain vehicle (ATV). Once the roads and pads are completed, the contractor would deliver the structure sections and hardware to each structure pad. The structure would then be erected on-site and buried in an augered hole; the hole would be backfilled with concrete slurry and any leftover excavation material. After all the structures have been installed the conductor wires would be attached to the structure insulators. There would be six main conductor wires (aluminum conductor steel reinforced, 1272 size) and two ¾-inch ground wires. Installation would involve the placement of wire-pulling equipment at intervals of approximately 15,000 feet (the length of wire in a conductor reel). No wire-pulling equipment would be placed on BLM land. The conductor wire would be manually carried over the San Pedro River and, where necessary, around archaeological sites.

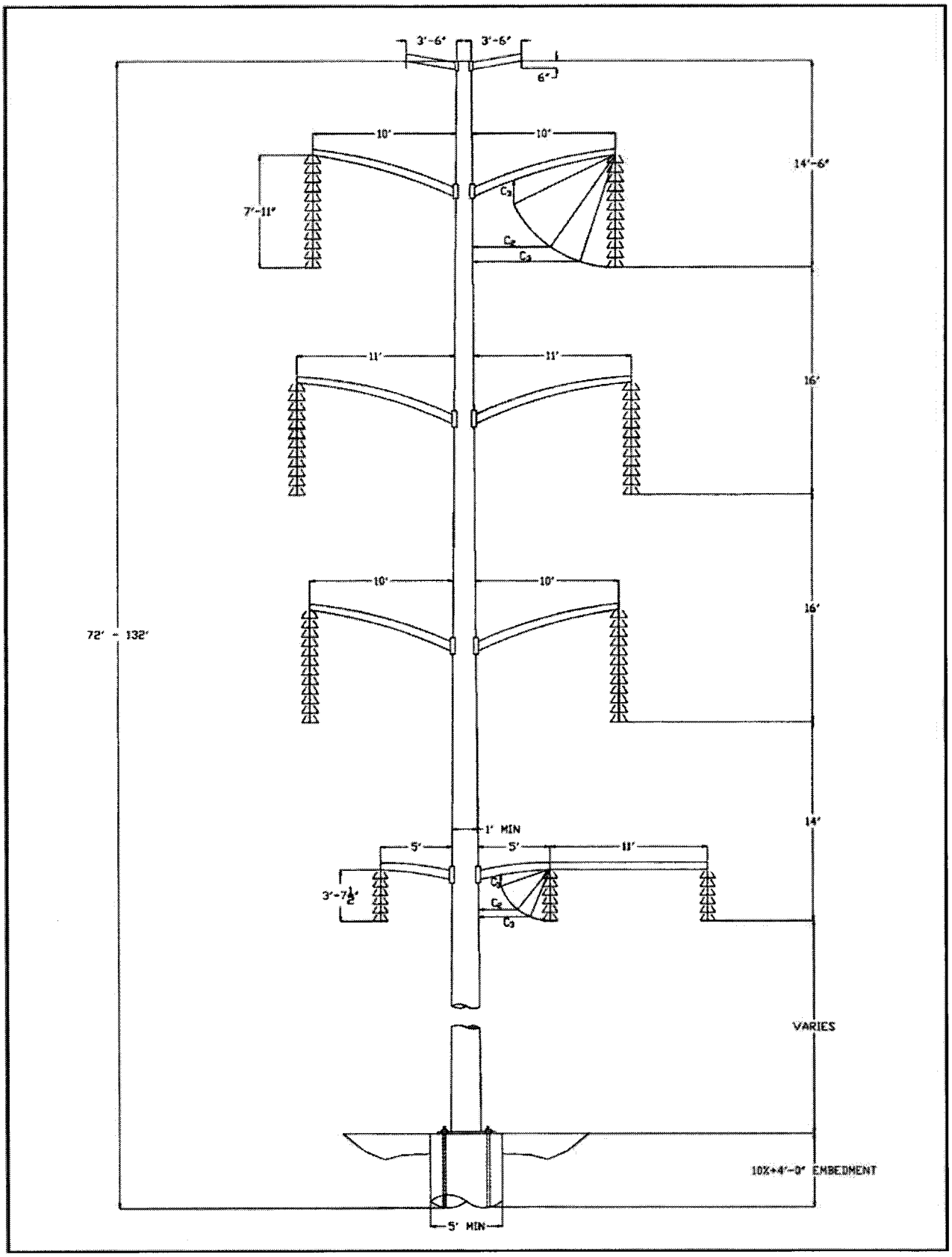

Figure 3. Transmission line structure.

Maintenance. The transmission line would be inspected and maintained only by qualified SWTC personnel. Maintenance crews would follow strict safety rules in conducting on-site work. The access roads would only need occasional maintenance during the first five years after construction. Inspections of the transmission line would be conducted semi-annually. No industrial wastes or toxic substances would be used for the long-term maintenance of the transmission line. SWTC would require long-term access to the transmission line.

2.1.1 Mitigation Measures

General mitigation measures would include the following:

1. All vehicles and construction equipment would be properly maintained to minimize exhaust emissions and would be properly muffled to minimize noise.
2. Any equipment or materials transported onto BLM-administered lands for maintenance or repair would be promptly removed upon completion of the project.
3. Any vehicles that are brought in from outside the area would be power-washed, including the undercarriage, to prevent the introduction and spread of noxious weeds and invasive species.
4. Watering trucks or other means would be used as needed to minimize fugitive dust.
5. An archaeological monitor would be provided during ground-disturbing activities in dense mesquite woodland along the San Pedro River floodplain to avoid impacts to hidden or buried cultural features.
6. If any archaeological resources or vertebrate fossils are discovered during implementation of this project, all surface-disturbing activities in the area of discovery will cease. The archaeologist will evaluate the discovery and provide recommendations to the authorized officer. Surface-disturbing activities will not resume until permission is obtained from the authorized officer.
7. If any species listed as threatened or endangered under the ESA is encountered during the activities, work will stop and telephone notification of the discovery will be made immediately to the BLM wildlife biologist. The activity may resume only after the authorized officer has issued a continuance.

Summarized below are measures proposed to avoid impacts to southwestern willow flycatcher (federally listed endangered) and designated Critical Habitat for southwestern willow flycatcher.

1. Implement project construction and maintenance procedures that would avoid to the extent possible vegetation impacts in the vicinity of the active San Pedro River channel.
2. Avoid changes to river morphology by siting roads outside the active San Pedro River channel and using a cement base and small disturbance footprint for the installation of the single transmission structure near the active channel.
3. Prohibit ATVs from crossing the active channel of the San Pedro River.
4. Install gates on new access roads in the San Pedro River floodplain to prevent unauthorized ATV access to Critical Habitat.
5. Conduct all work along the San Pedro River floodplain between September 1 and April 15, the non-breeding season for southwestern willow flycatcher.
6. Continue to conduct southwestern willow flycatcher surveys in 2009 (despite no detections in 2007 and 2008).

Summarized below are measures proposed to avoid impacts to lesser long-nosed bat (federally listed endangered) and lesser long-nosed bat foraging habitat.

1. Provide a monitor during road construction to avoid unnecessary impacts to saguaros.
2. Transplant along the road corridor all saguaros ≤5 feet tall that would be impacted by the project.
3. Pay an in-lieu fee to AGFD for future research benefiting lesser long-nosed bat. The in-lieu fee would be paid upfront (prior to road construction) and the fee amount would be based on the stumpage value (calculated according to ADA guidelines) of all saguaros >5 feet tall that would be impacted by the project.

2.2 NO-ACTION ALTERNATIVE

Under the No-Action Alternative, SWTC would not construct the project. Power quality for residents of southeast Pinal County would be unreliable. As loads increase in this area, service reliability would continue to deteriorate to the point that service would not be provided to new customers.

2.3 ALTERNATIVE CONSIDERED BUT NOT ANALYZED

SWTC considered constructing the eastern portion of the 230-kV transmission line (the portion on the east side of the San Pedro River) along a corridor located north of the preferred corridor. Under this alternative, structures would be placed in the Clark Wash drainage, a potentially jurisdictional water of the United States (WUS). There also are more archaeological sites along the Clark Wash drainage than along the preferred corridor. Furthermore, compared with the Preferred Alternative, this alternative would require two angle structures, each redirecting the line approximately 90 degrees, and a greater total number of structures because of its greater length. Although there is already a dirt road providing access to the existing Apache to Hayden 115-kV transmission line, the road would require extensive upgrading to facilitate construction access. Based on these considerations, SWTC has determined that this alternative 1) is too costly (because of the need for angle structures and more total structures and conductor); 2) is potentially more environmentally damaging (because of the presence of Clark Wash); and 3) would require more time to permit and construct (because of the presence of potentially jurisdictional WUS and archaeological sites).

Chapter 3

AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

3.1 ENVIRONMENTAL SETTING

The landscape in the project area is characteristic of the Basin and Range physiographic province of southeastern Arizona, which is characterized by elongated mountain ranges trending northwest to southeast, separated by broad alluvial valleys (Chronic 1983). The mountains consist of massive blocks of rock of varying types and ages that was thrust upward and tilted in such a way that the northeastern slopes rise at less of a gradient than the southwestern slopes, which are characterized by large areas of exposed rock and cliff faces.

The project area is located on broad, alluvial fan deposits that have been dissected by the San Pedro River and by ephemeral drainages originating in the Galiuro and Santa Catalina mountains, which border the San Pedro River valley to the east and west, respectively. Elevations range from approximately 3,200 feet above mean sea (amsl) at the existing San Manuel Substation to approximately 2,500 feet amsl at the point at which the project area crosses the San Pedro River floodplain. The elevation at the point of interconnection with the existing Apache to Hayden 115-kV transmission line is approximately 2,950 feet amsl.

The proposed transmission line alignment would cross River Road east of the San Pedro River, and the San Manuel Arizona Railroad, an entity owned by BHP, west of the San Pedro River near San Manuel. River Road merges with State Route (SR) 77 at Mammoth, located approximately 10 miles north of the project area. Representative photographs of the project area are included in Appendix A.

3.2 CRITICAL ELEMENTS

To comply with NEPA, the BLM is required to address specific elements of the environment that are subject to requirements specified in statutes or regulations or by executive order. These elements are addressed individually below.

3.2.1 Air Quality

The U.S. Environmental Protection Agency (EPA) has promulgated primary and secondary National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: carbon monoxide (CO), nitrogen dioxide (NO_2), particulate matter (PM_{10} and $PM_{2.5}$), ozone (O_3), sulfur dioxide (SO_2), and lead (Pb). Primary standards are adopted to protect public health (the health of "sensitive" populations such as asthmatics, children, and the elderly). Secondary standards are adopted to protect public welfare (protection against decreased visibility, damage to animals, crops, vegetation, and buildings). Geographic areas are designated as being in "attainment," in "nonattainment," or "unclassified" with respect to each criteria pollutant. Areas where concentrations of criteria pollutants exceed the NAAQS are designated as being in nonattainment. The Arizona Department of Environmental Quality (ADEQ) has adopted the federal NAAQS as the State Ambient Air Quality Standards.

The project area is designated as being in attainment for all six criteria pollutants, including SO_2 (Pinal County 2008). In early January 2008, ADEQ announced that the EPA had officially determined that the San Manuel area meets federal health standards for SO_2 and re-designated the area as being in attainment. The San Manuel area had been designated as being in nonattainment for SO_2 in 1979 because of emissions from the BHP copper smelter; however, the smelter was closed in 1999 and was recently dismantled by BHP. San Manuel has not recorded any SO_2 exceedances since 1985.[1]

Impacts of the Proposed Action

Impacts to air quality are anticipated to be minor, temporary, and short term in nature. Increased PM_{10} emissions will likely occur as a result of soil disturbance associated with vegetation removal, construction activities, and movement of construction equipment. However, the use of water during construction activities and the subsequent application of acceptable soil-stabilizing techniques would reduce the potential emissions. A localized, short-term increase in CO emissions would also likely occur because of construction equipment used during construction. However, all vehicles and construction equipment would be properly maintained to minimize exhaust emissions. Once construction is complete, there are no anticipated impacts on air quality that would result from maintenance of the transmission line.

Impacts of the No-Action Alternative

The No-Action Alternative would have no effect on air quality.

3.2.2 Areas of Critical Environmental Concern

There are no designated Areas of Critical Environmental Concern within the limits of the project area.

3.2.3 Cultural Resources

NHPA Section 106, as amended and implemented, requires federal agencies to take into account the effects of their activities and programs on sites that may be eligible for the National Register of Historic Places (NRHP). Section 106 also requires federal agencies to consult with Native American groups concerning properties of traditional religious or cultural importance. The American Indian Religious Freedom Act (AIRFA) (Public Law [PL] 95-341, 92 Stat. 469; 42 United States Code [USC] 1996) protects and preserves for the American Indian, Eskimo, Aleut, and Native Hawaiian the inherent right of freedom to believe, express, and exercise their traditional religions, including "access to religious sites, use and possession of sacred objects, and freedom to worship through ceremonials and traditional rites." Federal land managers are directed to consult with "native traditional religious leaders" to determine which sites on federal lands are sacred and how they are used. In addition to AIRFA, Presidential Executive Order 13007 was issued in 1996 to protect and preserve Indian sacred sites and religious practices. It states that managers must, "(1) accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners, and (2) avoid adversely affecting the physical integrity of such sacred sites." It applies explicitly to sacred sites on federal lands.

The Archaeological Resources Protection Act or 1979, as amended, protects archaeological sites on federal lands as an irreplaceable part of our nation's heritage. The Native American Graves Protection and

[1] SO_2 is formed when fuel containing sulfur (mainly coal and oil) is burned and during smelting and other industrial processes. The major health concerns associated with exposure to high concentrations of SO_2 include effects on breathing, respiratory illness, alterations in pulmonary defenses, and aggravation of existing cardiovascular disease. Children, the elderly, and people with asthma, cardiovascular disease, or chronic lung disease (such as bronchitis or emphysema) are most susceptible to adverse health effects associated with exposure.

Repatriation Act of 1990 enables affiliated Native Americans to control the ownership of cultural items and human remains when those items are found intentionally or inadvertently on federal lands. On state and privately held lands in Arizona, human remains and associated artifacts are protected by Arizona Revised Statutes (ARS) §41-844 and §41-865; the Arizona State Museum (ASM) would conduct consultation with Native American tribes under these laws, as needed.

A Class III cultural resources survey of the project area was conducted in November and December 2006 (WestLand 2007b). The report was prepared in accordance with NHPA Section 106. Eight archaeological sites were recorded in the project area. Six of these sites were newly discovered, and two had been previously recorded and were reassessed during the current project (Table 1). Of these eight sites, six are considered potentially eligible for the NRHP: AZ BB:6:109(ASM); AZ BB:6:110(ASM); AZ BB:6:235(ASM); AZ BB:6:236(ASM); AZ BB:6:237(ASM); and AZ BB:6:238(ASM). Twenty-eight isolated occurrences were recorded in the project area. None of these potentially eligible sites are located on BLM land. This high density of prehistoric and historic sites is a common occurrence along the San Pedro River.

Table 1. NRHP Eligibility Determinations, San Manuel Interconnect Project, Pinal County, Arizona

ASM Site Number	Land Status	Site Type	Age/Cultural Affiliation	NRHP Eligibility	SHPO Concurrence
AZ BB:6:109(ASM)	Private	Habitation/ agricultural	Late Formative, Salado	Contributing under D	Although previously recorded by Center for Desert Archaeology in 1991, the site was not evaluated at that time.
AZ BB:6:110(ASM)	Private	Habitation/ agricultural	Late Formative, Salado	Contributing under D	Although previously recorded by Center for Desert Archaeology in 1991, the site was not evaluated at that time.
AZ BB:6:235(ASM)	Private	Ranch or farm	Historic (built ca. 1890–1935)	Contributing under C and D	Newly recorded site.
AZ BB:6:236(ASM)	Private	Agricultural	Late Formative, Native American	Contributing under D	Newly recorded site.
AZ BB:6:237(ASM)	Private	Agricultural	Formative, Native American	Contributing under D	Newly recorded site.
AZ BB:6:238(ASM)	Private	Prehistoric habitation, historic refuse pile	Late Formative, Salado and 1920s Euro-American	Contributing under D	Newly recorded site.
AZ BB:6:239(ASM) (San Pedro River Road)	Traverses State Trust and private land but is maintained by Pinal County	Transportation corridor	Historic (ca. 1878–1935), Euro-American	Not eligible	Newly recorded site.
AZ BB:6:241(ASM) (APS Power Line)	Private within the project area	Electric power transmission line	Historic (ca. early 1950s)	Not eligible	Newly recorded site.

Impacts of the Proposed Action

Six cultural resource sites considered potentially eligible for the NRHP are located in the project area. Two of these archaeological sites are located near the westernmost two proposed access road alignments. Avoidance of these sites has been recommended. If avoidance is not possible, SWTC would comply with

Section 106 requirements for mitigation, as appropriate. The San Pedro River floodplain portion of the project area was not thoroughly surveyed by WestLand Resources, Inc. (WestLand) because of dense vegetation. It is recommended that any ground-disturbing activities in this portion of the project area be monitored by a qualified archaeologist for hidden or buried cultural features.

In the event that an unanticipated discovery of cultural resources is made during construction, all work should immediately cease at that location and an archaeologist be contacted to verify the discovery and assess its significance. If the discovery involves human remains or funerary items, either the BLM archaeologist (BLM-administered lands) or the director of the ASM (state or private lands) would be contacted immediately.

Impacts of the No-Action Alternative

The No-Action Alternative would have no effect on any known prehistoric or historic cultural resources.

3.2.4 Environmental Justice

Title VI of the Civil Rights Act of 1964 and related statutes ensure that individuals are not excluded from participation in, denied the benefit of, or subjected to discrimination under any program or activity receiving federal financial assistance on the basis of Race, Color, National Origin, Age, Sex, and Disability. Executive Order 12898 on Environmental Justice directs that programs, policies, and activities not have a disproportionately high and adverse human health and environmental effect on minority and low-income populations. Potential impacts to human health include electromagnetic field (EMF) exposure and exposure to creosote pressure-treated wood.

Electromagnetic Field. EMF exposure can be broken down into two components: extremely low frequency electric and magnetic fields (ELF-EMF). In 1992, Congress authorized the Electric and Magnetic Fields Research and Public Information Dissemination Program (EMF-RAPID) in the Energy Policy Act. At that time, Congress instructed the National Institute of Environmental Health Services (NIEHS), National Institutes of Health, and the U.S. Department of Energy to direct and manage a program of research aimed at providing scientific evidence to clarify the potential for health risks from exposure to extremely low frequency electric and magnetic fields (ELF-EMF). NIEHS was mandated upon completion of the Program to provide a report outlining the possible human health risks associated with exposure to ELF-EMF.

In June 1999, NIEHS released its report *Health Effects from Exposure to Power-line Frequency Electric and Magnetic Fields* (NIEHS 1999). NIEHS concluded that the scientific evidence suggesting that ELF-EMF exposures pose any health risk is "weak." Since 1999, several other assessments have been completed (see NIEHS 2002). For most health outcomes, there is no evidence that EMF exposures have adverse effects. There is some evidence from epidemiology studies that exposure to power-frequency EMF is associated with an increased risk for childhood leukemia. This association is difficult to interpret, however, in the absence of reproducible laboratory evidence or a scientific explanation that links magnetic fields with childhood leukemia.

In the San Manuel project area, the sources of EMF exposure are the existing Apache to Hayden 115-kV transmission line and the two existing APS 115-kV lines. EMF originating at the San Manuel Substation is expected to be minimal. In general, the strongest EMF around the outside of a substation comes from the power lines entering and leaving the substation (NIEHS 2002). The strength of the EMF from equipment within a substation, such as transformers, reactors, and capacitor banks, decreases rapidly with increased distance. Beyond the substation fence or wall, the EMF produced by substation equipment is typically indistinguishable from background levels.

Since most recent research has focused on the potential effects of magnetic fields, the utility industry also typically addresses only magnetic field effects. Magnetic field measurements are expressed in units of milligauss (mG). The typical magnetic field levels for a 115-kV transmission line are provided in Table 2. Exposure for both electric and magnetic fields decreases as the distance from the source increases.

Table 2. Typical Magnetic Field Levels for a 115-kV Transmission Line*†

Type of transmission line	Maximum on ROW	Distance from line (feet)			
		50	100	200	300
115 kV	29.7	6.5	1.7	0.4	0.2

* Adapted from NIEHS (2002).

† Magnetic field measurements are expressed in units of mG.

Creosote Pressure-Treated Wood. The wood used in the construction of the BHP 46-kV line structures was originally preserved by pressure treatment with an EPA-registered pesticide containing creosote. The purpose of this treatment was to protect the wood from insect attack and general decay.

Impacts of the Proposed Action

Electromagnetic Field Exposure. The proposed new transmission line would be a double-circuit 230-kV line initially energized at 115 kV. The typical EMF levels for a 230-kV transmission line are provided in Table 3 for comparison with a 115-kV line.

Table 3. Typical Magnetic Field Levels for a 230-kV Transmission Line*†

Type of transmission line	Maximum on ROW	Distance from line (feet)			
		50	100	200	300
230 kV	57.5	19.5	7.1	1.8	0.8

* Adapted from NIEHS (2002).

† Magnetic field measurements are expressed in units of mG.

NIEHS does not believe that the results of recent EMF exposure studies provide sufficient evidence that substations, or overhead transmission lines for that matter, pose a risk to human health and consequently does not believe that stringent standards, such as burying transmission lines, are warranted (NIEHS 1999, 2002). Instead, the NIEHS suggests, among other passive measures, that the power industry continue its current practice of siting facilities to reduce exposure.

The proposed transmission line would not be sited in close proximity (within 1,000 feet) to any schools or other public facilities occupied on a continuous basis and would therefore not pose a threat to human health and safety. In addition, SWTC would follow all applicable codes for project design, such as the National Electric Safety Code and the Rural Utility Service Line Design Manual. The policy of SWTC's Board of Directors is as follows:

1. SWTC's policy is to provide its customers reliable electric service in a manner that minimizes foreseeable risks to the public, its employees, and the environment.
2. SWTC shall adhere to applicable federal, state, and local electrical construction codes as well as all other codes or regulations relative to the installation, operation, and maintenance of electric facilities.

3. SWTC will continue to monitor the ongoing research relative to EMF and its effect on human health.
4. SWTC will maintain an open policy to the public and employees regarding EMF, will continue SWTC's efforts to address proven risks, and will share new information as it is generated and validated.

Creosote Pressure-Treated Wood. The Utility Solid Waste Activities Group has developed a set of safety guidelines regarding the use and management of treated wood by utility companies. This includes ensuring that secondary users are appropriately informed with regard to the proper handling, use, and disposal of wood utility poles treated with creosote. To this end, SWTC's policy is to provide prospective secondary users (e.g., adjacent landowners) with consumer information and require that they sign a standard release form and identify a location for delivery. Any poles that are not taken by adjacent land owners are the responsibility of the contractor, who is also asked to sign a standard release form.

Impacts of the No-Action Alternative

Under the No-Action Alternative, adverse human health or environmental effects could result from unreliable electric service to residents and businesses in southeastern Pinal County.

3.2.5 Prime or Unique Farmlands

The Farmland Protection Policy Act (FPPA) and USDA Departmental Regulation No. 9500-3, Land Use Policy, provide protection for important farmland, prime forestland, and prime rangeland. The USDA Regulation 7 CFR Part 658 implements the FPPA.

The project is exempt from the requirements of the FPPA; there are no prime or unique farmlands within or near the project area.

3.2.6 Floodplains

Executive Order 11988, "Floodplain Management," requires federal agencies to avoid actions that would result in the location of facilities in floodplains and/or affect floodplain values. Facilities located in a floodplain may be damaged or destroyed by a flood or may change the flood-handling capability of the floodplain, or the pattern, or magnitude, of the flood flow.

SWCA examined Flood Insurance Rate Map (FIRM) panel numbers 040077 1275 C and 040077 1300 C (Appendix B). According to these panels, the transmission line would cross Flood Zone A in the San Pedro River floodplain. Zone A designations are high-risk areas defined as "areas with a 1% annual chance of flooding and a 26% chance of flooding over the life of a 30-year mortgage. Because detailed analyses are not performed for such areas; no depths or base flood elevations are shown within these zones." Big Wash, which is also designated Zone A, is located immediately north of the proposed alignment. At the western end of the project area, the alignment would terminate in an area designated Zone C. These are defined as "areas outside the 1-percent annual chance floodplain, areas of 1% annual chance sheet flow flooding where average depths are less than 1 foot, areas of 1% annual chance stream flooding where the contributing drainage area is less than 1 square mile, or areas protected from the 1% annual chance flood by levees. No Base Flood Elevations or depths are shown within this zone."

Impacts of the Proposed Action

The transmission line alignment crosses the 100-year floodplain of the San Pedro River in Sections 14, 15, and 22. It also parallels, but avoids, the 100-year floodplain of Big Wash in Sections 21, 28, and 29. Although up to two transmission structures would likely be placed in the 100-year floodplain of the San Pedro River, the access roads would not be located in any 100-year floodplains.

SWTC is committed to minimizing ground disturbance and potential erosion associated with the construction of the transmission line and access roads. Best Management Practices and other appropriate control measures would be identified and implemented in a Stormwater Pollution Prevention Plan as mandated by Section 402 of the CWA. The plan would include spill prevention, containment, and countermeasures that would be implemented prior to construction.

Impacts of the No-Action Alternative

Under the No-Action Alternative, there would be no impacts to any 100-year floodplains.

3.2.7 Geology and Soils

The geologic terrain in the project area is relatively simple, consisting primarily of Precambrian quartz monzonite basement rocks that have been intruded by early Tertiary monzonite porphyry (Blodgett 2002). Both the monzonite units have been intruded by irregular diabase bodies and later by a few Tertiary rhyolite dikes. Overlying the basement rocks are the Cloudburst, San Manuel, and Quiburis formations, a series of tuffs and flows of early Tertiary to Pliocene age. These rocks are covered by as much as 1,000 feet of Gila conglomerate of Quaternary age. Gila conglomerate is the most extensive surficial rock unit in the area.

Gila conglomerate is characterized by indurated boulder and cobble conglomerate, unconsolidated marls and limy silts and clays, and an unconsolidated sand and conglomerate (EPA 1992). These units of Gila conglomerate are identifiable on a topographic map based on the degree of dissection of each unit. The marl and limy silt unit is the most heavily dissected showing steep-sided, narrow gullies, while the unconsolidated sand and conglomerate unit is reflected in a smooth land surface. An unconsolidated cap of gravel overlies the Gila conglomerate.

Adjacent to the San Pedro River channel, recent alluvium, consisting of unconsolidated gravels, sands, and silts (ranging in thickness from 40–90 feet), covers the gravel and Gila conglomerate layers (EPA 1992). The alluvium in the San Pedro River floodplain originated from sedimentary and volcanic rocks common to the region. Alluvial deposits extending beyond the floodplain are locally referred to as the Whetstone pediment, characterized by unconsolidated fine-grained silts and clays that extend outward 3 miles to an elevation of approximately 3,400 feet. The Tombstone pediment is characterized by semi-consolidated to consolidated coarse-grained gravels and cobbles and begins at the gradational contact with the Whetstone pediment at an elevation of 3,400 feet. This pediment extends to the Santa Catalina Mountain Block, which begins at an elevation of about 4,000 feet. The Santa Catalina Mountain Block is composed of quartz monzonite. Weathering of this mountain block has contributed to the thin layer of unconsolidated quartz and granitic gravel on the Gila conglomerate in the area of the San Manuel mine site.

Impacts of the Proposed Action

The authorization of the ROW and its connected actions would impact soils in the project area. However, the BLM ROW program provides guidelines for the stabilization, rehabilitation, and revegetation of disturbed soils (BLM 2008a). The applicant is required to demonstrate how disturbed areas would be stabilized and recontoured and describe how waterbars or other erosion-control structures would be used. The contractor would use a seed mix approved by BLM.

Impacts of the No-Action Alternative

Under the No-Action Alternative, no impacts to soils would occur.

3.2.8 Grazing Management or Range

The subject BLM land is encumbered by a grazing lease (lease #5-95001) (ASLD 2008). The lease area totals 7,285 acres.

Impacts of the Proposed Action

Under the Proposed Action, there would be no decrease in the number of authorized animal unit months (AUMs)[2] for the grazing allotment.

Impacts of the No-Action Alternative

The No-Action Alternative would have no effect on grazing management in the project area.

3.2.9 Land Use

The eastern end of the proposed alignment is located in the foothills of the Galiuro Mountains on ASLD State Trust and BLM land. West of River Road, the alignment crosses into the San Pedro River floodplain. Between River Road and the San Pedro River floodplain, the terrain is relatively flat former agricultural land owned by BHP. This land is now overgrown with small mesquites. It is not being used for any active agriculture or grazing, although there has been some encroachment of cattle from neighboring operations. The west end of the alignment also is on land currently owned by BHP and formerly used for copper processing. The processing site once included a mill, concentrator, and smelter, but all of these facilities have been removed, and the site has been reclaimed. Remaining evidence of these facilities is now limited to reclaimed slag disposal areas, reclaimed tailings impoundments (the alignment would pass between two impoundments), and offices and shops related to reclamation efforts. Immediately west of the plant site is the town of San Manuel.

The project area alignment includes land administered by the BLM Tucson Field Office in Section 13, which is currently encumbered by the existing Apache to Hayden 115-kV transmission line and associated access roads (AR 032556), shown in Table 4. Section 13 is part of a larger BLM parcel that also includes all or portions of Section 24, T9S, R17E, and Sections 17–20, 29, and 30, T9S R18E, a total of 3,560 acres. Table 4 gives a list of existing ROW grants on this parcel (BLM 2008a). This entire land parcel has been identified for retention in the RMP/FEIS (personal communication, S. Bernal, BLM, 2008).

[2] An AUM is the amount of forage needed to feed one cow, one horse, or five sheep for one month.

Table 4. Existing ROW Grants on BLM Land in the San Manuel Interconnect Project Area

Description	Width (feet)	Authorization (Grant No.)
Transmission line	50	AR 032556
Access roads	10	AR 032556
Transmission line	20	AR 016625
Road	50	A 19149

Impacts of the Proposed Action

SWTC would amend its existing BLM ROW grant for the installation of the transmission line in Section 13. This process would begin with the submission of a renewal application, processing fee, and project-related information, including line construction details, cultural and environmental reports, etc. SWTC also would be required to submit a ROW application to ASLD for installation of the transmission line and construction of the access road east of River Road. The application would include processing fee, project details, and clearances for cultural resources and native plants.

Impact of the No-Action Alternative

The No-Action Alternative would have no effect on current land use.

3.2.10 Minerals

When in operation, the San Manuel mine was a low-grade porphyry copper deposit located approximately 7 miles northwest of this proposed project area. The San Manuel ore body is located in an area of bedrock characterized by intrusive, extrusive, and sedimentary rocks from Precambrian to Pleistocene age, with the oldest rocks found being the quartz monzonite, granodiorite, and minor diabase and aplite of Precambrian age (EPA 1992). It is an elliptical granodiorite porphyry cylinder that measures 8,000 feet long × 2,500 feet across and is situated from 700 to 3,000 feet below the surface. The ore body contains zones of disseminated copper mineralization at an average grade of 0.65% copper, or approximately 13 pounds of copper per ton of ore. The Kalamazoo porphyry contains a copper grade of 0.75% copper and 0.015% molybdenite. Copper porphyry is characterized by small percentages of copper in a large deposit of country rock that contains other minerals, such as molybdenum, lead, zinc, manganese, gold, and silver.

Impacts of the Proposed Action

The authorization of the ROW and its connected actions would have no effect on mineral extraction in the area. Although the mine is now closed, if it were to reopen the authorization of the ROW potentially would be beneficial by providing more reliable energy to the mine.

Impact of the No-Action Alternative

The No-Action Alternative would have no effect on mineral resources.

3.2.11 Migratory Birds

Under the Migratory Bird Treaty Act (MBTA) of 1918 and subsequent amendments (16 USC 703–711), it is unlawful to take, kill, or possess migratory birds. Executive Order 13186, issued on January 11, 2001, further defines the responsibilities of federal agencies to protect migratory birds; a list of protected birds can be found in 50 CFR 10.13.

Impacts of the Proposed Action

The authorization of the ROW and its connected actions would require that the project proponent comply with the MBTA and avoid, to the extent possible, potential impacts to those bird species covered by the MBTA.

Impacts of the No-Action Alternative

The No-Action Alternative would have no effect on migratory birds.

3.2.12 National Energy Policy

In 2001, President George W. Bush established the National Energy Policy Development Group, directing it to "develop a national energy policy designed to help the private sector, State and local governments, promote dependable, affordable, and environmentally sound production and distribution of energy for the future." The outcome of this group's effort was a report and a recommendation that "envisions a comprehensive long-term strategy that uses leading edge technology to produce an integrated energy, environmental and economic policy," the National Energy Policy.

Impacts of the Proposed Action

The authorization of the ROW and its connected actions would comply with this policy.

Impacts of the No-Action Alternative

The No-Action Alternative would have no effect on National Energy Policy.

3.2.13 Native American Religious Concerns

AIRFA established national policy to protect and preserve for Native Americans their inherent right of freedom to believe, express, and exercise their traditional religions, including the rights of access to religious sites, use and possession of sacred objects, and freedom to worship through traditional ceremonies and rites.

To our knowledge, there are no Native American religious concerns associated with the project area.

3.2.14 Noxious Weeds

The ADA is responsible for enforcing Arizona's noxious weed regulations, which categorize noxious weeds (including plants, stolons, rhizomes, cuttings, and seed) into three groups: regulated, restricted, and prohibited. According to the Arizona regulations, regulated noxious weeds are those exotic plant species that 'if found within the state may be controlled or quarantined to prevent further infestation or

contamination'; restricted noxious weeds are those exotic plant species that 'if found within the state shall be quarantined to prevent further infestation or contamination'; and prohibited noxious weeds are those plant species 'prohibited from entry into the state'.

No ADA-regulated noxious weeds were observed in the project area during field investigations.

Impacts of the Proposed Action

The primary concern stemming from the authorization of the ROW and its connected actions is the potential for noxious or invasive weeds to be introduced into the ROW by equipment during construction or maintenance activities. To minimize this potential, vehicles and equipment would be power-washed, including the undercarriage, prior to entering the ROW. Equipment would be similarly washed before being moved onto other public lands.

Impacts of the No-Action Alternative

Under the No-Action Alternative, the project area would remain free of noxious weeds, unless they were spread by natural means or other means outside BLM control.

3.2.15 Recreation

The majority of the project area (the area west of River Road) is owned by BHP and is fenced and closed to recreational uses. The Galiuro Wilderness, located approximately 5 miles east of the project area, is remote and accessible only by dirt roads. The area provides opportunities for hiking and nature study. Motorized and mechanized vehicles and equipment, including mountain bikes, are not permitted in Wilderness.

The major access points to the Galiuro Wilderness are on the east and south sides of the Galiuro Mountains and include the Deer Creek Trailhead at the end of Forest Road (FR) 253 off the Aravaipa Road and the Redfield Canyon Trailhead at the end of FR 691 through Muleshoe Ranch Preserve. BLM land east of River Road, in the western foothills of the Galiuro Mountains, is accessible via Tom Rhodes Ranch Road.

Impacts of the Proposed Action

The authorization of the ROW and its connected actions is not expected to impact recreational uses of public lands, either authorized or unauthorized.

Impacts of the No-Action Alternative

Under the No-Action Alternative, there would be no change in recreation use of the area.

3.2.16 Socioeconomic Values

Executive Order 12989 (Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations, 11 February 1994) and USDA Departmental Regulation 5600-2 (Environmental Justice), requires that environmental justice issues be addressed to ensure that there are no disproportionate adverse impacts to low income or minority groups.

Pinal County, with an estimated population of 271,059 in 2006, encompasses a land area of approximately 5,370 square miles (Fedstats 2008). Population density (persons per square mile) is 33.5 in Pinal County, compared with 45.2 for Arizona as a whole. The San Pedro River basin, including the project area, is sparsely settled. The population centers nearest the project area are San Manuel, Mammoth, and Oracle (Table 5); these communities make up what is referred to as the tri-community area. Oracle and Mammoth are approximately 10 miles west and north of San Manuel, respectively. Population data is from the Arizona Department of Commerce (ADC 2008).

Table 6 provides a comparison of current U.S. Census Bureau (Census) data for median household income, poverty levels, and unemployment between Pinal County and the State of Arizona (Fedstats 2008). At 7.1% and 8.1%, respectively, 2006 unemployment rates for the communities of San Manuel and Mammoth are higher than those for either Pinal County or Arizona as a whole (ADC 2008), likely because of the recent closure of the BHP mine at San Manuel.

Table 5. Selected Population Centers in Pinal County, Arizona

Census Area	Population		Approximate Distance/ Direction from the Project Area
	2000	2006	
Town of Mammoth	1,762	1,805	10 miles north
San Manuel CDP*	4,375	N/A†	<0.5 mile west
Town of Oracle	3,563	N/A†	10 miles west

* A statistical entity, defined for each decennial census according to U.S. Census Bureau guidelines, comprising a densely settled concentration of people that is not within an incorporated place but is locally identified by a name.

† Population estimate for this community not available in 2006.

Table 6. Census Data Comparing Median Incomes, Relative Poverty Levels, and Unemployment between Pinal County and the State or Arizona—San Manuel Interconnect Project

Category	Pinal County	Statewide
Median Household Income*	$40,255	$43,696
Percent of Persons Below Poverty Level*	15.1%	14.6%
Unemployment†	5.0%	4.1%

*2004 Census data.

†2006 Census data.

According to Year 2006 Census data (ADC 2008), approximately 70% of the population of Pinal County is white, 29% is Hispanic or Latino (of any race), 6% is American Indian, and 3% is black or African-American. No minority enclaves are known to be located near the project area. The school nearest the project area is located in San Manuel.

Florence, established in 1866, is the Pinal County seat. The communities of Mammoth, Oracle, San Manuel, and Kearny have traditionally been active in copper mining, smelting, milling and refining. With the recent closing of BHP, the economies of San Manuel, Mammoth, and Oracle have shifted from mining to other activities. According to the Arizona Department of Commerce (ADC 2008), Oracle now depends on arts and crafts, a growing electronic cottage industry, and tourism. The primary economic activities in Mammoth are retail trade, transportation and warehousing, accommodation and food services, and agriculture. San Manuel is primarily a bedroom community. Arizona City, Eloy, Maricopa, Picacho, Red Rock, and Stanfield have agriculturally based economies.

Apache Junction, Arizona City, Coolidge, Eloy, and particularly Casa Grande have diversified their economic base to include manufacturing, trade, and services. This expansion and diversification has been facilitated by their location in the major growth corridor between Phoenix and Tucson near the junction of Interstate (I-) 10 and I-8, except for Apache Junction, which is east of Mesa. Most of the southern three-fourths of Pinal County and a small area in Apache Junction are designated Enterprise Zones (ADC 2008). 2006 Pinal County employment by sector is shown in Table 7 (Census 2008).

Table 7. The Five Largest Economic Sectors in Pinal County in 2006—San Manuel Interconnect Project

Industry Description	Number of Employees
Educational services, health care, and social assistance	19,483
Retail trade	14,038
Construction	11,341
Public administration	9,997
Manufacturing	9,739

Impacts of the Proposed Action

With the increased electrical capacity provided by the project, SWTC would be able to provide reliable service to existing and new customers in the service area, thereby improving socioeconomic and community resources. Any benefit to the local community resulting from the provision of food and lodging to construction crews would be short term and minimal. No permanent jobs would be created as a result of the project, and no influx of new workers is expected; therefore, there would be no impact to housing, school, or health care facilities. The project would have no disproportionately adverse impact to any minority groups or low-income populations.

The project would not cross any densely populated areas. Project construction would not create any short- or long-term disruption of traffic flow on River Road. There would be no impacts to air, freight, or public transportation facilities as a result of transmission line and access road construction.

Impacts of the No-Action Alternative

Under the No-Action Alternative, unreliable electrical capacity would have a potentially adverse effect on low-income populations in southeastern Pinal County.

3.2.17 Threatened and Endangered Species

The ESA of 1973, as amended, establishes a national program for the conservation and protection of threatened and endangered species of plants and animals and the preservation of their habitats. Section 7 of the ESA requires federal agencies to consult with the U.S. Fish and Wildlife Service (USFWS) to ensure that the actions they authorize do not jeopardize the continued existence of a federally listed threatened or endangered species.

In December 2006, a field reconnaissance of the San Manuel Interconnect project area was conducted to evaluate the potential for occurrence of federally listed and proposed species (WestLand 2007c). In 2008, prior to the preparation of this EA, SWCA reviewed the current USFWS list of endangered, threatened, and candidate species for Pinal County to determine whether there had been any changes. Since the preparation of the WestLand report, the bald eagle (*Haliaeetus leucocephalus*) was removed from the list of species covered under the authority of the ESA (effective July 9, 2007). However, USFWS then

relisted as threatened (effective May 1, 2008) the population of bald eagles occupying the Sonoran Desert of central Arizona.

Of the 16 species on the current USFWS Pinal County list, 13 were excluded from more detailed consideration in this EA because the project area is clearly outside the known range of these species or does not provide suitable habitat for these species, or both (see WestLand 2007c). The proposed project would have no adverse effect on any of these 13 species.

It was determined that three species have the potential to occur in the vicinity of the project area: southwestern willow flycatcher (*Empidonax traillii extimus*), federally listed endangered; lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*), federally listed endangered; and yellow-billed cuckoo (*Coccyzus americanus*), a candidate for federal listing. There is designated Critical Habitat for southwestern willow flycatcher, and potential foraging habitat (a large population of saguaro cactus [*Carnegiea gigantea*]) for lesser long-nosed bat in the project area. There also is potential breeding habitat for yellow-billed cuckoo in the project vicinity. These three species are addressed in greater detail below.

Because the transmission line would cross designated Critical Habitat for southwestern willow flycatcher, SWTC requested that BLM enter into formal consultation with USFWS, pursuant to Section 7(a)(2) of the ESA. BLM, as the lead federal agency for the consultation, is required to assess the impacts of the proposed action on species listed or proposed for listing under the ESA. SWTC, acting as agent for BLM, has prepared a biological assessment (BA) as part of ESA consultation for the proposed federal actions, and to establish a foundation to support the requested Section 7 consultation for adverse impacts to designated Critical Habitat for southwestern willow flycatcher and adverse impacts to the potential foraging habitat of lesser long-nosed bat (SWCA 2008).

Southwestern Willow Flycatcher. Southwestern willow flycatcher was listed as endangered in 1995 (USFWS 1995). Critical Habitat was designated in 2005 and includes the San Pedro River from Kelsey Canyon (upstream of Cascabel) to the confluence with the Gila River at Winkelman (USFWS 2005). The current breeding range of this bird includes Arizona, southern California, New Mexico, southern Nevada, southern Utah, and southwestern Colorado (USFWS 2005).

Current information on southwestern willow flycatcher nesting habitat is summarized by USFWS (2005). Riparian habitat in a dynamic successional riverine environment is required for nesting, foraging, migration, dispersal, and shelter. Flycatchers require dense thickets of trees and shrubs ranging in height from 6 to 98 feet. Lower-stature thickets (6–13 feet tall) are found at higher-elevation riparian forests, and tall-stature thickets are found at middle- and lower-elevation riparian forests. Preferred are areas of dense riparian foliage at least from the ground level up to approximately 13 feet above ground or dense foliage only at the shrub level, or as a low, dense tree canopy. Sites for nesting typically contain a dense tree and/or shrub canopy (the amount of cover provided by tree and shrub branches measured from the ground) (i.e., a tree or shrub canopy with densities ranging from 50%–100%). Ideally, sites contain dense patches of riparian forests that are interspersed with small openings of open water or marsh, or shorter/sparser vegetation that creates a mosaic that is not uniformly dense. Patch size may be as small as 0.25 acre or as large as 175 acres.

The proposed project is located in the San Manuel Crossing survey area, which was surveyed for southwestern willow flycatcher almost annually from 1993 to 2005. The San Manuel Crossing survey area, which is about 9 miles long, begins about 3.2 miles upstream of the project site and extends approximately 5.8 miles downstream of the project site. Although this area has not been surveyed by AGFD since 2005, the SWTC project area was surveyed in 2007 and 2008 by WestLand (2007d, 2008). Within the project area boundaries, hydrophilic vegetation is restricted to the immediate vicinity of the

San Pedro River channel. Vegetation in this area occurs as a narrow stringer composed mostly of tamarisk (*Tamarix* sp.), although Fremont cottonwood (*Populus fremontii*) and willow (*Salix* spp.) also are present.

No territorial southwestern willow flycatchers were reported within 2 miles of the proposed transmission line corridor during any of these previous surveys. The closest territory to the proposed transmission line corridor was located approximately 2.14 miles upstream in 2005 (English et al. 2006; personal communication, A. Graber, SWCA, February 21, 2008). Two successful nests were recorded in this territory that year. The closest site downstream of the proposed transmission line corridor was near the Arivaipa Creek-San Pedro River confluence, a distance of approximately 13 miles, in 2005 (English et al. 2006; personal communication, A. Graber, SWCA, February 21, 2008).

SWTC has made significant efforts to minimize adverse impacts to southwestern willow flycatcher Critical Habitat resulting from the proposed action (see SWCA 2008). During initial planning, SWTC overlaid Critical Habitat boundaries, available from the USFWS Critical Habitat Decision Support System (USFWS 2008), on a recent aerial photograph of the project area. SWTC then sited transmission line structures and access roads in order to avoid and minimize impacts to Critical Habitat. The aerial map, with Critical Habitat boundaries and project infrastructure, was provided to Jason Douglas, USFWS, during an informal project meeting at the SWCA Tucson office on February 20, 2008. Photographs of Critical Habitat in the project area also were made available at the meeting.

During the meeting, SWCA and SWTC characterized the majority of Critical Habitat in the project area as mesquite woodland on old river terraces located well above the main channel of the San Pedro River. It was determined following discussion that the majority of this mesquite woodland is unlikely to provide the essential life cycle needs of southwestern willow flycatcher (i.e., areas on which are found the primary constituent elements [PCEs], as defined at 50 CFR 424.12(b)). According to USFWS (2005:60893), "Areas that do not contain the PCEs within the boundaries of critical habitat are not considered to be critical habitat and thus, actions in those areas would not trigger consultation unless they affected adjacent critical habitat." During the February 20, 2008, meeting, USFWS and SWTC re-examined the aerial photograph and agreed in principal on boundaries that appear to reflect more accurately the area required by southwestern willow flycatcher to satisfy essential life-cycle needs.

Following the meeting, SWTC prepared a map depicting both Critical Habitat, as designated by USFWS, and a newly delineated area within Critical Habitat on the basis of the discussion referenced above (see SWCA 2008). The newly delineated area excludes the majority of mesquite woodland in the project area; SWTC retained on the map a 150-foot-wide buffer of mesquite woodland on the south side of the San Pedro River because there is unpublished literature that documents occasional southwestern willow flycatcher use of this vegetation type when it is immediately adjacent to "traditional" nesting habitats, such as willow. In this BA, calculations of direct impact (i.e., acres) are provided for both Critical Habitat and this newly delineated area. The mesquite woodland excluded from the newly delineated area depicted in Figure 4 does not in the opinion of SWTC and SWCA exhibit the following features: 1) the riparian plant species needed for breeding, foraging, and shelter for breeding, non-breeding, territorial, migrating, and dispersing flycatchers; 2) the variety of structural vegetation features targeted for nest placement; 3) the range of more generalized riparian habitat used for migrating, foraging, dispersing, and non-breeding southwestern willow flycatchers; and 4) southwestern willow flycatcher food requirements.

Lesser Long-nosed Bat. Lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*) was listed as endangered in 1988 (USFWS 1988), without Critical Habitat. A recovery plan for this species was finalized in 1997 (USFWS 1997). In Arizona, lesser long-nosed bat roosts have been found from the Picacho Mountains, southwest to the Agua Dulce Mountains, southeast to the Chiricahua and Peloncillo mountains, and south to the international boundary (USFWS 2006). Individual bats have also been observed in the Pinaleño Mountains, and as far north as Phoenix and Glendale (USFWS 2006).

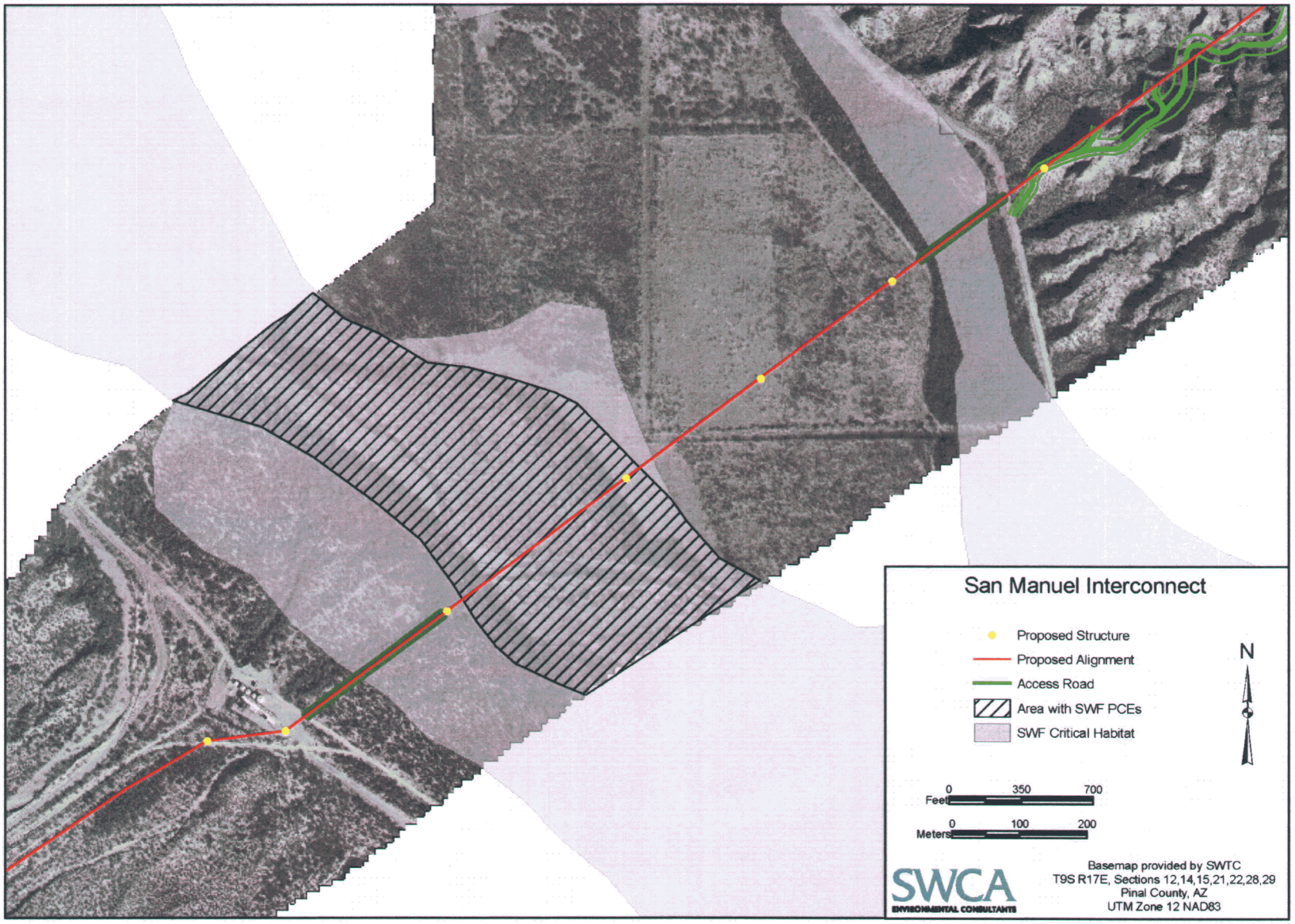

Figure 4. Southwestern willow flycatcher Critical Habitat.

In Arizona, New Mexico, and northwestern Mexico, the lesser long-nosed bat is migratory and is not present in Arizona during winter months. Impregnated females arrive in late April and early May and feed on the nectar and pollen of columnar cacti, especially saguaro (Wilson 1985). Maternity roosts are generally located in natural caves or abandoned mines. In late July and early August, adult males arrive to join females and young as they disperse from maternity roosts to feed on the nectar and pollen of agave flowers. At this time, the range of lesser long-nosed bat expands east and north (Cockrum and Petryszyn 1991). Available information suggests that the foraging radius of *Leptonycteris* bats may be on the order of 48 to 60 miles (USFWS 1997), or more.

There are no known mines or natural caves in the project area. In addition, where the proposed transmission line corridor traverses the foothills of the Galiuro Mountains soils are composed of alluvial gravels that would not support the natural caves used by this bat for roosting. There are, however, several non-maternity roosts located within 25 miles of the project area (personal communication, Jason Douglas, USFWS, February 25, 2008; see SWCA 2008). The majority of these roosts appear to be used in late summer or fall when bats are likely feeding on agaves, but this could be partially due to the fact that survey efforts are generally conducted at that time of the year. It has been suggested that bats detected in Redfield Canyon (located about 18 miles from the project area) in May could be feeding on saguaro flowers in the San Pedro Valley (personal communication, Tim Snow, AGFD, February 21, 2008). The nearest known lesser long-nosed bat maternity roost is at Old Mammon Mine in the Slate Mountains, about 75 miles west of the project area.

The project area is within the foraging range of lesser long-nosed bats occupying nearby roosts, and there is a relatively large population of large, multi-armed saguaro cacti in the project area; no agaves were observed in the project vicinity (SWCA 2008; WestLand 2007c). The densest saguaro concentrations in the proposed transmission line corridor are on the southwest-facing foothills of the Galiuro Mountains where SWTC proposes construction of an access road.

SWTC originally envisioned that a road alignment approximately 100 feet wide would be required because of engineering challenges associated with the steep terrain in the Galiuro Mountains. However, after examining the alignment in the field, SWTC determined that the large number of saguaro cacti adversely impacted by an alignment of this width would be unacceptable. SWTC therefore redesigned the access road alignment to a width of 50 feet and, on the basis of aerial photography, shifted the road alignment in order to avoid the greatest saguaro concentrations.

The new access road alignment was surveyed for saguaro cacti on April 24 and 25, 2008, by an SWCA biologist. Following the survey, SWTC created a series of maps showing the following: 1) the locations of saguaro cacti within the disturbance footprints of the original and new access road alignments; 2) the locations of saguaro cacti by size class (>5 feet tall and ≤5 feet tall), including those that would be avoided (based on field survey), within the new access road alignment; and 3) the locations of saguaro cacti within a study area that includes the new access road alignment and surrounding area (see SWCA 2008). The aforementioned maps and associated saguaro density information were provided to Douglas and Scott Richardson, USFWS, at the USFWS Tucson office during a second informal project meeting on May 7, 2008.

Yellow-billed Cuckoo. Yellow-billed cuckoo is a candidate for listing as threatened or endangered by USFWS. The listing of yellow-billed cuckoo as a Distinct Vertebrate Population Segment west of the crest of the Rocky Mountains is considered warranted, but was precluded by higher-priority listing actions (USFWS 2001). This bird appears to require large blocks of riparian habitat for nesting, particularly woodlands with Fremont cottonwoods and Goodding willows (*Salix gooddingii*) (USFWS 2001). In Arizona, the species occurs from 90 to 6,710 feet above mean sea level, preferring streamside

cottonwood-willow groves and larger mesquite bosques during migration and for breeding. It is rarely observed as a transient in xeric desert or urban settings (AGFD 2002).

Cuckoos are known to be present, and breeding is known or suspected, at many locations along the San Pedro River (Corman and Wise-Gervais 2005). According to WestLand (2007c), "Habitat conditions in the proposed corridor are suitable to support breeding cuckoos, but with the low density of cottonwoods and willow, conditions are not optimal. However, the cottonwoods and willows are likely to support insect populations that could provide a foraging source for cuckoos that might nest upstream."

Impacts of the Proposed Action

Southwestern Willow Flycatcher. The project would result in the alteration of approximately 0.56 acre of designated Critical Habitat for southwestern willow flycatcher. However, as described above, the majority of Critical Habitat in the project area is mesquite woodland located on elevated river terraces above the main channel of the San Pedro River and does not exhibit the PCEs necessary for the conservation of this species. Based on this consideration, SWTC has determined that project-related impacts would be limited to the placement of one transmission structure, with a footprint of 0.03 acre, in former agricultural land east of the main San Pedro River channel. No impacts to cottonwood-willow riparian vegetation are anticipated as a result of the proposed project.

The project will have "no effect" on individual southwestern willow flycatchers. This determination of effect is based on the following: 1) no southwestern willow flycatcher detections during "project-related" clearance surveys (USFWS 2000) conducted in 2007 and 2008 (WestLand 2007d, 2008); 2) the absence of southwestern willow flycatcher breeding records in the immediate project vicinity (the nearest breeding record is 2.14 miles upstream); 3) the absence of vegetation in the project area with suitable density and structure for nesting; and 4) the planned implementation of a variety of measures by SWTC to avoid and minimize the potential impacts of the project, including conducting work along the San Pedro River during the non-breeding season for southwestern willow flycatcher.

Lesser Long-nosed Bat. At total of 208 saguaro cacti, a potential food plant for lesser long-nosed bat in the early to mid-summer range of the species, were recorded in the access road alignment. Of this total, 95 cacti would be transplanted, 16 would be avoided, and 97 would be destroyed during project construction. Based on current available aerial photography, SWTC estimated a population of 1,437 saguaros within a 106-acre study area centered on the access road alignment at the eastern end of the project area in the Galiuro Mountains. Project construction would impact only 6.7% of the saguaros present in this 106-acre area. Although it is impossible to evaluate the significance of the loss of foraging habitat to lesser long-nosed bat, the loss is considered insignificant compared with the large amount of potential foraging habitat available to lesser long-nosed bat regionally.

The project will have "no effect" on individual lesser long-nosed bats. This determination of effect is based on the following: 1) the location of the project in that portion of the Arizona range believed to be used from mid- to late summer when agaves (not saguaros) are the primary food source; 2) the distance of the project area from the nearest lesser long-nosed bat maternity roost (Old Mammon Mine is located about 75 miles to the west); and 3) the absence of lesser long-nosed bat roost sites and documented foraging records for the project area.

Yellow-billed Cuckoo. No impacts to yellow-billed cuckoo are anticipated as a result of the Proposed Action.

Impact of the No-Action Alternative

The No-Action Alternative would have no effect on any threatened or endangered species or their designated Critical Habitat.

3.2.18 Vegetation

Portions of the project area have been disturbed by previous human activity associated with BHP copper processing facilities and agriculture. The west end of the project area is located parallel to a maintenance road that runs between tailings impoundments. Vegetation in this area is limited to scattered velvet mesquite (*Prosopis velutina*), tamarisk, desert broom (*Baccharis sarathroides*), and Russian thistle (*Salsola iberica*). In the floodplain on the east side of the San Pedro River, land formerly used for agriculture is now overgrown with small mesquites and silverleaf nightshade (*Solanum elaeagnifolium*).

The natural vegetation communities in the project area are Sonoran Desertscrub (Arizona Upland subdivision) and Sonoran Riparian Scrubland (based on Brown 1994). Little-leaf paloverde (*Parkinsonia microphylla*) and saguaro cactus are the dominant plant species in the Sonoran Desertscrub community, which is typical of the foothills of the Galiuro Mountains east of River Road and some undisturbed areas west of the San Pedro River floodplain. Saguaros are robust and relatively abundant at the east end of the project area. Other common species in this community are velvet mesquite, creosote bush (*Larrea tridentata*), desert hackberry (*Celtis pallida*), catclaw acacia (*Acacia greggii*), whitethorn acacia (*A. constricta*), canyon ragweed (*Ambrosia ambrosioides*), and ocotillo (*Fouquieria splendens*). Also present are a variety of cholla and prickly pear cacti (*Opuntia* spp.). Sonoran Riparian Scrubland vegetation is associated with the San Pedro River floodplain. This community includes several species common in the adjacent uplands, including velvet mesquite, whitethorn acacia, and desert hackberry. Other species more commonly associated with riparian conditions include seepwillow (*Baccharis salicifolia*) and desert broom. Tamarisk is common in some areas. Near the active channel of the San Pedro River, there is a narrow ribbon of vegetation more typical of Sonoran Riparian Deciduous Woodland. In this community, dominant species include Fremont cottonwood, Goodding willow, and tamarisk. The upper portions of the riparian corridor originally supported a dense mesquite bosque. At the present time the main channel of the San Pedro River is incised several feet below the active floodplain, which in turn is a few feet below the level of the mesquite woodland.

Special-Status Species. Two plant species classified as Salvage Restricted under the Arizona Native Plant Law have been documented within 5 miles of the project area, according to AGFD (2008). These plants are San Carlos wild-buckwheat (*Eriogonum capillare*) and staghorn cholla (*Opuntia versicolor*); San Carlos wild-buckwheat is also listed by USFWS as a Species of Concern. Neither is listed as a BLM Sensitive Species in Pinal County.

Impacts of the Proposed Action

The authorization of the ROW and its connected actions would result in adverse impacts to approximately 9.6 acres of land, including 0.87 acre of BLM land (Table 8). On BLM land, SWTC would apply a seed mix approved by the BLM, if so required. On ASLD land, a native plant survey would be conducted following ADA guidelines and a stumpage fee would be paid to mitigate the loss of protected native plants. A Notice of Intent to Clear Land form would be filed with the ADA prior to land-clearing activities, and the ADA would be informed of the intended disposition of all protected native plants. A permit from the ADA would be required to collect any Salvage Restricted plants located on ASLD land. Vegetation removed from the project area would either be scattered along the easement or, in the case of large woody debris, removed to an off-site landfill.

Table 8. Acres of Impact by Land Status—
San Manuel Interconnect Project

Land Status	Impact (Acres)
BLM	0.87
ASLD	7.81
Private (BHP)	0.92
Total	**9.60**

Impacts of the No-Action Alternative

The No-Action Alternative would have no effect on vegetation.

3.2.19 Visual Resources

BLM managers use a visual resource inventory process for determining visual values. The inventory process consists of rating the visual appeal of a tract of land, measuring public concern for scenic quality, and determining whether the tract of land is visible from travel routes or observation points. Based on these three factors, BLM-administered lands are placed into one of four Visual Resource Management (VRM) inventory classes. The system is used to minimize the visual impacts of surface-disturbing activities and to maintain scenic values.

A VRM inventory of public lands in the project area has not been completed by BLM (personal communication, F. Mendoza, BLM, February 22, 2008). In the absence of a VRM inventory, BLM has established an interim VRM Class III designation for the area (by default). The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate, and management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

According to BLM, the project would be visible from populated areas and scenic travel routes, and viewing volume is considered high (personal communication, S. Bernal, BLM, February 22, 2008). However, BLM also acknowledges that it is in a landscape previously modified by various land use activities, including agricultural, rural residential, mining, utilities, and transportation developments. According to the RMP/FEIS (BLM 1991:149), "Agricultural modification is evident along the Gila River from Safford to Fort Thomas, Interstate 10 near Bowie and San Simon, the Gila River near Duncan and the Aravaipa and San Pedro valleys. Mineral development has created significant changes to the landscape in the mountains north of Clifton and Morenci, in the Dripping Springs Mountains at Christmas, in the San Pedro Valley near San Manuel and in the San Simon Valley north of Interstate 10."

Existing visual disturbances in the immediate vicinity of the project area include the following:

- Apache to Hayden 115-kV transmission line and associated access roads;
- Two APS 115-kV transmission lines;
- APS San Manuel Substation;
- APS 12.5-kV transmission line;
- 46-kV yard and pump house;

- River Road (a county-maintained, improved dirt road);
- Abandoned agricultural land and farm roads east of the San Pedro River;
- Mine access roads, reclaimed slag disposal areas, reclaimed tailings impoundments, and offices and shops associated with the BHP San Manuel plant site; and
- The San Manuel Arizona Railroad.

Impacts of the Proposed Action

SWCA evaluated the potential impacts of the proposed project on the local viewshed as seen from SR 77 between Oracle and Mammoth, a distance of approximately 9 miles. A 10-m digital elevation model (DEM) obtained from USGS was used for the analysis. The analysis included the visual impacts of the 12 easternmost transmission line structures (those structures located in the Galiuro Mountains and San Pedro River floodplain; the locations of the remaining structures on BHP land have not yet been determined by SWTC) and the easternmost access road (the access road located in the Galiuro Mountains). For the transmission structures, elevations stored in the DEM were amended to account for the average height of the proposed new structures, which is 115 feet. Actual ground elevations were used for the proposed access road. SR 77 was subdivided into ¼-mile segments, which resulted in 37 specific viewing locations. The analysis did not include views of the project area from River Road or the town of San Manuel, the nearest populated area. It was assumed that the structures and access road would be readily visible from these locations.

The construction of the project would result in a moderate level of change to the predominantly rural nature of the existing landscape, particularly in the eastern portion of the project area, where six structures and an access road would be sited in the foothills of the Galiuro Mountains. However, a moderate level of change is consistent with the objectives of VRM Class III. The transmission structures and access road in the Galiuro Mountains, and to a lesser extent the transmission structures along the San Pedro River floodplain, would be visible to and may attract the attention of the casual observer at several locations along SR 77 between Oracle and Mammoth (Figures 5 and 6); some structures would be more visible than others, depending on the topography. The project would not dominate the view of the casual observer traveling along SR 77, however, because 1) the project would be located in the foreground of the Galiuro Mountains, which would tend to camouflage the line and structures, and 2) throughout the project area, SWTC would use self-weathering steel structures designed to reduce visual impacts. Furthermore, the proposed new transmission line would be constructed in a viewshed with a variety of existing linear and non-linear landscape alterations. Consequently, the visual contrast of the proposed new 230-kV line and access road would be consistent with the existing character of the landscape and would not result in a significant decrease in visual quality.

Impacts of the No-Action Alternative

The No-Action Alternative would have no effect on visual resources.

3.2.20 Wastes, Hazardous or Solid

No chemicals subject to the Superfund Amendments and Reauthorization Act of 1986 in amounts greater than 10,000 pounds, and no extremely hazardous substances (as defined in 40 CFR 355) in threshold-planning quantities would be used in the project area.

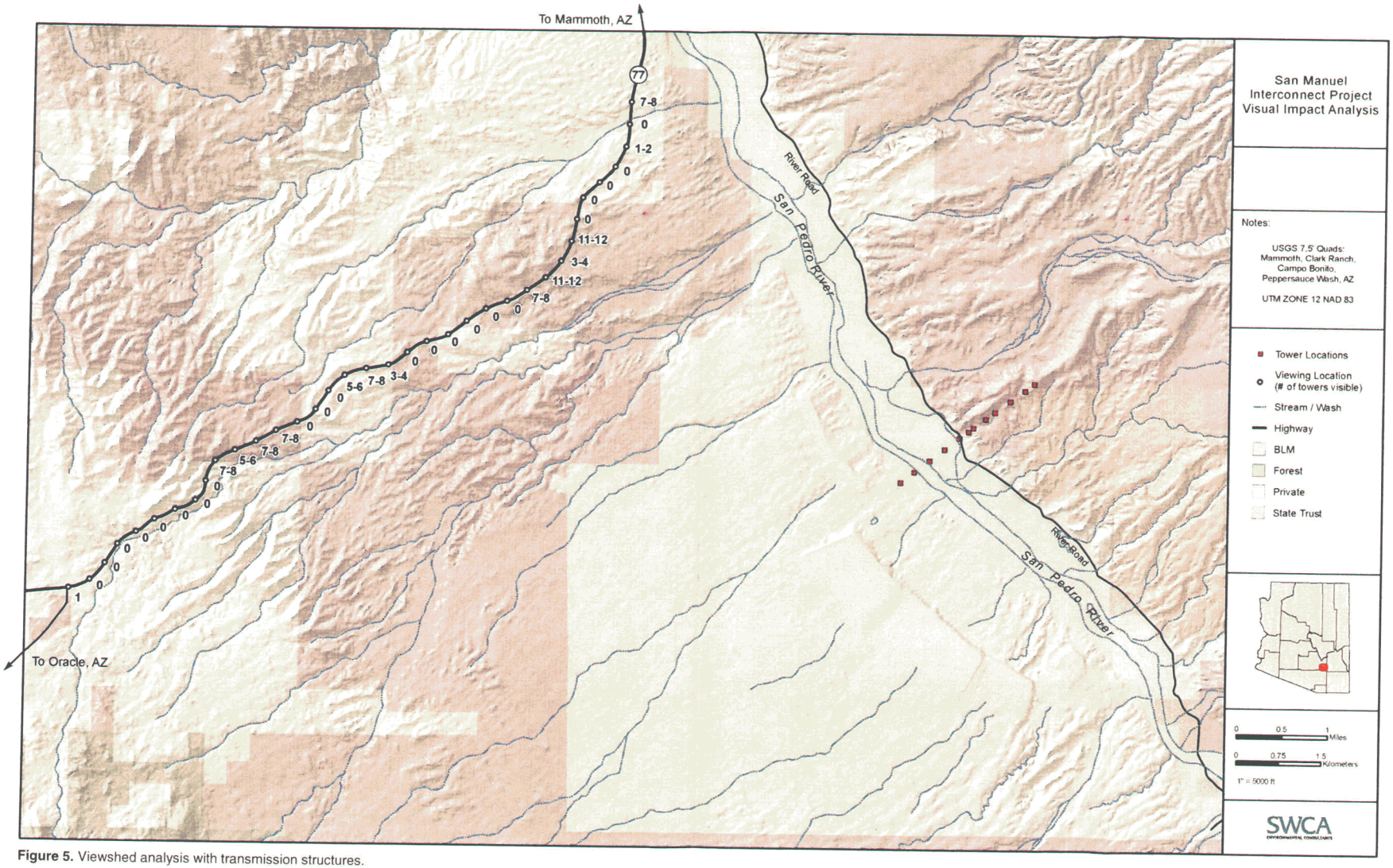

Figure 5. Viewshed analysis with transmission structures.

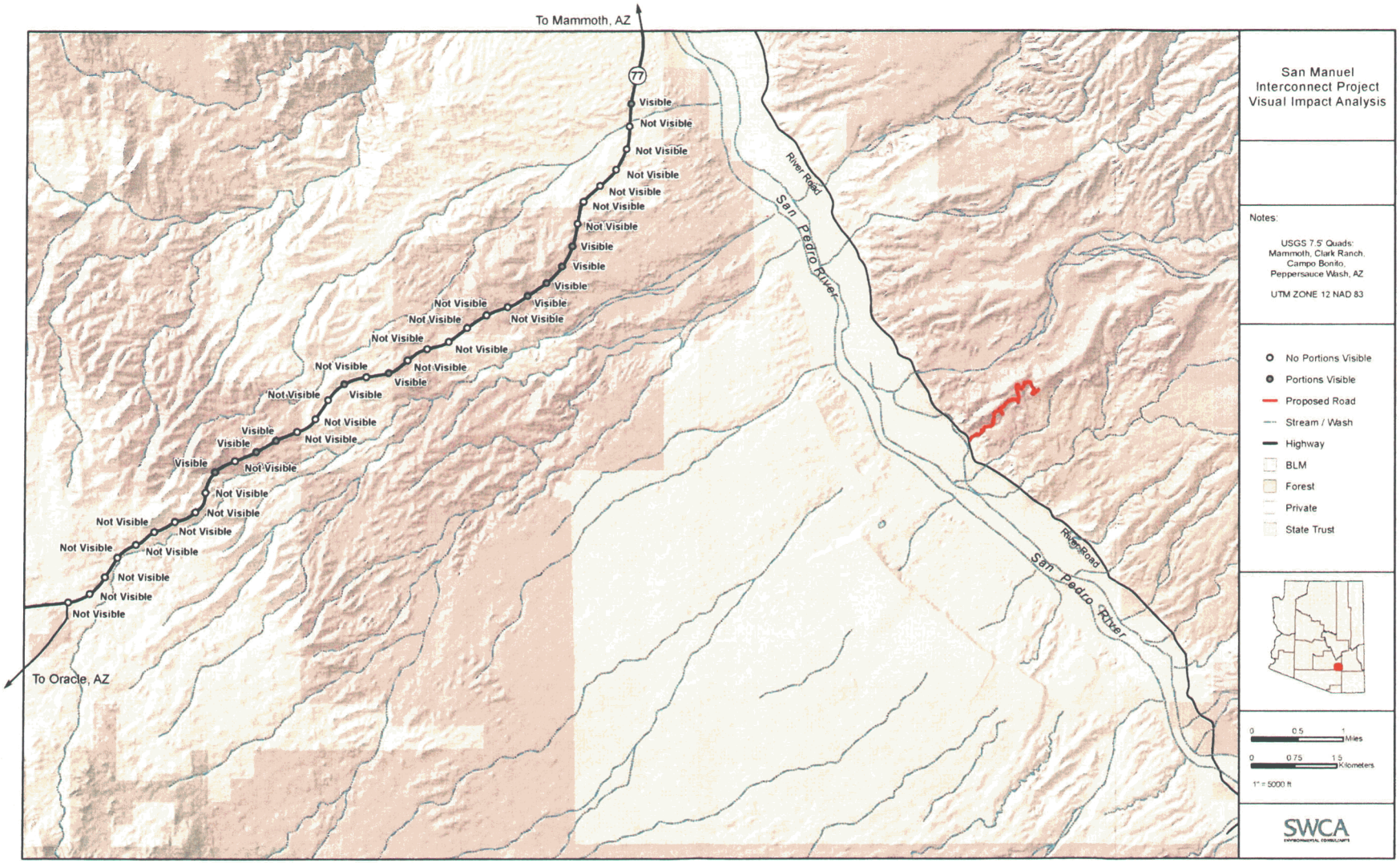

Figure 6. Viewshed analysis with access road.

Impacts of the Proposed Action

The authorization of the ROW and its connected actions would not result in the introduction of any hazardous materials into the ROW. No fuels or hazardous materials would be stored on-site temporarily or permanently.

Impacts of the No-Action Alternative

Under the No-Action Alternative, there would be no use of hazardous materials on-site.

3.2.21 Water Resources

Groundwater. Two aquifers reportedly underlie the San Manuel area, the floodplain aquifer and the regional San Pedro aquifer (EPA 1992). The floodplain aquifer consists of groundwater in the floodplain alluvium, which is recharged by precipitation, San Pedro River flow, and seepage from irrigation systems. The regional aquifer is located within the Gila Conglomerate and is recharged by precipitation along the mountain fronts and by stream channel infiltration. Drinking water for the town of San Manuel is pumped from deep wells in the San Pedro regional aquifer.

On June 25, 1999, BHP announced the suspension of operations at the San Manuel copper mine and smelter in Pinal County, Arizona (Arizona Mining Association 2008). Following this announcement, operations were managed on a "care and maintenance" basis until the mine site was closed in January 2002 and the plant site was closed in October 2003. Decommissioning and reclamation of the sites are in large part complete (BHP Billiton 2008).

Tailings impoundments cover approximately 3,000 acres and consist of seven different impoundments that are over 6 miles long, 200 feet high in places, and just upgradient of the San Pedro River (Arizona Mining Association 2008). These facilities were contoured, covered with soil, armored, and revegetated to minimize long-term erosion and provide for lower long-term maintenance costs. In addition, the reclamation and armoring enhance the aesthetics of these large facilities. Groundwater down gradient from the site will be monitored by a series of monitoring wells for as many years as required to demonstrate compliance with Aquifer Water Quality Standards under the Aquifer Protection Permit issued for the site.

Surface Water. Surface water in the vicinity of the project area is limited to the San Pedro River, which is characterized by intermittent flows, and several ephemeral tributaries to the San Pedro River. A preliminary evaluation of the project area was conducted to identify potential WUS (WestLand 2007a). Between the two reclaimed tailings impoundments at the west end of the project area is a braided ephemeral drainage system (associated with Big Wash) that conveys stormwater northeast toward the San Pedro River. The San Pedro River crosses the project area east of the tailings impoundments. The uplands on the east side of the San Pedro River, within the floodplain, have been disturbed, and stormwater generally travels as sheet flow. An abandoned human-made channel was found in this area, but a connection to any potentially jurisdictional WUS was not observed. To the east of River Road, ephemeral washes convey stormwater west toward the San Pedro River. Impacts to WUS in the project area would be subject to U.S. Army Corps of Engineers (USACE) jurisdiction and would require a Section 404 Permit under the CWA.

Section 402 of the CWA addresses stormwater discharges to WUS associated with construction activities. In Arizona, stormwater discharges from construction sites disturbing 1 or more acres require a Construction General Permit under the Arizona Pollutant Discharge Elimination System (AZPDES) program. The AZPDES program is administered by ADEQ.

The San Pedro River in the vicinity or the proposed project is not considered a "Unique or Impaired Water" according to the ADEQ (2008).

Impacts of the Proposed Action

The project, as proposed, would require the discharge of fill material into several ephemeral drainages, which are assumed by SWTC to be WUS and therefore subject to USACE jurisdiction. Although the project crosses the San Pedro River, no fill material would be discharged into the San Pedro River. Based on the recent Regulatory Guidance Letter from the USACE (USACE 2008), SWTC's consultant is currently preparing a "Preliminary" Jurisdictional Delineation for submittal to the USACE. The project would be covered by the Nationwide Permit (NWP) Program under NWP 12, which is for utility line activities, including access roads. Prior to any construction activities, NWP 12 coverage would be obtained. Because installation of the transmission line and construction of the access roads would require grading or clearing of more than one acre, a CWA Section 402 permit would be required.

No impacts to groundwater resources are anticipated assuming compliance with federal and state water quality regulations.

Impacts of the No-Action Alternative

Under the No-Action Alternative, there would be no effect on water quality.

3.2.22 Wetland or Riparian Zones

Executive Order 11990 of May 24, 1977, requires each agency to take action to minimize destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands.

There are not wetlands in or adjacent to the project area.

3.2.23 Wild and Scenic Rivers

The Wild and Scenic Rivers Act of October 2, 1968, protects the free-flowing waters of many of our nation's most spectacular rivers. The Act specifically

- Prohibits dams and other federally assisted water resources projects that would adversely affect river values;
- Protects outstanding natural, cultural, or recreational values;
- Ensures water quality is maintained; and
- Requires the creation of a comprehensive river management plan that addresses resource protection, development of lands and facilities, user capacities, and other management practices necessary to achieve purposes of the Act.

There are no wild and scenic rivers in or adjacent to the project area.

3.2.24 Wilderness

According to the Wilderness Act of September 3, 1964 (PL 88-577), there shall be no commercial enterprise and no permanent road within any wilderness area designated by this Act and, except as

necessary to meet minimum requirements for the administration of the area for the purpose of this Act (including measures required in emergencies involving the health and safety of persons within the area), there shall be no temporary road, no use of motor vehicles, motorized equipment or motorboats, no landing of aircraft, no other form of mechanical transport, and no structure or installation within any such area.

There is no designated wilderness in the project area. The nearest designated wilderness is the 76,317-acre Galiuro Wilderness, part of the Coronado National Forest, located approximately 5 miles east of the project area in Graham County. Although the transmission line would cross BLM land, the BLM land in this area is not formally classified federal land.

3.2.25 Wildlife

General Wildlife. Diversity of wildlife in the project area is expected to be typical of that found in the Sonoran Desertscrub (Arizona Upland subdivision) and Sonoran Riparian Scrubland vegetation communities (Brown 1994). Big-game species known to occur in the project area include mule deer (*Odocoileus hemionus*) and collared peccary (*Pecari tajacu*). Small-game species that were observed or are expected to occur in the project area include Gambel's quail (*Callipepla gambelii*), desert cottontail (*Sylvilagus audubonii*), white-winged dove (*Zenaida asiatica*), mourning dove (*Zenaida macroura*), and blacktail jackrabbit (*Lepus californicus*). A wide variety of non-game mammal, bird, and reptile and amphibian species are found in the project area, or are expected to occur in the project area, particularly along the San Pedro River floodplain.

Special-Status Species. For the purposes of this EA, special-status species include the following: 1) species listed as Sensitive by BLM; 2) USFWS Species of Concern; and 3) species listed as Wildlife of Special Concern in Arizona by AGFD. BLM Sensitive Species are those species that are designated by the BLM State Director for special management consideration. USFWS Species of Concern are species that may be listed in the future as threatened or endangered. Wildlife of Special Concern in Arizona are those species whose occurrence in Arizona is or may be in jeopardy, or those species with known or perceived threats or population declines, as described by the AGFD.

An evaluation of the potential for occurrence of BLM Sensitive species in the project area is provided by WestLand (2007c). In January 2008, SWCA submitted a coordination letter to the AGFD, Heritage Data Management System (HDMS), requesting a list of BLM and other special-status species that reportedly have been observed near the project area. The AGFD response letter is included in Appendix C. Table 9 gives a list of BLM Sensitive and other special-status species and their potential for occurrence in San Manuel Interconnect Project Area based on information provided by Westland (2007c) and AGFD. None of these species are afforded protection under the ESA.

Impacts of the Proposed Action

It is assumed that impacts to wildlife habitat from transmission line and access road construction (approximately 9.6 acres) would be identical to those described below for vegetation. Construction-related disturbance would result in short-term displacement of some wildlife species, but no significant long-term impacts to local wildlife populations are anticipated, given the limited area of disturbance and the large amount of similar habitat present in the surrounding area.

Table 9. Special-Status Species with the Potential to Occur in the San Manuel Interconnect Project Area, Pinal County, Arizona

Species	Status*	Habitat	Potential for Occurrence
Maricopa tiger beetle (*Cicindela oregona maricipa*)	BLM-S USFWS-SC	Found most commonly on sandy stream banks. May occur near seeps or reservoir banks. Preferred substrate appears to be a sand/silt material. Elevation range 1,100–6,900 feet.	Possible along the San Pedro River.†
Gila longfin dace (*Agosia chrysogaster chrysogaster*)	BLM-S USFWS-SC	Intermittent hot, low-desert streams to clear, cool brooks at higher elevations. Elevation range generally below 4,900 feet.	Possible in the San Pedro River.†
Desert sucker (*Catostomus clarki*)	BLM-S USFWS-SC	Rapids and flowing pools of streams and rivers primarily over bottoms of gravel-rubble with sandy silt in the interstices. Elevation range 480–8,840 feet.	Possible in the San Pedro River.†
Sonora sucker (*Catostomus insignis*)	BLM-S USFWS-SC	Variety of habitats from warm water rivers to trout streams. Elevation range 1,210–8,730 feet.	Possible in the San Pedro River.†
Desert tortoise (Sonoran population) (*Gopherus agassizii*)	USFWS-SC	Rocky slopes and bajadas in the Sonoran Desertscrub biotic community. Shelter sites are caliche caves in incised, cut banks of washes.	Probable.†
Western small-footed myotis (*Myotis ciliolabrum*)	BLM-S USFWS-SC	Deserts, chaparral, riparian areas, and oak-juniper forests. Hibernates in caves and old mines. Elevation range 2,120–8,670 feet	Possible along the San Pedro River.†
Cave myotis (*Myotis velifer*)	BLM-S USFWS-SC	Desertscrub of creosote, brittlebush, paloverde, and cacti. Roosts in caves, tunnels, mine shafts, under bridges, and sometimes in buildings. Elevation range 300–5,000 feet.	Probable.†
Pocketed free-tailed bat (*Nyctinomops femorasaccus*)	BLM-S	Desertscrub to pine-oak forests, arid lower elevations usually around high cliffs and rock outcrops. Roosts in rock crevices; may also use buildings. Elevation range 190–7,520 feet.	Possible.†
Mississippi kite (*Ictinia mississippiensis*)	AGFD-WSC	In Arizona, the small population is primarily restricted to lowland riparian woodlands, where they nest in cottonwoods taller than 50 feet. Elevation range 1,750–3,680 feet.	Documented within 5 miles of the project area.‡
Northern gray hawk (*Buteo nitidus maxima*)	USFWS-SC AGFD-WSC	In Arizona, nests almost exclusively along lowland riparian areas; mostly along perennial, intermittent drainages dominated by Fremont cottonwood and Goodding willow, typically with adjacent stands of velvet mesquite. Elevation range 1,950–5,000 feet.	Documented within 5 miles of the project area.‡
Thick-billed kingbird (*Tyrannus crassirostris*)	AGFD-WSC	Primarily found in riparian gallery woodlands along perennial or intermittent creeks and rivers. Elevation range 3,500–4,200 feet.	Documented within 5 miles of the project area.‡
Lowland leopard frog (*Rana yavapaiensis*)	USFWS-SC AGFD-WSC	Habitat generalist that breeds in a variety of natural and human-made aquatic systems, including rivers, permanent streams, permanent pools in intermittent streams, beaver ponds, wetlands, springs, earthen cattle tanks, livestock drinkers, canals, irrigation sloughs, wells, mine adits, and ornamental backyard ponds. Elevation range 480–8,200 feet.	Documented within 5 miles of the project area.‡

* Status Codes: BLM-S (BLM Sensitive); USFWS-SC (USFWS Species of Concern); AGFD-WSC (AGFD Wildlife of Special Concern in Arizona).

† Potential for occurrence based on WestLand (2007c).

‡ Potential for occurrence based on letter response from AGFD (2008).

It is unlikely that the project would adversely impact any of the 12 special-status animal species listed in Table 9. Although Mississippi kite, northern gray hawk, and thick-billed kingbird may forage or nest along the San Pedro River near the project area, impacts to vegetation would be would be avoided or minimized to the extent practicable according to measures outlined in Section 3.4. Western small-footed myotis, cave myotis, and pocketed free-tailed bat may forage in the project area, but there are no known potential roost sites within the footprints of the transmission line or access roads. Fish habitat within the San Pedro River channel would not be impacted as a result of the Proposed Action.

The proposed project could adversely impact San Carlos wild-buckwheat and possibly desert tortoise, both of which are listed as USFWS Species of Concern. Although San Carlos wild-buckwheat has been recorded within 5 miles of the project area, its presence in the project area has not been confirmed. While desert tortoise may occasionally be found in the project area, occurrences are expected to be infrequent.

SWTC would use transmission structures that are designed to minimize potential electrocutions of birds-of-prey (raptors). The objective in designing raptor-safe transmission structures is to provide 60 inches between energized conductors or between energized conductors and grounded hardware. Accordingly, SWTC would use a davit arm structure design for this project that provides an approximately 15-foot space between suspended phases. These dimensions are adequate to protect most birds under most conditions. The davit arms accommodate raptor perching while providing a sufficient distance (approximately 6 feet) between the top of the arm and conductors both above and below the perch site. Additionally, the insulation bells upon which the conductor is suspended are 7 feet 11 inches long. This allows sufficient spacing for potential perching on the two lower davit arms.

Impacts of the No-Action Alternative

Under the No-Action Alternative, there would be no impacts to wildlife.

3.3 CUMULATIVE IMPACTS

A Cumulative Impact, as defined by Council on Environmental Quality (40 CFR 1508.7), is the impact on the environment that results from the incremental impact of the Proposed Action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts are interdisciplinary, multi-jurisdictional, and usually do not conform to political boundaries. To determine the cumulative effects, past, present, and future actions were evaluated within of the same geographic extent as the Proposed Action.

Past Actions

The past actions in the project vicinity include extensive industrial infrastructure associated with the San Manuel plant, transportation corridors (including roads, highways, and the San Manuel Arizona Railroad), commercial and residential development, and public utility installation. An existing linear public utility ROW and road ROWs are located on BLM land in the project area.

Present Actions, Including Proposed Actions

Present and proposed actions in the project vicinity include completed plant site reclamation, public utility installation associated with this project, and improvements to transportation infrastructure. To our knowledge, other than this project there are no additional actions currently proposed on BLM land in the project area.

As the need for future load increases, SWTC will eventually construct a new substation, the Redington Substation, on BHP property along the segment of the San Manuel Interconnect project near the existing San Manuel Substation. The date at which this proposed substation would need to be in service has not yet been determined.

Reasonably Foreseeable Future Actions

SWTC's Hayden Substation currently has the ability to wheel power from the Salt River Project (SRP). SRP has plans to upgrade to 230 kV their 115-kV system from southwest Phoenix into Hayden. When this happens, SWTC will also consider upgrading the Apache to San Manuel and San

Manuel to Hayden 115-kV line to 230 kV. The APS Saguaro to San Manuel 115-kV line is also insulated for future 230-kV operation. The currently proposed San Manuel Interconnect project would benefit both APS and SWTC in this regard.

When the Apache to Winchester 230-kV line was built in 2004, it was constructed in the same ROW as the Apache to Hayden 115-kV line; and both lines were constructed as a double-circuit 230-/115-kV line. The Apache to Hayden line was upgraded for future 230-kV operation and future plans call for tying the Hayden line in to Winchester when the 230-kV system of SRP reaches Hayden and SWTC upgrades to 230 kV the 115-kV line from Hayden to San Manuel to Winchester.

Reasonably foreseeable future actions identified on BLM land in the project area are limited to maintenance of existing facilities.

3.3.1 Cumulative Impacts of the Proposed Action

Based on the previous analysis of specific environmental elements, the following resources would be impacted by the Proposed Action: air quality, geology or soils, visual resources, vegetation, migratory birds, and wildlife. These resources have the potential to be cumulatively impacted by activities within the area of the Proposed Action.

Cumulative Construction Impacts. Construction activities would result in permanent impacts to vegetation, wildlife habitat, and soils on approximately 9.6 acres, including 0.87 acre of BLM land. Depending on project timing, these impacts could potentially impact migratory birds. No major construction activities are likely to occur concurrently in the same general area as the Proposed Action. The decrease in vegetation, wildlife habitat, and soils associated with the Proposed Action would be cumulatively insignificant in light of the widespread abundance of similar vegetation and wildlife habitat in the project vicinity.

Construction activities would result in cumulative air quality and visual impacts. Impacts to air quality would be temporary and of short duration. Visual resource impacts would be permanent.

Cumulative Operational Impacts. The existing transmission line on BLM land in the project area would require periodic maintenance and operational visits. Human presence and vehicular noise during these visits and during maintenance activities associated with the proposed 230-kV transmission line would potentially disturb wildlife and migratory birds in the area. However, the limited noise associated with these activities would be temporary. Consequently, it is likely that operational impacts associated with operation and maintenance of the existing and proposed transmission lines would be cumulatively insignificant. Air quality impacts also would be temporary and localized; it is therefore unlikely that maintenance activities would result in cumulatively significant air quality impacts.

3.3.2 Cumulative Impacts of the No-Action Alternative

If the BLM does not authorize the ROW, SWTC would be required to reconsider alternative routes in order to provide electricity to Trico, one of its member systems. Trico in turn needs to be able to import and export power into the SWTC system to support the increasing loads in southeast Pinal County. To provide power to the APS transmission system, it is necessary for SWTC to tie in to the APS 115-kV system at the San Manuel Substation. If a suitable alternative cannot be found, there would be a negative impact to socioeconomic resources from decreased energy reliability in southeast Pinal County.

3.4 DESCRIPTION OF MITIGATION MEASURES

3.4.1 Proposed Action

General mitigation measures would include the following:

1. All vehicles and construction equipment will be properly maintained to minimize exhaust emissions and will be properly muffled to minimize noise.
2. Any equipment or materials transported onto BLM-administered lands for maintenance or repair will be promptly removed upon completion of the project.
3. Any vehicles that are brought in from outside the area will be power-washed, including the undercarriage, to prevent the introduction and spread of noxious weeds and invasive species.
4. Watering trucks or other means shall be used as needed to minimize fugitive dust.
5. An archaeological monitor would be provided during ground-disturbing activities in dense mesquite woodland along the San Pedro River floodplain to avoid impacts to hidden or buried cultural features.
6. If any archaeological resources or vertebrate fossils are discovered during implementation of this project, all surface-disturbing activities in the area of discovery will cease. The archaeologist will evaluate the discovery and provide recommendations to the authorized officer. Surface disturbing activities will not resume until permission is obtained from the authorized officer.
7. If any species listed as threatened or endangered under the ESA is encountered during the activities, work will stop and telephone notification of the discovery will be made immediately to the BLM wildlife biologist. The activity may resume only after the authorized officer has issued a continuance.

Summarized below are measures proposed to avoid impacts to southwestern willow flycatcher and southwestern willow flycatcher Critical Habitat.

1. Implement project construction and maintenance procedures that would avoid to the extent possible vegetation impacts in the vicinity of the active San Pedro River channel.
2. Avoid changes to river morphology by siting roads outside the active San Pedro River channel and using a cement base and small disturbance footprint for the installation of the single transmission structure near the active channel.
3. Prohibit ATVs from crossing the active channel of the San Pedro River.
4. Install gates on new access roads in the San Pedro River floodplain to prevent unauthorized ATV access to Critical Habitat.
5. Conduct all work along the San Pedro River floodplain between September 1 and April 15, the non-breeding season for southwestern willow flycatcher.
6. Continue to conduct southwestern willow flycatcher surveys in 2009 (despite no detections in 2007 and 2008).

Summarized below are measures proposed to avoid impacts to lesser long-nosed bat and lesser long-nosed bat habitat.

1. Provide a monitor during road construction to avoid unnecessary impacts to saguaros.
2. Transplant along the road corridor all saguaros ≤5 feet tall that would be impacted by the project.

3. Pay an in-lieu fee to AGFD for future research benefiting lesser long-nosed bat. The in-lieu fee would be paid upfront (prior to road construction) and the fee amount would be based on the stumpage value (calculated according to ADA guidelines) of all saguaros >5 feet tall that would be impacted by the project.

3.5 COMPLIANCE AND AREA MONITORING

SWTC, the ROW grant holder, shall notify the BLM prior to commencing emergency maintenance activities outside the ROW grant area on BLM-administered lands. The ROW grant Terms and Conditions are incorporated by reference in this document. Area monitoring of the ROW by the BLM is not considered necessary.

3.6 BENEFICIAL AND RESIDUAL IMPACTS

3.6.1 Beneficial Impacts of the Proposed Action

Beneficial impacts include increased energy reliability to communities in southeast Pinal County.

3.6.2 Residual Impacts of the No-Action Alternative

Residual impacts include the potential for energy shortages and the possibility of service disruptions in the southeast Pinal County.

Chapter 4

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Chapter 5

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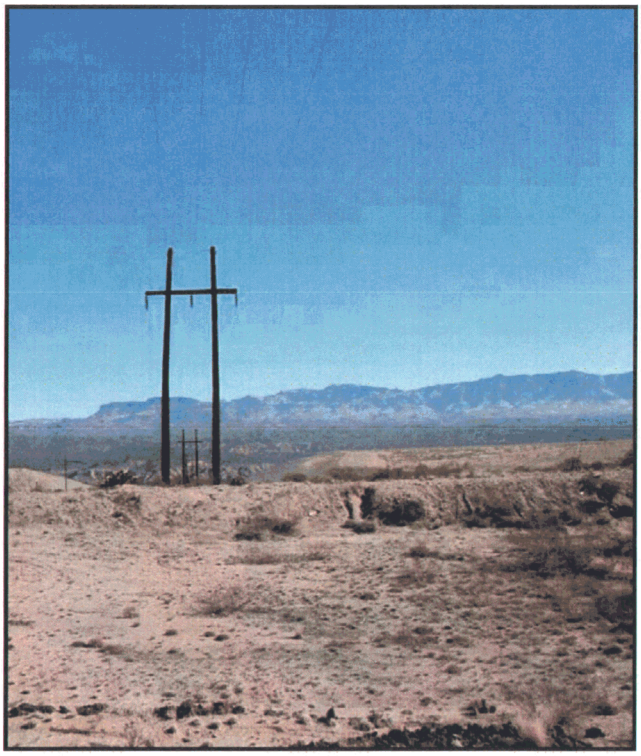
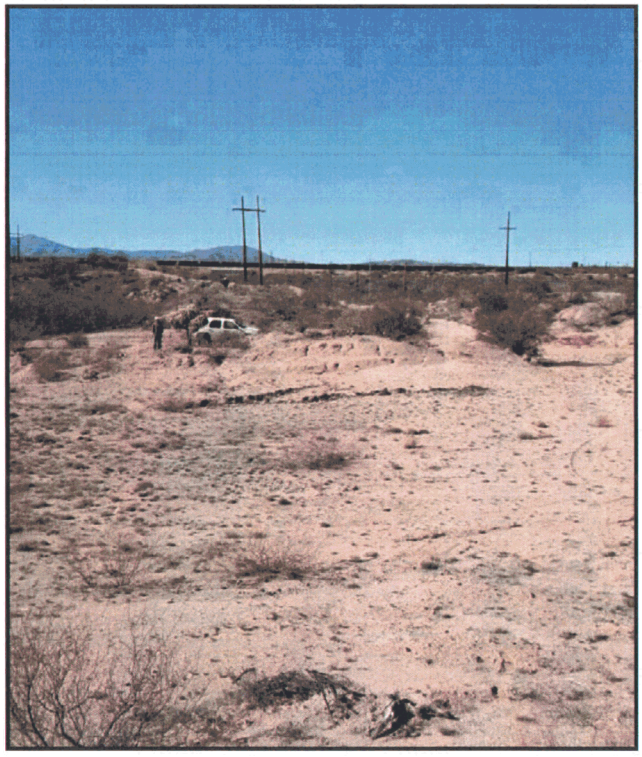
APPENDIX A

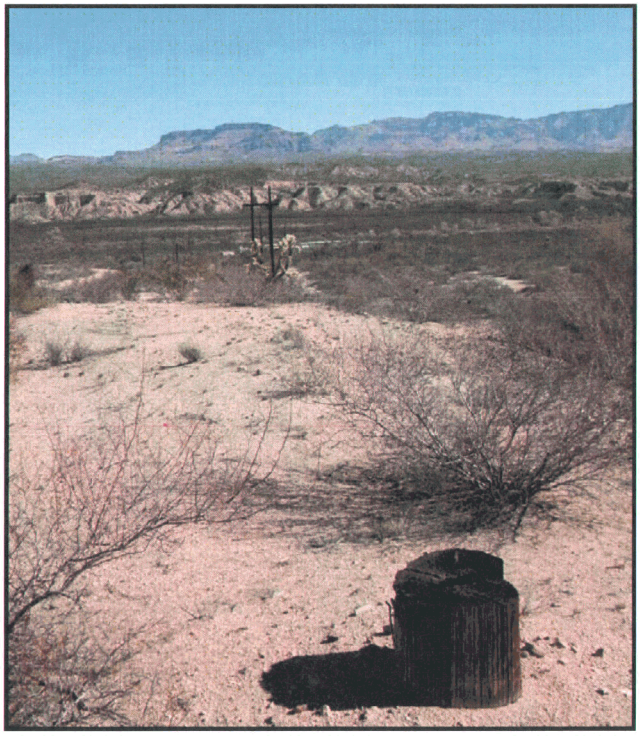
Representative Photographs of the Project Area



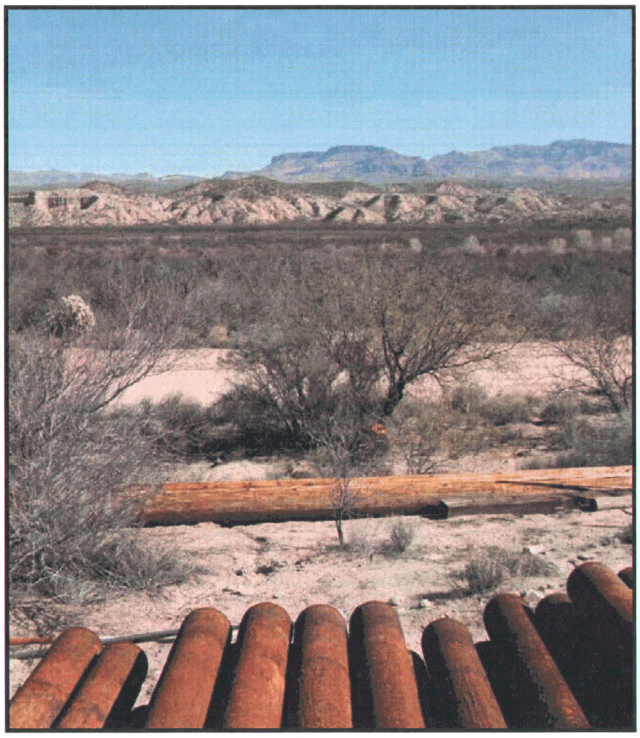
Photograph 1. BHP 46 kV line, San Manuel Interconnect Project.



Photograph 2. BHP 46 kV line looking west toward San Manuel, San Manuel Interconnect Project.



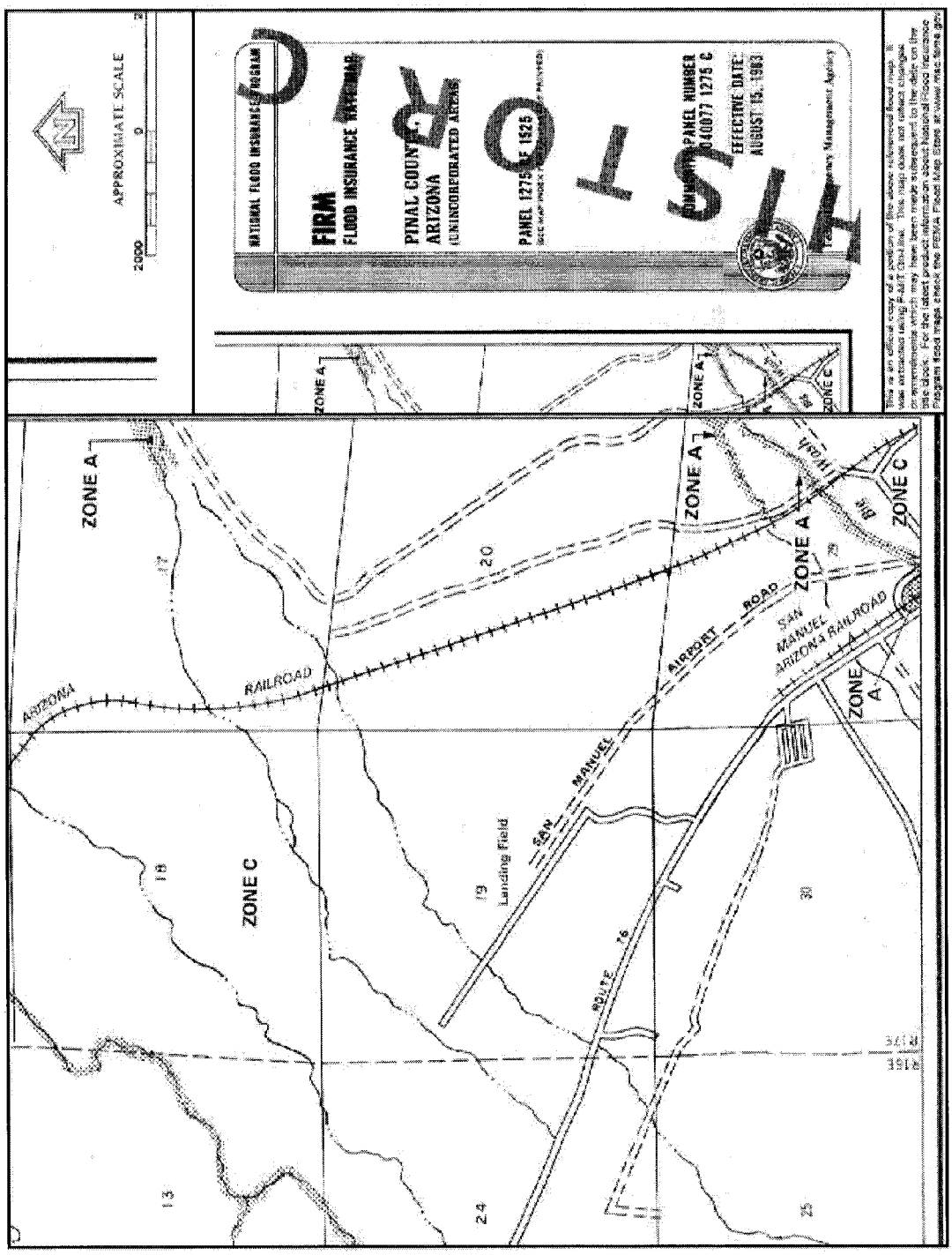
Photograph 3. BHP 46 kV line looking east across San Pedro River toward Galiuro Mountains, San Manuel Interconnect Project.



Photograph 4. Looking east across San Pedro River from Pump House site, San Manuel Interconnect Project.

APPENDIX B

Flood Insurance Rate Maps


APPROXIMATE SCALE
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NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
PINAL COUNTY,
ARIZONA
(UNINCORPORATED AREAS)
PANEL 1275 OF 1525
PANEL NUMBER
040077 1275 C
EFFECTIVE DATE:
AUGUST 15, 1983
Federal Emergency Management Agency
ZONE A
ZONE C
ARIZONA
RAILROAD
AIRPORT
ROAD
SAN
MANUEL
Landing Field
ROUTE 76
SAN
MANUEL
ARIZONA RAILROAD
13
18
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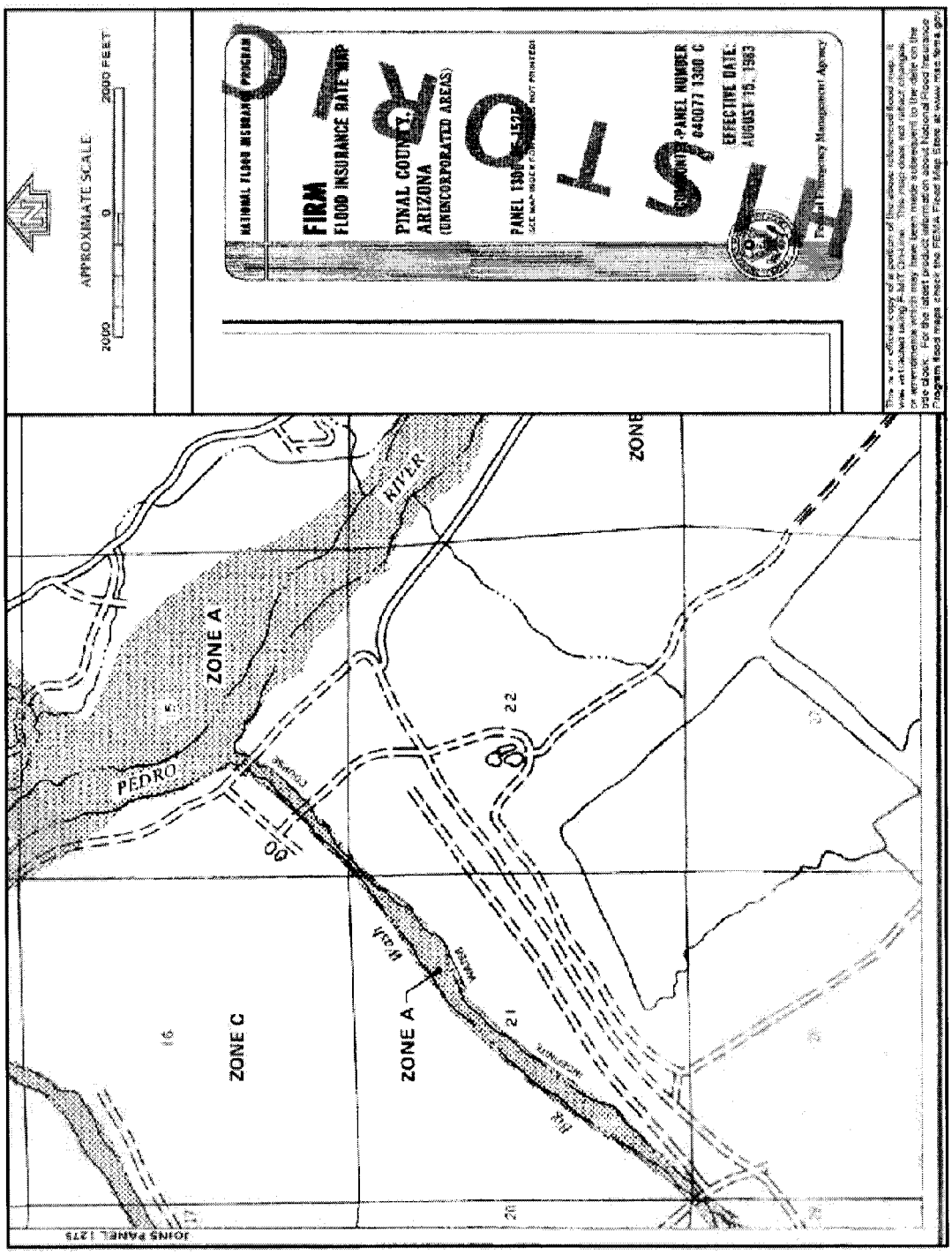
25
30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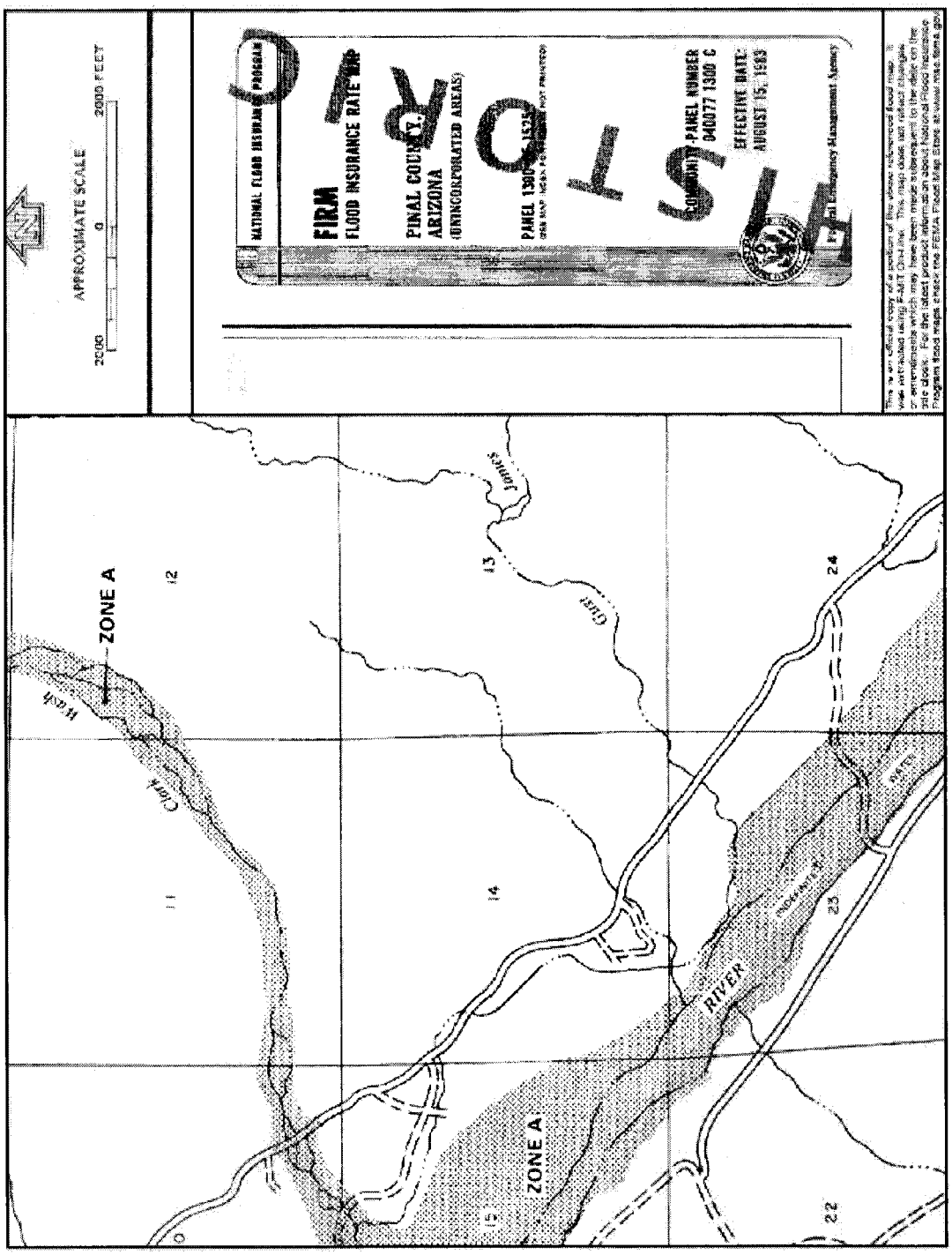
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
PINAL COUNTY,
ARIZONA
(UNINCORPORATED AREAS)
PANEL 1300 OF 1650
NOT PRINTED
COMMUNITY-PANEL NUMBER
040077 1300 C
EFFECTIVE DATE:
AUGUST 16, 1983
Federal Emergency Management Agency
ZONE A
ZONE C
ZONE A
ZONE
PEDRO
RIVER
JOINS PANEL 1275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NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
PINAL COUNTY,
ARIZONA
(UNINCORPORATED AREAS)
PANEL 1300 OF 1325
COMMUNITY-PANEL NUMBER
040077 1300 C
EFFECTIVE DATE:
AUGUST 15, 1993
Federal Emergency Management Agency
ZONE A
ZONE A
RIVER
GILA
SAN PEDRO
11
12
13
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15
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23
24

APPENDIX C

AZHGIS Online Environmental Review Tool

THE STATE OF ARIZONA
GAME AND FISH DEPARTMENT
5000 W. CAREFREE HIGHWAY
PHOENIX, AZ 85086-5000
(602) 942-3000 • WWW.AZGFD.GOV

GOVERNOR
JANET NAPOLITANO
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ROBERT R. WOODHOUSE, ROLL
DIRECTOR
DUANE L. SHROUFE
DEPUTY DIRECTOR
STEVE K. FERRELL

January 28, 2008

RECEIVED JAN 31 2008

SWCA
Ken Kertell
343 W. Franklin St.
Tucson, A 85701

RE: SWTC 115 kV Line, San Manuel substation

Dear Mr. Franklin:

The Arizona Game and Fish Department (Department) has reviewed your letter dated January 18, 2008, regarding the proposed Apache to Hayden 115 kV transmission line.A list of special status species within the project area is provided as an attachment. This information provided is now generated utilizing an interactive Environmental Review on-line tool (Tool). The Tool is an interactive web-based application that provides our customer's the opportunity to submit land and water projects on-line by following a few simple steps (refer to the Tool application homepage for instructions and help pages) http://www.azgfd.gov/hgis/.

The project "receipt" (attached) provides special status species information, along with critical habitat designations, tribal entities on or in proximity to your project boundaries, appropriate state, tribal, and/or federal contacts, special handling guidelines for desert tortoise and/or burrowing owls, and preliminary project type recommendations. Please note this species information can now be provided to almost instantaneously and is designed to replace the need for requests via writing by fax, mail, or email for most projects. However, there are circumstances where it would be necessary to submit the project through the normal mailing process (please refer to the Tool application for further instructions).

The Department appreciates the opportunity to provide comments early in the planning and design stages of the proposed roadway construction project. We would like to continue this coordinated effort and offer additional site-specific guidance that will help conserve wildlife and their habitats, including sensitive, threatened, non-game and game species. If you have any questions regarding this letter, please contact me at 602-789-3606.

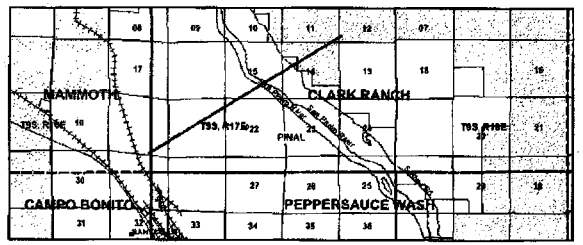
Sincerely,

Daniel E. Nelson
Project Evaluation Specialist

AN EQUAL OPPORTUNITY REASONABLE ACCOMMODATIONS AGENCY

Arizona's On-line Environmental Review Tool
Search ID: 20080128005040
Project Name: SWTC 115kV line San Manuel substation.
Date: 1/28/2008 7:46:43 AM

Project Location



Project Name: SWTC 115kV line San Manuel substation.
Submitted By: PEP Project Evaluation Program
On behalf of: CONSULTING
Project Search ID: 20080128005040
Date: 1/28/2008 7:46:33 AM
Project Category: Energy Storage/Production/Transfer,Energy Transfer,Power line/electric line (new)
Project Coordinates (UTM Zone 12-NAD 83): NaN, NaN meter
Project Length: 6354.516 meter
County: PINAL
USGS 7.5 Minute Quadrangle ID: 1584
Quadrangle Name: CLARK RANCH
Project locality is not anticipated to change

Location Accuracy Disclaimer

Project locations are assumed to be both precise and accurate for the purposes of environmental review. The creator/owner of the Project Review Receipt is solely responsible for the project location and thus the correctness of the Project Review Receipt content.

The Department appreciates the opportunity to provide in-depth comments and project review when additional information or environmental documentation becomes available.

Special Status Species Occurrences/Critical Habitat/Tribal Lands within 3 miles of Project Vicinity:

Name	Common Name	ESA	USFS	BLM	State
Buteo nitidus maxima	Northern Gray Hawk	SC	S		WSC
CH for Empidonax traillii extimus	Designated Critical Habitat for southwestern willow flycatcher				
Empidonax traillii extimus	Southwestern Willow Flycatcher	LE	S		WSC
Eriogonum capillare	San Carlos Wild-buckwheat	SC			SR
Euphorbia gracillima	Mexican Broomspurge		S		
Gopherus agassizii (Sonoran Population)	Sonoran Desert Tortoise	SC			WSC
Ictinia mississippiensis	Mississippi Kite				WSC
Rana yavapaiensis	Lowland Leopard Frog	SC	S		WSC

 APPLICATION INITIALS: _____

Arizona's On-line Environmental Review Tool
Search ID: 20080128005040
Project Name: SWTC 115kV line San Manuel substation.
Date: 1/28/2008 7:46:43 AM

Please review the entire receipt for project type recommendations and/or species or location information and retain a copy for future reference. If any of the information you provided did not accurately reflect this project, or if project plans change, another review should be conducted, as this determination may not be valid.

Arizona's On-line Environmental Review Tool:

1. This On-line Environmental Review Tool inquiry has generated recommendations regarding the potential impacts of your project on Special Status Species (SSS) and other wildlife of Arizona. SSS include all U.S. Fish and Wildlife Service federally listed, U.S. Bureau of Land Management sensitive, U.S. Forest Service sensitive, and Arizona Game and Fish Department (Department) recognized species of concern.
2. These recommendations have been made by the Department, under authority of Arizona Revised Statutes Title 5 (Amusements and Sports), 17 (Game and Fish), and 28 (Transportation). These recommendations are preliminary in scope, designed to provide early considerations for all species of wildlife, pertinent to the project type you entered.
3. This receipt, generated by the automated On-line Environmental Review Tool does not constitute an official project review by Department biologists and planners. Further coordination may be necessary as appropriate under the National Environmental Policy Act (NEPA) and/or the Endangered Species Act (ESA).

The U.S. Fish and Wildlife Service (USFWS) has regulatory authority over all federally listed species under the ESA. Contact USFWS Ecological Services Offices: http://arizonaes.fws.gov/.

Phoenix Main Office
2321 W. Royal Palm Road, Suite 103
Phoenix, AZ 85021
Phone 602-242-0210
Fax 602-242-2513

Tucson Sub-Office
201 North Bonita, Suite 141
Tucson, AZ 85745
Phone 520-670-6144
Fax 520-670-6154

Flagstaff Sub-Office
323 N. Leroux Street, Suite 101
Flagstaff, AZ 86001
Phone 928-226-0614
Fax 928-226-1099

Disclaimer:

1. This is a preliminary environmental screening tool. It is not a substitute for the potential knowledge gained by having a biologist conduct a field survey of the project area.
2. The Department's Heritage Data Management System (HDMS) data is not intended to include potential distribution of special status species. Arizona is large and diverse with plants, animals, and environmental conditions that are ever changing. Consequently, many areas may contain species that biologists do not know about or species previously noted in a particular area may no longer occur there.
3. Not all of Arizona has been surveyed for special status species, and surveys that have been conducted have varied greatly in scope and intensity. Such surveys may reveal previously undocumented population of species of special concern.
4. HDMS data contains information about species occurrences that have actually been reported to the Department.

Arizona Game and Fish Department Mission

To conserve, enhance, and restore Arizona's diverse wildlife resources and habitats through aggressive protection and

 APPLICATION INITIALS: _____

management programs, and to provide wildlife resources and safe watercraft and off-highway vehicle recreation for the enjoyment, appreciation, and use by present and future generations.

Project Category: Energy Storage/Production/Transfer,Energy Transfer,Power line/electric line (new)

Project Type Recommendations:

Based on the project type entered; coordination with U.S. Fish and Wildlife Service (Migratory Bird Treaty Act) may be required (http://arizonaes.fws.gov/)

During planning and construction, minimize potential introduction or spread of exotic invasive species. Invasive species can be plants, animals (exotic snails), and other organisms (e.g. microbes), which may cause alteration to ecological functions or compete with or prey upon native species and can cause social impacts (e.g. livestock forage reduction, increase wildfire risk). The terms noxious weed or invasive plants are often used interchangeably. Precautions should be taken to wash all equipment utilized in the project activities before leaving the site. Arizona has noxious weed regulations (Arizona Revised Statutes, Rules R3-4-244 and R3-4-245). See Arizona Department of Agriculture website for restricted plants http://www.azda.gov/PSD/quarantine5.htm. Additionally, the U.S. Department of Agriculture has information regarding pest and invasive plant control methods including: pesticide, herbicide, biological control agents, and mechanical control: http://www.usda.gov/wps/portal/usdahome. The Department regulates the importation, purchasing, and transportation of wildlife and fish (Restricted Live Wildlife), please refer to the hunting regulations for further information http://www.azgfd.gov/h_f/hunting_rules.shtml.

Impacts to raptors by above ground power lines and poles have been well documented. A number of structural improvements can minimize potential impacts to raptors and other migratory birds. Arizona Public Service (APS) offers guidelines to reduce mortality to these species http://www.aps.com/my_community/Environmental/Environmental_10.html. In addition, indirect affects to wildlife due to construction (timing of activity, clearing of rights-of-way, associated bridges and culverts, affects to wetlands, fences) should also be considered and mitigated. Please contact the Project Evaluation Program for further recommendations regarding trenching and power line associated activities.

The Department recommends that wildlife surveys are conducted to determine if noise-sensitive species occur within the project area. Avoidance or minimization measures could include conducting project activities outside of breeding seasons.

Project Location and/or Species recommendations:

HDMS records indicate that one or more listed, proposed, or candidate species or Critical Habitat (Designated or Proposed) have been documented in the vicinity of your project (refer to page 1 of the receipt). Please contact:
Ecological Services Office
US Fish and Wildlife Service

2321 W. Royal Palm Rd.
Phoenix, AZ 85021-4951
Phone: 602-242-0210
Fax: 602-242-2513

 APPLICATION INITIALS: _____

Arizona's On-line Environmental Review Tool
Search ID: 20080128005040
Project Name: SWTC 115kV line San Manuel substation.
Date: 1/28/2008 7:46:43 AM

HDMS records indicate that Sonoran desert tortoise have been documented within the vicinity of your project area (refer to the species list on page 1 of the receipt). Please review the Tortoise Handling Guidelines found on the Environmental Review Home Page.

http://www.azgfd.gov/hgis/guidelines.azpx

Recommendations Disclaimer:

1. Potential impacts to fish and wildlife resources may be minimized or avoided by the recommendations generated from information submitted for your proposed project.
2. These recommendations are proposed actions or guidelines to be considered during **preliminary project development.**
3. Additional site specific recommendations may be proposed during further NEPA/ESA analysis or through coordination with affected agencies.
4. Making this information directly available does not substitute for the Department's review of project proposals, and should not decrease our opportunity to review and evaluate additional project information and/or new project proposals.
5. The Department is interested in the conservation of all fish and wildlife resources, including those Special Status Species listed on this receipt, and those that may have not been documented within the project vicinity as well as other game and nongame wildlife.
6. **Further coordination requires the submittal of this initialed and signed Environmental Review Receipt with a cover letter and project plans or documentation that includes project narrative, acreage to be impacted, how construction or project activity(s) are to be accomplished, and project locality information (including site map).**
7. Upon receiving information by AZGFD, please allow 30 days for completion of project reviews. Mail requests to:

Project Evaluation Program, Habitat Branch
Arizona Game and Fish Department
5000 West Carefree Highway
Phoenix, Arizona 85086-5000
Phone Number: (623) 236-7600
Fax Number: (623) 236-7366

Terms of Use

By using this site, you acknowledge that you have read and understand the terms of use. Department staff may revise these terms periodically. If you continue to use our website after we post changes to these terms, it will mean that you accept such changes. If at any time you do not wish to accept the Terms, you may choose not to use the website.

1. This Environmental Review and project planning website was developed and intended for the purpose of screening projects for potential impacts on resources of special concern. By indicating your agreement to the terms of use for this website, you warrant that you will not use this website for any other purpose.
2. Unauthorized attempts to upload information or change information on this website are strictly prohibited and may be punishable under the Computer Fraud and Abuse Act of 1986 and/or the National Information Infrastructure Protection Act.
3. The Department reserves the right at any time, without notice, to enhance, modify, alter, or suspend the website and to terminate or restrict your access to the website.
4. This Environmental Review is based on the project study area that was entered. The review must be redone if the project study area, location, or the type of project changes. If additional information becomes available, this review may need to be reconsidered.
5. A signed and initialed copy of the Environmental Review Receipt

 APPLICATION INITIALS: _____

Arizona's On-line Environmental Review Tool
Search ID: 20080128005040
Project Name: SWTC 115kV line San Manuel substation.
Date: 1/28/2008 7:46:43 AM

indicates that the entire receipt has been read by the signer of the Environmental Review Receipt.

Security:

The Environmental Review and project planning web application operates on a complex State computer system. This system is monitored to ensure proper operation, to verify the functioning of applicable security features, and for other like purposes. Anyone using this system expressly consents to such monitoring and is advised that if such monitoring reveals possible evidence of criminal activity, system personnel may provide the evidence of such monitoring to law enforcement officials. Unauthorized attempts to upload or change information; to defeat or circumvent security measures; or to utilize this system for other than its intended purposes are prohibited.

This website maintains a record of each environmental review search result as well as all contact information. This information is maintained for internal tracking purposes. Information collected in this application will not be shared outside of the purposes of the Department.

If the Environmental Review Receipt and supporting material are not mailed to the Department or other appropriate agencies within six (6) months of the Project Review Receipt date, the receipt is considered to be null and void, and a new review must be initiated.

Print this Environmental Review Receipt using your Internet browser's print function and keep it for your records. Signature of this receipt indicates the signer has read and understands the information provided.

Signature:_____

Date: _____

Proposed Date of Implementation: _____

Please provide point of contact information regarding this Environmental Review.

Application or organization responsible for project implementation

Agency/organization:_____

Contact Name: _____

Address: _____

City, State, Zip: _____

Phone: _____

E-mail: _____

Person Conducting Search (if not applicant)

Agency/organization:_____

Page 5 of 6 APPLICATION INITIALS: _____

Arizona's On-line Environmental Review Tool
Search ID: 20080128005040
Project Name: SWTC 115kV line San Manuel substation.
Date: 1/28/2008 7:46:43 AM

Contact Name: _____

Address: _____

City, State, Zip: _____

Phone: _____

E-mail: _____

Page 6 of 6 APPLICATION INITIALS: _____

Exhibit C

BIOLOGICAL EVALUATION

The following summary of biological resources is from the Biological Evaluation prepared by WestLand Resources, Inc. (see attached), and information collected by SWCA Environmental Consultants (SWCA) during correspondence with the Arizona Game and Fish Department (AGFD) (Exhibit K-3). Special-status species include the following: 1) species listed or candidates for listing as endangered or threatened by U.S. Fish and Wildlife Service (USFWS); 2) USFWS Species of Concern; 3) species listed as Sensitive by Bureau of Land Management (BLM); and 4) species listed as Wildlife of Special Concern in Arizona by AGFD. Only those species listed as threatened or endangered by USFWS are afforded protection under the Endangered Species Act.

Of the species included on the USFWS Pinal County list, it was determined that yellow-billed cuckoo (*Coccyzus americanus*), southwestern willow flycatcher (*Empidonax traillii extimus*), and lesser long-nosed bat (*Leptonycteris yerbabuenae*) have a reasonable potential of occurring in the project area. No impacts to yellow-billed cuckoo, a candidate for federal listing, are anticipated as a result of the project. Southwestern willow flycatcher and lesser long-nosed bat, both federally listed endangered, are addressed in detail in the Biological Assessment (Exhibit D) prepared for Southwest Transmission Cooperative, Inc., by SWCA to initiate formal consultation with the USFWS. The proposed project would result in the alteration of approximately 0.56 acre of designated Critical Habitat for southwestern willow flycatcher and the removal of 97 saguaro cacti (*Carnegiea gigantea*), a potential food plant for lesser long-nosed bat in the early to mid-summer range of the species.

Twelve additional special-status species have the potential to occur in the project area (Table C.1). Of these 12 species, only desert tortoise (*Gopherus agassizii*) has a reasonable potential of being impacted by the project during access road construction in the Galiuro Mountains. Although Mississippi kite (*Ictinia mississippiensis*), northern gray hawk (*Buteo nitidus maxima*), and thick-billed kingbird (*Tyrannus crassirostris*) may forage or nest along the San Pedro River near the project area, impacts to broadleaf riparian vegetation would be avoided. Western small-footed myotis (*Myotis ciliolabrum*), cave myotis (*M. velifer*), and pocketed free-tailed bat (*Nyctinomops femorasaccus*) may forage in the project area, but there are no known potential roost sites within the footprints of the transmission line or access roads. Fish habitat within the San Pedro River channel would not be impacted as a result of the project.

Table C.1. Special-Status Species with the Potential to Occur in the San Manuel Interconnect Project Area, Pinal County, Arizona

Species	Status*	Habitat	Potential for Occurrence
Maricopa tiger beetle (*Cicindela oregona maricipa*)	BLM-S USFWS-SC	Found most commonly on sandy stream banks. May occur near seeps or reservoir banks. Preferred substrate appears to be a sand/silt material. Elevation range is 1,100–6,900 feet.	Possible along the San Pedro River.
Gila longfin dace (*Agosia chrysogaster chrysogaster*)	BLM-S USFWS-SC	Intermittent hot, low-desert streams to clear, cool brooks at higher elevations. Elevation range is generally below 4,900 feet.	Possible in the San Pedro River.
Desert sucker (*Catostomus clarki*)	BLM-S USFWS-SC	Rapids and flowing pools of streams and rivers, primarily over bottoms of gravel-rubble with sandy silt in the interstices. Elevation range is 480–8,840 feet.	Possible in the San Pedro River.
Sonora sucker (*Catostomus insignis*)	BLM-S USFWS-SC	Variety of habitats, from warm-water rivers to trout streams. Elevation range is 1,210–8,730 feet.	Possible in the San Pedro River.

Table C.1. Special-Status Species with the Potential to Occur in the San Manuel Interconnect Project Area, Pinal County, Arizona (Continued)

Species	Status*	Habitat	Potential for Occurrence
Desert tortoise (Sonoran population) (*Gopherus agassizii*)	USFWS-SC	Rocky slopes and bajadas in the Sonoran Desertscrub biotic community. Shelter sites are caliche caves in incised, cut banks of washes.	Probable.
Western small-footed myotis (*Myotis ciliolabrum*)	BLM-S USFWS-SC	Deserts, chaparral, riparian areas, and oak-juniper forests. Hibernates in caves and old mines. Elevation range is 2,120–8,670 feet.	Possible along the San Pedro River.
Cave myotis (*Myotis velifer*)	BLM-S USFWS-SC	Desertscrub of creosote, brittlebush, paloverde, and cacti. Roosts in caves, tunnels, mine shafts, under bridges, and sometimes in buildings. Elevation range is 300–5,000 feet.	Probable.
Pocketed free-tailed bat (*Nyctinomops femorasaccus*)	BLM-S	Desertscrub to pine-oak forests, arid lower elevations usually around high cliffs and rock outcrops. Roosts in rock crevices; may also use buildings. Elevation range is 190–7,520 feet.	Possible.
Mississippi kite (*Ictinia mississippiensis*)	AGFD-WSC	In Arizona, the small population is primarily restricted to lowland riparian woodlands, where they nest in cottonwoods taller than 50 feet. Elevation range is 1,750–3,680 feet.	Documented within 5 miles of the project area.
Northern gray hawk (*Buteo nitidus maxima*)	USFWS-SC AGFD-WSC	In Arizona, nests almost exclusively along lowland riparian areas; mostly along perennial, intermittent drainages dominated by Fremont cottonwood and Goodding willow, typically with adjacent stands of velvet mesquite. Elevation range is 1,950–5,000 feet.	Documented within 5 miles of the project area.
Thick-billed kingbird (*Tyrannus crassirostris*)	AGFD-WSC	Primarily found in riparian gallery woodlands along perennial or intermittent creeks and rivers. Elevation range is 3,500–4,200 feet.	Documented within 5 miles of the project area.
Lowland leopard frog (*Rana yavapaiensis*)	USFWS-SC AGFD-WSC	Habitat generalist that breeds in a variety of natural and human-made aquatic systems, including rivers, permanent streams, permanent pools in intermittent streams, beaver ponds, wetlands, springs, earthen cattle tanks, livestock drinkers, canals, irrigation sloughs, wells, mine adits, and ornamental backyard ponds. Elevation range is 480–8,200 feet.	Documented within 5 miles of the project area.

* Status Codes:

AGFD-WSC = AGFD Wildlife of Special Concern in Arizona;

BLM-S = BLM Sensitive;

USFWS-SC = USFWS Species of Concern.

BIOLOGICAL ASSESSMENT

REDINGTON INTERCONNECT PROJECT
SAN MANUEL, PINAL COUNTY, ARIZONA

Prepared for:

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July 24, 2007
Job No. 473.20 340 340

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1. INTRODUCTION

Southwest Transmission Cooperative, Inc. (the Applicant) has retained WestLand Resources, Inc. (WestLand) to prepare this Biological Assessment (BA) evaluating the impacts of their proposed transmission line and Redington Interconnect Project (the Project) to any species listed as threatened or endangered under the Endangered Species Act (ESA). The Project will include the following: (1) construction of a new 115 kV switchyard with additional space available for future expansion to a 230/69 kV electric substation and (2) construction of approximately 4.5 miles of 230 kV double circuit transmission line, although the line will be initially energized at 115 kV. The structures will be constructed of self-weathering steel, approximately 115 feet in height. The Redington switchyard will be constructed on an approximately five-acre parcel of land in the area of the former BHP Copper Inc. plant site. Two locations are currently being considered for the switchyard. A detailed discussion of the proposed project can be found in Section 3 of this BA.

WestLand prepared a preliminary jurisdictional delineation of waters of the United States (waters) located within the Project area. Depending on the final project design, construction of the Project may require the discharge of dredged or fill material into waters of the U.S. One alternative of the Project includes approximately 35 acres of BLM lands. The Project requires authorization for funding and construction from the Rural Utilities Service (RUS). Depending upon final design and alternative selection, the project may not require any authorization from the Corps of Engineers or the BLM for its construction. For purposes of this Section 7 consultation, therefore, it is assumed that RUS will be the lead federal agency.

This BA has been prepared in accordance with U.S. Fish & Wildlife Service (USFWS) procedures for consultation as set forth in 50 CFR Parts 402.12 and 402.14(c)(1) through (6).

This BA consists of the following sections:

- Section 1, Introduction (this section), provides the background and regulatory context of the Project.
- Section 2, Environmental Setting, describes the local and regional context of the site, focusing on threatened and endangered species present or potentially present onsite.
- Section 3, Project Description, details the Proposed Activities, describes the overall site development plan, and describes the Applicant's proposed conservation measures.
- Section 4, Analysis of Impacts, describes the impacts to the threatened and endangered species present or potentially present onsite which are likely to occur as a result of the Project.
- Section 5, Literature Cited, provides a reference list of other documents used to support our research.

2. ENVIRONMENTAL SETTING

2.1. Existing Development and Adjacent Land Uses

The project area is located adjacent to the town of San Manuel, Pinal County, Arizona (T9S, R17E, Sections 10 through 15, 21, 22, 23, 28, 29, 32; see Figure 1). Land ownership associated with the project corridor includes Bureau of Land Management (BLM), Arizona State Trust Lands, and private (BHP). The analysis area includes a corridor 1,000 to 1,500 feet wide (500 to 750 feet on each side of the center line) along approximately 7.2 miles of proposed transmission line construction, including the primary and one alternate alignment (Figure 2). The analysis area includes two proposed locations for the switchyard. The total analysis area is approximately 1,060 acres. The southwest end of the line, at the new switchyard, will be at an elevation of about 3,200 feet above mean sea level (amsl). The northeast end of the line originates at an existing transmission line running in a northwest to southeast direction in the foothills of the Galiuro Mountains. This line is located about one mile east of and roughly parallel to River Road. There are two possible connections to the existing transmission line, in the primary and alternate alignments.

The western end of the proposed corridor is on land currently owned by BHP and formerly used for copper processing facilities. This site once included a mill, concentrator, and smelter, but all of these facilities have been removed, and the site is being reclaimed. Remaining evidence of these facilities is now limited to slag disposal areas, a few square miles of reclaimed tailings impoundments, and offices and shops related to the reclamation efforts. The proposed corridor would pass between two tailings impoundments.

The east end of the proposed corridor crosses a wide, flat area that was formerly used for agriculture, although it is now grazed and becoming overgrown with shrubby mesquites. An abandoned ranch house and other buildings are located in the mesquite bosque in the northern corridor alternative.

River Road runs parallel to the San Pedro River, on the east edge of the mesquite bosque, and it crosses both alternative corridors. The northern alternative follows Clark Wash, and a narrow dirt road is currently accessible to the existing transmission line. Access to the southern alternative is more difficult, although a road to the existing transmission line is available on adjacent property. The current land use for areas on the east side of the river is primarily low intensity livestock grazing.

2.2. Physical Resources

The elevation at the northeast end of the northern alignment, in Clark Wash, is approximately 2,700 feet amsl. The elevation at the northeast end of the southern alignment, on the ridge south of Clark Wash, is approximately 2,950 feet amsl. The low point of the corridor is at the crossing over the San Pedro River at an elevation of approximately 2,500 feet amsl. On the west side of the river, the gradient is relatively low and constant. On the east side of the river, the corridor is nearly flat in old agricultural fields, and then the surface rises abruptly at the edge of the Galiuro foothills. The substrate along the entire length of the corridor is either conglomerate or recent alluvium near the river.

Potentially jurisdictional waters of the United States are present on the active channel of the San Pedro River and in ephemeral washes on both sides of the river. These features are described in detail in a separate report (WestLand 2006).

2.3. Vegetation and Habitat

A site visit was conducted on December 6, 2006, to evaluate the existing conditions on the site with regard to vegetation patterns, special aquatic sites, and potential impacts. Selected photographs taken during the site visit are included in Appendix A.

Dominant natural vegetation communities in the project area include the Arizona Upland Subdivision of the Sonoran Desertscrub and Sonoran Riparian Scrubland (Brown 1982). Portions of the proposed corridor have been previously disturbed by human activity. The west end of the corridor runs parallel to a maintenance road between tailings impoundments from former copper concentrating operations at the BHP facility. The two new switchyard locations and access road will be near an existing substation on land formerly occupied by the copper processing facilities (Photo 1). Very little vegetation is present in this vicinity, but there are a few velvet mesquite (*Prosopis velutina*), tamarisk (*Tamarix* sp.), desert broom (*Baccharis sarathroides*), and Russian thistle (*Salsola iberica*) near a drainage channel (Photo 2). East of the substation, the corridor passes between two existing tailings impoundments that are currently being reclaimed (Photo 3). Other anthropogenic activities include areas cleared for agricultural use in the old mesquite bosque in the floodplain on the east side of the San Pedro River. These areas are now overgrown with shrubby mesquites and silverleaf nightshade (*Solanum elaeagnifolium*) (Photos 4 and 5). Some abandoned ranch facilities are located in the remaining part of the bosque, near River Road from Mammoth to Redington. This road is located near the foot of the hills east of the river.

The Arizona Upland Subdivision of Sonoran Desertscrub covers the hills east of the San Pedro River (Photo 6) and some relatively undisturbed areas of the corridor between the river and the tailings impoundments (Photo 3). Within this subdivision, the dominant vegetation association is the paloverde-cacti-mixed shrub series, as described by Turner and Brown (1982). The defining species of this association are little-leaf paloverde (*Parkinsonia microphylla*) and saguaro cactus (*Carnegiea gigantea*). Other common species include, but are not limited to, velvet mesquite, creosote bush (*Larrea tridentata*), desert hackberry (*Celtis pallida*), catclaw acacia (*Acacia greggii*), whitethorn acacia (*A. constricta*), canyon ragweed (*A. ambrosioides*), and ocotillo (*Fouquieria splendens*). A variety of cholla and prickly pear (*Opuntia* spp.) species contribute significantly to this association. At higher points on the slopes, there are generally lower vertical structure, species diversity, and species density in the plant community. Plant species observed in this community are listed in Appendix B; animal species are listed in Appendix C.

The floodplain area adjacent to the San Pedro River is covered primarily by Sonoran Riparian Scrubland, where it has not been cleared for agriculture (Photo 7). This community is comprised of scrublands 5 to 10 feet tall and too dense to be considered desertscrub or riparian strand (Minckley and Brown 1982a). This community includes several species common in the adjacent uplands, including velvet mesquite, whitethorn acacia, and desert hackberry. Other species more characteristic of the riparian conditions include seepwillow (*Baccharis salicifolia*) and desert broom (*Baccharis sarathroides*). Tamarisk (*Tamarix* sp.) is abundant in some areas. Some parts of the riparian zone along the San Pedro River support species more typical of the Sonoran Riparian Deciduous Woodland association, as described by

Minckley and Brown (1982b). Dominant species in this community include Fremont cottonwood (*Populus fremontii*), Goodding willow (*Salix gooddingii*), and tamarisk (*Tamarix* sp.). All of these species are present within the corridor, but the cottonwoods and willows are widely spaced while the tamarisk is abundant (Photo 8). The upper levels of the riparian corridor were originally a dense bosque of velvet mesquite. At the present time, the main channel of the San Pedro River is incised several feet below the active floodplain (Photo 9), which in turn is a few feet below the level of the mesquite bosque. Within the transmission line corridor, the main channel meanders from the east side to the west side of the active floodplain. At the time of our site visit, water in the river was 15 to 20 feet wide and up to a foot deep.

2.4. Special Status Species

2.4.1. Special Status Species Screening Analysis

Based on our evaluation of habitat requirements and geographic and elevational range of special status species provided below, three of the species included on the list of federally-listed species for Pinal County (Appendix D) have a reasonable potential to be present in the proposed corridor. These species are the yellow-billed cuckoo (*Coccyzus americanus*), southwestern willow flycatcher (*Empidonax traillii extimus*), and lesser long-nosed bat (*Leptonycteris yerbabeunae*). These species are discussed in more detail in the following sections. The bald eagle (*Haliaeetus leucocephalus*) may be seen in this vicinity as a rare transient, but the site provides no resources for long-term residency. Each of these species is considered in greater detail following the screening analysis presented below.

2.4.1.1. Federally Listed Species. Lists of potential threatened, endangered, or sensitive plant and animal species were compiled from internet sites maintained by Arizona Game and Fish Department (AGFD 2006) and U. S. Fish and Wildlife Service (USFWS 2006a). Habitat information on these species was obtained from the same sources and from published literature. Potential species in this vicinity were compared with available habitat conditions to assess a probability of occurrence on the site. Current taxonomic information for plants and animals was obtained from Integrated Taxonomic Information System (ITIS 2006). For the purposes of this evaluation, our primary analysis was limited to species covered by the Endangered Species Act as endangered, threatened, candidate, or species of concern, as listed in Appendix D. Of these species, only those formally listed as threatened or endangered are provided statutory protection. The other species are considered because of the possibility of listing at some time in the future.

2.4.1.2. BLM Sensitive Species – BLM. Because a very small portion of one of the alternative corridors crosses through BLM land, we also considered the possibility of BLM sensitive species in our analysis. The BLM portion of the corridor is limited to the northwest corner of Section 13, T9S, R17E. Vegetation on this parcel is limited to Arizona Upland Subdivision of Sonoran Desertscrub, and none of the riparian zone along the San Pedro is administered by BLM. BLM sensitive species known to be present in Pinal County are listed in Appendix E. Although these species have no special statutory protection, they are considered important by BLM as indicator species.

No plant species listed as sensitive by BLM in Pima County have any reasonable potential to be found in the proposed corridor. One invertebrate, the Maricopa tiger beetle (*Cicindela oregona maricopa*), is considered sensitive by BLM. This species is likely to be found in moist sand near the San Pedro River, and it is unlikely to be present on the small parcel of BLM land within the corridor.

Three fish species listed as sensitive by BLM are known to be present in the San Pedro River and have potential to be present at the proposed crossing, when surface water is available. However, no fish were seen in the river at the time of our site visit. These species are the Gila longfin dace (*Agosia chrysogaster chrysogaster*), desert sucker (*Catostomus clarki*), and Sonora sucker (*Catostomus insignis*). Each of these species is also a species of concern for USFWS. There is no possibility of these species being present in the BLM administered parcel of land within the corridor.

The desert tortoise (Sonoran population) is listed as a species of special concern by USFWS and it is treated as a sensitive species by BLM. The San Pedro Valley is near the eastern range limit for this species, but it supports a substantial population of these tortoises (AGFD 2001). Desert tortoises are found primarily on rocky slopes and bajadas of Mojave and Sonoran desertscrub. Caliche caves in incised, cut banks of washes are also used for shelter sites (AGFD 2001). Sonoran tortoise forage includes (in order of relative abundance in scat fragment analysis) dicot annuals, grasses, herbaceous perennials, trees and shrubs, subshrubs/woody vines, and succulents (AGFD 2001). These physical features and vegetation resources are available in the washes and ridges east of River Road (Photo 12) on the east side of the San Pedro River and, to a lesser extent, in the wash between Tailings Impoundments 1 and 10. Desert tortoises are likely to be present within the proposed corridors. None were seen during our site visit, but they are likely to be in their winter hibernacula at this season. WestLand archeologists observed an old tortoise shell in the corridor.

Three bat species listed as sensitive by BLM are likely to be present in the vicinity of the transmission line corridor. These species are the western small-footed myotis (*Myotis ciliolabrum*), cave myotis (*Myotis velifer*), and pocketed free-tailed bat (*Nyctinomops femorosaccus*). These bats are all insectivorous and are likely to forage over the site, particularly over the riparian corridor. There are no known abandoned mines or caves on the site that could provide hibernation sites, although day or night roost sites are available in abandoned ranch buildings and tree snags. If the construction of the transmission line could be completed during the bat hibernation period, it is unlikely that construction activities would have any effect on these bats.

If the construction is conducted during a season when bats are present, there could be some impact to bats roosting in trees or abandoned buildings. If construction activities are restricted to daylight hours, there would be little, if any, disturbance to bats foraging over the river. If construction activities are conducted at night, there would be a possibility of interference with bat foraging flights. It is also possible that insects could be attracted to the construction lighting system, providing a concentrated food resource for these bats.

2.4.2. Southwestern Willow Flycatcher

The southwestern willow flycatcher is one of four subspecies of the willow flycatcher. This subspecies was first listed as endangered in 1995 (60 FR 10695-10715). Critical habitat was designated in 1997 (62 FR 39129-39147), but this designation was set aside by the 10th Circuit Court of Appeals

(USFWS 2002a). A new critical habitat designation was finalized in 2005 (70 FR 60886-61009). Designated critical habitat includes the San Pedro River from Kelsey Canyon (upstream from Cascabel) to the confluence with the Gila River at Winkelman.

The southwestern willow flycatcher is migratory, spending the winter in Mexico and Central America and the breeding season in Arizona, New Mexico, and parts of California, Nevada, Utah, Colorado, and Texas (AGFD 2002b). They generally arrive on the breeding grounds in mid-May and depart by mid-September (USFWS 2002b). The preferred breeding habitat of this flycatcher is in dense, shrubby riparian vegetation along streams or wetlands, usually close to surface water or saturated soils. Preferred shrub species include willows (*Salix* spp.), tamarisk (*Tamarix ramosissima*), seepwillow, and cottonwood (*Populus* spp.) (USFWS 2002b).

Southwestern willow flycatchers are known to breed in at least 12 sites along the San Pedro River between Kelsey Canyon and the Gila River (70 FR 60924). In 2004, there were about 140 active territories in these 12 sites. The status of willow flycatchers at the proposed transmission line crossing remains unconfirmed, although territories and nests have been located by AGFD within one-half mile upstream from the corridor. In 2004, AGFD surveys found 59 territories in the San Manuel Crossing vicinity (Munzer, et al. 2005). At the time of our site visit, habitat conditions within the corridor did not appear to be optimal for willow flycatchers, but there were some patches of tamarisk that appeared to have the appropriate density and structure for these flycatchers. One bird nest was found in these tamarisks, but it could have been built by any of several species in addition to the willow flycatcher (Photograph 10).

2.4.3. Lesser Long-nosed Bat

The lesser long-nosed bat was proposed for listing as endangered by the USFWS in 1987 (52FR 25171), with a final ruling in 1988 (53 FR 38456), without critical habitat. It is also listed by AGFD as a Wildlife Species of Special Concern. This species has also had a complicated taxonomic history. It was originally described as Sanborn's long-nosed bat (*Leptonycteris sanborni*) by Hoffmeister (1957). Later, other taxonomists determined that this bat should be considered a subspecies of *L. curasoae* from northern South America, and the name was changed to lesser long-nosed bat (*L. c. yerbabuenae*). More recently, this bat was elevated to full species status as *Leptonycteris curasoae* (ITIS 2006).

In Arizona, New Mexico, and northwestern Mexico, this species is migratory. Pregnant females arrive in Arizona in late April and early May and feed on nectar and pollen of saguaros and other columnar cacti (Wilson 1985). Maternity colonies are located in natural caves in limestone and basalt and in abandoned mines. Adult males arrive in late July to early August to join females and young as they disperse from maternity roosts to forage on nectar and pollen of agave flowers. At this time, the species distribution expands east and north into plant communities at higher elevations than the earlier foraging grounds (Cockrum and Petryszyn 1991). By mid- to late-September, the majority of these bats have left Arizona to return to Mexico.

The proposed corridors for this project are near the northeast limit of the normal geographic range for this species. Saguaros are present as a foraging source, primarily in the hills on the east side of the San Pedro River, but no agaves were seen on the site. There are no known abandoned mines within the corridor, and the alluvial gravels in the hills would not support natural caves that could be used by these bats. The

closest known maternity roost is about 85 miles west of San Manuel, and the closest known dispersal roost is about 35 miles to the south. However, radio-tracking data (USFWS 1995) have indicated that these bats may fly 80 to 100 kilometers (48 to 60 miles) a night while foraging. The distances between roosts and foraging areas have been estimated to be between 9 miles and 60 miles (USFWS 1995).

Because of the extreme mobility of these bats and their post-maternity dispersal, it is likely that they could feed on saguaros flowers and fruit in the corridor. It is unlikely that they could find any roosting sites in the corridor, although abandoned mines higher in the Galiuro Mountains might provide roost sites.

2.4.4. Bald Eagle

The bald eagle was originally listed as endangered in 1967 (32 FR 4001, March 3, 1967), but it was down-listed to threatened in 1995 (60 FR 35999, August 11, 1995). It has been proposed for de-listing (64 FR 36454, July 6, 1999), and recent petition to have bald eagles in the Sonoran Desert recognized as a distinct population segment and reclassified as endangered was rejected by USFWS (71 FR 51549, August 30, 2006).

Bald eagles feed primarily on fish, although they will also take mammals, waterfowl, carrion, and some reptiles (AGFD 2002a). Because of the emphasis on fish, breeding territories in Arizona are restricted to reservoirs or large rivers with cliffs or large trees for nest sites. Wintering eagles may be found in a greater variety of habitats. Most breeding territories in the state are located on the Salt, Verde, Bill Williams, and Gila Rivers, including reservoirs and upper tributaries. Their presence on the Gila River is limited by the availability of favorable conditions, but territories have been reported from the vicinity of Winkelman and near San Carlos Reservoir. It is likely that eagles could follow the San Pedro corridor during migrations and winter dispersal. Because of their selection of high, exposed perches, they are likely to utilize transmission line towers, particularly when the towers are the tallest features available.

2.4.5. Yellow-billed Cuckoo

The yellow-billed cuckoo is currently a candidate for listing as threatened or endangered. USFWS has determined that the listing is warranted but precluded by higher priority listing actions (USFWS 2006b).

In Arizona, cuckoos are generally limited to riparian cottonwood and willow stands and adjacent mesquite bosques. Their preferred food appears to be hairy caterpillars, but they will also eat bird eggs, frogs, lizards, ants, beetles, wasps, flies, berries, and fruit (AGFD 2002a). Their distribution in Arizona is restricted to river and stream corridors with intact riparian woodlands, including the Colorado, Salt, Verde, and Gila rivers and their tributaries. Cuckoos are very late migrants, arriving in late-May at the earliest, and often not arriving until mid-June (Corman and Wise-Gervais 2005). Populations of cuckoos in Arizona have declined significantly over the past eighty years. The reasons for the decline appear to be the loss, degradation, and fragmentation of suitable riparian habitat (USFWS 2006b; Corman and Wise-Gervais 2005).

Cuckoos are known to be present in many parts of the San Pedro River from the Mexican border to the confluence with the Gila River at Winkelman, and breeding is known or suspected in many areas (Corman and Wise-Gervais 2005). Habitat conditions in the proposed corridor are suitable to support breeding cuckoos, but with the low density of cottonwoods and willows, conditions are not optimal. However, the cottonwoods and willows are likely to support insect populations that could provide a foraging source for cuckoos that might nest upstream.

3. PROJECT DESCRIPTION

Southwest Transmission Cooperative, Inc. (SWTC) is proposing the Redington Interconnect Project in Pinal County, Arizona. The project would include the following: (1) construction of a new 115 kV switchyard with additional space available for future expansion to a 230/69 kV electric substation and (2) construction of approximately 3.50 miles of 230 kV double circuit transmission line, although the line will be initially energized at 115 kV. The structures would be constructed of self-weathering steel, approximately 115 feet in height. The Redington switchyard would be constructed on an approximately five-acre parcel of land; two parcels are currently being considered for the switchyard. The transmission corridor would be constructed on property owned by BHP, BLM, and the Arizona State Land Department. The proposed access road that would be used to access the switchyard would be located on real property owned by BHP. SWTC will secure an easement for all appropriate access.

Both of the potential new switchyard areas are located on a previously disturbed brownfield site that is located in the vicinity of the former copper processing facilities of BHP, as shown in Photograph 1. Access to this portion of the project area is by existing roads, and large, previously disturbed areas are available for construction support. No undisturbed areas of native vegetation will be disturbed by actions related to the switchyard construction or operation.

The line will be placed on steel structures, approximately 115 feet in height, and construction access for trucks, cranes, and other equipment will be necessary to each structure location. Existing maintenance roads for a transmission line are available, providing access on both sides of the San Pedro, although these roads have not been used recently and would require upgrading. It is anticipated that construction access would be accomplished from both sides of the river, and that no vehicular crossing of the river would be required. The active channel of the river is relatively narrow, and it should be possible to span the channel without placing any structures within the channel.

West of the riparian area and mesquite bosque adjacent to the San Pedro River, the corridor would follow an existing maintenance road between two tailings impoundments. Depending on final pole locations, short spur roads might be required to access structure locations.

East of the riparian area, on the east side of River Road, two corridor alternatives are under consideration. The north corridor would follow Clark Wash, a relatively flat area with an existing road that provides access to the existing transmission line. This road would require upgrading to facilitate construction access, and spurs would probably be required to provide access to specific structure locations. The south corridor would follow an unnamed ridge about one-half mile south of Clark Wash. Access to this alternative is more difficult, and it would likely require more extensive road and spur construction through relatively undisturbed desertscrub.

4. ANALYSIS OF IMPACTS

4.1. Impacts to Bald Eagle

The proposed Project area provides no resources to support breeding bald eagles, and it is unlikely that a transient eagle would spend any significant amount of time in this area. It is our opinion that, provided that raptor friendly tower construction methods are employed (see EEI-APLIC and USFWS 2005), that the proposed construction and operation of the switchyard and transmission line would have no impact on bald eagles or their habitat and no mitigation measures are needed or recommended. If raptor friendly construction methods are not used, the towers could affect bald eagles because of the risk of electrocution. Any mortality of eagles would have to be considered a significant adverse impact.

4.2. Impacts to Southwestern Willow Flycatcher and its Critical Habitat

The southwestern willow flycatcher is known to breed within one-half mile of the proposed crossing location for the San Pedro River. Surveys completed in 2007 did not identify any individuals within or proximate to the proposed crossing. If there is no impact to potential habitat along the river, surveys would not be required. However, we recommend that surveys be conducted to avoid any potential delays. If willow flycatchers are detected during survey or otherwise confirmed to use habitat proximate to the crossing, then foraging and nesting sites for willow flycatchers could be impacted by construction of the transmission line.

4.3. Impacts to Lesser Long-nosed Bat

The lesser long-nosed bat, federally listed as endangered, could be occasionally present within the Project area, although this area is near the northeast limit of their normal geographic range. Saguaros are available for foraging, and abandoned mines higher in the Galiuro Mountains could provide suitable roosting habitat. The lack of agaves in the corridor could make it less attractive as a post-maternity dispersal foraging area. Potential impacts to this species could result from transmission line construction activities through undisturbed areas of Arizona Upland vegetation. The loss of saguaros could impact potential foraging resources for these bats. Although no agaves were seen on the site, a few could be present and their loss would impact a potential (but limited) foraging resource.

4.4. Impacts to Yellow-billed Cuckoo

The yellow-billed cuckoo is a candidate for listing but is not listed as threatened or endangered by the USFWS. This species is likely to breed along the San Pedro River and potential foraging sites for cuckoos could be impacted by construction and maintenance of the transmission line across the San Pedro River if it is necessary to remove large cottonwoods, willows, or mesquite.

4.5. Impacts to Desert Tortoise

The desert tortoise is not listed as threatened or endangered by the USFWS, but is a species of special interest to the BLM and is known to be present within the corridor. Tortoises could be impacted directly by project construction by direct injury from trucks or heavy construction equipment used to construct the power line. Construction activities could also cause burrows to collapse, could destroy vegetation foraging resources, or could fragment areas of tortoise habitat.

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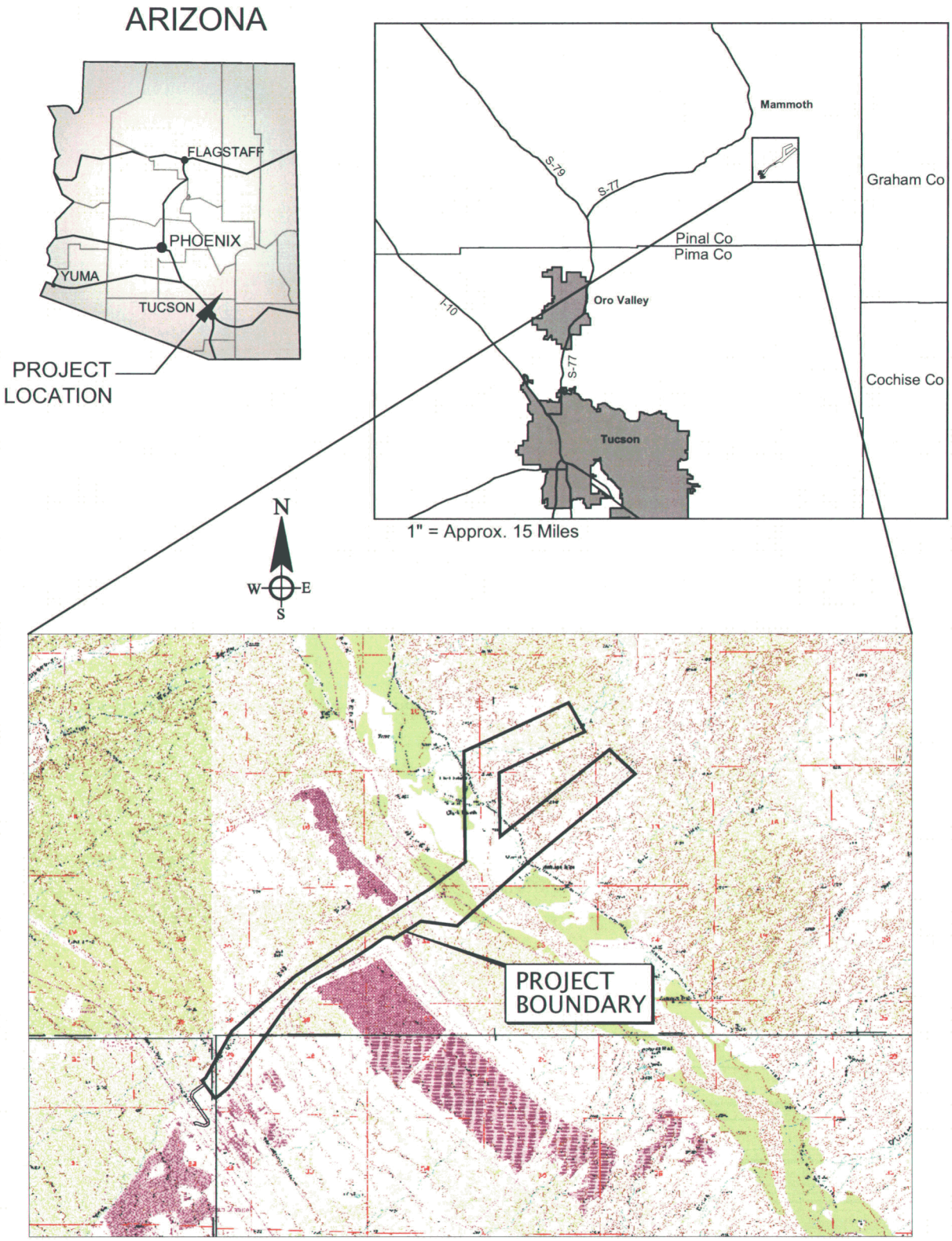
FIGURES



T.9S., R.17E., Portion of Sections 10-15, 21-23, 28, 29, & 32.
Pinal County, Arizona. Clark Ranch, Peppersauce Wash &
Campo Bonito 7.5' USGS Quadrangles.

WestLand Resources Inc.
Engineering and Environmental Consultants
4001 E. Paradise Falls Drive
Tucson, Az 85712 (520) 206-9585

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REDINGTON INTERCONNECT PROJECT
BIOLOGICAL ASSESSMENT

VICINITY MAP

Figure 1

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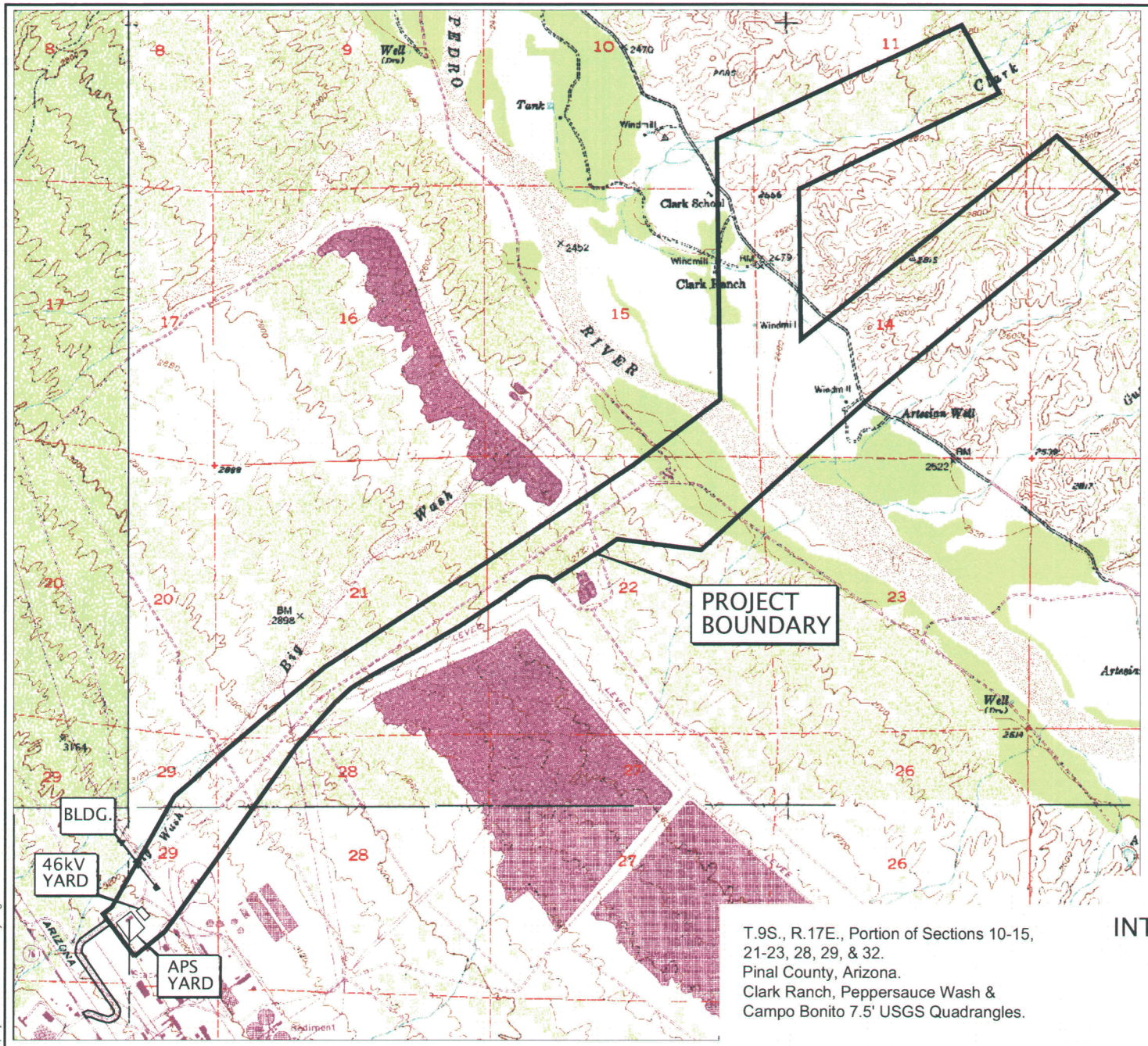

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Pinal County, Arizona.
Clark Ranch, Peppersauce Wash & Campo Bonito 7.5' USGS Quadrangles.

REDINGTON INTERCONNECT PROJECT
BIOLOGICAL ASSESSMENT

PROJECT OVERVIEW

Figure 2

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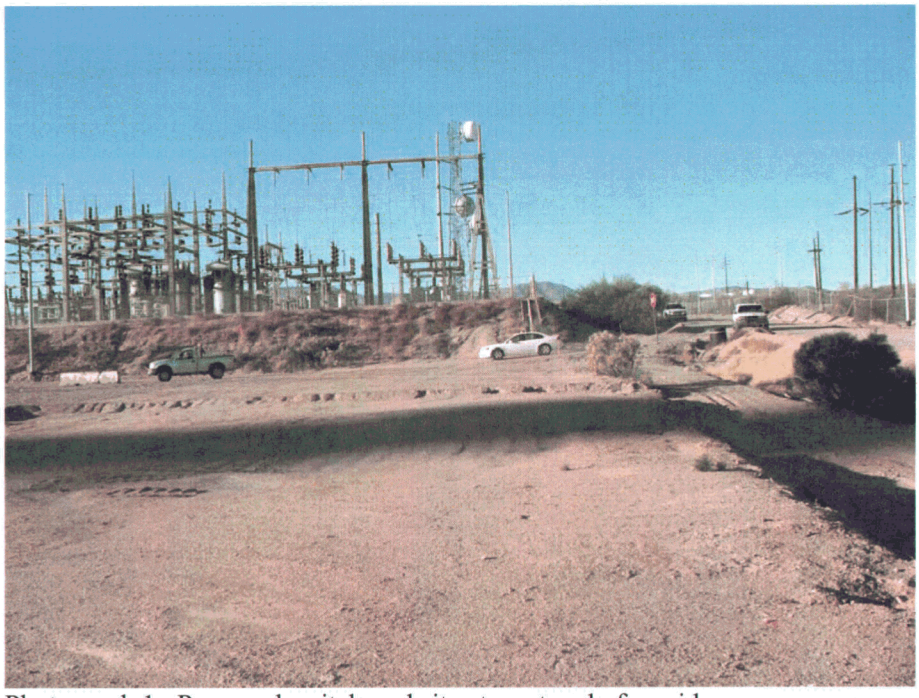
APPENDIX A

PHOTOGRAPHS



Photograph 1. Proposed switchyard site at west end of corridor.

Photograph 2. Vegetation along drainage channel near switchyard site.

Photograph 3. Proposed corridor between existing tailings impoundments.

Photograph 4. Cleared area east of San Pedro River.

Photograph 5. Cleared area east of San Pedro River.

Photograph 6. Arizona Upland vegetation on hills east of River Road, east of the San Pedro River, looking northwest along existing transmission line.

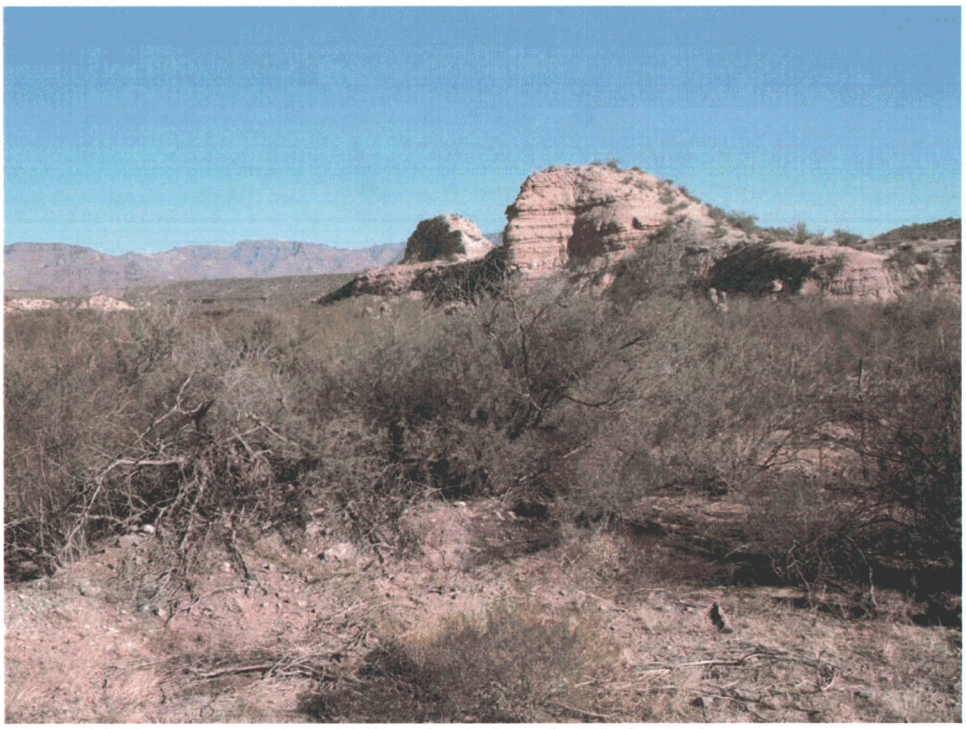
Photograph 7. Arizona Upland vegetation between Tailings Impoundments 1 and 10, west of the San Pedro River, looking northeast.

Photograph 8. Riparian corridor on San Pedro River, looking downstream.

Photograph 9. Riparian corridor on San Pedro River, looking upstream at small clump of cottonwoods.

Photograph 10. Flowing channel in San Pedro River, looking downstream.

Photograph 11. Bird nest in tamarisk adjacent to flowing channel of San Pedro River.



Photograph 12. Potential desert tortoise habitat in Clark Wash.

Photograph 13. Tire tracks and cow tracks adjacent to the San Pedro River.

APPENDIX B

PLANTS SPECIES OBSERVED ON SITE

Appendix B. Common plant species observed in habitats available along the southwest transmission corridor. This list is representative of the species on the site, but it is not intended to be an exhaustive list of species that could be present.

Family	Scientific Name	Common Name	Habitat Type		
			Disturbed Areas	Arizona Upland	Riparian Corridor
Agavaceae	*Yucca elata*	Soaptree Yucca	✓	✓	
Asteraceae	*Ambrosia ambrosioides*	Canyon Ragweed		✓	
	Baccharis sarathroides	Desert Broom	✓	✓	✓
	Baccharis salicifolia	Seepwillow			✓
	Hymenoclea salsola	Cheeseweed		✓	✓
	Isocoma tenuisecta	Burroweed		✓	✓
	Xanthium strumariium	Common Cocklebur			✓
Cactaceae	*Carnegiea gigantea*	Saguaro		✓	
	Ferocactus wislizenii	Fishhook Barrel Cactus		✓	
	Opuntia versicolor	Staghorn Cholla		✓	
	Opuntia engelmannii	Engelmann Prickly Pear		✓	
	Opuntia fulgida	Chainfruit Cholla		✓	
Caprifoliaceae	*Sambucus mexicana*	Mexican Elder			✓
Brassicaceae	*Rorippa nasturtium-aquaticum*	Watercress			✓
	Sysimbrium irio	London Rocket			✓
Chenopodiaceae	*Salsola iberica*	Russian Thistle	✓	✓	✓
Fabaceae	*Acacia greggii*	Catclaw Acacia		✓	
	Acacia constricta	Whitethorn Acacia		✓	✓
	Parkinsonia florida	Blue Paloverde	✓		
	Parkinsonia microphylla	Foothill Paloverde		✓	
	Prosopis velutina	Velvet Mesquite	✓	✓	✓
Fouquieriaceae	*Fouquieria splendens*	Ocotillo		✓	
Koeberliniaceae	*Koeberlinia spinosa*	Allthorn		✓	

Family	Scientific Name	Common Name	Habitat Type		
			Disturbed Areas	Arizona Upland	Riparian Corridor
Poaceae	*Aristida* sp.	Three-awn		✓	
	Bouteloua rothrockii	Rothrock Grama		✓	
	Chloris virgata	Feather Fingergrass		✓	
	Cynodon dactylon	Bermudagrass			✓
	Dasyochloa pulchellus	Fluffgrass		✓	
	Sporobolus wrightii	Big Sacaton		✓	✓
Ranunculaceae	*Clematis drummondii*	Texas Virgin Bower			✓
Rhamnaceae	*Ziziphus obtusifolia*	Graythorn		✓	
Salicaceae	*Populus fremontii*	Fremont Cottonwood			✓
	Salix gooddingii	Goodding Willow			✓
Scrophulariaceae	*Veronica americana*	American Brooklime			✓
Solanaceae	*Datura meteloides*	Sacred Datura		✓	✓
	Lycium sp.	Thornbush			✓
	Solanum elaeagnifolium	Silverleaf Nightshade		✓	✓
Tamaricaceae	*Tamarix* sp.	Salt Cedar	✓		✓
Ulmaceae	*Celtis pallida*	Desert Hackberry		✓	✓
Viscaceae	*Phorodendron californicum*	Desert Mistletoe		✓	✓
Zygophyllaceae	*Larrea tridentata*	Creosote		✓	

APPENDIX C

ANIMAL SPECIES OBSERVED ON SITE

Appendix C. Animal species observed along the southwest transmission corridor (including evidence such as tracks, nests, scat, vocalizations, etc.). This list is representative of the species on the site, but it is not intended to be an exhaustive list of species that could be present.

Taxonomic Group	Scientific Name	Common Name
Mammals	*Sylvilagus audubonii*	Desert Cottontail
	Ammospermophilus variegatus	Harris' Antelope Squirrel
	Dipodomys sp.	Kangaroo Rat
	Erethizon dorsatum	Porcupine
	Canis latrans	Coyote
	Nasua nasua	Coati
	Pecari tajacu	Collared Peccary
	Odocoileus hemionus	Mule Deer
Birds	*Callipepla gambelii*	Gambel's Quail
	Accipiter cooperii	Cooper's Hawk
	Buteo jamaicensis	Red-tailed Hawk
	Charadrius vociferus	Killdeer
	Colaptes auratus	Northern Flicker
	Sayornis nigricans	Black Phoebe
	Sayornis saya	Say's Phoebe
	Corvus corax	Common Raven
	Polioptila melanura	Black-tailed Gnatcatcher
	Zonotrichia leucophrys	White-crowned Sparrow

APPENDIX D

THREATENED AND ENDANGERED SPECIES IN PINAL COUNTY, ARIZONA

Appendix D. Threatened, Endangered, and Sensitive Species Present in Pinal County, Arizona.

Scientific Name	Common Name	Status	Habitat Requirements	Potential for Occurrence in Vicinity of Project
Plants				
Echinocactus horizonthalonius var. *nicholii*	Nichol Turk's Head Cactus	E AZ-HS	Sonoran desertscrub, unshaded sited on dissected alluvial fans at the foot of limestone mountains, also on inclined terraces and saddles on limestone mountainsides. Elevation range 2,400 – 4,100 ft.	None. No suitable limestone habitat,
Echinomastus erectocentrus var. *acunensis*	Acuña Cactus	C AZ-HS	Well-drained knolls and gravel ridges in Sonoran desertscrub. Elevation range 1,300 – 2,000 ft.	None. Above elevation limit. About 40 miles from closest known populations.
Echinocereus triglochidiatus var. *arizonicus*	Arizona Hedgehog Cactus	E USFS-S AZ-HS	Ecotone between interior chaparral and madrean evergreen woodland, in narrow cracks between boulders. Does not occur outside of type locality. Elevation range 3,700 – 5,200 ft.	None. Below elevation range. About 50 miles from only known populations.
Fish				
Cyprinidon macularius	Desert Pupfish	E AZ-WSC	Shallow springs, small streams, marshes; tolerates warm and saline water. Elevation range below 5,000 ft. No natural populations remain in Arizona.	None. No suitable habitat, not known to be present in San Pedro River.
Gila intermedia	Gila Chub	E USFS-S AZ-WSC	Pools, springs, cienegas, and streams. Elevation range 2,000 – 5,500 ft. Not known to be present in Gila River below San Pedro confluence.	Highly unlikely. Not known to be present in main stream of San Pedro, but present in Redfield Canyon, an upstream tributary.
Poeciliopsis occidentalis occidentalis	Gila Topminnow	E AZ-WSC	Small streams, springs, and cienegas, vegetated shallows. Elevation range below 4,500 ft. Present in up to 35 disjunct locations in the Gila River drainage.	None. No suitable habitat. Not known to be present in San Pedro River.
Tiaroga cobitis	Loach Minnow	T USFS-S AS-WSC	Benthic portions of small to large perennial streams with swift shallow water over cobble and gravel. Elevation range below 8,000 ft. Currently known only from Aravaipa Creek and upper tributaries of Gila and Salt Rivers.	None. No suitable habitat. Not known to be present in this portion of the San Pedro River.
Xyrauchen texanus	Razorback Sucker	E USFS-S AZ-WSC	Riverine and lacustrine areas, backwaters, generally not in fast moving water. Elevation range below 6,000 ft.	None. No suitable habitat. Not known to be present in the San Pedro River.

Scientific Name	Common Name	Status	Habitat Requirements	Potential for Occurrence in Vicinity of Project
Meda fulgida	Spikedace	T USFS-S AZ-WSC	Moderate to large perennial streams with gravel cobble substrates and moderate to swift velocities over sand and gravel substrates. Elevation range below 6,000 ft. Proposed designation of critical habitat in Aravaipa Creek and San Pedro River between Aravaipa and Gila River.	Highly unlikely, but Aravaipa Creek is known to be occupied.
Birds				
Pelecanus occidentalis californicus	California Brown Pelican	E USFS-S	Coastal land and islands. Uncommon transient in some Arizona lakes and rivers.	None. No suitable habitat.
Haliaeetus leucocephalus	Bald Eagle	T USFS-S AZ-WSC	Large trees or cliffs near water (reservoirs, rivers, streams) with abundant prey. Wide elevation range.	Unlikely. No suitable breeding habitat, but possible as occasional transient.
Rallus longirostris yumanensis	Yuma Clapper Rail	E AZ-WSC	Fresh water and brackish marshes, dense emergent vegetation, wit substrate (mudflat or sandbar), dense herbaceous or woody vegetation for nesting. Elevation range below 4,500 ft. Not known to be present on the Gila River above the Salt River confluence.	None. Outside of geographic range, no suitable habitat.
Strix occidentalis lucida	Mexican Spotted Owl	T USFS-S AZ-WSC	Canyons and dense forests with multilayered foliage structure, generally older forests of mixed conifer or ponderosa pine/Gambel oak. Elevation range 4,100 to 9,000 ft.	None. Below elevation range, no suitable habitat.
Coccyzus americanus	Yellow-billed Cuckoo	C USFS-S AZ-WSC	Large blocks of riparian woodland (cottonwood, willow, or tamarisk galleries). Elevation range below 6,500 ft.	Possible. Suitable habitat may be present on San Pedro River.
Empidonax traillii extimus	Southwestern Willow Flycatcher	E USFS-S AZ-WSC	Cottonwood, willow, and tamarisk vegetation communities along rivers and streams. Elevation range below 8,500 ft.	Probable. Suitable habitat is available. Known to be present on San Pedro River.
Mammals				
Leptonycteris yerbabuenae	Lesser Long-nosed Bat	E AZ-WSC	Desertscrub with agave and columnar cacti available for food supply, roosts in caves and abandoned mines. Elevation range below 6,000 ft. Range generally south of Picacho Mountains.	Possible. Within dispersal range. Foraging habitat available east of San Pedro River. No known roosts sites on property.

Species lists and habitat information from USFWS (2006a) and AGFD (2006a; 2006b).
Status Codes: E – Endangered; T – Threatened; C – Candidate; SC – Species of Concern; BLM-S – Bureau of Land Management Sensitive Species; USFS-S – Forest Service Sensitive Species; AZ-HS –Arizona Highly Safeguarded; AZ-WSC –Arizona Wildlife of Special Concern.

APPENDIX E

BLM SENSITIVE SPECIES IN PINAL COUNTY, ARIZONA

Appendix E. BLM Sensitive Species Present in Pinal County, Arizona.

Scientific Name	Common Name	Status	Habitat Requirements	Potential for Occurrence in Vicinity of Project
Plants				
Abutilon parishii	Pima Indian Mallow	SC BLM-S USFS-S AZ-SR	Higher elevation Sonoran desertscrub. Rocky hillsides, cliff bases, canyon bottoms, lower side slopes and ledges of canyons among rocks and boulders. Elevation range 1,720 – 4,900 ft.	Highly unlikely. Suitable habitat, but in Pinal County only known to be present in Superstition, Picacho, Tortolito, and Dripping Spring Mountains.
Agave murpheyi	Hohokam Agave	SC BLM-S USFS-S AZ-HS	Benches or alluvial terraces on gentle bajada slopes above major drainages in desert scrub. Associated with pre-Columbian agricultural and settlement features. Elevation range 1,300 – 3,20 feet.	None. Suitable habitat, but only known location in Pinal County is at Queen Creek near Superior.
Carex ultra	Arizona Giant Sedge	BLM-S USFS-S	Moist soil near perennially wet springs and streams, undulating gravelly terrain. Aquatic riparian woodland or oak/pinyon woodland. Elevation range 2,040 – 6,000 ft.	None. No suitable habitat. Only known location in Pinal County is in Aravaipa Canyon in the Galiuro Mountains.
Fremontodendron californicum	Flannel Bush	BLM-S AZ-SR	Well-drained rocky hillsides and ridges, in chaparral and oak/pine woodland, usually on dry, north slopes in canyons. Elevation range 3,500 – 6,500 feet.	None. No suitable habitat, below elevational range. Only known location in Pinal County is in Superstition Mountains.
Salvia amissa	Aravaipa Sage	SC BLM-S USFS-S	Upper floodplain terraces in shady canyon bottoms near streams in understory of mature sycamore, ash, cottonwood, walnut, and mesquite, not far from permanent water. Elevation range 3,100 – 5,000 feet.	None. No suitable habitat. Present at higher elevations in canyons of Galiuro Mountains.
Thelypteris puberula var. *sonorensis*	Aravaipa Wood Fern	BLM-S	Moist soil in the shade of boulders in mesic canyons, riverbanks, seepage areas, and meadow habitats. Elevation range 2,220 – 4,500 feet.	None. No suitable habitat. Present in Aravaipa Canyon in the Galiuro Mountains.
Tumamoca macdougalii	Tumamoc Globeberry	BLM-S USFS-S AZ-SR	Sonoran Desertscrub, sandy washes of hills and valleys, xeric conditions. Elevation range below 3,000 ft.	None. Suitable habitat but in Pinal County only known to be present in southwest corner of county.
Invertebrates				
Cicindela oregona maricopa	Maricopa Tiger Beetle	SC BLM-S USFS-S	Different habitats within its range, most commonly on sandy stream banks. May occur near seeps or reservoir banks. Substrate appears to be a sand/silt material capable of holding together around a burrow throughout larval stage development, capable of retaining sufficient moisture to prevent larval desiccation, and capable of being burrowed into by larval stages. Elevation range 1,100 – 6,900 feet.	Possible. Suitable habitat is available. Known to be present in Aravaipa Canyon and lower San Pedro River.

Scientific Name	Common Name	Status	Habitat Requirements	Potential for Occurrence in Vicinity of Project
Fish				
Agosia chrysogaster chrysogaster	Gila Longfin Dace	SC BLM-S	Intermittent hot low-desert streams to clear and cool brooks at higher elevations; relatively small or medium size streams, with sandy or gravely bottoms; eddies, pools near overhanging banks or other cover; uually in water less than 0.6 ft.deep with moderate velocities of around 1.1 ft/s; tolerant of high temperatures and low dissolved oxygen. During low water, they may take refuge in moist detritus and algal mats. Elevation range generally below 4,900 feet.	Possible. Present but hard to find in San Pedro River (AGFD 2006c).
Catostomus clarki	Desert Sucker	SC BLM-S	Rapids and flowing pools of streams and rivers primarily over bottoms of gravel-rubble with sandy silt in the interstices. Normal temperature range 50°F – 70°F, but can tolerate up to 90°F. Elevation range 480 – 8,840 feet.	Possible. Known to be present in San Pedro River.
Catostomus insignis	Sonora Sucker	SC BLM-S	Variety of habitats from warm water rivers to trout streams. Elevation range 1,210 – 8,730 feet.	Possible. Known to be present in San Pedro River.
Rhinichthys osculus	Speckled Dace	SC BLM-S	Rocky riffles, runs, and pools of headwaters, creeks, and small to medium rivers: rarely in lakes; water less than 1.6 ft deep, with current averaging about 1.3 ft/sec. Elevation range 1,550 – 8,920, but usually above 4920 feet.	Unlikely. Habitat not suitable, but present in Aravaipa Creek and Redfield Canyon in the Galiuro Mountains.
Reptiles				
Aspidocelus burti strictogrammus	Giant Spotted Whiptail	SC BLM-S USFS-S	Semidesert Grassland and Madrean Evergreen Woodland. Canyon bottoms in mountainous terrain, washes, riparian corridors, low valley bottoms, usually near streams or temporary water. Elevation generally below 4,500 feet.	Unlikely. No grassland or woodland habitat.
Gopherus agassizii	Desert Tortoise (Sonoran Desert Population)	SC	Rocky slopes and bajadas of Sonoran desertscrub, caliche caves in incised, cut banks of washes are also used for shelter sites.	Probable. Known to be present in San Pedro Valley.
Birds				
Athene cunicularia hypugaea	Western Burrowing Owl	SC BLM-S	Open, well-drained grasslands, steppes, deserts, prairies, and agricultural lands, often associated with burrowing mammals. Sometimes in open areas such as vacant lots near human habitation, golf courses or airports. Elevation range 650 – 6,140 feet.	Highly unlikely. Not known to be present in San Pedro Valley.
Mammals				

Scientific Name	Common Name	Status	Habitat Requirements	Potential for Occurrence in Vicinity of Project
Myotis ciliolabrum	Western Small-footed Myotis	SC BKM-S	Deserts, chaparral, riparian areas and oak-juniper forests; hibernates in caves and old mines; summers in crevices, cracks, holes, snags, hollow trees, under rocks and in buildings; rely heavily on mines for hibernation. Elevation range 2,120- 8,670 feet.	Possible foraging over river on site. No known or potential hibernation sites. Possible roosts sites in abandoned buildings.
Myotis velifer	Cave Myotis	SC BLM-S	Desertscrub of creosote, brittlebush, palo verde and cacti. Roost in caves, tunnels, mineshafts, under bridges; sometimes in buildings within a few miles of water. Arizona population is migratory. Elevation range mostly 300 – 5,000 feet, but occasionally higher.	Probable foraging on site. Possible roosts sites in abandoned buildings.
Nyctinomops femorosaccus	Pocketed Free-tailed Bat	BLM-S	Desertscrub to pine-oak forests, arid lower elevations usually around high cliffs and rugged rock outcrops. Roosts in rock crevices during the day; may also use human built structures. Elevation range 190 – 7,520 feet.	Possible foraging on site. Possible roost sites in crevices in hills east of River Road. Site is near northern limit of geographic range.

Species lists from AGFD (2006a). Habitat information from AGFD (2006b)
Status Codes: E – Endangered; T – Threatened; C – Candidate; SC – Species of Concern; BLM-S – Bureau of Land Management Sensitive Species; USFS-S – Forest Service Sensitive Species; AZ-HS –Arizona Highly Safeguarded; AZ-WSC –Arizona Wildlife of Special Concern.

Exhibit C-1

2007 SOUTHWESTERN WILLOW FLYCATCHER SURVEY REPORT

WestLand Resources, Inc.
Engineering and Environmental Consultants

September 25, 2007

Ms. Michelle Freeark
SOUTHWEST TRANSMISSION COOPERATIVE, INC.
P.O. Box 2195
Benson, Arizona 85602

Re: SOUTHWESTERN WILLOW FLYCATCHER SURVEY FOR THE REDINGTON INTERCONNECT PROJECT, 2007 WESTLAND PROJECT NO. 473.20 341 341

Dear Ms. Freeark:

At your request, WestLand Resources, Inc. (WestLand) completed southwestern willow flycatcher (SWFL; *Empidonax traillii extimus*) survey in 2007 for the proposed Redington Interconnect Project in Pinal County, Arizona, more than three miles northeast of the town of San Manuel (Township 9 South, Range 17 East, Sections 14, 15, 22, and 23; Figure 1). The Survey Area is along the San Pedro River in the vicinity of Clark Ranch. The surveys were completed under U.S. Fish & Wildlife Service (USFWS) Permit No. TE-834782-0 and Arizona Game & Fish Department (AGFD) License No. SP722555. No SWFLs were detected during the survey efforts. In addition, WestLand reviewed AGFD annual reports of agency and private SWFL survey efforts throughout the state for records of SWFL surveys conducted in the project vicinity.

The proposed project includes construction of approximately 3.50 miles of 230 kV double circuit transmission line, which will cross the San Pedro River in the Clark Ranch vicinity. The USFWS designated Critical Habitat on October 19, 2005 (70 FR 60886), including the San Pedro River at the transmission line crossing. The SWFL surveys were conducted in support of anticipated Endangered Species Act Section 7 consultation for the SWFL.

Surveys followed the 1997[1] multi-agency SWFL survey protocol, as modified in 2000[2]. Recorded SWFL songs are broadcast along transects within potential habitat. At each call station, a 1- to 2-minute listening period is followed by a 15- to 30-second SWFL vocalization, followed by another 1- to 2-minute listening period. This is repeated every 65 to 100 feet (20 to 30 meters [m]), or less in areas with high background noise. The daily survey period starts when there is enough light to walk (45 minutes to one hour before sunrise) and ends when environmental factors (particularly heat) could cause stress to responding birds or make survey ineffective (e.g., wind, rain, noise), generally between 9:00 and 10:00 a.m. If no SWFLs are detected, five surveys at least five days apart must be completed between May 15 and July 17; one between May 15 and May 31, one between June 1 and June 21, and three between June 22 and July 17.

The surveys were conducted by a single WestLand biologist on May 24, June 8, June 22, June 28, and July 13, 2007. All potentially suitable habitat within the Survey Area (Figures 1 and 2) was surveyed during each effort. A total of 17 hours and 45 minutes of survey was conducted. Detailed information regarding survey at the project site is found on the respective survey form (attached) transmitted to USFWS and AGFD per permit requirements.

---

1 Sogge, M.K., R.M. Marshall, S.J. Sferra, and T.J. Tibbits. 1997. *A southwestern willow flycatcher natural history summary and survey protocol.*

2 USFWS letter R2/ES-TE.

2343 E. Broadway Blvd., Suite 202 • Tucson, AZ 85719 • 520·206·9585 Fax 520·206·9518
5150 N. 16th Street, Suite B-235 • Phoenix, AZ 85016 • 602·279·2051 Fax 602·279·5431

No SWFLs or other *Empidonax* flycatchers were detected during the survey efforts. Brown-headed cowbirds (*Molothrus ater*), a known nest parasite of SWFLs, were detected during all surveys, and recent sign of livestock (cowbird associates) was present.

Where the Survey Area is located, the San Pedro Valley separates the Santa Catalina Mountains to the southwest and the Galiuro Mountains to the east. On the west side of the river, bajada with a relatively gradual slope leads to the Catalinas, while east of the river the Galiuro's rugged terrain is within close proximity of the river. The BHP San Manuel Plant Site is located on the west side of the river, its tailings impoundments within approximately 2,000 feet (600 m) of the Survey Area. The elevation of the Survey Area ranges from approximately 2,475 to 2,520 feet (755 to 770 m) above mean sea level.

The Survey Area is dominated by large tracts of velvet mesquite (*Prosopis velutina*) bosque and "secondary" mesquite bosque on historic floodplain terraces elevated 5 to 20 feet (1.5 to 6 m) above the active San Pedro River floodplain. Along the eastern side of the river several large remnant tracts of historic mesquite bosque are present, bordered by large abandoned fields that have begun to convert back to mesquite bosque. These areas are noted on Figure 2 as secondary mesquite bosque.

The mesquite bosque in the Survey Area is a well developed and mature community. The mesquite trees are large (20-40 feet [6-12 m] in height and 12-40 inches [30-100 centimeters] in diameter) and the understory is dominated by greythorn (*Ziziphus obtusifolia*) and wolfberry (*Lycium* sp.) bushes. The dominant forbs present were London rocket (*Sisymbrium irio*), burroweed (*Isocoma tenuisecta*) and Palmer's amaranth (*Amaranthus palmeri*). Overall, the habitat is open in the center of the bosque and denser near the edges. Most of the large mesquites show evidence of historic cutting for firewood.

The mesquite trees within the abandoned fields range from approximately 6 to 15 feet (2 to 5 m) in height, and some areas are quite dense. Historic, abandoned earthen irrigation ditches are present around all of the fields. In some cases these ditches appear to collect and convey storm water run-off.

Secondary mesquite bosque, including some tamarisk and greythorn, is also present along the western side of the river on a secondary shelf. This habitat is less robust than the mesquite bosque on the eastern side of the river. Approximately 50 to 75 percent of the large trees within this habitat show evidence of wood cutting.

Hydrophilic vegetation other than mesquite bosque within the Survey Area is restricted to the active stream channel and floodplain. A dense, 65- to 155-foot-wide (20- to 50-meter-wide) stringer of mature Fremont cottonwood (*Populus fremontii*), greythorn, and tamarisk (*Tamarix* sp.) separates the floodplain from the abandoned fields to the east. The fields are edged by an old irrigation ditch, varying from approximately 20 to 250 feet (6 to 75 m) east of surface water present in the river. This habitat is likely a result of historic irrigation practices and maintained by agricultural field runoff entering the canals.

Entrenchment has confined the active floodplain to a channel that at present ranges from 5 to 10 feet (1.5 to 3 m) below the historic floodplain and in places is 10 to 20 feet (3 to 6 m) below the secondary shelves. The vegetation within the active floodplain is sparse with denser patches at the northwest end of the project area,

becoming overall denser proceeding upstream (southeast). The vegetation is generally composed of tamarisk with an occasional cottonwood, although patches of both species occur and cottonwoods become more prevalent along the upstream end of the historic floodplain. Additional species noted in the active floodplain include desert broom (*Baccharis sarothroides*), Goodding's willow (*Salix gooddingii*), coyote willow (*Salix exigua*), spikerush (*Eleocharis* sp.), seepwillow (*Baccharis salicifolia*), common sunflower (*Helianthus annuus*), and Arizona ash (*Fraxinus velutina*).

The SWFL survey route (Figure 2) included the habitat within the active floodplain, which in WestLand's opinion is only marginally suitable SWFL habitat. The habitat with the greatest potential for SWFL occupation within the Survey Area occurs along the active floodplain in the upstream segment of the Survey Area. Vegetation along the stream appears to be maturing, increasing in biomass and riparian species diversity, and has the potential to become more suitable for SWFL in the future.

Additional areas surveyed include the potential habitat patch occurring along the historic irrigation ditch east of the river and portions of the mature mesquite bosque east of the river. Although these areas lack permanent surface water and saturated soils, the vegetative communities present have the structure and density found at known SWFL nesting sites.

We did not survey any of the habitat described as secondary mesquite bosque. These patches lacked primary constituent elements of SWFL habitat, including dense riparian vegetation and surface water or marshes. This habitat, as noted above, consists primarily of short stature (1- to 2-meter-tall) mesquite trees with little or no ground cover present.

WestLand conducted SWFL survey within the project area for the first time in 2007, and does not have any other historical records of SWFL surveys or activity for the Survey Area.

The AGFD annually compiles a list of all SWFL surveys conducted throughout Arizona, along with survey results. We reviewed the annual reports from 2000 through 2006 to identify the nearest surveys and nearest nest locations to the Interconnect Project Survey Area. San Manuel Crossing, approximately five miles upstream from the Survey Area, was surveyed in 2000 and 2002 through 2005. No SWFL territories were found in 2000, but in 2002 seven territories and three nests were found, and the numbers increased in 2003, peaked in 2004 with 59 territories and 84 nests, and decreased slightly in 2005.

The nearest surveys downstream from the Interconnect Project Survey Area were at Cronley Wash, approximately 10 miles downstream. It was surveyed in 2001 and 2002, with no territories or nests found. The nearest territories and nests downstream were at Capgage Wash, over 11 miles downstream. It was surveyed annually from 2000 through 2003 and in 2005, but the only territories and nests found were in 2002, when two of each were recorded. Approximately 12 miles downstream from the Interconnect Project Survey Area, at Wheatfields, surveys were conducted annually from 2000 through 2005, with territories and nests found each year.

In summary, WestLand surveyed all potentially suitable SWFL habitat within the Redington Interconnect Project area. No SWFLs were detected during the survey efforts, and it is WestLand's opinion that the habitat within the Survey Area currently is marginally suitable for SWFL occupation. However, development of the vegetation could enhance its suitability for SWFLs in the future.

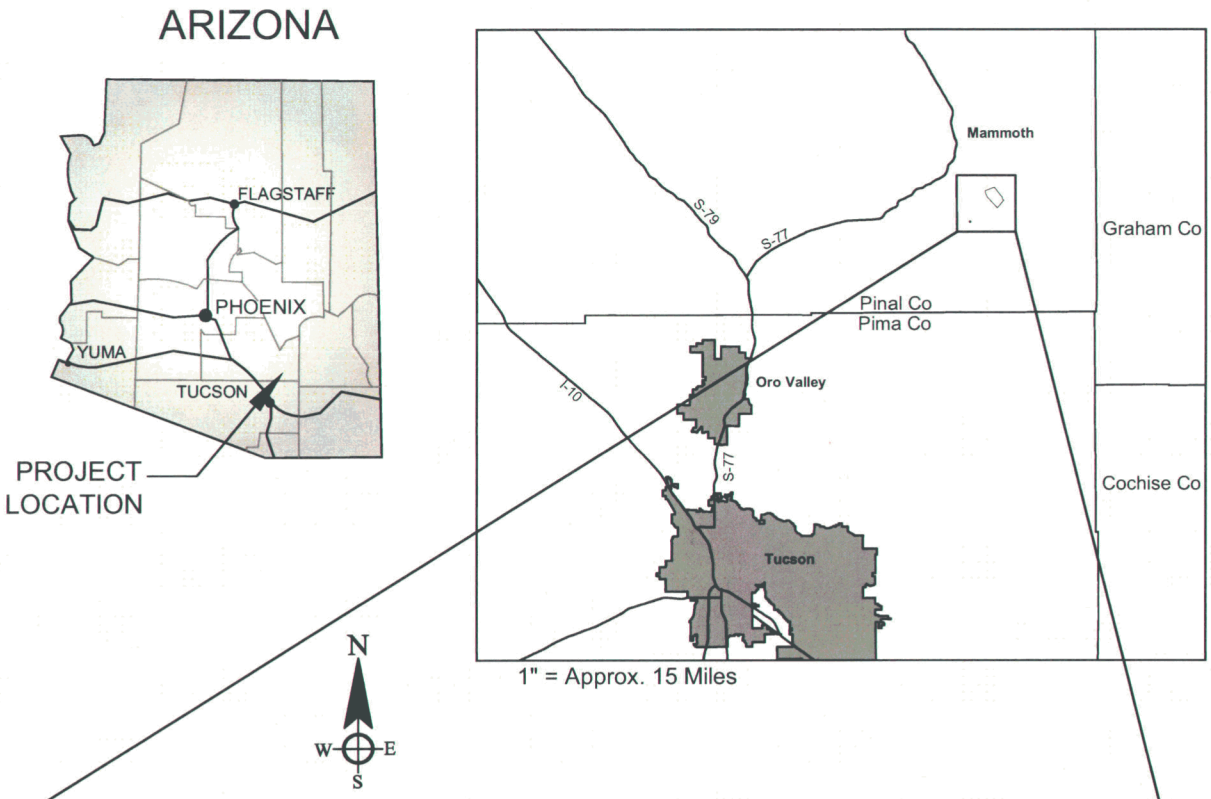
WestLand appreciates the opportunity to complete this survey on your behalf. If you have any questions, or we can be of additional assistance, please contact Brian Lindenlaub or me at (520) 206-9585.

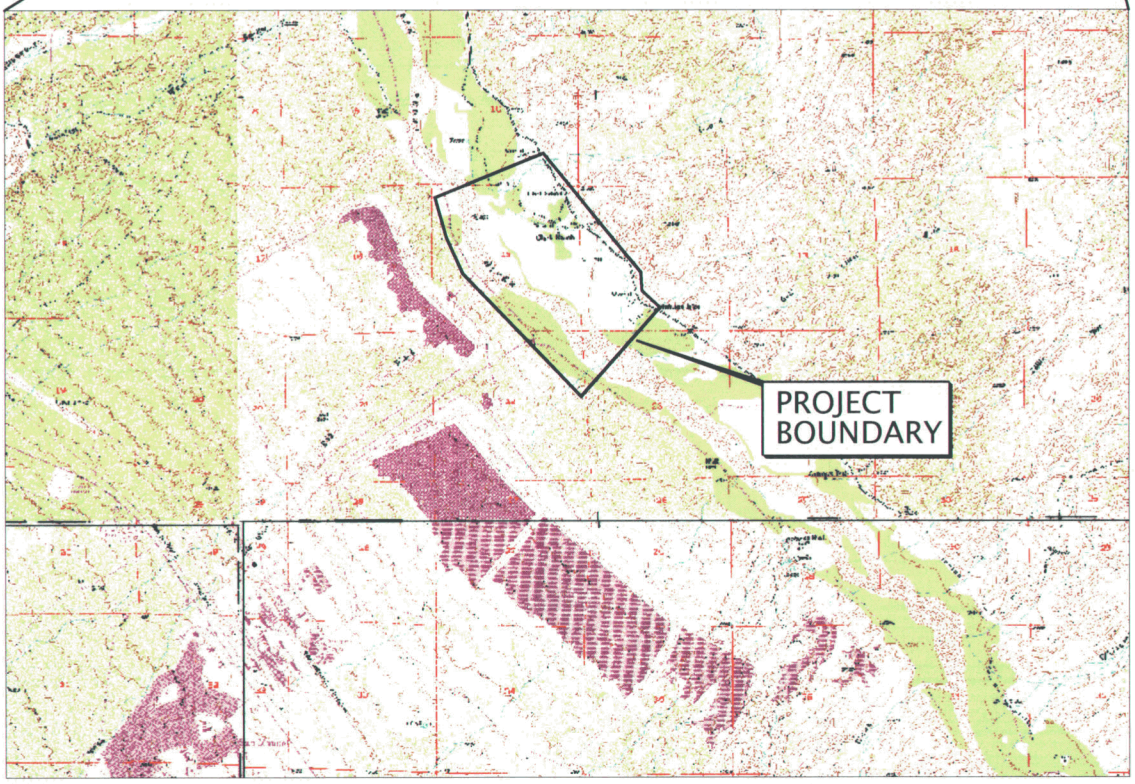
Sincerely,
WestLand Resources, Inc.

Scott Hart

Scott Hart
Project Manager

SDH:gd
Enclosures: Figure 1: Project USGS 7.5' Location Map
Figure 2: Aerial Overview of Project Area
Attachment A: 2007 SWFL Survey Form





T.9S., R.17E., Portion of Sections 10, 14, 15, 22 & 23
Pinal County, Arizona. Clark Ranch, Peppersauce Wash &
Campo Bonito 7.5' USGS Quadrangles.

WestLand Resources Inc.
Engineering and Environmental Consultants
4001 E. Paradise Falls Drive
Tucson, Az 85712 (520) 206-9585

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APPROX. SCALE: 1" = 6600'

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REDINGTON INTERCONNECT PROJECT

VICINITY MAP

Figure 1

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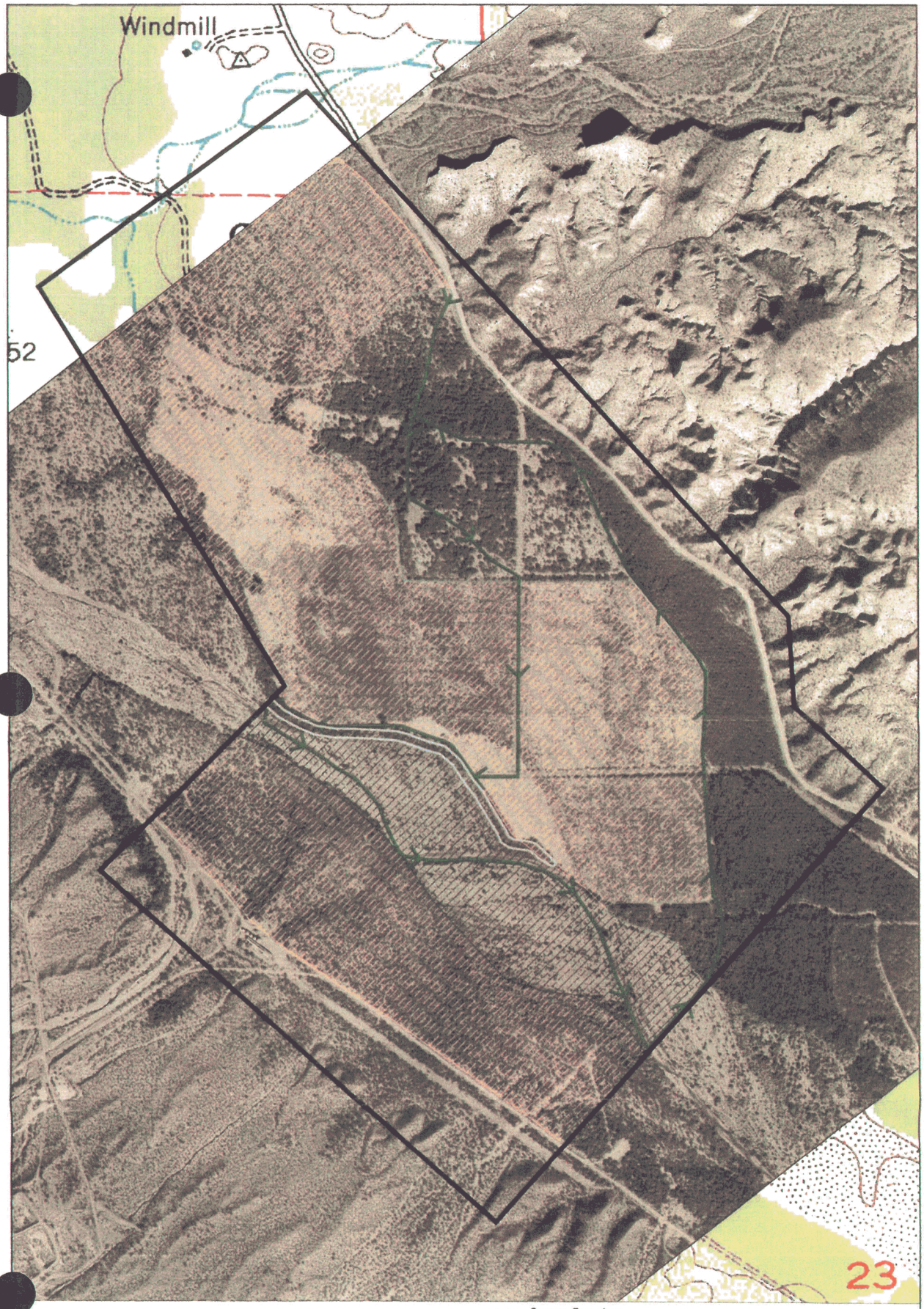

T.9S., R.17E., Portion of Sections 10, 14, 15, 22 & 23
Pinal County, Arizona. Clark Ranch, Peppersauce Wash &
Campo Bonito 7.5' USGS Quadrangles.

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Tucson, Az 85719 (520) 206-9585

0' 100' 200'
APPROX. SCALE: 1" = 200'

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Survey Boundary
Irrigation Ditch (Abandoned)
Survey Route
Mature Mesquite Bosque
Secondary Mesquite Bosque
Active Floodplain

REDINGTON
INTERCONNECT PROJECT

SOUTHWESTERN WILLOW
FLYCATCHER SURVEY 2007

Figure 2

Willow Flycatcher Survey and Detection Form (revised April, 2004)

Site Name San Pedro: Clark Ranch State AZ County Pinal
USGS Quad Name Clark Ranch 7.5' Elevation 2475-2520 feet / meters (circle one)

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ☒ *Yes* ☐ *No*

Site Coordinates: Start: N 538817 E 3613000 UTM Datum NAD27 (NAD27 preferred)
Stop: N 538810 E 3612700 UTM Zone 12

***** Fill in additional site information on back of this page *****

Survey # Observer(s) (Full Name)	Date (m/d/y) Survey time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign, If Yes, Describe Y or N	Comments about this survey (e.g., bird behavior, evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
1 Dan Ginter	Date 5/24/07 Start 5:30 Stop 9:30 Total hrs 4:00	0	0	0	0	yes	yes	
2 D. Ginter	Date 6/8/07 Start 5:15 Stop 10:00 Total hrs 4:45	0	0	0	0	yes	yes	
3 D. Ginter	Date 6/22/07 Start 5:10 Stop 8:30 Total hrs 3:20	0	0	0	0	yes	yes	
4 D. Ginter	Date 6/28/07 Start 5:15 Stop 8:45 Total hrs 3:30	0	0	0	0	yes	yes	
5 D. Ginter	Date 7/13/07 Start 5:30 Stop 7:40 Total hrs 2:10	0	0	0	0	yes	yes	

Overall Site Summary (Total **resident** WIFLs only)	Adults	Pairs	Territories	Nests	Were any WIFLs color-banded? Yes No
Total survey hrs 17:45	0	0	0	0	If yes, report color combination(s) in the comments section on back of form

Reporting Individual Dan Ginter / Scott Hart Date Report Completed 15 Aug 2007
US Fish and Wildlife Service Permit # TE-834782-0 AZ Game and Fish Department (or other state) Permit # SP554427

Submit original form by August 1st. Retain a copy for your records.

Fill in the following information completely. Submit original form by August 1st. Retain a copy for your records.

Reporting Individual Pam Grinter / Scott Hart Phone # 520 - 206 - 9518
Affiliation Westland Resources Inc. E-mail shart@westlandresources.com
Site Name San Pedro: Clark Ranch Date Report Completed 15 Aug 2007

Did you verify that this site name is consistent with that used in previous years? Yes / No (circle one)
If name is different, what name(s) was used in the past? NA
If site was surveyed last year, did you survey the same general area this year? Yes / No If no, summarize in comments below.
Did you survey the same general area during each visit to this site this year? Yes / No If no, summarize in comments below.

Management Authority for Survey Area (circle one): Federal Municipal/County State Tribal Private
Name of Management Entity or Owner (e.g., Tonto National Forest) _____

Length of area surveyed: ~ 2.85 mi (specify units, e.g., miles = mi, kilometers = km, meters = m)

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

- [ ] Native broadleaf plants (entirely or almost entirely, includes high-elevation willow)
- [x] Mixed native and exotic plants (mostly native)
- [x] Mixed native and exotic plants (mostly exotic)
- [ ] Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: PRVE, TACH, POFR + SAGO

Average height of canopy (Do not put a range): 30' (specify units)

Was surface water or saturated soil present at or adjacent to site? Yes / No (circle one)
Distance from the site to surface water or saturated soil: 5'-1,000' (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? Yes / No (circle one)
If yes, describe in comments section below.

Remember to attach a copy of a USGS quad/topographical map (REQUIRED) of the survey area, outlining the survey site and location of WIFL detections. Also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map. Please include photos of the interior of the patch, exterior of the patch, and overall site and describe any unique habitat features.

Comments (attach additional sheets if necessary)
During the last two survey times the River was starting to dry up.

WIFL Detection Locations:

Date Detected	N UTM	E UTM	Date Detected	N UTM	E UTM

Exhibit C-2

2008 SOUTHWESTERN WILLOW FLYCATCHER SURVEY REPORT

WestLand Resources, Inc.
Engineering and Environmental Consultants
Tucson • Phoenix

July 21, 2008

Mr. Kevin Barnes
SOUTHWEST TRANSMISSION COOPERATIVE, INC.
P.O. Box 2195
Benson, Arizona 85602

RE: SOUTHWESTERN WILLOW FLYCATCHER SURVEY FOR THE REDINGTON INTERCONNECT PROJECT, 2008 WESTLAND PROJECT NO. 473.23 341 341

Dear Mr. Barnes:

At your request, WestLand Resources, Inc. (WestLand) completed southwestern willow flycatcher (SWFL; *Empidonax traillii extimus*) survey in 2008 for the proposed Redington Interconnect Project in Pinal County, Arizona, more than three miles northeast of the town of San Manuel (Township 9 South, Range 17 East, Sections 14, 15, 22, and 23; Figure 1). The Survey Area, as depicted on Figure 1, is along the San Pedro River in the vicinity of Clark Ranch. The surveys were completed under U.S. Fish & Wildlife Service (USFWS) Permit No. TE-834782-0 and Arizona Game & Fish Department (AGFD) License No. SP637280. No SWFLs were detected during the survey efforts.

The proposed project includes construction of approximately 3.50 miles of 230 kV double circuit transmission line, which will cross the San Pedro River in the Clark Ranch vicinity. The USFWS designated Critical Habitat on October 19, 2005 (70 FR 60886), which includes the San Pedro River at the transmission line crossing.

Surveys followed the 1997[1] multi-agency SWFL survey protocol, as modified in 2000[2]. Recorded SWFL songs are broadcast along transects within potential habitat. At each call station, a 1- to 2-minute listening period is followed by a 15- to 30-second SWFL vocalization, followed by another 1- to 2-minute listening period. This is repeated every 65 to 100 feet (20 to 30 meters), or less in areas with high background noise. The daily survey period starts when there is enough light to walk (about 45 minutes before sunrise) and ends when environmental factors (particularly heat) could cause stress to active birds or make survey ineffective (e.g., wind, rain, noise); generally between 9:00 and 10:00 a.m. If no SWFLs are detected, five surveys at least five days apart are completed between May 15 and July 17; one between May 15 and May 31, one between June 1 and June 21, and three between June 22 and July 17.

The surveys were conducted by a single WestLand biologist on May 27, June 10, July 2, July 8, and July 16, 2008. All potentially suitable habitat within the Survey Area (Figures 1 and 2) was surveyed during each effort. A total of 20 hours of survey was conducted. Detailed information regarding the survey is found on the survey

[1] Sogge, M.K., R.M. Marshall, S.J. Sferra, and T.J. Tibbits. 1997. *A southwestern willow flycatcher natural history summary and survey protocol.*
[2] USFWS letter R2/ES-TE.

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5150 N. 16th Street, Suite B-235 • Phoenix, AZ 85016 • 602•279•2051 Fax 602•279•5431

form (attached) transmitted to USFWS and AGFD per permit requirements. No SWFLs or other *Empidonax* flycatchers were detected during the survey efforts. Brown-headed cowbirds (*Molothrus ater*), a known nest parasite of SWFLs, were detected during all surveys, and recent sign of livestock (cowbird associates) was present.

Vegetation within the Survey Area is summarized below, and is depicted on Figure 2. Further detail is found in the 2007 SWFL survey report prepared by WestLand for this project. Habitat conditions were not notably different in 2008.

The San Pedro River within the Survey Area has intermittent flow. In 2007, the river was flowing during the first three surveys and was drying up during the last two. In 2008, the channel was primarily dry during the first three visits, had partial flow during the fourth visit, and was flowing throughout the survey area during the final visit.

In general, the Survey Area includes large tracts of velvet mesquite (*Prosopis velutina*) bosque on floodplain elevated above the active channel of the San Pedro River. This includes remnants of historic bosque, as well as abandoned agricultural fields that are reverting to bosque, identified as secondary mesquite bosque on Figure 2.

Riparian vegetation with mature Fremont cottonwood (*Populus fremontii*), tamarisk (*Tamarix* sp.), Goodding's willow (*Salix gooddingii*), coyote willow (*Salix exigua*), Arizona ash (*Fraxinus velutina*), and various shrubs is restricted to the active channel and floodplain of the San Pedro River. A stringer of dense vegetation dominated by cottonwood and tamarisk, ranging from 20 to 40 feet (10 to 12 meters) wide, is on the eastern edge of the active floodplain, along an abandoned irrigation ditch at the edge of the abandoned fields.[3] The rest of the active floodplain is generally sparsely vegetated with smaller tamarisk dominant, although species composition varies and becomes denser with more cottonwoods toward the upstream end of the Survey Area. The active floodplain is entrenched up to 10 feet (3 meters) below the historic floodplain and 10 to 20 feet (3 to 6 meters) below the secondary shelves.

The survey route in 2008 (Figure 2) was the same that WestLand used in 2007. This included the habitat within the active floodplain and the mature mesquite bosque. The secondary mesquite bosque was not surveyed because it lacked the primary constituent elements of SWFL habitat.

In WestLand's opinion, only marginally suitable SWFL habitat is found within the Survey Area. Habitat with the greatest potential for SWFL occupation occurs along the active floodplain in the upstream segment of the Survey Area. Vegetation there appears to be maturing, but lacks the presence of slow or standing surface water.

WestLand conducted project-clearance level SWFL survey within the project area in 2007 and 2008 with no detections, and is not aware of any historical records of SWFL surveys or activity for the Survey Area. The AGFD annually compiles the results of SWFL surveys conducted throughout Arizona. We reviewed the annual reports for surveys conducted from 2000 through 2007 to identify the nearest surveys and nearest nest locations to the Redington Interconnect Project Survey Area. San Manuel Crossing, approximately five miles upstream from the Survey Area, was surveyed in 2000 and 2002 through 2005. No SWFL territories were found in 2000, but in 2002 seven territories and three nests were found, and the numbers increased in 2003, peaked in 2004

[3] This stringer was erroneously reported to be much wider in the 2007 report.

with 59 territories and 84 nests, and decreased slightly in 2005. South Catalina Wash, approximately one mile upstream from San Manuel Crossing, had four and three territories in 2005 and 2006, respectively. Flycatchers were also present within approximately one mile upstream from the Survey Area in 2008 (Shaylon Stump, AGFD, pers. comm.).

The nearest surveys downstream from the Interconnect Project Survey Area were at Cronley Wash, approximately 10 miles downstream. The area was surveyed in 2001 and 2002, with no territories or nests found. The nearest territories and nests downstream were at Capgage Wash, over 11 miles downstream. It was surveyed annually from 2000 through 2003 and in 2005, but territories and nests were found only in 2002, when two of each were recorded. Approximately 12 miles downstream from the Interconnect Project Survey Area, at Wheatfields, surveys were conducted annually from 2000 through 2005, with territories and nests found each year.

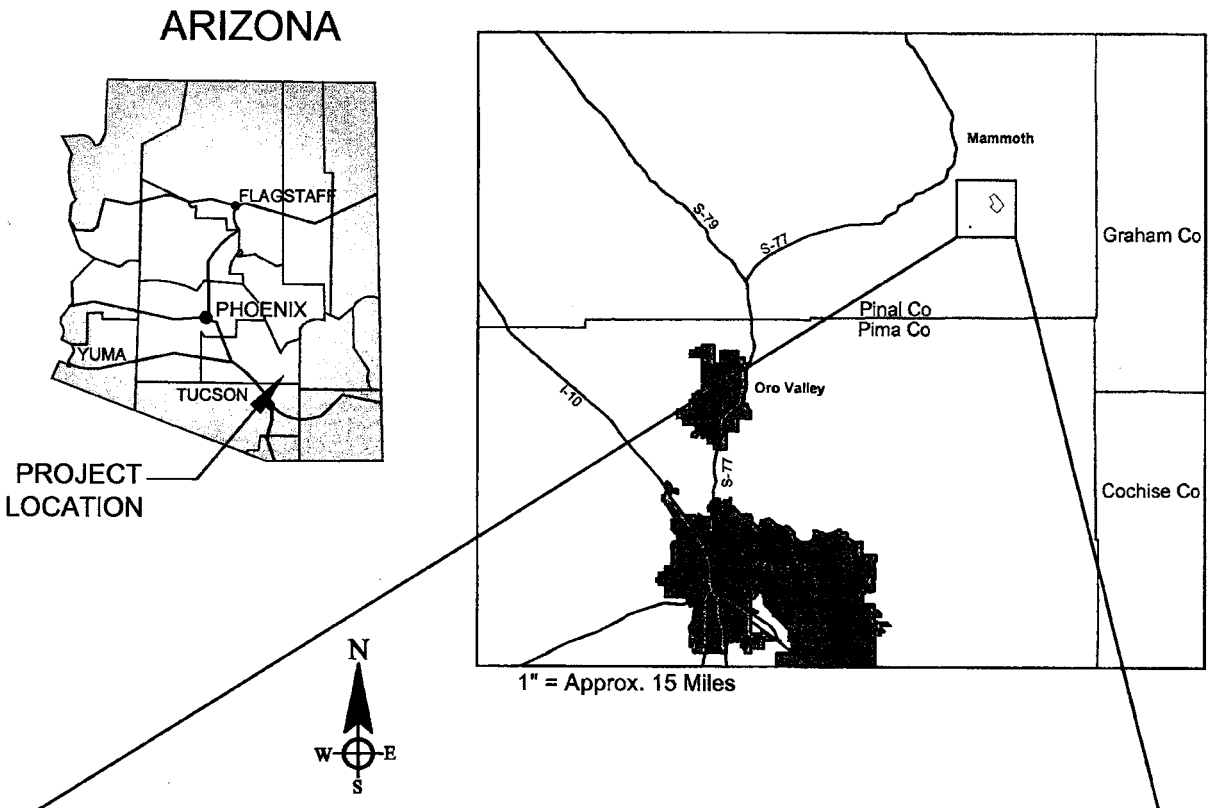
In summary, WestLand surveyed all potentially suitable SWFL habitat within the Redington Interconnect Project area in both 2007 and 2008. No SWFLs were detected during the survey efforts, and it is WestLand's opinion that the habitat within the Survey Area currently is marginally suitable for SWFL occupation. However, development of the vegetation could enhance its suitability for SWFLs in the future.

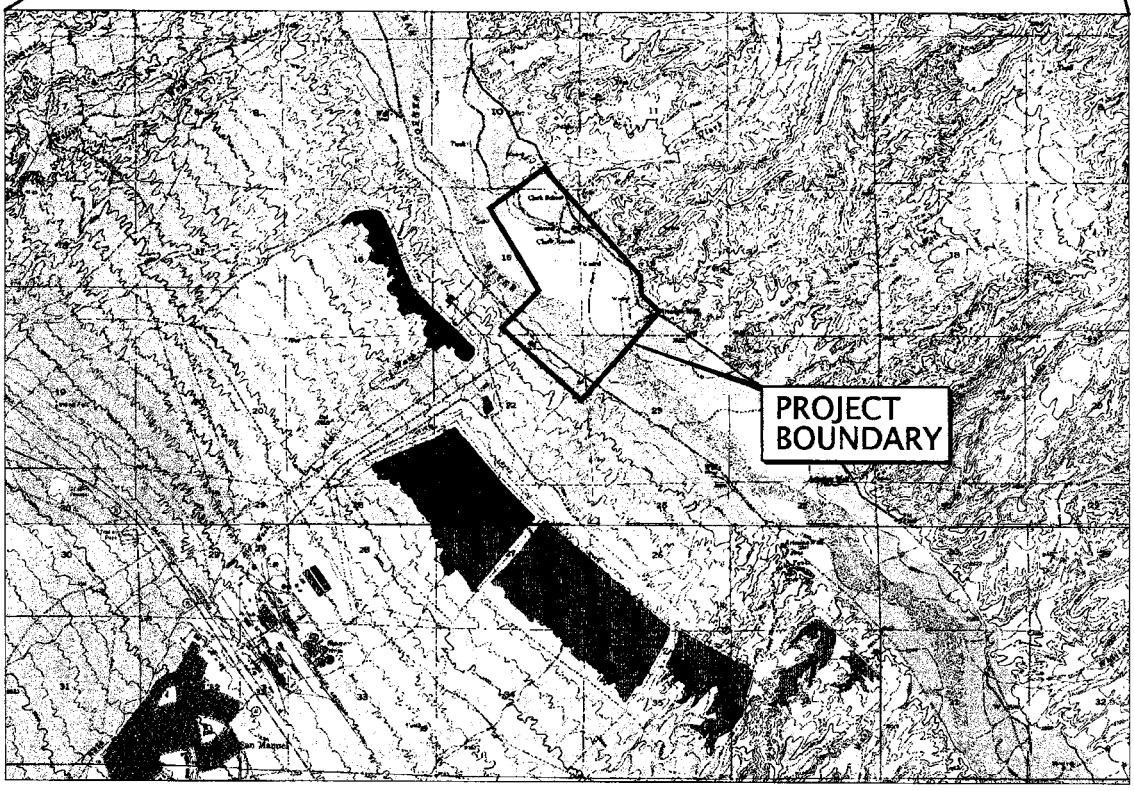
WestLand appreciates the opportunity to complete this survey on your behalf. If you have any questions, or we can be of additional assistance, please contact Brian Lindenlaub or me at (520) 206-9585.

Sincerely,
WestLand Resources, Inc.

Scott Hart
Project Manager

SDH:pb
Enclosures: Figure 1, Project USGS 7.5' Location Map
Figure 2, Aerial Overview of Project Area
Attachment A, 2008 SWFL Survey Form





T.9S., R.17E., Portion of Sections 10, 14, 15, 22 & 23
Pinal County, Arizona. Clark Ranch, Peppersauce Wash &
Campo Bonito 7.5' USGS Quadrangles.

REDINGTON INTERCONNECT PROJECT

SOUTHWESTERN WILLOW
FLYCATCHER SURVEY 2008
VICINITY MAP

Figure 1

WestLand Resources Inc.
Engineering and Environmental Consultants
4001 E. Paradise Falls Drive
Tucson, Az 85712 (520) 206-9585

0' 3300' 6600'
APPROX. SCALE: 1" = 6600'

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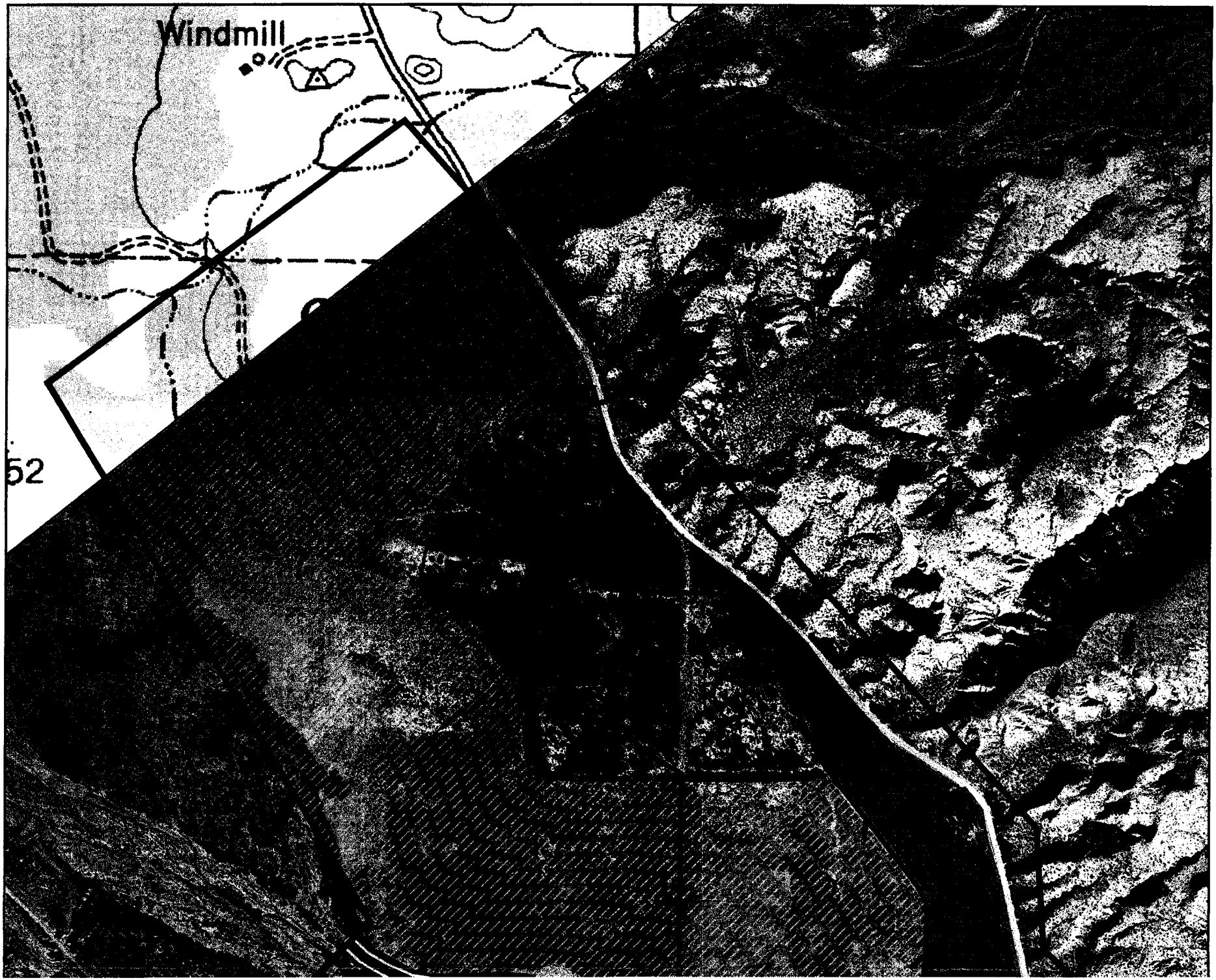
Windmill
52

Willow Flycatcher Survey and Detection Form (revised April, 2004)

Site Name: San Pedro: Clark Ranch State AZ County Pinal
USGS Quad Name Clark Ranch 7.5' Elevation 2475-2520 (feet) meters (circle one)

Is copy of USGS map marked with survey area and WIFL sightings attached (as required)? ☒ *Yes* ☐ *No*

Site Coordinates: Start: E 538817 N 3613000 UTM Datum NAD27 (NAD27 preferred)
Stop: E 538810 N 3612700 UTM Zone 12

***** Fill in additional site information on back of this page *****

Survey # Observer(s) (Full Name)	Date (m/d/y) Survey time	Number of Adult WIFLs	Estimated Number of Pairs	Estimated Number of Territories	Nest(s) Found? Y or N	Cowbirds Detected? Y or N	Presence of Livestock, Recent sign, If Yes, Describe Y or N	Comments about this survey (e.g., bird behavior, evidence of pairs or breeding, number of nests, nest contents or number of fledges seen; potential threats)
1 John Ginter	Date 05-27-2008 Start 0545 Stop 0945 Total hrs 4.0	Ø	Ø	Ø	N	Y	Yes. 10-15 cattle seen on site	Secondary PRVE stands in old ag. fields seem more developed than depicted in Photo
2 Dan Ginter	Date 06-10-08 Start 0530 Stop 0930 Total hrs 4.0	Ø	Ø	Ø	N	Y	Yes multiple seen	San Pedro River Dry along Survey Rt. for most of Downstream 2/3rds.
3 John Ginter	Date 7-2-08 Start 0600 Stop 1000 Total hrs 4.0	Ø	Ø	Ø	N	Y	Yes multiple seen	~~Pulse of water noted~~ San Pedro Dry @ time of Survey
4 John Ginter	Date 7-8-08 Start 0600 Stop 1000 Total hrs 4.0	Ø	Ø	Ø	N	Y	Yes multiple seen	Storm water pulse of flow noted upstream 1/3 of survey area
5 John Ginter	Date 7-16-08 Start 0600 Stop 1000 Total hrs 4.0	Ø	Ø	Ø	N	Y	Yes multiple seen	Flows present in San Pedro channel @ time of Survey

Overall Site Summary (Total resident WIFLs only)	Adults	Pairs	Territories	Nests
Total survey hrs 20.0	Ø	Ø	Ø	Ø

Were any WIFLs color-banded? Yes (No)

If yes, report color combination(s) in the comments section on back of form N/A

Reporting Individual Scott Hart Date Report Completed 18 July 2008
US Fish and Wildlife Service Permit # TE834782 AZ Game and Fish Department (or other state) Permit # SF637280

Submit original form by August 1st. Retain a copy for your records.

Fill in the following information completely. Submit original form by August 1st. Retain a copy for your records.

Reporting Individual Scott Hart Phone # 520-206-9585
Organization Westland Resources E-mail Shart@westlandresources.com
Site Name San Pedro: Clark Ranch Date Report Completed 18 July 2008

Did you verify that this site name is consistent with that used in previous years? (Yes) / No (circle one)
If name is different, what name(s) was used in the past? NA
If site was surveyed last year, did you survey the same general area this year? (Yes) / No If no, summarize in comments below.
Did you survey the same general area during each visit to this site this year? (Yes) / No If no, summarize in comments below.

Management Authority for Survey Area (circle one): Federal Municipal/County State Tribal (Private)
Name of Management Entity or Owner (e.g., Tonto National Forest) BHP Copper, Inc.

Length of area surveyed: ≈ 2.85 miles (specify units, e.g., miles = mi, kilometers = km, meters = m)

Vegetation Characteristics: Overall, are the species in tree/shrub layer at this site comprised predominantly of (check one):

- [ ] Native broadleaf plants (entirely or almost entirely, includes high-elevation willow)
- [x] Mixed native and exotic plants (mostly native)
- [ ] Mixed native and exotic plants (mostly exotic)
- [ ] Exotic/introduced plants (entirely or almost entirely)

Identify the 2-3 predominant tree/shrub species: Prve TACH Pofr SAGO

Average height of canopy (Do not put a range): 30' (specify units)

Was surface water or saturated soil present at or adjacent to site? (Yes) / No (circle one)
Distance from the site to surface water or saturated soil: 5'-2000' (specify units)

Did hydrological conditions change significantly among visits (did the site flood or dry out)? (Yes) / No (circle one)
If yes, describe in comments section below.

Remember to attach a copy of a USGS quad/topographical map (REQUIRED) of the survey area, outlining the survey site and location of WIFL detections. Also include a sketch or aerial photograph showing details of site location, patch shape, survey route in relation to patch, and location of any willow flycatchers or willow flycatcher nests detected. Such sketches or photographs are welcomed, but DO NOT substitute for the required USGS quad map. Please include photos of the interior of the patch, exterior of the patch, and overall site and describe any unique habitat features.

Comments (attach additional sheets if necessary)
Site was primarily dry during 1st 3 visits, partial flows in 4th visit, and continuous flows in San Pedro during final visit.

WIFL Detection Locations:

Date Detected	N UTM	E UTM	Date Detected	N UTM	E UTM
NA			NA		

Exhibit D

BIOLOGICAL ASSESSMENT FOR IMPACTS TO SOUTHWESTERN WILLOW FLYCATCHER AND LESSER LONG-NOSED BAT

The transmission line corridor crosses designated Critical Habitat for southwestern willow flycatcher (*Empidonax traillii extimus*), and the proposed project would result in direct impacts to saguaro cacti (*Carnegiea gigantea*), a potential food plant for lesser long-nosed bat (*Leptonycteris yerbabuenae*). Both of these species are federally listed endangered. A summary of impacts to these two species is provided below.

Southwest Transmission Cooperative, Inc. (SWTC), requested that Bureau of Land Management (BLM) enter into formal consultation with U.S. Fish and Wildlife Service, pursuant to Section 7(a)(2) of the Endangered Species Act (ESA). BLM, as the lead federal agency for the consultation, is required to assess the impacts of the proposed action to species listed or proposed for listing under the ESA. SWTC, acting as agent for BLM, prepared a Biological Assessment (Exhibit D) as part of ESA consultation for the proposed federal actions and to establish a foundation to support the requested Section 7 consultation for adverse impacts to designated Critical Habitat for southwestern willow flycatcher and adverse impacts to the potential foraging habitat of lesser long-nosed bat. Southwestern willow flycatcher Critical Habitat boundaries in the project area are depicted in Figure 4 of Exhibit D.

Southwestern Willow Flycatcher

The project would result in the alteration of approximately 0.56 acre of designated Critical Habitat for southwestern willow flycatcher. The majority of Critical Habitat in the project area is mesquite woodland located on elevated river terraces above the main channel of the San Pedro River, and it does not exhibit the Primary Constituent Elements necessary for the conservation of this species. Based on this consideration, SWTC has determined that project-related impacts would be limited to the placement of one transmission structure, with a footprint of 0.03 acre, in former agricultural land east of the main San Pedro River channel. No impacts to cottonwood-willow (*Populus-Salix*) riparian vegetation are anticipated as a result of the proposed project.

The proposed project would have "no effect" on individual southwestern willow flycatchers.
This determination of effect is based on the following: 1) no southwestern willow flycatcher detections during "project-related" clearance surveys conducted in 2007 and 2008 (Exhibits C-1 and C-2); 2) the absence of southwestern willow flycatcher breeding records in the immediate project vicinity (the nearest breeding record is 2.14 miles upstream); 3) the absence of vegetation in the project area with suitable density and structure for nesting; and 4) the planned implementation of a variety of measures by SWTC to avoid and minimize the potential impacts of the project, including conducting work along the San Pedro River during the non-breeding season for southwestern willow flycatcher.

Lesser Long-Nosed Bat

A total of 208 saguaro cacti, a potential food plant for lesser long-nosed bat in the early to mid-summer range of the species, was recorded in the easternmost access road alignment. Of this total, 95 cacti would be transplanted, 16 will be avoided, and 97 would be removed during project construction. Based on current available aerial photography, SWTC estimated a population of 1,437 saguaros within a 106-acre

study area centered on the access road alignment at the east end of the project area in the lower foothills of the Galiuro Mountains. Project construction would impact only 6.7% of the saguaros present in this 106-acre area. Although it is impossible to evaluate the significance of the loss of foraging habitat to lesser long-nosed bat, the loss is considered insignificant, compared with the large amount of potential foraging habitat available to lesser long-nosed bat regionally.

The proposed project would have "no effect" on individual lesser long-nosed bats. This determination of effect is based on the following: 1) the location of the project in that portion of the Arizona range believed to be used from mid- to late summer when agaves (not saguaros) are the primary food source; 2) the distance of the project area from the nearest lesser long-nosed bat maternity roost (Old Mammon Mine is located about 75 miles to the west); and 3) the absence of lesser long-nosed bat roost sites and documented foraging records for the project area.

Biological Assessment of Impacts to Southwestern Willow Flycatcher and Lesser Long-nosed Bat from the Proposed San Manuel Interconnect Project, Pinal County, Arizona

Prepared for

U.S. Department of the Interior

On behalf of

Southwest Transmission Cooperative, Inc.

Prepared by

SWCA Environmental Consultants

August 2008

BIOLOGICAL ASSESSMENT OF IMPACTS TO SOUTHWESTERN WILLOW FLYCATCHER AND LESSER LONG-NOSED BAT FROM THE PROPOSED SAN MANUEL INTERCONNECT PROJECT, PINAL COUNTY, ARIZONA

Prepared for

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SWCA Project No. 13793

August 2008

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1.0 INTRODUCTION

Southwest Transmission Cooperative, Inc. (SWTC) is requesting that the Bureau of Land Management (BLM) enter into formal consultation with the U.S. Fish and Wildlife Service (USFWS), pursuant to Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended, because the San Manuel Interconnect Project, as proposed, would result in adverse impacts to approximately 0.56 acre of designated Critical Habitat (hereafter "Critical Habitat") for southwestern willow flycatcher (SWF) (*Empidonax traillii extimus*), a federally listed endangered species.

SWCA Environmental Consultants (SWCA) reviewed a list of threatened and endangered species for Pinal County available from the USFWS website (USFWS 2008a). On the basis of this review, discussions with USFWS, and correspondence with Arizona Game and Fish Department (AGFD), it was determined that the only federally listed species with the potential to occur in the project area are SWF and lesser long-nosed bat (LLNB) (*Leptonycteris curasoae yerbabuenae*).

The following biological assessment (BA) was prepared as part of ESA consultation for the proposed federal action and to establish a foundation to support the requested Section 7 consultation for adverse impacts to SWF Critical Habitat. The potential for the project to impact LLNB also is evaluated in the BA. Section 2 of the BA is a detailed description of the proposed San Manuel Interconnect Project. Section 3 is a description of the proposed federal actions. Section 4 is a discussion of the biology and status of SWF and LLNB, which provides the basis for the analysis of impacts presented in Section 5. Published and unpublished literature is provided in Section 6.

2.0 PROJECT DESCRIPTION

2.1 Project Location

The proposed San Manuel Interconnect Project is located in the San Pedro River valley near the town of San Manuel in Pinal County, Arizona (Figure 1). The project originates at the existing Apache to Hayden 115-kV transmission line in the SW ¼ of Section 12, Township 9 South, Range 17 East, extends through Sections 13–15, 21, 22, and 28, Township 9 South, Range 17 East, and terminates at the San Manuel Substation in Section 29, Township 9 South, Range 17 East (Figure 2).

2.2 Project History

SWTC is a rural electric cooperative that operates and maintains a 603-mile-long transmission system that extends north and west from the southeastern part of Arizona at the Apache Generating Station in Cochise County to the Bullhead City area along the Colorado River. There is rapid growth in the area of Pinal County, which SWTC supports through delivery of electricity to one of its member systems, Trico Electric Cooperative, Inc. (Trico). Trico needs to import and export power into the SWTC system to support the increased loads in southeastern Pinal County. To provide (i.e., wheel) power to the Arizona Public Service (APS) transmission system, it is necessary for SWTC to "tie in to" the existing APS 115-kV system at the San Manuel Substation.

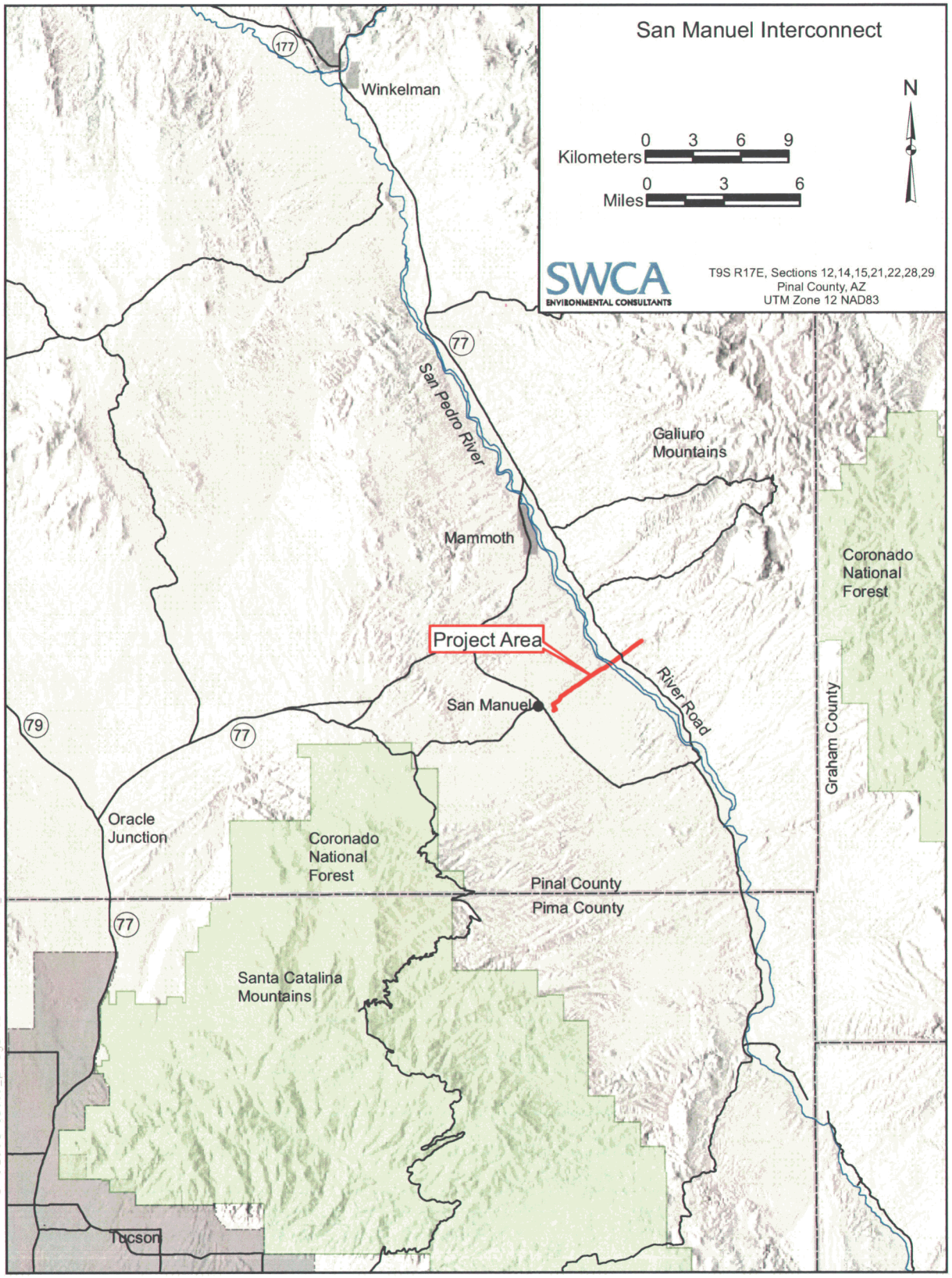

Figure 1. Project location.

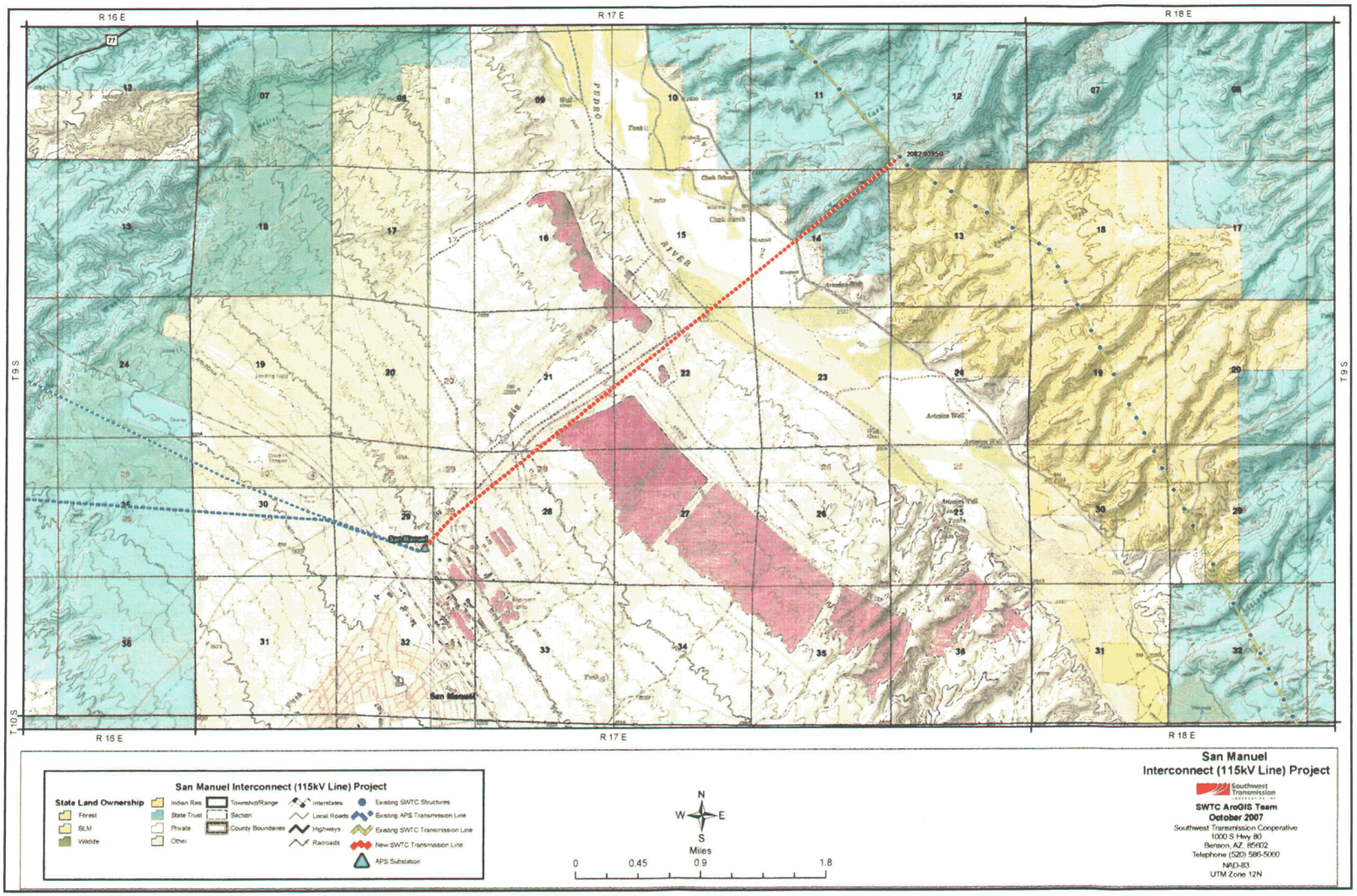

Figure 2. San Manuel Interconnect project detail.

Several SWTC and Trico substations are served from the APS 115-kV system. However, SWTC has only one existing interconnection with APS: at the Westwing Substation, located in the Phoenix area. The Westwing transmission path provides service to the majority of SWTC's remote Class A Members. APS has indicated that their ability to wheel power from the Westwing Substation to southeastern Pinal County is limited and may be constrained sometime in 2008. The proposed project provides a very necessary second interconnection with APS to reduce the Westwing constraints. Additionally, the interconnection at San Manuel Substation provides a direct transmission path from the Apache Generating Station to southeastern Pinal County while using only a small portion of the APS 115-kV system as a wheeling path. Finally, the proposed project would also benefit APS under certain emergency conditions by providing service to Bisbee and Douglas.

2.3 Existing Conditions

2.3.1 Project Area Terrain

The San Pedro River valley is typical of valleys in the Basin and Range physiographic province, which is characterized by numerous mountain ranges that rise abruptly from broad valleys or basins. The project area is located entirely on broad alluvial fan deposits that have been dissected by the San Pedro River and by ephemeral drainages originating in the Galiuro and Santa Catalina mountains, located immediately east and west of the project area, respectively. Elevations in the project area range from approximately 3,200 feet above mean sea level (amsl) at the existing San Manuel Substation to 2,500 feet amsl where the project area crosses the San Pedro River. The elevation at the east end of the project area, near the existing Apache to Hayden 115-kV transmission line, is 2,950 feet amsl.

2.3.2 Surrounding Land Uses

East of River Road, the project would be on and adjacent to land administered by Arizona State Land Department (ASLD) (Sections 11, 12, and 14) and BLM (Section 13). ASLD and BLM land in this area is largely undeveloped, with the exception of the existing Apache to Hayden 115-kV line and associated access roads. West of River Road, the project area is bordered by private property owned by BHP Copper Inc. (BHP). BHP land includes former agricultural land between the main channel of the San Pedro River and River Road, and land formerly used for copper processing facilities west of the San Pedro River floodplain.

2.3.3 Project Area Vegetation

Portions of the project area have been disturbed by previous human activity associated with agriculture and BHP copper processing. At the west end of the project area, the proposed transmission line would follow a BHP maintenance road that runs between recently reclaimed tailings impoundments. Vegetation in this area is limited to scattered velvet mesquite (*Prosopis velutina*), saltcedar (*Tamarix* sp.), desert broom (*Baccharis sarothroides*), and Russian thistle (*Salsola iberica*). On the east side of the San Pedro River, land formerly used for agriculture is now overgrown with small mesquites and silverleaf nightshade (*Solanum elaeagnifolium*).

The natural vegetation communities in the project area are Sonoran Desertscrub (Arizona Upland Subdivision) and Sonoran Riparian Scrubland (Brown 1994). These communities are described in detail below.

Sonoran Desertscrub. The dominant plant species in the Sonoran Desertscrub community, which is typical of the foothills of the Galiuro Mountains east of River Road and some undisturbed areas west of the San Pedro River on BHP property, are little-leaf paloverde (*Parkinsonia microphylla*) and saguaro

cactus (*Carnegiea gigantea*). Saguaros are relatively abundant in the foothills of the Galiuro Mountains at the east end of the project area. Other common species in this plant community are velvet mesquite, creosote bush (*Larrea tridentata*), desert hackberry (*Celtis pallida*), catclaw acacia (*Acacia greggii*), whitethorn acacia (*A. constricta*), canyon ragweed (*Ambrosia ambrosioides*), and ocotillo (*Fouquieria splendens*). Also present is a variety of cholla and prickly pear cacti (*Opuntia* spp.).

Sonoran Riparian Scrubland. Sonoran Riparian Scrubland vegetation is associated with the San Pedro River. Two vegetation series were identified within the Sonoran Riparian Scrubland community: 1) Cottonwood-Willow; and 2) Mesquite. The Cottonwood-Willow series is present as a narrow stringer of vegetation along the main channel of the San Pedro River. Dominant species in this series include Fremont cottonwood (*Populus fremontii*), Goodding willow (*Salix gooddingii*), and saltcedar. Additional plant species found in the vicinity of San Pedro River include seepwillow (*Baccharis salicifolia*) and desert broom. The main channel of the San Pedro River is incised several feet below the adjacent floodplain terraces; the entire floodplain, including channel and adjacent terraces, is approximately 800 feet wide at the location at which it would be spanned by the transmission line. With the exception of the former agricultural land described above, these river terraces support relatively dense woodlands of velvet mesquite, the majority of which are approximately 25 feet tall. The mesquite woodland understory supports little vegetation other than scattered graythorn (*Ziziphus obtusifolia*), whitethorn acacia, desert hackberry, and annual forbs and grasses.

2.3.4 Existing Structures and Disturbances

Between River Road and the San Pedro River floodplain, the terrain is relatively flat former agricultural land owned by BHP. The land is now overgrown with small mesquites and is not active for agriculture or grazing. The western end of the project area, west of the San Pedro River floodplain, was formerly used for copper processing. The processing site once included a mill, concentrator, and smelter, but all of these facilities have been removed and the site is reclaimed. Remaining evidence of these facilities is now limited to reclaimed slag disposal areas, reclaimed tailings impoundments, and offices and shops related to ongoing reclamation efforts. There are several existing roads and utilities located in the project area. These include

- Apache to Hayden 115-kV transmission line and associated access roads;
- Two APS 115-kV transmission lines;
- APS San Manuel Substation;
- APS 12.5-kV transmission line and access road;
- 46-kV yard and pump house;
- River Road (a county-maintained, improved dirt road);
- Mine access roads, slag disposal areas, reclaimed tailings impoundments, and offices and shops associated with the BHP San Manuel plant site; and
- The San Manuel Arizona Railroad, owned by BHP.

2.4 Proposed Action

The project would consist of the following components:

1. A 230-kV transmission line extending approximately 4.5 miles from the existing Apache to Hayden 115-kV transmission line to the existing San Manuel Substation; and

2. Approximately 1.69 miles (8,910 feet) of new access roads.

The proposed new transmission line will be a double-circuit 230-kV line (using 230-kV post insulators) initially energized at 115 kV. The line will use davit arm construction and will be supported by self-weathering steel monopole structures that are approximately 115 feet tall (Figure 3). A total of 17 structures will be required to complete the line. In order to connect to the San Manuel Substation, SWTC will acquire two bays from APS. In addition, along approximately 3 miles of the 4.5-mile-long transmission line (from the pump house to the San Manuel Substation, all on BHP property on the west side of the San Pedro River), SWTC will hang an additional 46-kV line on the new structures. SWTC will remove and dispose of the existing BHP 46-kV line following installation of the new 46-kV line. Installation of the new 230-kV transmission line will require a 100-foot-wide right-of-way (ROW) across ASLD, BLM, and BHP lands.

Three access roads will be required for project construction and future maintenance. At the east end of the project area, a 7,560-foot-long access road will be constructed to link the existing Apache to Hayden 115-kV transmission line, located in the foothills of the Galiuro Mountains, with River Road. The disturbance footprint associated with this road will vary in width from 14 to 50 feet, depending on the terrain. The remaining two road segments will be located west of River Road in mesquite woodland. These roads will be 14 feet wide, with an additional 5-foot-wide buffer on either side where vegetation will be manually trimmed. The access road on the east side of the San Pedro River, which will measure approximately 500 feet long, will provide access from River Road to an existing BHP farm road. The road on the west side of the San Pedro River, which will be approximately 1,000 feet long, will provide access to an existing BHP mine road from a transmission structure located east of the main channel of the San Pedro River. The locations of the access roads are shown in Figure 4. A cross section showing the extent of proposed mechanical and manual vegetation clearing along the westernmost access road is provided in Figure 5.

2.4.1 Measures to Avoid, Minimize, and Mitigate for Impacts

Southwestern Willow Flycatcher. SWTC has made significant efforts to minimize adverse impacts to SWF Critical Habitat resulting from the proposed action. During initial planning, SWTC overlaid SWF Critical Habitat boundaries, available from the USFWS Critical Habitat Decision Support System (USFWS 2008b), on a recent aerial photograph of the project area. SWTC then sited transmission line structures and access roads in order to avoid and minimize impacts to Critical Habitat. The aerial map, with Critical Habitat boundaries and project infrastructure, was provided to Jason Douglas, USFWS, during an informal project meeting at the SWCA Tucson office on February 20, 2008. Photographs of Critical Habitat in the project area also were made available at the meeting (Appendix A).

During the meeting, SWCA and SWTC characterized the majority of Critical Habitat in the project area as mesquite woodland on old river terraces located well above the main channel of the San Pedro River. It was determined following discussion that the majority of this mesquite woodland is unlikely to provide the essential life cycle needs of SWF (i.e., areas on which are found the primary constituent elements (PCEs), as defined at 50 Code of Federal Regulations (CFR) 424.12(b)). According to USFWS (2005:60893), "Areas that do not contain the PCEs within the boundaries of critical habitat are not considered to be critical habitat and thus, actions in those areas would not trigger consultation unless they affected adjacent critical habitat." SWF PCEs are listed in Section 4.1.5. During the February 20 meeting, USFWS and SWTC re-examined the aerial photograph and agreed in principal on boundaries that appear to reflect more accurately the area required by SWF to satisfy essential life-cycle needs.

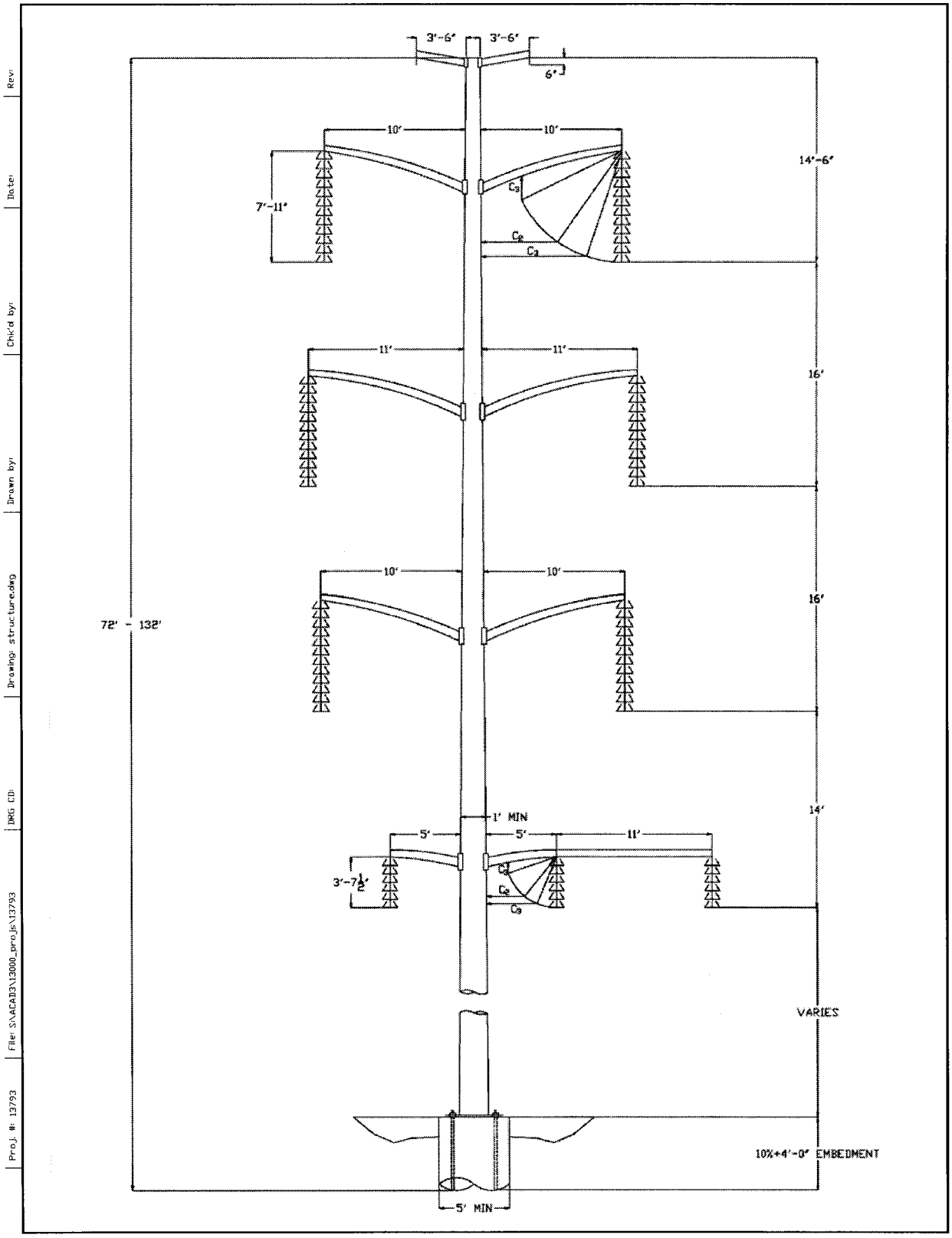

Figure 3. Transmission line structure.

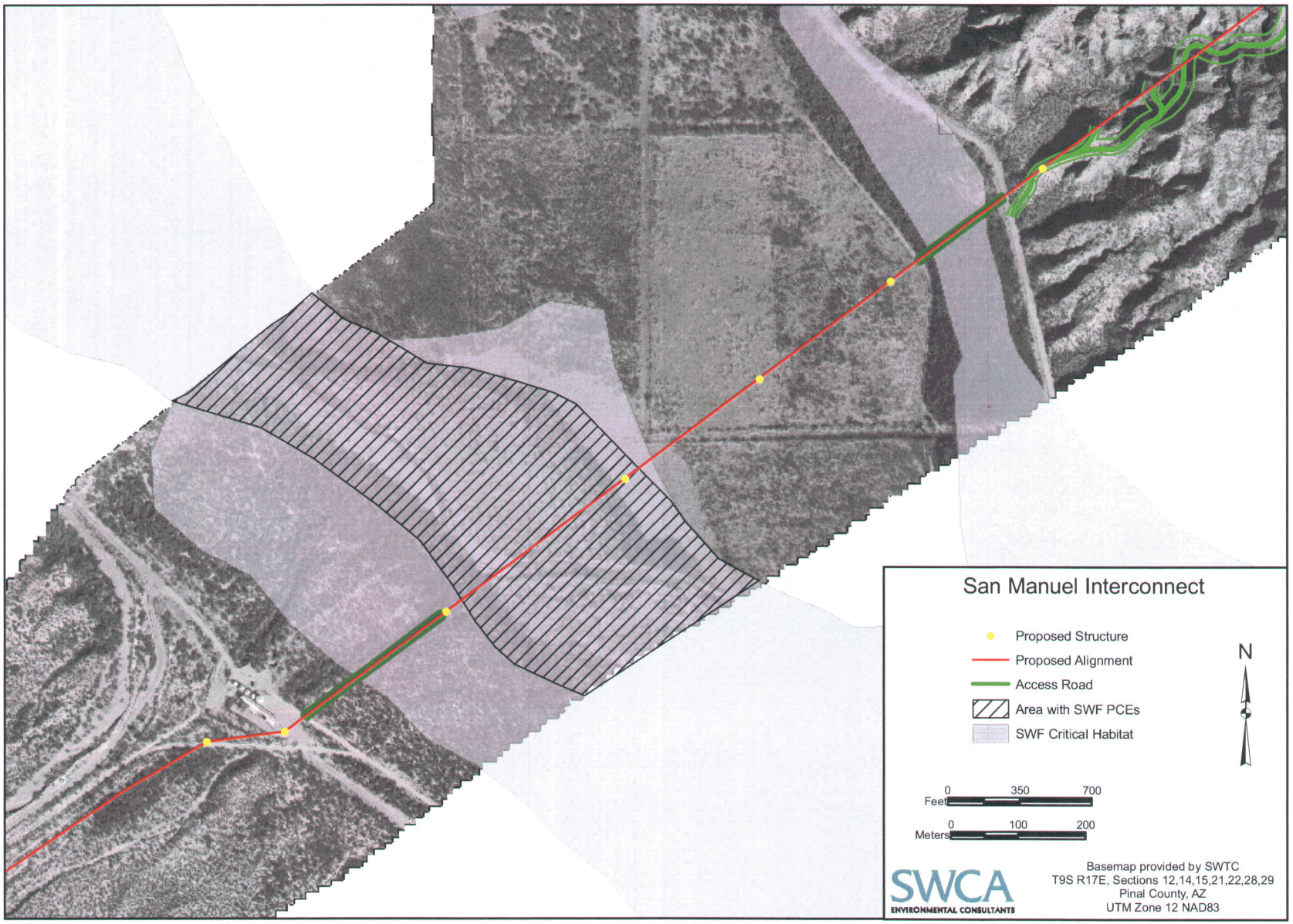

Figure 4. Aerial photograph showing SWF Critical Habitat, area with SWF PCEs, and proposed areas of disturbance.

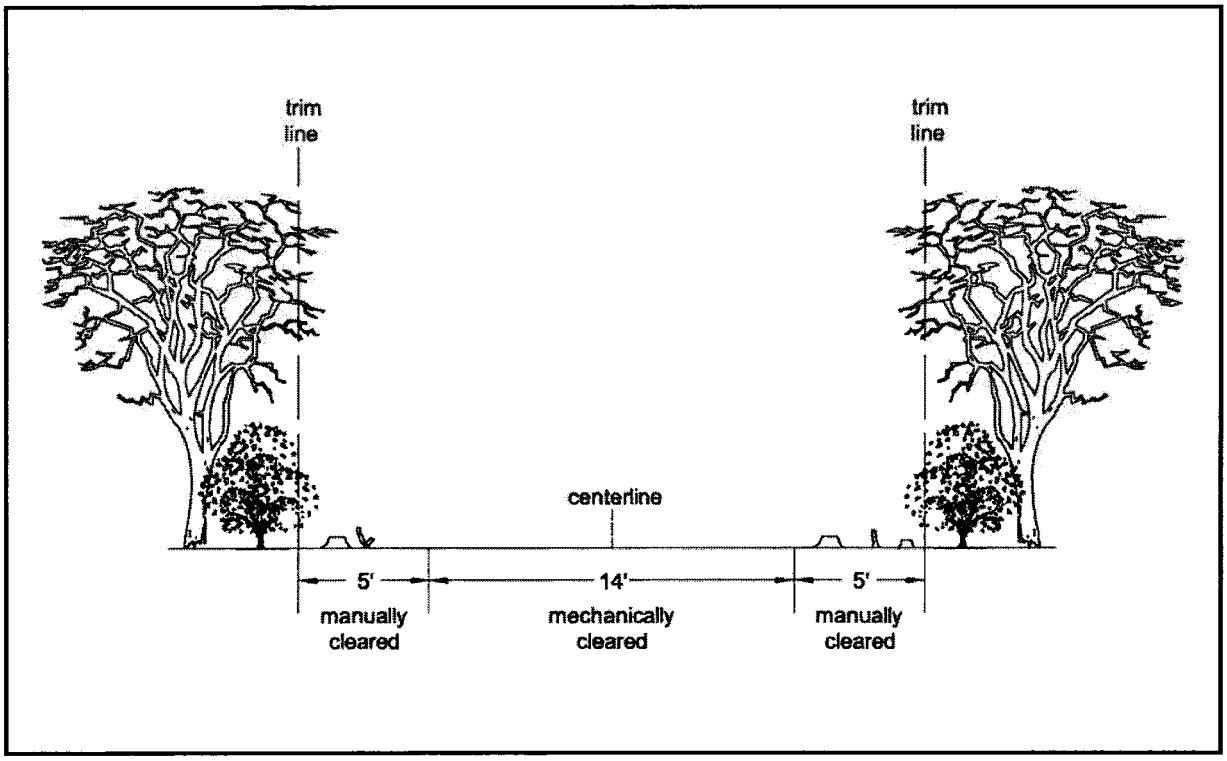

Figure 5. Cross-section showing proposed vegetation impacts along the westernmost access road in the San Pedro floodplain.

Following the meeting, SWTC prepared a map depicting both Critical Habitat, as designated by USFWS, and a newly delineated area within Critical Habitat based on the discussion referenced above (see Figure 4). The newly delineated area excludes the majority of mesquite woodland in the project area; SWTC retained on the map a 150-foot-wide buffer of mesquite woodland on the south side of the San Pedro River because there is unpublished literature documenting occasional SWF use of this vegetation type when it is immediately adjacent to "traditional" nesting habitats, such as willow (see Section 4.1.4). In this BA, calculations of direct impact (i.e., acres) are provided for both Critical Habitat and this newly delineated area. The mesquite woodland excluded from the newly delineated area depicted in Figure 4 does not in the opinion of SWTC and SWCA exhibit the following features: 1) the riparian plant species needed for breeding, foraging, and shelter for breeding, non-breeding, territorial, migrating, and dispersing flycatchers; 2) the variety of structural vegetation features targeted for nest placement; 3) the range of more generalized riparian habitat used for migrating, foraging, dispersing, and non-breeding SWFs; and 4) SWF food requirements. In addition, the majority of mesquite woodland in the project area does not exhibit the river hydrology and geomorphology, groundwater, surface water, channel-floodplain connectivity, overbank flooding, hydrologic regime, fine sediments, moist soils, microclimate, and other processes such as erosion, precipitation, drought, humidity, etc., that are considered important for the presence, development, location, abundance, growth, regeneration, suitability, and maintenance of the vegetation and insects.

In addition to the project design considerations described above, SWTC has adopted a variety of additional measures discussed at the meeting with USFWS to avoid and minimize potential impacts to SWF and SWF Critical Habitat. These measures include the following: 1) prevent unauthorized off-road vehicle access to Critical Habitat by installing locked gates on new access roads; 2) conduct all construction activities within the San Pedro River floodplain between September 1 and April 15, the non-

breeding season for SWF; 3) continue to conduct "project-related" clearance surveys for SWF (see USFWS 2000); 4) avoid changes to river morphology by siting roads outside the main channel of the San Pedro River and by using a cement base and small disturbance footprint for the installation of the transmission structure near the main channel; and 5) manually carry the conductor wire across the San Pedro River during project construction.

Lesser Long-nosed Bat. SWTC also has made significant efforts to minimize impacts to LLNB habitat in the project area. The densest saguaro concentrations in the project area are on the southwest-facing foothills of the Galiuro Mountains. SWTC originally considered two major alternatives for access road construction in the foothills of the Galiuro Mountains between the Apache to Hayden 115-kV transmission line and River Road: the Clark Wash alternative and the southern alternative. The Clark Wash alternative, located approximately 0.5 mile north of the southern alternative, was eliminated for the following reasons: 1) structures would need to be located in the Clark Wash drainage, a potentially jurisdictional water of the U.S.; 2) there are several archaeological sites along the Clark Wash drainage; and 3) this alternative would be more costly because it would require two angle structures (each redirecting the line approximately 90 degrees) and a greater total number of structures due to its greater length.

The southern alternative was chosen as the only practicable route for the access road. SWTC originally envisioned that disturbance limits of 100 feet would be required due to engineering challenges associated with the steep terrain in the area. However, after examining the alignment in the field, SWTC determined that the large number of saguaro cacti adversely impacted by a disturbance footprint of this width would be unacceptable. SWTC therefore redesigned the access road to reduce disturbance limits to 50 feet or less and, on the basis of aerial photography, shifted the road alignment in order to avoid the greatest saguaro concentrations.

The new access road alignment was surveyed for saguaro cacti on April 24 and 25, 2008, by an SWCA biologist. A handheld Trimble Navigation Geo XT global positioning system (GPS) data recorder was used to map the locations of all saguaros in the 50-foot-wide alignment, which had been staked by SWTC prior to the field visit. Data recorded for each cactus included the height of the main stem, number of arms, total linear feet (including arms), and general viability (health).

Following the survey, SWTC created a series of maps showing the following: 1) the locations of saguaro cacti within the disturbance footprints of the original and new access road alignments (Figure 6); 2) the locations of saguaro cacti by size class (>5 feet tall and ≤5 feet tall), including those that would be avoided (based on field survey), within the new access road alignment (Figure 7); and 3) the locations of saguaro cacti within a study area that includes the new access road alignment and surrounding area (Figure 8).

The aforementioned maps and associated saguaro density information were provided to Douglas and Scott Richardson, USFWS, at the USFWS Tucson office during a second informal project meeting on May 7, 2008. Following discussions with USFWS, SWTC adopted the following additional measures to mitigate potential impacts to LLNB and LLNB habitat: 1) provide a monitor during road construction to avoid unnecessary impacts to saguaros; 2) pay an in-lieu fee to AGFD for future research benefiting LLNB; and 3) transplant along the road alignment all saguaros ≤5 feet tall that are impacted by the project. It was decided during the meeting that the in-lieu fee would be paid upfront (prior to road construction) and the fee amount would be based on the stumpage value (calculated according to ASLD guidelines) of all saguaros that would be impacted by the project. According to information collected during the field survey, SWTC would impact 2,839.5 linear feet of saguaro at a stumpage value of $3.00 per linear foot, for a total of $8,518.50, payable to AGFD. AGFD prepared a letter providing assurances that the in-lieu funds can be accepted by AGFD and that the funds will be used for future research benefiting LLNB (Appendix B).

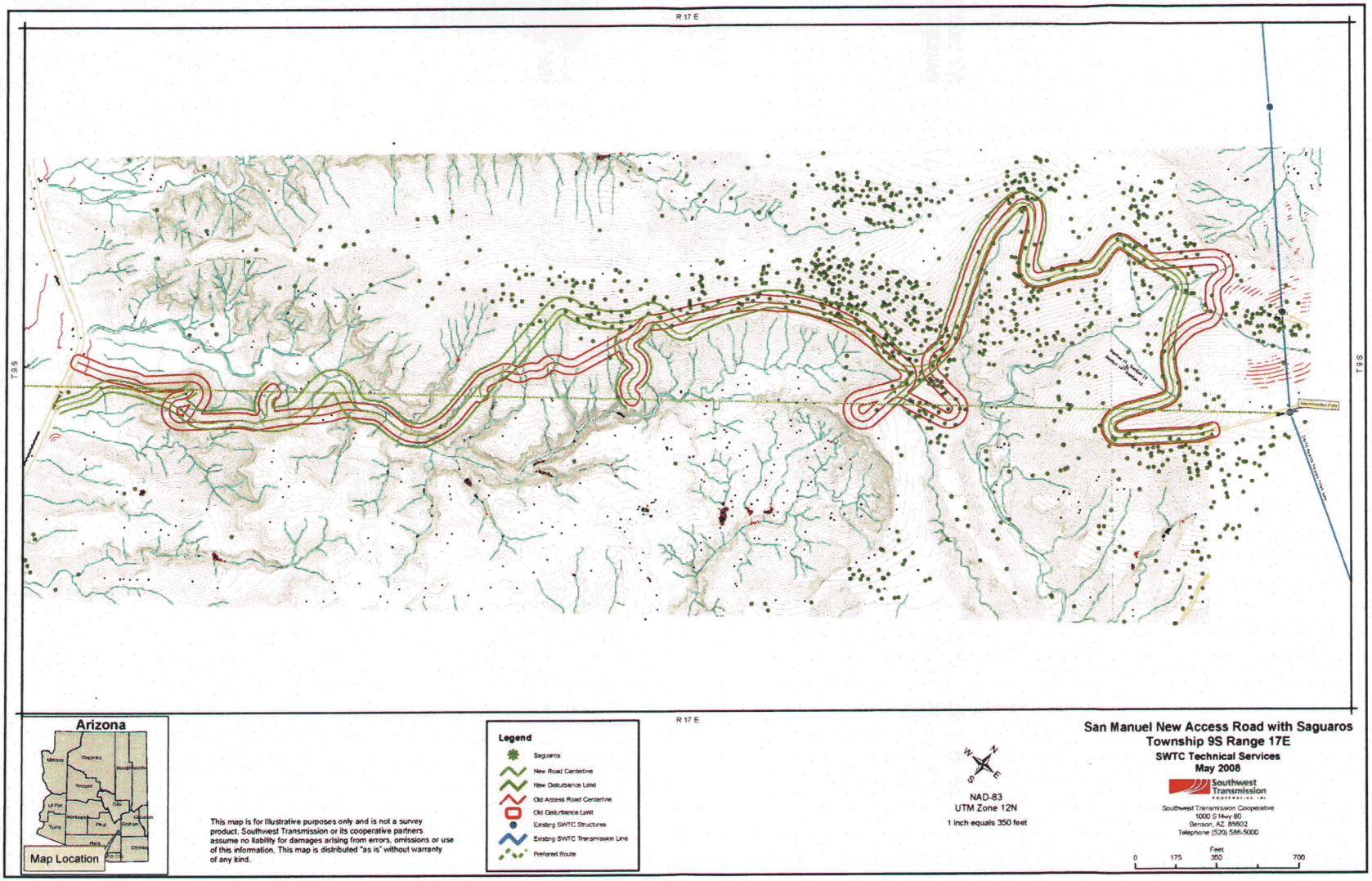

Figure 6. Locations of saguaro cacti relative to the old and new access road alignments.

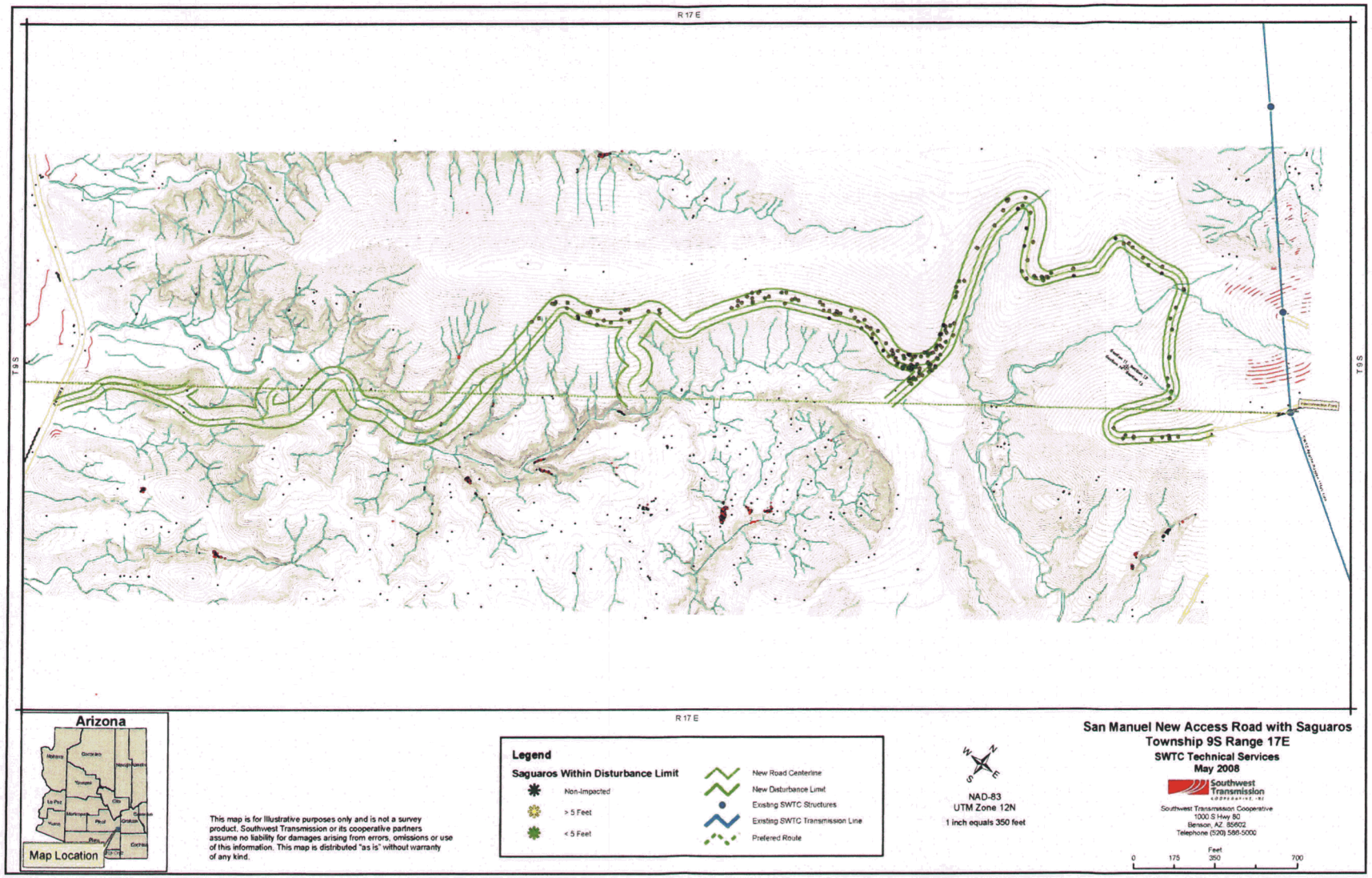

Figure 7. Locations of saguaro cacti in the new access road alignment.

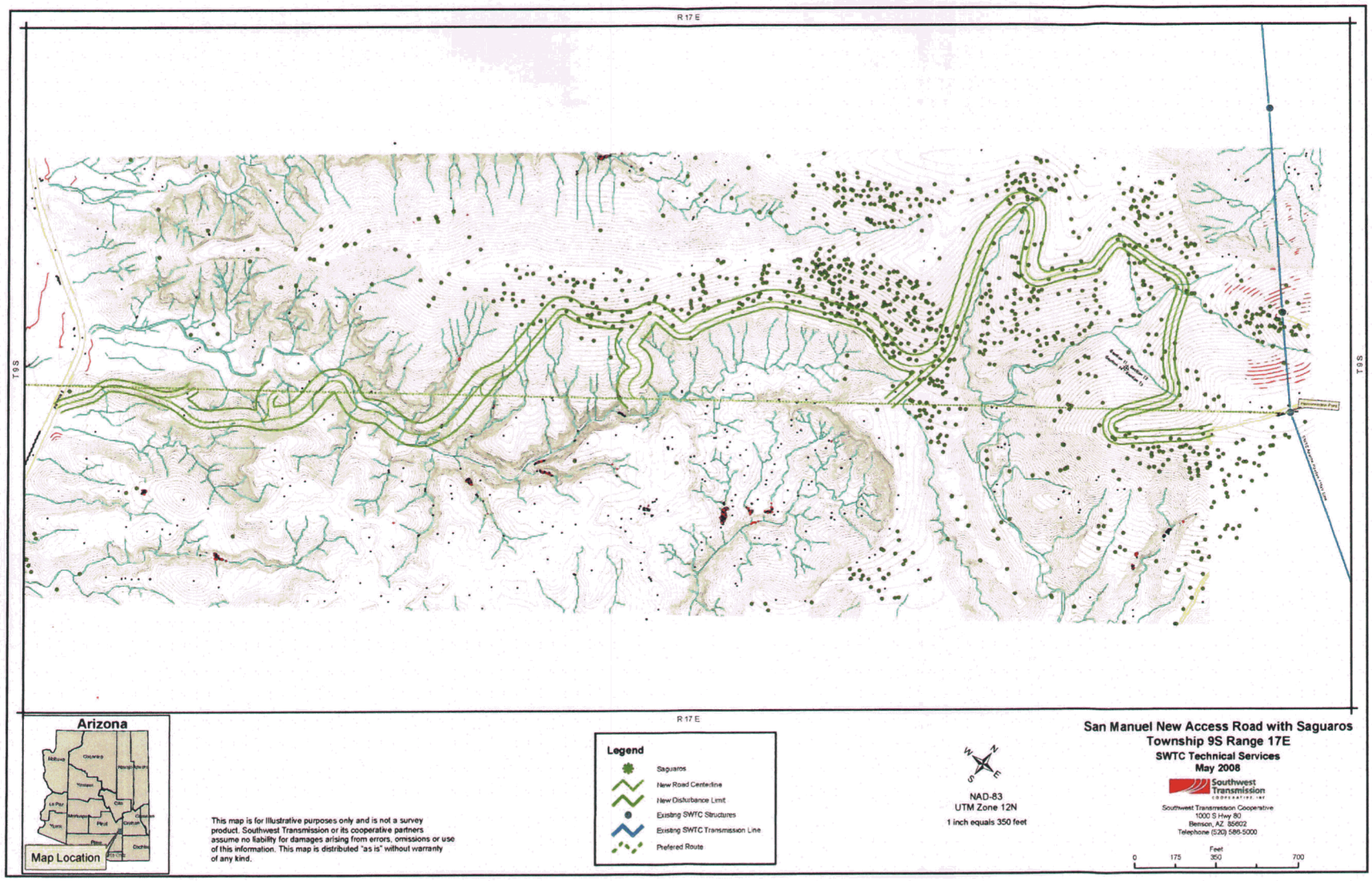

Figure 8. Locations of saguaro cacti in the study area.

3.0 FEDERAL ACTION

In order to construct the transmission line between the existing Apache to Hayden 115-kV line and the San Manuel Substation, SWTC is applying to the BLM for a ROW grant in the Tucson Field Office management area. The ROW grant application is for a 100-foot-wide ROW for transmission line and access road construction across approximately 360 feet of BLM land in Section 13, Township 9 South, Range 17 East. In addition, the project would be constructed with federal funds provided by the Rural Utilities Service, an agency of the U.S. Department of Agriculture. BLM, as the lead federal agency for the consultation, is required to assess the impacts of the proposed action to species listed or proposed for listing under the ESA.

4.0 BIOLOGY AND STATUS OF SOUTHWESTERN WILLOW FLYCATCHER AND LESSER LONG-NOSED BAT

4.1 Southwestern Willow Flycatcher

4.1.1 History of Listing and Critical Habitat Designation

SWF was listed as endangered, without Critical Habitat, on February 27, 1995 (USFWS 1995). Critical Habitat was later designated on July 22, 1997 (USFWS 1997a), and a correction notice was published in the *Federal Register* on August 20, 1997, to clarify the lateral extent of the designation (USFWS 1997b). On May 11, 2001, the 10th Circuit Court of Appeals set aside Critical Habitat in those states under the 10th Circuit Court's jurisdiction (New Mexico). USFWS decided to set aside Critical Habitat in all other states (California and Arizona) until it could re-assess the economic analysis. On October 19, 2005, the USFWS re-designated Critical Habitat for SWF (USFWS 2005). A total of 737 river miles across southern California, Arizona, New Mexico, southern Nevada, and southern Utah was included in the final designation. The lateral extent of Critical Habitat includes areas within the 100-year floodplain.

A final recovery plan for the SWF was released to the public in March 2003 (USFWS 2002). The plan describes the reasons for endangerment and the current status of SWF, addresses important recovery actions, includes detailed issue papers on management issues, and provides recovery goals. Recovery is achieved by reaching numerical and habitat related goals for specific management units established throughout the subspecies range and by establishing long-term conservation plans (USFWS 2002). The project area is located in the Middle Gila–San Pedro Management Unit of the Gila Recovery Unit (USFWS 2002).

4.1.2 Taxonomy

SWF is one of four subspecies of the willow flycatcher currently recognized (Hubbard 1987; Unitt 1987), although Browning (1993) proposes a fifth subspecies (*E. t. campestris*) in the central and midwestern U.S. The willow flycatcher subspecies are distinguished primarily by subtle differences in color and morphology and by habitat use. The southwestern subspecies *E. t. extimus* was described by Phillips (1948), and its taxonomic status has been accepted by most authors. Recent research (Paxton 2000) concluded that *E. t. extimus* is genetically distinct from the other willow flycatcher subspecies.

4.1.3 Reasons for Endangerment

Reasons for the decline of SWF have been attributed primarily to loss, modification, and fragmentation of riparian breeding habitat, along with a variety of other factors, including loss of wintering habitat and brood parasitism by the brown-headed cowbird (*Molothrus ater*) (McCarthey et al. 1998; Sogge et al.

1997). Habitat loss and degradation are caused by a variety of factors, including 1) urban, recreational, and agricultural development; 2) water diversion and groundwater pumping; 3) river channelization; 4) dam construction; 5) livestock grazing; and 6) fire. Fire is an increasing threat to willow flycatcher habitat (Paxton et al. 1996), especially in monotypic saltcedar vegetation (DeLoach 1991) and where water diversions or groundwater pumping desiccates riparian vegetation (Sogge et al. 1997). Feeding sites for cowbirds are enhanced by the presence of livestock and range improvements, such as water tanks and corrals, agriculture, urban areas, golf courses, bird feeders, and trash areas. When coupled with habitat fragmentation, proximity of these feeding areas to flycatcher breeding habitat may lead to an increase in cowbird parasitism of flycatcher nests.

4.1.4 Habitat

SWF breeds in dense riparian habitats from sea level in California to approximately 8,500 feet amsl in Arizona and southwestern Colorado. Nesting occurs primarily in Geyer willow (*Salix geyeriana*), coyote willow (*Salix exigua*), Goodding willow, boxelder (*Acer negundo*), saltcedar, Russian olive (*Elaeagnus angustifolia*), and live oak (*Quercus agrifolia*). Other plant species less commonly used for nesting include: buttonbush (*Cephalanthus* sp.), black twinberry (*Lonicera involucrata*), cottonwood (*Populus* spp.), white alder (*Alnus rhombifolia*), blackberry (*Rubus ursinus*), stinging nettle (*Urtica* spp.), and mesquite (*Prosopis* sp.). Based on the diversity of plant species and complexity of habitat structure, four basic habitat types are described for SWF: monotypic willow, monotypic exotic, native broadleaf dominated, and mixed native/exotic (Sogge et al. 1997).

Saltcedar is an important component of the nesting and foraging habitat of SWF in Arizona and other parts of its range. In 2001 in Arizona, 323 of the 404 (80%) known flycatcher nests (in 346 territories) were placed in saltcedar (Smith et al. 2002). Saltcedar was once believed by some to be a lower-quality habitat type than native vegetation; however, comparisons of reproductive performance (USFWS 2002), prey populations (Durst 2004), and physiological conditions (Owen and Sogge 2002) of flycatchers breeding in native and exotic vegetation have demonstrated no difference between the two (Sogge et al. 2005).

Mesquite has been used as a nesting substrate by SWF. At Cook's Lake Cienega, Arizona, SWF nested in mesquite annually from 2004–2006 (Graber et. al. 2007). Mesquite use at Cook's Lake was restricted to young mesquites located immediately adjacent to "traditional" SWF nesting habitat, which consists of buttonbush, cottonwood, willow, and ash (A. Graber, SWCA, personal communication February 27, 2008). Also, in SWF nesting habitat upstream of the San Manuel Interconnect Project area, SWF were observed foraging in mesquite woodland located immediately adjacent to occupied nesting habitat in willows (A. Graber, SWCA, personal communication February 27, 2008). There is no evidence that supports SWF use of mesquite woodland away from more traditional occupied nesting sites.

Open water, cienegas, marshy seeps, or saturated soil are typically in the vicinity of flycatcher territories and nests, and flycatchers sometimes nest in areas where nesting substrates are in standing water (Maynard 1995; Sferra et al. 1995, 1997). However, hydrological conditions at a particular site can vary considerably in Arizona within and between years. At some locations, particularly during drier years, water or saturated soil is only present early in the breeding season (i.e., May and part of June). However, the total absence of water or visibly saturated soil has been documented at several occupied sites where the river channel has been modified (e.g., pilot channels have been created), where subsurface flows have been modified (e.g., agricultural runoff), or as a result of changes in river channel configuration after flood events (Spencer et al. 1996).

The habitat of SWF is dynamic and can change rapidly in suitability for a variety of reasons, including changes in vegetation conditions resulting from natural vegetation succession, establishment of saltcedar

habitat, and changes in river channel location and floodplain width (Finch and Stoleson 2000). Over-mature or young habitat not suitable for nesting can be occupied and used for foraging and shelter by migrating, breeding, dispersing, or non-territorial flycatchers (Cardinal and Paxton 2005; McLeod et al. 2005). That same habitat may subsequently grow into nesting habitat.

4.1.5 Primary Constituent Elements of Southwestern Willow Flycatcher Critical Habitat

Critical Habitat is defined, in part, as areas occupied by the species at the time of listing and containing those physical and biological features (PCEs) that are essential to the conservation of the species and that may require special management considerations or protection (USFWS 2005). PCEs for SWF are listed below (USFWS 2005):

1. Riparian habitat in a dynamic successional riverine environment (for nesting, foraging, migration, dispersal, and shelter) that comprises
    a. Trees and shrubs that include, but are not limited to, willow species, box elder, saltcedar, Russian olive, cottonwood, stinging nettle, alder, ash, poison hemlock, blackberry, oak, rose, false indigo, Pacific poison ivy, grape, Virginia creeper, Siberian elm, and walnut.
    b. Dense riparian vegetation with thickets of trees and shrubs ranging in height from 2 to 30 m (6–98 feet). Lower-stature thickets (2–4 m, or 6–13 feet tall) are found at higher elevation riparian forests, and tall-stature thickets are found at middle- and lower-elevation riparian forests;
    c. Areas of dense riparian foliage at least from the ground level up to approximately 4 m (13 feet) aboveground or dense foliage only at the shrub level, or as a low, dense tree canopy;
    d. Sites for nesting that contain a dense tree and/or shrub canopy (the amount of cover provided by tree and shrub branches measured from the ground) (i.e., a tree or shrub canopy with densities ranging from 50%–100%); or
    e. Dense patches of riparian forests that are interspersed with small openings of open water or marsh, or shorter/sparser vegetation that creates a mosaic that is not uniformly dense. Patch size may be as small as 0.1 hectare (0.25 acre) or as large as 70 hectare (175 acres).
2. A variety of insect prey populations found within or adjacent to riparian floodplains or moist environments, including flying ants, wasps, and bees; dragonflies; flies; true bugs; beetles; butterflies/moths and caterpillars; and spittlebugs.

River features that help develop and maintain these PCEs include broad floodplains, water, saturated soil, hydrologic regimes, elevated groundwater, fine sediments, etc. (USFWS 2005).

4.1.6 Breeding Biology

Throughout its range, SWF arrives on the breeding grounds in late April and May (Maynard 1995; Muiznieks et al. 1994; Sferra et al. 1995, 1997; Sogge and Tibbitts 1992, 1994; Sogge et al. 1993). Nesting begins in late May and early June and young fledge from late June through mid-August (Brown 1988a, 1988b; Whitfield 1990, 1994). Typically, one brood is raised per year, but birds have been documented raising two broods in a single season and re-nesting after a failure (Whitfield 1994; Whitfield and Strong 1995).

4.1.7 Rangewide Distribution and Abundance

SWF breeds in the southwestern U.S. and migrates to Mexico, Central America, and possibly northern South America during the non-breeding season (Howell and Webb 1995; Phillips 1948). The historical

breeding range included southern California, Arizona, New Mexico, western Texas, southwestern Colorado, southern Utah, extreme southern Nevada, and extreme northwestern Mexico (Sonora and Baja) (Unitt 1987).

The estimated range-wide population of SWF is 500 to 1,000 pairs (Unitt 1987). Since 1993, 133 sites once known to have nesting flycatchers are no longer presently occupied by breeding birds (Durst et al. 2006). From 1993 to 2005, there were 275 known SWF breeding sites (all sites where a resident flycatcher had been detected) and an estimated 1,214 territories in California, Nevada, Arizona, Utah, New Mexico, and Colorado (Durst et al. 2006). It is difficult to determine the total number of flycatcher territories since not all sites are surveyed annually. Also, sampling errors bias population estimates (e.g., incomplete survey effort, double-counting males/females, composite tabulation methodology, natural population fluctuation, and random events), and it is likely that the total breeding population of SWF fluctuates. Although SWF numbers have increased since the bird was listed, after nearly a decade of intensive surveys, the current numbers barely exceed the upper limit of the 1987 estimate of Unitt (1987). About 50% of the 1,214 territories currently estimated throughout the range of the subspecies are located at four general locations (Cliff-Gila valley and Middle Rio Grande, New Mexico; and Roosevelt Lake and San Pedro–Gila river confluence, Arizona).

The survival and recovery of SWF appears to be dependent on populations that are distributed fairly close together throughout the range (USFWS 2002). SWF are believed to function as a group of meta-populations (USFWS 2002). In Arizona, AGFD has documented frequent between-year movements within and between study areas (Graber et al. 2007).

4.1.8 Arizona Distribution and Abundance

Historical records for Arizona indicate that the former range of SWF included portions of all major river systems (Colorado, Salt, Verde, Gila, Santa Cruz, and San Pedro) and major tributaries, such as the Little Colorado River and headwaters, and the White River. Unitt (1987) concluded that "probably the steepest decline in the population level of *E.t. extimus* has occurred in Arizona."

The results of SWF surveys conducted by AGFD in 2005 and 2006 are provided below. In 2005, 483 territories were known from 47 sites along 15 drainages (English et al. 2006). The lowest elevation where territorial pairs were detected in 2005 was 459 feet amsl along the Lower Colorado River; the highest elevation was near Hereford Bridge along the upper San Pedro River (4,150 feet amsl). In 2006, there were 351 flycatcher territories, with 276 pairs documented at 39 sites (the remaining 75 territories were classified as lone males, although undetected mates may have been present) (Graber et al. 2007).

In 2005, the largest concentrations of breeding willow flycatchers in Arizona were at the following locations: near the San Pedro–Gila river confluence; at the Salt River and Tonto Creek inflows to Roosevelt Lake; Big Sandy River, Wikieup; Gila River, Safford area; Verde River, Horseshoe Lake; Topock Marsh on the Lower Colorado River; and Alamo lake on the Bill Williams River (includes lower Santa Maria and Big Sandy river sites) (English et al. 2006). Combined, Roosevelt Lake and the San Pedro–Gila river confluence made up 70% (338 of the 483 territories) of the documented records in Arizona in 2005. In 2006, the major concentrations at low elevations occurred at the Roosevelt Lake complex (Salt River study area and Tonto Creek study area), the San Pedro–Gila river complex (San Pedro River study area and Gila River study area), and the Gila-Safford area (Graber et al. 2007). During the 2006 survey effort, 70% of all documented flycatcher territories were concentrated in three areas of the state: the Roosevelt Lake complex (31%), the San Pedro River/Gila River complex (20%), and the Gila-Safford area (19%).

While SWF numbers increased significantly in Arizona from 1996 to 2006 (145–351 territories), the 2006 survey effort documented an 11% statewide decline in territories compared with 2005 (483–351). The largest "actual" decline in flycatcher territories during that period was at the Roosevelt Lake complex.

The distribution of flycatchers throughout the state has changed little. Since listing, the majority of known SWF territories in Arizona have been at two locations; Roosevelt Lake and the San Pedro–Gila river confluence. Consequently, population stability in Arizona is believed to be largely dependent on the presence of these two large populations, and catastrophic events at one of these locations could greatly change the status and long-term survival of SWF.

4.1.9 Status and Distribution in the Project Area

AGFD has for several years surveyed and monitored three SWF study areas in Arizona: the Salt River study area and Tonto Creek study area at Roosevelt Lake and the Winkelman study area (English et al. 2006). The proposed project is located in the Winkelman study area, which includes approximately 53 miles of riverine habitat along the San Pedro and Gila rivers (English et al. 2006). Along the San Pedro River, the study area stretches from Bingham Cienega downstream to the Gila River confluence.

Within the Winkelman study area, AGFD identified several specific survey areas. The proposed project is in the San Manuel Crossing survey area, which for many years had the largest concentration of SWF in the Winkelman study area. The San Manuel Crossing survey area, which is about 9 miles long, begins about 3.2 miles upstream (south) of the San Manuel project area and extends approximately 5.8 miles downstream (north) of the project area; the Catalina Wash survey area begins approximately 0.5 mile upstream (south) of the San Manuel Crossing survey area.

The San Manuel Crossing survey area was surveyed almost annually by AGFD from 1993 to 2005. In 2006, AGFD did not conduct surveys anywhere along the San Pedro River because their funding agency, Bureau of Reclamation (Reclamation), had satisfied ESA Section 7 commitments (Graber et al. 2007). In 2006 and 2007, Reclamation, Salt River Project, and The Nature Conservancy surveyed select sites on the San Pedro River (including Catalina Wash), but not San Manuel Crossing. However, the area addressed in this BA was surveyed for SWF by WestLand Resources, Inc. (WestLand), in 2007 and 2008 (WestLand 2007, 2008) on behalf of SWTC.

No territorial SWF have been reported within 2 miles of the San Manuel project area during any of these previous surveys. The territory closest to the proposed transmission line alignment was located approximately 2.14 miles upstream in 2005 (English et al. 2006; A. Graber, SWCA, personal communication February 21, 2008). Two successful nests were recorded in this territory that year. The closest site downstream of the proposed transmission line alignment was near the Arivaipa Creek-San Pedro River confluence, a distance of approximately 13 miles, in 2005 (English et al. 2006; A. Graber, SWCA, personal communication February 21, 2008). SWF nest site and resident locations upstream of the project area are depicted in Figure 9. Survey results for the San Manuel Crossing and Catalina Wash survey areas are provided in Tables 1 and 2, respectively.

Vegetation density and structure immediately adjacent to the main channel of the San Pedro River is not currently considered suitable for SWF nesting. Although Fremont cottonwood, Goodding willow, and saltcedar are all present within the alignment, only saltcedar is abundant; cottonwoods and willows are widely spaced.

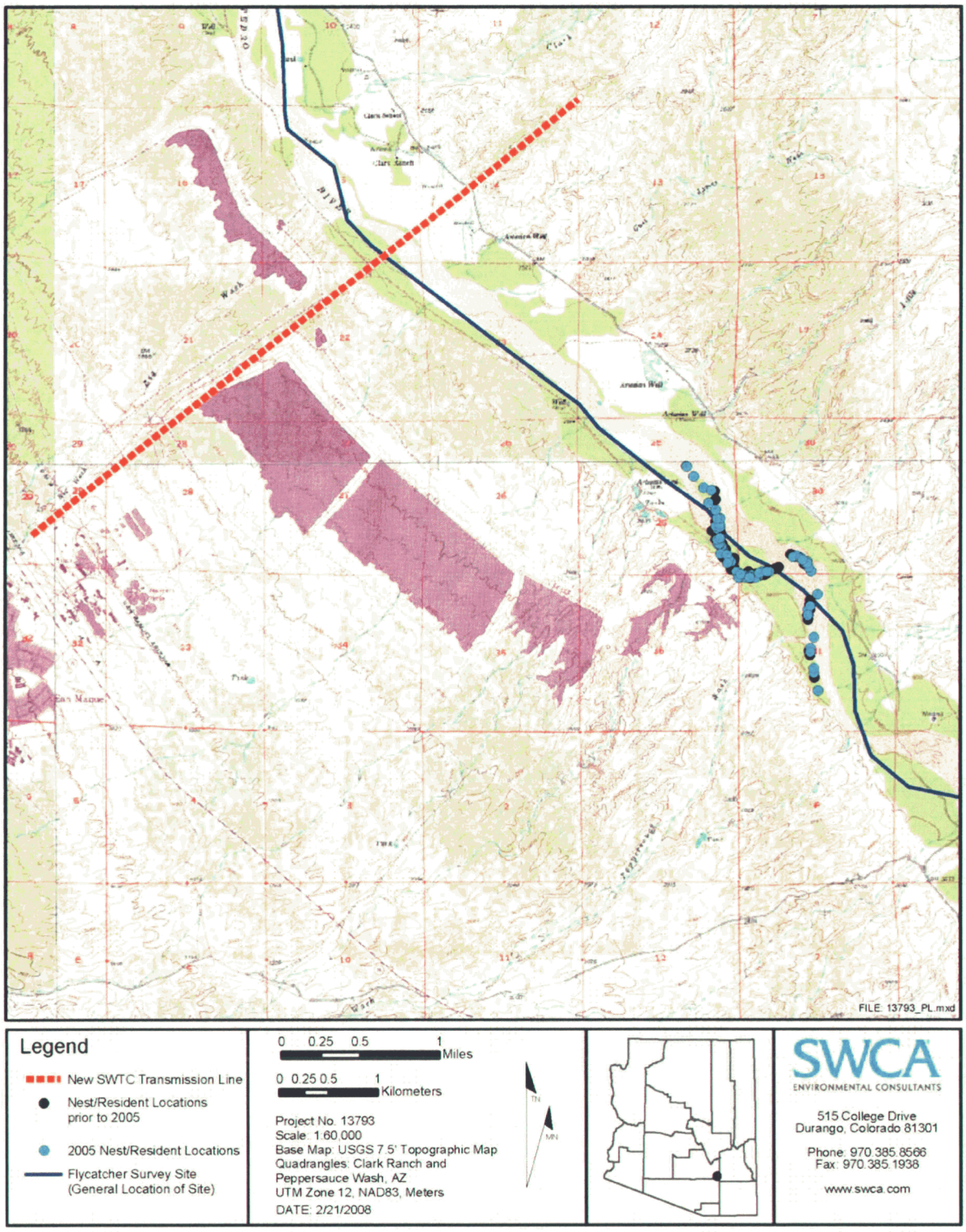

Figure 9. Southwestern willow flycatcher locations.

Table 1. Number of Flycatchers by Year at the San Manuel Crossing Survey Area, San Manuel Interconnect Project, Pinal County, Arizona

Survey Site	Year	Residents	Territories	Pairs	Nests	Migrants
San Manuel Crossing	2005	107	55	52	67	1
San Manuel Crossing	2004	114	59	55	83	3
San Manuel Crossing	2003	65	35	30	43	1
San Manuel Crossing	2002	11	7	4	3	2
San Manuel Crossing	2000	0	0	0	0	0
San Manuel Crossing	1999	0	0	0	0	0
San Manuel Crossing	1998	0	0	0	0	0
San Manuel Crossing	1996	0	0	0	0	1
San Manuel Crossing	1994	0	0	0	0	0
San Manuel Crossing	1993	0	0	0	0	0

Table 2. Number of Flycatchers by Year at the Catalina Wash Survey Area, San Manuel Interconnect Project, Pinal County, Arizona

Survey Site	Year	Residents	Territories	Pairs	Nests	Migrants
Catalina Wash	2006*	5	3	2	1	0
Catalina Wash	2005	7	4	3	1	1
Catalina Wash	2004	12	6	6	8	1
Catalina Wash	2003	25	13	12	12	0
Catalina Wash	2002	5	3	3	3	0
Catalina Wash	2001	4	2	2	2	0
Catalina Wash	2000	0	0	0	0	1
Catalina Wash	1999	0	0	0	0	0
Catalina Wash	1998	0	0	0	0	0
Catalina Wash	1993	0	0	0	0	0

*Surveyed by Reclamation in 2006.

4.2 Lesser Long-nosed Bat

4.2.1 History of Listing and Critical Habitat Designation

LLNB was listed as endangered in 1988 (USFWS 1988). No Critical Habitat has been designated for this species. A recovery plan was completed in 1997 (USFWS 1997a). The recovery plan states that LLNB will be considered for delisting when three major maternity roosts and two post-maternity roosts in the United States and three maternity roosts in Mexico have remained stable or increased in size for at least five years, following the approval of the recovery plan. Following a 5-year review of the status of LLNB, USFWS determined that while LLNB populations do not currently meet the definition of "endangered," the protection afforded by the ESA is warranted due to ongoing vulnerabilities of key roost sites (USFWS 2007).

4.2.2 Taxonomy

LLNB was originally listed as *Leptoynycteris sanborni*, Sanborn's long-nosed bat (USFWS 1988). Wilkinson and Fleming (1995, 1996) support the classification of this bat as *Leptonycteris curasoae*. They further define two subspecies, *L. c. curasoae* (found in the southern portion of the range) and *L. c. yerbabuenae* (found in the northern portion of the range). Some researchers support the raising of *L. c. yerbabuenae* to specific status as *Leptonycteris yerbabuenae* (Cole and Wilson 2006). However, USFWS currently classifies the listed entity as *Leptonycteris c. yerbabuenae*. Information gathered during the 5-year status review indicates that additional investigation into the taxonomy of the LLNB is warranted (USFWS 2007).

4.2.3 Threats and Limiting Factors

Loss of roost and foraging habitat, as well as direct taking of individual bats during animal control programs, particularly in Mexico, have contributed to the current endangered status of the species. The following threat overview is adapted from the LLNB 5-year status review (USFWS 2007).

Roost Disturbance. The primary threat to LLNB is roost-site disturbance or loss. The colonial roosting behavior of this species, where a high percentage of the population can congregate at a limited number of roost sites, increases the risk of significant declines or extinction.

Recreation. Caves and mines continue to attract recreational users interested in exploring these features. While no specific incidences of recreation-related disturbance at LLNB roosts have been documented, this threat continues to be an issue. Disturbance from pedestrian traffic is believed to have resulted in the abandonment of the Bluebird roost on Cabeza Prieta National Wildlife Refuge in three out of the past five years. Therefore, disturbance from recreational users could also cause roost abandonment. Increased urbanization in proximity to many LLNB roosts in southeastern Arizona will likely result in increased recreational use and increased disturbance to LLNB roosts.

Forage Availability. Although LLNB has the ability to forage over long distances to obtain resources when they are scarce, research has shown that when forage resources are adequate and long movements are not necessary, LLNBs forage as close to their roost sites as possible (Horner et al. 1998; Ober and Steidl 2004; Ober et al. 2005). This foraging strategy emphasizes the importance of maintaining food resources close to roost sites. However, foraging studies have also shown that LLNB will fly long distances to forage even when forage resources are available closer to roost sites, suggesting that further investigation into the foraging behavior of this species is needed. Impacts to forage availability include drought, fire, grazing, and urban development.

4.2.4 Habitat

In the United States, LLNB habitat can be broadly characterized as desert grassland and shrubland to the oak transition zone. Preferred plant communities are paloverde-saguaro, semidesert grassland, and oak woodland. A suitable day roost, typically a cave or mine, is probably the most important habitat requirement; however, potentially suitable roosts must be within reasonable foraging distances of sufficient amounts of required foods (USFWS 1997c). Foods of LLNB include the nectar and pollen of paniculate agave flowers and the nectar, pollen, and fruit produced by columnar cacti. In Arizona, four species of agave and two cacti are the main food plants (Hayward and Cockrum 1971; Wilson 1985). The agaves include Palmer's agave (*Agave palmeri*), Parry's agave (*A. parryi*), desert agave (*A. deserti*), and amole (*A. schotti*), although amole is considered to be an incidental food source. Cacti used by LLNB include saguaro cactus and organ pipe cactus (*Stenocereus thurberi*). Concentrations of food resources are patchily distributed, and the nectar of each plant species is available only seasonally. Cactus flowers and

fruits are available during the spring and early summer, while blooming agaves are available through the summer, primarily from July through early October, although Parry's agave and amole bloom earlier. A summary of available literature suggests that LLNB are probably dependent on agaves as a food source from mid- to late summer (Barnitz 2002). Columnar cacti occur in lower elevation areas of the Sonoran Desert region, and paniculate agaves are found primarily in higher elevation areas, such as desert grasslands, shrublands, and habitats in the mountains.

LLNB is known to fly long distances from roost sites to foraging sites. Night flights from maternity colonies to flowering columnar cacti have been documented in Arizona at 15 miles, and in Mexico at 25 miles and 38 miles (see USFWS 2007). Horner et al. (1990) found that LLNB commuted 30 to 36 miles round-trip between an island maternity roost and the mainland in Sonora; the authors suggested these bats regularly flew at least 47 miles each night. LLNB has been observed feeding at hummingbird feeders many miles from the closest potential roost site (see USFWS 2007), including during the winter in Tucson (Sidner and Houser 1990).

Ober et al. (2000) reported that LLNB returned to foraging areas on consecutive nights and observed that changes in core use areas tended to coincide with the conclusion of nectar production in the original area. LLNB visitation rates to individual agave plants increased as the number of flowering umbels per plant increased; it was higher at plants where blooming had progressed to mid-inflorescence and decreased again as blooming moved to the top of plants. Peak visitation occurred at 21:00, which is when agave nectar production was the highest. Therefore, foraging areas experiencing regular, ongoing use, based on nectar and pollen production, may be of particular importance to LLNB. Ober et al. calculated that a population of 100,000 bats would need an average density of 0.39 flowering plants per acre over a 1,456-square-mile foraging area surrounding a roost. They concluded that density over a broad area is probably less of a determinant than the spacing of food plant populations and the density of flowering plants within those populations.

There is evidence suggesting that LLNB selects areas with evidence of high resource abundance in previous years (old floral stalks), suggesting site fidelity to agave stands (Ober et al. 2000). The seasonal dietary specialization of LLNB implies that a reduction in or further fragmentation of agave populations could have serious effects on bat behavior, forcing them to commute farther, roost in suboptimal situations, or compete with one another for food at remaining plants. It is suggested that these effects would be especially evident during years of low flower production, when energy expended by bats is appreciably higher.

4.2.5 Breeding Biology

In Arizona, LLNB roosts are occupied from April to as late as early November (Cockrum and Petryszyn 1991; Slauson 1999, 2000); although, as mentioned previously, the species has been recorded in winter at hummingbird feeders in Tucson (Sidner and Houser 1990). In spring, adult females, most of which are pregnant, arrive in Arizona and gather into maternity colonies in the southwestern portion of the state. These roosts are typically at low elevations near concentrations of flowering columnar cacti. Maternity colonies disband in July and August after the young are weaned. During this period some females and young move to higher elevations, ranging up to more than 6,000 feet, primarily in southeastern Arizona near concentrations of blooming paniculate agaves. Dates of these seasonal movements are variable from one year to the next (Cockrum and Petryszyn 1991; Fleming et al. 1993).

4.2.6 Rangewide Distribution and Abundance

LLNB is found from southern Arizona and extreme southwestern New Mexico, through western Mexico, and south to El Salvador (USFWS 1994). In southern Arizona, LLNB roosts have been found from the

Picacho Mountains (Pinal County) southwest to the Agua Dulce Mountains (Pima County), southeast to the Chiricahua Mountains (Cochise County), and south to the international boundary. Individuals have also been observed near the Pinaleño Mountains (Graham County) and as far north as Phoenix and Glendale (Maricopa County). This bat is also known from far southwestern New Mexico in the Animas and Peloncillo mountains (Hidalgo County).

There were 17 known major LLNB roost sites in Arizona and Mexico in the early 1990s (USFWS 1994). Based on surveys conducted in 1992 and 1993, it was estimated that more than 200,000 bats occupied 16 of the 17 sites. A recently discovered roost in Cochise County may support an additional 25,000 bats. Twelve major maternity roost sites are known from Arizona and Mexico. According to the same 1992 and 1993 surveys, the maternity roosts are occupied by more than 150,000 bats.

Current population numbers of LLNB exceed the levels known and recorded at the time of listing in 1988 (USFWS 2007). In general, the trend in overall numbers has been stable or increasing in both the United States and Mexico. However, the number of known roost sites has not increased significantly.

4.2.7 Arizona Distribution and Abundance

There are three known LLNB maternity roosts and approximately 40 total LLNB roosts in Arizona (USFWS 2007). Nearly all of the LLNB experts and researchers who provided input to the LLNB 5-year status review felt that numbers of LLNB at most of the roost sites in both the United States and Mexico was stable or increasing (USFWS 2007). Current population estimates at Arizona roosts identified in the LLNB recovery plan (USFWS 1994) are summarized in Table 3.

According to USFWS (2007), numbers provided in Table 3 do not accurately represent the total number of LLNB in Arizona for the following reasons: 1) counts include a combination of maternity roosts and late summer roosts; 2) only those roosts identified in the LLNB recovery plan are monitored; 3) multiple counts at each roost each year are not conducted; and 4) roost-monitoring experience indicates that developing a definitive population estimate for this species is difficult. Bats found in maternity roosts early in the year could occupy late summer roosts, resulting in double counting of some individuals. The number of LLNB at any given roost fluctuates considerably each year and among years.

Table 3. Current LLNB Numbers at Arizona Roosts Identified in the LLNB Recovery Plan*

Roost	Current Numbers (approximate)
Copper Mountain	35,000
Bluebird	4,500
Old Mammon	6,300
Patagonia Bat Cave	41,500
State of Texas	21,000
Hilltop	200

* Adapted from USFWS (2007).

In addition, researchers have found increasing, stable populations at roost sites not identified for monitoring in the LLNB recovery plan. Of particular note are steady increases in numbers of LLNB at roost sites on Fort Huachuca in the Huachuca Mountains, based on monitoring over the past 10 years. Additionally, at least four new roost sites discovered at various locations in Arizona within the past 5 years also are not monitored.

4.2.8 Status and Distribution in the Project Area

There are no known mines or natural caves in the immediate project area. Furthermore, where the proposed project alignment traverses the foothills of the Galiuro Mountains, soils are composed of alluvial gravels that are not conducive to the formation of caves used by LLNB for roosting.

There are, however, several non-maternity roosts located in rocky canyons within 25 miles of the project area (Jason Douglas, USFWS, personal communication February 25, 2008). A summary of the closest known LLNB records is provided in Table 4. The majority of these roosts appear to be used in late summer or fall when bats are likely feeding on agaves, but this could be partially due to the fact that survey efforts are generally conducted at that time of the year. It has been suggested that bats detected in Redfield Canyon in May could be feeding on saguaro flowers in the San Pedro Valley (Tim Snow, AGFD, personal communication February 21, 2008). The nearest known LLNB maternity roost is at Old Mammon Mine in the Slate Mountains, about 75 miles west of the project area.

Table 4. LLNB Roosts (Suspected and Confirmed) in Relation to the San Manuel Interconnect Project Area

Roost Name	Distance and Direction from Project Area (approximate)
Box Canyon Crevice, Santa Catalina Mountains	25 miles SSE
Youtcy Canyon, Santa Catalina Mountains	20 miles SSE
Wildhorse Mountain (=Rincon Gold), near Mescal	35 miles SSE
Hot Springs Canyon, Galiuro Mountains	24 miles SE
Redfield Canyon, Galiuro Mountains	18 miles SE
West side of Rincon Mountains	24 miles SSE

The project area is within the foraging range of LLNB occupying nearby roosts, and there is a relatively dense population of large, multi-armed saguaro cacti in the project area on the southwest-facing foothills of the Galiuro Mountains between the existing Apache to Hayden 115-kV transmission line and River Road. The density of saguaros in the immediate vicinity of the project area is estimated to be approximately 14 per acre based on aerial photography and field reconnaissance. No agaves were observed in the project area.

5.0 ANALYSIS OF IMPACTS

5.1 Impacts to Southwestern Willow Flycatcher

5.1.1 Direct and Indirect Impacts

Removal of Vegetation. Approximately 0.77 acre of mesquite woodland vegetation and 0.09 acre of sparsely vegetated former agricultural land along the San Pedro River floodplain would be directly impacted during project construction. No cottonwood-willow riparian vegetation would be impacted as a result of the proposed project. Impacts to mesquite woodland and agricultural land are summarized in Table 5.

There are no data demonstrating that SWF are currently nesting or have recently (1993–2007) nested or established territories in the project area. Vegetation structure in the project area is currently unsuitable for use by SWF. Furthermore, it is extremely unlikely that the proposed future removal of mesquite woodland vegetation in the San Manuel interconnect project area will result in any direct or indirect adverse impacts to SWF in the project area or in occupied upstream areas.

Table 5. Acres of Impact along the San Pedro River by Vegetation Type and Project Component, San Manuel Interconnect Project

Vegetation Type	Project Component	Impact Area
Mesquite Woodland	Access Roads	1,350 × 24 feet (0.74 acre)
	Transmission Structures*	1 (0.03 acre)
Total		*0.77 acre*
Former Agricultural Land	Transmission Structures*	3 (0.09 acre)

*Transmission structure footprints measure 50 × 25 feet.

Creation of Edge. SWF nests built near a patch edge are more susceptible to parasitism by brown-headed cowbirds than are nests placed within the core of large patches, although the insulating effect apparently is not evident in small and medium-sized patches (Brodhead et al. 2007). One measure that has been recommended by USFWS for some SWF management units (e.g., in California) is the creation of biological buffers of at least 100 feet adjacent to breeding flycatcher habitat, measured from the outer edge of riparian vegetation (USFWS 2005).

None of the access roads proposed by SWTC will be within 200 feet of riparian vegetation (e.g., cottonwood, willow, and saltcedar) along the main channel of the San Pedro River. Consequently, it is not anticipated that access road construction associated with this project will contribute to increased parasitism of SWF nests by brown-head cowbirds.

Alteration of Critical Habitat. The project would result in the alteration of approximately 0.56 acre of Critical Habitat for SWF (Table 6). This represents a long-term negative impact. However, as discussed previously, the majority of designated Critical Habitat in the project area is mesquite woodland located on elevated river terraces above the main channel of the San Pedro River and does not exhibit the PCEs necessary for the conservation of SWF. Based on this consideration, SWTC has determined that project-related impacts will be limited to the placement of one transmission structure, with a footprint of 0.03 acre, in former agricultural land east of the main San Pedro River channel (see Figure 4).

Table 6. Acres of Impact in SWF Critical Habitat by Vegetation Type and Project Component, San Manuel Interconnect Project

Vegetation Type	Project Component	Impact Area
Mesquite Woodland	Access Roads	900 × 24 feet (0.50 acre)
	Transmission Structures*	1 (0.03 acre)
Total		*0.53 acre*
Former Agricultural Land	Transmission Structures*	1 (0.03 acre)

*Transmission structure footprints measure 50 × 25 feet.

5.1.2 Cumulative Impacts

Cumulative effects include the effects of future state, tribal, local, or private actions that are reasonably certain to occur within the area of the federal action subject to consultation (50 CFR §402.02). Cumulative effects are considered together with the effect of the federal action under consultation by USFWS to determine whether the effects of the federal action are likely to jeopardize the continued existence of a listed species. Other future federal actions that may affect a listed species would be subject

to consultation requirements established in Section 7 of the ESA and, therefore, are not considered cumulative effects of the proposed action.

We are not aware of any state, tribal, local, or private activities that are reasonably certain to occur within the action area of this project and that are likely to significantly affect SWF or SWF Critical Habitat. Because the San Pedro River upstream and downstream of the action area is within designated Critical Habitat for SWF, virtually any future project with significant impacts would be subject to consultation under Section 7 of the ESA.

5.1.3 Determination of Effect

Southwestern Willow Flycatcher. In light of the impacts discussed in Section 5.1.1, the project will have "no effect" on individual SWF. This determination of effect is based on the following: 1) no southwestern willow flycatcher detections during "project-related" clearance surveys conducted in 2007 and 2008 (WestLand 2007d, 2008); 2) the absence of SWF breeding records in the immediate project vicinity (the nearest breeding record is 2.14 miles upstream); 3) the absence of vegetation in the project area with suitable density and structure for nesting; and 4) the planned implementation of a variety of measures by SWTC to avoid and minimize the potential impacts of the project (see Section 2.4.1 Measures to Avoid, Minimize, and Mitigate for Impacts), including conducting work along the San Pedro River during the non-breeding season for SWF.

Critical Habitat. The proposed project "may affect and is likely to adversely modify" approximately 0.56 acre of designated Critical Habitat for SWF. However, based on the previously described refinement of Critical Habitat boundaries to more accurately reflect the area required by SWF to satisfy essential life cycle needs (see Figure 4), adverse modification realistically is limited to the placement of one transmission line structure with a footprint of 0.03 acre. Although an adverse impact, this impact is not considered significant when viewed in the context of available riverine habitat in the project vicinity and considering that there would be no removal of cottonwood-willow vegetation and no anticipated change in channel morphology resulting from the project.

5.2 Impacts to Lesser Long-nosed Bat

5.2.1 Direct Impacts

The proposed project would result in direct impacts to potential LLNB forage plants in the early to mid-summer range of the species. Disturbance would result from the construction of 5,960 feet of access road (impacting 8.98 acres) and the installation of four transmission structures (impacting 0.12 acre) in potential LLNB habitat (areas with saguaro cacti) at the east end of the project area between the existing Apache to Hayden 115-kV transmission line and River Road.

A total of 208 saguaros were recorded during the previously described survey of the access road alignment (Table 7). Of this total, 95 cacti are ≤5 feet tall and will be transplanted, and 16 cacti, all >5 feet tall, will be avoided. The remaining 97 cacti, all >5 feet tall, will be destroyed during project construction. Approximately 40% of the saguaros in the survey area have developed arms.[1]

Table 7. Saguaros in the Access Road Alignment by Size Class

Size Category	Number
≤5 feet tall	95
>5 feet tall	113
Total	**208**

[1] 8 feet is generally considered the height at which a saguaro first flowers (Steenbergh and Lowe 1977). The first flowering event may result in the production of only one or two fruits. The number of fruits increases rapidly, however, in succeeding years and production commonly exceeds 100 fruits per year by the time the plant has attained a height of approximately 15 feet. Saguaros first develop arms when approximately 20 feet tall.

Destruction of 97 saguaro cacti will reduce food available to LLNB in the early to mid-summer range of the species. To better evaluate the significance of this impact, SWTC, at the request of USFWS, determined the relative impacts of the project on the local saguaro population. Based on current available aerial photography, SWTC estimated a population of 1,437 saguaros within a 106-acre study area that includes the access road alignment (see Figure 8).[2] Project construction would impact 97 saguaros, or 6.7% of the saguaros present in this 106-acre area. Although it is impossible to evaluate the significance of the loss of foraging habitat to LLNB, the loss is considered insignificant compared with the large amount of potential foraging habitat available to LLNB regionally and because the majority of adult females in spring (when saguaros are blooming) gather in maternity colonies in the southwestern portion of the state; the majority of roosts in the project vicinity are likely used in late summer or fall when bats are feeding on agaves.

5.2.2 Indirect Impacts

No indirect effects to forage plants or LLNB roosts outside of the project area are anticipated. The nearest known LLNB maternity roost is about 75 miles west of the project area at Old Mammon Mine in the Slate Mountains. There are several LLNB non-maternity roosts located within 25 miles of the project area, the nearest being about 18 miles southeast of the project area. There are no known roosts in the immediate vicinity of the project area.

5.2.3 Cumulative Impacts

Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in this BA. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation under Section 7 of the ESA.

The lands in the San Pedro Basin are primarily state and private grazing and ranchlands. These surrounding lands are largely undeveloped and used by people at low intensities. Much of the land in the project area itself is owned by BHP. These BHP lands were formerly used for copper processing, but the mill, concentrator, smelter, and most other facilities have been removed and the site has been reclaimed.

The effects of future growth and expansion of nearby communities on potential LLNB foraging habitat is expected to be minimal. The town of San Manuel is very near the project site, but the economy of this community has always been dependent on the nearby copper mine, which is now closed. The other population centers nearest the project area are Mammoth and Oracle, which are approximately 10 miles north and west of the project area, respectively. Combined, San Manuel, Mammoth, and Oracle have a population of approximately 10,000. Projected future growth of these communities is expected to be minimal.

5.2.4 Determination of Effect

The project "may affect, is not likely to adversely affect" LLNB. This determination of effect is based on 1) the location of the project in that portion of the Arizona range believed to be used from mid- to late summer when agaves (not saguaros) are the primary food source; 2) the distance of the project area from the nearest LLNB maternity roost (Old Mammon Mine is located about 75 miles to the west);

[2] SWTC counted saguaros visible on the aerial photograph of the study area (which includes the access road alignment) and compared these saguaro numbers with those in the access road alignment alone, where densities were known based on a field survey. Based on this analysis, SWTC determined that only saguaros ≥8 feet tall were visible in the unsurveyed area, i.e., the area outside the road alignment. Approximately 52% of the saguaros present in the road alignment were not visible on aerial photographs. Consequently, to estimate the total number of saguaros in the 106-acre study, SWTC multiplied the number of saguaros visible on the aerial photograph (946) by 1.52, resulting in a total saguaro count of 1,437 in the study area.

3) the absence of documented LLNB foraging records for the project area; and 4) the planned implementation of a variety of measures to minimize and mitigate potential impacts of the project (see Section 2.4.1 Measures to Avoid, Minimize, and Mitigate for Impacts). Impacts to LLNB foraging habitat are expected to insignificant given the relatively small percentage of the available saguaro population that would be impacted by the project.

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APPENDIX A

Photographs of Critical Habitat in the Project Area

Photograph 1. Looking east toward SWF Critical Habitat along San Pedro River, San Manuel Interconnect Project.

Photograph 2. Looking west from the foothills of the Galiuro Mountains toward SWF Critical Habitat along San Pedro River, San Manuel Interconnect Project.

APPENDIX B

AGFD Correspondence

THE STATE OF ARIZONA
GAME AND FISH DEPARTMENT
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RECEIVED
JUN 09 2008
ENVIRON/SAFETY

June 5, 2008

Mr. Kevin Barnes
Southwest Transmission Cooperative
PO Box 2195
Benson, Arizona 85602

RE: Mitigation for loss of forage resources for lesser long-nosed bat

Dear Mr. Barnes:

Thank you for contacting me regarding Southwest Transmission Cooperative's desire to provide mitigation funds to the Arizona Game and Fish Department (Department) to offset loss of forage resources near San Manuel for the lesser long-nosed bat. The Department's Research Branch is currently conducting a research study to investigate movements and resource needs for this species in the Tucson and Marana areas. These funds would be used to enhance and expand the telemetry components of the study and would help us to better understand lesser long-nosed bat habitat requirements.

By way of this letter, I am confirming that the Department will accept these funds to a donation account for conservation of the lesser long-nosed bat. When the time arises, please contact me to coordinate this transaction at 623-236-7574 or amcintire@azgfd.gov. Thank you.

Sincerely,

Angie McIntire
Bat Management Coordinator

cc: Mike Ingraldi, Research Branch

AN EQUAL OPPORTUNITY REASONABLE ACCOMMODATIONS AGENCY

Exhibit E

VEGETATION, FISH, AND WILDLIFE

An examination of potential impacts to vegetation, fish, and wildlife is provided in the Environmental Assessment (Exhibit B). Findings are summarized here.

Vegetation

Portions of the project area have been disturbed by previous human activity associated with BHP Copper, Inc. (BHP), copper processing facilities and agriculture. The west end of the project area is located parallel to a maintenance road that runs between tailings impoundments. Vegetation in this area is limited to scattered velvet mesquite (*Prosopis velutina*), tamarisk (*Tamarix ramosissima*), desert broom (*Baccharis sarothroides*), and Russian thistle (*Salsola iberica*). In the floodplain on the east side of the San Pedro River, land formerly used for agriculture is now overgrown with small velvet mesquites and silverleaf nightshade (*Solanum elaeagnifolium*).

The natural vegetation communities in the project area are Sonoran Desertscrub (Arizona Upland subdivision) and Sonoran Riparian Scrubland. Little-leaf paloverde (*Parkinsonia microphylla*) and saguaro cactus (*Carnegiea gigantea*) are the dominant plant species in the Sonoran Desertscrub community, which is typical of the foothills of the Galiuro Mountains east of River Road and some undisturbed areas west of the San Pedro River floodplain. Saguaros are robust and relatively abundant at the east end of the project area. Other common species in this community are velvet mesquite, creosote bush (*Larrea tridentata*), desert hackberry (*Celtis pallida*), catclaw acacia (*Acacia greggii*), whitethorn acacia (*A. constricta*), canyon ragweed (*Ambrosia ambrosioides*), and ocotillo (*Fouquieria splendens*). Also present are a variety of cholla and prickly pear cacti (*Opuntia* spp.). Sonoran Riparian Scrubland vegetation is associated with the San Pedro River floodplain. This community includes several species common in the adjacent uplands, including velvet mesquite, whitethorn acacia, and desert hackberry. Other species more commonly associated with riparian conditions include seepwillow (*B. salicifolia*) and desert broom. Tamarisk is common in some areas. Near the active channel of the San Pedro River, there is a narrow ribbon of vegetation more typical of Sonoran Riparian Deciduous Woodland. In this community, dominant species include Fremont cottonwood (*Populus fremontii*), Goodding willow (*Salix gooddingii*), and tamarisk. The upper portions of the riparian corridor originally supported a dense mesquite bosque. At the present time, the main channel of the San Pedro River is incised several feet below the active floodplain, which in turn is a few feet below the level of the mesquite woodland.

Project implementation would result in adverse impacts to approximately 9.6 acres of land, including 0.87 acre of Bureau of Land Management (BLM) land (Table E.1).

Table E.1. Acres of Impact by Land Status—
San Manuel Interconnect Project

Land Status	Impact (Acres)
Bureau of Land Management	0.87
Arizona State Land Department	7.81
Private (BHP Copper, Inc.)	0.92
Total	**9.60**

Two plant species classified as Salvage Restricted under the Arizona Native Plant Law have been documented within 5 miles of the project area, according to Arizona Game and Fish Department. These plants are San Carlos wild-buckwheat (*Eriogonum capillare*) and staghorn cholla (*O. versicolor*). The proposed project could adversely impact San Carlos wild-buckwheat, which is listed as a U.S. Fish and Wildlife Service Species of Concern.

On BLM land, Southwest Transmission Cooperative, Inc. (SWTC), will apply a seed mix approved by the BLM, if so required. On Arizona State Land Department (ASLD) land, a native plant survey will be conducted following Arizona Department of Agriculture (ADA) guidelines, and a stumpage fee will be paid to ASLD mitigate the loss of protected native plants. A Notice of Intent to Clear Land form will be filed with the ADA prior to land-clearing activities, and the ADA will be informed of the intended disposition of all protected native plants. Plants that are salvaged and transplanted or salvaged and removed by a nursery will not require a salvage fee. SWTC will transplant all saguaros ≤5 feet tall that will be impacted by the project.

Fish

Gila longfin dace (*Agosia chrysogaster chrysogaster*), desert sucker (*Catostomus clarki*), and Sonora sucker (*C. insignis*) may occur in the San Pedro River in the project area. However, fish habitat in the San Pedro River would not be impacted. No construction would occur in the active channel of the San Pedro River, and all-terrain vehicles would be prohibited from crossing the San Pedro River during project construction.

Wildlife

Diversity of wildlife in the project area is expected to be typical of that found in the Sonoran Desertscrub (Arizona Upland subdivision) and Sonoran Riparian Scrubland vegetation communities. Big-game species known to occur in the project area include mule deer (*Odocoileus hemionus*) and collared peccary (*Pecari tajacu*). Small-game species that were observed or are expected to occur in the project area include Gambel's quail (*Callipepla gambelii*), desert cottontail (*Sylvilagus audubonii*), white-winged dove (*Zenaida asiatica*), mourning dove (*Z. macroura*), and blacktail jackrabbit (*Lepus californicus*). A wide variety of non-game mammal, bird, and reptile and amphibian species are found in the project area, or are expected to occur in the project area, particularly along the San Pedro River floodplain. Surface water in the vicinity of the project area is limited to the San Pedro River, which is characterized by intermittent flows and limited use by fishes.

It is assumed that impacts to wildlife habitat from transmission line and access road construction (approximately 9.6 acres) would be identical to those described above for vegetation. Construction-related disturbance would result in short-term displacement of some common wildlife species, but no significant long-term impacts to local fish or wildlife populations are anticipated, given the limited area of disturbance and the large amount of similar habitat present in the surrounding area.

SWTC would use transmission structures that are designed to minimize potential electrocutions of birds-of-prey (raptors). The objective in designing raptor-safe transmission structures is to provide 60 inches between energized conductors or between energized conductors and grounded hardware. Accordingly, SWTC would use a davit arm structure design for this project that provides an approximately 15-foot space between suspended phases. These dimensions are adequate to protect most birds under most conditions. The davit arms accommodate raptor perching while providing a sufficient distance (approximately 6 feet) between the top of the arm and the conductors both above and below the perch site. Additionally, the insulation bells on which the conductor is suspended are 7 feet 11 inches long. This allows sufficient space for potential perching on the two lower davit arms.

Exhibit F

SCENIC AREAS AND CULTURAL RESOURCES

An examination of potential impacts to visual resources is provided in the Environmental Assessment (Exhibit B). Impacts to cultural resources are examined in the attached Class III Survey Report and summarized in the Environmental Assessment (Exhibit B). Findings are included here.

Scenic Areas

Bureau of Land Management (BLM) managers use a visual resource inventory process for determining visual values. The inventory process consists of rating the visual appeal of a tract of land, measuring public concern for scenic quality, and determining whether the tract of land is visible from travel routes or observation points. Based on these three factors, BLM-administered lands are placed into one of four Visual Resource Management (VRM) inventory classes. The system is used to minimize the visual impacts of surface-disturbing activities and to maintain scenic values.

A VRM inventory of public lands in the project area has not been completed by BLM. In the absence of a VRM inventory, BLM has established an interim VRM Class III designation for the area (by default). The objective of this class is to partially retain the existing character of the landscape. The level of change to the characteristic landscape should be moderate, and management activities may attract attention but should not dominate the view of the casual observer. Changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

According to BLM, the project would be visible from populated areas and scenic travel routes, and viewing volume is considered high. However, BLM also notes that the proposed project would be in a landscape that has been previously modified by various land use activities, including agricultural, rural residential, mining, utilities, and transportation developments. According to the BLM *Final Safford Resource Management Plan and Environmental Impact Statement*, "Agricultural modification is evident along the Gila River from Safford to Fort Thomas, Interstate 10 near Bowie and San Simon, the Gila River near Duncan and the Aravaipa and San Pedro valleys. Mineral development has created significant changes to the landscape in the mountains north of Clifton and Morenci, in the Dripping Springs Mountains at Christmas, in the San Pedro Valley near San Manuel and in the San Simon Valley north of Interstate 10."

Existing visual disturbances in the immediate vicinity of the project area include the following:

- Apache to Hayden 115-kV transmission line and associated access roads;
- Two Arizona Public Service (APS) 115-kV transmission lines;
- APS San Manuel Substation;
- APS 12.5-kV transmission line;
- 46-kV yard and pump house;
- River Road (a county-maintained, improved dirt road);
- Abandoned agricultural land and farm roads east of the San Pedro River;
- Mine access roads, reclaimed slag disposal areas, reclaimed tailings impoundments, and offices and shops associated with the BHP Copper, Inc., San Manuel plant site; and
- The San Manuel Arizona Railroad.

The evaluation of the potential impacts of the San Manuel Interconnect concluded that the project would result in a moderate level of change to the predominantly rural nature of the existing landscape, particularly in the eastern portion of the project area, where six structures and an access road would be sited in the foothills of the Galiuro Mountains. However, a moderate level of change is consistent with the objectives of VRM Class III. The transmission structures and access road would be visible to and may attract the attention of the casual observer at several locations along State Route (SR) 77 between Oracle and Mammoth; some structures would be more visible than others, depending on the topography (Figures 5 and 6 in Exhibit B). The project would not dominate the view of the casual observer traveling along SR 77, however, because 1) the project would be located in the foreground of the Galiuro Mountains, which would tend to camouflage the line and structures; and 2) throughout the project area, Southwest Transmission Cooperative, Inc. (SWTC), would use self-weathering steel structures designed to reduce visual impacts. Furthermore, the proposed new transmission line would be constructed in a viewshed with a variety of existing linear and non-linear landscape alterations. Consequently, the visual contrast of the proposed new 230-kV line and access road would be consistent with the existing character of the landscape and would not result in a significant decrease in visual quality.

Cultural Resources

Eight archaeological sites were recorded in the project area. Six of these sites were newly discovered; two had been previously recorded and were reassessed during the current project. Of these eight sites, six are considered potentially eligible for the National Register of Historic Places: AZ BB:6:109(ASM), AZ BB:6:110(ASM), AZ BB:6:235(ASM), AZ BB:6:236(ASM), AZ BB:6:237(ASM), and AZ BB:6:238(ASM). None of these potentially eligible sites are located on BLM land. Twenty-eight isolated occurrences also were recorded in the project area.

Two of the six potentially eligible cultural resource sites are located near the westernmost two proposed access road alignments. SWTC has engineered the project to avoid impacting these two cultural resource sites, and ground-disturbing activity in the vicinity of these sites would be monitored by a qualified archaeologist. None of the other four archaeological sites would be impacted as a result of the project. The San Pedro River floodplain portion of the project area was not thoroughly surveyed by WestLand Resources, Inc., because of dense vegetation. Ground-disturbing activities in this portion of the project area also would be monitored by a qualified archaeologist for hidden or buried cultural features.

In the event that an unanticipated discovery of cultural resources is made during construction, all work should immediately cease at that location, and an archaeologist should be contacted to verify the discovery and assess its significance. If the discovery involves human remains or funerary items, either the BLM archaeologist (for BLM-administered lands) or the director of the Arizona State Museum (for state or private lands) would be contacted immediately.

Exhibit F-1

CLASS III CULTURAL RESOURCES SURVEY REPORT

A CLASS III CULTURAL RESOURCES SURVEY OF 1,056 ACRES NEAR SAN MANUEL, PINAL COUNTY, ARIZONA

REDINGTON INTERCONNECT PROJECT

Prepared by:
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Cultural Resources Report 2006-77

April 4, 2007
Project No. 473.19 520 520

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ABSTRACT

REPORT TITLE: A Class III Cultural Resources Survey of 1,056 Acres near San Manuel, Pinal County, Arizona

PROJECT NAME: Redington Interconnect Project

REPORT DATE: April 4, 2007

LEAD AGENCY: Rural Utilities Service (RUS)

PERMIT NUMBER: Arizona Antiquities Act Blanket Permit No. 2006-027bl, BLM Permit No. AZ-000280

WESTLAND PROJECT NUMBER: 473.19 520 520

LOCATION: Township 9 South, Range 17 East, portions of Sections 10–15, 21–23, 28, 29, and 32, Pinal County, Arizona, Gila and Salt River Baseline and Meridian, USGS 7.5-minute series Clark Ranch, Peppersauce Wash, and Campo Bonito quadrangles

ACREAGE: 1,056

REGISTER-ELIGIBLE PROPERTIES: 10 (AZ BB:6:109, BB:6:110, BB:6:231, BB:6:232, BB:6:233, BB:6:234, BB:6:235, BB:6:236, BB:6:237, and BB:6:238 [all ASM])

REGISTER-INELIGIBLE PROPERTIES: 3 (AZ BB:6:239, BB:6:240, and BB:6:241[all ASM])

PROJECT DESCRIPTION: WestLand Resources, Inc., conducted an archaeological survey of 1,056 acres of land in Pinal County, Arizona, for Southwest Transmission Cooperative, Inc. The survey was performed in anticipation of the construction of a new transmission line and switchyard. Eleven previously unrecorded archaeological sites, AZ BB:6:231–241 (ASM), two previously recorded archaeological sites (AZ BB:6:109 [ASM] and AZ BB:6:110 [ASM]), and 41 isolated occurrences of archaeological remains were located during the survey.

RECOMMENDATION: WestLand Resources, Inc., recommends avoidance of the National Register of Historic Places-eligible properties. If avoidance of the properties is not possible, the implementation of a testing plan, data recovery plan, or both for each eligible property is recommended. The floodplain portion of the area of potential effect is covered by thick vegetative growth and was therefore not completely surveyed. WestLand Resources, Inc., recommends that any ground-disturbing activities in this portion of the area of potential effect be monitored by a qualified archaeologist for hidden and/or buried cultural features.

A Class III Cultural Resources Survey
Redington Interconnect Project

by Avi Buckles, Michael Cook, Michael Coughlan, and William Deaver

Introduction and Project Background

Southwest Transmission Cooperative, Inc., contracted WestLand Resources, Inc. (WestLand), to conduct a Class III cultural resources inventory (full coverage) of a 1,056-ac parcel of land (area of potential effect [APE]) located along the San Pedro River near San Manuel, Pinal County, Arizona. The APE is located within Township 9 South, Range 17 East, portions of Sections 10–15, 21–23, 28, 29, and 32, Gila and Salt River Baseline and Meridian, and can be found on the USGS 7.5-minute series Clark Ranch, Peppersauce Wash, and Campo Bonito quadrangles ***(Figures 1 and 2)***. The land ownership within the APE is a combination of private, state, and federally administered lands ***(Figure 3)***. The privately held land is owned by BHP Billiton and accounts for 646 ac within the APE, all of it west of River Road. The State of Arizona land is administered by the Arizona State Land Department and comprises 376.5 ac within the APE. The federally managed land is administered by the Bureau of Land Management (BLM) and covers 33.5 ac in the far northeastern portion of the APE.

The survey was conducted under Arizona Antiquities Act Blanket Permit No. 2006-027bl and BLM Permit No. AZ-000280. Federal funds are supporting this project through the Rural Utilities Service (RUS), an entity of the United States Department of Agriculture (USDA), and this report was prepared in accordance with Section 106 of the National Historic Preservation Act. The fieldwork was conducted on November 14 through December 7, 2006 (24 field person days), by WestLand archaeologists Avi Buckles (field director), Gaylen Tinsley, Erich Wright, and Adam Horne. Field mapping and production were performed by Michael Coughlan. WestLand senior archaeologist William L. Deaver, M.A., RPA, served as principal investigator for the project. The assistance of Gerald Brunskill and Bill McKay, both of BHP Billiton San Manuel, was indispensable in helping the field personnel maneuver through the BHP San Manuel Plant Site, and their help was much appreciated. Michelle Freeark of Southwest Transmission Cooperative, Inc., took an active role in helping WestLand coordinate with BHP Billiton, and her help is also appreciated. Final copies will be sent to the Arizona State Museum (ASM) pending review and possible modifications by the regulatory agencies involved in the project.

Thirteen archaeological sites were recorded within the APE. Eleven of these were newly discovered sites, while two (AZ BB:6:109 [ASM] and AZ BB:6:110 [ASM]) had been previously recorded and were reassessed during the current project. Forty-one isolated occurrences of artifacts or cultural features were recorded within the APE.

Project Environment

Landscape and Geology

The APE is located in the San Pedro River valley, north of the city of Tucson ***(Figures 1 and 2)***. It falls within the Basin and Range physiographic province, which is characterized by north-to-south trending mountain ranges and deep alluvial valleys. The APE crosses the San Pedro River, which lies between two large mountain ranges. The Santa Catalina Mountains, approximately 12 km to the south, reach elevations of over 2,791 m (9,157 ft) above sea level and consist of rocks of varying types and ages, including Mesozoic and Tertiary granite, Precambrian granite, and Paleozoic sedimentary deposits. The Galiuro Mountains are located approximately 10 km north of the San Pedro River. These mountains are the more rugged of the two ranges and reach a maximum elevation of 2,336 m (7,663 ft) above sea level. Granitic and sedimentary deposits comprise the bulk of the Galiuro Mountains. The APE is located in the San Pedro valley and ranges from 762 to 975 m above sea level (masl). The extensive tailings impoundments of the San Manuel Plant Site surround the southern portion of the APE ***(Figures 1 and 2)***.

The APE crosses several landforms, including the Pleistocene alluvial terraces along the San Pedro River, the floodplain of the river, and the bajadas (or piedmonts) that slope downward from the Santa Catalina and Galiuro Mountains. Numerous small

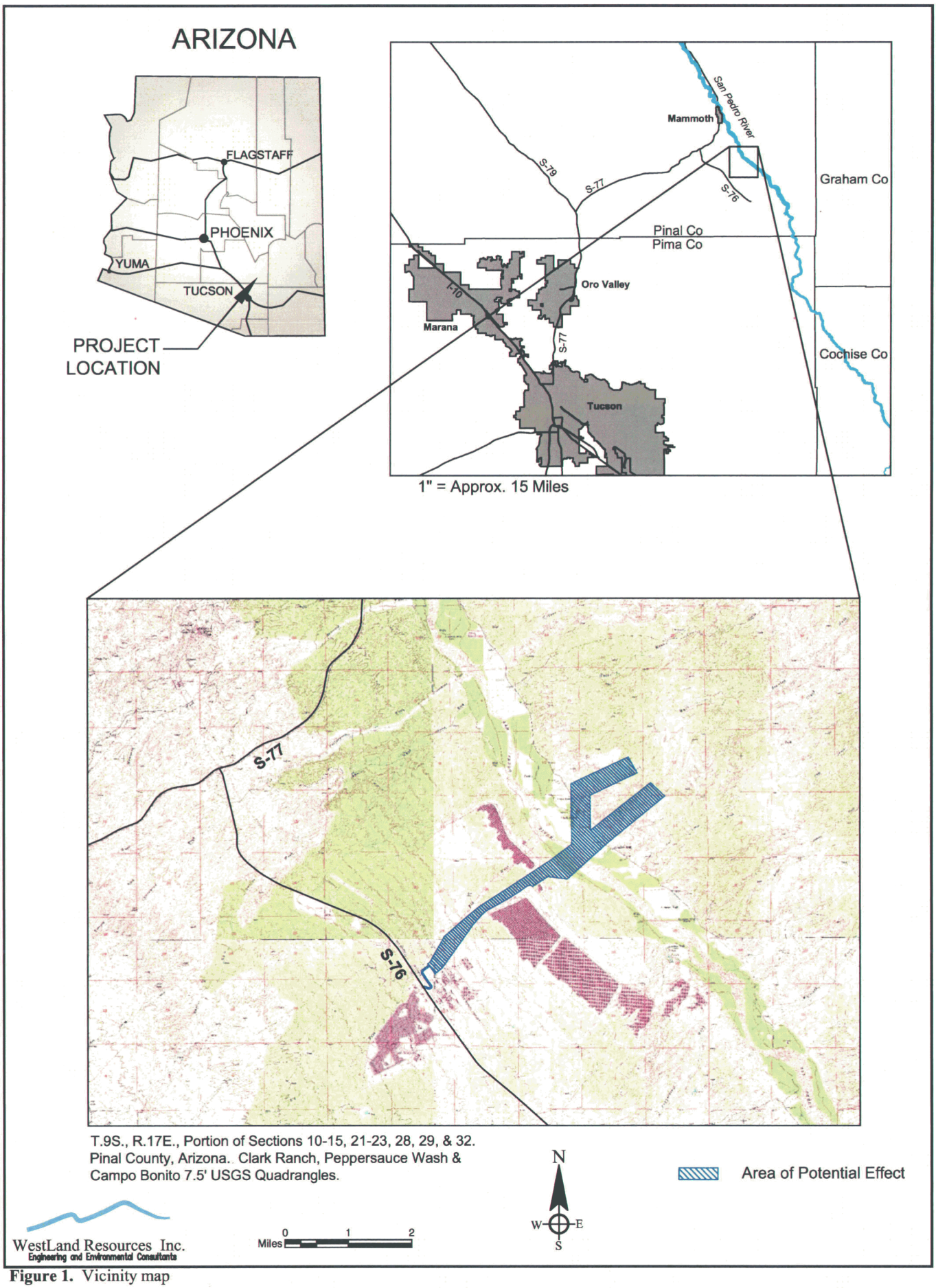


Figure 1. Vicinity map

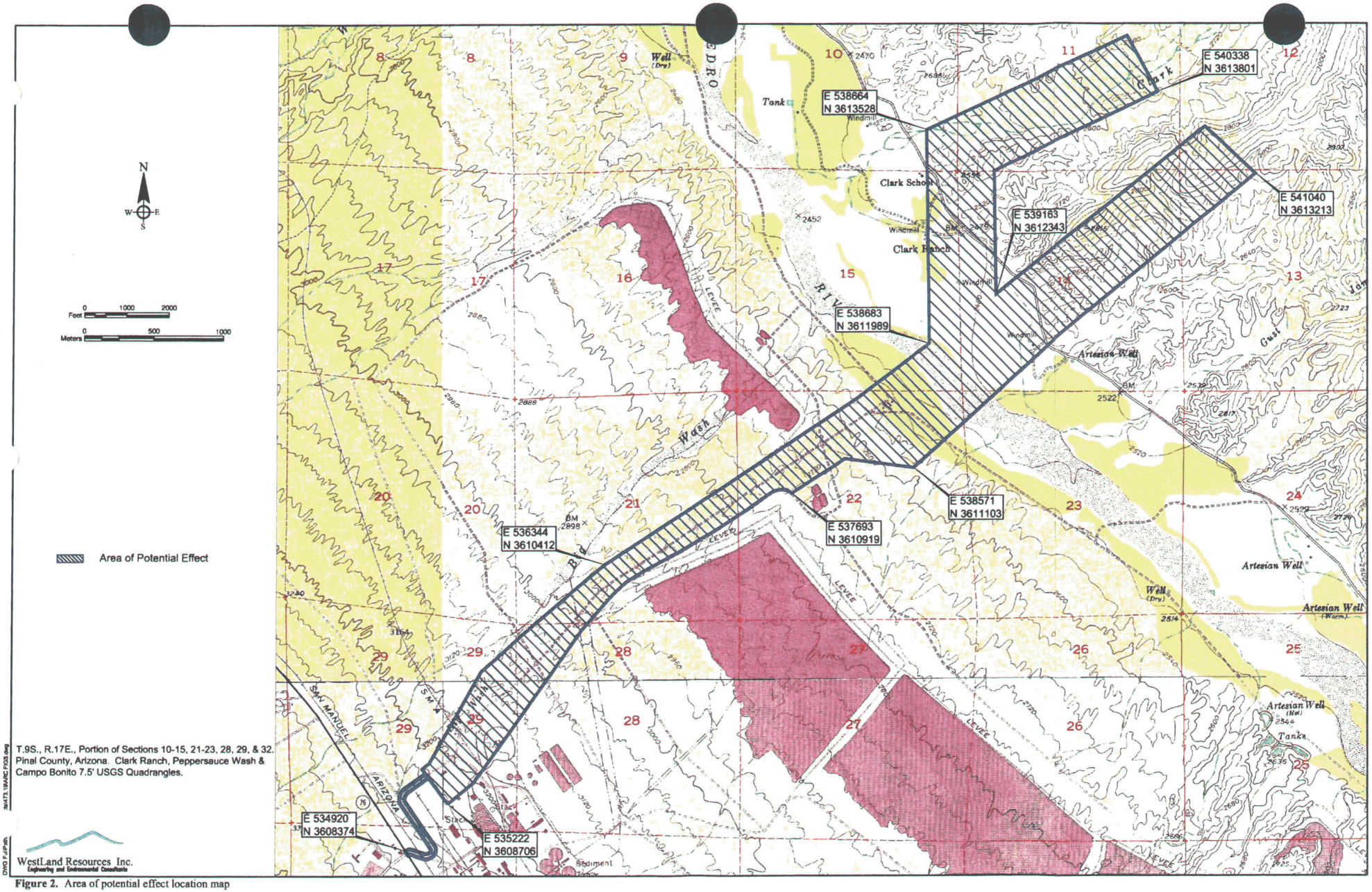


Figure 2. Area of potential effect location map

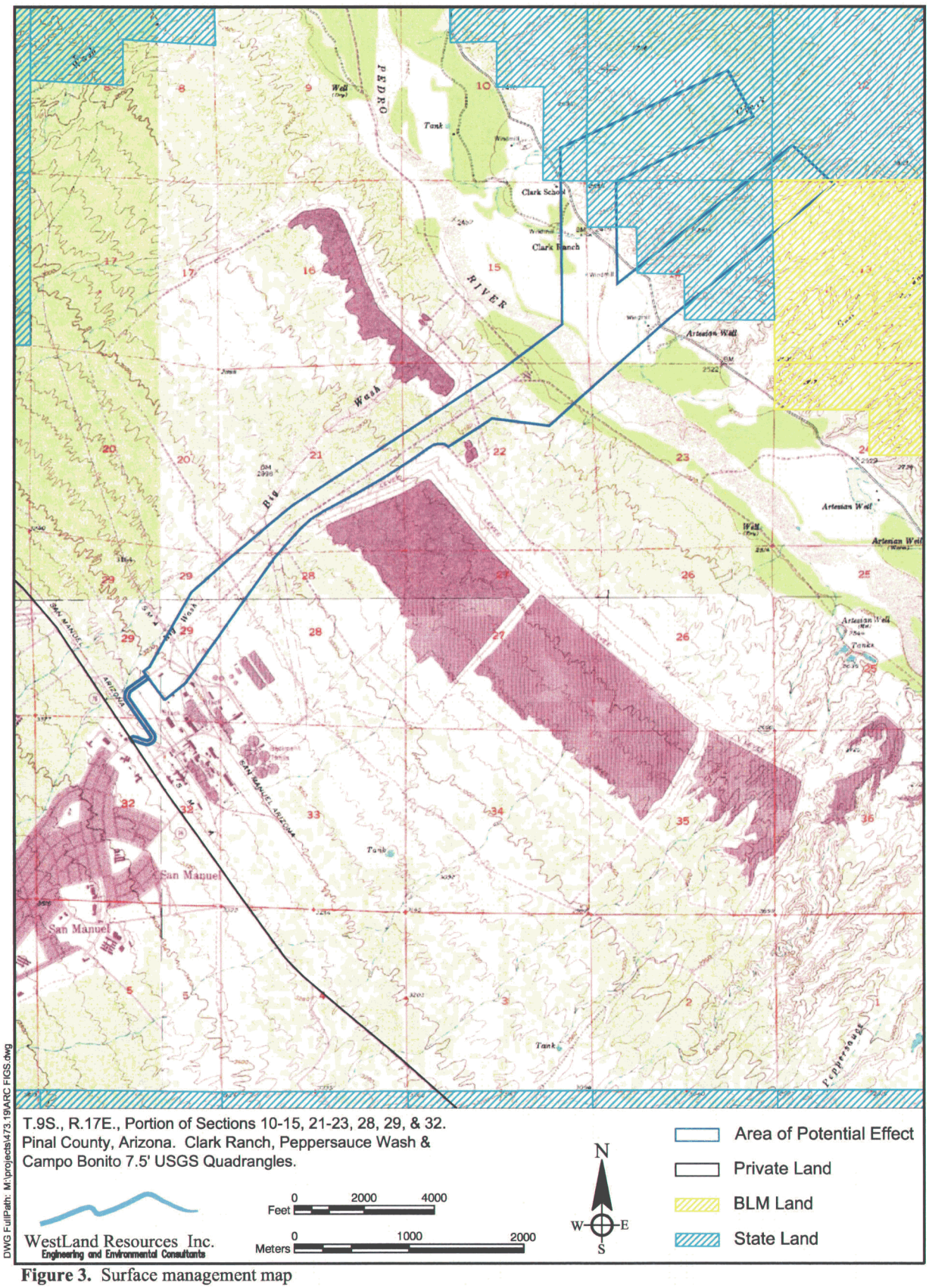


Figure 3. Surface management map

and large drainages incise these bajadas and flow toward the San Pedro. Over time, these small washes have repeatedly changed course in a constantly shifting alluvial depositional and erosional process. This continuous alluvial phenomenon has helped to create a wide, well-graded bajada surface. The west side of the river within the Santa Catalina bajada is composed of gently sloping, rocky finger ridges created by numerous large washes, including Big Wash, which is located adjacent to the APE.

The APE on the east side of San Pedro River crosses the distal margins of the Galiuro Mountain bajada. The bajada is composed of a very fine, white chalky substrate that is high in gypsum. Layers of shale are visible in the wash cuts. These likely formed from sediments deposited during the Pliocene. The distal end of the Galiuro bajada is highly incised by several large washes, including the Clark and Gust James Washes, whose impressive cuts expose light-colored gypsum and shale deposits *(Photo 1)*. Although not marked on the USGS map, this area is known locally as "White Cliffs," and the White Cliffs gypsum mine is located just south of the APE.

Photo 1. APE on the east side of the San Pedro River

The San Pedro River is the last free-flowing river in southern Arizona. It is known internationally as a sanctuary for migratory birds and animals and for its archaeological remains. This river was of vital importance to the prehistoric peoples living within the APE, supplying essential resources like wood, wild food crops, animals (including fish species), and water for crop irrigation. The river actively flows through the APE, and a small over-story of riparian trees is present. Geologically, the San Pedro River valley contains deep alluvial sediments extending back to the Pliocene epoch or earlier. Perhaps best known for the Paleoindian remains found further south at Naco, Lehner Ranch, and Murray Springs (Faught and Freeman 1998), the floodplain of the San Pedro likely contains deeply buried deposits spanning the entire continuum of Native American occupation in southern Arizona. Much of the APE is located within the floodplain, and the likelihood of buried cultural deposits not visible on the ground surface is high, which must be taken into consideration when planning ground-disturbing activities within the APE.

VEGETATION AND FAUNA

The APE is within the Arizona Upland subdivision of the Sonoran Desertscrub biotic community. The Arizona Uplands are considered one of the best-watered and least desert-like regions of North America. Plant life within the picturesque landscape is found in scrublands of leguminous trees and in open spaces, where bushes, shrubs, and a variety of cacti and succulents grow (Turner and Brown 1994:200).

The APE encompasses several biotic zones, most of them dominated by scrublands of mesquite (*Prosopis* sp.), acacia (*Acacia* sp.), and creosote (*Larrea tridentata*). These biotic zones also contain various cacti species, including cholla and prickly pear (*Opuntia* sp.), barrel cactus (*Ferocactus wislizenii*), saguaro (*Carnegiea gigantea*), Christmas cactus (*Opuntia leptocaulis*), and rare occurrences of night-blooming cereus (*Peniocereus greggii*). Smaller cactus species such as pincushion (*Mammillaria* sp.) and hedgehog (*Echinocereus* sp.) grow throughout the region, often under larger cholla cacti and mesquite trees. Additional habitats include minor riparian environments along drainages and washes, where vegetative species consist of small woody shrubs and trees such as palo verde (*Cercidium* sp.), ironwood (*Olneya tesota*), mesquite, and acacia. Clumps of desert grasses and weedy annuals also grow throughout the region (Turner and Brown 1994). The San Pedro River itself supports a rich array of plants, including the impressive Fremont cottonwood (*Populus fremontii*), Goodding willow (*Salix gooddingii*), and invasive, non-native tamarisk (*Tamarix* sp.), which are all present within the APE. The cottonwoods and willows are widely spaced, but the tamarisk grows in such abundance that it hinders pedestrian access to certain areas.

The upper levels of the riparian corridor originally comprised a dense bosque of velvet mesquite, which would have supplied prehistoric peoples with an abundant source of food, fuel, and building materials. At the present time, the main channel of the San Pedro River is incised several feet below the active floodplain, which in turn is a few feet below the level of the mesquite bosque. The geologic floodplain area adjacent to the San Pedro River is covered primarily by Sonoran Riparian Scrubland, where it has not been cleared for agriculture. This community is comprised of scrub trees 5 to 10 ft tall that are too dense to be considered desertscrub or riparian stands. This community includes several species common in the adjacent bajadas, such as velvet mesquite, white-thorn acacia, and desert hackberry (*Celtis pallida*).

The well-watered Sonoran habitat supports a variety of wildlife. Among the fauna in the APE are desert mule deer (*Odocoileus hemionus crooki*), coyote (*Canis latrans*), and javelina (*Dicotyles tajacu*), as well as numerous smaller mammals such as jackrabbits (*Lepus* sp.), cottontails (*Sylvilagus* sp.), and cactus mice (*Peromyscus eremicus*). The biotic communities also support a rich diversity of bird life, including such species as Harris' hawk (*Parabuteo unicintus*), white-winged dove (*Zenaida asiatica*), Inca dove (*Columbina inca*), elf owl (*Micrathene whitneyi*), flycatchers (*Empidonax* sp.), quail (*Callipepla* sp.), and species of migratory waterfowl. Also found in the APE are numerous reptiles and lizards, like the regal horned lizard (*Phrynosoma solare*), Gila monster (*Heloderma suspectum*), Arizona coral snake (*Micruroides euryxanthus*), and rattlesnake (*Crotalus* sp.) (Turner and Brown 1994:203).

Climate

The Arizona Sonoran Upland Subdivision of Desertscrub has a semi-arid climate and a bimodal rainfall pattern, which distinguish it from other subdivisions of the Sonoran Desertscrub (Sellers and Hill 1974). Summer temperatures are typically hot; winter temperatures remain relatively cool. Bimodal rainfall occurs in the summer and winter, averaging 200 mm per year. Summer rains are usually short, intense afternoon rainstorms that yield 30 to 60 percent of the annual rainfall total. Winter rains tend to be gentler and can last for several days. During this period of rainfall, the Sonoran Desert can receive 10 to 40 percent of the annual total. During the dry season, little to no rainfall occurs between the winter and summer rains (Turner and Brown 1994:201).

Historic and Modern Alterations to the Landscape

The southern portion of the APE is situated on the San Manuel Plant Site between two tailings impoundment dams within a comparatively undisturbed portion of the bajada surface. The landscape surrounding this portion of the APE has been significantly altered since the 1950s *(Figure 2)*. Agricultural- and mining-related water usage, the introduction of non-native tamarisk, cattle ranching, and land clearing have altered the flow of the San Pedro River and changed the landscape from earlier times. Marshes and other wetlands were more common than they are today. However, in comparison to many other rivers in southern Arizona, the San Pedro retains a certain historical integrity of times past *(Photo 2)*.

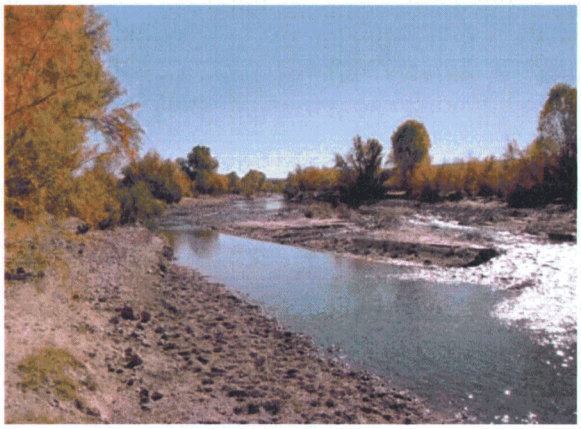


Photo 2. San Pedro River within the APE

Culture History of Southern Arizona

The majority of archaeological work in southern Arizona has been done under the guise of cultural resource management. This work was specifically directed at mitigating the impacts to our shared cultural heritage brought about by road projects, dam projects, and a variety of development projects. As a result, the most intensive and sustained long-term archaeological studies have occurred in urban areas, particularly Tucson and Phoenix. Thus the archaeological information from these two urban areas far surpasses what is known from the rural areas. Other large and significant archaeological projects have occurred in rural parts of southern

Arizona, but these often do not provide a full spectrum of human history or the detail of information necessary to formulate detailed culture histories. As a consequence, the culture history of many parts of southern Arizona is unknown or only generally known. As scientists, archaeologists should be aware of the inherent bias in the information available for formulating reconstructions of human prehistory and making judgments about the causes and sources of cultural influence. With this in mind, the following culture history tries to paint the big picture of the general trends in prehistory and history for southern Arizona. Taken as a whole, what is known about the prehistoric and historic culture developments of southern Arizona, both within and beyond the Phoenix and Tucson areas, indicates broadly sweeping changes in human technologies and culture across southern Arizona. Because the details of these sweeping changes are only known in a few locations, caution should be exercised in extrapolating the details from one area to another.

Archaeological evidence from across the Southwest indicates that throughout prehistory and history there were waves of cultural change that swept across the Southwest. This resulted in shared cultural practices and technologies among peoples across a broad region. In constant opposition to these shared similarities were regionally and locally unique expressions of cultural identity. This contrast of similarities and dissimilarities leads to the general conclusion that the expression of human culture in each specific locality was a unique alloy resulting from the blending and annealing of both indigenous and exogenous cultural forces. The following discussion is an attempt to formulate a different perspective on the prehistory of southern Arizona by considering it as an integrated region and is presented with regard to five main periods of history and prehistory: Paleoindian, Archaic, Formative, Protohistoric, and Historic.

PALEOINDIAN (CA. 11,500–10,500 B.P./9500–8400 B.C.)

The first inhabitants of southern Arizona are referred to by archaeologists as Paleoindians. They were migratory, nomadic, hunting peoples who roamed across North America during the end of the Pleistocene epoch. Two diagnostic characteristics of the Paleoindians are large, fluted, lanceolate projectile points and the association of these points with the fossil remains of now extinct animals, particularly mammoth (*Mammuthus* spp.) and ancient bison (*Bison antiquus*) (Reid and Whittlesey 1997:30–37). While originally conceptualized as purely "big-game hunters," Paleoindians also exploited plant resources in ways akin to later Archaic peoples (Mabry 1998:105–107; Reid and Whittlesey 1997).

The oldest evidence of human occupation in the Southwest is attributable to the Clovis complex. This complex is identified by a distinctive lanceolate spear point with a concave base, longitudinal fluting, and lateral and marginal grinding (Slaughter 1992:72). Several important Clovis sites are located in the upper San Pedro Valley of southeastern Arizona, including Naco, Lehner, Escapule, and Murray Springs (Faught and Freeman 1998:41). Much of the evidence for a Clovis presence in Arizona is reflected in isolated occurrences of Clovis points (either whole or in fragments); for example, Clovis points have been found in the St. Johns and Winslow areas (Faught and Freeman 1998:44; Neily 1985:10). The Folsom complex succeeded the Clovis complex. Folsom, like Clovis, is identified by a distinctive style of projectile point. Folsom points are also lanceolate, fluted, spear points similar to Clovis points; however, Folsom points are distinguished from Clovis points by the extent of the fluting. The flutes of Folsom points extend the full length of the blade, from the proximal to distal ends, and the margins of the points were retouched after fluting. In Arizona, Folsom points have been found only in surface contexts on the Colorado Plateau and the mountainous Mogollon Rim country (Faught and Freeman 1998:45). A third Paleoindian "complex," known as the Plainview, is a late Pleistocene or early Holocene Paleoindian tool tradition represented on the Colorado Plateau and in the Southern Basin and Range Province (although not, to date, elsewhere in Arizona). Plainview points comprise several subtypes, including Goshen, Meserve, Milnesand, and Belen points. All of these points resemble Clovis points in their basic configuration, but are unfluted (Faught and Freeman 1998:47). A Plainview point was discovered on the bajada of the Winchester Mountains in the Sulphur Springs Valley (Carlson et al. 1989). A "Clovis-style" point is also known from the Sanchez area (Seymour et al. 1997:1–8). Paleoindian period isolates have also been identified in the Bylas vicinity (Johnson and Wasley 1966).

ARCHAIC (CA. 8400 B.C.–A.D. 1)

The transition between the Paleoindian and Archaic periods correlates with a change in the environment that distinguishes the Holocene epoch from the preceding Pleistocene epoch. With this change came changes in human adaptations. Whereas the Paleoindian cultures are characterized as big-game hunters, the Archaic cultures are characterized as generalized hunters and gatherers (Mabry 1997:4 [97-7]). Archaic cultures sustained themselves with a more generalized subsistence strategy, one that consisted of hunting the large game animals characteristic of the Holocene epoch and of gathering a broad spectrum of plant foods. The transition probably was not abrupt, and some have suggested that people practicing both subsistence strategies may have lived at the same time and occupied the same territories (Faught and Freeman 1998:50). Nevertheless, 8500 B.C. is taken as the starting point of the Archaic period because it was around this time that a ground-stone-tool industry consisting of handstones and netherstones became common across the Southwest (Huckell 1996:306, 327). The Archaic ends in southern Arizona with the appearance of pottery, which is generally accepted as the indication of sedentary, agricultural, *formative* cultures, somewhere between A.D. 1 and 150 (Deaver and Ciolek-Torrello 1995; Mabry 1998[97-7]).

Several regional Archaic traditions are recognized: the Cochise tradition across southern Arizona, northwestern Chihuahua, and northern Sonora (Sayles 1983); the Oshara tradition on the Colorado Plateau (Irwin-Williams 1967); the San Dieguito-Pinto tradition in southwestern Arizona, western California, and southern Nevada (Hayden 1967, 1976; Rogers 1966); the Hueco Basketmaker complex in western Texas and southeastern New Mexico; and the Frontera complex in the northern Mexican states of Coahuila and northeastern Chihuahua. In recognition of the many cultural similarities that characterized these local traditions, Irwin-Williams (1967, 1979) suggested that each was a manifestation of an overarching cultural tradition she termed the *Picosa culture*. Further consideration of the issue led Huckell (Huckell 1984a, 1984b, 1988) to suggest that the Cochise culture and its counterparts be referred to collectively as the *Southwestern Archaic*. Given where boundaries later appear among Formative period cultures, there still may be merit in considering several Late Archaic cultural traditions. Of direct concern to this overview of prehistory is the basin-and-range geographic region encompassed by the Cochise culture (Sayles 1983; Sayles and Antevs 1941). This region was occupied later by the Hohokam, Mogollon, and Trincheras cultural traditions.

Sayles (1983) originally defined three sequential phases of the Cochise archaic culture: Sulphur Springs, Chiricahua, and San Pedro. The Archaic period in southern Arizona is still divided into three primary parts, but the formulation of the phases and the naming of the last period in the sequence have been revised based on recent archaeological explorations and findings. The oldest periods are referred to simply as Early and Middle Archaic. These correspond, respectively, with Sayles' Sulphur Springs and Chiricahua phases. The third, and last, period is referred to alternatively as the Late Archaic period or the Early Agricultural period. The latter label acknowledges the adoption and development of agriculture and the cultivation of maize during the last millennium and a half of the Archaic period (Huckell 1995; Mabry 1997, 1998). Admittedly, the adoption of maize and the development of agriculture, which includes forms of canal and ditch irrigation, is a substantial diversion from the original concept of the Archaic; however, maize has also been found at Middle Archaic period sites that predate the Early Agricultural period by about a millennium. For this reason and for simplicity of structure, the Archaic period is discussed simply as a three-part division of early, middle, and late.

Early Archaic (ca. 8400–6000 B.C.)

The Early Archaic period (ca. 8400–6000 B.C.) of the Cochise culture is known as the Sulphur Springs phase. Sayles and Antevs originally defined this phase in 1941 in the Sulphur Springs Valley in southeastern Arizona (Reid and Whittlesey 1997:44, 45). Problems with dating (the work having taken place prior to the development of carbon dating techniques) originally led Sayles to the conclusion that a Paleoindian tradition (typified by the exploitation of megafauna) co-existed here with a hunting-and-gathering tradition that exploited smaller game and various plant resources, as reflected in an artifact assemblage composed of flat milling stones, unifacial scrapers, and other lithic implements. This assessment turned out to be incorrect; however, reexamination of the Sulphur Springs material did establish a reliable beginning

date of ca. 8400 B.C. for the Sulphur Springs phase. Even though they have now been dated with certainty, the sites investigated by Sayles did not include any artifacts, e.g., projectile points, that were stylistically distinctive and, therefore, diagnostic of this cultural stage.

In southeastern Arizona, few diagnostic projectile points recovered from Early Archaic sites can be directly correlated in time with the Sulphur Springs phase, and sites dating to this epoch are not always recognizable when they lack other more direct methods of dating, such as radiocarbon (Huckell 1996:329). Elsewhere in the Southwest, however, archaeologists have identified several early Holocene "complexes" differentiated by particulars of projectile point morphology, although whether these complexes belong to the "Paleoindian" or the "Early Archaic" is a matter of some debate (Mabry and Faught 1998:55). One of these complexes is known as the Western Stemmed Point complex and includes the 17 stemmed "Ventana-Amargosa I" points that were recovered by Haury under the Red Sand deposit in Ventana Cave (the stratigraphic location of these points suggests their manufacture and deposit some time after 6700 B.C.). Other projectile point complexes include the Jay points of the Oshara tradition and the Lake Mojave and Silver Lake points of the Mojave Desert and lower Colorado River Valley (Mabry and Faught 1998:54, 55).

Middle Archaic (ca. 6000–1500 B.C.)

The Middle Archaic period (ca. 6000–1500 B.C.) of the Cochise culture is known as the Chiricahua phase. It is typified by the addition of shallow basin metates, mortars and pestles, bifacial tools, and distinctive side-notched projectile points (Chiricahua points) to the overall tool assemblage. Generally, the Middle Archaic period was a time when regional variations in the material culture across the Southwest became less pronounced. In particular, projectile points take on a similarity of design over large geographic regions. Chiricahua points, for example, are similar in style and manufacture technique to Northern Side-notched, Pinto, and San Jose points, all found in other areas of Arizona (Slaughter 1992:70). It is also during the Middle Archaic that evidence for permanent or semi-permanent domestic architecture appears (although bands of people probably remained highly mobile). The first Mesoamerican cultigens (including maize) probably arrived in the Southwest at this time as well, perhaps as early as 2000 B.C. (Huckell 1996:343).

During the Middle Archaic, the Southwest and southeastern California experienced the Altithermal interval of the Middle Holocene. This time of environmental change was characterized by a peak in average seasonal temperatures (the highest experienced since the end of the Pleistocene) and greatly increased aridity, resulting in the drying of lakes and previously perennial rivers and streams. This in turn resulted in the abandonment of areas that had been previously rich in resources and a general movement to higher elevations and the wetter plateau areas. Upland areas became the refugia of the Archaic peoples. After environmental conditions began to improve following the Altithermal, Archaic peoples moved back into the desert basins. An important new element in the Middle Archaic period lifeway is maize. Recent investigation into the adoption of maize puts the current threshold for the use of this plant by people in the Southwest at about 2100 B.C. (Mabry 2005:34). Although the archaeological evidence places the use of maize in the latter part of the Middle Archaic period, the evidence is too recent and too sparse to evaluate what, if any, impacts the presence of a cultivated crop may have had on the Middle Archaic lifeways.

Late Archaic (ca. 1500 B.C.–A.D. 1)

Changes in population, settlement patterns, and subsistence strategies around 1500 B.C. distinguish the Late Archaic period from the preceding Middle Archaic period (Gilman 1995; Huckell 1988, 1990, 1995; Irwin-Williams 1979; Mabry 1998b; Matson 1991; Roth 1996 [ed.]; Whalen 1971). These changes are linked to four important interrelated factors. The first factor is an increasing regionalism among Late Archaic groups resulting apparently from an increase in population relative to earlier times. The second factor is the existence of a broad-based interaction network that allowed for the rapid dissemination of information and materials. The third factor is the increasing importance of maize in the diet as seen in the development and spread of agriculture. The fourth factor is the appearance of large settlements that are perhaps the first expressions of sedentary village life (Mabry 1998). The changes resulting from the interaction of these factors set the stage for what happened later during the Formative period.

Archaeological sites attributed to the Late Archaic period are more numerous across the landscape than earlier Archaic sites. This could be explained in a number of ways, including sampling biases, archaeological visibility, shifts in settlement patterns with an increase in the number and types of settlements occupied in a given occupational cycle, or a change to a generally more dispersed settlement pattern. Without entirely discounting any of the aforementioned alternatives, the preferred explanation is that the number of sites results from an increase in the number of people, resulting from normal population growth, migration, or some combination of both (Berry 1982; Matson 1991).

The Late Archaic peoples had a versatile set of subsistence technologies. They had inherited from previous generations an effective hunting-and-foraging subsistence adaptation. The introduction of maize in the latter part of the Middle Archaic period was another valuable subsistence resource for minimizing subsistence risk. With this suite of subsistence strategies, the Late Archaic peoples seem particularly well suited to adapt to a variety of environmental conditions and establish population centers in most of the desert basins and river valleys (Huckell 1990, 1995; Irwin-Williams 1979; Matson 1991; Roth 1996 [ed.]; Wills 1988). What emerged from this seems to have been economically self-sufficient and politically autonomous groups with dominion over defined territories (see Whittlesey 1998 for a related discussion of Formative period social organization). The boundaries of these territories were prescribed by the availability of exploitable resources and the physiographic features of the landscape. Relying on geochemical studies of obsidian from Middle and Late Archaic sites, Shackley (1996) demonstrates a constriction in procurement territories from the Middle to Late Archaic, suggesting a trend of decreasing group mobility among the Late Archaic peoples.

Establishment of distinct territories did not inhibit the exchange of goods or the dissemination of information. A network of alliances fostered interaction and exchange that resulted in the rapid transmission of ideas and goods (Irwin-Williams 1979:38). The existence of some sort of information-sharing network is evidenced by the nearly synchronous adoption of maize across widely separate regions of the Southwest. A recent review in *Archaeology Southwest* (Thiel 1999:8, 9) of radiocarbon dating early maize in the Southwest shows that the spread of agriculture was essentially a contemporaneous phenomenon across the Greater Southwest (see also Hard 1994; Hard and Merrill 1992; Huckell 1990, 1995; Matson 1991; Wills 1988). Similarly, the widespread exchange of marine shell jewelry (Howard 1987; L. Huckell 1993; Vokes 1998.1, 1998.2) and shared stylistic patterns in material culture (Huckell 1984a, 1984b, 1988; Irwin-Williams 1979:38) also attest to the existence of an exchange network. As a measure of the breadth of this system, marine shell and other objects found at Late Archaic sites in the middle Santa Cruz River valley indicate a network reaching to the Gulf of California on the southwest and to the Pacific Ocean on the west (L. Huckell 1993; Vokes 1998.1, 1998.2).

Late Archaic peoples' ability to adapt to the variety of environmental areas was largely due to their knowledge of foraging, hunting, and farming subsistence technologies. Foraging and hunting were the inheritance handed down to these peoples from their Middle Archaic ancestors and were used to a large extent by all Late Archaic groups. The adoption and spread of agriculture sometime prior to 1500 B.C. had a pronounced impact on the cultural trajectory of the Southwest. Maize was adopted in the southwestern United States by 2100 B.C., and by 900 B.C., irrigation canals and ditches had been constructed for farming. Even though the spread of agriculture was extensive and rapid, it was not uniformly adopted across the Southwest (Gilman et al. 1996; Mauldin 1993; Roth 1996 [ed.]; Stone and Bostwick 1995). Some groups seem to have been able to sustain essentially permanent settlements by intensifying their exploitation of native plants, particularly legumes (Fish et al. 1990; Halbirt et al. 1993; Stone and Bostwick 1996:25, 26). The apparent increase in legume consumption may have had as pronounced an impact on Late Archaic adaptations as did agriculture. Even in areas where agriculture was adopted early, such as the Tucson Basin, there appear to be sites within the settlement system that are dedicated to foraging and hunting activities (Roth 1992, 1996b).

Evidence for the cultivation of maize, beans, and squash has been found at many sites of this period across southern Arizona, but most notably in the Tucson Basin and in the San Pedro River and Cienega Creek valleys (e.g., Diehl 1997, 2005; Eddy and Cooley 1983; Gasser and Kwiatkowski 1991a, 1991b; Huckell 1990, 1995; Mabry 1998a [ed.],

2005). Huckell (1996) has suggested that the adoption of agriculture correlates with a period of stream aggradation that occurred during a period of cooler summer temperatures and reduced precipitation that was underway by about 3,000 years ago. He goes on to surmise that "cooler summer temperatures, despite lessened precipitation, may have created greater levels of effective moisture, which would in turn have created better conditions during the growing season" (Huckell 1996:35, 36). In southern Arizona, agriculture appears to have been first adopted in low-elevation desert valleys with predictable and manageable streams. These locations may have been suited to the early adoption and development of agriculture not only because they were desirable farming locations, but also because the surrounding environment contained varied and plentiful native food resources within a relatively short distance of the farmlands (see also Stone and Bostwick 1996:19). These resources would have helped hedge subsistence stress in times of agricultural failure.

In most localities in southern Arizona where regional archaeological surveys have been carried out, Late Archaic sites have been found in two zones: first, on the floodplains and terraces along the rivers and second at the mountain fronts (Altschul et al. 1997; Huckell 1988, 1990; Roth 1992, 1996b; Vanderpot 1997; Whalen 1971). This is essentially a reversal of the primary settlement pattern seen in the Middle Archaic period. The Late Archaic settlements were located at strategic positions that provided ready access to the rich variety of valley and mountain resources (Roth 1992, 1996b:39). Between these two nodes in the settlement pattern are strings of smaller sites and isolated artifacts that appear to represent use of the resources occurring in the intervening landscape.

Recent investigation at a number of the lowland settlements along the Santa Cruz River in the Tucson Basin (Freeman 1998; Gregory 1997; Mabry and Archer 1997) has revealed the beginnings of village life. Evidence for communal behavior, including food production, food storage, and public architecture, and indications of social differentiation and social integration exist at these sites. Pit structures in the period 1500–800 B.C. tend to be small, oval structures with no obvious evidence of interior structural supports. Many of these structures have subfloor storage pits and informal hearths (Eddy and Cooley 1983:17; Ezzo and Deaver 1998; Huckell 1990, 1995; Huckell and Huckell 1984; Mabry 1990, 1998c; Sayles 1983; Sayles and Antevs 1941). Pit structures after 800 B.C. were larger, ranging from 3 m^2 to 45 m^2 and averaging about 8 m^2 (Mabry 1998c:219, 220). These structures were also more consistently circular to oval in shape, with interior postholes that suggest a more substantial superstructure than preceding structures (Mabry 1998c). Large subfloor storage pits and the absence of formal hearths were still characteristic (Mabry 1998c).

Large settlements, some with several hundred houses, have been found along Cienega Creek (Huckell 1990, 1995) and the Santa Cruz River near Tucson (Freeman 1998; Gregory 2001; Mabry and Archer 1997). The scale of these sites may not indicate the presence of a singularly large populace, but rather the accumulation of features and debris that resulted from the repeated occupancy by groups of a more modest size (Gregory 1999). Even if the result of repeated occupations, the sheer scale of these settlements, the architectural style, the diversity of activities indicated by the variety of features and artifacts, and the clearly planned arrangement of features relative to one another bespeak a level of village life not known from earlier periods.

At larger settlements along the middle Santa Cruz Valley, the differentiation in architectural forms, settlement organization, and material culture suggests an increasing degree of social complexity. At the Santa Cruz Bend site along the east bank of the Santa Cruz River in Tucson, a dichotomy between big houses and small houses has been found (Mabry 1997:2). The settlement comprised several house clusters, each characterized by the presence of a relatively large circular structure surrounded by several smaller circular structures. The large, central structure typically contained large storage pits. The size of these structures, their central location relative to the other houses, and the presence of storage pits suggest that these facilities served a unique role, perhaps as an integrative focal point of the social group. A similar "big house-small house" dichotomy was observed at Coffee Camp, where the "big house" contained many items suggestive of a special or ritual use (Halbirt et al. 1993:87–91). This "big house" phenomenon was once thought to be a diagnostic characteristic of the Early Formative period (e.g., Agua Caliente phase settlements in the Tucson Basin [Ciolek-Torrello

1995, 1998a:3], Early Pithouse period Mogollon settlements in the Mimbres area [Anyon et al. 1981], and the Viejo phase in Chihuahua, Mexico [Di Peso 1974]), but it is now clear that it is part of the Late Archaic culture after 800 B.C.

The Late Archaic material culture is surprisingly diverse. The bulk of the inventory is made up of utilitarian stone tools that reflect the processing of plant and animal subsistence resources. There are also objects made of animal bone, shell, stone, and ceramic, which are presumed to have been items of personal adornment or of ritual use. The most diverse inventories of material culture and the most elaborate artifacts have been found at settlements along the rivers and streams of southern Arizona. These items include cruciforms, stone nose plugs, phyllite wands, stone cloud-blower pipes, stone jewelry, ceramic figurines, ceramic beads, small ceramic containers, and shell jewelry (Halbirt et al. 1993; Heidke 1999; Howard 1987; Huckell 1993, 1995; Kisselberg 1989; Mabry 1998, 1999a; Roth 1989).

Mortuary practices of the Late Archaic period reveal the same recurring pattern across a broad region. A recent review of mortuary practices by Mabry (1998d:711) for the Late Archaic period identifies three kinds of burial practices: primary inhumation, secondary inhumation, and secondary cremation. Inhumation is clearly the dominant and most frequently performed mortuary practice (Mabry 1998d:712); however, cremation burials have also been documented in central Arizona (Haury 1986), southern Arizona (Dongoske 1993), and far to the east in the Guadalupe Mountains of New Mexico (Howard 1932:67–69).

During primary inhumation, the body of the deceased was typically placed in the grave in a flexed position (Huckell 1988:64, 1995; Mabry 1998d; Mabry and Archer 1997:190–198; Thiel and Mabry 1998; Sayles 1983), but occasionally the body was extended (Hayden 1967:339; Mabry 1998d:Table 16.2). When flexed, the body may have been placed on its side, back, or in an upright, seated position (Mabry 1998d:Table 16.2). Much less common than primary inhumations were secondary inhumation burials containing wholly or partially disarticulated remains (Hemmings et al. 1968:17; Huckell 1995:48–50; Mabry 1998d; Mabry and Archer 1997; Thiel and Mabry 1998). Mabry (1998d) lists five secondary inhumations. Of these, one is the remains of a disarticulated juvenile, another is the articulated bones of an adult hand, and the remaining three contain the remains of two to seven individuals.

Material items were often buried with the remains of the deceased. The most complete inventories of funerary accompaniments have been found at sheltered sites. The bulk of the materials associated with the graves were perishable materials, such as animal skins, animal-fur blankets, woven mats, fur robes, pouches, cradle boards, sandals, fiber cordage, fragments of cotton textiles, and baskets (Mabry 1998d:Table 16.2). Nonperishable materials found at sheltered sites and open-air sites include items such as projectile points, cloud-blower pipes, ochre (either as lumps or spread over the body), bone tools, stone pendants, shell pendants, shell beads, metates, and hand stones (Mabry 1998d:Table 16.2). Because many grave offerings were perishable, it is no surprise that few objects are found associated with the skeletal remains at open-air sites (Mabry and Archer 1997:190–198; Thiel and Mabry 1998). Secondary inhumations have all been found at open-air sites; nevertheless, shell pendants, polished bone, metates, and red ochre have been found in these graves (Mabry 1998d:Table 16.2), suggesting that the remains were accorded many of the same accoutrements as primary inhumations.

Secondary cremations attributed to the Late Archaic period are known from three locations in the Southwest: central Arizona, southern Arizona, and southeastern New Mexico (Dongoske 1993; Haury 1986; Howard 1932; Mabry 1998d). Cremations are seemingly more common than secondary inhumations, but this is due in large part to a single cemetery excavated at a site along Cienega Creek on the San Carlos Indian Reservation: it contained 47 cremations (Haury 1986:162; Mabry 1998d:Table 16.2). Mabry (1998d:727) attributes the practice of secondary cremation burial to a custom apparently centered in the Big Bend region of the middle Rio Grande River valley. In southern Arizona, two secondary cremations have been found along the lower Santa Cruz River valley at the Coffee Camp site (Dongoske 1993). Despite the distance between these three locations, there are similarities between the New Mexico cremations and those along Cienega Creek, which suggests a common burial ritual. The cremated bones of three of the New Mexico cremations and one of the Cienega Creek cremations were placed in coiled baskets or woven

bags before interment (Mabry 1998b:Table 16.2). The coiled basket at the Cienega Creek location had been preserved in a waterlogged deposit. Haury (1986:163) supposed that burying the ashes in a basket was a common practice for which direct evidence had been destroyed in all cases with this one exception. As he states, this seems a reasonable supposition, as it seems reasonable to speculate that the secondary cremations at Coffee Camp may have been treated similarly.

Even though the bodies were cremated, other material remains often were interred with the human remains. At Cienega Creek, projectile points, stone blades, an obsidian disk, stone tools, a cloud-blower pipe, a pestle, a stone tray, worked schist, concretions, bone tools, basketry, and red ochre were found (Haury 1986:Table 9.1). Some of these items had apparently passed through the crematory fire (Haury 1986:167–169). Haury (1986:167) conjectures that other perishable items may have been placed in the graves. This is consistent with the inventory of materials associated with the cremations from southeastern New Mexico and southwestern Texas (Mabry 1998d:737, Table 16.2). It seems that even though the body and some of the material items had been burned, cremated individuals were afforded many of the same accoutrements as individuals who were inhumed.

The discussion of mortuary practices and ritual behavior in southern Arizona would not be complete without mention of the burials of a juvenile bear and a domestic dog at the Santa Cruz Bend site (Mabry and Archer 1997:198). Both had been intentionally buried, though neither was afforded any nonperishable offerings. Despite the lack of offerings, the interments speak of a level of respect and ritual behavior attributed to animals as well as humans.

To summarize, the Late Archaic was a time of important cultural developments that set the stage for the later Formative period. The increased occurrence of sites attributable to this period probably reflects an increase in population across the Southwest. The increase in population was in some part fostered by the adoption of an agricultural subsistence technology prior to about 1500 B.C. Agriculture, however, was not adopted by all late Archaic groups. The commitment to agriculture may have been stronger in the low-lying desert river valleys, such as the Tucson Basin, than in upland localities with grassland and woodland environments. In these riverine settings, large settlements occurred along the Santa Cruz River, Cienega Creek, and the San Pedro River, seemingly in response to the success of farming and the possibility of using stored surplus to support larger populations. The arrangement of structures and other facilities at some of these sites suggests a growing commitment to village living, including recognizable manifestations of social differentiation and attempts at social integration; an attachment to "place" as evidenced by the repeated and enduring use of particular settlements with formal cemeteries; and elaborations of the material culture. The complex interplay among these trends resulted in a mosaic of local groups across the Southwest that were similar in as many ways as they were distinct. It is from this mosaic that the next step toward cultural differentiation was taken.

FORMATIVE PERIOD (A.D. 1–1450)

The Formative period in southern Arizona is differentiated from the Archaic by the addition of pottery to the material repertoire. Pottery in and of itself is not a singularly significant accomplishment—some form of ceramic technology had existed for a millennium or more—but rather, pottery marks the subtle threshold between transitory or semi-sedentary peoples and sedentary peoples (Deaver and Ciolek-Torrello 1995). The trends set in motion during the previous Late Archaic period continued into the Early Formative period (A.D. 1–700). Although the Early Formative was a continuance of earlier traditions, the cultural expressions were not simply Late Archaic adaptations with pottery. They were, in fact, uniquely different. This is the first period where unique markers of cultural identity appear among the populations inhabiting southern Arizona. For example, the Hohokam culture of the Gila River valley can be identified by distinctive pottery characteristics.

In the Early Formative period, the Hohokam culture does not yet hold the regionally influential position that it will later during the Middle Formative period (A.D. 700–1150). Interactions between the "pioneer" Hohokam populations on the Gila River with other populations across southern Arizona appear to have been interactions among equals. In the Middle Formative period, the way local populations interacted with one another and with the populations residing in the Hohokam

heartland to the north changed fundamentally. The Hohokam culture, as we now know it archaeologically, emanated from the portion of the middle Gila River between the confluence with the Salt River and the modern town of Florence. This emerging culture quickly rose to prominence and touched the lives of peoples living throughout most of southern Arizona. Just as the agricultural "revolution" found unique expressions in different localities as it spread across southern Arizona, so did the Hohokam "colonization." The Hohokam culture reorganized the preceding network of interaction and information sharing, and a definite center, or core, emerged. The center of this network is the Hohokam heartland on the Gila River. After ascension to prominence, the Hohokam culture reigned supreme for several centuries and then began to descend in prominence. The response to the Hohokam descension was a re-emergence of local, autonomous settlement systems.

In the succeeding Late Formative period (A.D. 1150–1450), there was another wave of cultural influence across southern Arizona. The source of this influence is not known, although it may be found in part in the abandonment of Chaco Canyon and the establishment of Paquimé (Casas Grandes) in northern Chihuahua. As in previous times, the cultural changes were integrated into existing local cultural traditions in many different ways, resulting in a seeming hodgepodge of local traditions, each as dissimilar from the others as they were similar.

The three-part division of the Formative period corresponds closely to Di Peso's (1956) outline of prehistory. Generally, the Early, Middle, and Late Formative periods used here are equivalent to Di Peso's Formative O'otam, Hohokam Intrusion, and O'otam Reassertion periods, respectively. The three Formative periods also generally correspond to the Hohokam cultural sequence (Gladwin et al. 1937; Haury 1978), but the fit is not as exact. The Early Formative period corresponds with the Pioneer period through the end of the Sweetwater phase. The Middle Formative period begins with the Snaketown phase of the Pioneer period and encompasses the Colonial and Sedentary periods. The Late Formative period corresponds with the Classic period. The slight mismatch in the two sequences is the result of looking at Hohokam prehistory from the so-called Hohokam peripheries: the Papaguería, the Tucson Basin, the upper Santa Cruz River valley, the lower Santa Cruz River valley, the Gila Bend region, the San Pedro River valley, the Safford Basin, southeastern Arizona, and the Tonto Basin.

The cultural expressions and trajectories of each of these southern peripheries are singularly unique, defined by the individual responses to local physiographic, environmental, cultural, and cosmological contexts. Still, the cultural traditions in this region are affected by far-reaching cultural, environmental, and cosmological phenomena. It is the response of these peripheral culture areas to these far-reaching phenomena that gives a similar structure to the local culture histories. An outline of this prehistory is presented below.

Early Formative Period (A.D. 1–700): The Late Archaic Legacy

Trends set in motion during the 1,500 years spanned by the Late Archaic period continued uninterrupted well into the first millennium A.D. Early Formative period peoples continued along the course toward reliance on agriculture, sedentary village life, and refinement in adaptive strategies that eventually led to the emergence of the regional cultural traditions that we recognize as Hohokam, Mogollon, and Trincheras (Deaver and Ciolek-Torrello 1995). One particular theme that characterized the Late Archaic was the development of regional and local cultural traditions that were as much similar as dissimilar. This situation developed on the one hand from increasing population, constriction of procurement areas, and development of territories, and on the other hand from the existence of a broad-scale interaction network that fostered the exchange of goods and the sharing of information and technologies. This theme continues through the Early Formative period.

There was a perpetual contradiction between conformity to wide-ranging cultural and technological trends and the uniquely localized expressions of those trends. What remained was a cultural landscape characterized by autonomous settlement systems occupying the river valleys and basins of southern Arizona. These autonomous settlement systems were interconnected by an interaction network that fostered the exchange of goods and information between groups. This is evidenced by the presence of exotic goods such as shell, and in the similarities in locally produced goods such as pottery. The movement of goods between groups

occurs at a relatively low level, and presently the evidence seems to suggest a uniform access to these goods. The presence of a singularly powerful and influential regional culture is lacking in the Early Formative. This phenomenon emerges in the Middle Formative.

Similarities in settlement locations, the practice of a mixed agriculture-and-foraging subsistence strategy, and flaked stone and ground stone industries revealed by previous and modern archaeological findings support the thesis of continuity between Late Archaic cultures and formative, pottery-making, sedentary, agricultural cultures across the southern Southwest (Bowen 1976; Cable and Doyel 1987; Ciolek-Torrello 1998a; Di Peso 1956, 1979; Doyel 1991, 1995; Elson and Lindeman 1994; Gilman 1995; Gilman et al. 1986; Haury 1957, 1986; Hayden 1970; Johnson 1960; McGuire and Villalpondo 1993; Roth 1996 [ed.]; Sayles 1945; Schroeder 1957; Wallace et al. 1995). The Early Formative period was not, however, simply the Late Archaic with pottery. The adoption of a pottery technology, an eventual elaboration in the forms and use of pottery, the construction of more formal and larger houses, and a shift from circular to rectangular floor plans and to more permanent and enduring settlements indicate a new configuration in economy and social organization (Ciolek-Torrello 1998a:254; Whittlesey and Ciolek-Torrello 1996:50).

The addition of pottery containers to the Early Formative material repertoire is one of the first new technological innovations to occur. Three pottery horizons are recognized for the Southwest during this period: the Plain Ware horizon (A.D. 1–400); the Red Ware horizon (A.D. 400–650); and the Broadline horizon (A.D. 650–700) (Deaver 1989a, 1989b, 1998; Deaver and Ciolek-Torrello 1995). These pottery horizons serve as chronological markers for the period. The earliest ceramic containers (A.D. 1–400) were made of brown-firing clay and were largely undecorated, although in some regions the surfaces of these vessels were decorated with incisions, punctuations, or other forms of non-paint decoration. The next horizon (A.D. 400–650) is marked by the technological innovation of coating one or both surfaces of a vessel with a red-firing slip. Eventually, simple, broad-line red designs were painted on what were essentially plain wares or red ware clay bodies (A.D. 650–700). By the end of this period, more sophisticated design traditions had emerged. The broad trends in pottery development from plain wares to red wares to broad-line-painted wares provide a convenient tool for monitoring cultural developments and recognizing differences among groups in various regions.

Technological changes in pottery were associated with an increase in the amount of pottery relative to other aspects of the material culture, in the diversity of vessel forms, and in the range of uses (Whittlesey 1998; Whittlesey and Ciolek-Torrello 1996). Using data from the Late Archaic sites of Clearwater (Diehl 1997), Coffee Camp (Halbirt et al. 1993), Santa Cruz Bend (Mabry 1998), Stone Pipe (Mabry 1998), and Wetlands (Freeman 1998), and the Formative period sites of El Arbolito (Huckell et al. 1987), Houghton Road (Whittlesey 1998), Stone Pipe (Mabry 1998), and Square Hearth (Mabry 1998), the shift to the importance of pottery containers becomes obvious. The Late Archaic sites have a composite frequency of about 101 ceramic artifacts for each 1,000 pieces of flaked stone. This count includes ceramics, beads, and small vessels, as well as pottery sherds that were intrusive into these deposits from overlying younger deposits. At the Early Formative sites, ceramics were recovered at a frequency of about 1,467 sherds for each 1,000 pieces of flaked stone. Without placing too much emphasis on the actual numbers, the trend is quite apparent: over the span of a very few centuries, pottery containers become an important component of the Early Formative period material culture.

It is difficult to differentiate the roles that population growth, agricultural dependence, and sedentism had on shaping the Early Formative period culture. The position taken here is simply that these three occurred in concert with one another. Monitoring trends in population growth between the Late Archaic and Early Formative period is difficult. Few Early Formative period sites have been excavated, and these sites are difficult to identify in regional reconnaissance. Additionally, increases in settlement permanence may mask population trends early in this period. Nevertheless, it is clear that population growth continued based on the increased number of settlements by the end of this period. With increasing population, the localized settlement systems that were conjectured for the Late Archaic period became more firmly established within territories as groups continued to refine adaptive strategies to the diverse qualities of the southwestern landscape. Roth (1996a:3) observes that "the variability in adaptations between

groups in different portions of the southern Southwest is more apparent than differences between Late Archaic and Early Ceramic period occupations within one region." The autonomous local settlement systems postulated for the Late Archaic appear now to have become established. Boundaries between local groups of the Early Formative period, as in the Late Archaic, probably were defined by physiographic features and the distribution of vital subsistence resources.

Despite the continued development of localized settlement systems and the differentiation between these local systems, movement of peoples and goods over relatively long distances was common. The river systems were the most likely corridors for travel, interaction, and information flow. The large-scale, low-level interaction network of the Late Archaic was still in place. This is seen in the sharing of similar cultural practices among widely dispersed groups, the continued long-distance exchange of marine shell (Howard 1987; Vokes 1998), and the discovery of exogenous pottery among the ceramic assemblages of local traditions. Whether this pottery was traded as a commodity itself or as a container for some other commodity (e.g., seeds), or whether the pottery indicates the long-distance movement of populations between regions is unknown. Even though the nature of the pottery exchange is unclear at present, the distances represented by these pots are impressive. For example, San Francisco Red from the Mogollon region around the Gila River headwaters has been found in the early Pioneer periods at the middle Gila River village of Snaketown (Haury 1976). Likewise, plain brown ware pottery technologically similar to traditions of the northern Mogollon region was recovered in the Early Formative deposits of the Dairy site and at the Houghton Road site, both in the Tucson Basin (Whittlesey 1998). These suggest movements and exchange on the order of several hundred kilometers.

Even though the scale of the exchange network is large, it appears to not be as strong as during the previous Late Archaic. Marine shell and obsidian are still found at Early Formative period sites, but in depleted numbers and with less diversity. This is seen in differences in the relative frequency of these two commodities at settlements dating to the end of the Late Archaic period (800 B.C.–A.D. 1) and the early portion of the Early Formative period (A.D. 1–400) in the middle Santa Cruz River valley. Comparisons of the relative quantity of shell and obsidian artifacts between Late Archaic and Early Formative period sites illustrate this shift in the volume of exchange. The Late Archaic period is represented by published data from the Clearwater site (Diehl 1997), Coffee Camp (Halbirt et al. 1993), Santa Cruz Bend (Mabry and Archer 1997), Stone Pipe (Swartz and Lindeman 1997; Wöcherl and Clark 1997), and Wetlands (Freeman 1998). The Early Formative period is represented by published and archival data from the sites of El Arbolito (Huckell et al. 1987), Houghton Road (Ciolek-Torrello 1998a), Stone Pipe, and Square Hearth.

To make these comparisons, the frequencies of marine shell and obsidian were standardized relative to the number of flaked stone artifacts. The composite frequencies for shell and obsidian at the Late Archaic sites are 76 and 2.4 per 1,000, respectively. At the Early Formative period sites, the frequencies for shell and obsidian are 17 and 0.4 per 1,000, respectively. These numbers indicate decreased availability and consumption of these items at Early Formative period sites. The decrease in the exchange of goods is also represented in the shell by sharp declines in the amount of nacreous shell, particularly the species from the Pacific Coast of southern California (Vokes 1998a, 1998b, 2005). This decrease in the access to trade goods may have resulted from the continued population growth and the regionalization of populations.

Pottery studies at Early Formative period sites in the middle Santa Cruz River valley provide evidence for considerable movement of commodities within settlement systems. Much of the pottery at the Early Formative villages of Square Hearth, Stone Pipe, El Arbolito, and Houghton Road was not made at these locations (Heidke 1998; Huckell 1987; Whittlesey 1998). Mineralogical studies suggest that most were made at other locations within the Tucson Basin, though some may have been made at locations outside the Tucson Basin (Huckell 1987). This has led to the suggestion that populations were either still highly mobile within the Tucson Basin, or that they were trading for pottery or for the commodities transported in the pottery. The fact that these early pots were probably first used for seed storage (Whittlesey 1998; Whittlesey and Ciolek-Torrello 1996) would serve to amplify either model. People may have transported seeds from remote farming settlements to villages or traded for seeds among kin and acquaintances.

Three possible factors are offered here for the decline in exotic commodities. First, the number of items moving over the regional exchange system may have been relatively constant, but as the number of consumers increased, the availability of these commodities would have decreased. Second, the number of items moving across the system may have declined, likewise reducing availability. Third, the character of the regional network may have started to undergo restructuring and realignments resulting from the increasing number of local, autonomous settlement systems. As more people and more population clusters appeared across the landscape, negotiations for exotic goods may have become more complicated as the goods had to pass through a greater number of hands. Each factor may have played some part, but changes in the structure of the regional exchange systems may have been the primary factor.

Over the course of the Early Formative period, regional cultural traditions became apparent, largely because they were associated with distinctive ceramic traditions (see Whittlesey 1998 for a discussion of these traditions). In the southern Southwest, the pioneer stages of the Hohokam culture are recognized based on that culture's distinctive preference for using crushed, micaceous rock as temper, which gives vessel surfaces a glittering, luminescent sheen (Haury 1937, 1976). This pottery is found in low frequencies at contemporary sites in the Tucson Basin (Deaver 1989b) and along the Salt River (Cable 1985:189), where it is quite distinct from the local traditions. A similarly distinctive tradition, the Trincheras, emerges in northern Sonora (Bowen 1976; Johnson 1960; McGuire and Villalpondo 1993). At the risk of provoking debate, the remainder of the southern Southwest is characterized by a brown ware tradition that can be characterized generally as representing various branches of the Mogollon tradition (Heckman et al. 2000; Huckell 1987; Whittlesey 1998). As distinctive as these pottery traditions may be, they also shared characteristics. What has yet to be resolved among these traditions is the degree to which regional variations in resources and adaptations affected the pottery (see Whittlesey 1998) and what characteristics reflect differences in the cultural identities of the makers. The emergence of these pottery traditions does not necessarily mean that new distinct regional cultures emerged. The ceramic characteristics that materially serve as markers for these traditions, perhaps as early as A.D. 400–700, probably follow patterns of social interaction that were already in place during the Late Archaic, but did not have as readily identifiable material identifiers.

Various groups practiced some combination of foraging, farming, and hunting. The relative mixture of these three strategies varies from one locality to another. It is perhaps in the unique combination of these three strategies that the effects of the physiographic environments on the cultural traditions are evident. Variation in the diet and subsistence economies probably reflects the mixture of resources in the environment. A consistent trend, however, was an increasing reliance on agricultural products and a decreasing emphasis on hunting, particularly of large game. Given the presence of irrigation canals and ditches in the Tucson Basin by about 1200 B.C. and in the lower Salt River at about A.D. 1 (Henderson 1989), it is clear that these Early Formative period groups were devoted to agriculture. However, in portions of southeastern Arizona, foraging may have persisted as the dominant adaptation, and agricultural dependency may not have occurred until much later (Gilman et al. 1996; Mauldin 1993).

Continuity between Late Archaic and Early Formative period milling implements is apparent (Adams 1998; Huckell 1998b). Oval manos, pestles, basin metates, and slab metates are the dominant utilitarian forms throughout the early part of the Early Formative period. New, however, was the rectangular mano and open-end trough metate milling complex. This complex did not entirely replace the earlier hand stone and basin metate milling complex, but by the end of this period, it had become the dominant technology. Traditionally, the change from a generalized grinding complex consisting of small oval hand stones and basin metates to a more definitive grinding complex consisting of rectangular manos and open-end trough metates had been taken as an indication of a greater reliance on corn agriculture. Adams (1998), however, questions the traditional notion that the rectangular mano and open-end trough metate is a milling complex dedicated to maize. She notes that small and large seeds can be ground on both types of milling complexes. She suggests that the rectangular mano and trough metate milling complex represented a response to a greater emphasis on flour production (Adams 1998). The

large surface area of the mano and metate, and the reciprocal grinding motion are more ergonomically efficient for producing large quantities of flour. Bruce Huckell (1998b:125) notes the potential for regional variation in ground stone implements by contrasting the absence of rectangular manos and open-end trough metates at Houghton Road with the presence of these forms at other early Mogollon and Hohokam sites.

The flaked stone implements from Early Formative period sites also exhibit continuity from the Late Archaic implements. Based on the analysis of the flaked stone industry at the Early Formative site of Houghton Road and a comparison with earlier and later flaked stone industries, Bruce Huckell (1998a:116, 117) concludes:

> It differs from the preceding Late Archaic period industry in no particularly significant ways, at least insofar as the formal, technological repertoire is concerned. It differs from the succeeding Hohokam industries only in that soft-hammer biface manufacture is still part of the technology... The relative contribution of the biface technology to the total Houghton Road site implement collection, however, is quite small and is consistent with the relative frequencies of arrow projectile points and point preforms in younger collections. In a very real way, the survival of the atlatl dart into the early centuries A.D. is the only reason why the Houghton Road site collection has any uniquely Archaic stage characteristics at all. The transition is completed when the bow replaces the atlatl, and large, heavy dart projectile points are superseded by smaller, lighter arrow points, which can be produced solely by pressure flaking. Flakes for such arrow points can be struck from small cores, thereby eliminating the need for soft-hammer biface manufacture.

Sliva (1998) also noted similar continuities and discontinuities between Late Archaic and Early Formative flaked stone industries in the flaked stone collections from the Late Archaic and Early Formative settlements in the middle Santa Cruz River valley. Although the gradual reduction of biface technology in the Early Formative period may generally characterize a trend that began in the Late Archaic period, Huckell (1998a:114) also notes that projectile points and bifaces were more numerous at contemporary sites in the Mogollon highlands. This implies a greater emphasis on hunting and other pursuits relying on a biface technology by the Mogollon peoples. This reiterates the theme that Early Formative period groups applied similar technologies in uniquely different combinations as a means to adapt to environmental variations.

Studies within local settlement systems have demonstrated a continuation of the dual settlement pattern seen in the Late Archaic. This pattern involved larger, semi-permanent farmsteads located in the river valleys and smaller, seasonal settlements with structures along the bajadas surrounding the valleys (Cable and Doyel 1987; Doyel 1991:237; Gilman 1995; Gilman et al. 1996; Huckell 1984a:260, 1987; Lightfoot 1984; Roth 1993; Whalen 1971).

Architectural forms diversify. Some of this diversity may correspond to function or to seasonality of use, but other differences result from a shift in the character of house construction. At settlements along the floodplains of rivers, there is an increase in the formality of houses: the house pits were frequently much deeper than preceding Late Archaic pit structures; floors were more often plastered; clay-lined hearths were more common; subfloor storage pits were not as common, and the total volume of subfloor storage pits decreased; and a new feature was added to the architecture—the construction of plastered pilasters on either side of the doorway into the house (Anyon et al. 1981; Ciolek-Torrello 1995, 1998b; Gilman 1988; Gilman et al. 1996:74; Mabry 1998c). Rectangular floor plans appear early in this period in conjunction with circular floor plans more reminiscent of Late Archaic houses (Bernard-Shaw 1989b; Ciolek-Torrello 1995, 1998a; Haury 1936b; Mabry 1998c). By the end of this period, rectangular floor plans become the dominant form. Contrasting with the formality of the houses at the permanent sites, houses at seasonal or temporary settlements resemble more the small informal houses that characterized the Late Archaic period (Cable and Doyel 1987; Ciolek-Torrello 1998b; Doyel 1991:241; Henderson 1989).

Another key architectural trait suggests continuity in the social structure and organization of these settlements. The big house-small house dichotomy continued into the Early Formative (Anyon et al. 1981; Ciolek-Torrello 1995, 1998b; Mabry 1998c). Evidence has not yet been compiled

to determine if the settlement plan consisting of a concentric arrangement of small houses surrounding a larger house revealed at the Late Archaic site of Santa Cruz Bend (Mabry 1997) continued into the Early Formative period in all regions, but the pattern was found at the Early Formative period Convento site in Chihuahua (Di Peso 1974). At the Houghton Road site in the Tucson Basin, there was a suggestion of a concentric ring of small houses surrounding a large house, but the excavation area was limited by a road right-of-way (Ciolek-Torrello 1995). Contemporaneous sites in the Mogollon region were generally characterized as having a haphazard arrangement of houses (see Ciolek-Torrello 1998b for a review of Early Formative period settlement arrangements).

The Late Archaic traditions in mortuary customs continued into the Early Formative. Flexed and semi-flexed inhumation continued to be the predominant burial custom, and cremation occurred as a less frequent custom (Ciolek-Torrello 1998b: 248, 249; Mabry 1998d:Table 16.3). Cremation practices included secondary, pit cremation (Wöcherl and Clark 1997:269–271) and primary cremation (Ciolek-Torrello 1998b; Henderson and Morgan 1989:68, 69; Wöcherl and Clark 1997:271–274).

The Early Formative period has been portrayed here as a time during which the trends that began in the Late Archaic period continued essentially uninterrupted by outside influence. In the early part of this period, a broad cultural horizon is recognizable, one that Di Peso (1956, 1979) labeled the *O'otam* and Woodson and others (Woodson et al. 1999:67) have recently termed the *Southern Mogollon*. Whatever the label, the evidence is clear that people occupying settlement clusters along the basins and river valleys shared similar technologies and cultural practices. Regional interaction was still at a scale that allowed for the rapid spread of new technologies and information, but the diversity of the landscape seems to have helped shape a variety of adaptive solutions. These differing adaptive solutions eventually led to the emergence of distinctive cultural traditions. Population probably continued to grow, settlements became more permanent, and reliance on agriculture increased. All of these trends led to the continued development of economically independent and politically autonomous groups who established dominion over territories focused on the river valleys and basins. Whereas the movement of goods or people within local settlement systems may still have been common, interactions on a regional scale seem to have decreased. This is seen in the reduced quantities of marine shell, particularly the reduction in the quantity of nacreous shell from the Pacific coast of southern California, and in the quantities of obsidian found at Early Formative period sites as opposed to Late Archaic period sites. By the end of the period, we see the emergence of regional cultural traditions that we recognize as the Hohokam, Mogollon, and Trincheras.

The Hohokam culture often takes center stage in discussions of prehistory of southern Arizona. Taking for a moment a Hohokam-centric view of prehistory, it would seem that most of southern Arizona followed fairly similar developmental trajectories. In the middle Gila River valley, however, there began to emerge a unique group of people recognizable as the Pioneer period Hohokam. During most of the Early Formative period, this group seems to have been no more influential than any other contemporary group in the Tucson Basin or other localities. But this balance rapidly shifted, and the Early Formative period ends with the ascension of the Hohokam as a prominent and influential cultural tradition. This story is more appropriately told in the Middle Formative period.

Middle Formative Period (A.D. 700–1150): Hohokam Ascension and Descension

The trend toward agriculturally dependent, sedentary societies was essentially complete across most of southern Arizona by the Middle Formative period. Settlements were located in two general zones: along rivers and along mountain fronts. Agricultural products were clearly the mainstay of the subsistence economy, principally the triumvirate of maize, beans, and squash. Foraging of native foods and hunting of small and large mammals remained an important aspect of the subsistence regime. Despite the similarity in the general pattern, local and regional variations still existed. The repertoire of food-producing and food-gathering techniques was sufficiently diverse and the level of social organization sufficiently well developed to allow groups to adapt to a variety of environments and to cope with the inevitable.

The defining theme of the Middle Formative period is the rise and fall of the Hohokam as a regionally influential force that altered the flow of prehistory over much of southern Arizona.

Sometime during the Early Formative period, along the middle Gila River between the confluence with the Salt River and the modern town of Florence, there was a group of people whose descendants would come to exert influence over much of southern Arizona. These were the "pioneering" stages of the Hohokam. To some extent, lesser or greater, the Hohokam culture touched the lives of peoples across most of the Greater Southwest, including portions of northern Mexico. The Middle Formative period corresponds generally to Di Peso's (1956, 1979) Hohokam Intrusion period for southern Arizona and to the late Pioneer, Colonial, and Sedentary periods of the Hohokam chronology (Gladwin et al. 1937; Haury 1976). This period can be divided into two parts. These two parts do not necessarily correlate with the archaeological phases defined for the local cultural sequences.

The first part of the Middle Formative period is characterized by the emergence and spread of the Hohokam as a regionally influential cultural tradition. The initial spread of this tradition occurred during the Snaketown phase of the Hohokam cultural sequence between A.D. 700 and 800. The initial expansion of the Hohokam influence was marked by the widespread trade of a red-on-buff pottery decorated in a distinctive hachured style. This initial expansion was soon followed by the spread of the Colonial period Hohokam cultural pattern, whose most notable characteristics include a ball court ceremonialism, a cremation death ritual, and an iconography emphasizing the representation of animal and human forms. Between A.D. 800 and 950, the Hohokam culture ranked supreme over most of southern Arizona. This is the Colonial period of the Hohokam cultural chronology (Haury 1976). During this 150-year period, many of the low-lying river valleys along the Gila River and its tributaries witnessed the "colonization" and growth of Hohokam settlements.

The second part of the Middle Formative period is characterized by the inevitable decline of Hohokam influence and interaction across southern Arizona. Di Peso (1956, 1979) placed the Hohokam descension at the beginning of the Hohokam Classic period, which is currently dated to A.D. 1150. The descension of Hohokam authority, however, began earlier and was not necessarily coeval across the entire region. The descension was relatively short-lived and was followed by the re-emergence of local autonomous settlement systems. This final part of the Middle Formative period during the interval A.D. 950–1150, a time interval equivalent to the Hohokam Sedentary period, was marked by changes in material culture, architecture, and settlement patterns.

Hohokam is an agrarian culture defined by a unique set of cultural characteristics. This culture occupied the Lower Sonoran Desert and grew corn, beans, squash, and cotton. The people practiced a variety of agricultural techniques, but are most famous for the extensive irrigation systems along the middle Gila River and the lower Salt River of the Phoenix Basin. They made a distinctive red-on-buff pottery and a plain ware with a distinctive micaceous sheen. They lived in brush-and-earth structures constructed in shallow pits, usually arranged in courtyards. They practiced a cremation death ritual that often included the burning and breaking of funerary offerings. They were artisans who manufactured shell jewelry, turquoise mosaics, slate palettes, pyrite mirrors, clay figurines, and distinctive serrated points. They are also well known for their naturalistic depictions of animals and people in a variety of media, including pottery, shell, and stone. They practiced ceremonies that involved the use of structures referred to as ball courts and elevated mounds. Many characteristics of the Colonial period seem to have occurred without earlier precedents, leading to the inference that an infusion of new traits and characteristics took place at the beginning of this period.

The spread of the Hohokam culture across central and southern Arizona is clearly one of the more phenomenal cultural events in prehistory. Archaeologists continue to postulate and debate the mechanisms responsible for this spread and the nature of the interaction. Evidence currently available reveals that although Hohokam cultural traits occur across a large region, there is no singular set of traits that appears consistently in all areas. Haury (1978) explains the variation as the result of divergence over time from a common origin. He postulated that the Hohokam migrated outward from the Gila River heartland and colonized the fertile valleys of the Gila and Salt tributaries. Once established in these outlying areas, the local cultures began to diverge from one another. At the time this explanation was offered, there was no strong archaeological evidence that these areas were occupied prior to the establishment of the Hohokam settlements. Archaeological evidence is

now available to indicate that these locations had already been settled by foraging-and-farming peoples for more than a millennium. This new knowledge leads to a different formulation for explaining variations in Hohokam cultural expressions across southern Arizona.

The Hohokam culture area covers most of southern and central Arizona. Conventionally, this area of influence is perceived as a cultural core with peripheries. The core area is the only place with the complete complement of Hohokam cultural traits. The explanation has been offered that the Hohokam culture was composed of a network of interconnected and interrelated settlement systems. The current archaeological evidence indicates that the various settlement systems that comprise the Hohokam regional system had developed in place over a millennium or more prior to the emergence of a distinctive Hohokam culture. Whittlesey (1998) reviewed the concept of the Hohokam as a cultural core in the Phoenix Basin surrounded by peripheral regions. After careful consideration of the model, she concluded that it is necessary to "unpack" the Hohokam culture and examine its geographic, religious, economic, and social bases. Quite persuasively, Whittlesey emphasized the structure of the landscape on the character of the interaction among populations in southern Arizona and suggested that these interactions were along river valleys and within drainage basins. She stated,

> The organizational distinctiveness of riverine systems... suggests that each functioned separately, and that no overarching political organization existed. Each basin or drainage system thus appears to define an independent settlement system (Whittlesey 1998).

Expanding on this, variations between these local systems probably had an effect on the structure of these interactions, in some instances facilitating interaction and in other instances inhibiting interaction. Whittlesey's argument accords well with the archaeological record of southern Arizona. Over the past decade or more, most researchers have attempted to understand the prehistory of southern Arizona in terms of the Hohokam culture as an overarching cultural system. It now appears that studies would fare better by researching the ways in which local settlement systems interacted with one another and expressed their own cultural identity in addition to expressing an affinity with the Hohokam. The culture of each local group was no doubt shaped by traditions handed down through preceding generations, but also by interactions with other peoples living in neighboring regions.

The nature of these interactions probably was complex and possibly unstable. Associations and alliances may have formed among various groups that resulted in particular configurations of cultural practices and material culture. The emergence of the Hohokam as a regional force may have been the result of restructuring and realigning the associations and alliances into a single integrated system. The Hohokam descension in southern Arizona may have been the result of the inherent instability of this structure. This discussion will return to the issue of the spread of the Hohokam culture after considering the origins of the culture.

The origin of Hohokam society has been debated for many years, waxing and waning between two viewpoints. On the one hand is the view that the Hohokam were a technologically advanced group of people who migrated into central Arizona from a northern Mexico homeland. Although this view has been shared by many authorities (e.g., Di Peso 1956:259–264, 562–564; Gladwin 1948:232, 1957:81–94; Haury 1976, 1978; Hayden 1970; Schroeder 1960, 1975:302), the formulations of their models are quite different. On the other hand is the view that the Hohokam developed from the Late Archaic Cochise culture in southern Arizona infused with a host of cultural factors flowing from Mesoamerica (Haury 1943, 1957:185–188, 1975). With the publication of *Hohokam Desert Farmers and Craftsmen* (Haury 1976), Haury marshaled the opinion that the Hohokam were a group of Mesoamerican peoples who had migrated to the Gila River sometime in the early centuries A.D. and then spread outward from this heartland into the adjoining river valleys (Doyel 1977a; Haury 1976, 1978).

Archaeological research over the past score of years has largely swung the consensus back to the point of view that the Hohokam developed from an in situ late Archaic culture (Cable and Doyel 1987; Deaver and Ciolek-Torrello 1995; Doyel 1991; Feinman 1991; Wallace et al. 1995). Neither of these models alone seems to satisfactorily explain the physical evidence. The migration model may explain the constellation of traits that appears apparently rapidly at the beginning of the Colonial period, but does not explain the long, continuous cultural

record from the Late Archaic to the Early Formative period. Similarly, the indigenous-origins model explains well the Late Archaic and Early Formative continuities, but does not explain the rapid appearance of the constellation of traits at the beginning of the Colonial period.

Adding to the difficulty in understanding Hohokam origins and the mechanisms that fostered the spread of the Hohokam cultural pattern and the integration of autonomous settlement systems into a single overarching cultural pattern is the tendency to look at Hohokam origins as a uniform process. Researchers have looked for clues to Hohokam origins in the Gila River valley (Gladwin et al. 1937; Haury 1976), the Salt River valley (Cable and Doyel 1991; Henderson 1989), and the Tucson Basin (Wallace et al. 1995, 2003), all with the notion of finding a single explanatory model. Whether or not the Hohokam culture developed in place from the Late Archaic in the Gila River valley, it is clear in other areas of southern Arizona that the Hohokam cultural pattern and the objects signifying Hohokam identity emanate from the Gila River valley. Hohokam culture is, therefore, clearly intrusive to the so-called peripheral areas of southern Arizona. The culture history of these peripheral areas appears to flow unimpeded from the Late Archaic through the Early Formative periods, only to be abruptly truncated and altered at the beginning of the Middle Formative period. The evidence for Hohokam origins is to be found in the Gila River. The primary research theme of the so-called peripheral areas is to study and explain the mechanism responsible for the spread of the Hohokam cultural pattern.

The spread of the Hohokam culture across southern Arizona probably involved a recipe of population movement as well as diffusion of cultural traits. Haury (1976, 1978) postulated the spread of the Hohokam as a migration of people from the Gila and Salt River valleys into the outlying areas. An alternative and more dynamic scenario is offered here, based on the assumptions that at the time the Hohokam culture emerged, the basins and river valleys of southern Arizona were already occupied. At a critical juncture in time, something happened in the Gila and Salt valleys that changed the balance of the cultural dynamics of southern Arizona. It is postulated here that that "something" was the development of large-scale irrigation agriculture—the second agricultural revolution in southern Arizona.

The first agricultural revolution was the adoption of agriculture across the Southwest. By 1200 B.C., early farmers were irrigating in the Tucson Basin and probably elsewhere. These early irrigation systems were probably rudimentary and best suited to rivers and streams with lesser flows than the Salt and Gila rivers. The second agricultural revolution was the adaptation of irrigation agriculture to the large rivers of the Gila and Salt. This technological innovation was probably the necessary impetus for the development of a large sedentary population in the Phoenix Basin (Doyel 1995:647). The earliest evidence for irrigation of the floodplains of these rivers is around A.D. 1 (Henderson 1989).

Fertile soils, blessed with the waters from the Gila and Salt rivers, grew into bountiful oases. As word of the bounty spread across the Southwest, it inspired hosts of migrations of people in search of a better way. The people may have come from the Santa Cruz Flats, the Verde River, the Mogollon Highlands, the upper Gila River, the Tucson Basin, and the lower San Pedro—to name only a few regions. Movements of people at the scale required for this explanation find precedence in the Late Archaic period. Many of the first so-called immigrants may have considered these rivers part of their territories. It is likely that some of these migrants came from the south, perhaps well to the south. This coalescing of people into one locality and the continual expansion of the irrigation systems may have, of itself, been enough to give rise to the level of Hohokam culture that we see through the Colonial, Sedentary, and Classic periods. It is of some note that the collapse of the Hohokam cultural system in the fourteenth century has been attributed, in part, to a series of drought and flood conditions that may have destroyed the canal heads beyond repair and re-engineering.

What occurred during the Late Pioneer period was not the adoption or adaptation of irrigation technology, but rather the elaboration and intensification of this technology. The emphasis on large-scale irrigation technology sparked the rise of the Hohokam influence. With continued immigration, population influx would have required expansion of existing canal systems or construction of new systems to expand farmlands. This influx also would have supplied the labor necessary for these tasks. In addition, it is possible that a symbiotic economic relationship emerged between the Gila River

population and populations in outlying areas. Agricultural opportunities existed in the Salt and Gila valleys, but local labor to expand and maintain the canal networks may have been in short supply. In contrast, opportunities for large-scale irrigation in the outlying areas were few, but potential labor was reasonably abundant. In exchange for their work, laborers could have earned a share of the harvest, in a manner similar to practices documented ethnographically for the O'odham (Castetter and Bell 1942). The initial outflowing of goods in the eighth century A.D. may have been the result not of population expansion or expanded exchange of Hohokam goods into outlying areas, but rather the result of migrant workers or immigrants returning periodically to their homes with trinkets, newly acquired skills, and intriguing information about the customs practiced in the middle Gila River basin. Peoples who had moved to the Gila River to enjoy the agricultural bounty could have served as emissaries of Hohokam culture when they themselves returned to their homelands. Thus introduced, aspects of Hohokam culture were selectively incorporated and reinterpreted by indigenous populations to create distinctive local cultural traditions. A scenario such as this could account for the selective dissemination of Hohokam traditions and material culture to areas outside the Hohokam heartland, an observation made by numerous researchers (Wilcox 1979; Wilcox and Shenk 1977; Wilcox and Sternberg 1983; Wilcox et al. 1981).

Part of the Hohokam ascension in southern Arizona may have been economic. The development of large-scale irrigation systems may have had a direct impact on the amount of subsistence crops that were grown. It may also have provided ample opportunity for the cropping of cotton. The long, warm growing season, abundant water, fertile soils, and physiographic opportunities for large-scale irrigation in the Gila-Salt Basin were ideal for the cultivation of this valuable crop. Cotton requires a longer growing season and more water than corn and other subsistence crops (about 200 frost-free growing days [Teague 1998]). Further, cotton is more tolerant of moderately saline soils than any of the traditional Southwestern cultigen triad, corn, beans, and squash (Ayers and Wescot 1989:31–35, Tables 4 and 5). Locations that could support cotton production, then, would have been extremely desirable and economically profitable. Cotton was documented at the site of Snaketown first during the Sweetwater phase (ca. A.D. 600–700), but by the Colonial period (ca. A.D. 800–950), cotton occurs in almost all archaeobotanical assemblages from sites along the Gila, Salt, and Verde rivers. High ubiquity values for cotton suggest that this fiber plant was being grown in great volumes for textile production and exchange (Adams 1997). Given archaeological evidence for its presence in Mexico as well as on the Colorado Plateau (Teague 1998), it is quite likely that cotton was one of the desert Southwest's major export commodities.

The spread of the Hohokam cultural pattern at the beginning of the Colonial period suggests the development of an interaction network of unprecedented scale. Such a network was likely superimposed over avenues of interaction that had existed since the Late Archaic. One of the impressive changes in the network of interaction is the manner in which goods were moved. Prior to the emergence of the Hohokam culture, the exchange of exotic goods was relatively low in volume. With the rise of the Hohokam to prominence, goods were exchanged and transported across southern Arizona at an unprecedented scale. This network was of sufficient vigor that relatively large quantities of Gila River red-on-buff pottery, among other goods, reached populations as far away as Paloparado (Di Peso 1956), some 180 km to the south.

Economic specialization occurred in commodities other than cotton during the early portion of the Middle Formative period (A.D. 700–950). Although various items were manufactured and exchanged at most residential sites, certain settlements apparently specialized in the production of particular goods. Of primary importance among these is the production and exchange of red-on-buff pottery. Both casual and careful studies of this ware suggest that the majority of red-on-buff pottery was manufactured in a relatively restricted area of the middle Gila River valley and exported across southern Arizona. The volume of pottery exchanged is impressive. At sites in the northern Tucson Basin, red-on-buff pottery from the Gila River accounts for 60 percent of the decorated pottery, which was about 15 percent of the total amount of pottery. Shell jewelry manufacture has been documented at sites in the Altar valley of Sonora (McGuire and Villalpondo 1993) and in the lower Santa Cruz River valley of Arizona (Marmaduke and Martynec 1993). Turquoise jewelry manufacture has been documented at sites in the Tucson Basin (Bernard-Shaw

1989b). Although these sites in southern Arizona exhibit intensified evidence for manufacture, the question arises as to what market they were serving.

In the later portion of the Middle Formative period, the supreme influence of the Hohokam cultural system on populations in southern Arizona diminished. This can be documented in the material culture, architecture, and settlement patterns. For example, the importation of red-on-buff painted pottery from the Gila River to outlying areas slowed dramatically around A.D. 950 (Wallace 1988; Wilcox 1987). In its place, a number of local ceramic series evolved that imperfectly emulated Hohokam Sedentary-style decorations, but were clearly produced from local clays with a non-Hohokam technology (Deaver 1984, 1989b; Greenleaf 1975; Kelly 1978; Wallace 1986). Across southern Arizona, ball courts were largely abandoned as integrative features of the community by about A.D. 1000, and widespread shifts in settlement location and configuration occurred (Doelle et al. 1987; Ferg et al. 1984). In short, the changes of the post-A.D. 950 period are sufficiently dramatic to suggest that populations of southern Arizona again functioned as independent political and economic systems sometime after the middle of the tenth century A.D.

Aware of these changes, Di Peso (1956) proposed a period where the ancestrally indigenous peoples of southern Arizona reasserted their independence and returned to their own cultural traditions. Rather than interpreting these events as the result of a rebellion that restored the ancient order, an alternative explanation is that in the absence of a vigorous economic exchange system, populations of southern Arizona reverted to an interaction network that had existed since Late Archaic times. While it is true that certain Hohokam customs persisted after A.D. 950 (e.g., the practice of cremation), rather than viewing these practices as continued Hohokam influence, it may be that the practices had become so integrated in the local customs that there simply was no other way. Life in southern Arizona after A.D. 950 was not the same as it had been before A.D. 700. The Hohokam presence had irrevocably altered the indigenous cultural traditions.

Late Formative (A.D. 1150–1450): A New Direction of Change

After the decline of Hohokam influence across southern Arizona, another series of sweeping regional changes occurred. In southern and central Arizona, these changes signaled the advent of the Late Formative—a time of distinctive forms of architecture and settlements, styles of painted pottery, and patterns of interaction. Influence was no longer peddled from the Hohokam core area, but rather, influence now flowed from northeast to southwest. This was a time of migration, with peoples from the Kayenta region of the Colorado Plateau moving southward into east-central Arizona (Woodson 1999, 2006). It was also a time when Paquimé (Casas Grandes) in Chihuahua, Mexico, emerged as a center of regional influence (Di Peso 1974). Other local centers developed, too, probably as part of a natural reorganization of people in response to the vacuum left by the Gila River Hohokam. The local systems flourished at the expense of regional systems, and within localities, districts were abandoned and new communities and community centers came into being. Influential local systems existed in northern Mexico, in the middle and lower San Pedro River valley, in the Papaguería, and in the Tucson Basin. That new sociopolitical and economic relationships developed is inferred from the patterns of indigenous and exotic ceramics in archaeological assemblages. In the Tucson Basin, for example, Tanque Verde Red-on-brown was produced with a vigor not reflected by its Gila Basin counterpart, Casa Grande Red-on-buff. Similarly, to the east in the Safford region, San Carlos Red-on-brown (a stylistic homologue of Tanque Verde Red-on-brown) was also produced with a vigor unmatched in the Gila Basin. In addition, the influx of pottery from the San Pedro River valley, the Tonto Basin, and the Cibola region (Wallace and Holmlund 1984:176, 177) suggests that a more sustained interaction with peoples to the southeast and northeast took place. Eventually, a new style of pottery, the so-called Salado polychromes, appears in east-central Arizona and eventually spreads over most of central and southeastern Arizona.

The beginning of the Late Formative period is signaled by the appearance and rapid spread of a new architectural style consisting of aboveground, rectangular rooms formed by one of several construction methods. Among other techniques, walls were built with adobe "turtlebacks" (i.e., puddled adobe masses), adobe reinforced by wooden posts or cobbles, or dry-laid masonry. Initially, aboveground rooms coexisted with old-style brush-

and earth-walled pit structures characteristic of the Middle Formative period. But by A.D. 1200, aboveground architecture was the dominant form of dwelling and storage space. Geographic variations in construction techniques suggest that architectural styles were developing at a local level.

In conjunction with architectural style, changes in settlement structure occurred. In particular, the concept of enclosing space with walls to create private compounds emerges. One or more structures were surrounded by enclosing walls that were constructed in a manner similar to the houses. The effects were to partition space and formalize the relationships between compounds and other important features within the larger settlement, such as cemeteries, middens, and public buildings. Such structure existed in earlier times, but was less overtly defined. Some researchers have suggested that the practice of formally delimiting space is a likely response to aggregation of formerly dispersed populations into fewer but larger settlements—a phenomenon that appears to have occurred in numerous locales across the Southwest. Wilcox (1987) has suggested that the aggregation was a response to threats of violence and attack.

Near the end of the Late Formative period, sometime after A.D. 1300, a strong network of regional exchange re-emerges. This network is evidenced in the widespread occurrence of Gila Polychrome and obsidian, among other goods. Goods were again traveling over long distances and in large quantities. For much of central, eastern, and southern Arizona, a new cultural pattern emerged. This pattern, like that of the preceding Hohokam, was manifested differently across the region. This suggests that once again the culture emerged through a realignment of alliances among autonomous settlement systems. This new cultural tradition was the Salado culture, which is almost universally considered to be the most poorly understood culture. The Salado culture is discussed here as an example of the trends that characterize the Late Formative period.

To understand the "Salado culture" in terms of its influence across southern Arizona, it is first useful to consider the evolution of the concept as formulated by archaeologists. The Salado culture was an attempt to explain the source of puebloan cultural characteristics at late prehistoric sites in the Hohokam culture area. Based on the current state of knowledge, the Tonto Basin seems the likely source for these cultural changes. The Salado culture was identified by a unique polychrome pottery that had a dark, red-slipped exterior with black-on-white designs on the interior. Three chronologically sequential types are recognized: Pinto, Gila Polychromes, and Tonto. Technically, these three polychromes are part of the Roosevelt Red ware tradition, but they are often referred to collectively as the *Salado polychromes*. Although this affectation is technically incorrect, it more aptly connotes the cultural expression that is identified by the occurrence of this pottery. This expression will be used accordingly in this text.

Reid and Whittlesey (1997) summarize the archaeological history behind the definition of the Salado culture. In the 1920s, archaeologists such as Harold Gladwin and Erich Schmidt made some of the first attempts at a coherent definition and explanation of Salado. A common approach to explaining archaeological change during that time was to rely on the idea of *migration*, when one population group moves physically into a given area and brings all its cultural traits with it, often superimposing them upon any groups already living there. Gladwin, for example, in taking this interpretive approach, concluded that the presence of polychrome ceramics at Casa Grande near present-day Coolidge indicated the presence of invading peoples moving into this previously Hohokam-dominated site (Reid and Whittlesey 1997:235). It was held that the Salado were pueblo-dwelling people from the north who expanded into the Tonto Basin, and whose lifeways and worldviews were imposed upon or adopted by the Hohokam people already living there. Florence Hawley (as well as Gladwin) hypothesized that this migration originated from two areas, the upper Gila region and, later, from the Little Colorado area. Finally, Emil Haury presented a somewhat modified version of the migration model, concluding that the Salado peoples did not "invade" the Hohokam so much as coexist in the same geographical region (Reid and Whittlesey 1997:238, 239).

In the intervening years, it has been recognized that migration models are often overly simplistic or unnecessary; however, theories underlying the Salado concept initially were influenced by this paradigm. As time progressed, archaeologists began reconsidering the "migrating puebloan people" model. Rather than the Salado culture being "brought in" from the Colorado Plateau, it was

proposed that it had instead developed in place among the local Hohokam populations of the lower Salt River and Tonto Basin. The mechanism for this change could have had, at least in part, to do with changing sociopolitical realities among the Hohokam, namely, a trend toward more centralized polities—or "chiefdoms"—and away from relatively more egalitarian groups or segmented social groupings. Both concepts derive from the standard model of social "evolution" found in cultural anthropology, with which archaeology was attempting to ally itself, particularly in the 1960s and 1970s. This scheme would explain, for example, the presence of platform mounds and the absence of ball courts. By the 1980s, this perception of the Salado culture was widely accepted, and Salado was not seen as a unique cultural tradition, but rather one of the many regional offshoots of the Classic period Hohokam.

However, a minority of scholars argued against the in-place development of the Salado culture from the Hohokam populations that had colonized the Tonto Basin in the Middle Formative period. Some felt that a model of increased social complexity as a mechanism for such a change was unviable. Furthermore, these archaeologists made several other observations. First, the appearance of the Salado culture was too "sudden"; that is, it appeared too abruptly in the archaeological record with little or no indication of intervening stages of development. Second, although Hohokam populations had certainly been present in the Tonto Basin, Mogollon sites were present as well. More recent speculation on the Salado has led to a reconsideration of the migration model (Clark 1995, 2001; Elson et al. 2000:175; Rice 1998; Stark et al. 1995; Whittlesey and Ciolek-Torrello 1992; Woodson 1999, 2006).

The Salado culture manifests an identifiable identity during the Roosevelt phase (ca. A.D. 1250–1350) in the Tonto Basin. Large, permanent villages of aboveground, coursed masonry architecture begin to be built, a somewhat radical break from the semi-sedentary dry farming/hunting-and-gathering lifeway that had begun during the Sedentary, at least in the upper areas of the Tonto Basin. Also, it was during this time that platform mounds appear with no prototypes, constructed over a brief period beginning in about A.D. 1280 (Wood 2000:113), and puebloan people move into the area (Reid and Whittlesey 1997:247–253). It is at this point that the "migration factor" can be reintroduced into the archaeological model of Salado development. As discussed above, people in the Tonto Basin had previously established ties with people living above the Mogollon Rim, as evidenced by the influx of Cibola White Ware ceramics. The Roosevelt phase, however, appears to have involved a migration (as opposed to mere interaction) of puebloan people from the Colorado Plateau, which was undergoing a process of abandonment due to a serious, widespread drought that began ca. A.D. 1275. This influx is reflected in the embellishment of some existing residential compounds with distinctive puebloan-style architecture and an expansion to full village settlement. The basic village structure that developed consisted of several residential compounds loosely focused on a platform mound with a compound wall surrounding it (Reid and Whittlesey 1997:251, 252). It is thought that this arrangement is reflective of a change in polity that became necessary as a result of the population increase and the attendant interaction between culturally diverse groups, especially where arable land was at a premium. Regardless of the ties that may have been established through trade and possibly kinship with puebloan people, the demographic shift resulting from the drought of the late thirteenth century brought both economic and social stress, and probably conflict, to the Tonto Basin. The platform mounds may have served as consolidating points for the cosmopolitan human presence in the villages through the rituals that were associated with them (Elson et al. 2000:182–185) and the cooperative (and presumably administrative) efforts to build and maintain them. It is also evident that other aspects of the spiritual life of the people began to undergo change: in addition to the ritual orientation toward the platform mounds, mortuary practices increasingly took on the form of extended inhumations rather than the secondary cremations customary among the Hohokam. Additionally, despite an increasing occurrence of architecture executed in the pueblo style, both kivas and great kivas are conspicuously absent from the villages, which implies that the Katsina cult was not brought to the Tonto Basin by the puebloan immigrants (Reid and Whittlesey 1997:256, 257). Reasons for this omission are unclear, but it may be reasonable to speculate that it relates to the drought experienced on the Colorado Plateau and the Katsinas' connection to the phenomenon of rainfall.

It was also at this time that the hallmark polychrome ceramics of the Salado began to be

manufactured. The Salado polychromes are essentially Roosevelt Red Wares executed in the Pinedale style, an approach to ceramic design and motif execution that originated with artisans on the Colorado Plateau, and which also appears on Cibola White Wares (Zedeño 1994:89), which Roosevelt (and White Mountain) Red Wares replaced (Reid et al. 1992:212). Some scholars have postulated that the Pinedale style in general and the iconography of the Salado design styles in particular (such as the mask and parrot designs found on Gila Polychrome) are indicative of a "regional cult" that was widespread throughout the Southwest and that developed in response to the environmental and social changes being experienced during the Classic period (Simon and Jacobs 2000:199, 200). In terms of social function, a regional cult can be interpreted as a medium that allows dissimilar social groups to participate in a common realm, thus lessening social discord and stress. Ceramic vessels reflect their users' participation in the symbolic system as it is expressed through the design of the vessel. That this regional belief system—as reflected in the ceramics—was imported into the Tonto Basin area is perhaps shown by the similarity of Fourmile Polychrome (a red ware made on the Plateau) and Gila Polychrome, while at the same time the extent of the cult outside of the Salado heartland is indicated by the occurrence of the polychrome wares at sites far distant from the Basin.

The efforts to unify the strands of cultural diversity in the Tonto Basin during the Roosevelt phase did not last long. The villages and platform mounds that had developed during Roosevelt times were abandoned, and much of the populace aggregated into fewer, but much larger, settlements. This aggregation is known as the Gila Phase (A.D. 1350–1400). This was probably a time of conflict, as evidenced by settlements with defensive characteristics and the fact that the majority of the Roosevelt phase structures were burned (Elson et al. 2000:186, 187). The latter may have been part of the ritual process of abandonment that occurred, apparently *en masse*, at the end of the Roosevelt phase. Finally, intensively destructive floods during the years A.D. 1380 and 1385, followed by equally disastrous years of drought from A.D. 1385 to 1390, may have forced the complete abandonment of the Tonto Basin, thus bringing to an end the distinctive cultures and lifeways practiced there for many hundreds of years. The abandonment may have led the people to dispersed settlements along the Gila and San Pedro rivers; Salado sites are known from these regions, but their temporal associations are as yet uncertain (Reid and Whittlesey 1997:257).

It is evident that late in prehistory a new way of life that had many of the physical manifestations of puebloan culture appeared across most of southern Arizona. The mechanisms that promoted the spread of this culture appear to involve southerly and southwesterly migrations of puebloan peoples from the southern margins of the Colorado Plateau, as well as the adoption of puebloan-like characteristics by indigenous populations. This interaction may not have always been amicable, and warfare may have been common.

PROTOHISTORIC PERIOD (A.D. 1450–1681)

The Protohistoric period is an obscure period in the history of the Southwest that falls between the Late Formative period and the arrival of the Spanish missionaries. This period is not well represented in the archaeological record, yet early Spanish explorers documented their encounters with people who were well established in some areas of the Southwest. An accounting of this period is based on the historical accounts of newly arriving Europeans, linguistic relationships among indigenous peoples, and Native oral traditions.

Spanish exploration of the Southwest began as early as 1539 with the preliminary scouting expedition of Fray Marcos de Niza, who had been sent to the region by Mexican viceroy Antonio de Mendoza in response to the accounts of Alvar Núñez Cabeza de Vaca and Moroccan slave Estevan. Cabeza de Vaca and Estevan had wandered to Sonora after being shipwrecked in the Gulf of Mexico in 1528. After de Niza returned, Viceroy Mendoza proposed a larger expedition and selected Vásquez de Coronado as its leader. Coronado's party departed in 1540 in search of the fabled Seven Cities of Cibola. The route of the expedition probably took Coronado through what is now eastern Arizona, although at one time it was speculated that one stop on the journey, Chichilticale or "Red House," was in fact the Hohokam adobe house at Casa Grande. A preliminary scouting party led by Melchior Diaz had preceded Coronado and journeyed up the San Pedro River, exploring the area around the Gila-San Pedro confluence to the "east and west." (The exact extent of this survey is unknown [Wilson 1999:25]).

The Spanish likely entered a world that had undergone traumatic social and environmental changes shortly before their arrival. When the Spanish arrived in the sixteenth century, much of the Southwest was subject to regular warfare. As a result, large areas were uninhabited. Captain Hernando de Alarçon, who was transporting supplies up the Colorado for the Coronado expedition, was told by a native informant that the region between the Colorado and Coronado's route was uninhabited (Wilson 1999:13). Similarly, Coronado found the region that is now eastern Arizona to be a great *despoblado*—an uninhabited region (Reid and Whittlesey 1997:165). Indeed, eastern Arizona had been minimally inhabited following the final abandonment of the pueblos. The precise route taken by the Coronado expedition is not known, but several routes have been proposed. The most commonly (and perhaps uncritically) accepted is that of Coronado biographer Herbert Bolton (Reid and Whittlesey 1997:267–273), who proposed that the expedition crossed the Gila near Bylas, continued northward across the Salt, White, and Little Colorado rivers, and finally arrived at Cibola—the Zuni village of Hawikuh—where the expedition members were disappointed to find that the streets were not paved with gold as expected.

Around 1600, bands of Western Apache, Athabaskan-speaking groups with a linguistic affinity to peoples in northern North America, began arriving in the region of the southern Colorado Plateau and the mountainous region below the Mogollon Rim (Stein 1994:10, 11). Each Western Apache band practiced a hunting-and-gathering subsistence strategy supplemented by limited horticulture and held dominion across specific territories. Conflicts between Apache groups, Pimans, and Europeans would continue over the next several centuries.

Prior to the missionizing efforts of the Jesuits and their use of the rather generic term "Pima," the Spanish explorers (and others, including Franciscan missionaries) had a varied nomenclature for the groups of people living in different regions of southern Arizona and northern Sonora. Some of these people spoke closely related dialects of Piman (which belongs to the Uto-Aztecan linguistic family), while others spoke Hokan (or Yuman) languages (which are unrelated to Uto-Aztecan). The Hokan speakers were primarily those inhabiting the areas along the lower Colorado, but some resided alongside the Piman speakers on the Gila River, having migrated there in response to ongoing warfare (Reid and Whittlesey 1997:114). The Hokan speakers along the Gila included the Opas (later known as the Maricopas) and the Kaveltcadom (or Cocomaricopas). The Piman speakers included such groups as the Sobaipuris, Cipias (or Zipias), Ymiris (or Hymeris), and Kohatks (Wilson 1999:10, 11).

Linguistically, there is a continuity between west-central Mexico and southern Arizona, a continuity that may have existed prehistorically and been paralleled by some aspects of the material culture, notably ball courts (Kelly 1991). The languages or dialects spoken by both the Upper and Lower Pimans belong to Lowland Pima, one of four divisions of the Tepiman group of languages (itself belonging to the wider Uto-Aztecan family), the other three being Mountain Pima, Northern Tepehuan, and Southern Tepehuan (Saxton and Saxton 1973:xvii). The Tepehuan languages occur in the Zacatecas and Durango regions in west-central Mexico, whereas (as we have seen) the Piman languages occur in northwest Sonora/southern Arizona. This linguistic homogeneity, although quite possibly existing in prehistoric times, does not necessarily reflect a long, in-place population, although several linguists have concluded that the Uto-Aztecan family has been present in the Southwest since the Middle Archaic period (Mabry 1998:85). A second possible scenario that accounts for the distribution of Tepiman languages in southern Arizona is that Piman speakers moved northward from homelands in northern Mexico (Teague 1993:437), presumably replacing the extant language or languages, which may themselves have belonged to the Tepiman group.

Although the Piman groups probably had distinct social (or at least political) identities, they were closely related linguistically, a fact that did not go unnoticed by the Spanish. As early as 1540, the first official Spanish expedition led by Vásquez de Coronado recorded people speaking dialects of the same language (Piman) over a large geographic region, from Sonora to southern Arizona (Wilson 1999:12). Eventually, the Spanish recognized a variety of linguistic groups across northern Mexico and the Southwest, including others belonging to the Uto-Aztecan family, such as the Opatas of north-central Sonora and the Mayo and Yaqui tribes (Spicer 1962:12, 13).

The fundamental question facing archaeologists is whether the Piman-speaking peoples (such as the Sobaipuri of the San Pedro valley) encountered by the Spanish were descendants of the prehistoric peoples of the Late Formative period, or had they arrived from elsewhere prior to European contact? There are two possible answers to this question. One is that the Piman-speaking people living in southern Arizona were simply the direct descendants of the prehistoric peoples whose numbers and culture were reduced by the social and economic changes that marked the end of the Formative period. The other is that the Piman-speaking peoples moved into the area after the collapse of the prehistoric cultural traditions. They may have not found the region completely abandoned and perhaps were integrated with the descendants of the prehistoric cultures, a possibility suggested by oral tradition (Teague 1993:444).

The possibility of direct descent of the Piman speakers is suggested by the descriptive accounts of the Spanish as they moved northwest from central Mexico into what is now Sonora and Arizona. They found that the majority of people across this region practiced agriculture as a subsistence base, in contrast to people in the surrounding regions of California and the Great Basin, where hunting and foraging prevailed. The Spanish also noted little to no political unity beyond the level of individual and autonomous *rancherías*, a condition unlike that encountered in Aztec-dominated central Mexico. Finally, trade across the region, although sporadic and not regularized, was widespread and generally did not involve food and tools, but rather emphasized luxury and ceremonial items (Spicer 1962:8–15). All of these traits might be expected at the time of European contact, agriculture and trade having long been the norm, and the *rancherías* perhaps the result of the social reorganization that occurred at the end of the Formative period.

In contrast, archaeologists have pointed out dissimilarities in the material culture between the Piman peoples and the prehistoric cultural traditions, which is supportive of the new cultural identity model. Teague (1993) suggests that both linguistics and Piman oral traditions support this discontinuity. Linguistically, there is a continuity between west-central Mexico and southern Arizona, a continuity that may have existed prehistorically and been paralleled by some aspects of the material culture, notably ball courts (Kelley 1991). This continuity exists among people speaking variants of the Tepiman language group. The languages spoken by some of the people in Sonora and southern Arizona belong to Piman, one of the members of the Tepiman group.

The oral traditions of the Piman people in southern Arizona are consistent with both the archaeological record and the linguistic model described above. The traditions focus on the conflict between Elder Brother, *I'itoi*, the hero of the Tohono O'odham (and who is known as *Siuuhu* among the Akimel O'odham) and the (Hohokam) *Sivanyi* or *Siwani*. In one version of the story, Siwani is a personal name (Saxton and Saxton 1973:147–168), but the word *sivanyi* is also a reference to a Hohokam priesthood. It may also be related linguistically to *Shiwanni*, the Zuni directional rain priesthoods (Teague 1993:439). The traditions state that warfare breaks out between Siwani (or the *Sivanyi*) and *I'itoi* and his followers, whom (depending on the account) he gathered together from among the O'odham people of northern Sonora, or who emerged from beneath the earth from a point south of Baboquivari. There are rather detailed accounts of the progression of the subsequent war against the *Sivanyi* and the eventual victory of *I'itoi's* warriors. Following the conflict and the disposal of the *Sivani* priesthood, the warriors dispersed, some returning south to the Lower Piman homeland, some going north to the pueblos, and some remaining in the Gila valley and intermarrying into the local (Hohokam) population, eventually to become the Pimas Gileños (Teague 1993:444). From the foregoing, it appears plausible that these traditions telling of a rebellion against a priestly hegemony at the end of the Classic period echo events that are also reflected in the archaeological record.

HISTORIC PERIOD (A.D. 1691–1950)

The historic period begins in 1691 with the establishment of the mission system in the Santa Cruz valley following the arrival of Jesuit missionary Eusebio Kino. Kino made his first forays into the Santa Cruz valley in 1691 (to Tumacácori) and 1692 (to San Xavier del Bac) (Wilson 1999:12, 13). After a poorly documented visit to the Casa Grande area in 1694, Kino made a second *entrada* to the area in 1697 (Wilson 1999:24). Setting out from the Nuestra Señora de Dolores mission, Kino traveled north along the San Pedro and then followed the

Gila to the west, arriving again at Casa Grande on November 18. He was accompanied by Captain Juan Mateo Manje and some 20 soldiers and native guides. Manje, unlike Kino, kept well-written journals of his travels. The chronicle of this expedition makes note of small groups of people living along the San Pedro, identified as the Sobaipuri (Doelle and Wallace 1990; Masse 1981), and also mentions many abandoned villages along the river corridor. These were most likely recently abandoned Sobaipuri villages, although he may have included prehistoric sites as well (Masse 1980). The chronicle also notes "six or seven" Piman *rancherías* along the Gila River in the area around Casa Grande. This appears to be the first known reference to the Pima by Europeans (Debowski et al. 1976:30).

The subsequent missionizing efforts identified the groups of people inhabiting southern Arizona and northern Sonora as Lower and Upper Pimans, or Pimas Bajos and Pimas Altos. The Pimas Altos, or the people inhabiting the Pimería Alta (which includes the Santa Cruz and Gila rivers as well as the adjacent desert regions), were described by the Spanish missionaries as consisting of four broad groups: the Pimas, inhabiting the southeastern portion of the Pimería Alta; the Papabotas, inhabiting the desert areas and later known as the Papagos (and today as the Tohono O'odham); the Sobas, supposed followers of a man named Soba in the southwestern Pimería Alta (and unlikely a distinct cultural entity); and the Sobaipuris, inhabitants of the north and northeastern areas, or the San Pedro and Santa Cruz river valleys (Spicer 1962:119, 126–128; Wilson 1999:20). Subsistence strategies practiced by these native peoples included direct procurement of several resources (with wild melons and bighorn sheep being particularly important sources of food) and floodwater farming. It appears uncertain if irrigated agriculture was being used at this time (as it had during the Hohokam era), although a 1699 account by Captain Manje states that the Pimas did not make use of canals to irrigate their crops and relied upon floodwater (Wilson 1999:38). However, people in the San Pedro valley are mentioned obliquely by Kino during an early visit as cultivating cotton by irrigated agriculture.

Two of the more well-known Sobaipuri sites, Quibari and Gaybanipitea, are located in the San Pedro valley. Both sites were excavated by Charles Di Peso, and European metal and glass were recovered from each. In addition, Sobaipuri Whetstone Plain Ware was recovered from Gaybanipitea. Although occupied for only a brief period of time (from 1692 to 1698), Quibari was the largest settlement along the San Pedro at this time, with about 500 occupants at its peak (Altschul and Jones 1990). In addition to the sand-tempered Whetstone Plain ceramics, other aspects of Sobaipuri material culture included small, serrated projectile points with deep basal notching and finely flaked unifacial and bifacial tools (Altschul and Jones 1990; Slaughter 1992:70, 71).

Owing to the efforts of Padre Kino, missionizing of the people of the Pimería Alta continued into the early eighteenth century, although after Kino's death in 1711, the mission system in Sonora began to deteriorate, partly as a result of neglect while Spain was distracted by the War of the Spanish Succession (Walker and Bufkin 1979:14). In a 1723 report on the state of the mission system in Sonora, Fray Daniel Januske reported that the native population of the Pimería Alta was declining. This decline was probably his interpretation of native parishioners escaping the missions; from about 1740 to 1770, it appears that the population of the middle Gila area in fact underwent an increase (Wilson 1999:44). This increase was probably due largely to an influx of people responding to poor living conditions at the missions (including both disease and abuse), as well as defense against incursions by the Apache. The Apache had been raiding Piman settlements since shortly prior to the time of Kino's initial contact (Spicer 1962:234), and the increase in raiding over time resulted in more and more geographical shifts among the Piman-speaking populace. By 1750, most of the people occupying the San Pedro valley had been forced to move to the Santa Cruz and Altar valleys. This turned out to be only a temporary solution, as the Apache began raiding these locations as well. In 1762, the remaining Sobaipuri populations were moved out of the San Pedro valley to replace Pimas who had succumbed to disease at the Guevavi Mission in the Santa Cruz valley. These people either died or were absorbed into the Pima populace, thus ending the existence of the Sobaipuri as a distinct cultural group (Walker and Bufkin 1979:12).

Incursions by the Apache continued unabated. Beginning around 1790, as a means of bringing raiding to a halt, the Apache were provided with

rations and supplies, an action by the Spanish government that allowed for the expansion of ranching and stock raising in what would eventually become southern Arizona. This time of relative peace ended with the independence of Mexico from Spain in 1821. With Spanish support no longer available, ranching became unviable as the Apache once again began their raiding activities (Morrisey 1950:151).

Anglo-Americans first established a substantial presence in the middle Gila region during the period between Mexico's independence in 1821 and the beginning of the Mexican-American War (1846). The first Americans to enter the area appear to have been Sylvester and James Ohio Pattie, father and son beaver trappers who made several trapping excursions along the San Pedro, Gila, and Colorado rivers during the years 1825 and 1826 (Walker and Bufkin 1979:17). During the war itself, the "Army of the West" under the command of Colonel Stephen Watts Kearny was assembled at Fort Leavenworth, Kansas, for the conquest of the Southwest. The first expedition headed by Kearny passed along the Gila River in 1846. Reinforcements were sent to follow behind this force and included the Second Missouri Mounted Rifles and an infantry of 500. This infantry, known as the Mormon Battalion, consisted of volunteer Mormons from Nauvoo, Illinois, who were intending to settle in Utah. The first commander of the battalion, Captain James Allen, died before reaching Santa Fe, and Captain Philip St. George Cooke was promoted to the position. Cooke entered what is now Arizona through the Guadalupe Pass, marched up the San Pedro to the Benson area, then turned west toward Tucson. From there, he continued up the Santa Cruz and followed Kearny's previous route along the Gila to California. Although temporary, this is perhaps the first instance of a Mormon presence in the San Pedro valley (Walker and Bufkin 1979:18).

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 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. Within Arizona itself, military garrisons and a growing mining industry also provided a need for beef (Morrisey 1950:151, 152). Following the Civil War, a neglected and immense cattle population in Texas began to be driven westward by enterprising ranchers who realized that Arizona—with its military forts and Indian reservations—was a growing market for beef (Sheridan 1995). In the Sulphur Springs valley, the Sierra Bonita Ranch was established by Colonel Henry Hooker. Hooker possessed at least 11,000 head of cattle on his range by the mid-1870s (Sheridan 1995:130).

The Gadsden Purchase also provided territory for the United States' ever-expanding railroad system. In 1860, Fort Breckenridge was established along the San Pedro to defend American settlements from Apache raiders (Sheridan 1995:61). Fort Breckenridge was abandoned during the Civil War, though later reoccupied in 1865, and became known as Camp Grant. In 1866, Camp Wallen was established as one of a number of temporary military posts in Arizona during the Apache conflicts (Walker and Bufkin 1979:37). Conflict between the Apache and the Anglo settlers continued until 1886, when Geronimo surrendered and peace was negotiated (Collins et al. 1993:32). With the end of open hostilities, settlers resumed their migration to the area with the aid of the railroad. Mining and cattle ranching became the main industries, although ranching had already developed into a lucrative business some time prior to this.

During the nineteenth century, Mormon pioneers established farming settlements in many parts of Arizona. The Mormons were on a quest to establish the State of Deseret, which was to be the Mormon "homeland" covering a large portion of western North America. The borders of Deseret included the present states of Nevada, Utah, and Arizona (north of the Gila River); a large portion of California, New Mexico, and Wyoming; and parts of southern Idaho. Church members settled in the Salt Lake valley after leaving Illinois during 1847 and 1848. With Salt Lake as a base, from 1849 to 1856 they colonized Utah and eventually a 1,000-×-800-mi area covering much of the West. Settlements within this area included Lemhi, Idaho; Carson Valley and Las Vegas, Nevada; San Bernardino, California; and Fort Bridger, Wyoming. The

Compromise of 1850 with the federal government ceded all of Utah and Nevada, and parts of Colorado and Wyoming to the Mormons as the Utah Territory. After this date, Arizona was no longer "officially" Mormon, but continued to be settled into the 1860s and 1870s, including locations in the San Pedro valley, notably Pomerene and St. David. St. David, which was the southernmost Mormon settlement in Arizona (Walker and Bufkin 1979:28), was founded in 1877 as a result of members of Camp Utah leaving in resistance to working alongside Native Americans (Sheridan 1995:196).

The Union Army arrived in Arizona in the mid-nineteenth century and established camps and forts around the state, primarily to protect settlers from Apache raids. In 1863, the Arizona Territory was established after successful lobbying by Charles D. Poston. A year before, in 1862, the National Homestead Act offered land tracts of 160 ac at $1.25 per acre or 80 ac at $2.50 per acre for land within a railroad grant (Stein 1990:4). This began a series of homesteading acts that eventually led to the Stock Raising Homestead Act of 1916, which sparked a boom in homesteading in Arizona in the 1880s that peaked between 1910 and 1940 (Stein 1990).

Arizona became the 48th state in the Union in 1912. With statehood came a population increase and changes in the socioeconomic fabric of the region.

MINING IN ARIZONA (A.D. 1536–1950)

Mineral exploitation began in Arizona during the Spanish Colonial period. Under New Spain's Viceroy Mendoza, ordinances were issued that helped to fuel mining exploration throughout the northern territories. The ordinances, in effect from 1536 to 1577, entitled miners to 4/5ths of the minerals they extracted from their claims, the remaining fifth being owed to the crown (Lacy 1987). Initially, Spaniards entered the northern territories in search of vast hordes of gold. Instead they found silver. Most of southern Arizona was not heavily prospected due to hostilities with Apache groups who made the area unstable for mining ventures. On August 22, 1584, Phillip II enacted a new mining code that was applied to the entire Spanish Empire. Viceroy Mendoza's earlier mining ordinances formed the basis for these new laws. The code granted miners the right to work a claim as if it were private property and to pay duties to the crown accordingly. Royalties to the crown were paid on a sliding scale and depended on the amount of ore produced by an individual claim. Mining activity in Arizona, known at that time as the Pimería Alta, was not extensive under the 1584 decree, and claim registrations or records of ore shipments are lacking from this period. However, Father Eusebio Kino, one of the first and most important explorers of southern Arizona, describes a small number of mines scattered throughout the Santa Cruz valley. It is possible that mines in the river valley functioned on an illegal basis, exporting silver to the black market (Lacy 1987).

In 1736, a rich deposit of silver, known as the *Planches de Plata* (sheets of silver), was found southwest of present day Nogales, Sonora. The discovery fueled a mining boom in southern Arizona as miners rushed into the area with the hopes of making similar discoveries (Lacy 1987; Wilson 1943). Charles III enacted a new mining code on May 26, 1783, that was applicable only to New Spain. The new laws were an updated version of the 1584 ordinances and remained in place until Arizona became a United States territory under the Treaty of Guadalupe-Hidalgo of 1848 and the Gadsden Purchase of 1853. Under the 1783 code, mining activities in Arizona were slow to develop. Ecclesiastics remained the only permanent residents in the northern territories of New Spain and they were prohibited from filing mining claims. In addition, supply lines needed to transport ore were virtually nonexistent, and other, richer silver deposits had been discovered closer to Mexico City in Zacatecas. Continuing hostilities with the Apache kept the region unstable. The limited mining that was taking place was concentrated in the Santa Cruz valley, where a temporary peace between the Apache and Spanish from 1790 to 1820 encouraged development. Mining was documented in Arivaca as early as 1777 (Lacy 1987; Wilson 1943).

When the United States gained the territory following the Mexican-American War, a code regulating mining activities was adopted, largely based on the previous Spanish ordinances. The legendary *Planches de Plata* lode fueled American mining exploration in the region from 1853 to 1861. The high cost of transport was somewhat alleviated by the Butterfield Stage Line, which operated tri-weekly runs through Pima County from 1857–1860 (Wilson 1943). Charles D. Poston, a leading figure in mining and politics during the early American

period, discovered silver deposits in the Santa Rita and Cerro Colorado mountains in 1855 (Lacy 1987). Poston and his associates were largely responsible for legislation that allowed the establishment of semi-autonomous mining districts throughout the American Southwest. The new mining districts dictated their own regulations for everything from the establishment of claims to settling disputes. During the Civil War, U.S. troops were removed from the area and hostilities with Apache groups effectively brought the Arizona mining industry to a standstill. With the establishment of the Arizona Territory in 1863, a code was established that echoed the 1783 ordinances of New Spain. Although the mining districts continued, they were now subject to a more centralized authority. The code was declared illegal by the U.S. government in 1866 based on the premise that a territory could not grant miners ownership of federal land. Following the ruling, the semi-autonomous mining districts were soon to return and were allowed to operate provided their laws did not conflict in any fundamental way with federal laws (Lacy 1987). The Mining Law of 1872, passed by the United States Congress, echoed many of the laws established by the independent mining districts. This law set formal rules as to how a mining claim could be staked on public lands. It established the maximum size of a claim and what improvements were necessary to maintain and later patent that claim (Heinrichs 2000).

Mining in Arizona attracted people, and between 1860 and 1864, the population of Arizona doubled. It doubled again by 1870 (Keane and Rogge 1992:2). Mining has been extremely important to Arizona's economy (Keane and Rogge 1992:2), leaving a unique signature on the Arizona landscape. Miners followed a different path than farmers and ranchers. Settlements arose in places that would have never been settled by agriculturalists (Keane and Rogge 1992:10). Many of these settlements disappeared from the landscape within a few years. Army posts, roads, and railroads were built to meet the demands of the mining communities' needs for food, clothing, medicine, hardware, building supplies, and economical shipping of ore from the mines. Mining has continued to be an important industry in Arizona.

The Gadsden Purchase in 1853 resulted in the establishment of the Mexico-U.S. border in its present location. The U.S. Army arrived in Tucson in 1856 and founded Fort Lowell in 1873, whose primary purpose was to protect the settlers from the Apache. Similarly, the military established Camp Grant at the mouth of Aravaipa Creek in 1860 (Walker and Bufkin 1979:37), permitting for the first time relatively safe Anglo settlement of the area around Mammoth and the future site of San Manuel. The economy quickly formed around ranching and, more significantly, mining. The following account of the history of mining in the Tiger/Mammoth/San Manuel area is summarized from Howell (1991).

Gold was the initial focus of prospectors in the Tiger/Mammoth/San Manuel area. Tradition attributes the first mining claim to Frank Schultz, who had emigrated from Austria. However, the first official claim for which records exist is the Hackney claim, attributed to Charles Dyke (a prominent rancher in the area) and T. C. Weed, made in July 1879. The Hackney claim was on a quartz vein later known as the Collins vein. Frank Schultz made two claims, the Mars and Mammoth claims, on a segment of the Collins vein in 1882; this segment became known as the Mammoth vein. Schultz eventually established a mining camp bearing his name, where he lived until his death in 1918. He also named the Old Hat Mining District, which extended from Schultz's camp to include mining camps located on the northern Santa Catalina foothills. Although Schultz had sold the Mammoth claim by 1884 (to George M. Fletcher, who also purchased the Mars claim), he and his descendants retained interest in various mining claims in the region for many years, well into the twentieth century.

In 1889, Mammoth Gold Mines, Ltd., based in London, acquired the Mammoth mill at Mammoth and the mine at Schultz. In 1891, the Mohawk claim, located on the Mammoth vein, was recorded; eventually, this claim became the basis of a mining operation run by the Mohawk Gold Mining Company. The town of Mammoth officially came into being in 1887 with the establishment of a post office; a school, saloons, and stores soon followed. Schultz achieved the status of a town nearly a decade later, in 1896, when it obtained its own post office. It was also in 1896 that Mammoth Gold Mines was reorganized and renamed the Mammoth Gold Mining Company. The name changed again in 1897, to Mammoth Collins Gold Mines, Ltd. Mining activities continued on an increasingly large scale up until the turn of the century, including the

installation of an aerial tramway between the Mammoth mill and the mine at Schultz and a cyanidation plant. After the Mammoth shaft encountered the water table at a depth of some 800 ft, and after expenses caught up with profits, it became evident that a reconfiguration of the entire Mammoth operation was needed. This did not occur and the company passed into a long period of inactivity marked by litigation from its shareholders and the burning down of the Mammoth mill. The Schultz post office closed in 1902.

From the beginning of mineralogical exploration in the Tiger/Mammoth/San Manuel area, gold was the primary metal exploited. However, other mineral resources—particularly lead, molybdenum, silver, vanadium, wulfenite, copper, and zinc—were known to be abundant in the region. Gold mining continued, particularly after 1906, when the Mohawk Gold Mining Company upgraded their facility (after having ceased operations in 1898), but with the beginning of World War I, other metals became increasingly important, and non-auric resources from the Schultz area mines became the focus of renewed interest (although earlier, and unsuccessful, attempts had been made in the late 1890s to market wulfenite from the Mammoth mine). The Arizona Rare Metals Company was formed in 1914 by Frank H. Hereford and William Jennings Bryan, Jr., originally with the intention of extracting wulfenite from tailings at Mammoth. Mining was expanded to include molybdenum, an element used in steel alloys, once the recovery of wulfenite proved profitable. During the war years, the Mammoth mines produced the entire U.S. output of molybdenum.

The Arizona Rare Metals Company operation was based on extraction from previously mined material, and had purchased all the rights to the old Mammoth tailings by 1918. That same year, Hereford and other investors, including well-known Tucsonan Epes Randolph, formed the Mammoth Development Company (later renamed the St. Anthony Mining and Development Company) to begin extracting molybdenum and wulfenite directly from the Mammoth and Collins mines at Schultz. However, when the war ended, the molybdenum market disappeared, and no mining of any kind took place at Schultz in the early 1920s.

The old Mohawk mine was purchased by a New York firm in 1925, and the mill was modernized to utilize concentration and chemical extraction methods. The Mammoth-Collins mines, although evaluated by the United Verde Copper Company in 1926, continued to lie dormant. Meanwhile, the New Year claim, immediately to the east of the Mohawk claim, was purchased and developed by Sam Houghton. Houghton elicited the interest of several investors, and following an increase in the price of gold in 1933, he incorporated the Mohawk and New Year claims together as the Molybdenum Gold Mining Company, founded as a subsidiary of the Molybdenum Corporation of America (which had been the primary investor in the Mohawk-New Year venture).

In 1934, the Mammoth-St. Anthony Mining Company, Ltd., was created by the stockholders of the St. Anthony Mining and Development Company. The Mammoth-St. Anthony Company was responsible for the construction of a power line in anticipation of resuming operations at the Mammoth and Collins mines. The line was run from Hayden, where it was connected to the line originating at the Coolidge Dam, to Schultz. Eventually, this line also provided electrical power to Oracle and to the town of Mammoth.

Early in 1939, the Mammoth-St. Anthony Mining Company purchased the entirety of the Mohawk-New Year facilities, which by that time had become large, complex, and lucrative. As the mining operations expanded, the surrounding community grew accordingly, and the town that had until now been known as Schultz was officially renamed Tiger with the founding of a new post office on March 15, 1939.

The Tiger mines suffered from a labor shortage after the United States entered World War II in December 1941. The Army discharged 65 soldiers from duty and sent them to work at the mines in order to keep up production; nevertheless, production waned, and the mines faced increasing financial uncertainty as the war progressed. Only funding from the U.S. government allowed the mines to continue production, which, in addition to molybdenum and vanadium, now included lead and zinc as metals vital to the war effort. In 1945, the Mammoth-St. Anthony Mining Company was dissolved and the operation of the Tiger mines was transferred to the St. Anthony Mining and Development Company. Lead and zinc continued to be extracted in large quantities from the Collins vein following the war and were the focus of the Tiger mines until about 1952, when both the ore

quality from the Collins shaft and the market price of lead and zinc dropped, due in part to saturation of the market from foreign imports.

In 1953, the Magma Copper Company purchased the mining properties at Tiger from the St. Anthony Mining and Development Company and the town of Tiger was abandoned. The post office was closed in November 1954. The town of San Manuel was founded by Magma to provide facilities for the development of the San Manuel and Kalamazoo ore bodies. In 1956, the flotation concentrator began operation in San Manuel with an output of 35,000 tons per day (Rabb and Chase 1987). The San Manuel Plant Site continued operation up to the 1990s, the ore being brought in by the San Manuel Arizona Railroad from the mine site south of the town of Mammoth (EPA 1992). Broken Hill Proprietary Co., Ltd. (BHP Billiton), of Australia acquired the mine, which had become the largest underground mine in the United States, in the late 1990s, before its final closure in 2002. Reclamation activities began at the San Manuel Plant Site shortly thereafter, and these activities were still ongoing at the time of the survey.

Feature and Site Type Definitions

Site Types

There are many site typologies in Southwestern archaeology to describe prehistoric archaeological manifestations on the landscape. Generally accepted categories like habitation, resource procurement, resource processing, and campsite are used by most archaeologists to describe prehistoric sites. Gregory (1991) has refined the Hohokam "habitation site" into four types: villages, hamlets, farmsteads, and fieldhouses. For the purposes of this report, sites are physically described (e.g., low-density artifact scatter with surface rock features; high-density artifact scatter with one midden and one cobble-lined structure). They are also categorized as either a *habitation*—a site people intensively occupied for an extended period of time—or a *limited activity site*—likely related to subsistence activities such as wild food gathering and processing. The limited activity sites are further refined to include *agricultural sites*, that is, sites containing rock piles associated with prehistoric agriculture. It should be noted that certain limited activity sites might also have been the locations of limited or seasonally occupied habitations (e.g., temporary campsites). Further work at these sites is needed in order to fully appreciate their prehistoric utilization. The site descriptions provided below include an "interpretation" field where the potential use of each site is described.

Feature Types

Features are defined as modifications to the landscape that leave a lasting, physical record of their presence. The terms used to label common features in this document are described below. More rare features are described in the individual site descriptions.

Artifact Scatter: A somewhat discrete concentration of artifacts (e.g., sherds, lithics, ground stone, cans, bottles, bricks, etc.) on the ground surface. Artifact density is described qualitatively as low, moderate, or high. The number of artifacts per square meter is also stated when deemed necessary. This type of feature often defines an entire site.

Midden: A discrete, slightly mounded area exhibiting an extremely high density of artifacts, ash, structural material (e.g., daub), and charcoal. These features are associated with intensively occupied habitation sites and are generally found in direct association with habitation structures. These are also labeled trash mounds by some archaeologists.

Artifact Concentration: A discrete concentration of artifacts within an artifact scatter. It may represent trash deposition from activity areas or seasonally occupied habitation structures. This feature is not mounded and generally contains fewer artifacts than middens.

Fire-Cracked Rock (FCR) Concentration: A discrete aggregate of FCR that may be surficial or partially buried. Many of these features are "deflated" (i.e., the surrounding sediment, including the feature fill, has been eroded away leaving only the FCR fragments). This feature is interpreted as being either a single-use or communal (used multiple times) thermal feature (a "roasting" feature).

Fire-Cracked Rock: Rocks of various material types that show evidence of thermal alteration. In-field evidence of FCR includes the presence of cracking, blackening, and spalling. These traits can also be found on natural, cracked rocks, so field personnel must use their best judgment when identifying FCR.

Rock Pile: A discrete, non-thermally altered pile of rocks (pebbles and cobbles) that is noticeably mounded. These are found solely within bajada environments, on rocky ridge tops and slopes. They are often situated on cobble-lag deposits. This feature is generally found clustered with other similar features in "fields" and is commonly interpreted as being related to dry-farming agricultural practices (Fish et al. 1992).

Rock Pile Fields: Discrete clusters of rock piles that may represent prehistoric agricultural fields.

Cobble-lined Structure: This structure is generally associated with the Classic period (A.D. 1150–1450) in southern and central Arizona, specifically with the Salado culture. The structures and compound walls that compose Salado sites were likely constructed with puddled adobe with the addition of basal courses of upright cobbles, presumably to add structural support to the walls. The remains of these walls are visible today and are marked by a basal course of cobbles, the adobe having melted away. Numerous cobble structures and one compound wall were discovered on the survey and are discussed in the individual site descriptions.

Historic Contexts

The National Historic Preservation Act (NHPA) of 1966 (as amended) and its implementing regulations provide the basis for assessing the eligibility of cultural resources for inclusion in the National Register of Historic Places (NRHP). Only sites that are included or eligible for inclusion in the NRHP are afforded protection under the NHPA. Section 106 of this act requires federal agencies to consider the effects of their projects on cultural resources considered eligible for inclusion in the NRHP. The criteria for evaluating the eligibility of a resource are specified in the Code of Federal Regulations (CFR) (36CFR60.4). These criteria are excerpted and listed below:

> The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, 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 or history.

Application of Criterion D requires establishing the scientific importance or significance of the resource. The National Park Service (1990, 1997) provides guidelines for developing historic contexts (research themes) that are applicable to the sites and the encompassing region. The significance of an archaeological site is determined by its ability to yield information relevant to these themes. The State Historic Preservation Office (SHPO) has also prepared a series of guides that focus on prehistoric and historic research themes in Arizona. Taking into consideration the NPS and Arizona SHPO guidelines, WestLand defines the following historic contexts for evaluating the significance of the cultural resources discovered during the current project.

Research Theme 1: Chronology

The archaeological record is the summation of human history and prehistory. Without question, one of the truly unique aspects of the archaeological discipline is the opportunity to study human cultural and social systems over long intervals of time. Put quite simply, archaeologists fundamentally desire to know what happened when. It is not possible to develop a thorough understanding of human history and prehistory, particularly trying to understand cause and effect or directions of influence, without the ability to place cultural events, innovations, and trends into a proper chronological sequence. Consequently, chronology is a critical and necessary aspect of archaeological research and is fundamentally intertwined in most other research themes.

Chronology, however, should not be viewed as an end in and of itself; rather, it should properly be viewed as a means to an end. The overarching objective of chronological studies is to document the history of human occupation and use of the landscape. This requires location and identification of cultural deposits and horizons, and the gathering of information and data to determine the age of these deposits and horizons.

Chronological research should be framed at different levels of synthesis. At the broadest level, chronological studies should be directed toward understanding the timing of cultural innovations and developments across a region. The resources that provide for understanding the cultural chronology of a region also provide the information necessary to compare the timing of cultural events and trends across many regions. The next level of synthesis is at the site or settlement. Reconstructing the founding and historical development of an archaeological site is critical for chronicling changes in the size and complexity of a settlement over time and also provides another powerful interpretive tool for evaluating the cultural processes that are going on in regions through comparison of the developmental cycles of individual settlements. Furthermore, studies of cultural affiliation, social organization, and economic organization often require being able to discern contemporaneous complexes of archaeological features and deposits within a settlement. At the most specific level, chronological studies focus on the life cycle of individual features. Evidence for construction, remodeling, renovation, rebuilding, and abandonment of features provides many clues to the qualities of these archaeological occupations such as the permanence or seasonality of feature use.

A variety of data and information can be brought to bear on chronological issues. This information is divided here into two categories. The first category is chronometric data. Simply put, chronometric data derive from methods that can provide a measure of time relative to some type of numerically based calendar. Examples of chronometric techniques include archaeomagnetic dating, dendrochronological dating, radiocarbon dating, obsidian hydration, and thermoluminescent or optical luminescent dating. These chronometric methods are not equal with regard to their accuracy, precision, reliability, or applicability.

The second category is chronological information. This category includes a variety of information and techniques that provide some assessment of the age of archaeological materials relative to one another, but falls short of being able to assign events to numerically based calendars. This latter category includes the so-called archaeological dating methods such as stratigraphic superposition, seriation, ceramic dating, and other general chronological associations based on the style or form of cultural objects, features, or practices. Chronological information often indicates a sequence of cultural events, or whether events fall within periods that have similar cultural expressions. The limitation on the accuracy and precision of chronological evidence depends on the uniqueness of the patterns, the consistency in the patterns across the landscape, how quickly the patterns develop and change, and how readily and consistently the patterns can be recognized in the archaeological record. Regardless of the specific chronometric or chronological methods used and the availability of materials in the archaeological record, the most effective and accurate research strategy is to use several lines of evidence rather than relying on one technique at the expense of another.

Research Questions

- Is there evidence for unrecognized cultural horizons?
- What is the timing of cultural developments and innovations?
- Do changes in artifacts, features, social organization, economics, and ritual occur in lock-step with one another or do these cultural characteristics change individually?
- What are the dates and ages of the archaeological sites?
- Can a history of occupation be reconstructed from available chronometric and chronological data?
- Were there hiatuses in the occupation history?
- Was cultural change constant, intermittent, punctuated, or erratic?
- Was cultural change slow or rapid?
- How does the timing of cultural changes in the present region compare with what is known of the timing of changes in other regions?

RESEARCH THEME 2: MIGRATION AND REGIONAL INTERACTION

Archaeologists studying the prehistory of southern Arizona have long pondered whether radical cultural changes resulted from forces inherent in the culture itself or from the influence of a more vibrant and dominant exogenous culture. Even when the evidence is strong that particular suites of cultural characteristics derive from interaction with an exogenous culture, there is still the issue of identifying the mechanism through which the new cultural characteristics disseminated. Archaeological research in central and southern Arizona over the past decade has renewed interest in migration as an explanatory factor of cultural change in central and southern Arizona, particularly in the Late Formative period. Migration may be one of the enduring themes in human history since the dawn of humanity. Still, cultural traits could have diffused from one culture to another by other mechanisms such as prolonged interaction, intermarriage, and alliances to state a few. It is also quite likely that there may be more than one source for the dissemination of traits. Even if migration is the primary factor, the nature of regional interaction, alliances, and affiliations may play a significant role in whether the migration is peaceful or violent. The actual explanation probably includes forces inherent in the culture, various interactions with other cultural traditions, and periodic or continual movements of people across the landscape.

Research Questions

- What is the nature of regional interaction before and during the Late Formative period?
- Was regional interaction fostered and perpetuated by economic, political, social, or religious alliances?
- Were new cultural traits adopted by indigenous peoples from an exogenous culture or introduced by immigrants from another region?
- Considering migration as a cause of culture change, who were the immigrants into the lower San Pedro River valley? Where were they from? And how many generations removed from the original homeland were they?
- What were the factors that drew the migrants to the lower San Pedro River valley?
- What was the scale of the migration?
- Was the area already occupied prior to the migration?
- If the area was currently occupied, was the migration peaceful or violent? Did the migrants and immigrants exist as segregated ethnic or cultural groups or did they integrate into a single group?
- Does the Late Formative period cultural pattern reflect simply changes in technologies and styles, or do these changes reflect fundamental changes in ideology?

RESEARCH THEME 3: LAND USE, RESOURCE PROCUREMENT, AND SUBSISTENCE

This research theme combines land use, resource procurement, and subsistence, all of which are linked at many levels. The focus is on how prehistoric peoples obtained food and other subsistence resources within the local environment. The current project is situated generally in the Sonoran desert among the diverse topography of mountain ranges, piedmont slopes, basin fill, and open expanses of floodplains (Brown 1994; Fish and Nabhan 1991:31). This varied topography hosts a variety of plants and animals. The distribution of these resources shaped subsistence strategies. The surrounding environment not only affected subsistence strategies, but also gave unique characteristics to the cultural traditions of the prehistoric peoples living within it. Location and elevation are key factors in the adaptations of desert cultures (Fish and Nabhan 1991:30).

Subsistence studies illustrate the wide variety of plant and animal resources exploited by prehistoric peoples. By the Formative period, desert peoples had established a diversified subsistence strategy that incorporated agriculture, the gathering of native food resources, and hunting. A large part of the subsistence effort was directed toward agriculture. Communities participated in intensive cultivation of maize, cotton, and agave. The availability of arable land and water were likely key factors in determining the location of primary settlements. The main settlements were usually located along the terraces bounding the floodplains and on the bajadas at the mountain fronts adjacent to valleys. These locations provided access to the land and

water resources necessary for agriculture while still providing reasonable proximity to the array of native foods associated with the various desert plant communities (Fish and Nabhan 1991:30). In the Late Formative period, extensive rock pile fields and gridded gardens were established in upland settings away from the rivers. These fields and gridded gardens were possibly used for cultivating agave (Fish et al. 1985; Fish et al. 1991).

In the Southwest, some archaeologists argue that the specialization of staple goods for exchange was a common element to the prehistoric cultures that occupied this region. For example, researchers such as Gasser and Miksicek (1985:484) believe that the Hohokam exchanged plant products and emphasized cultivating surpluses of cotton and maize to maintain exchange networks. This economic focus on agriculture may have been one of the driving factors for the establishment of Hohokam-affiliated communities in the Lower San Pedro River valley during the Middle Formative period. The extensive rock pile fields and gridded gardens generally associated with the Later Formative period may similarly indicate a subsequent emphasis on agave production.

Native plants growing on the piedmont slopes around the margins of the desert basins were also important components to the prehistoric diet. Vegetation on the piedmont was dominated by perennial desert grasses and low-growing trees, shrubs, and succulents, and the various cactus species interspersed among them (Brown 1994:127; Fish and Nabhan 1991:29). Evidence is abundant that many of these resources, i.e., the mesquite pods, cacti fruit, cholla buds, and other native plants, were used consistently as food or for exchange (Bohrer 1991:230; Doelle 1976; Gasser and Kwiatkowski 1991:432). The well-watered Sonoran desert and grassland habitats also supported a variety of wildlife, including desert mule deer, pronghorn antelope, bighorn sheep, and white-tail deer, as well as numerous smaller mammals such as jackrabbits and cottontails. All of these animal resources were exploited, but jackrabbits and cottontails made up the bulk of the meat in the diet.

In addition to subsistence resources related to food and water, other natural resources were also important to the prehistoric inhabitants. The construction, maintenance, and use of features such as residential structures, public architecture, storage pits, and cooking pits would have required a variety of raw materials, including clay, wood, grasses, cobbles, and caliche for waddle-and-daub or adobe structures; digging sticks to excavate pit structures and cooking pits; rocks for heating cooking pits; rocks for stone tools; animal hides, cotton, and vegetative material for clothing; and clay and temper for pottery.

As part of this research project, WestLand's main goal is to identify the types of subsistence practices that the prehistoric peoples engaged in. Another research goal is to look for evidence of the specialized production of both cultivated and wild foods by these prehistoric inhabitants. The following research questions are posed in order to evaluate land use and subsistence and to determine how the prehistoric peoples exploited the resources available in the environment.

Research Questions

- What types of subsistence activities did the prehistoric inhabitants practice?
- What was the relative dependence upon hunting, gathering, cultivation, and agricultural subsistence strategies?
- How did the local environment aid or hinder these activities?
- What types of faunal resources did the prehistoric peoples exploit?
- Where did they exploit these resources (i.e., riparian environment versus piedmont slopes)?
- What can faunal remains tell us about the degree of sedentism?
- Did the inhabitants of the project sites exchange cultivated crops such as maize with other prehistoric groups for additional resources? Can we see this in the archaeological record?
- What other natural resources were collected as raw materials for tools, clothing, and shelter?
- Did subsistence and resource procurement strategies change over time?
- Did the prehistoric peoples practice irrigation agriculture?

- If they practiced irrigation agriculture, what were the use-lives of the canals and the canal systems? What were the patterns of growth and abandonment in the canal systems?
- Is it possible to use patterns in canal layout to identify the locations of agricultural fields?
- When did irrigation agriculture begin in the lower San Pedro River valley?
- If irrigation was practiced, did irrigation strategies or methods change through time?
- When were the upland rock pile fields and gridded gardens established?
- What was the primary plant cultivated in these upland fields and gardens?
- Was only a single plant cultivated in these upland fields or was an array of plants cultivated?
- Is there evidence for agricultural specialization, and if so, was there specialized production of both cultivated and wild foods by the prehistoric inhabitants?
- To what degree was agriculture emphasized relative to wild resource procurement?
- Were agricultural activities directed strictly at subsistence needs or were certain crops such as cotton or agave grown for their economic value?
- Did the sites' inhabitants participate in the exchange of agricultural or wild foods with other communities?

RESEARCH THEME 4: CULTURAL AFFILIATION AND IDENTITY

In studying cultural affiliation and identity, two related but different concepts will be addressed. The first concept is that of cultural affiliation. This is the prehistoric peoples' explicit association with other peoples of the region through their overt expression of cultural markers. The second issue is identity, which in this case is linked with ethnicity. Prehistoric people leave indelible records of their cultural affiliation in almost every aspect of the archaeological record. Obviously, cultural affiliation is expressed in the architectural styles, artifact styles, iconography, settlement structure, technologies, and the "imprint" left on the landscape. Shared cultural patterns do not, however, indicate a common ethnicity, origin, or language. Posing cultural affiliation and identity as separate issues allows the possibility of explaining the prehistory of the lower San Pedro River valley in terms of an integrated multi-ethnic culture.

The available evidence indicates that the prehistoric peoples of the lower San Pedro River valley affiliated themselves with the Hohokam culture of the middle Gila and lower Salt river valleys during the Middle Formative period. The archaeological remains express a particularly "Hohokam" worldview. It is difficult, however, to marshal the evidence as to whether these people were ethnically the same as the peoples on the Gila and Salt rivers and whether or not they spoke the same language. It is evident, however, that they interacted intensively with one another. Similarly, it is difficult to determine whether or not the lower San Pedro itself was a single unified ethnic group.

The available archaeological evidence for the Late Formative period in the San Pedro represents a different cultural affiliation with peoples to the north and northeast. It is clear that cultural affiliation has changed. What is not clear is whether this new cultural affinity derives from a realignment of interaction by the indigenous peoples of the lower San Pedro River valley, or whether the new cultural affinity indicates a migration of a new group of people into the valley.

Research Questions

- What does the physical evidence reveal about the cultural affiliation of the people inhabiting the lower San Pedro River valley?
- How did the people in the lower San Pedro River valley affiliate themselves with the cultures of neighboring regions?
- Do the concepts of Hohokam, Mogollon, and Salado have similar meaning and expression in the lower San Pedro River valley as they do in other regions?
- In addition to expressing affiliation with a particular cultural group, do the people of the lower San Pedro River valley also express a unique identity?

- Does the shift in cultural affiliation between the Middle and Late Formative periods also indicate shifts in the identity of the people residing in the valley?
- Is the populace of the lower San Pedro River valley culturally homogenous?
- Is there any evidence to indicate whether the populace of the lower San Pedro River valley is ethnically unified? Or is it a multi-ethnic culture?

RESEARCH THEME 5: SETTLEMENT PATTERNS AND COMMUNITY STRUCTURE

Archaeologists presume that the prehistoric inhabitants of settlements participated in increasingly larger social circles. The social group of concern here is the community. Settlement patterns are often the archaeological expression of the community. A community consists not of a single settlement but of a set of interrelated sites within a bounded territory (S. Fish and Fish 1994). Such a community contains a center with public architecture of a kind and/or magnitude not duplicated in other community sites. Such edifices are believed to be the focus of communal observances on behalf of all members. The interlinkage of population and settlements is symbolically embodied in the communal structures (S. Fish and Fish 2000:378).

The scale of a prehistoric community can be measured with multiple lines of evidence, including settlement size, population, investment in facilities, and intensity of trade and production. The identification of prehistoric communities is important in the study of prehistory because the internal organization and hierarchy of the sites within a community can be indicative of the social, political, economic, and religious practices that bound the prehistoric peoples of the larger region together.

The absence of architectural features visible on the ground surface, especially at Early and Middle Formative period settlements, makes the identification of communities difficult. Nevertheless, the structure of the prehistoric communities can be inferred from the replication of patterns across the landscape. As an example, the lower San Pedro River valley is characterized by a Hohokam cultural affinity during the Middle Formative period. Hohokam communities are typically hierarchical, with ball court villages holding the pre-eminent position in the community. Below this, sites seem to be ranked based on population size, which is loosely translated into the overall site size. The replication of ball court villages with surrounding clusters of settlements is indicative of ball court communities. The function of the ball court is apparently replaced by the platform mound in the Late Formative period. Similarly, Late Formative period communities may be evidenced by the distribution of platform mound sites and the associated constellation of other sites surrounding them. The goal of this research topic is to identify the prehistoric community, or communities, to which the inhabitants of the project sites belonged.

Research Questions

- What are the spatial relationships of the project settlements to other settlements in the region?
- Is there evidence for affiliation with one village over another?
- Are the project sites more closely aligned with sites located on the same side of the river than with sites across the river?
- Is there evidence of interaction between the project sites and one or more village sites?
- Are sites associated with one another through shared communal, ritual, ceremonial, or economic ties?
- How does the community to which the project sites belonged, if such a community can be identified, compare to other communities in the lower San Pedro River valley?

RESEARCH THEME 6: SITE STRUCTURE

Site structure is a key tool for determining social organization within settlements. The way features and facilities are laid out relative to one another not only reflects culturally held perceptions, but the replication of features and facilities in the built environment is key to identifying households and suprahousehold social groups. The study of site structure has become a dominant theme in Southwestern research, but not enough work has been done in the lower San Pedro River valley to provide a relevant comparative baseline. The work that has been completed suggests that the Middle and Late Formative period patterns conform well with the

patterns seen in other nearby regions. The Middle Formative period is characterized by a Hohokam organizational structure, where domiciles are arranged so that their doorways open onto shared courtyards. This archaeological expression leads to the inference that the people living in houses sharing a common courtyard were related to one another more closely than they were related to people living in houses in other courtyards. By the Late Formative period, the archaeological expression of these related residential families seems to have changed, but there is insufficient evidence from the San Pedro to support this inference.

Research Questions

- What levels of integration are apparent at the project sites?
- What are the spatial relationships between visible architectural features, courtyards, and plazas?
- How are houses, trash mounds, and other features arranged within the various sites, and what do these arrangements tell us about social organization?
- Are there communal-use features evident at the sites?

RESEARCH THEME 7: EXCHANGE, TRADE, AND CRAFT SPECIALIZATION

The relationship of peoples in one region with peoples in other regions is often evidenced in artifact objects or goods that are exchanged between the regions. Additional interaction is indicated by shared cultural practices. The sharing of cultural practices can indicate either borrowing or adoption of traits from the donor culture or mutually participating in an information network where both cultures are recipients from a third party donor culture.

Relevant to the Middle Formative period, the role of exchange, trade, and craft specialization in Hohokam society has been discussed and investigated for decades (Bayman 2001; Doyel 1991b; Haury 1976). This discussion is summarized here to provide a background for the lower San Pedro River valley. There is evidence for specialization in the production and exchange of goods at several levels within Hohokam society. In many cases, craft specialization and concurrent exchange or trade is viewed as a "buffering strategy" used by a household, courtyard, or village to offset a chronic resource shortfall due to vagaries in agricultural production on marginal land. In these cases, craftsmen will manufacture and trade goods for food. In other cases, such as the over-production of agricultural products, the specialization can be viewed as another type of buffer against a shortfall, but in this case food is traded for needed but not locally available manufactured goods.

In contrast to this "buffer model," there is evidence that craft specialization also occurs at villages that have access to productive agricultural land and, therefore, appear to have no need for a "buffer." The West Branch site, for example, is believed to have been a major production center for pottery in the Tucson Basin, but it is located on the Santa Cruz River where land would have been very fertile. Yet ceramic production occurred at the household level throughout the site. If this craft specialization isn't a buffer to help with unpredictable crop yields, then why did households seemingly produce more pottery than they needed? Whittlesey (2004) argues that this is a case of having the necessary raw materials nearby (a good source of clay) to allow household ceramic production, and that the "exchange" of these ceramics was accomplished primarily through seasonal population movement rather than purposeful exchange strategies. This evidence from the West Branch site suggests that Hohokam archaeologists should examine the rate of production for goods as well as the means by which they were moved around the landscape. What has been called craft specialization, due to the presence of a large number of artifacts or widespread distribution, may in fact be the result of long-term, low-level production and distribution.

It is likely that long-distance trade and exchange occurred across the Hohokam region. Doyel (1991b:241, 242) suggests that six long-distance procurement strategies were used by the Hohokam: (1) expedition to source, (2) acquisition through middlemen, (3) down-the-line acquisition, (4) interaction at or near the source, (5) colonization, and (6) ritual integration or regulation. Seasonal mobility could be added to the above as another means by which people moved goods across the landscape, albeit over shorter distances.

Doyel's (1991b) use of the term *commerce* to describe Hohokam exchange provides a working definition that takes into account not only trade (the

exchange of goods for other goods), but also resource acquisition, production for exchange, long-distance contact, and a mechanism that regulates the flow of materials and products across a region. It is possible that what is being called craft specialization existed at several levels, both embedded in the day-to-day activities of some villages as well as an important aspect of the economy of other villages. Examples include specialized marine shell and projectile point procurement, production, and trade, and ground stone quarrying and trade (McGuire and Howard 1987; Wasley and Johnson 1965). In this and other cases, long-distance movement of raw materials clearly falls under commerce rather than the seasonal movements of a population.

With regard to the lower San Pedro River valley, the production of a local, Aravaipa variant of the Hohokam buff wares has been part of the archaeological folk knowledge. This local ware appears to be centered on the Big Ditch site near the San Pedro River and Aravaipa Creek confluence and does not occur in the San Manuel area. This suggests that there may be a localized production and distribution of this ware.

Trade routes have been reconstructed using ethnographic information (Doyel 1991b). In southern Arizona, these reconstructions show that avenues of trade and travel normally followed watercourses like the Colorado, Gila, Salt, Santa Cruz, and San Pedro rivers. The Phoenix Basin was advantageously located, with many of these rivers passing through the valley. The Tucson Basin was located along one of the major trade routes from Mexico. Although these avenues were used to transport goods and people, not all exchange goods would have been moved on the same scale, by the same strategy, or over the same distances. It is probable that different resources or manufactured/grown goods had different but overlapping exchange networks operating to unite producer with consumer. Doyel (1991b) calls these adaptive areas *interaction spheres* and identifies three spheres: prestige, utilitarian, and social. The prestige sphere included Mesoamerican items, obsidian, carved stone, some projectile points, some shell items, and minerals; the utilitarian sphere included stone tools and ground stone; and the social sphere included common shell, ceramics, textiles, and basketry. Each sphere had a means to distribute its products once they arrived at their destination. The ball court system was probably one mechanism of exchange, maintaining a flow of goods throughout the Hohokam area during the Middle Formative period. Hundreds of ball courts were built across the region until the system collapsed around A.D. 1100 and was replaced by a mound site system in the regional economy/exchange network of the Late Formative.

In summary, the procurement of nonlocal utilitarian and ornamental resources, the production and distribution of ceremonial and prestige artifacts, and the specialized manufacture and trade of goods, including foodstuffs, are all features of the Hohokam exchange system. How this exchange system functioned and was integrated into the various levels of Hohokam society is not entirely understood. However, it is clear that at most, if not all, economic and social levels, Hohokam society was guided by ideology. It is also evident that as this ideology evolved through time, the material requirements of Hohokam society changed along with it, including changes in the distribution and types of goods procured, manufactured, and traded and also a shift in the exchange corridors, spheres, and networks used to distribute these products. Middle Formative Hohokam ideology has been identified with material correlates such as ball courts, cremation burials, palettes, censers, and pyrite mirrors (Wallace 2003:33). Exchange and craft specialization functioned to promote and maintain this ideology by redistributing resources to offset local imbalances, by helping to redistribute the population, by acquiring exotic resources that could be used by the elite to maintain and emphasize their authority, and by promoting social interaction within and between communities while reinforcing the same belief system.

The archaeological evidence from the lower San Pedro River valley represents a trend evident throughout southern Arizona. By the Late Formative period, interaction with the Hohokam culture area on the middle Gila and lower Salt rivers has diminished, and there is a growing interaction with groups to the north and northeast. The Safford Basin particularly appears to become an important source of objects.

Research Questions

- Did prehistoric populations in the lower San Pedro River valley participate in regional exchange? If so, with whom and to what extent?
- What types of goods or services were exchanged?

- To what degree was exchange specialized?
- How dependent were the local inhabitants on exchange?
- Were the inhabitants of the APE part of a larger regional exchange system or trade route?
- Are artifacts present that may have been imported from another geographic area or cultural affiliation? What can be inferred from the presence and context of exogenous ceramics?
- What was the nature and extent of regional interaction and influence on the people of the lower San Pedro River valley?
- Are cultural features present that may be distinctive or similar to those from another geographic area or cultural affiliation?
- Were interactions between local and regional populations peaceful or confrontational?
- Is there evidence for warfare or violence?
- Is there evidence for significant changes in the patterns of regional interaction and exchange?
- What were the events that precipitated the shift in interaction between the Middle and Late Formative periods?
- Does the shift in regional interaction between the Middle and Late Formative periods attest to a shift in regional influence and power? Does this indicate the demise of the Hohokam regional system?
- How is the shift in regional interaction between the Middle and Late Formative periods in the lower San Pedro River valley related to expressions of the same phenomenon in other regions to the north, south, southeast, and southwest?

RESEARCH THEME 8: CATTLE RANCHING

The cattle industry, like the mining industry, began with the Spanish. Under the direction of Father Kino, ranches and haciendas flourished in the Pimería Alta (Morrisey 1950). Beginning about 1790, the Apache were provided with rations and supplies, an action by the Spanish government that allowed for the expansion of ranching and stock raising in the region. This time of relative peace ended with the independence of Mexico from Spain in 1821. Like other industries and settlements in southern Arizona, ranches were subject to increasing hostilities from the Apache now that Spanish support was no longer available. Haciendas were abandoned and stock animals were left to roam free. Great numbers of wild cattle and horses were noted by the first American settlers entering the area in the mid-1800s (Morrisey 1950).

As immigration into California increased, fueled by the discovery of gold, the demand for beef followed. In the early 1850s, tens of thousands of cattle were crossing the southern Arizona desert from Texas bound for the Pacific market. Apache raids still prohibited the ranching industry from developing in Arizona during this time. Following the Civil War, overgrazing of the Texas rangelands began to take its toll on cattle production. This factor, coupled with the revival of the mining industry and the establishment of military garrisons in Arizona, fueled the development of ranches in southern Arizona (Sheridan 1995). By the 1890s, overgrazing, years of drought, and a fall in the market price of beef forced many ranches to close and others to sell a majority of their herds to ranches in other states (Morrisey 1950). Ranches continued into the twentieth century, but were greatly diminished in size and scale.

Research Questions

- What is the occupational history of the ranch in the historic period?
- What were the economic realities of ranching and farming in the San Pedro River valley during the nineteenth and twentieth centuries?
- Who were the workers at the ranch?

RESEARCH THEME 9: HOMESTEADING

The 1862 National Homestead Act opened vast areas of the American west for settlement. This act granted 160-ac plots to those who were willing to work the land and make improvements on it (Stein 1990). This act had little effect in the Southwest, as the lands were too arid for traditional water-dependant crops. Spurred by a revival of dry-farming techniques in conjunction with the use of drought-tolerant crops, the Enlarged (Dry Farming) Homestead Act was passed in 1909. The Act

granted 320-ac parcels to homesteaders in arid lands. The larger parcels were necessary to produce profitable crops. The passage of the 1909 act fueled a decade-long boom in homestead claims in Arizona (Stein 1990). In 1916, Congress passed the Stock Raising Homestead Act. This granted even larger parcels of land, 640 ac, to those who were willing to raise cattle on and improve lands designated as non-irrigable, non-mineral, and non-timbered (Stein 1990).

Research Questions

- Where were the people who patented land in this portion of the San Pedro River valley from?
- How did homesteading and agricultural development impact the local environment?
- Who were the previous occupants of the land that would become Clark Ranch?

RESEARCH THEME 10: COMMERCE AND TRANSPORTATION

Movement of people and goods across the Arizona landscape can be traced back to the first inhabitants about 11,000 years ago (Stein 1994). There are probably few, if any, recognizable vestiges of these trails on the landscape, but some trails likely became well-defined routes and may have persisted for several hundred or thousands of years. Although the ancient trails may not be visible today, the evidence for the existence of these trails persists in the archaeological record. Even in Paleoindian times, long-distance trade of goods existed. By the Formative period, shell, turquoise, obsidian, pottery, and other goods were being transported over relatively modest distances of a few hundred miles. Stein (1994, Figure 1) illustrates some of the major Native American trails used in prehistoric and historic times. One of these trails follows the San Pedro River from the confluence with the Gila River beyond the international border. In the Middle Formative period, the Hohokam culture was responsible for moving large quantities of marine shell northward from the Gulf of Baja, California, and dispersing the shell and artifacts made from this shell over a large area of the Southwest (Haury 1976). As is indicated by Stein's (1994, Figure 1) map of Native American trails, the river valleys were the most likely corridors of transport and travel.

The early Spanish explorers and missionaries crossed the Southwest using some of the Native American trails. Friar Marcos de Niza, Francisco Vásquez de Coronado, and Father Eusebio Francisco Kino each traveled through the San Pedro River valley (Stein 1994:5–8, Figure 2). Trappers, miners, soldiers, and settlers continued to define trails and wagon routes across Arizona. Many of these trails follow the ancient Native American travel routes (Stein 1994:8–11, Figure 3). By the early twentieth century, many of these trails and wagon routes became highways for the automobile (Stein 1994:26–28).

METHODS

This project encompassed three separate tasks: a site files search, a field survey, and a final report. The methods for each task are discussed below.

TASK 1. SITE FILES AND RECORDS SEARCH

Prior to fieldwork, WestLand reviewed existing cultural resource information for the area within the present APE. Site record files were reviewed at the Arizona State Museum and on the ASM online database (AZSITE) for information on recorded sites and projects in the APE and within a 1.6-km (1-mi) buffer outside of the APE. Information was collected for each site located in this area, including site number, site location, age, cultural affiliation, date recorded, whether or not the site had been scientifically investigated, National Register status (if known), and literature citations affiliated with the recording or investigation of the site. General Land Office (GLO) maps and records administered by the Bureau of Land Management (BLM) were also examined for relevant historical period information about the APE. Historic United States Geological Survey (USGS) maps, aerial photographs of the APE obtained from the Arizona Historical Society (AHS) and the Arizona Geological Survey (AZGS), Sanborn-Perris Fire Insurance Maps, local historical societies, and other relevant historical period sources were used when available. The information obtained during the site files search was used to help determine the presence of possible prehistoric and/or historic properties and cultural resources within the APE. All sites previously recorded within the APE were plotted on field maps for relocation and reassessment during the field survey.

TASK 2. FIELD SURVEY OF THE APE

Fieldwork consisted of a continuous, intensive, and complete survey of the majority of the APE. Specifically, WestLand archaeologists walked close-interval parallel transects 20 m apart until the area had been thoroughly examined for evidence of prehistoric or historic cultural features and artifacts on the ground surface. Topographic maps, surveying compasses, global positioning system (GPS) units, and flagging tape were used to ensure complete coverage.

On this survey, thick vegetative cover consisting of impenetrable mesquite, acacia, and salt cedar groves made complete coverage of the San Pedro River floodplain portion of the APE impossible ***(Figure 4)***. This area was surveyed by WestLand personnel, but parallel transects were hard to maintain and certain areas of thick growth of young mesquite groves in abandoned agricultural fields were impenetrable. Another portion of the APE was also not as intensively surveyed by WestLand for safety reasons ***(Figure 4)***. The San Manuel Plant Site, a former copper ore-processing facility, is in the process of reclamation. This involves the leveling and covering of the site with offsite fill that consists of soil and broken rock. The leveling and covering of the northern portion of the APE shown in ***Figure 4*** had occurred prior to the present cultural resources survey. Large earthmovers and graders were actively working in this area during the survey, and WestLand personnel were allowed only limited access as a safety precaution. A visit to the leveled and covered area revealed that any cultural resources that may have been present were no longer visible on the ground surface.

WestLand used Arizona State Museum guidelines (ASM 1993 [revised 1995]) to determine whether cultural resources qualified as archaeological sites. These guidelines specify the following minimum criteria for designating cultural resources as an archaeological site:

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 meters (50 feet) 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, groundstone, nails, glass) within an area 15 meters (50 feet) 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.

Field recording of archaeological sites and isolates followed Arizona State Museum guidelines as outlined in the Arizona State Museum Site Recording Manual (ASM 1993). For every site, archaeologists provided written descriptions that included materials present, environmental setting, topographic setting, erosion and other disturbances, and any other qualities that would influence interpretation; scaled, hand-drawn maps; photographs; and electronic data collection with a Trimble-XT GPS unit (sub-meter post-process). A primary site datum (PSD) marked with an aluminum tag was placed at each newly recorded site. UTM coordinates were electronically recorded for each PSD with the GPS hand-held unit accurate to within 1 m and initialized to the NAD 27 CONUS datum. Site boundaries were established by the relative vicinity of prehistoric features and artifacts, historic features and artifacts, or both. Isolated artifacts and features that did not meet the minimum standards for a site were recorded as isolated occurrences (IOs). The UTM location of each IO was recorded with the Trimble-XT GPS unit. Descriptions, drawings, and photographs of each IO were completed as necessary.

All recorded sites were evaluated for eligibility to the National Register of Historic Places (NRHP). The criteria for evaluating whether or not a resource is eligible for the NRHP are specified in the Code of Federal Regulations (36CFR60.4). The pertinent criteria as specified in the federal regulations are excerpted and presented below.

> The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites,

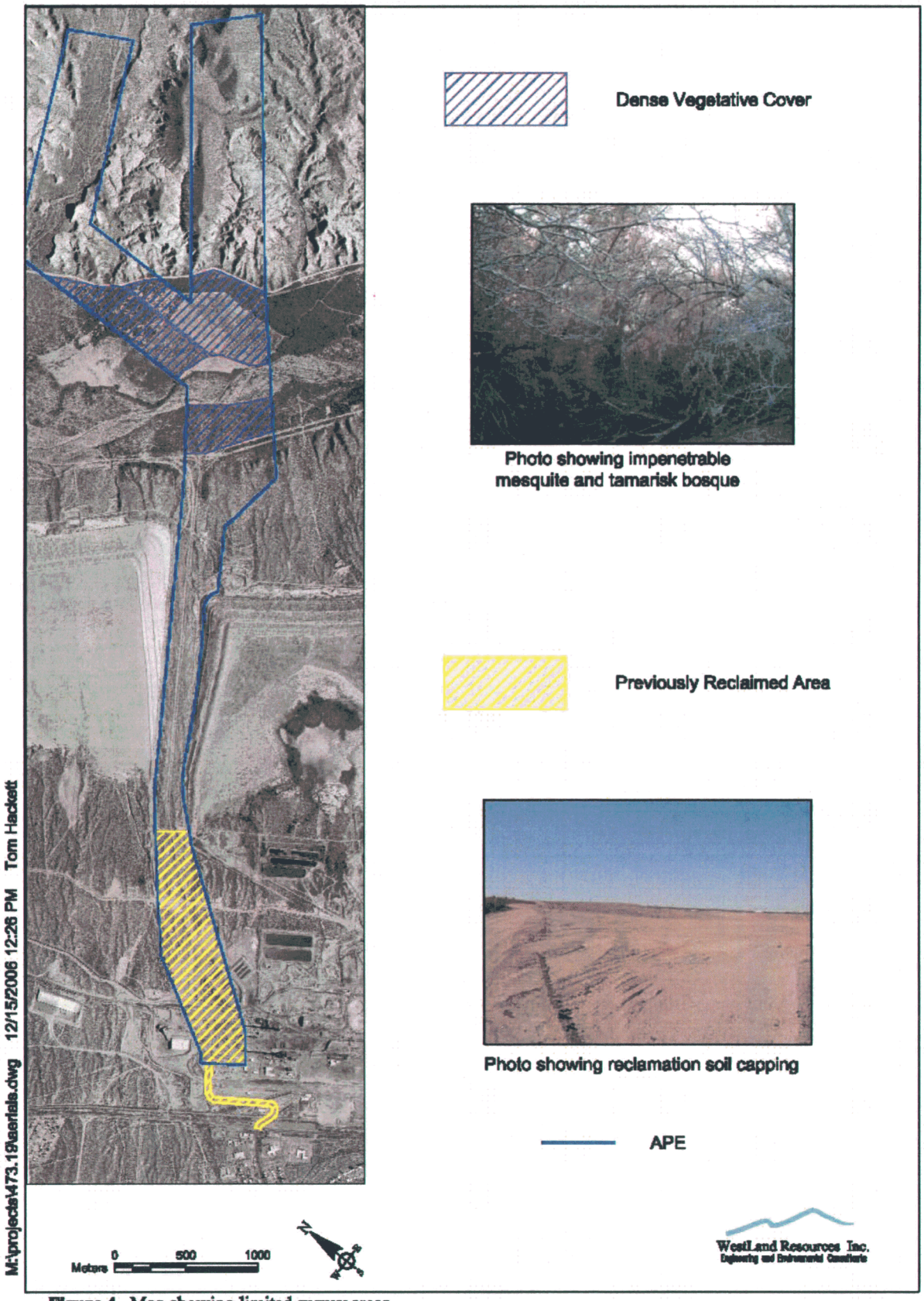


Figure 4. Map showing limited survey areas

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 or history.

Each site documented by WestLand during the survey has been evaluated for NRHP eligibility based on these criteria and following published National Park Service guidelines for applying these criteria (National Park Service 1990, 1997). If archaeological sites are deemed to have integrity and significance, then they are recommended as ***eligible*** for inclusion in the NRHP. If, however, archaeological sites lack significance, integrity, or both, then they are recommended as ***ineligible***. Reasons for the recommendations are also presented, including WestLand's professional opinion of future research potential through further investigations and the possible presence of human remains.

TASK 3. FINAL REPORT

This document constitutes the final report of the records search and field investigations and was prepared in accordance with Section 106 of the National Historic Preservation Act. The report includes detailed descriptions of all identified cultural resources in the APE. Maps are included for the project location, the location of previous sites and projects, and for each recorded site. 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 ASM for entry into their site files records and database (AZSITE). Any previously recorded sites encountered in the current project vicinity were reassessed, and updated information was provided to ASM. Final copies of this report will be sent to ASM.

RESULTS

SITE FILES SEARCH

Prior to fieldwork, a search was conducted of ASM records, including the online database AZSITE, to identify previous projects and previously recorded archaeological sites within the APE and a 1.6-km-wide (1-mi) buffer. Site information collected by the BLM had been previously transferred to ASM and made a records check at the BLM office in Tucson unnecessary.

Four ASM-registered projects have been conducted within 1.6 km (1 mi) of the APE ***(Table 1 and Figure 5)***. One of these surveys—ASM Project No. 1998-237—covered an area that is partially included within the present APE.

Table 1. Previously recorded projects within 1.6 km (1 mi) of the area of potential effect

Project Number	Project Name	End Date	Company or Agency	Reference
1998-237.ASM	**15 Miles of Road ROW on BLM Lands in the San Pedro Valley**	**09/26/88**	**SWCATCS**	**Euler 1998**
1989-59.ASM	San Manuel – Mammoth Underground	06/08/89	ACS	Adams 1989
1995-447.ASM	Arizona Electric Power Cooperative Apache to Hayden Transmission Line, Southeastern Arizona	12/03/95	SWCATCS	Phillips 1995
1999-438.ASM	BHP San Manuel Diversion Channel Project	10/19/99	SWCATCS	Hesse 1999

Note: *The project highlighted in bold partially falls within the present APE.*

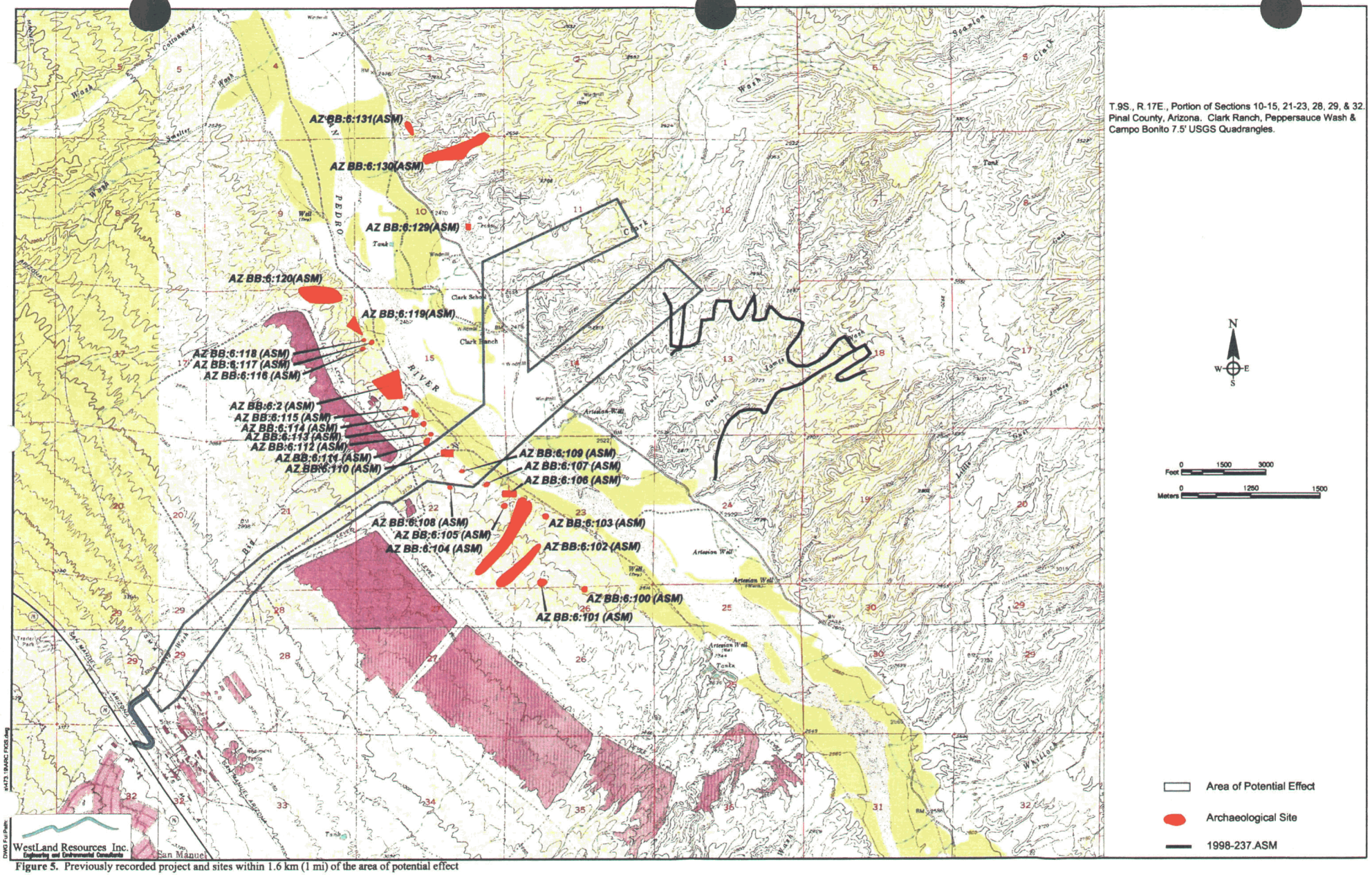


Figure 5. Previously recorded project and sites within 1.6 km (1 mi) of the area of potential effect

Twenty-five sites have been recorded within 1.6 km (1 mi) of the APE ***(Table 2 and Figure 5)***. Two of these sites—AZ BB:6:109 (ASM) and AZ BB:6:110 (ASM)—are located within the APE.

Table 2. Previously recorded sites within 1.6 km (1 mi) of the area of potential effect

Site Number	National Register	Cultural Affiliation and Site Type	Date Recorded	Reference
AZ BB:6:2(ASM)	not evaluated	Prehistoric – Native Archaeological Culture cremation, room block and ceramic artifact scatter	2/11/45	Haury (1947)
AZ BB:6:100(ASM)	not evaluated	Prehistoric – Native Archaeological Culture rock pile and ceramic artifact scatter	02/02/91	Site card on file at ASM
AZ BB:6:101(ASM)	not evaluated	Prehistoric – Native Archaeological Culture undefined rock alignment and rock pile	02/02/91	Site card on file at ASM
AZ BB:6:102(ASM)	not evaluated	Prehistoric – Native Archaeological Culture low-density rock pile	02/02/91	Site card on file at ASM
AZ BB:6:103(ASM)	not evaluated	Prehistoric – Native Archaeological Culture rock pile and low-density ceramic artifact scatter	5/5/1990	Site card on file at ASM
AZ BB:6:104(ASM)	not evaluated	Prehistoric – Native Archaeological Culture low-density rock pile	5/5/1990	Site card on file at ASM
AZ BB:6:105(ASM)	not evaluated	Prehistoric – Native Archaeological Culture one room structure, rock pile, and water control device	5/5/1990	Site card on file at ASM
AZ BB:6:106(ASM)	not evaluated	Prehistoric – Hohokam undefined depression, roasting pit, rock pile and low density ceramic artifact scatter	3/5/1990	Site card on file at ASM
AZ BB:6:107(ASM)	not evaluated	Prehistoric – Native Archaeological Culture undefined depression, undefined rock feature and low-density artifact scatter	5/5/1990	Site card on file at ASM
AZ BB:6:108(ASM)	not evaluated	Prehistoric – Native Archaeological Culture cremation, undefined rock pile and low-density artifact scatter	12/15/91	Site card on file at ASM
AZ BB:6:109(ASM)	**not evaluated**	**Prehistoric – Native Archaeological Culture undefined rock alignment, rock pile and low density artifact scatter**	**12/15/91**	**Site card on file at ASM**
AZ BB:6:110(ASM)	**not evaluated**	**Prehistoric – Hohokam /Salado cremation, mound structure, one room structure, pit house and wall**	**12/15/91**	**Site card on file at ASM**
AZ BB:6:111(ASM)	not evaluated	Prehistoric – Hohokam ceramic artifact scatter	12/01/91	Site card on file at ASM
AZ BB:6:112(ASM)	not evaluated	Prehistoric – Native Archaeological Culture ceramic artifact scatter	12/01/91	Site card on file at ASM
AZ BB:6:113(ASM)	not evaluated	Prehistoric – Hohokam undefined depression and midden with possible pit structure	12/01/91	Site card on file at ASM

Table 2. Previously recorded sites within 1.6 km (1 mi) of the area of potential effect

Site Number	National Register	Cultural Affiliation and Site Type	Date Recorded	Reference
AZ BB:6:114(ASM)	not evaluated	Prehistoric – Hohokam/Salado one room structure with high-density artifact scatter	12/01/90	Site card on file at ASM
AZ BB:6:115(ASM)	not evaluated	Prehistoric – Hohokam/Salado midden, pit house and roasting pit	12/01/91	Site card on file at ASM
AZ BB:6:116(ASM)	not evaluated	Prehistoric – Native Archaeological Culture midden, room block, and artifact scatter	12/01/90	Site card on file at ASM
AZ BB:6:117(ASM)	not evaluated	Prehistoric – Native Archaeological Culture undefined rock alignment and low-density artifact scatter	12/01/90	Site card on file at ASM
AZ BB:6:118(ASM)	not evaluated	Prehistoric – Native Archaeological Culture undefined rock alignment and rock ring	12/01/90	Site card on file at ASM
AZ BB:6:119(ASM)	not evaluated	Prehistoric – Native Archaeological Culture one room structure, roasting pit and soil control structure	12/01/90	Site card on file at ASM
AZ BB:6:120(ASM)	not evaluated	Prehistoric – Native Archaeological Culture low density rock pile	12/15/90	Site card on file at ASM
AZ BB:6:129(ASM)	not evaluated	Prehistoric – Native Archaeological Culture low-density lithic scatter and rock ring	11/03/90	Site card on file at ASM
AZ BB:6:130(ASM)	not evaluated	Prehistoric – Hohokam ball court, mound trash, pit house, undefined rock alignment, rock pile, soil control structure and water control structure	11/03/90	Site card on file at ASM
AZ BB:6:131(ASM)	not evaluated	Prehistoric – Native Archaeological Culture mound trash, one room structure and pit house	11/17/90	Site card on file at ASM

Note: *The sites highlighted in bold fall within the present APE.*

An additional significant archaeological survey/ research project has been carried out within the San Pedro River valley by the Center for Desert Archaeology (CDA). Archaeologists and volunteers under the guidance of William Doelle (1995) performed a partial pedestrian survey of the San Pedro River valley during the 1990s and recorded the bulk of the sites found within and near the present APE. The report outlining the survey and research results is in process, but Jefferey Clark of CDA was kind enough to provide WestLand with a copy of the draft *Synthesis* chapter (Clark et al. 2006). His help and expertise were gladly accepted.

GLO Records Search

The Homestead Act of 1862 and three subsequent, related laws—the Forest Homestead Act of 1906, the Enlarged Homestead Act of 1909, and the Stock Raising Homestead Act of 1916—established a framework by which United States citizens could obtain public land and transfer it to private ownership (Stein 1990). In order to fulfill the legal requirements of these Homestead Acts, the "entryman," as the person who filed the land claim was known, had to carry out several improvements to the land as well as reside permanently on it for a set period of time. The activities to "prove up"

(satisfy the legal requirements for) a homestead were confirmed by inspectors from the General Land Office (Stein 1990). The GLO kept the records of land transfers ("patents") as well as maps of the structures, roads, and other features of the landscape within the homesteads throughout the Western United States, including Arizona. The GLO records are now administered by the BLM and are an important source of information about historic period land use.

GLO records and maps of the APE were checked prior to the commencement of fieldwork, which were obtained from the BLM office in Phoenix in DVD digital format. Information on land patents, including the name of the patentee and patent date, were obtained from the GLO database available online at GLORECORDS.BLM.GOV.

The 1878 GLO map for Township 9S Range 17E, G&SRB&M was reviewed prior to fieldwork ***(Figure 6)***. The map reveals the house of a certain Peter Sullivan in the Northeast ¼ of Section 15. This is the exact location of the present-day Clark Ranch, a homestead dating to at least 1895, that was recorded by WestLand on the present survey and described below (AZ BB:6:234 [ASM]). The GLO map also shows the house of John Sullivan, presumably a relative of Peter Sullivan, within the Southwestern ¼ of Section 24; however, it is located outside of the APE and was not visited by WestLand personnel. The 1878 map also shows a road that follows the east side of the San Pedro River, slightly southwest of the present alignment of River Road (AZ BB:6:239 [ASM]). No other historical features are mapped within or adjacent to the APE on the 1878 map; however, an approximately 30-ac agricultural field is shown in the Southwestern ¼ of Section 14, in the future location of the Clark Ranch agricultural fields.

The BLM records were also searched for land patent information within the APE. The results of this search are displayed in ***Figure 7***. The Sullivans shown on the 1878 GLO map appear to have moved on, as they did not patent any land within or adjacent to the APE.

OTHER HISTORICAL RECORDS

Because the APE lies outside of any large metropolitan areas, very few records detail its historical development. Nevertheless, the following records were searched for evidence of historical development within the APE.

1935 and 1955 Aerial Photographs

The 1935 Fairchild aerial photograph collection and an unnamed 1955 aerial photograph collection—both housed at the Arizona Geologic Survey—were reviewed for historical photographs of the APE. The Fairchild collection, which contains some of the earliest aerial photographs taken in Arizona, was named for an early aerial photography company. The source of the 1955 aerial photographs is not known by AZGS personnel. Black and white aerial photographs of the APE were found in both collections.

The 1935 aerial photograph of the APE showed the Clark Ranch (AZ BB:6:234 [ASM]), the historic house made of gypsum block (AZ BB:6:235 [ASM]), River Road (AZ BB:6:239 [ASM]), and the Clark Wash two-track road (AZ BB:6:240 [ASM]). The abandoned agricultural fields that surround the Clark Ranch today are also visible in an identical configuration on the 1935 aerial.

The 1955 aerial shows the above-mentioned properties as well as the Arizona Public Service (APS) power line alignment (AZ BB:6:241 [ASM]) and the building of the San Manuel Plant Site.

Arizona Historical Society

Historical records administered by the Arizona Historical Society were briefly reviewed following completion of the survey. Limited information was available on historic ranching and homesteading in the vicinity of the APE. A more exhaustive search of these archives by future researchers will likely reveal additional historical information on the sites discovered in the APE.

FIELD SURVEY

On November 14 through December 7, 2006, WestLand archaeologists Avi Buckles, Gaylen Tinsley, Erich Wright, Adam Horne, and Michael Coughlan conducted the fieldwork for the Class III cultural resources survey. Eleven newly recorded sites, AZ BB:6:231–241 (ASM) were identified. Two previously recorded sites, AZ BB:6:109 (ASM) and AZ BB:6:110 (ASM), were reassessed and remapped. Forty-one isolated occurrences (IOs) of artifacts (and/or features) were recorded in the APE that did not meet the ASM minimum standards for recording as a site. Descriptions of these IOs are listed in ***Table 3***. The locations of the sites and IOs are presented in ***Figure 8***.

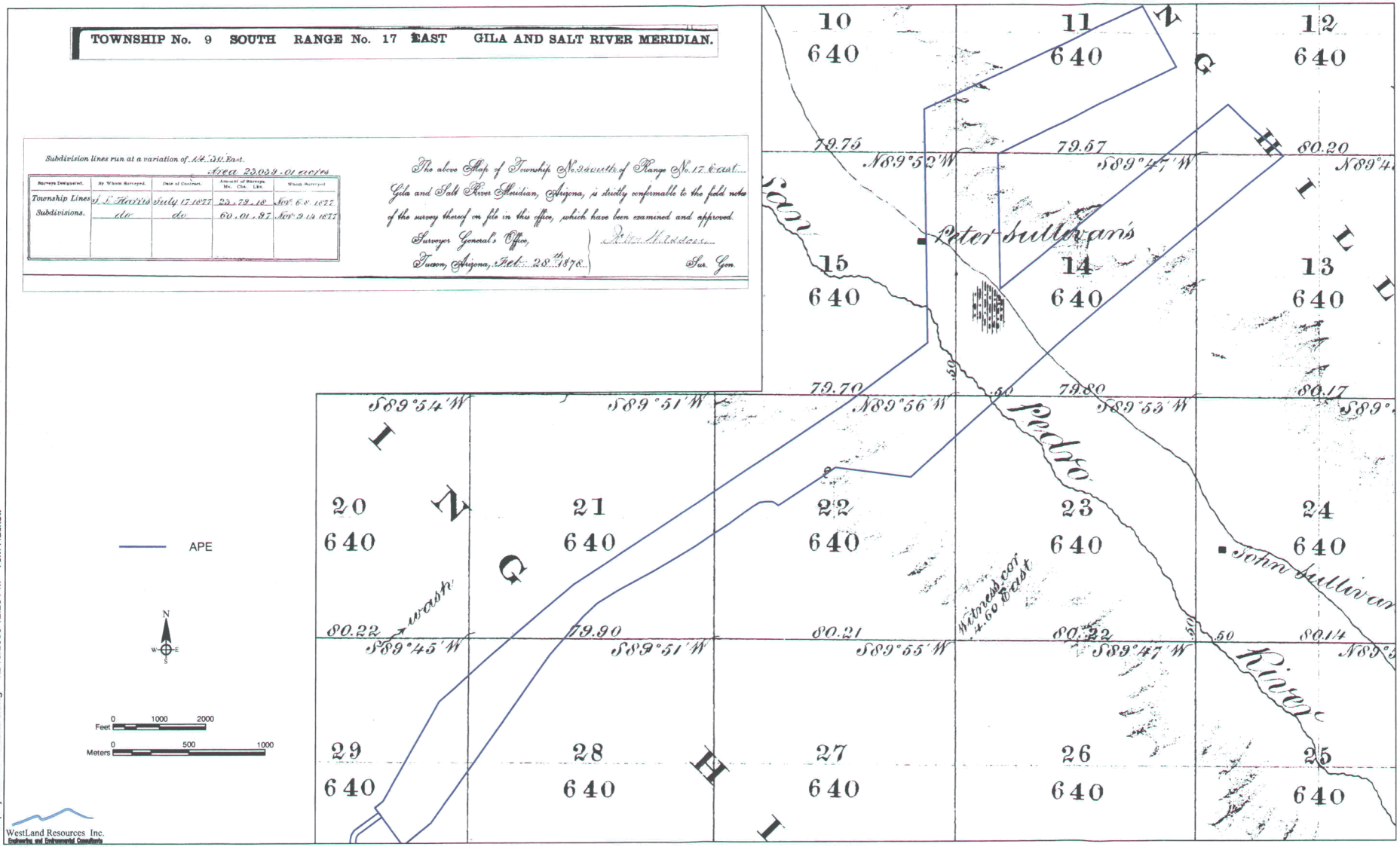
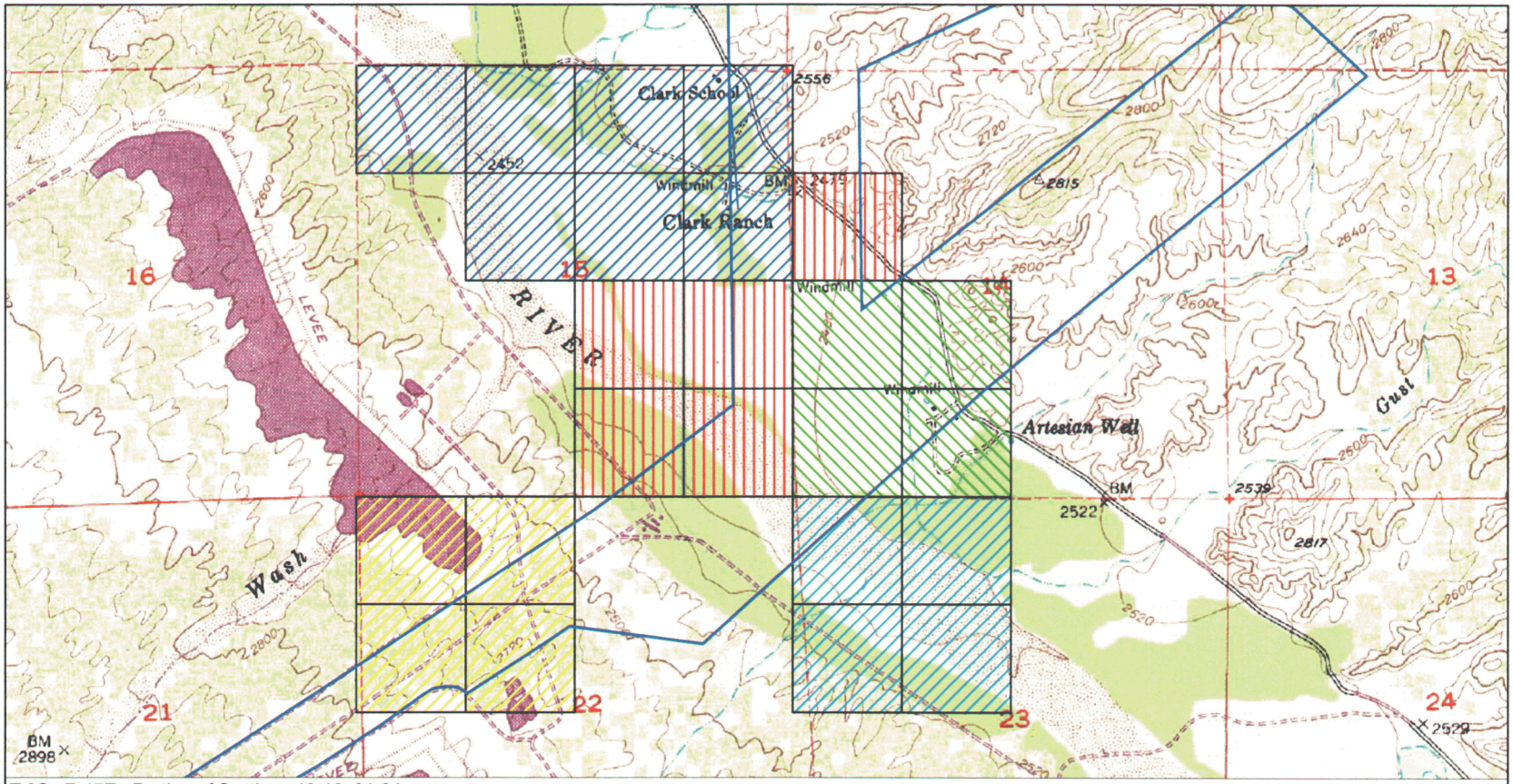


Figure 6. 1878 GLO plat



T.9S., R.17E. Portion of Sections 10-16, 21-24
Clark Ranch USGS 7.5' Quadrangle

1/4 1/4 section

APE

Patented by Joseph Clark, 1895 and 1901

Patented by John Kennedy, 1891

Patented by George J. Acton, 1894 and 1897

Patented by George M. Williams, 1891

Patented by Isaac Laurin, 1890

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WestLand Resources Inc.
Engineering and Environmental Consultants

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Figure 7. Historic homestead land patents within portions of the area of potential effect

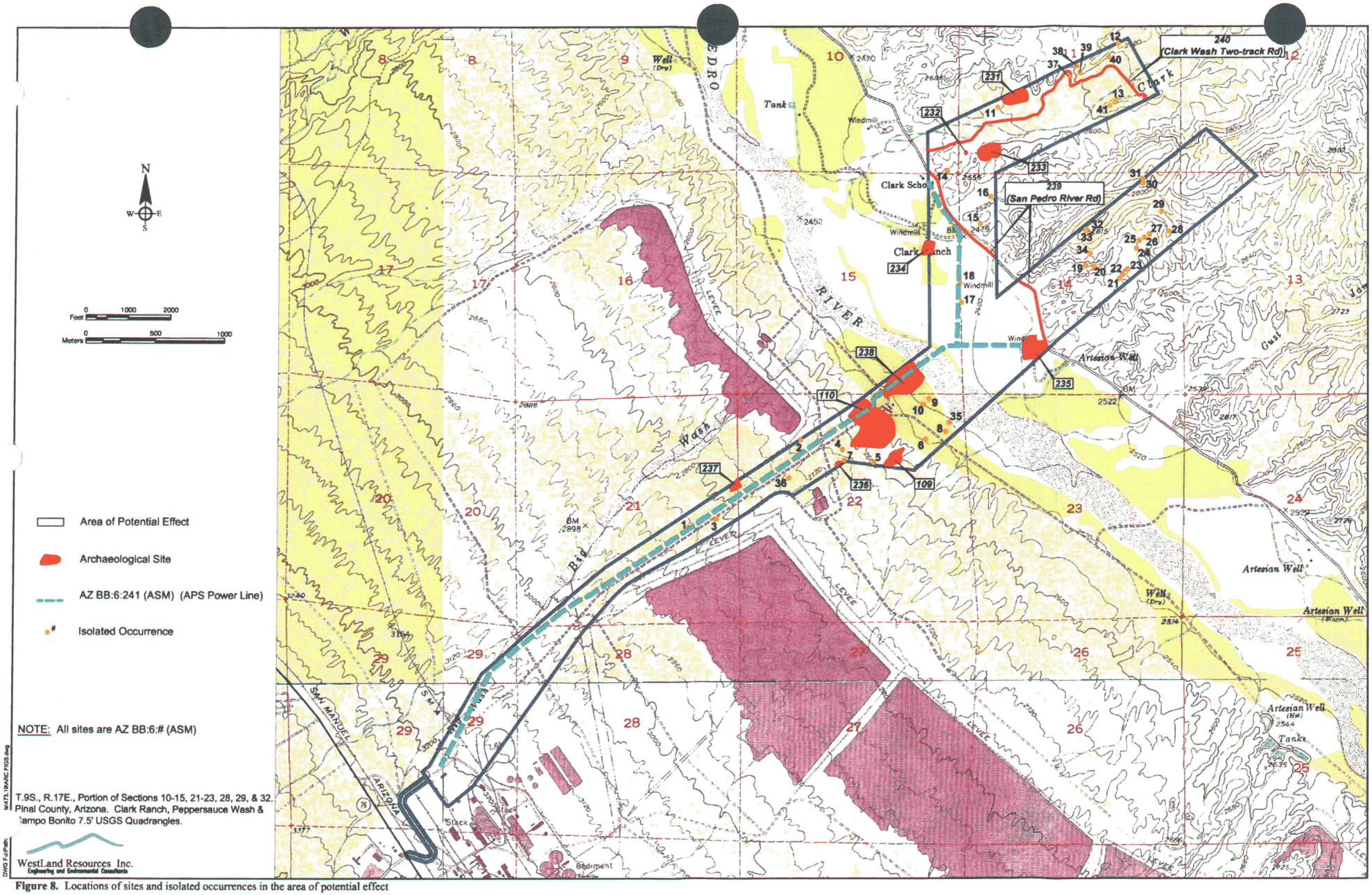

Figure 8. Locations of sites and isolated occurrences in the area of potential effect

Table 3. Isolated occurrences in the APE

IO #	Description
1	Corrugated body sherd located on road berm
2	Brown ware body sherd located in mechanically disturbed area
3	Bifacial chopper, gray rhyolite
4	Corrugated brown ware body sherd
5	Brown ware body sherd
6	Corrugated brown ware body sherds (n=2)
7	Brown ware body sherds (n=3)
8	Brown ware body sherds in 40-m² area (n=15)
9	Brown ware body sherds located in thick bosque (n=18)
10	Brown ware body sherds (1 corrugated), located in thick bosque (n=10)
11	1 multi-directional basalt core and 1 brown ware body sherd
12	Basalt primary flake
13	White chert primary flake
14	1930s car parts
15	Rhyolite multi-directional core
16	Rhyolite primary flake
17	Stoneware sherd
18	Stoneware sherds (n=3) and 1 piece of window glass
19	Purple rhyolite core, ~ 15 flakes. Possible primary reduction station
20	Brown ware body sherd
21	Purple rhyolite primary flakes (n=2), green metasediment primary flake
22	Green metasediment multi-directional core and 1 basalt primary flake
23	Basalt (n=1) and rhyolite (n=1) primary flakes
24	Rhyolite primary flake

Table 3. Isolated occurrences in the APE

IO #	Description
25	Rhyolite primary flake and white rhyolite multi-directional core
26	White rhyolite primary flake
27	Basalt unifacial chopper
28	Basalt primary flake
29	Pot-break of obliterated corrugated brown ware
30	Pot-break of obliterated corrugated brown ware
31	Axe-cut fence posts (n=5) cache
32	1946 USGS "Clark" benchmark
33	Brown ware body sherd (n=1) and rhyolite primary flake
34	Brown ware pot-break of interior slipped (orange-red) bowl made of gray/brown paste with sand temper and rhyolite cores (n=5)
35	Gila polychrome sherd, brown ware body sherds (n~15), and basalt primary flakes in a 30-m-diameter area located on the edge of an alluvial fan that drops to the San Pedro River floodplain
36	Thermal feature made up of 10 FCR and charcoal-stained soil
37	Deflated rock pile, 5 FCR
38	Deflated rock pile, 20 FCR
39	Cairn, 1.2 m diameter, 30 cobbles, 2 courses high
40	Cairn, 0.75 m diameter, 25 cobbles, 5 courses high
41	Cairn, 1.0 m diameter, 40 cobbles, 5 courses high

A description of each reevaluated and newly recorded site is provided below, along with recommendations as to its eligibility for inclusion in the National Register of Historic Places and its future research potential.

NRHP-Eligible Sites

Site AZ BB:6:109 (ASM)

Cultural Affiliation: Salado

Site Period: Late Formative

Site Type: Agricultural/habitation

Site Size/Area: 95 × 177 m/16,815 m²

Site Description: Site AZ BB:6:109 (ASM) *(Figure 9)* was originally recorded by the Center for Desert Archaeology in 1991 during a survey of the San Pedro River valley (ASM Site Card). The 1991 site description matches the present condition of the site; however, rock piles that were not included in the original site dimensions have been included in the current dimensions. The site consists of a possible cobble-lined structure and associated artifact scatter and 10 likely agricultural rock piles. AZ BB:6:109 (ASM) continues beyond the APE, to the south, and may connect with another CDA-recorded site, AZ BB:6:108 (ASM), an artifact scatter containing one rock cluster and an eroding cremation. This updated site information will be supplied to the ASM Archaeological Records Office.

Site Location: The site is located on the flat top and sloping sides of a finger ridge that overlooks the west side of the San Pedro River, near San Manuel, Arizona. Geologically, this area is located on the rocky to sandy deposits of the lower bajada emanating from the Santa Catalina Mountains to the south. The San Pedro River channel is located less than ½ km to the northeast of the site, and the river's floodplain and a verdant, mesquite bosque are within several hundred meters of the site.

Site Condition: The site has been subject to moderate erosion (sheetwash), cattle trampling, and bioturbation. The possible cobble structure does not appear potted.

Features: Twelve cultural features were observed at the site *(Table 4)*. This includes 10 agricultural rock piles (Features 1–5 and 8–11) *(Photo 3)* and a rock alignment that probably represents the remains of a cobble-outlined room (Feature 12). The area adjacent to the alignment is cleared of gravels and contains the highest density of artifacts on the site.

Photo 3. Example of a rock pile at AZ BB:6:109 (ASM)

Table 4. Surface features identified at AZ BB:6:109 (ASM)

Feature No.	Feature Type	Dimensions (m) l × w × h	Description
1	rock pile	1.0 × 1.0 × 0.1	ca. 50 sub-angular cobbles, 10–15 cm diam; 1 course
2	rock pile	2.0 × 1.95 × 0.15	ca. 200 sub-angular cobbles, 10–15 cm diam; 2 courses
3	rock pile	1.0 × 1.0 × 0.1	ca. 75 sub-angular cobbles, 10–15 cm diam; 1 course
4	rock pile	1.5 × 1.0 × 0.15	ca. 100 sub-angular cobbles, 10–15 cm diam; 2 courses
5	rock pile	2.0 × 1.5 × 0.15	ca. 200–300 sub-angular cobbles, 5–10 cm diam; 2 courses
6	FCR concentration	1.0 × 1.2 × 0.10	ca. 30 fire-affected cobbles, embedded in substrate
7	rock pile	1.0 × .8 × 0.1	ca. 50 sub-angular cobbles, 10–15 cm diam; 1 course
8	rock pile	1.2 × 1.2 × 0.15	ca. 75 sub-angular cobbles, 10–15 cm diam; 1 course
9	rock pile	0.75 × 0.5 × 0.1	ca. 30 sub-angular cobbles, 10–15 cm diam; 1 course
10	rock pile	1.1 × 0.9 × 0.2	ca. 100 sub-angular cobbles, 10–15 cm diam; 2–3 courses
11	rock pile	1.0 × 0.9 × 0.1	ca. 100 sub-angular cobbles, 10–15 cm diam; 2 courses
12	rock alignment/ probable structure	3.0 × 3.0 × 0.15	line of upright, rounded cobbles adjacent to gravel-cleared, artifact-dense area

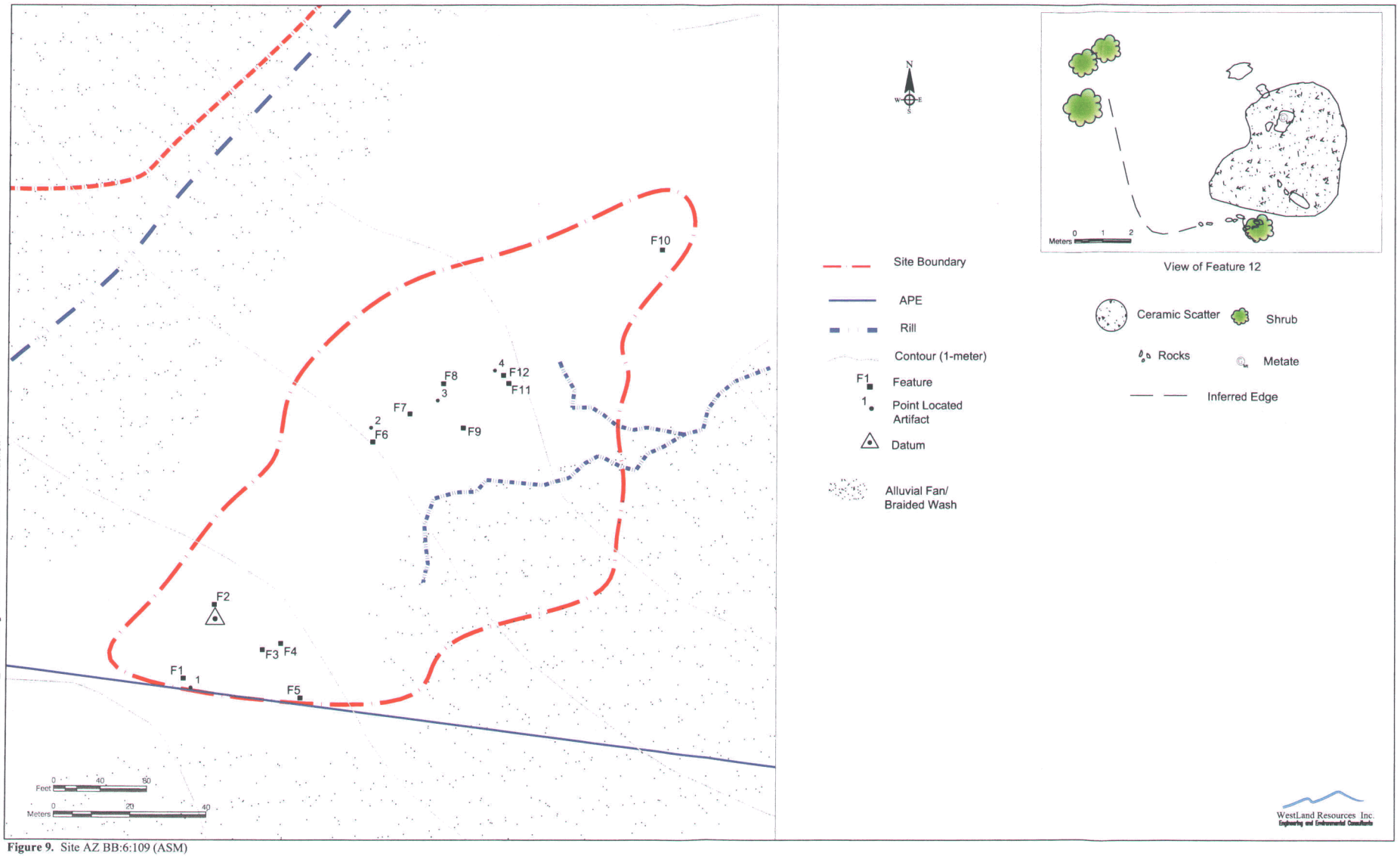

Figure 9. Site AZ BB:6:109 (ASM)

Artifacts: An estimated 500 to 600 artifacts were observed on the site's surface. These artifacts consisted of over 500 ceramics and included brown wares, corrugated brown wares, and approximately 100 obliterated corrugated brown ware sherds. Vessel forms included both jars and bowls, with restricted forms dominating. Between 50 and 100 flaked stone artifacts of basalt and rhyolite were also identified. Stone tools observed on the surface included a schist tabular tool (PL 1) and a whole granite metate (PL 4). Four of the artifacts were point-located ***(see Table 5 and Figure 9)***.

Table 5.
Point-located artifacts on surface of Site AZ BB:6:109 (ASM)

PL	Artifact Type
1	Schist tabular tool with non-serrated use surface
2	Unifacial chopper (basalt)
3	Core (basalt)
4	Flat-concave metate (granite)

Site Interpretation: AZ BB:6:109 (ASM) may represent a Late Formative period Salado agricultural rock pile field and associated fieldhouse. The presence of the plant-processing tools supports this conjecture. The site is likely related to Site AZ BB:6:108 (ASM) and Site AZ BB:6:110 (ASM), a Salado compound located just north of the site.

Site Integrity: The site has been minimally disturbed by natural processes, and no evidence of potting was noted.

Research Potential/National Register Status: Some of the rock pile features may retain subsurface components that contain botanical remains which could be used to determine the function of the rock piles. It is also possible that the rock alignment represents a cobble structure. Site AZ BB:6:109 (ASM) can potentially add to our understanding of Late Formative period subsistence and settlement patterns (Research Theme Nos. 3 and 5) and migration (Research Theme No. 2) in the San Pedro River valley and is, therefore, recommended as ***eligible*** for inclusion in the National Register of Historic Places under Criterion D.

Site AZ BB:6:110 (ASM)

Cultural Affiliation: Salado

Site Period: Late Formative

Site Type: Habitation/agricultural

Site Size/Area: 343 × 348 m/119,364 m²

Site Description: Site AZ BB:6:110 (ASM) *(Figure 10)* was originally recorded by the Center for Desert Archaeology in 1991 during a survey of the San Pedro River valley (ASM Site Card). The present condition of the site matches the description given on the 1991 site card. However, only the compound area was mapped in 1991, and the current survey discovered that the site is much more extensive than previously believed. The site consists of a distinct Salado compound, three rooms isolated from the compound area, a checkdam, four agricultural rock piles, and an extensive artifact scatter. Portions of the site are located in alluvial and colluvial deposits within braided wash areas and may contain buried features. The expanded site boundaries will be supplied to the ASM Archaeological Records Office.

Site Location: The site is located on two distinct landforms. The Salado compound is located on the distal end of a flat, rocky finger ridge emanating from the Santa Catalina bajada. This ridge overlooks the San Pedro River and a thick mesquite bosque less than ¼ km to the northeast. The lower areas of the site—northeast and southwest of the finger ridge—consist of alluvial and colluvial sediments. These areas are cut by two large, braided washes, the one to the west being Big Wash.

Site Condition: AZ BB:6:110 (ASM) has been subject to a high degree of disturbance. First, the site has been heavily potted. Every cobble room appeared to have been looted to some degree, with both mechanical (e.g., a backhoe) and manual excavations, which made mapping and interpretation of the site very difficult. However, much of the subsurface component may still remain in situ, particularly outside of the obvious surface features. Second, the area west of the compound has been disturbed by road construction, berms for flood control, and natural erosion. Third, it is possible that the San Pedro pumphouse (part of the San Manuel Plant Site) located between this site and Site AZ BB:6:638 (ASM) may have impacted the site. However, no evidence of such disturbance was observed.

Features: Eleven distinct cultural features were observed at the site *(Table 6)*, although the disturbed nature of the site made inventory difficult. The cultural features included 4 agricultural rock piles (Features 1–4), a checkdam (Feature 10), a large midden (Feature 6), a compound wall (Feature 5) *(Photo 4)*, and at least 20 cobble-outlined rooms (including Features 7, 8, and 9 and the unnumbered potted rooms).

Table 6. Surface features identified at AZ BB:6:110 (ASM)

Feature No.	Feature Type	Dimensions (m) l × w × h	Description
1	rock pile	2.0 × 2.0 × 0.1	ca. 200 sub-angular cobbles, 5–10 cm diam; 1 course
2	rock pile	2.1 × 1.8 × 0.1	ca. 250 sub-angular cobbles, 5–10 cm diam; 1 course
3	rock pile	1.0 × 0.9 × 0.5	ca. 40 sub-angular cobbles, 5–10 cm diam; 1 course
4	rock pile	1.1 × 0.9 × 0.5	ca. 60 sub-angular cobbles, 5–10 cm diam; 1 course
5	compound wall segments	see map	upright cobbles along ridge edge enclosing room block
6	Midden	20 × 25	thousands of artifacts
7	cobble-outlined structure	5 m long	6 upright rounded cobbles forming wall; 30 other cobbles spread out (possible wall-fall)
8	architectural stone rubble pile	ca. 5 × 5	possible separate structure east of compound in braided wash
9	cobble-outlined structure	ca. 10 × 10	2 room blocks with upright cobbles east of main compound in braided wash
10	checkdam	3 × 0.3	rounded cobbles exposed in small rill
11	room block	see map	disturbed (looted) room blocks within Feat.5 wall segments

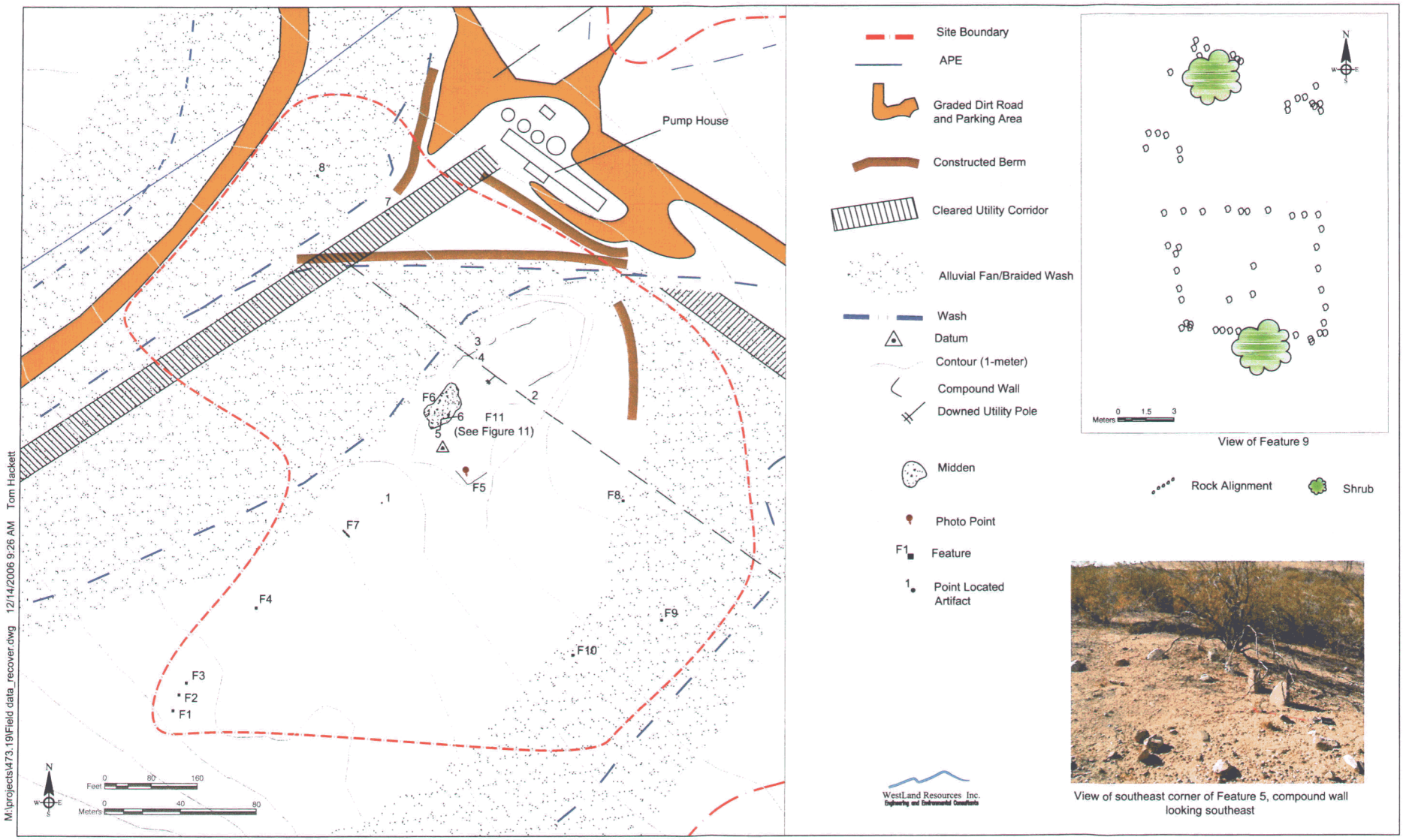

Figure 10. Site AZ BB:6:110 (ASM), Salado Compound site

Photo 4. Feature 5 compound wall segment, looking northeast, Site AZ BB:6:110 (ASM)

Feature 5, the possible compound wall, consisted of five main visible segments *(see Figure 10)* of rounded cobbles embedded 10 to 20 cm in the ground (no adobe melt was observed). These wall segments followed the edge of the finger ridge and enclosed multiple rooms in what appeared to be a room block (Feature 11) *(Figure 11)*. The area inside the compound wall is highly disturbed from intense potting that has likely spanned generations. This disturbance—including numerous identifiable potholes—prevented a reliable determination of individual room orientations; thus a single feature number (11) was assigned to all of these rooms. Three additional rooms were recorded outside of the compound wall. Two of these are east of the compound wall (Features 8 and 9) in a braided wash area. Feature 9 probably represents two rooms, but this was difficult to determine from surface observations. The other room (Feature 7) was located southwest of the compound wall on the ridge top. The midden, Feature 6, was located on the western edge of the compound wall and measured approximately 20 × 25 m. The midden had been extensively looted, but still contained several thousand artifacts, including both burnt and unburned human bone, shell, ceramics, and stone artifacts. It was distinguishable from other portions of the site by a heavier artifact concentration mixed with liberal amounts of ash and charcoal. A looter's pickaxe was also found within the midden.

Artifacts: Field observations estimated between 20,000 and 25,000 artifacts present on the site's surface. Ceramic artifacts consisted of thousands of corrugated and obliterated corrugated brown ware sherds, hundreds of red ware sherds, hundreds of interior-polished smudged brown ware sherds, two interior red-slipped obliterated corrugated brown ware bowl sherds, and two Gila polychrome sherds. Stone artifacts consisted of at least 10 trough metate fragments, 10 basin metate fragments, a basalt shaft straightener *(see Photo 5)*, hundreds of lithic cores and expedient tools, and thousands of primary, secondary, and tertiary flakes of basalt, rhyolite, and quartzite. Although most of the artifacts were discovered near the compound area, numerous artifacts were found in the depositional areas below and adjacent to the compound.

Photo 5. PL 8, basalt shaft straightener, Site AZ BB:6:110 (ASM)

The depositional area to the north and west of the compound contained a higher density of artifacts than the area northeast of the compound and may contain buried features. Due to the sheer number of diagnostic artifacts and tools, not all were point-located. Eight of the artifacts were point-located *(see Table 7 and Figure 10)*.

Table 7.
Point-located artifacts on surface of Site AZ BB:6:110 (ASM)

PL	Artifact Type
1	Partial Tanque Verde red-on-brown bowl
2	Tabular tool (unknown igneous material)
3	Calcined human bone adjacent to an incised brown ware sherd (Mogollon?)
4	Trough metate fragment (vesicular basalt)
5	Unworked marine shell fragment
6	Unburned human long bone fragment
7	*Glycemeris* sp. shell bracelet fragment
8	Shaft straightener (basalt)

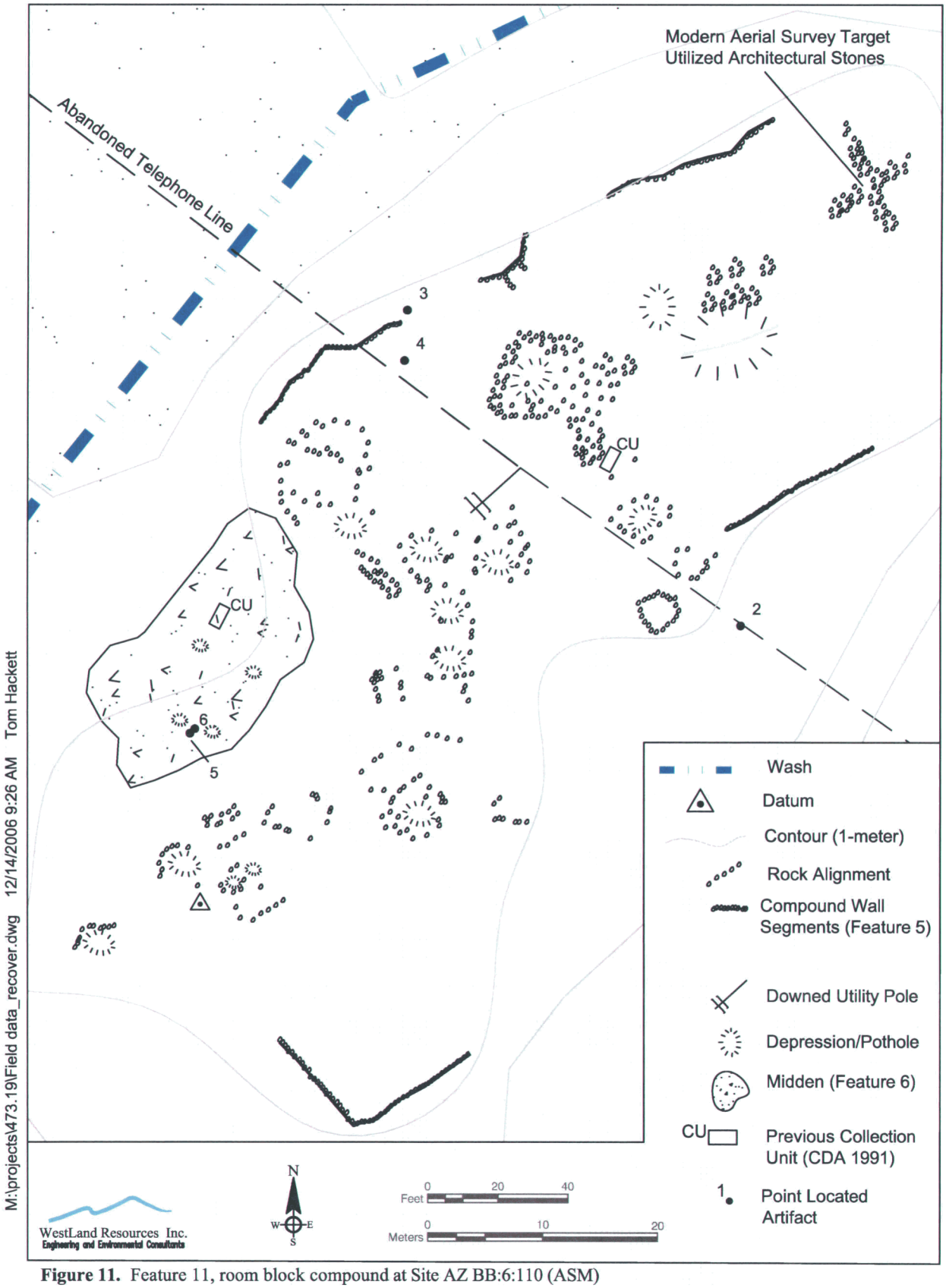

Figure 11. Feature 11, room block compound at Site AZ BB:6:110 (ASM)

Site Interpretation: Site AZ BB:6:110 (ASM) is a large Salado compound with associated agricultural rock piles. The isolated cobble structures east of the site may be the remains of fieldhouses where the individuals who tended the crops growing in the braided wash area lived. The artifact scatter within this depositional environment may be eroding from buried cultural deposits.

Site Integrity: The site has been intensively potted over generations, as indicated by the types of beverage containers on the site, and the compound area has received the brunt of this vandalism. However, undisturbed portions of the features are likely present, as well as buried features outside of the compound area. The site therefore retains integrity.

Research Potential/National Register Status: This large Salado compound has the potential to contribute significant information on all of the prehistoric period research themes (Research Theme Nos. 1 through 7) outlined earlier in this report. The site is therefore recommended as ***eligible*** for inclusion in the National Register of Historic Places under Criterion D.

Site AZ BB:6:231 (ASM)

Cultural Affiliation: Native American

Site Period: Formative; possibly Late Formative

Site Type: Limited activity, agricultural

Site Size/Area: 169 m × 100 m/16,900 m²

Site Description: Site AZ BB:6:231 (ASM) *(Figure 12)* is a low- to moderate-density artifact scatter associated with one rock cluster (Feature 1) and one possible checkdam (Feature 2).

Site Location: The site is located on a series of small ridges in the northern portion of Clark Wash, a large, braided wash that empties into the San Pedro River 1 km to the southwest. Clark Wash begins in the Galiuro Mountains to the north of the APE and cuts deeply into the bajada emanating from those mountains. The site is situated on a white, chalky, gypsum-rich sterile substrate that is highly eroded, forming a "badlands" environment.

Site Condition: The site has been moderately to highly disturbed by site formation processes, including erosion, cattle trampling, and off-road motorcycle use. Erosion of the organic horizon has caused artifacts and features to deflate onto the sterile substrate, a common occurrence in the portion of the APE that lies east of River Road. However, areas within the site that exhibit less deflation may contain intact cultural deposits. The eastern portion of the site contains the least erosion.

Features: Two features, a rock cluster (Feature 1) and a possible checkdam (Feature 2), were identified within the site.

Feature 1. This feature is composed of 30 rhyolite and basalt cobbles (~20 cm in diameter) randomly arranged in a 50-cm-diameter area. The cobbles did not exhibit any thermal alteration, and the feature contained one course of cobbles. The cobbles were embedded approximately 3 cm in the substrate. Although no evidence of thermal alteration was present, this rock cluster likely served as a thermal feature (i.e., a single-use roasting feature).

Feature 2. This feature is a 2-m-long rock alignment composed of approximately 10 large (~40 cm in diameter) igneous cobbles. This possible checkdam was aligned approximately east-west and placed perpendicularly to a small, active rill. The cobbles were moderately embedded (~4 cm) in the substrate. This feature is shown in *Photo 6.*

Photo 6. Feature 2, a checkdam, at AZ BB:6:231 (ASM)

Artifacts: Two-hundred pieces of lithic debitage, 10 ceramic sherds, 2 lapstones, and 1 metate fragment were present on the site surface. The lithic debitage was mostly composed of primary and secondary flakes of fine-grained basalt, rhyolite, and quartzite. Several secondary and tertiary flakes of banded red chert were also noted. Several tested cobbles, multi-directional cores, and unifacial chopping tools were also present. The artifact assemblage indicates that lithic reduction activities occurred at this site, likely using cobbles found in the active channel of Clark Wash.

The ceramic assemblage was dominated by brown ware sherds tempered with sand. One obliterated corrugated brown ware sherd was also present, indicating a Late Formative period occupation, as were two complete lapstones and a trough metate fragment, both produced of a dark, igneous material. The lapstones show evidence of both pecking and grinding and may have been either used for food processing or in lithic reduction activities (i.e., as a lithic anvil). *Table 8* summarizes the point-located tools on the site surface.

Table 8. Point-located artifacts at AZ BB:6:231 (ASM)

PL	Artifact Type
1	Lapstone with pecking (igneous rock)
2	Unifacial chopper (basalt)
3	Lapstone with pecking and one grinding surface (igneous rock)
4	Unifacial chopper (basalt)
5	Hammerstone (basalt)
6	Trough metate fragment (igneous rock)
7	Multi-directional core (rhyolite)
8	Multi-directional core (basalt)
9	Unidirectional core (rhyolite)

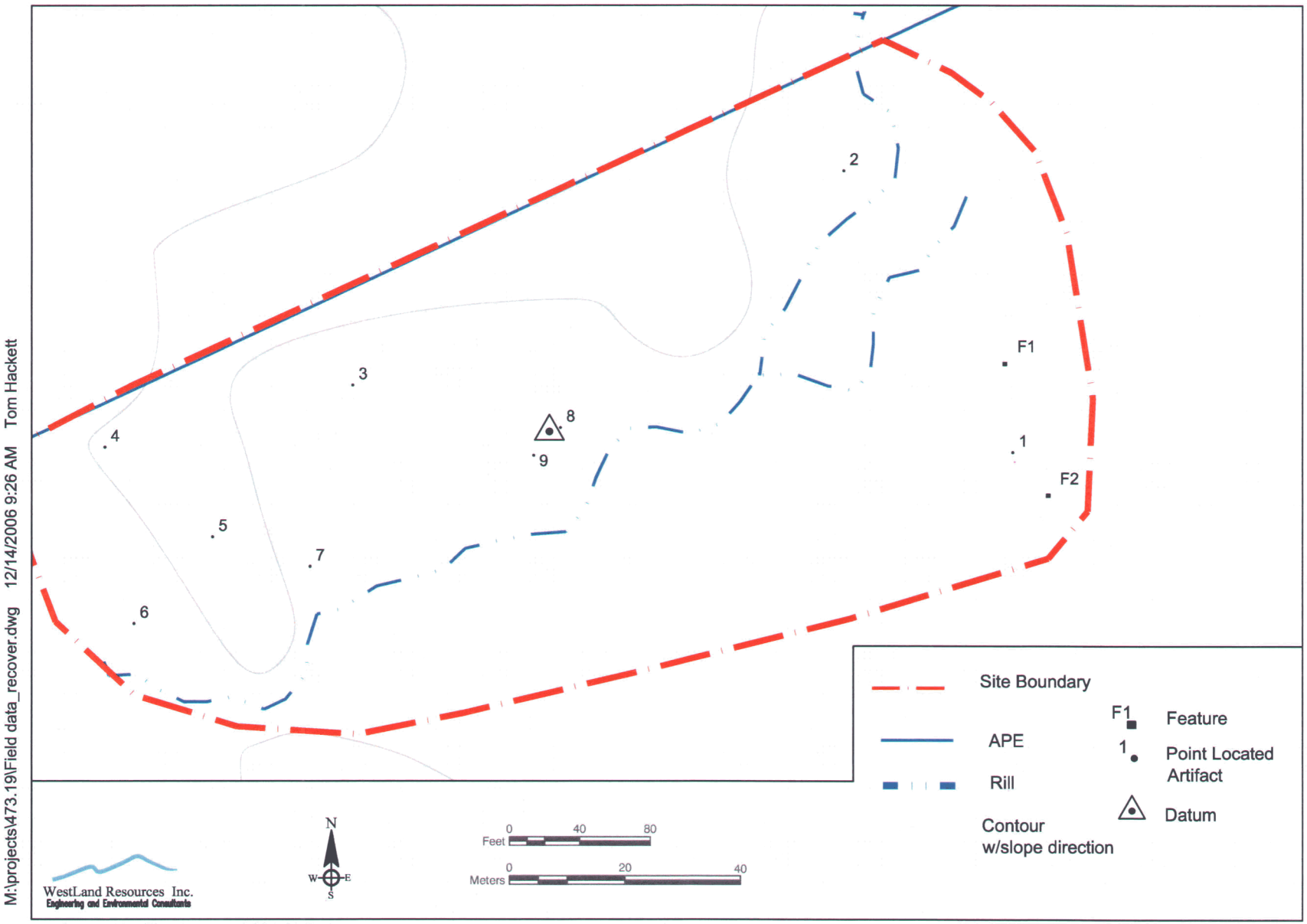

Figure 12. Site AZ BB:6:231 (ASM)

Site Interpretation: AZ BB:6:231 (ASM) was likely a temporary campsite where wild foods were processed (i.e., a cactus camp) as evidenced by the presence of food-processing tools (i.e., the ground stone and unifacial choppers). The site may also have served as a lithic material-reduction area using cobbles collected in Clark Wash. Lastly, the checkdam may indicate a dry-farming agricultural component to the site.

Site Integrity: Although AZ BB:6:231 (ASM) has been moderately disturbed by erosion (i.e., widespread sheetwash resulting in the deflation of some of the site), cattle, and off-road vehicle use, the site may still contain valuable information about prehistory. The rock features appear intact, and subsurface components may be present. The artifacts appearing on the site surface could offer valuable insight into site usage and settlement patterns in the San Pedro River valley. The site therefore retains integrity.

Research Potential/National Register Status: AZ BB:6:231 (ASM) has the potential to provide information on the subsistence patterns and settlement patterns (Research Theme Nos. 3 and 5) of the Late Formative period occupants of the San Pedro River valley. The site is therefore recommended as ***eligible*** for inclusion in the National Register of Historic Places under Criterion D.

Site AZ BB:6:232 (ASM)

Cultural Affiliation: Native American

Site Period: Formative period

Site Type: Limited activity

Site Size/Area: 29 × 21 m/609 m²

Site Description: Site AZ BB:6:232 (ASM) *(Figure 13)* is a low-density lithic and ceramic scatter clustered around a deflated FCR concentration.

Site Location: The site is situated on the flat top of an eroded finger ridge near the distal end of the bajada emanating from the south side of the Galiuro Mountains. It is located approximately ½ km northeast of the San Pedro River and overlooks Clark Wash to the north.

Site Condition: The site has been significantly disturbed by erosional processes that have resulted in the deflation of the site onto a white, chalky, gypsum-rich sterile substrate.

Features: One dispersed, deflated FCR concentration was discovered and is described below *(see Photo 7)*.

Photo 7. Feature 1, a deflated FCR concentration at AZ BB:6:232 (ASM)

Feature 1. This feature is a highly deflated FCR concentration. It measures 3.5 m in diameter and contains approximately 100 pieces of FCR of igneous material ranging from 10 to 15 cm in diameter. Several brown ware sherds from a seed jar were present in the feature.

Artifacts: Approximately 50 pieces of lithic debitage were present at the site. These were exclusively primary and secondary flakes of basalt, rhyolite, and quartzite. Three brown ware sherds with sand temper were scattered throughout the site area. Two brown ware seed jar sherds with a dark brown paste and a highly polished interior surface were noted within Feature 1 and may be of the Mogollon ceramic tradition. An additional 20 pieces of FCR were also present, indicating that thermal features may have been present, but which are now dispersed. No point-located tools were identified on the site.

Site Interpretation: AZ BB:6:232 (ASM) was likely a resource-processing site where wild food resources were roasted or cooked in the thermal feature (i.e., the FCR concentration). The presence of a moderate amount of artifacts indicates that the site may have been used over a period of time or was revisited during several seasonal rounds.

Site Integrity: Feature 1 appears eroded and deflated, and the lack of feature fill means that prehistoric macrobotanical remains may not be found within the feature. Therefore, the potential for gleaning information on plant species or chronology is likely negligible. The possibility of finding additional buried features and deposits in the highly eroded portions of the bajada landform is also highly unlikely, but not impossible. Artifacts are present that could contribute to our understanding of the prehistoric activities that took place at the site. The possibility of subsurface remains appears low, but this cannot be definitively determined without further investigation. The site retains sufficient integrity for future research.

Research Potential/National Register Status: AZ BB:6:232 (ASM) has the potential to contribute to our understanding of the subsistence activities and settlement patterns (Research Theme Nos. 3 and 5) of the prehistoric peoples who inhabited this portion of the San Pedro River valley. A more detailed analysis of the artifact assemblage, particularly the Mogollon tradition ceramics, could also help in our understanding of the cultural affiliations of the site (Research Theme No. 4). The site is therefore recommended as *eligible* for inclusion in the National Register of Historic Places under Criterion D.

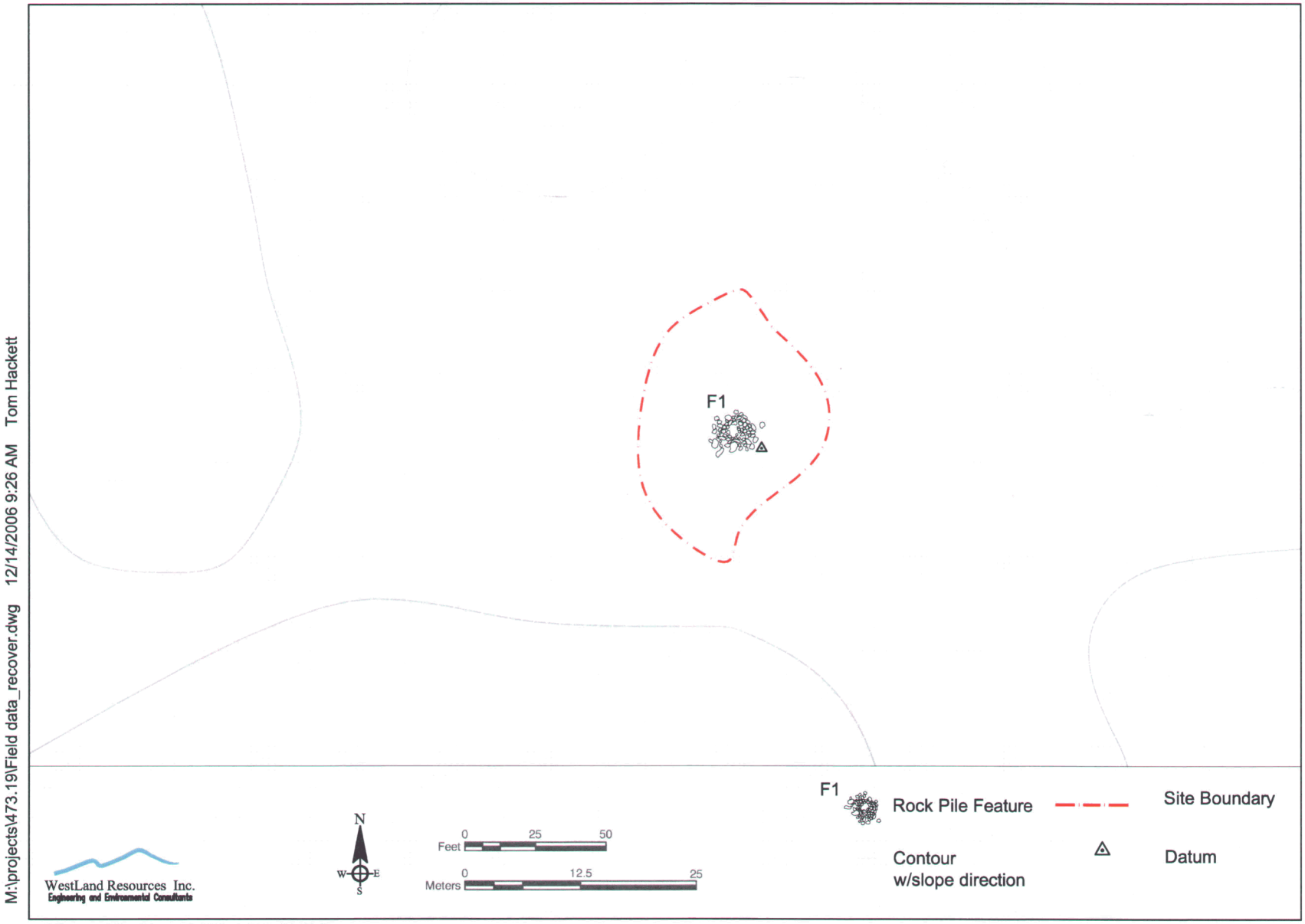

Figure 13. Site AZ BB:6:232 (ASM)

Site AZ BB:6:233 (ASM)

Cultural Affiliation: Native American

Site Period: Formative period

Site Type: Limited activity

Site Size/Area: 176 × 110 m/19,360 m²

Site Description: Site AZ BB:6:233 (ASM) *(Figure 14)* is a low- to moderate-density lithic and ceramic scatter with an associated FCR concentration.

Site Location: The site is located in two distinct topographical settings: 1) the sloping top and side of an eroded finger ridge emanating from the Galiuro Mountains to the north of the APE and 2) an inset terrace area located adjacent to the active channel of Clark Wash. The majority of the site is located on the eroded top and side of the finger ridge. The San Pedro River is located approximately ½ km to the southwest. A distinct butte is located on the northern portion of the site and contains a small rock shelter facing southeast *(Photo 8)*. This shelter was searched for evidence of human occupation, but none was found. This is likely due to the unstable gypsum and shale deposits that form the shelter's walls, which would have rendered it unfit for occupation. The finger ridge portion of the site is composed of a soft, chalky, gypsum-rich substrate, and little organic soil horizon is present. This portion of the site is cut by small and large rills.

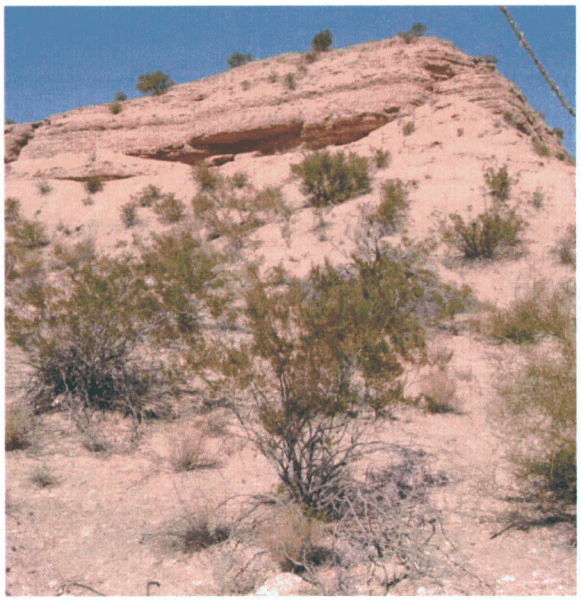

Photo 8. Overview of AZ BB:6:233 (ASM)

The Clark Wash inset terrace portion of the site is located in the extreme northwest corner of the site. This area closely hugs the southern cut-bank that marks the southern extreme of the geologic floodplain of Clark Wash. Sediments here are colluvial and alluvial in nature. Buried cultural features could potentially be located within this area.

Site Condition: The site is moderately to highly disturbed in the form of widespread sheetwash, gullying, and cattle trampling, the finger ridge portion being the most disturbed.

Features: One feature, a buried FCR concentration that had been potted, was recorded on the site.

Feature 1. This feature is located within the Clark Wash inset terrace portion of the site. It is defined by a 1-m-diameter, 0.75-m-deep hole and a large pile of FCR to the east *(Photo 9)*. At least 200 fragments of FCR (5–15 cm in diameter) are located in this pile. Several flakes were noted in proximity to the pile, but no charcoal or ash. The backdirt pile contained a crust of cryptogamic soil, indicating that several years had likely passed since this thermal feature's excavation. The surrounding soil is a silty to sandy substrate originating from alluvial and colluvial activities in Clark Wash. The location of the feature along the San Pedro River—an internationally known archaeological area—likely convinced the amateur archaeologist that something of value was contained within the feature.

Photo 9. Feature 1, a looted thermal feature at AZ BB:6:233 (ASM)

Artifacts: Approximately 400 pieces of lithic debitage, several lithic cores, and 15 brown ware sherds were scattered throughout the site surface.

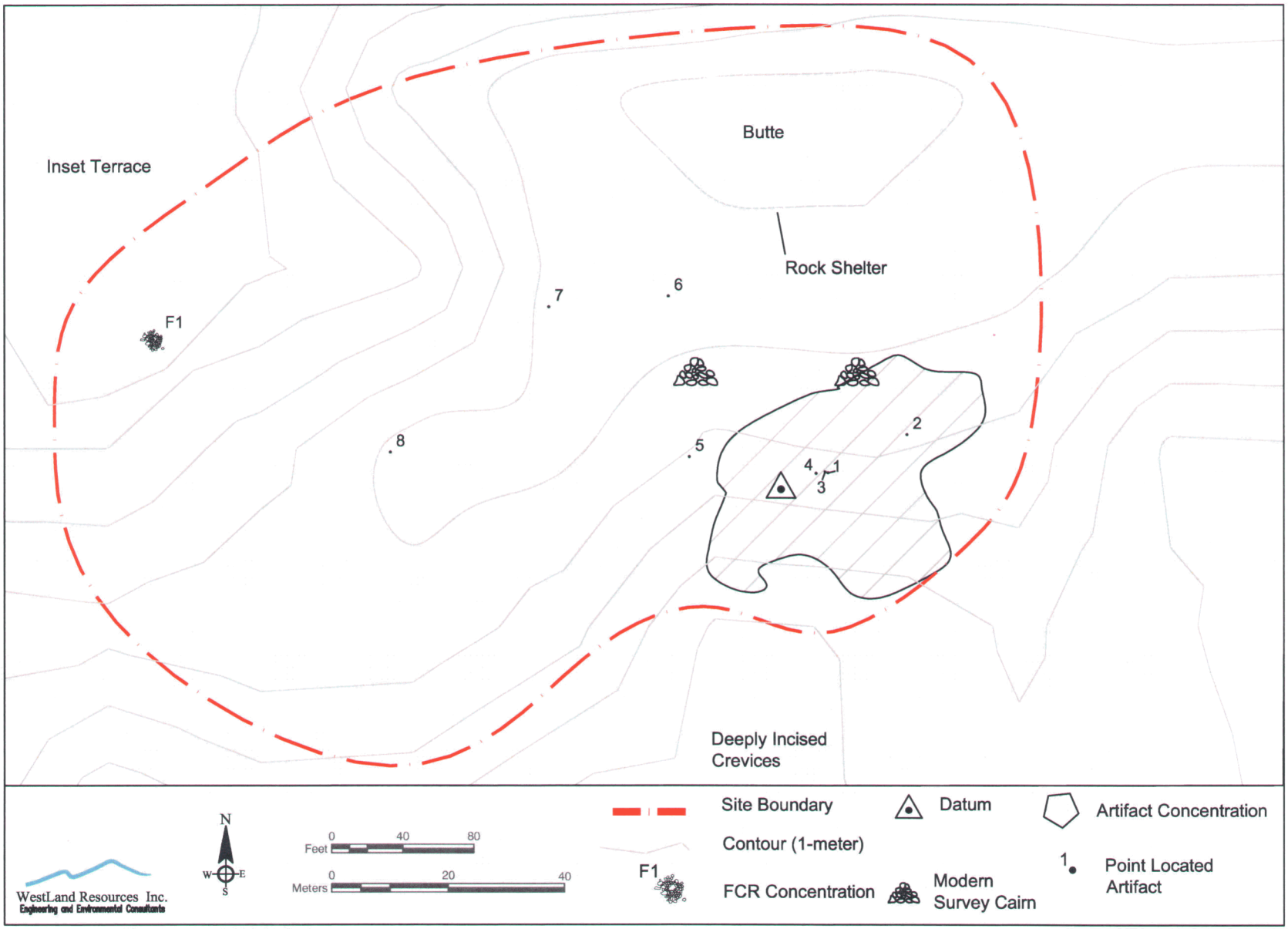

Figure 14. Site AZ BB:6:233 (ASM)

The lithic assemblage is dominated by primary and secondary flakes of fine-grained basalt, rhyolite, green metasediment, chert, and quartzite. Seven cores and several tested cobbles were also present, suggesting that reduction activities may have taken place at the site. The source of the lithic raw materials may have been Clark Wash or cobbles eroding out of the finger ridge itself. The ceramics were all undiagnostic brown ware body sherds with sand temper. The majority of the artifacts were discovered within the artifact concentration shown on the site map. ***Table 9*** summarizes the point-located tools.

Table 9. Point-located artifacts at Site AZ BB:6:233 (ASM)

PL	Artifact Type
1	Basalt flake with utilized edge
2	Rhyolite multi-directional core
3	Banded rhyolite multi-directional core
4	Silicified rhyolite multi-directional core
5	Quartzite unidirectional core
6	Rhyolite multi-directional core
7	Basalt multi-directional core
8	Rhyolite multi-directional core

Site Interpretation: AZ BB:6:233 (ASM) was likely a resource-processing site where wild food resources were roasted or cooked in the thermal feature (i.e., the FCR concentration). The presence of a moderate amount of artifacts suggests that the site may have been used over a period of time or was revisited during several seasonal rounds. The site may also have been a location where lithic raw materials were reduced for further use. Its advantageous position near a rock shelter and butte would have afforded the site's inhabitants shelter and a view of the surrounding countryside.

Site Integrity: Although AZ BB:6:233 (ASM) has been moderately disturbed by erosion (i.e., widespread sheetwash resulting in the deflation of some of the site), cattle, and potting, it may still be able to provide valuable information about prehistory. The depth of Feature 1 indicates that other features may be buried in that portion of the site. These potential buried features could provide information on the subsistence activities of the prehistoric peoples in the San Pedro River valley. The artifacts contained on the site surface could offer valuable insight into site usage and settlement patterns. The site therefore retains integrity.

Research Potential/National Register Status: AZ BB:6:233 (ASM) has the potential to yield information on the subsistence patterns and settlement patterns (Research Theme Nos. 3 and 5) of the Formative period occupants of the San Pedro River valley. The site is therefore recommended as ***eligible*** for inclusion in the National Register of Historic Places under Criterion D.

Site AZ BB:6:234 (ASM) (Clark Ranch)

Cultural Affiliation: Euroamerican

Site Period: Historic (1870–present)

Site Type: Ranch and farm

Site Size/Area: 122 × 90 m/~11,000 m²

Site Description: Site AZ BB:6:234 (ASM) *(Figure 15)* consists of a historic ranch house and associated historic and modern homestead/ranching developments. While the house and outbuildings appear historic in construction style and materials, the additional attributes of the site are early modern to recent in origin. Modern trash and appliances litter the site as a result of recent occupation. The site most certainly continues westward outside the APE as the APE boundary actually transects the house itself.

Site Location: The site is located on the geologic floodplain of the San Pedro River, a few hundred meters west of the distal end of the "white cliffs" Galiuro bajada. Vegetation consists of a dense mesquite and tamarisk bosque at various stages of growth resulting from the gradual abandonment of nearby agricultural fields. Old growth cottonwood and athel tamarisks are found within the site itself. Soils are a combination of alluvial and colluvial sedimentary silts deposited by the river and its tributaries during large flood events.

Site Condition: Gradual abandonment of the Clark Ranch homestead has resulted in the encroachment of the mesquite bosque, to the point that investigation of the property was hindered by vegetative growth. The house itself appears to be in the initial stages of collapse due to neglect. In addition to natural decay, until quite recently, ephemeral occupation of the site as housing for migrant agricultural workers has resulted in a copious amount of modern trash, graffiti, and damaging modifications to the site features. In spite of these factors, the Clark Ranch site retains much of its historic integrity, as modern development has not yet affected the property.

Features: Three historic features were recorded at the site. These include a house and two small outbuildings, all associated with the historic ranching activities of the Clark family and their successors.

Feature 1. This feature, 24225 River Road, is a historic one-story adobe house measuring approximately 38.5 × 38.5 ft square *(Photo 10)*. The foundation is poured concrete approximately 10 in tall, and there is no basement. The walls consist of courses of cement-plastered adobe bricks that measure approximately 3.5 × 18 × 6 in. These have been stacked with locally procured mortar to a height of approximately 8.5 ft. The roof is built of corrugated metal on a pitched wooden superstructure constructed with 2 × 4 and 1 × 6 standard milled lumber boards. The roof appears to be a more recent replacement and may, in fact, be early modern in origin. The house has two front doors, a rear "kitchen" door, and seven rectangular windows of differing dimensions. The interior is divided into seven rooms; interior walls are plastered adobe with modern electrical outlets and switches, and the ceiling consists of low-density fiberboard paneling (Beaver Board). The floors are constructed of 3.5-ft-wide wooden planks (possibly Douglas fir) with a dirt surface approximately 5 to 6 in below. Two stove-pipe chimneys exit the house, one from the kitchen area in the southeast corner of the house, the other in a "living" area in the southwest corner.

Photo 10. Feature 1, adobe ranch house (view is to the north)

Feature 2. This feature is a concrete outbuilding and pad. The building has a poured concrete foundation that at one time supported a wood-beam superstructure for a tower of some sort. The building measures approximately 8 × 8 ft at its base and tapers to 6.8 × 6.8 ft at the top. It is 7.5 ft tall, with 5.5-in square wooden beams inset into each of the

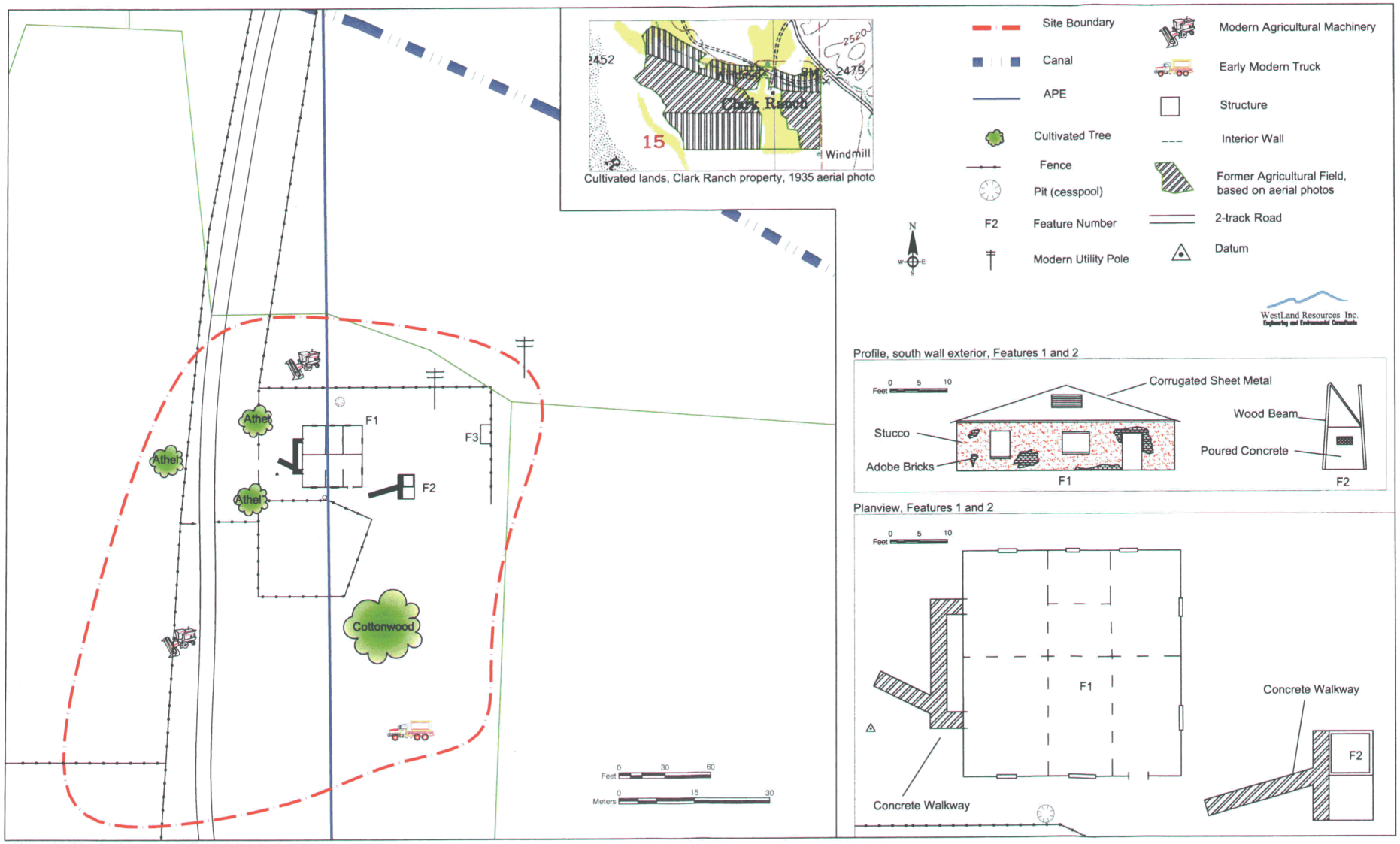

Figure 15. Site AZ BB:6:234 (ASM), Clark Ranch site

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four corners. At one time, these beams extended to an unknown height above the concrete walls, as evidenced by the two beams on the north side of the building, which remain partially standing at approximately 12 ft. A contiguous concrete pad (also ~8 × 8 ft square) extends to the south. A 2-in-diameter pipe is embedded in the pad vertically, suggesting that the structure was associated with water storage and/or pumping. More than likely, in conjunction with a windmill operating in one of the more exposed areas of the ranch, this structure supported a water tower cistern that provided water for the homestead.

Feature 3. This feature is a makeshift chicken coop built out of fencing material and corrugated metal. The coop measures 12 × 7 ft. This feature may be modern in origin.

Artifacts: All of the artifacts at the site appeared modern in origin. Several dump sites were noted, but artifacts on the surface dated from the late 1970s to the late 1990s. Historic artifacts may have been removed or buried beneath vegetative leaf litter and alluvial soil deposits.

Site Interpretation: Until fairly recently, the site has been continuously occupied for at least 130 years as a Euroamerican habitation and agricultural location. The 1878 GLO map notes a structure belonging to a Peter Sullivan located within the current site boundaries and likely refers to the house location if not the actual adobe structure. The GLO map also shows agricultural fields immediately south of the site in the same location as fields seen on the historic aerial photos of the 1930s and 1950s. By 1895, a Joseph Clark had patented the land under the Federal Homestead Act of 1862. In 1901, Mr. Clark patented the adjacent land, indicating an expanding ranching operation. The Clark family operated the property as a ranch for some time, and today the ranch is referred to on the USGS "Clark Ranch" Quadrangle as the "Clark Ranch." The nearby "Clark School" (shown outside of the APE on the USGS quadrangle) implies that the Clark family had a significant impact on American period settlement of the area.

Historic aerial photos (courtesy of AZGS) from 1935 and 1955 show agricultural fields enclosing a purposefully maintained grove of trees surrounding the homesite. These trees likely served as a windbreak as well as shade for the homesite area. In addition to the native mesquite bosque, athel tamarisks and cottonwood trees were planted adjacent to the house itself. Athel tamarisks were commonly planted in the historic period to provide shelter from the wind and sun. This species of tamarisk is non-invasive and is only propagated as a vegetative clone. Today, having grown taller than their invasive cousins, the athels stand out of the thick mesquite and tamarisk bosque surrounding the ranch house and disclose its location from afar.

The ranch has only been completely abandoned in recent years, with the last of its tenants having occupied the house in the 1990s. Two early modern combines and a large hay truck remain on the site as evidence of more recent intensive use. Several modern features outside of the APE include a cattle tank and other improvements likely associated with irrigation.

Site Integrity: Despite the encroachment of the riparian bosque, the site retains much of its historic setting and association. As noted above, the ranch house was historically surrounded by a relatively thick mesquite forest. The access road remains an unmodified dirt two-track road, and evidence of its continued use into the modern period points to a continuity of association with agricultural activity. Compared to other abandoned homesteads of a similar age, the house is in relatively good condition. However, as an adobe house, the building materials themselves are subject to quick deterioration once the protective roof and exterior plasters degrade. Over 60 percent of the roof has fallen in or been removed. As a result of this loss of cover, the southern wall has subsided considerably, much of the exterior plaster has peeled, and the interior of the house is beginning to collapse. The fiberboard ceiling has fallen in in most of the rooms, and the wooden floors show considerable deterioration. That being said, the house is not beyond repair and its integrity remains relatively intact.

In spite of the natural deterioration of the structure itself, the property only lacks integrity in its overall ability to portray the feeling of a historic ranch, which is the result of its specific use in more modern times. This impact is unique and interesting enough to note in some detail. Modern occupation by migrant workers has left the site littered with modern trash, appliances, furniture, and graffiti. The house appears to have been broken up into at least two apartments in order to house at least two large

families of workers. Makeshift plumbing and wiring piped water and electricity into the house through holes in the windows and other crevices drilled for this purpose. Two pits, one on either side of the house, have been excavated in modern times to serve as cesspools. There are six refrigerators onsite (four in the house), indicating that a considerable number of people lived there.

Research Potential/National Register Status: While the house is of an unknown age, the materials and workmanship used in its construction indicate that the house is historic in origin. As an adobe construction, it displays characteristics of historic period southwestern architecture that are distinctive and unique in the overall context of American homesteads (Criterion C). The remarkable integrity of the property also contributes to its significance. Although no historic artifacts were located during the archaeological survey, the site is known to date to at least 1878, as it appears on the GLO plat for this year. Furthermore, its location in a relatively active depositional environment increases the likelihood of substantial subsurface remains (Criterion D). In conclusion, Site AZ BB:6:234 (ASM) has the potential to yield subsurface features and artifacts that could contribute to our knowledge of historic homestead and ranching activities in the San Pedro River valley (Research Theme Nos. 8 and 9). The site is therefore recommended as ***eligible*** for inclusion in the National Register of Historic Places under Criteria C and D.

Site AZ BB:6:235 (ASM)

Cultural Affiliation: Euroamerican

Site Period: Historic period (1890s–1950s)

Site Type: Ranch or farm

Site Size/Area: 170 × 170 m/28,900 m²

Site Description: Site AZ BB:6:235 (ASM) ***(Figure 16)*** consists of several demolished structures, one notably constructed from shaped gypsum block. The site is bisected by a 1950s APS power line (AZ BB:6:241 [ASM]).

Site Location: The site is located on the geologic floodplain of the San Pedro River between the bajada on the south side of the Galiuro Mountains and former agricultural fields. Vegetation consists of a dense mesquite and tamarisk bosque at various stages of growth resulting from the gradual abandonment of nearby agricultural fields. Old growth athel tamarisks are found within the site itself. Soils are a combination of alluvial and colluvial sedimentary silts deposited by the river and its tributaries during large flood events.

Site Condition: The condition of the site is relatively poor. A fire has affected the large athel trees that surround the main feature—a gypsum-block house—causing the large trunks of these trees to fall into two of the features. Subsequent regrowth of the athels stimulated by the fire and the unchecked growth of the thick mesquite bosque have resulted in the site becoming cluttered and making assessment difficult. Flooding has also been a major disturbance. Sheetwash emanating from the bajada has seasonally swept through the site, causing the dispersal of structural debris and domestic trash from their original location. In addition, maintenance of the utility corridor for the historic APS power line has resulted in the mechanical removal of ground cover, contributing to further erosion and likely disturbing historic features and artifacts that originally occupied the corridor.

Features: The site contains five features.

Feature 1. This feature is a "demolished" remnant of a gypsum-block house. Judging by the wall fall/gypsum melt, the house was rectangular in shape and measured approximately 12 × 24 ft. Its height was indeterminate. Construction materials consisted of irregularly sized, hand-shaped, rectangular gypsum blocks likely cut from a nearby gypsum mine (the White Cliffs Mine). The blocks were capped with cement plaster, and the structure probably had a wooden frame roof. (This could not be confirmed from the wood debris left onsite.) The house appears to have had indoor plumbing; two upright galvanized "sink" pipes and a broken porcelain sink basin were located in the northwest corner of the house. A poured cement walkway or patio traverses the eastern side of the structure.

Feature 2. This feature is a subsurface storage "room" or cistern with an oval opening on the surface. Its depth is between 4 and 5 ft, but the internal dimensions remain unknown as it was deemed unsafe to investigate. Construction materials included standard cinderblock. Feature 2 appears to be considerably newer than Feature 1. More than likely the "room" served as a septic or pit toilet beneath a "privy" structure, possibly Feature 5, which appears to have been removed from its original location.

Feature 3. This feature consists of a water tank and a cement-walled structure. The structure is built of iron-bar-reinforced, poured-concrete walls that are 8.5 × 8.5 ft wide and 5 ft tall. The walls have now all toppled outward, and only the northernmost wall remains standing. The metal tank fits neatly inside this structure, though it perhaps once sat atop the walls. The tank stands approximately 7 ft tall and is about 8.5 ft in diameter.

Feature 4. This feature is a collapsed "double" occupancy privy. It has two holes with a divide between the two. Construction materials included a standard-sized milled lumber frame and corrugated metal walls and roof. The structure does not look to be in situ and may have been mechanically pushed out of the utility corridor.

Feature 5. This feature is a structural debris scatter that is likely a collapsed shed. Materials included a standard-sized milled lumber frame and corrugated metal walls. Debris may be in situ, but it was difficult to tell as no foundation was evident.

Artifacts: Artifacts located at the site included 10 whole bottles, enameled metal cookware, miscellaneous glass, dinnerware ceramics, and window glass. The majority of artifacts were located in a subsurface concentration eroding out of a

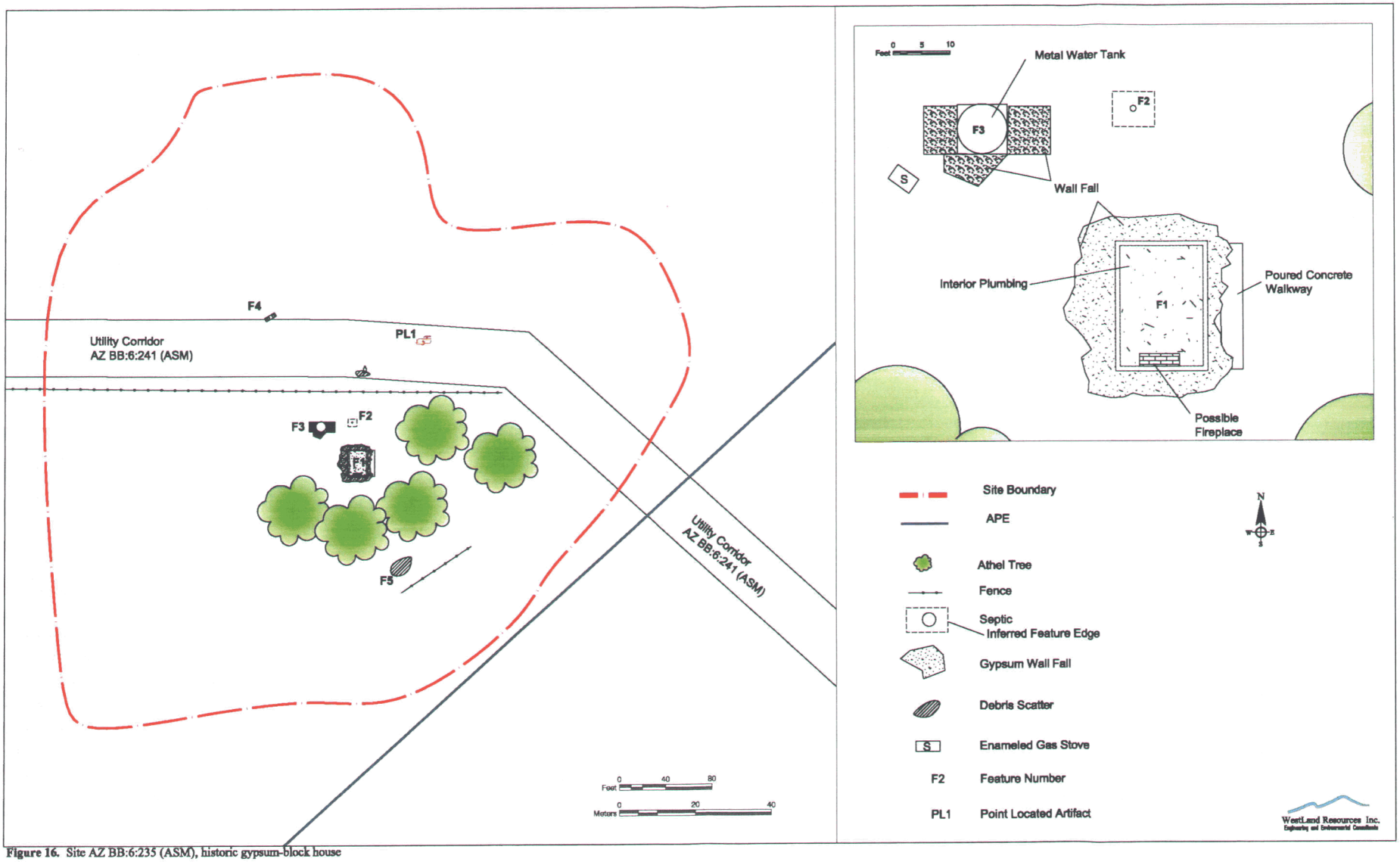

Figure 16. Site AZ BB:6:235 (ASM), historic gypsum-block house

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0.75-m-deep subsidence feature in a shallow rill on the east edge of the utility corridor. The artifacts were concentrated in the first 30 cm of soil. Bottles included a "log cabin" syrup bottle and a host of miscellaneous beverage, condiment, and medicine bottles. Makers' marks included two Owens Illinois Glass Company marks that indicated their place of origin as the Alton, Illinois, plant. The bottles date to either 1940 or 1950 and 1938 or 1948.

One abandoned automobile is located on the north side of the utility corridor, again likely pushed there by maintenance activities. The automobile, a black, two-door car, appears to be a 1940s era coupe of unknown make, but likely a 1940 Plymouth sedan.

In addition to the domestic trash, an enameled gas stove was located just outside of the house.

Site Interpretation: The site property and surrounding agricultural fields were patented by a Mr. John Kennedy in 1891 under the Homestead Act of 1862. Although the majority of features and artifacts from the site date to a later period (1930s–1950s), Feature 1 could very well date to the 1890s. The structure was constructed of local materials and hand shaped and assembled. These materials and craftsmanship are reminiscent of an earlier time, when cheap, mass-produced building materials were harder to come by. The site is most certainly associated with agricultural activities, as indicated by the surrounding fields, which are as evident today as they were on the 1935 and 1955 aerial photos. Unfortunately, no information about the history of this site was found during the survey.

In addition to the native mesquite bosque, athel tamarisk trees were planted adjacent to the house itself. Athel tamarisks were commonly planted in the historic period to provide shelter from the wind and sun. This species of tamarisk is non-invasive and can only be propagated as a vegetative clone. The athels are apparent in historic aerial photos of the site. Today, having grown taller than their invasive cousins, the athels stand out of the thick mesquite and tamarisk bosque that surrounds the site and discloses its location from afar.

Site Integrity: The site has been badly damaged by fire, flood, tree fall, vegetative encroachment, and the mechanical disturbance resulting from the maintenance of the utility corridor. Although flooding has disturbed the site, it has also ensured the preservation of trash deposits. The overall historic feeling of the site is diminished due to the intrusion of the utility corridor; however, the site does maintain some integrity of setting, association, materials, and workmanship.

Research Potential/National Register Status: Though the house is of an unknown age, the materials and workmanship evident in its construction indicate that it is historic in origin. As a gypsum-block construction, it displays characteristics of historic period architecture that are distinctive and unique in the overall context of American homesteads (Criterion C). The site likely dates from the 1890s and was patented as a homestead. The site's advanced age and its location in a relatively active depositional environment mean that it likely contains substantial subsurface remains (Criterion D). Site AZ BB:6:235 (ASM) is recommended as ***eligible*** for inclusion in the National Register of Historic Places under Criteria C and D. It has the potential to yield subsurface features and artifacts that could contribute to our knowledge of historic ranching and homesteading activities in the San Pedro River valley (Research Theme Nos. 8 and 9).

Site AZ BB:6:236 (ASM)

Cultural Affiliation: Salado

Site Period: Formative period, possibly Late Formative

Site Type: Limited activity, agricultural

Site Size/Area: 26 × 42 m/1,092 m²

Site Description: Site AZ BB:6:236 (ASM) *(Figure 17)* consists of five rock pile features (likely agricultural), one checkdam, and a low-density artifact scatter.

Site Location: The site is located on a small northeast-trending finger ridge that originates on the Santa Catalina bajada. The rock pile features were found on the flat portion of the ridge and on its gently sloping northwest portion. The checkdam was located in a small rill on the northwest side of the ridge. The site substrate consists of rocky sands overlying an ancient surface. This substrate was dissected by several small rills running through the site.

Site Condition: The site was in good condition, with only minimal disturbance from the rills that cross it. Erosion from the rills revealed a subsurface component to some of the rock features.

Features: Six features were identified on the ground surface of the site. Five of these were rock piles (Features 1–5). None of the rocks in these features showed evidence of thermal alteration, and neither ash nor charcoal was observed within the features. Rock types mostly consisted of sub-angular cobbles (with some sub-rounded) of rhyolite, basalt, quartzite, and unknown igneous rock. They ranged in size from 5–15 cm and were either one or two courses high. Feature 1 contained a lightly serrated, schist tabular stone tool with a well-polished edge *(see Photo 11)* and two corrugated brown ware sherds. The sixth feature (Feature 6) was a possible checkdam eroding from a small rill. Detailed descriptions of all six rock features are provided in *Table 10*.

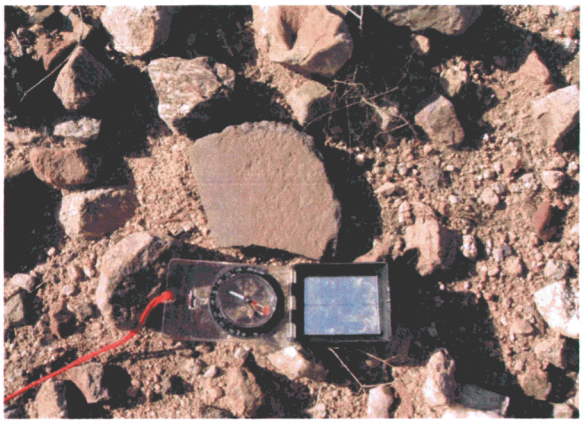


Photo 11. Tabular stone tool within Feature 1, Site AZ BB:6:236 (ASM)

Artifacts: The site contained a low-density artifact scatter (approximately 20 artifacts) spread across the site surface. Identified ceramic artifacts included 15 sand-tempered brown ware sherds (three of which were corrugated and one of which was obliterated corrugated). The corrugated sherds were all found near Feature 2. Stone artifacts consisted of a schist tabular tool and approximately five basalt stone flakes.

Site Interpretation: AZ BB:6:236 (ASM) was likely associated with subsistence activities, particularly agricultural practices that used rock piles to grow agave. The artifacts—especially the serrated tabular tool—indicate that processing of agricultural resources may also have taken place at the site. The presence of agricultural rock pile features, corrugated brown ware, and a tabular tool may suggest a Late Formative presence (Fish et al. 1992).

Table 10. Surface features identified at AZ BB:6:236 (ASM)

Feature No.	Feature Type	Dimensions (m) l × w × h	Description
1	rock pile	1.3 × 1.3 × 0.1	ca. 100 sub-angular cobbles, 5–15 cm diam; 1 course
2	rock pile	1.0 × 1.0 × 0.2	ca. 120 sub-angular cobbles, 5–15 cm diam; 2 courses
3	rock pile	0.8 × 0.9 × 0.05	ca. 75 sub-angular cobbles, 5–15 cm diam; 1 course
4	rock pile	0.5 × 0.4 × 0.05	ca. 75 sub-angular cobbles, 5–15 cm diam; 1 course
5	rock pile	0.75 × 0.75 × 0.1	ca. 50 sub-angular cobbles, 5–15 cm diam; 1 course
6	checkdam	1.0 × 0.3 × 0.2	ca. 1 m long; 2 courses

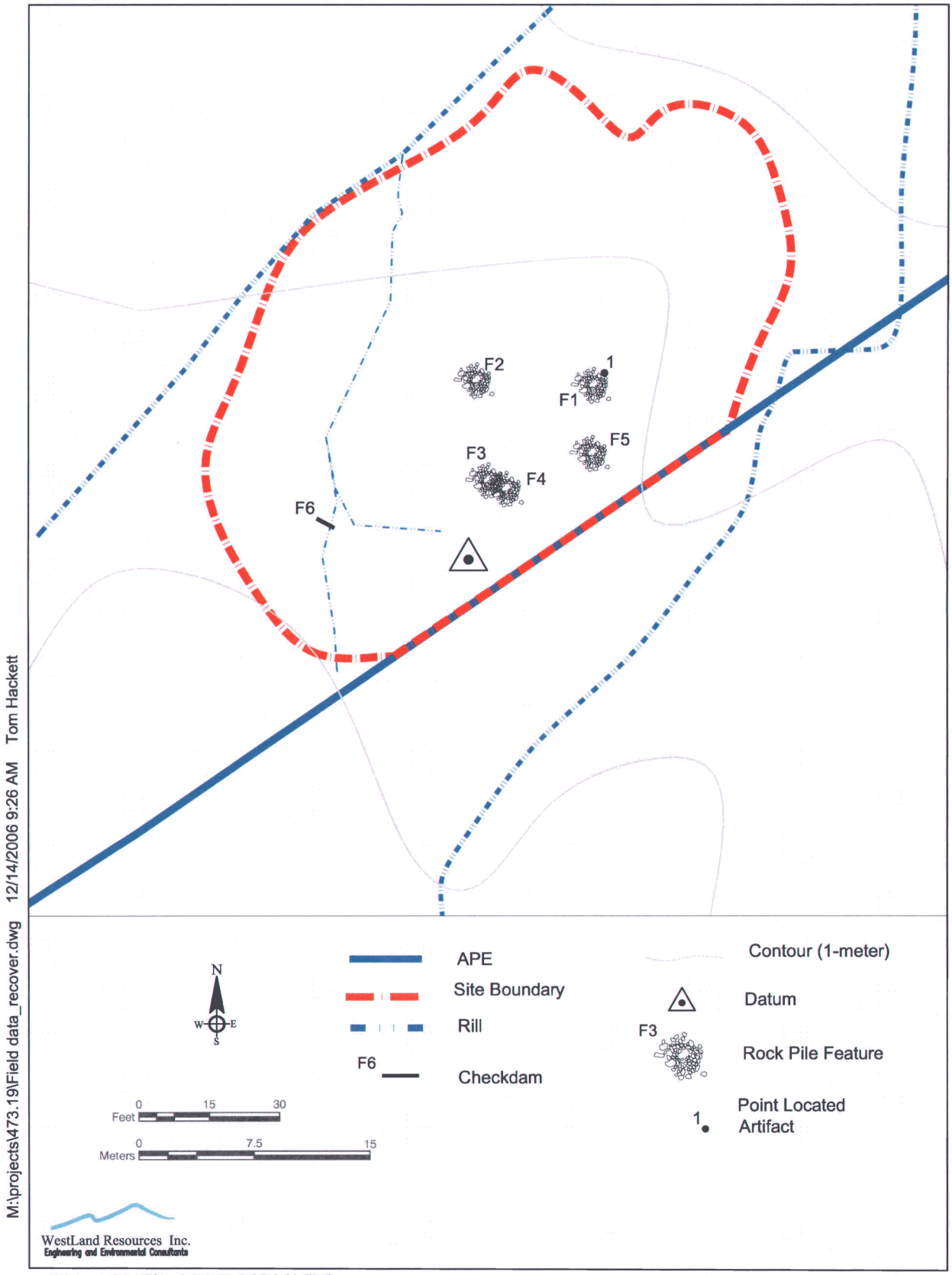


Figure 17. Site AZ BB:6:236 (ASM)

Site Integrity: The location of the site on a deflated, paleosol surface suggests that the site lacks abundant subsurface cultural deposits; however, it is possible that some of the rock pile features retain a subsurface component. If such a component is present, these deposits may contain botanical remains that could be used to determine the function of the rock piles.

Research Potential/National Register Status: The possibility of a subsurface component to the rock piles suggests that the site may retain sufficient research potential to aid in our understanding of prehistoric subsistence practices in this area (Research Theme No. 3). As a result, AZ BB:6:236 (ASM) is recommended as ***eligible*** for inclusion in the National Register of Historic Places under Criterion D.

Site AZ BB:6:237 (ASM)

Cultural Affiliation: Native American

Site Period: Formative period, possibly Late Formative

Site Type: Limited activity, agricultural

Site Size/Area: 47 × 83 m

Site Description: Site AZ BB:6:237 (ASM) *(Figure 18)* consists of 14 rock pile features (likely agricultural) and one mano fragment. The site continues north-northeast beyond the APE.

Site Location: The site is located on a gently sloping northeast-trending finger ridge that originates on the Santa Catalina bajada.

Site Condition: The site is in relatively good condition despite vehicle tracks from heavy equipment that were observed on approximately 25 percent of the site surface. A deeply incised wash was located north of the site, and an in-use mining road was located to the south. Neither the wash nor the road seems to have disturbed the site.

Features: Fourteen features were identified on the ground surface of the site. All are rock piles. None of the rocks in these features showed evidence of thermal alteration, and neither ash nor charcoal was observed within them. Rock types mostly consisted of sub-angular cobbles (with some sub-rounded) of rhyolite, basalt, quartzite, and unknown igneous rock. Rocks ranged in size from 5–20 cm. Detailed descriptions of each rock feature are provided in *Table 11*.

Artifacts: Only one artifact was observed: a flat-concave mano fragment made of granite.

Site Interpretation: AZ EE:1:237 (ASM) is likely associated with subsistence activities, particularly with Late Formative agricultural practices that used rock piles to grow agave. The mano fragment suggests that processing of these agricultural resources may also have taken place at the site.

Site Integrity: The location of the site on a deflated surface suggests that the site lacks abundant subsurface cultural deposits; however, it is possible that some of the rock pile features retain a subsurface component. If present, such deposits

Table 11. Surface features identified at AZ BB:6:237 (ASM)

Feature No.	Feature Type	Dimensions (m) l × w × h	Description
1	rock pile	1.3 × 0.7 × 0.2	ca. 100 sub-angular cobbles, 5–20 cm diam; 2 courses
2	rock pile	1.0 × 1.0 × 0.3	ca. 100 sub-angular cobbles, 5–20 cm diam; 2 courses
3	rock pile	1.0 × 1.0 × 0.2	ca. 75 sub-angular cobbles, 5–15 cm diam; 2 courses; partial modern disturbance
4	rock pile	2.0 × 1.0 × 0.2	ca. 200 sub-angular cobbles, 5–15 cm diam; 3 courses; well-embedded
5	rock pile	2.0 × 1.5 × 0.2	ca. 200 sub-angular cobbles, 5–15 cm diam; 1 course; high modern disturbance
6	rock pile	1.0 × 1.0 × 0.1	ca. 75 sub-angular cobbles, 5–15 cm diam; 1 course
7	rock pile	1.2 × 1.0 × 0.1	ca. 60 sub-angular cobbles, 0–5 cm diam; 2 courses
8	rock pile	0.8 × 0.8 × 0.5	ca. 40 sub-angular cobbles, 5–10 cm diam; 2 courses
9	rock pile	0.75 × 0.75 × 0.1	ca. 30 sub-angular cobbles, 5–10 cm diam; 2 courses
10	rock pile	1.1 × 1.0 × 0.1	ca. 100 sub-angular cobbles, 5–10 cm diam; 2 courses
11	rock pile	0.5 × 0.4 × 0.5	ca. 30 sub-angular cobbles, 5–7 cm diam; 1 course
12	rock pile	1.2 × 1.0 × 0.2	ca. 150 sub-angular cobbles, 5–10 cm diam; 2 courses
13	rock pile	1.2 × 1.2 × 0.1	ca. 100 sub-angular cobbles, 5–10 cm diam; 1 course
14	rock pile	1.2 × 1.2 × 0.1	ca. 100 sub-angular cobbles, 5–10 cm diam; 1 course

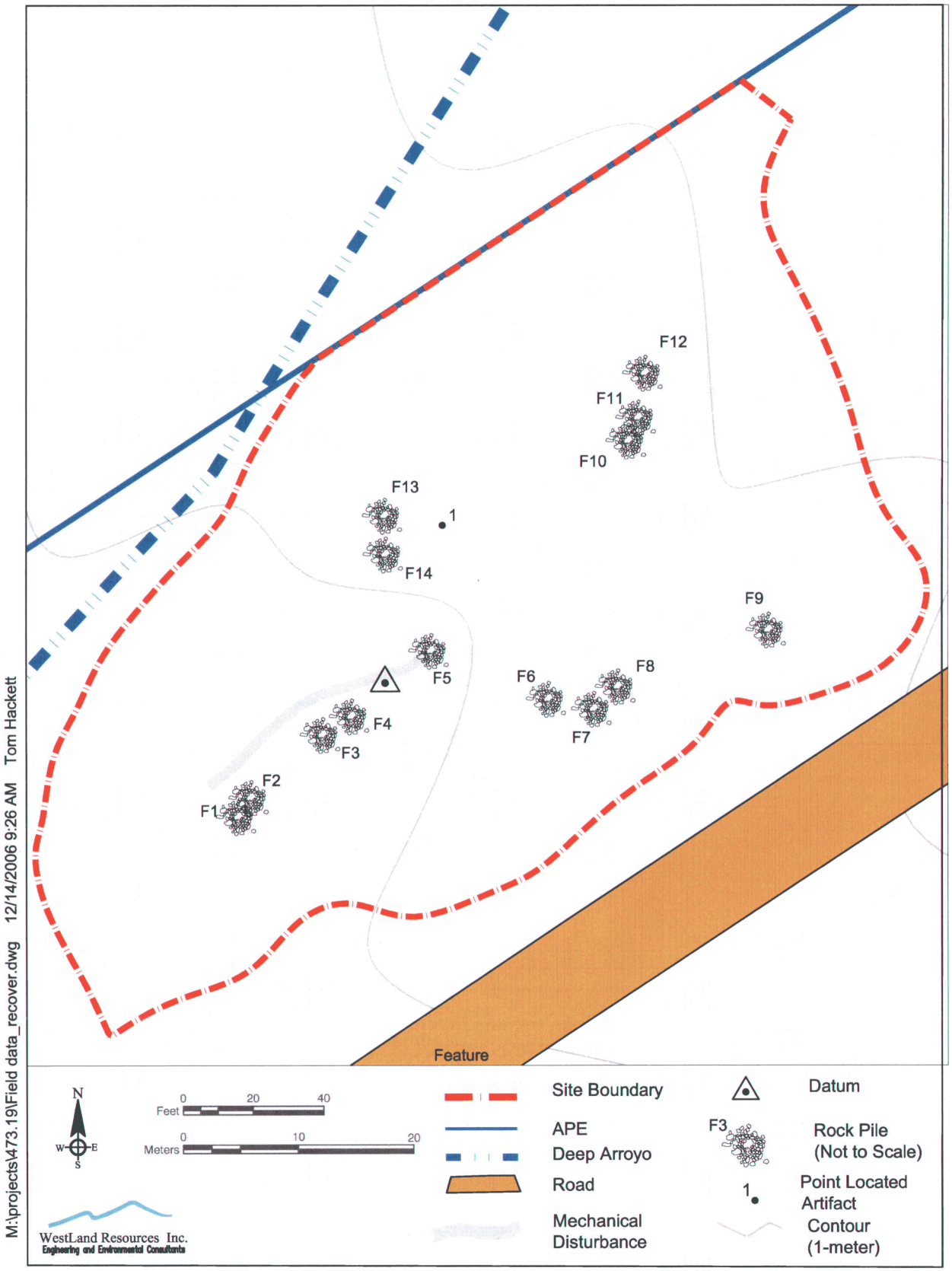


Figure 18. Site AZ BB:6:237 (ASM)

might contain botanical remains that could be used to determine the function of the rock piles. The vehicle tracks described above only intrude into a few of the features ***(see Table 11)*** and do not affect the site's overall integrity.

Research Potential/National Register Status: The possibility of a subsurface component to the rock piles suggests that the site may retain sufficient research potential to aid in our understanding of prehistoric subsistence practices in this area (Research Theme No. 3). AZ BB:6:237 (ASM) is therefore recommended as ***eligible*** for inclusion in the National Register of Historic Places under Criterion D.

Site AZ BB:6:238 (ASM)

Cultural Affiliation: Native American and Euroamerican

Site Period: Late Formative and Historic (circa. 1920s)

Site Type: Habitation (Prehistoric) and refuse pile (Historic)

Site Size/Area: 180 × 308 m/55,440 m²

Site Description: Site AZ BB:6:238 (ASM) ***(Figure 19)*** is a multi-component site consisting of both prehistoric and historic components. The prehistoric component includes two cobble-lined structures (Features 1 and 3) and over one thousand artifacts of ceramic, flaked stone, and ground stone scattered over the site's surface. The historic component comprises a moderate-density concentration of hundreds of historic artifacts. The site continues beyond the APE to the northwest.

Site Location: The site is located in an alluvial fan depositional environment within a thick mesquite bosque. The land slopes gently down toward the San Pedro River (to the northeast), and slack-water deposits from that river may be present below the site surface. The northeastern boundary of the site is defined by a 5-m-deep drop-off down to the active river channel and floodplain. A 5-m-deep incised wash is located northwest of the site. The substrate of the site consists of deep sand and silty alluvial and colluvial deposits. Several rills cut across the site, exposing buried features and artifacts. Additional buried cultural deposits are highly probable.

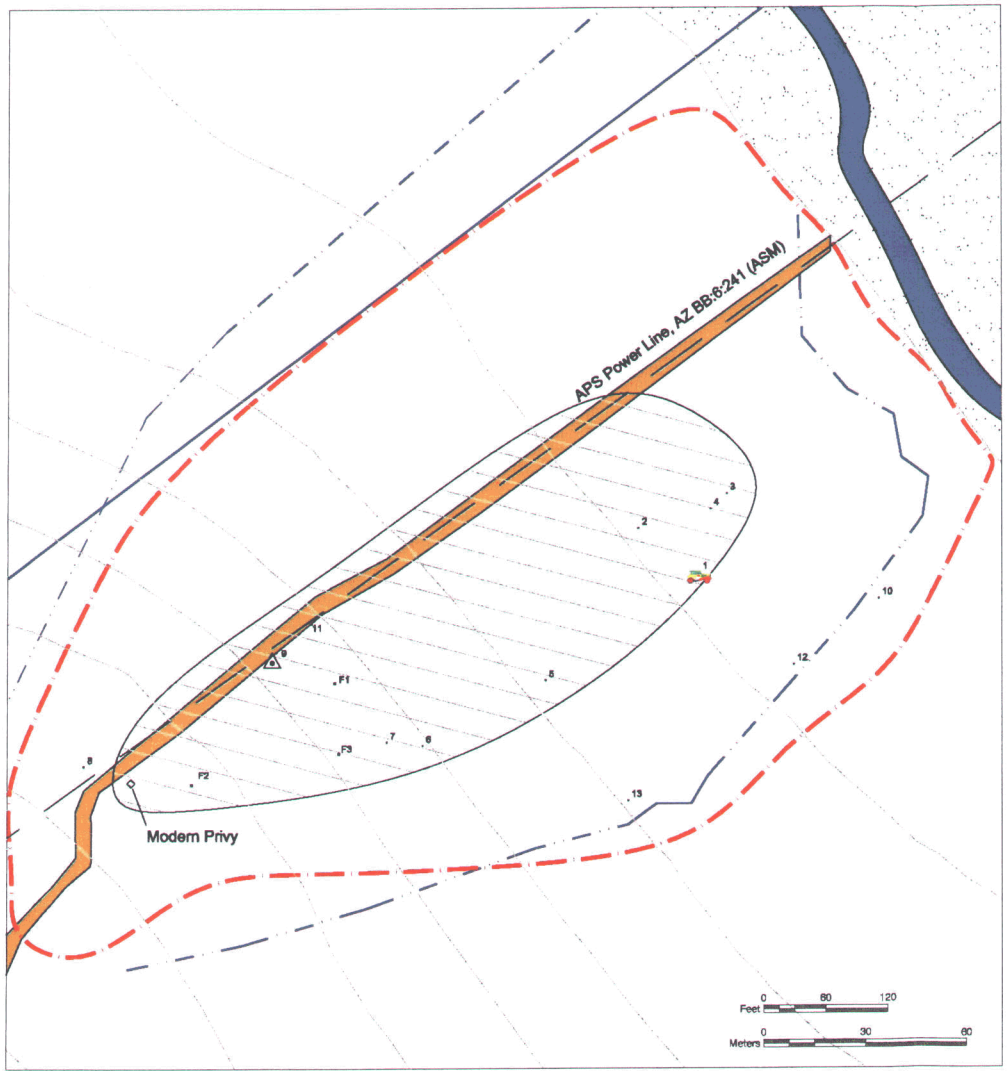
Site Condition: The site has been exposed to a variety of disturbing agents. First, rills have cut through the site, eroding and exposing buried cultural materials. Second, modern push piles from mechanical equipment have moved both prehistoric and historic artifacts. Third, a historic APS power line and its associated access road cut through the middle of the site. Erosion of this historic road has exposed some buried cultural materials. Fourth, mesquite duff (from the bosque) covers the site's surface and obscures the artifacts and features concealed beneath. Fifth, it is possible that a pumphouse (part of the San Manuel Plant Site) located between this site and Site AZ BB:6:110 (ASM) (a large Salado habitation site) may have impacted the site. However, no evidence of such a disturbance was observed.

Features: Three cultural features were observed at the site ***(Table 12)***. Two of these are the remnants of prehistoric cobble-lined structures (Features 1 and 3) and consist of upright, rounded cobbles that once formed the rectangular bases of prehistoric adobe structures. Both are exposed in the small rills that run through the site and are of similar size: Feature 1 is 5.5 × 6 m and Feature 3 is 6 m in length. (The perpendicular axis was not visible for Feature 3.) Feature 2 is a modern push pile approximately 20 m in diameter that contains both rounded cobbles (possible prehistoric construction debris) and 1970s trash.

Artifacts: Prehistoric artifacts consisted of over one thousand artifacts scattered across the site's surface. The included approximately one thousand ceramic sherds (mostly brown wares, but also corrugated, Tanque Verde red-on-brown, and one red-on-buff ware); over 100 flaked stone artifacts of basalt, quartzite, rhyolite, and chert; and less than a dozen ground stone artifacts (metates, manos, and one "donut stone"). Hundreds of historic period artifacts were also observed. These included glass shards (clear, aqua, and green) and various metal

Table 12. Surface features identified at AZ BB:6:238 (ASM)

Feature No.	Feature Type	Dimensions (m) l × w × h	Description
1	Cobble-lined structure	5.5 × 6 m	Upright cobbles forming square structure exposed in small rill
2	Modern push-pile with cobble construction debris	ca. 20 m diameter	Cobbles (from prehistoric structure?) and 1970s trash
3	Probable cobble-lined structure	6 m long	Cobble alignment; 6 upright cobbles exposed in small rill



Site Boundary

APE

Early 1920s Car

Historic Component

Dirt Road

Tree or Shrub

Active Floodplain

River Channel (2006)

Arroyo/Incised Wash

Braided Rill

Power Line
AZ BB:6:241 (ASM)

Contour (1-meter)

Datum

F1 Feature

1 Point Located Artifact

N

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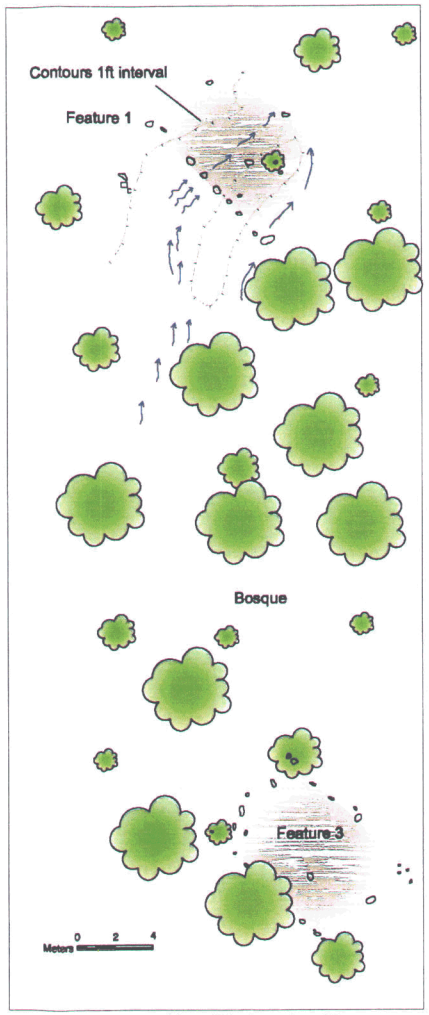
WestLand Resources Inc.
Engineering and Environmental Consultants



View of Features 1 and 3

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Figure 19. Site AZ BB:6:238 (ASM)

artifacts. The most substantial historic artifact was a partial Dodge truck dating to the early 1920s. Although many of the Euroamerican artifacts were not temporally diagnostic, the Dodge truck and a whiskey bottle dating to the 1920s suggest a likely date for the historic component of the site. Thirteen artifacts were point located on the site's surface *(Table 13)*.

Table 13.
Point-located artifacts on surface of Site AZ BB:6:238 (ASM)

PL	Artifact Type
1	Partial 1920s Dodge truck *(Photo 12)*
2	Whiskey bottle (ca. 1920s)
3	Aqua glass base (ca. 1900)
4	Metal barrel band
5	"Donut stone" fragment (vesicular basalt) *(Photo 13)*
6	Metate fragment (basalt)
7	12-gauge high-brass shotgun shell and square-head nail
8	Trough mano (granite)
9	Pestle (basalt) and mano fragment (basalt)
10	Buff ware sherd (indicating an earlier occupation?)
11	Tabular knife (rhyolite)
12	In situ trough metate (vesicular basalt) fragment exposed ~0.5 m below the surface in an incised rill
13	In situ basin metate (granite) and red ware sherd exposed ~0.5 m below the surface in an incised rill

Photo 12. PL 1, 1920s Dodge truck

Site Interpretation: The prehistoric component of AZ BB:6:238 (ASM) appears to have been habitational in nature, based on the remnants of two cobble-outlined structures. This site may be either a

Photo 13. PL 5, "donut stone" fragment

part of, or associated with, Site AZ BB:6:110 (ASM), a large Salado compound to the southwest. The high number and diversity of the artifact types suggest a prolonged occupation of the site. As for the historic period component, no GLO land patents were initiated by any private individual in this area, and there was no indication of a historic structure on the historic maps or aerials consulted for this project. The site may have been used for other purposes, such as trash disposal.

Site Integrity: Despite the post-depositional disturbances listed above, much of the site retains its integrity. As evidenced by both prehistoric features and artifacts eroding from the site's substrate, in situ cultural materials are still very much present. However, it is not clear whether any historic period features are present.

Research Potential/National Register Status: AZ BB:6:238 (ASM) has the potential to contribute to our understanding of Formative period lifeways along the San Pedro River (Research Theme Nos. 1 through 7), especially given the nature of the depositional environment, which may contain stratified deposits that span the entire continuum of human occupation in this portion of the valley. It is unclear at this point how the site could contribute to our understanding of historic period lifeways in the San Pedro River valley, but the historic artifact scatter likely represents early twentieth century wildcat dumping and is not significant to our understanding of trash disposal techniques in that time. The site is recommended as *eligible* for inclusion in the National Register of Historic Places under Criterion D.

NRHP-Ineligible Sites

Site AZ BB:6:239 (ASM) (River Road)

Cultural Affiliation: Euroamerican

Site Period: Historic (the present alignment was constructed some time between 1878 and 1935)

Site Type: Transportation corridor

Site Description: Site AZ BB:6:239 (ASM) *(Figure 20)* is a county-maintained, improved dirt road that traverses the east side of the San Pedro River within the APE *(Photo 14)*. It is a portion of the road system that would have been used historically to travel along the San Pedro River, a major north-south watercourse in southern Arizona and extreme northern Sonora. The road has been located in its current alignment since at least 1935, as indicated on an aerial photograph taken by the Fairchild aerial photography company in that same year. The 1878 GLO map of the road, however, shows it plotted slightly southwest of its present location *(Figure 6)*. This discrepancy may be the result of a mapping error or limitations in early mapping techniques. It could also indicate that the road was moved closer to the edge of the bajada to escape the floodwaters of the San Pedro River sometime between 1878 and 1935. In either case, the road has always served the same function: the movement of people and goods up the San Pedro to the various ranches (including Clark Ranch), farms, towns, and mining districts located along the river.

Photo 14. Overview of River Road (AZ BB:6:239 [ASM])

Site Location: Within the APE, the roadway is located on the east side of the San Pedro River, directly adjacent to the distal edge of the piedmont that emanates from the Galiuro Mountains to the north. Thick velvet mesquite bosques and historic farm fields abut the road on the riverside.

Site Condition: The road is continuously upgraded using heavy machinery, and the numerous small and large wash crossings are constantly being repaired following flood events.

Features: The roadbed itself is slightly raised and graveled. A ditch runs on both sides of the road that provides stormwater runoff protection during storm events. No other road features were noted in the APE.

Artifacts: No historic artifacts were found in direct association with the road; however, car parts from the 1930s were found approximately 100 m north of the road and were recorded as IO 14.

Site Interpretation: River Road served to connect the ranches, mines, and communities along this portion of the San Pedro River. Although this road roughly follows the alignment of prehistoric trails, Spanish expeditions, and a U.S. military route (marked as *Leach* in Stein 1994:18, Figure 2), there is no evidence that River Road was the exact alignment of these trails. The present alignment dates to at least 1935.

Site Integrity: The portion of River Road in the APE, although within a historic alignment dating to at least 1935, is continuously upgraded and repaired, undermining its integrity of workmanship and materials and leaving little that remains of the original construction plans and techniques. Field mitigation efforts would yield no additional information. Further research on the road would likely reveal numerous fascinating stories about the people who lived along the San Pedro River, but this research would generally be archival in nature.

Research Potential/National Register Status: AZ BB:6:239 (ASM) is a significant resource in the study of commerce and transportation (Research Theme No. 10) within the San Pedro River valley. However, this portion of River Road is a non-contributing element of the resource, and the recording of the road has exhausted its research potential. This portion of AZ BB:6:239 (ASM) is therefore recommended as ***ineligible*** for inclusion in the National Register of Historic Places under Criteria A, B, C, or D. Other portions of River Road may retain their historical integrity and thus their eligibility for inclusion in the NRHP.

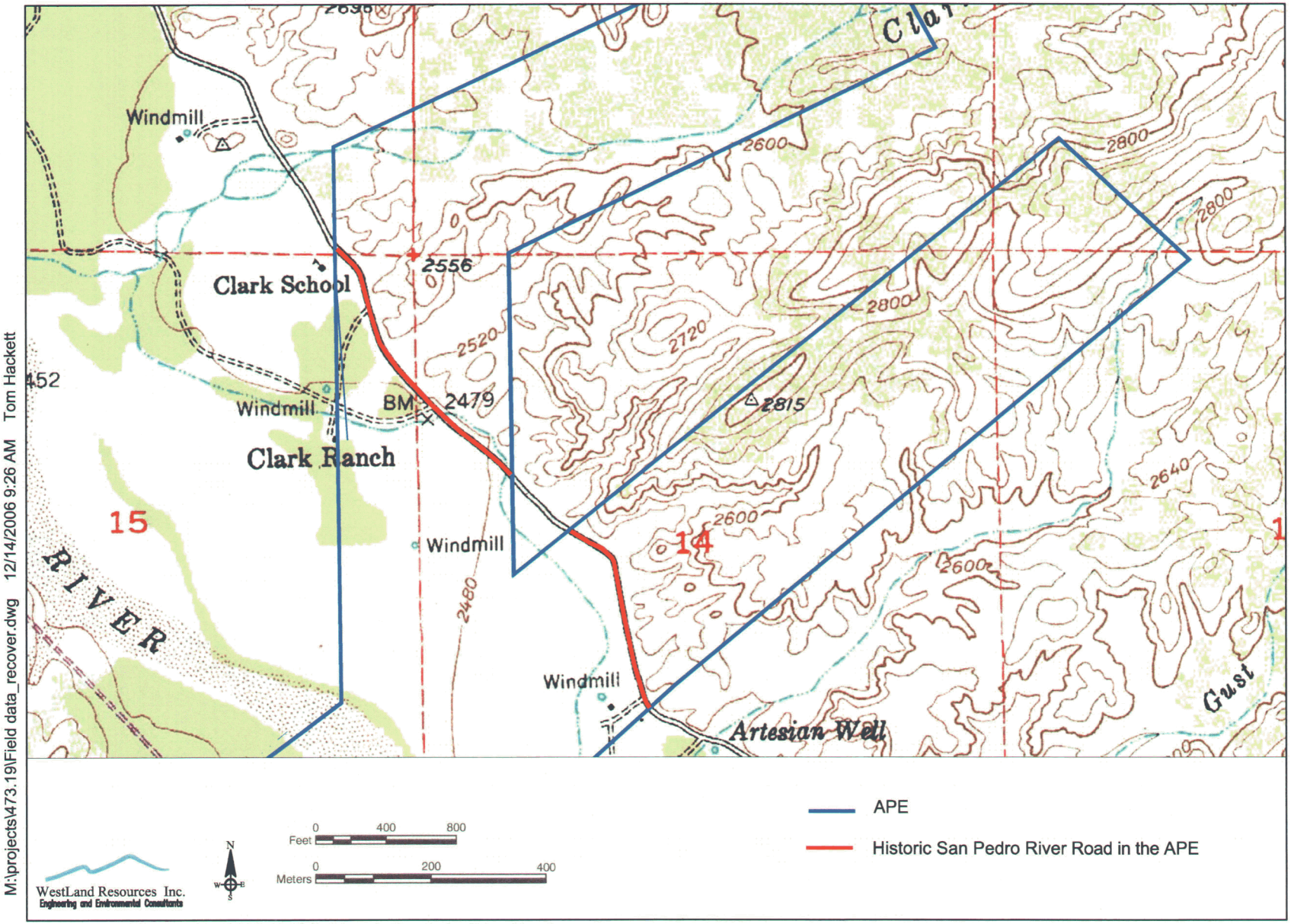

Figure 20. Site AZ BB:6:239 (ASM), historic San Pedro River Road

Site AZ BB:6:240 (ASM) (Clark Wash Road)

Cultural Affiliation: Euroamerican

Site Period: Historic (pre-1935)

Site Type: Transportation corridor

Site Description: Site AZ BB:6:240 (ASM) ***(Figure 21)*** is an in-use, continuously upgraded two-track dirt road that travels up Clark Wash, a large wash that empties into the San Pedro River near San Manuel, Arizona. The roadway begins on the west at the intersection of River Road (AZ BB:6:239 [ASM]), weaves its way eastward through Clark Wash for approximately 2 km, and ends at a circular feature that may be a stock tank or a small quarry. (This feature was not visited by WestLand staff as it is located outside of the APE, but it is clearly visible on aerial photographs.) The earliest evidence of this road is on a 1935 aerial photograph of the APE (Fairchild Aerial Photographic Collection courtesy of AZGS), and it remains in use to this day.

Site Location: The road traverses the bottom of Clark Wash, an extremely braided wash that empties out of the bajada emanating from the south side of the Galiuro Mountains, and crosses the braided channel of Clark Wash numerous times.

Site Condition: The road shows evidence of recent blading, and any original road features have been modified over years of continuous upkeep. The road is located on Arizona State Trust Land, and the lessee of the land, likely a local stockman, is responsible for maintaining the road.

Features: The roadbed itself is a 10-ft-wide dirt road cut into the native rocky and gravelly substrate of Clark Wash. No road features were identified in the APE.

Artifacts: No historic artifacts relating to the road's construction or use were present.

Site Interpretation: This road served to connect the historic River Road (AZ BB:6:239 [ASM]) with an unidentified feature, likely a stock tank, located outside of the current APE. The date of construction is prior to 1935. Clark Wash Road is likely related to Clark Ranch (AZ BB:6:234 [ASM]), a late nineteenth and twentieth century homestead and ranch located directly south of the intersection of this two-track road and River Road.

Site Integrity: The portion of Clark Wash Road in the APE, although within a historic alignment dating to at least 1935, is continuously upgraded and repaired and, therefore, lacks integrity of workmanship and materials, with little remaining of the original construction plans and techniques. Field mitigation efforts would contribute no additional information to our current understanding of the site.

Research Potential/National Register Status: It is unknown who originally constructed the Clark Wash Road and for what purpose; however, a safe guess is that it was related to cattle ranching in the area. As the Fairchild collection 1935 aerial photograph and the USGS 7.5' topographic maps of the area demonstrate, unimproved dirt roads are a common feature of the lower Galiuro Mountains bajada landscape. This particular road segment is not significant and would not contribute to our understanding of unimproved roadways related to historic period mining and cattle ranching in the area. Future research on the roadway will not contribute to our understanding of any of the themes outlined in the SHPO historic contexts on historic trails in Arizona (Stein 1994). The recording of this road as part of this survey has exhausted its research potential, and AZ BB:6:240 (ASM) is recommended as ***ineligible*** for inclusion in the National Register of Historic Places under Criteria A, B, C, or D.

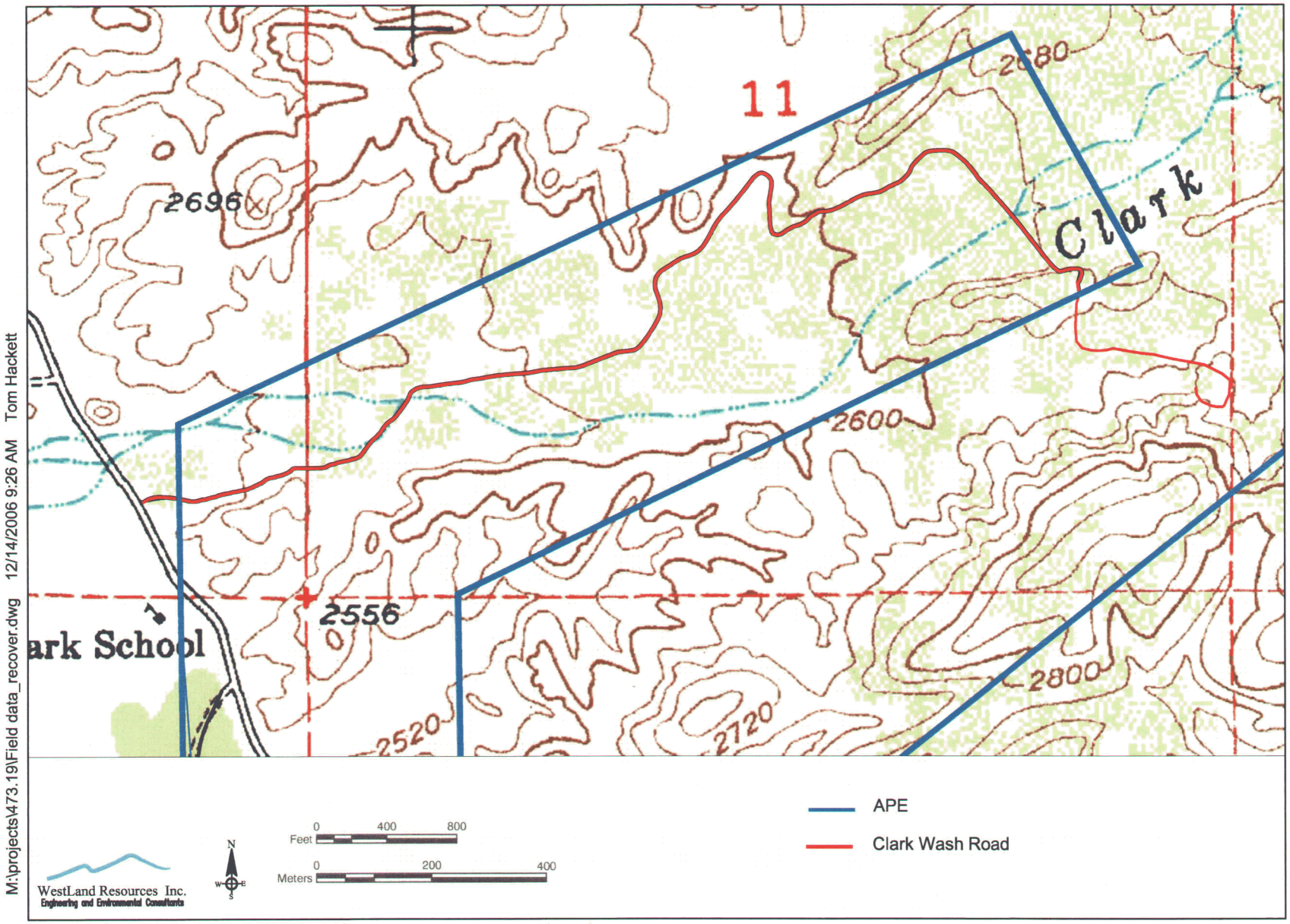

Figure 21. Site AZ BB:6:240 (ASM), historic Clark Wash two-track road

Site AZ BB:6:241 (ASM) (APS Power Line)

Cultural Affiliation: Euroamerican

Site Period: Historic (pre-1955)

Site Type: Electrical power transmission line

Site Description: Site AZ BB:6:241 (ASM) *(Figure 22)* is an in-use Arizona Public Service 12.5-kV electrical power transmission line that dates from the mid-twentieth century. The transmission line serves customers in the vicinity of San Manuel, Arizona. The portion of the line within the APE consists of approximately 20 T-frame power poles *(Photo 15)*. Three individual electrical lines and their associated ceramic conductors are present on the T-frame poles. The date of construction of the power line is prior to 1955, as an aerial photo taken in that year clearly shows it in place. The associated access road and construction easement swath demonstrate little vegetative growth in the 1955 photo, possibly indicating that the line was of recent construction. The early 1950s date of construction would correlate with the large boom in electrical power line construction in the post-WWII era (ACRE 2006).

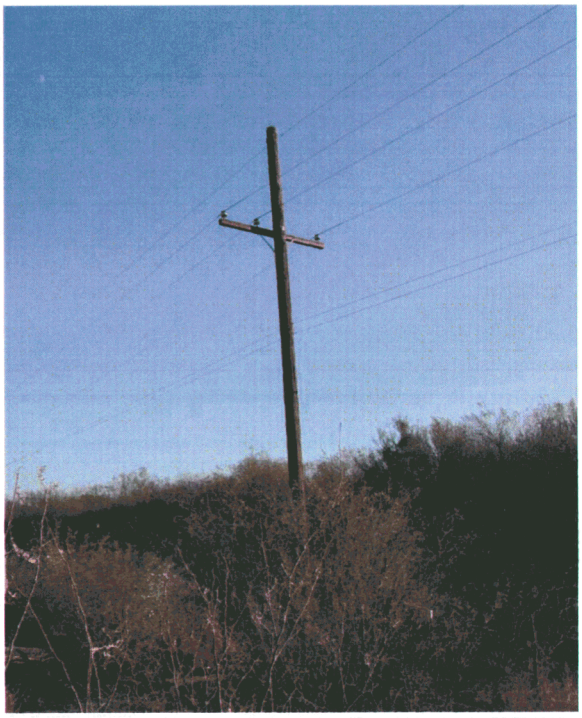

Photo 15. Historic APS transmission line, AZ BB:6:241 (ASM)

The source of the power that supplies this line is unknown at this time, but it likely connects to one of the large transmission lines that transport current from the numerous hydro-electric dams in central and northern Arizona. The following is a brief summary of the history of APS, taken from WWW.APS.Com.

> Arizona Public Service was born in 1886 as the Phoenix Illuminating Gas & Electric Light Co., providing electricity and natural gas to the then-small farming community of Phoenix. By 1906, the company had joined with other small utility companies that served various neighborhoods of the city to form Pacific Gas and Electric of Phoenix.
>
> As farming in the Salt River valley expanded, PG&E of Phoenix acquired additional utility companies and became the Central Arizona Light and Power Company. By the mid-1930s, another regional utility, Arizona Edison Inc., consolidated most of the remaining small gas and electric companies of central and southern Arizona. In 1952, these two utilities merged with Northern Arizona Light and Power to form Arizona Public Service, which provided power for Arizona's phenomenal post-war boom.

The construction of the 12.5-kV APS transmission line prior to 1955 predated cultural resource management regulations and laws. As a result, it crosses several large cultural resource sites within the APE. Sites that may have been impacted by the transmission line include AZ BB:6:110 (ASM), AZ BB:6:235 (ASM), and AZ BB:6:238 (ASM). Disturbance to the sites occurred in the form of transmission pole installation and blading of a right-of-way road to access and maintain the poles.

Site Location: The portion of the transmission line in the APE begins at a modern electrical sub-station within the San Manuel Plant Site and continues in a northeast direction across the San Pedro River. At this point, it splits into two lines, one traveling south down the river, the other going north. The power line supplies rural customers along this stretch of the San Pedro River.

Site Condition: The transmission line is still in use and is in excellent condition. The T-frame poles

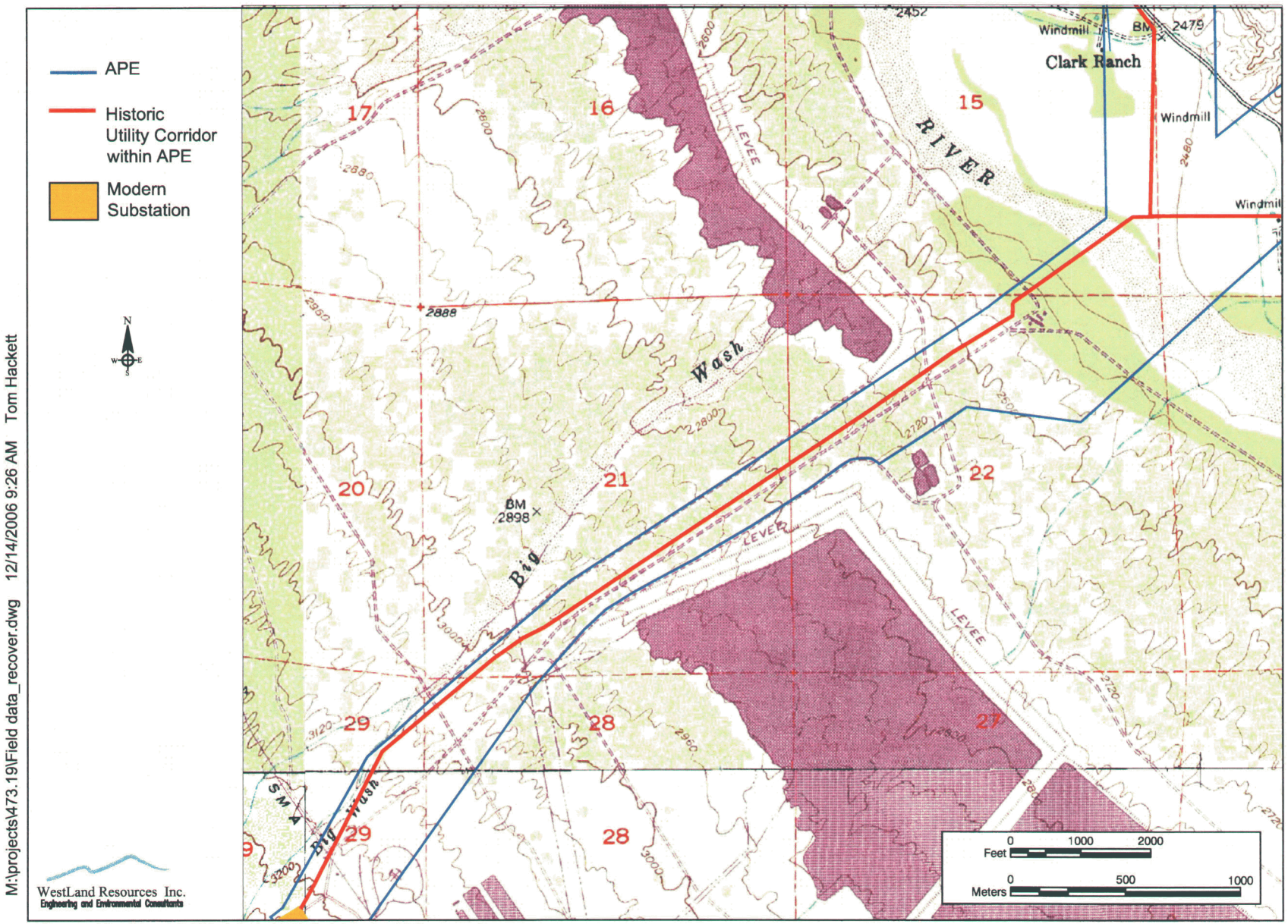

Figure 22. Site AZ BB:6:241 (ASM), historic APS power line

appear to be original, but some of the poles have likely been replaced over the years due to storm and other damage.

Features: The only features present in the APE are the T-frame poles and a 10-ft-wide unimproved access road.

Artifacts: No historic period artifacts were noted in direct association with the transmission line.

Site Interpretation: The transmission line was constructed sometime prior to 1955 by APS and supplied electrical power to customers along the San Pedro River in the vicinity of San Manuel, Arizona.

Site Integrity: AZ BB:6:241 (ASM) is an active and continuously maintained electrical power delivery structure and retains no integrity of construction or materials.

Research Potential/National Register Status: WestLand has been given no indication that the site is related to events or peoples that have made a significant contribution to the broad patterns of our history. In addition, the construction techniques used for the power line are similar to numerous other power lines in the western United States (ACRE 2006). The recording of AZ BB:6:241 (ASM) has exhausted its research potential, and the site is therefore recommended as ***ineligible*** for inclusion in the National Register of Historic Places under Criteria A, B, C, or D.

CONCLUSIONS AND RECOMMENDATIONS

The Class III cultural resources survey of 1,056 ac conducted along the San Pedro River near San Manuel, Arizona, resulted in the recording of thirteen archaeological sites.

The National Register of Historic Places eligibility recommendations for these sites are listed in *Table 14*. This high density of prehistoric and historic sites is a common occurrence along the San Pedro River, an important river in both prehistoric and historic times.

The survey was performed in anticipation of the construction of an aboveground electrical power transmission line by Southwest Transmission Cooperative, Inc. The specific transmission line construction plans are not finalized; therefore, WestLand Resources, Inc., is unable to make recommendations for specific treatments of the NRHP-eligible sites at this time. Once these plans are known, WestLand can prepare an impact assessment and recommend treatments to mitigate the impacts the project will have on the affected sites.

Table 14. NRHP eligibility recommendations

ASM Site Number	Land Status	Site Type	Age/Cultural Affiliation	NRHP Eligibility	SHPO Concurrence
AZ BB:6:109 (ASM)	Private	Habitation/ agricultural	Late Formative, Salado	Contributing under D	Although previously recorded by CDA in 1991, the site was not evaluated at that time.
AZ BB:6:110 (ASM)	Private	Habitation/ agricultural	Late Formative, Salado	Contributing under D	Although previously recorded by CDA in 1991, the site was not evaluated at that time.
AZ BB:6:231 (ASM)	Arizona State Trust Land	Limited activity/ agricultural	Late Formative, Native American	Contributing under D	Newly recorded site
AZ BB:6:232 (ASM)	Arizona State Trust Land	Limited activity	Formative, Native American	Contributing under D	Newly recorded site
AZ BB:6:233 (ASM)	Arizona State Trust Land	Limited activity	Formative, Native American	Contributing under D	Newly recorded site
AZ BB:6:234 (ASM) (Clark Ranch)	Private	Ranch and farm	Historic (built ca. late 1800s)	Contributing under C & D	Newly recorded site
AZ BB:6:235 (ASM)	Private	Ranch or farm	Historic (built ca. 1890–1935)	Contributing under C & D	Newly recorded site
AZ BB:6:236 (ASM)	Private	Agricultural	Late Formative, Native American	Contributing under D	Newly recorded site
AZ BB:6:237 (ASM)	Private	Agricultural	Formative, Native American	Contributing under D	Newly recorded site
AZ BB:6:238 (ASM)	Private	Prehistoric habitation, historic refuse pile	Late Formative, Salado and 1920s Euroamerican	Contributing under D	Newly recorded site
AZ BB:6:239 (ASM) (San Pedro River Road)	Traverses State Trust and private land but is maintained by Pinal Co.	Transportation corridor	Historic (ca. 1878–1935), Euroamerican	Not eligible	Newly recorded site
AZ BB:6:240 (ASM) (Clark Wash Road)	Arizona State Trust Land	Transportation corridor	Historic (ca. A.D. 1878–1935)	Not eligible	Newly recorded site
AZ BB:6:241 (ASM) (APS Power Line)	Private within the APE	Electrical power transmission line	Historic (ca. early 1950s)	Not eligible	Newly recorded site

WestLand Resources, Inc., recommends avoidance of the National Register of Historic Places-eligible properties. If avoidance of these properties is not possible, the implementation of a testing plan, data recovery plan, or both for each eligible property is recommended.

The floodplain portion of the APE contains a high density of thick vegetative growth and was not completely surveyed. We recommend that any ground-disturbing activities in this portion of the APE be monitored by a qualified archaeologist for hidden and/or buried cultural features.

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Exhibit G

AVAILABILITY OF THE PROJECT AREA TO THE PUBLIC FOR RECREATIONAL PURPOSES

The proposed transmission line does not cross or come into contact with formally designated parks or recreation areas. The majority of the project area (the area west of River Road) is owned by BHP Copper, Inc., and is fenced and closed to recreational uses. Limited unauthorized recreational use associated with all-terrain vehicles may occur on existing Southwest Transmission Cooperative, Inc., 115-kV transmission line access roads in the western foothills of the Galiuro Mountains. Bureau of Land Management (BLM) and Arizona State Land Department (ASLD) lands east of River Road in the Galiuro Mountains are accessible via existing dirt roads. The nearest formally designated land is the Galiuro Wilderness, located approximately 5 miles east of the project area. The major access points to the Galiuro Wilderness are on the east and south sides of the Galiuro Mountains and include the Deer Creek Trailhead at the end of Forest Road (FR) 253 off the Aravaipa Road and the Redfield Canyon Trailhead at the end of FR 691 through Muleshoe Ranch Preserve. Motorized and mechanized vehicles and equipment, including mountain bikes, are not permitted in Galiuro Wilderness.

The project would have no impact to the recreational opportunities offered by BLM and ASLD lands in the Galiuro Mountains. Access to the Galiuro Wilderness would not be affected by project activities.

Exhibit H

DEPICTION OF THE TRANSMISSION LINE STRUCTURE

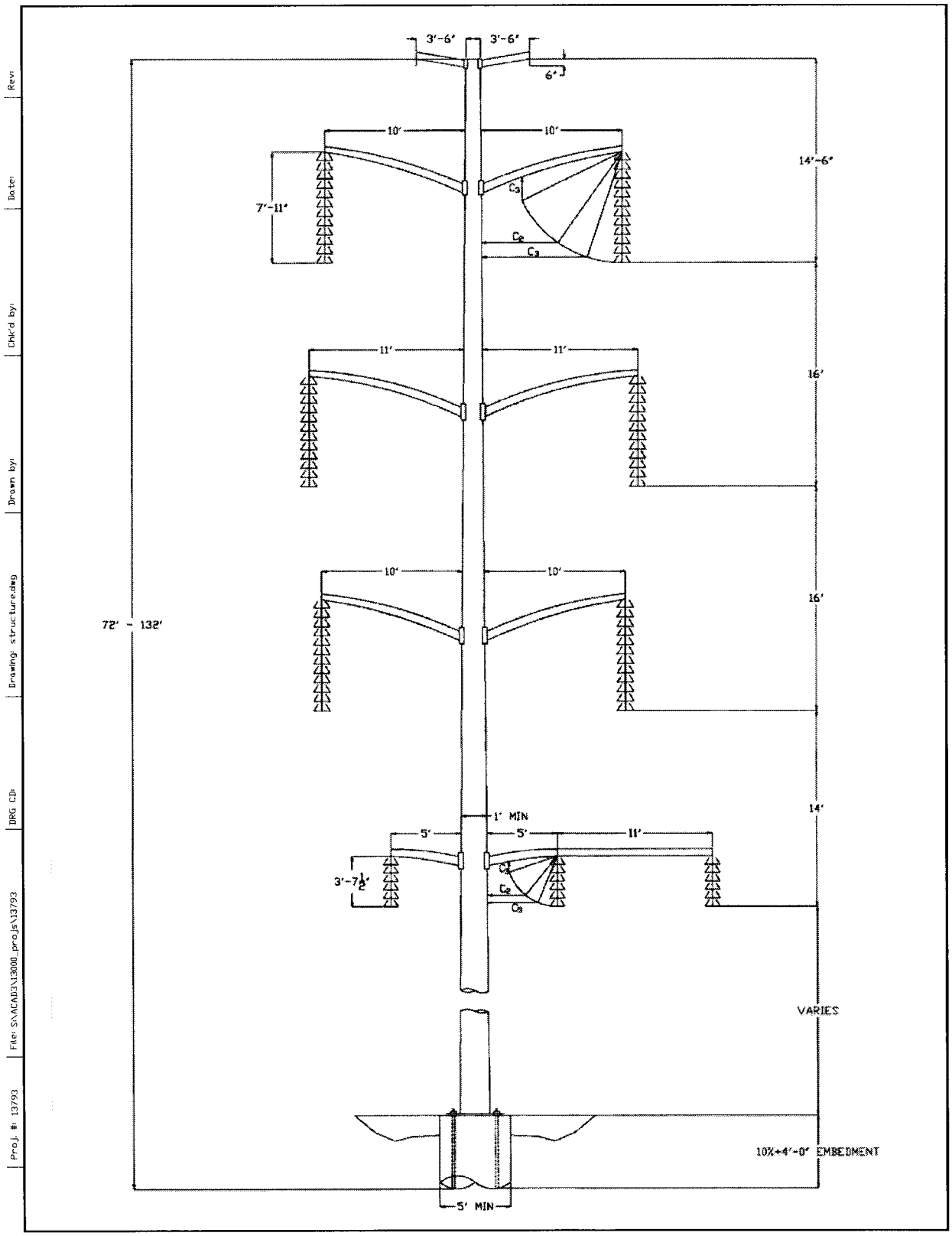

Exhibit H-1. 230-kV Transmission line monopole structure detail.

Exhibit I

EXISTING PLANS FOR THE PROJECT AREA

Existing plans for the project area are summarized in the Environmental Assessment (Exhibit B) and are compatible with the proposed project. The Proposed Action is subject to the Bureau of Land Management (BLM) *Final Safford Resource Management Plan and Environmental Impact Statement* (RMP/FEIS). It has been reviewed for conformance to the land use plan terms and conditions as required by 43 Code of Federal Regulations 1610.5, BLM Manual § 1617.3. The Proposed Action is in conformance with the RMP/EIS, which states, "Land Use Authorizations Rights-of-way, leases and permits will be considered on a case-by-case basis, in accordance with the decisions of this Resource Management Plan." The BLM parcel in question has been identified for retention per land tenure decisions in the RMP/FEIS.

For development plans in unincorporated Pinal County, the *Pinal County Comprehensive Plan* (approved in February 2007 and made available for public review in July 2008), was reviewed. The project would adhere to all land use plans and requirements of Pinal County.

Exhibit J

NOISE, RADIO, AND TELEVISION INTERFERENCE

Noise

Much of the project area is uninhabited; however, transportation, mining, and energy infrastructure development is present. For the majority of the area, populations immediately adjacent to the proposed transmission line would be classified as Rural (undeveloped), with a population density of less than 20 people per square mile. San Manuel, located immediately south of the existing San Manuel Substation at the southwest end of the project area, is considered Low Density Residential, with 1 to 4 dwelling units per acre.

Sources of noise along the proposed project alignment primarily relate to transportation sources and include local access along nearby South Redington and South River roads and limited noise from the San Manuel Arizona Railroad. Residential noise would also contribute to noise levels near the project area.

Sensitive noise receptors, such as churches or schools, are not located directly within the project alignment but are present in San Manuel, approximately 0.5 mile southwest of the project area. Some level of noise would result from transmission line construction, operation, and maintenance. During construction, equipment used for clearing and grading (access roads and structure sites), assembly and erection of structures, wire pulling and splicing, and rehabilitation activities would generate noise. Noise from construction activities would be audible, particularly to the closest residents in San Manuel. This construction noise, however, would not be considered a major impact because construction would occur during daytime hours when tolerance to noise is higher and noise is likely to be considered only a nuisance. Also, construction noise would be temporary, lasting only a few days at a time in any one location. Long-term noise impacts from transmission line and substation operation and maintenance activities are expected to be minimal.

Radio

Radio interference is most likely to affect the amplification modulation (AM) broadcast band; frequency modulation (FM) radio is rarely affected by transmission lines. Only AM receivers located immediately adjacent to the transmission line have the potential to be affected by radio interference. The only residences in the vicinity of the proposed project alignment are in San Manuel, which is located approximately 0.5 mile southwest of the project area. Because the proposed transmission line would be sited in the vicinity of two Arizona Public Service (APS) 115-kV transmission lines, additional radio interference as a result of project implementation is expected to be minimal.

Television

Interference with traditional television reception from the transmission line's corona effects may occur during periods of bad weather, but is usually only a concern for transmission lines of 345 kV or greater and only for receivers within 500 feet of the line. Because the proposed transmission line would be sited in the vicinity of two APS 115-kV transmission lines, additional radio interference is expected to be minimal.

Electric and Magnetic Fields

It is general practice to consider both electric and magnetic field (EMF) values together in assessing the amount of effect at the outer edge of a transmission line right-of-way. In the San Manuel project area, the existing sources of EMF exposure are the Apache to Hayden 115-kV transmission line and the two APS 115-kV lines. EMF originating at the existing San Manuel Substation is expected to be minimal. EMF values associated with this project are expected to be typical of EMF levels for a 230-kV transmission line.

Exhibit K

SPECIAL FACTORS

This section contains materials used in the agency and public scoping process. Federal, state, and local agencies and tribes were engaged in the initial stages of the environmental analysis for the project to solicit input and comments. The public was informed of the project at an open house held in San Manuel on March 10, 2009.

Agency scoping involved sending out informational letters and requests for input to appropriate land management and resource management agencies. Tribal coordination and consultation involved sending out informational letters and requests for input to relevant or interested Native American tribes.
In addition to the informational letter, Peter Steere, Tohono O'odham Nation, requested and was sent a hard copy of the archaeological survey report completed for the project. In all, seven tribes and 17 land and resource management agencies were sent information. Public scoping involved sending open house invitations to individuals living near the proposed project. The agency and public mailing lists are provided in Exhibit K-1. The agency scoping letter is included in Exhibit K-2, and the public open house invitation is included in K-3. The public open house sign-in sheet and information presented at the open house are provided in K-4 and K-5, respectively. The open house comment form is provided in K-6. Scoping response letters and phone logs are provided in Exhibit K-3.

Exhibit K-1

AGENCY AND PUBLIC MAILING LISTS

SWTC SAN MANUEL INTERCONNECT AGENCY/TRIBAL MAILING LIST 01/17/08

AGENCY

Steve Spangle Field Supervisor U.S. Fish and Wildlife Service 2321 W. Royal Palm Road, Suite 103 Phoenix, Arizona 85021	James McGinnis Manager Arizona Native Plant Law Arizona Department of Agriculture Plant Services Division 1688 W. Adams Phoenix, Arizona 85007
Michael Somerville State Conservationist Arizona Natural Resource Conservation Service State Headquarters 3003 N. Central Ave., Suite 800 Phoenix, AZ 85012-2945	JoAnne Medley Compliance Specialist/Archaeologist State Historic Preservation Office Arizona State Parks 1300 W. Washington Phoenix, AZ 85007
Bob Broscheid Arizona Game & Fish Department Habitat Branch - Project Evaluation Program 2221 W. Greenway Rd Phoenix, AZ 85023	Stephen A. Owens Arizona Department of Environmental Quality Mailcode: R1000T 400 W Congress Suite 433 Tucson, Arizona 85701
Marybeth McCormack, Administrative Manager Pinal County Development Services P.O. Box 2167 Florence, AZ 85232	Sheri Cluff Pinal County Clerk of the Board P.O. Box 827 Florence, Arizona 85232
Right-of-Way Manager Real Estate Division Arizona State Land Department 1616 W. Adams Phoenix, AZ 85007	Gordon Taylor Asset Management Planning Section Arizona State Land Department 1616 W. Adams Phoenix, AZ 85007
Shela McFarlin Bureau of Land Management Tucson Field Office 300 W. Congress Tucson, AZ 85701	Cindy Lester US Army Corps of Engineers Los Angeles District Phoenix Office 3636 N. Central Avenue Suite 760 Phoenix, AZ 85012-1936
Mark Winkleman Commissioner AZ State Land Department 1616 W. Adams Phoenix, AZ 85007	Dennis Rankin USDA Rural Utilities Service Mail Stop 1571, Room 2237-S 1400 Independence Avenue, SW Washington, DC 20250
Mr. David Harlow U.S. Fish & Wildlife Service AZ Ecological Services Office 2321 W. Royal Palm Rd., Ste.103 Phoenix, AZ 85021-4951	Ms. Sabra Schwartz AZ Game & Fish Department Heritage Database Mgmt. 2222 W. Greenway Road Phoenix, AZ 85023

Mr. James Garrison
State Historic Preservation Officer
1300 W. Washington
Phoenix, AZ 85007

TRIBAL

Elaine Peters, Director
Ak-Chin Him Dak Eco Museum & Archives
47685 N. Eco Museum Rd.
Maricopa, Arizona 85239

Amalia A.M. Reyes
Language and Culture Preservation Specialist
Pascua Yaqui Tribe
7474 S. Camino de Oeste
Tucson, AZ 85746

Leigh Kuwanwisiwma
Hopi Cultural Preservation Office
PO Box 123
Kykotsmovi, AZ 86039

Barnaby V. Lewis, Cultural Resource Specialist
Gila River Indian Community
Cultural Resources Management Program
PO Box 2140
Sacaton, AZ 85247

Vernelda J. Grant, Tribal Archaeologist/Director
Historic Preservation & Archaeology Department
San Carlos Apache Tribe
PO Box 0
San Carlos, Arizona 85550

Peter Steere, Program Manager
Cultural Affairs Department
Tohono O'odham Nation
PO Box 837
Sells, Arizona 85634

John Welch, Ph.D.
Tribal Historic Preservation Officer
White Mountain Apache Tribe Historic
Preservation Office
PO Box 507
Fort Apache, Arizona 85926

Public Mailing Lists
Businesses

TITLE	TITLE2	ADDRESSL	CITY	ST	ZIP	ZIP4
Desert Dreams Physical Therapy		23 S MCNAB PKWY	SAN MANUEL	AZ	85631	1156
Dales Auto Collison Center		140 W 8TH AVE	SAN MANUEL	AZ	85631	1117
Best Auto Supply		129 W 8TH AVE	SAN MANUEL	AZ	85631	1116
San Manuel Lodge		666 W 8TH AVE	SAN MANUEL	AZ	85631	1118
San Manuel Chamber of Commerce		130 N REDINGTON RD STE T	SAN MANUEL	AZ	85631	1160
3 G Financial Services LLC		147 W 8TH AVE	SAN MANUEL	AZ	85631	1116
San Manuel Miner		139 W 8TH AVE	SAN MANUEL	AZ	85631	1116
DM Federal Credit Union		141 W 8TH AVE	SAN MANUEL	AZ	85631	1116
San Manuel Barber Shop		145 W 8TH AVE	SAN MANUEL	AZ	85631	1116
Salt N Pepper #3 LLC		110 N REDINGTON RD	SAN MANUEL	AZ	85631	1129
OCCUPANT		114 N REDINGTON RD	SAN MANUEL	AZ	85631	1129
Elks Loge		143 W 8TH AVE	SAN MANUEL	AZ	85631	1116
Your Broker Connection		130 N REDINGTON RD STE E	SAN MANUEL	AZ	85631	1161
Radio Shack		137 W 8TH AVE	SAN MANUEL	AZ	85631	1116
State Division of Motor Vehicles		190 N REDINGTON RD	SAN MANUEL	AZ	85631	1129
RESIDENT		18 S MCNAB PKWY UNIT A	SAN MANUEL	AZ	85631	1113
RESIDENT		20 S MCNAB PKWY UNIT B	SAN MANUEL	AZ	85631	1113
Tircom Real Estate		22 S MCNAB PKWY	SAN MANUEL	AZ	85631	1113

Public Mailing Lists
Property Owners

TITLE	TITLE2	ADDRESSL	CITY	ST	ZIP	ZIP4
Sun Life Family Health Center Inc		PO Box L	SAN MANUEL	AZ	85631	
Dale Cline		205 E WEBB DR	SAN MANUEL	AZ	85631	
San Manuel Lodge 2007 BPOE		129 W 8TH AVE	SAN MANUEL	AZ	85631	1116
Western American Lodging LLC		666 W 8TH AVE	SAN MANUEL	AZ	85631	
San Manuel Lodge 2007 BPOE		P.O. Box 3	SAN MANUEL	AZ	85631	
Salt N Pepper #3 LLC		110 N REDINGTON RD	SAN MANUEL	AZ	85631	1129
FISERV ISS & CO FBO JERRY QUICK		PO Box 173859	DENVER	CO	80217	
BHP Copper Inc		PO Box M	SAN MANUEL	AZ	85631	
RAVENCREST THREE LLC		2681 SE RIVER ROAD	SAN MANUEL	AZ	85631	1113
NANCIE ROTHERHAM		20 S MCNAB PKWY UNIT B	SAN MANUEL	AZ	85631	1113
PAUL MERTEN		22 S MCNAB PKWY	SAN MANUEL	AZ	85631	1113
MORRIS AND LINDA MILLS		9971 N. CALLE SOLANO	TUCSON	AZ	85737	
WALTER AND CHRISTA EICHER		420 STEPHENS AVE	MISSOULA	MT	59801	
SHOW LOW ACQUISITION CO		1501 BELVEDERRE RD	WEST PALM BEACH	FL	33406	

Public Mailing Lists
Agencies

Company	First Name	Last Name	Title	Address	City	State	Zip
Arizona Department of Agriculture	James	McGinnis	Manager Arizona Native Plant Law	Plant Services Division, 1688 W. Adams	Phoenix,	AZ	85007
Arizona Department of Environmental Quality	Susan	Keith	Southern Regional Office Director	400 West Congress, Suite 433	Tucson	AZ	85701
Arizona Game and Fish Department	Sabra	Schwartz	Heritage Database Mgmt	5000 West Carefree Highway	Phoenix	AZ	85086
Arizona Game and Fish Department	Josh	Avery	Habitat Branch Chief	5000 West Carefree Highway	Phoenix	AZ	85086
Arizona State Land Department, Real Estate Division	Ruben	Ojeda	Right-of-Way Manager	1616 W. Adams	Phoenix	AZ	85007
Rural Utilities Service	Dennis	Rankin	Environmental Protection Specialist	Mailstop 1571, Room 2244-S, 1400 Independence Avenue SW	Washington	DC	20250
State Historic Preservation Office, Arizona State Parks	JoAnne	Medley	Compliance Specialist/Archaeologist	1300 W. Washington	Phoenix	AZ	85007
Bureau of Land Management	Susan	Berna	Realty Specialist	12661 East Broadway	Tucson	AZ	85748
Bureau of Land Management	Linda	Hughes	NEPA Coordinator	12661 East Broadway	Tucson	AZ	85748
Trico Electric	Ron	Brown	Manager of Electric Operations	PO Box 930	Marana	AZ	85653
Trico Electric	Frank	Gonzales		12225 N Kalama Circle	Marana	AZ	85653
U.S. Fish Wildlife Service	Sherry	Barrett	Supervisor	201 North Bonita Avenue, Suite 141	Tucson	AZ	85745
U. S. Fish Wildlife Service	Jason	Douglas		201 North Bonita Avenue, Suite 141	Tucson	AZ	85745
United States Army Corps of Engineers	Cindy	Lester	Arizona Regulatory Office Section Chief	Los Angeles District Phoenix Office, 3636 N. Central Avenue, Suite 760	Phoenix	AZ	85012
United States Fish and Wildlife Service	Steven L.	Spangle	Field Supervisor	2321 West Royal Palm Road, Suite 103	Phoenix	AZ	85021
Southwest Transmission Cooperative	Steve	George		P. O. Box 2195	Benson	AZ	85602
Southwest Transmission Cooperative	Michelle	Freeark		P. O. Box 2195	Benson	AZ	85602
Southwest Transmission Cooperative	Kevin	Barnes		P. O. Box 2195	Benson	AZ	85602
Southwest Transmission Cooperative	Ray	Sainz		P. O. Box 2195	Benson	AZ	85602
Southwest Transmission Cooperative	Jim	Burson		P. O. Box 2195	Benson	AZ	85602
Southwest Transmission Cooperative	Bruce	Evans		P. O. Box 2195	Benson	AZ	85602
Southwest Transmission Cooperative	Mike	Saunders		P. O. Box 2195	Benson	AZ	85602
BHP Copper Inc.	Gerry	Brunskill		200 S. Veterans Memorial Blvd	San Manuel	AZ	85631
	Vito	Konur		6600 N. Montrose Drive	Tucson	AZ	85741-3123
Pinal County Clerk of the Board	Sheri	Cluff		P.O. Box 827	Florence	AZ	85232
Pinal County Development Services				P.O. Box 2167	Florence	AZ	85232

Public Mailing Lists
San Manuel

TITLE	ADDRESS	CITY	STATE	ZIP	STATUS
Interested Party	PO BOX 1	SAN MANUEL	AZ	85631	
Interested Party	PO BOX 3	SAN MANUEL	AZ	85631	
Interested Party	PO BOX 4	SAN MANUEL	AZ	85631	
Interested Party	PO BOX 6	SAN MANUEL	AZ	85631	
Interested Party	PO BOX 8	SAN MANUEL	AZ	85631	
Interested Party	PO BOX 9	SAN MANUEL	AZ	85631	
Interested Party	PO BOX 11	SAN MANUEL	AZ	85631	
Interested Party	PO BOX 12	SAN MANUEL	AZ	85631	
Interested Party	PO BOX 13	SAN MANUEL	AZ	85631	
Interested Party	PO BOX 14	SAN MANUEL	AZ	85631	
Interested Party	PO BOX 21	SAN MANUEL	AZ	85631	
Interested Party	PO BOX 23	SAN MANUEL	AZ	85631	
Interested Party	PO BOX 24	SAN MANUEL	AZ	85631	
Interested Party	PO BOX 26	SAN MANUEL	AZ	85631	
Interested Party	PO BOX 28	SAN MANUEL	AZ	85631	
Interested Party	PO BOX 30	SAN MANUEL	AZ	85631	Returned
Interested Party	PO BOX 33	SAN MANUEL	AZ	85631	
Interested Party	PO BOX 34	SAN MANUEL	AZ	85631	
Interested Party	PO BOX 35	SAN MANUEL	AZ	85631	
Interested Party	PO BOX 37	SAN MANUEL	AZ	85631	
Interested Party	PO BOX 39	SAN MANUEL	AZ	85631	Returned
Interested Party	PO BOX 42	SAN MANUEL	AZ	85631	
Interested Party	PO BOX 43	SAN MANUEL	AZ	85631	
Interested Party	PO BOX 44	SAN MANUEL	AZ	85631	
Interested Party	PO BOX 52	SAN MANUEL	AZ	85631	
Interested Party	PO BOX 53	SAN MANUEL	AZ	85631	
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Interested Party	PO BOX 94	SAN MANUEL	AZ	85631	
Interested Party	PO BOX 96	SAN MANUEL	AZ	85631	
Interested Party	PO BOX 98	SAN MANUEL	AZ	85631	

Public Mailing Lists
San Manuel

Interested Party	PO BOX 101	SAN MANUEL	AZ	85631
Interested Party	PO BOX 102	SAN MANUEL	AZ	85631
Interested Party	PO BOX 103	SAN MANUEL	AZ	85631
Interested Party	PO BOX 104	SAN MANUEL	AZ	85631
Interested Party	PO BOX 105	SAN MANUEL	AZ	85631
Interested Party	PO BOX 111	SAN MANUEL	AZ	85631
Interested Party	PO BOX 112	SAN MANUEL	AZ	85631
Interested Party	PO BOX 113	SAN MANUEL	AZ	85631
Interested Party	PO BOX 114	SAN MANUEL	AZ	85631
Interested Party	PO BOX 115	SAN MANUEL	AZ	85631
Interested Party	PO BOX 117	SAN MANUEL	AZ	85631
Interested Party	PO BOX 119	SAN MANUEL	AZ	85631
Interested Party	PO BOX 120	SAN MANUEL	AZ	85631
Interested Party	PO BOX J	SAN MANUEL	AZ	85631
Interested Party	PO BOX 121	SAN MANUEL	AZ	85631
Interested Party	PO BOX 122	SAN MANUEL	AZ	85631
Interested Party	PO BOX 123	SAN MANUEL	AZ	85631
Interested Party	PO BOX 124	SAN MANUEL	AZ	85631
Interested Party	PO BOX 126	SAN MANUEL	AZ	85631
Interested Party	PO BOX 132	SAN MANUEL	AZ	85631
Interested Party	PO BOX 133	SAN MANUEL	AZ	85631
Interested Party	PO BOX 134	SAN MANUEL	AZ	85631
Interested Party	PO BOX 141	SAN MANUEL	AZ	85631
Interested Party	PO BOX 143	SAN MANUEL	AZ	85631
Interested Party	PO BOX 146	SAN MANUEL	AZ	85631
Interested Party	PO BOX 148	SAN MANUEL	AZ	85631
Interested Party	PO BOX 151	SAN MANUEL	AZ	85631
Interested Party	PO BOX 155	SAN MANUEL	AZ	85631
Interested Party	PO BOX 157	SAN MANUEL	AZ	85631
Interested Party	PO BOX 163	SAN MANUEL	AZ	85631
Interested Party	PO BOX 164	SAN MANUEL	AZ	85631
Interested Party	PO BOX 165	SAN MANUEL	AZ	85631
Interested Party	PO BOX 172	SAN MANUEL	AZ	85631
Interested Party	PO BOX 173	SAN MANUEL	AZ	85631
Interested Party	PO BOX 174	SAN MANUEL	AZ	85631
Interested Party	PO BOX 175	SAN MANUEL	AZ	85631
Interested Party	PO BOX 176	SAN MANUEL	AZ	85631
Interested Party	PO BOX 177	SAN MANUEL	AZ	85631
Interested Party	PO BOX 178	SAN MANUEL	AZ	85631
Interested Party	PO BOX L	SAN MANUEL	AZ	85631
Interested Party	PO BOX 401	SAN MANUEL	AZ	85631
Interested Party	PO BOX 405	SAN MANUEL	AZ	85631
Interested Party	PO BOX 412	SAN MANUEL	AZ	85631
Interested Party	PO BOX 413	SAN MANUEL	AZ	85631
Interested Party	PO BOX 416	SAN MANUEL	AZ	85631
Interested Party	PO BOX 425	SAN MANUEL	AZ	85631
Interested Party	PO BOX 426	SAN MANUEL	AZ	85631
Interested Party	PO BOX 427	SAN MANUEL	AZ	85631
Interested Party	PO BOX 432	SAN MANUEL	AZ	85631
Interested Party	PO BOX 441	SAN MANUEL	AZ	85631
Interested Party	PO BOX 444	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	PO BOX 446	SAN MANUEL	AZ	85631
Interested Party	PO BOX 447	SAN MANUEL	AZ	85631
Interested Party	PO BOX 452	SAN MANUEL	AZ	85631
Interested Party	PO BOX 453	SAN MANUEL	AZ	85631
Interested Party	PO BOX 456	SAN MANUEL	AZ	85631
Interested Party	PO BOX 457	SAN MANUEL	AZ	85631
Interested Party	PO BOX 461	SAN MANUEL	AZ	85631
Interested Party	PO BOX 465	SAN MANUEL	AZ	85631
Interested Party	PO BOX 471	SAN MANUEL	AZ	85631
Interested Party	PO BOX 473	SAN MANUEL	AZ	85631
Interested Party	PO BOX 474	SAN MANUEL	AZ	85631
Interested Party	PO BOX 485	SAN MANUEL	AZ	85631
Interested Party	PO BOX 487	SAN MANUEL	AZ	85631
Interested Party	PO BOX 491	SAN MANUEL	AZ	85631
Interested Party	PO BOX 504	SAN MANUEL	AZ	85631
Interested Party	PO BOX 511	SAN MANUEL	AZ	85631
Interested Party	PO BOX 514	SAN MANUEL	AZ	85631
Interested Party	PO BOX 515	SAN MANUEL	AZ	85631
Interested Party	PO BOX 551	SAN MANUEL	AZ	85631
Interested Party	PO BOX 558	SAN MANUEL	AZ	85631
Interested Party	PO BOX 561	SAN MANUEL	AZ	85631
Interested Party	PO BOX 564	SAN MANUEL	AZ	85631
Interested Party	PO BOX 565	SAN MANUEL	AZ	85631
Interested Party	PO BOX 571	SAN MANUEL	AZ	85631
Interested Party	PO BOX 572	SAN MANUEL	AZ	85631
Interested Party	PO BOX 574	SAN MANUEL	AZ	85631
Interested Party	PO BOX 575	SAN MANUEL	AZ	85631
Interested Party	PO BOX 591	SAN MANUEL	AZ	85631
Interested Party	PO BOX 604	SAN MANUEL	AZ	85631
Interested Party	PO BOX 605	SAN MANUEL	AZ	85631
Interested Party	PO BOX 607	SAN MANUEL	AZ	85631
Interested Party	PO BOX 608	SAN MANUEL	AZ	85631
Interested Party	PO BOX 610	SAN MANUEL	AZ	85631
Interested Party	PO BOX 616	SAN MANUEL	AZ	85631
Interested Party	PO BOX 621	SAN MANUEL	AZ	85631
Interested Party	PO BOX 624	SAN MANUEL	AZ	85631
Interested Party	PO BOX 625	SAN MANUEL	AZ	85631
Interested Party	PO BOX 631	SAN MANUEL	AZ	85631
Interested Party	PO BOX 634	SAN MANUEL	AZ	85631
Interested Party	PO BOX 642	SAN MANUEL	AZ	85631
Interested Party	PO BOX 644	SAN MANUEL	AZ	85631
Interested Party	PO BOX 651	SAN MANUEL	AZ	85631
Interested Party	PO BOX 653	SAN MANUEL	AZ	85631
Interested Party	PO BOX 659	SAN MANUEL	AZ	85631
Interested Party	PO BOX 661	SAN MANUEL	AZ	85631
Interested Party	PO BOX 662	SAN MANUEL	AZ	85631
Interested Party	PO BOX 667	SAN MANUEL	AZ	85631
Interested Party	PO BOX 671	SAN MANUEL	AZ	85631
Interested Party	PO BOX 672	SAN MANUEL	AZ	85631
Interested Party	PO BOX 674	SAN MANUEL	AZ	85631
Interested Party	PO BOX 675	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	PO BOX 678	SAN MANUEL	AZ	85631
Interested Party	PO BOX 679	SAN MANUEL	AZ	85631
Interested Party	PO BOX 682	SAN MANUEL	AZ	85631
Interested Party	PO BOX 683	SAN MANUEL	AZ	85631
Interested Party	PO BOX 685	SAN MANUEL	AZ	85631
Interested Party	PO BOX 702	SAN MANUEL	AZ	85631
Interested Party	PO BOX 703	SAN MANUEL	AZ	85631
Interested Party	PO BOX 704	SAN MANUEL	AZ	85631
Interested Party	PO BOX 705	SAN MANUEL	AZ	85631
Interested Party	PO BOX 711	SAN MANUEL	AZ	85631
Interested Party	PO BOX 713	SAN MANUEL	AZ	85631
Interested Party	PO BOX 715	SAN MANUEL	AZ	85631
Interested Party	PO BOX 721	SAN MANUEL	AZ	85631
Interested Party	PO BOX 722	SAN MANUEL	AZ	85631
Interested Party	PO BOX 723	SAN MANUEL	AZ	85631
Interested Party	PO BOX 724	SAN MANUEL	AZ	85631
Interested Party	PO BOX 725	SAN MANUEL	AZ	85631
Interested Party	PO BOX 727	SAN MANUEL	AZ	85631
Interested Party	PO BOX 731	SAN MANUEL	AZ	85631
Interested Party	PO BOX 732	SAN MANUEL	AZ	85631
Interested Party	PO BOX 733	SAN MANUEL	AZ	85631
Interested Party	PO BOX 734	SAN MANUEL	AZ	85631
Interested Party	PO BOX 735	SAN MANUEL	AZ	85631
Interested Party	PO BOX 736	SAN MANUEL	AZ	85631
Interested Party	PO BOX 741	SAN MANUEL	AZ	85631
Interested Party	PO BOX 742	SAN MANUEL	AZ	85631
Interested Party	PO BOX 743	SAN MANUEL	AZ	85631
Interested Party	PO BOX 744	SAN MANUEL	AZ	85631
Interested Party	PO BOX 745	SAN MANUEL	AZ	85631
Interested Party	PO BOX 746	SAN MANUEL	AZ	85631
Interested Party	PO BOX 751	SAN MANUEL	AZ	85631
Interested Party	PO BOX 752	SAN MANUEL	AZ	85631
Interested Party	PO BOX 753	SAN MANUEL	AZ	85631
Interested Party	PO BOX 754	SAN MANUEL	AZ	85631
Interested Party	PO BOX 755	SAN MANUEL	AZ	85631
Interested Party	PO BOX 756	SAN MANUEL	AZ	85631
Interested Party	PO BOX 758	SAN MANUEL	AZ	85631
Interested Party	PO BOX 761	SAN MANUEL	AZ	85631
Interested Party	PO BOX 762	SAN MANUEL	AZ	85631
Interested Party	PO BOX 763	SAN MANUEL	AZ	85631
Interested Party	PO BOX 765	SAN MANUEL	AZ	85631
Interested Party	PO BOX 766	SAN MANUEL	AZ	85631
Interested Party	PO BOX 771	SAN MANUEL	AZ	85631
Interested Party	PO BOX 773	SAN MANUEL	AZ	85631
Interested Party	PO BOX 774	SAN MANUEL	AZ	85631
Interested Party	PO BOX 775	SAN MANUEL	AZ	85631
Interested Party	PO BOX 781	SAN MANUEL	AZ	85631
Interested Party	PO BOX 784	SAN MANUEL	AZ	85631
Interested Party	PO BOX 786	SAN MANUEL	AZ	85631
Interested Party	PO BOX 791	SAN MANUEL	AZ	85631
Interested Party	PO BOX 792	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	PO BOX 793	SAN MANUEL	AZ	85631
Interested Party	PO BOX 794	SAN MANUEL	AZ	85631
Interested Party	PO BOX 795	SAN MANUEL	AZ	85631
Interested Party	PO BOX 796	SAN MANUEL	AZ	85631
Interested Party	PO BOX 801	SAN MANUEL	AZ	85631
Interested Party	PO BOX 802	SAN MANUEL	AZ	85631
Interested Party	PO BOX 804	SAN MANUEL	AZ	85631
Interested Party	PO BOX 805	SAN MANUEL	AZ	85631
Interested Party	PO BOX 806	SAN MANUEL	AZ	85631
Interested Party	PO BOX 811	SAN MANUEL	AZ	85631
Interested Party	PO BOX 812	SAN MANUEL	AZ	85631
Interested Party	PO BOX 813	SAN MANUEL	AZ	85631
Interested Party	PO BOX 815	SAN MANUEL	AZ	85631
Interested Party	PO BOX 816	SAN MANUEL	AZ	85631
Interested Party	PO BOX 821	SAN MANUEL	AZ	85631
Interested Party	PO BOX 822	SAN MANUEL	AZ	85631
Interested Party	PO BOX 824	SAN MANUEL	AZ	85631
Interested Party	PO BOX 825	SAN MANUEL	AZ	85631
Interested Party	PO BOX 826	SAN MANUEL	AZ	85631
Interested Party	PO BOX 834	SAN MANUEL	AZ	85631
Interested Party	PO BOX 835	SAN MANUEL	AZ	85631
Interested Party	PO BOX 836	SAN MANUEL	AZ	85631
Interested Party	PO BOX 842	SAN MANUEL	AZ	85631
Interested Party	PO BOX 843	SAN MANUEL	AZ	85631
Interested Party	PO BOX 844	SAN MANUEL	AZ	85631
Interested Party	PO BOX 846	SAN MANUEL	AZ	85631
Interested Party	PO BOX 851	SAN MANUEL	AZ	85631
Interested Party	PO BOX 852	SAN MANUEL	AZ	85631
Interested Party	PO BOX 856	SAN MANUEL	AZ	85631
Interested Party	PO BOX 861	SAN MANUEL	AZ	85631
Interested Party	PO BOX 863	SAN MANUEL	AZ	85631
Interested Party	PO BOX 864	SAN MANUEL	AZ	85631
Interested Party	PO BOX 872	SAN MANUEL	AZ	85631
Interested Party	PO BOX 873	SAN MANUEL	AZ	85631
Interested Party	PO BOX 874	SAN MANUEL	AZ	85631
Interested Party	PO BOX 875	SAN MANUEL	AZ	85631
Interested Party	PO BOX 876	SAN MANUEL	AZ	85631
Interested Party	440 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	420 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	470 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	101 W AVENUE G	SAN MANUEL	AZ	85631
Interested Party	400 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	510 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	550 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	570 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	590 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	318 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	319 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	320 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	321 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	326 S AVENUE A	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	327 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	328 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	329 S AVENUE A UNIT B	SAN MANUEL	AZ	85631
Interested Party	301 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	303 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	307 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	313 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	315 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	316 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	317 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	101 W SAN PEDRO	SAN MANUEL	AZ	85631
Interested Party	102 W SAN PEDRO	SAN MANUEL	AZ	85631
Interested Party	103 W SAN PEDRO	SAN MANUEL	AZ	85631
Interested Party	104 W SAN PEDRO	SAN MANUEL	AZ	85631
Interested Party	105 W SAN PEDRO	SAN MANUEL	AZ	85631
Interested Party	106 W SAN PEDRO	SAN MANUEL	AZ	85631
Interested Party	108 W SAN PEDRO	SAN MANUEL	AZ	85631
Interested Party	109 W SAN PEDRO	SAN MANUEL	AZ	85631
Interested Party	110 W SAN PEDRO	SAN MANUEL	AZ	85631
Interested Party	111 W SAN PEDRO	SAN MANUEL	AZ	85631
Interested Party	114 W SAN PEDRO	SAN MANUEL	AZ	85631
Interested Party	116 W SAN PEDRO	SAN MANUEL	AZ	85631
Interested Party	313 S ALTA VISTA ST	SAN MANUEL	AZ	85631
Interested Party	315 S ALTA VISTA ST	SAN MANUEL	AZ	85631
Interested Party	316 S ALTA VISTA ST	SAN MANUEL	AZ	85631
Interested Party	317 S ALTA VISTA ST	SAN MANUEL	AZ	85631
Interested Party	318 S ALTA VISTA ST	SAN MANUEL	AZ	85631
Interested Party	319 S ALTA VISTA ST	SAN MANUEL	AZ	85631
Interested Party	320 S ALTA VISTA ST	SAN MANUEL	AZ	85631
Interested Party	321 S ALTA VISTA ST	SAN MANUEL	AZ	85631
Interested Party	322 S ALTA VISTA ST	SAN MANUEL	AZ	85631
Interested Party	323 S ALTA VISTA ST	SAN MANUEL	AZ	85631
Interested Party	325 S ALTA VISTA ST	SAN MANUEL	AZ	85631
Interested Party	326 S ALTA VISTA ST	SAN MANUEL	AZ	85631
Interested Party	327 S ALTA VISTA ST	SAN MANUEL	AZ	85631
Interested Party	319 S EL CAMINO	SAN MANUEL	AZ	85631
Interested Party	320 S EL CAMINO	SAN MANUEL	AZ	85631
Interested Party	321 S EL CAMINO	SAN MANUEL	AZ	85631
Interested Party	322 S EL CAMINO	SAN MANUEL	AZ	85631
Interested Party	325 S EL CAMINO UNIT A	SAN MANUEL	AZ	85631
Interested Party	325 S EL CAMINO UNIT B	SAN MANUEL	AZ	85631
Interested Party	113 W SAN PEDRO	SAN MANUEL	AZ	85631
Interested Party	117 W SAN PEDRO	SAN MANUEL	AZ	85631
Interested Party	118 W SAN PEDRO	SAN MANUEL	AZ	85631
Interested Party	120 W SAN PEDRO	SAN MANUEL	AZ	85631
Interested Party	122 W SAN PEDRO	SAN MANUEL	AZ	85631
Interested Party	119 W SAN PEDRO	SAN MANUEL	AZ	85631
Interested Party	121 W SAN PEDRO	SAN MANUEL	AZ	85631
Interested Party	124 W SAN PEDRO	SAN MANUEL	AZ	85631
Interested Party	126 W SAN PEDRO	SAN MANUEL	AZ	85631
Interested Party	301 W MAIN ST	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	302 W MAIN ST UNIT B	SAN MANUEL	AZ	85631
Interested Party	303 W MAIN ST	SAN MANUEL	AZ	85631
Interested Party	304 W MAIN ST	SAN MANUEL	AZ	85631
Interested Party	305 W MAIN ST	SAN MANUEL	AZ	85631
Interested Party	306 W MAIN ST	SAN MANUEL	AZ	85631
Interested Party	309 W MAIN ST	SAN MANUEL	AZ	85631
Interested Party	311 W MAIN ST	SAN MANUEL	AZ	85631
Interested Party	313 W MAIN ST	SAN MANUEL	AZ	85631
Interested Party	219 W MAIN ST UNIT B	SAN MANUEL	AZ	85631
Interested Party	221 W MAIN ST	SAN MANUEL	AZ	85631
Interested Party	605 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	606 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	607 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	608 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	609 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	611 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	612 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	613 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	614 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	615 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	616 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	617 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	618 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	619 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	620 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	621 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	622 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	623 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	624 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	625 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	626 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	627 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	629 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	630 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	901 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	902 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	903 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	904 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	905 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	906 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	907 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	908 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	909 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	910 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	911 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	912 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	913 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	914 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	915 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	916 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	917 W 3RD AVE	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	918 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	919 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	920 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	921 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	922 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	923 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	924 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	925 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	926 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	927 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	928 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	929 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	930 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	931 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	932 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1002 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1003 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1004 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1005 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1006 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1007 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1008 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1009 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1010 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1011 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1014 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1015 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1016 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1017 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1018 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1019 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1020 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1021 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1022 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1023 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1024 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1025 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1026 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1027 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1028 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1030 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1032 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1034 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1036 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1013 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	1015 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	1017 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	1019 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	1021 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	1023 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	1025 W 1ST AVE	SAN MANUEL	AZ	85631

Public Mailing Lists
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Interested Party	1027 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	1029 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	1029 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1031 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1038 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1040 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	1042 W 3RD AVE	SAN MANUEL	AZ	85631
Interested Party	101 N GIFFEN AVE	SAN MANUEL	AZ	85631
Interested Party	103 N GIFFEN AVE	SAN MANUEL	AZ	85631
Interested Party	105 N GIFFEN AVE	SAN MANUEL	AZ	85631
Interested Party	1001 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	1003 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	1009 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	1011 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	1015 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	1017 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	1019 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	1020 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	1022 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	1024 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	901 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	903 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	905 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	907 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	909 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	911 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	913 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	915 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	919 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	923 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	927 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	102 N DOUGLAS AVE	SAN MANUEL	AZ	85631
Interested Party	104 N DOUGLAS AVE	SAN MANUEL	AZ	85631
Interested Party	106 N DOUGLAS AVE	SAN MANUEL	AZ	85631
Interested Party	108 N DOUGLAS AVE	SAN MANUEL	AZ	85631
Interested Party	110 N DOUGLAS AVE	SAN MANUEL	AZ	85631
Interested Party	112 N DOUGLAS AVE	SAN MANUEL	AZ	85631
Interested Party	114 N DOUGLAS AVE	SAN MANUEL	AZ	85631
Interested Party	204 N DOUGLAS AVE	SAN MANUEL	AZ	85631
Interested Party	206 N DOUGLAS AVE	SAN MANUEL	AZ	85631
Interested Party	208 N DOUGLAS AVE	SAN MANUEL	AZ	85631
Interested Party	801 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	803 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	805 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	807 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	809 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	811 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	813 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	815 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	817 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	819 W 1ST AVE	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	821 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	823 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	825 W 1ST AVE	SAN MANUEL	AZ	85631
Interested Party	101 N PARK PL	SAN MANUEL	AZ	85631
Interested Party	103 N PARK PL	SAN MANUEL	AZ	85631
Interested Party	106 N PARK PL	SAN MANUEL	AZ	85631
Interested Party	107 N PARK PL	SAN MANUEL	AZ	85631
Interested Party	108 N PARK PL	SAN MANUEL	AZ	85631
Interested Party	109 N PARK PL	SAN MANUEL	AZ	85631
Interested Party	110 N PARK PL	SAN MANUEL	AZ	85631
Interested Party	111 N PARK PL	SAN MANUEL	AZ	85631
Interested Party	112 N PARK PL	SAN MANUEL	AZ	85631
Interested Party	113 N PARK PL	SAN MANUEL	AZ	85631
Interested Party	114 N PARK PL	SAN MANUEL	AZ	85631
Interested Party	115 N PARK PL	SAN MANUEL	AZ	85631
Interested Party	626 W PARK PL	SAN MANUEL	AZ	85631
Interested Party	628 W PARK PL	SAN MANUEL	AZ	85631
Interested Party	630 W PARK PL	SAN MANUEL	AZ	85631
Interested Party	101 W MAIN ST	SAN MANUEL	AZ	85631
Interested Party	103 W MAIN ST	SAN MANUEL	AZ	85631
Interested Party	606 W PARK PL	SAN MANUEL	AZ	85631
Interested Party	608 W PARK PL	SAN MANUEL	AZ	85631
Interested Party	610 W PARK PL	SAN MANUEL	AZ	85631
Interested Party	612 W PARK PL	SAN MANUEL	AZ	85631
Interested Party	614 W PARK PL	SAN MANUEL	AZ	85631
Interested Party	616 W PARK PL	SAN MANUEL	AZ	85631
Interested Party	618 W PARK PL	SAN MANUEL	AZ	85631
Interested Party	620 W PARK PL	SAN MANUEL	AZ	85631
Interested Party	624 W PARK PL	SAN MANUEL	AZ	85631
Interested Party	609 W PARK PL	SAN MANUEL	AZ	85631
Interested Party	217 W MAIN ST UNIT A	SAN MANUEL	AZ	85631
Interested Party	217 W MAIN ST UNIT B	SAN MANUEL	AZ	85631
Interested Party	107 W MAIN ST	SAN MANUEL	AZ	85631
Interested Party	605 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	606 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	607 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	608 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	609 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	610 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	611 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	612 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	613 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	614 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	615 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	616 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	617 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	618 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	619 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	620 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	621 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	622 W 2ND AVE	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	623 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	627 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	628 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	629 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	630 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	904 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	906 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	908 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	910 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	912 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	914 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	916 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	918 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	920 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	922 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	924 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	926 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	928 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	930 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	932 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	107 N GIFFEN AVE	SAN MANUEL	AZ	85631
Interested Party	109 N GIFFEN AVE	SAN MANUEL	AZ	85631
Interested Party	111 N GIFFEN AVE	SAN MANUEL	AZ	85631
Interested Party	113 N GIFFEN AVE	SAN MANUEL	AZ	85631
Interested Party	1002 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	1008 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	1010 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	1012 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	1014 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	1016 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	1018 W 2ND AVE	SAN MANUEL	AZ	85631
Interested Party	202 S NICHOLS AVE	SAN MANUEL	AZ	85631
Interested Party	204 S NICHOLS AVE	SAN MANUEL	AZ	85631
Interested Party	206 S NICHOLS AVE	SAN MANUEL	AZ	85631
Interested Party	208 S NICHOLS AVE	SAN MANUEL	AZ	85631
Interested Party	210 S NICHOLS AVE	SAN MANUEL	AZ	85631
Interested Party	212 S NICHOLS AVE	SAN MANUEL	AZ	85631
Interested Party	214 S NICHOLS AVE	SAN MANUEL	AZ	85631
Interested Party	220 S NICHOLS AVE	SAN MANUEL	AZ	85631
Interested Party	99 S NICHOLS AVE	SAN MANUEL	AZ	85631
Interested Party	1017 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1018 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1019 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1020 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1021 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1022 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1023 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1024 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1025 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1026 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1027 W WEBB DR	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	1028 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1029 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1031 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1033 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1034 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1001 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1002 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1003 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1004 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1005 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1006 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1008 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1009 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1010 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1011 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1012 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1013 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1014 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1015 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	1016 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	917 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	918 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	919 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	920 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	922 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	923 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	924 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	925 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	926 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	927 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	928 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	930 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	931 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	932 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	901 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	902 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	903 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	904 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	905 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	906 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	907 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	908 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	909 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	910 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	911 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	912 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	914 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	915 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	916 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	621 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	622 W WEBB DR	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	623 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	624 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	625 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	627 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	628 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	629 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	630 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	631 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	632 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	633 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	634 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	635 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	636 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	602 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	604 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	606 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	607 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	608 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	609 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	610 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	611 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	612 W WEBB DR	SAN MANUEL	AZ	85631
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Interested Party	614 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	615 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	616 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	617 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	618 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	620 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	115 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	116 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	117 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	118 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	120 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	121 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	122 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	123 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	124 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	125 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	126 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	127 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	128 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	101 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	102 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	103 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	104 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	105 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	107 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	108 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	110 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	111 W WEBB DR	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	112 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	113 W WEBB DR	SAN MANUEL	AZ	85631
Interested Party	101 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	102 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	103 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	104 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	105 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	106 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	107 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	109 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	110 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	111 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	112 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	113 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	115 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	116 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	117 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	118 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	119 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	120 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	122 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	123 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	124 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	125 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	126 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	127 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	128 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	129 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	130 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	602 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	603 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	604 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	605 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	606 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	607 W 4TH AVE	SAN MANUEL	AZ	85631
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Interested Party	609 W 4TH AVE	SAN MANUEL	AZ	85631
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Interested Party	613 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	614 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	615 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	617 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	618 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	619 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	620 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	621 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	622 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	623 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	624 W 4TH AVE	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	625 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	626 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	627 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	628 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	629 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	630 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	631 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	632 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	634 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	901 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	902 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	903 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	904 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	905 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	907 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	908 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	909 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	910 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	911 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	912 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	913 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	914 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	917 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	918 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	919 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	920 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	921 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	922 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	923 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	924 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	925 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	926 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	928 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	929 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	930 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	931 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	932 W 4TH AVE	SAN MANUEL	AZ	85631
Interested Party	917 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	918 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	919 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	920 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	921 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	922 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	923 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	924 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	925 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	927 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	928 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	929 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	930 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	931 W 5TH AVE	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	932 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	901 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	902 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	903 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	904 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	905 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	906 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	907 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	908 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	909 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	910 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	912 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	913 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	915 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	617 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	618 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	619 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	620 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	621 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	622 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	623 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	624 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	626 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	627 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	628 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	629 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	630 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	631 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	602 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	603 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	604 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	605 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	606 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	607 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	608 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	609 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	610 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	612 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	613 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	614 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	615 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	616 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	106 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	108 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	110 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	114 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	116 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	120 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	122 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	124 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	126 W 5TH AVE	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	128 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	130 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	131 W 5TH PL	SAN MANUEL	AZ	85631
Interested Party	132 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	133 W 5TH PL	SAN MANUEL	AZ	85631
Interested Party	134 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	136 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	138 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	140 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	142 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	144 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	146 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	148 W 5TH AVE	SAN MANUEL	AZ	85631
Interested Party	101 W 5TH PL	SAN MANUEL	AZ	85631
Interested Party	103 W 5TH PL	SAN MANUEL	AZ	85631
Interested Party	107 W 5TH PL	SAN MANUEL	AZ	85631
Interested Party	111 W 5TH PL	SAN MANUEL	AZ	85631
Interested Party	113 W 5TH PL	SAN MANUEL	AZ	85631
Interested Party	115 W 5TH PL	SAN MANUEL	AZ	85631
Interested Party	117 W 5TH PL	SAN MANUEL	AZ	85631
Interested Party	119 W 5TH PL	SAN MANUEL	AZ	85631
Interested Party	121 W 5TH PL	SAN MANUEL	AZ	85631
Interested Party	123 W 5TH PL	SAN MANUEL	AZ	85631
Interested Party	125 W 5TH PL	SAN MANUEL	AZ	85631
Interested Party	127 W 5TH PL	SAN MANUEL	AZ	85631
Interested Party	129 W 5TH PL	SAN MANUEL	AZ	85631
Interested Party	217 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	223 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	225 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	227 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	229 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	231 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	233 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	235 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	237 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	241 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	243 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	245 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	247 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	128 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	129 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	130 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	132 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	201 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	202 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	203 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	204 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	205 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	207 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	208 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	209 S AVENUE A	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	210 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	211 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	213 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	16 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	17 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	18 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	19 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	20 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	22 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	101 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	102 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	103 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	104 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	105 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	106 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	107 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	109 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	110 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	111 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	112 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	113 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	114 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	115 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	116 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	117 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	118 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	119 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	120 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	122 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	123 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	124 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	126 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	127 S AVENUE A	SAN MANUEL	AZ	85631
Interested Party	105 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	106 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	107 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	108 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	109 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	110 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	111 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	112 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	113 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	114 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	115 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	117 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	118 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	119 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	120 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	121 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	122 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	123 W 6TH AVE	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	124 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	125 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	127 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	128 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	129 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	130 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	132 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	133 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	135 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	136 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	137 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	138 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	139 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	140 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	141 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	142 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	143 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	144 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	145 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	146 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	147 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	148 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	149 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	150 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	152 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	154 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	156 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	151 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	158 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	601 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	602 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	603 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	605 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	606 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	607 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	608 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	609 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	610 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	611 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	612 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	613 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	614 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	615 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	616 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	617 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	618 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	619 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	620 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	621 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	622 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	623 W 6TH AVE	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	624 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	625 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	626 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	627 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	628 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	901 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	902 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	903 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	905 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	906 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	907 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	908 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	909 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	910 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	911 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	912 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	913 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	914 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	915 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	916 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	701 N GIFFEN AVE	SAN MANUEL	AZ	85631
Interested Party	917 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	918 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	919 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	920 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	921 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	922 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	923 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	924 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	925 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	926 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	927 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	930 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	931 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	932 W 6TH AVE	SAN MANUEL	AZ	85631
Interested Party	401 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	403 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	405 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	407 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	409 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	411 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	415 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	417 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	419 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	501 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	301 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	303 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	305 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	307 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	311 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	313 S MCNAB PKWY	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	317 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	319 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	321 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	323 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	325 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	327 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	329 S MCNAB PKWY UNIT B	SAN MANUEL	AZ	85631
Interested Party	229 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	231 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	233 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	234 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	235 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	236 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	237 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	239 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	240 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	241 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	242 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	243 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	244 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	246 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	201 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	205 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	209 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	213 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	215 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	217 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	219 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	221 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	223 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	225 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	101 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	105 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	107 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	109 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	111 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	113 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	117 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	121 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	122 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	123 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	124 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	125 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	126 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	23 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	140 W 8TH AVE	SAN MANUEL	AZ	85631
Interested Party	129 W 8TH AVE	SAN MANUEL	AZ	85631
Interested Party	666 W 8TH AVE	SAN MANUEL	AZ	85631
Interested Party	130 N REDINGTON RD STE T	SAN MANUEL	AZ	85631
Interested Party	147 W 8TH AVE	SAN MANUEL	AZ	85631
Interested Party	139 W 8TH AVE	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	141 W 8TH AVE	SAN MANUEL	AZ	85631
Interested Party	145 W 8TH AVE	SAN MANUEL	AZ	85631
Interested Party	110 N REDINGTON RD	SAN MANUEL	AZ	85631
Interested Party	114 N REDINGTON RD	SAN MANUEL	AZ	85631
Interested Party	143 W 8TH AVE	SAN MANUEL	AZ	85631
Interested Party	130 N REDINGTON RD STE E	SAN MANUEL	AZ	85631
Interested Party	137 W 8TH AVE	SAN MANUEL	AZ	85631
Interested Party	190 N REDINGTON RD	SAN MANUEL	AZ	85631
Interested Party	102 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	104 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	106 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	110 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	112 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	114 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	116 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	118 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	120 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	18 S MCNAB PKWY UNIT A	SAN MANUEL	AZ	85631
Interested Party	20 S MCNAB PKWY UNIT B	SAN MANUEL	AZ	85631
Interested Party	22 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	202 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	204 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	208 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	210 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	214 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	216 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	220 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	222 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	224 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	226 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	228 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	230 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	232 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	302 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	304 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	306 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	308 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	310 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	312 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	314 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	316 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	318 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	322 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	324 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	326 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	330 S MCNAB PKWY	SAN MANUEL	AZ	85631
Interested Party	102 E AVENUE G	SAN MANUEL	AZ	85631
Interested Party	104 E AVENUE G	SAN MANUEL	AZ	85631
Interested Party	106 E AVENUE G	SAN MANUEL	AZ	85631
Interested Party	108 E AVENUE G	SAN MANUEL	AZ	85631
Interested Party	110 E AVENUE G	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	202 E AVENUE G	SAN MANUEL	AZ	85631
Interested Party	204 E AVENUE G	SAN MANUEL	AZ	85631
Interested Party	206 E AVENUE G	SAN MANUEL	AZ	85631
Interested Party	208 E AVENUE G	SAN MANUEL	AZ	85631
Interested Party	212 E AVENUE G	SAN MANUEL	AZ	85631
Interested Party	214 E AVENUE G	SAN MANUEL	AZ	85631
Interested Party	216 E AVENUE G	SAN MANUEL	AZ	85631
Interested Party	201 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	202 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	203 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	204 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	205 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	206 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	207 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	208 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	209 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	210 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	211 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	212 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	213 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	214 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	215 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	103 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	104 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	105 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	106 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	107 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	108 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	109 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	110 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	111 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	112 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	113 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	114 E AVENUE H	SAN MANUEL	AZ	85631
Interested Party	402 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	404 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	406 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	408 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	410 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	412 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	414 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	416 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	418 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	420 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	101 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	102 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	103 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	104 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	105 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	106 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	107 E AVENUE I	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	108 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	109 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	110 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	111 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	112 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	113 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	114 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	115 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	116 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	201 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	203 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	204 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	205 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	206 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	207 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	208 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	209 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	210 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	212 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	213 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	215 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	216 E AVENUE I	SAN MANUEL	AZ	85631
Interested Party	502 E WEBB DR	SAN MANUEL	AZ	85631
Interested Party	504 E WEBB DR	SAN MANUEL	AZ	85631
Interested Party	506 E WEBB DR	SAN MANUEL	AZ	85631
Interested Party	508 E WEBB DR	SAN MANUEL	AZ	85631
Interested Party	510 E WEBB DR	SAN MANUEL	AZ	85631
Interested Party	512 E WEBB DR	SAN MANUEL	AZ	85631
Interested Party	514 E WEBB DR	SAN MANUEL	AZ	85631
Interested Party	516 E WEBB DR	SAN MANUEL	AZ	85631
Interested Party	520 E WEBB DR	SAN MANUEL	AZ	85631
Interested Party	522 E WEBB DR	SAN MANUEL	AZ	85631
Interested Party	202 E MAIN ST	SAN MANUEL	AZ	85631
Interested Party	203 E MAIN ST	SAN MANUEL	AZ	85631
Interested Party	289 E MAIN ST	SAN MANUEL	AZ	85631
Interested Party	300 E MAIN ST	SAN MANUEL	AZ	85631
Interested Party	524 E WEBB DR	SAN MANUEL	AZ	85631
Interested Party	501 S AVENUE D	SAN MANUEL	AZ	85631
Interested Party	503 S AVENUE D	SAN MANUEL	AZ	85631
Interested Party	505 S AVENUE D	SAN MANUEL	AZ	85631
Interested Party	507 S AVENUE D	SAN MANUEL	AZ	85631
Interested Party	509 S AVENUE D	SAN MANUEL	AZ	85631
Interested Party	511 S AVENUE D	SAN MANUEL	AZ	85631
Interested Party	513 S AVENUE D	SAN MANUEL	AZ	85631
Interested Party	515 S AVENUE D	SAN MANUEL	AZ	85631
Interested Party	517 S AVENUE D	SAN MANUEL	AZ	85631
Interested Party	205 E AVENUE J	SAN MANUEL	AZ	85631
Interested Party	207 E AVENUE J	SAN MANUEL	AZ	85631
Interested Party	209 E AVENUE J	SAN MANUEL	AZ	85631
Interested Party	211 E AVENUE J	SAN MANUEL	AZ	85631
Interested Party	213 E AVENUE J	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	215 E AVENUE J	SAN MANUEL	AZ	85631
Interested Party	502 S AVENUE D	SAN MANUEL	AZ	85631
Interested Party	508 S AVENUE D	SAN MANUEL	AZ	85631
Interested Party	510 S AVENUE D	SAN MANUEL	AZ	85631
Interested Party	514 S AVENUE D	SAN MANUEL	AZ	85631
Interested Party	518 S AVENUE D	SAN MANUEL	AZ	85631
Interested Party	101 E AVENUE J	SAN MANUEL	AZ	85631
Interested Party	103 E AVENUE J	SAN MANUEL	AZ	85631
Interested Party	107 E AVENUE J	SAN MANUEL	AZ	85631
Interested Party	109 E AVENUE J	SAN MANUEL	AZ	85631
Interested Party	111 E AVENUE J	SAN MANUEL	AZ	85631
Interested Party	113 E AVENUE J	SAN MANUEL	AZ	85631
Interested Party	115 E AVENUE J	SAN MANUEL	AZ	85631
Interested Party	117 E AVENUE J	SAN MANUEL	AZ	85631
Interested Party	119 E AVENUE J	SAN MANUEL	AZ	85631
Interested Party	203 E AVENUE J	SAN MANUEL	AZ	85631
Interested Party	74 E MAIN ST	SAN MANUEL	AZ	85631
Interested Party	302 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	304 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	306 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	308 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	312 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	314 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	316 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	318 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	320 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	322 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	324 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	326 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	232 S AVENUE C	SAN MANUEL	AZ	85631
Interested Party	228 S AVENUE C	SAN MANUEL	AZ	85631
Interested Party	201 E WEBB DR	SAN MANUEL	AZ	85631
Interested Party	203 E WEBB DR	SAN MANUEL	AZ	85631
Interested Party	205 E WEBB DR	SAN MANUEL	AZ	85631
Interested Party	209 E WEBB DR	SAN MANUEL	AZ	85631
Interested Party	211 E WEBB DR	SAN MANUEL	AZ	85631
Interested Party	311 E WEBB DR	SAN MANUEL	AZ	85631
Interested Party	215 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	216 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	202 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	203 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	204 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	205 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	206 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	207 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	208 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	209 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	210 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	211 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	212 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	213 E 4TH ST	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	214 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	201 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	301 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	302 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	303 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	304 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	305 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	306 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	307 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	308 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	309 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	310 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	311 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	312 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	313 E 4TH ST	SAN MANUEL	AZ	85631
Interested Party	301 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	302 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	303 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	304 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	305 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	306 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	307 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	308 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	309 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	310 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	312 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	313 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	314 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	315 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	316 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	203 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	204 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	205 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	206 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	207 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	208 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	209 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	210 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	211 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	212 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	213 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	215 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	217 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	221 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	202 S AVENUE C	SAN MANUEL	AZ	85631
Interested Party	206 S AVENUE C	SAN MANUEL	AZ	85631
Interested Party	208 S AVENUE C	SAN MANUEL	AZ	85631
Interested Party	210 S AVENUE C	SAN MANUEL	AZ	85631
Interested Party	212 S AVENUE C	SAN MANUEL	AZ	85631
Interested Party	214 S AVENUE C	SAN MANUEL	AZ	85631
Interested Party	216 S AVENUE C	SAN MANUEL	AZ	85631

Public Mailing Lists
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Interested Party	220 S AVENUE C	SAN MANUEL	AZ	85631
Interested Party	222 S AVENUE C	SAN MANUEL	AZ	85631
Interested Party	224 S AVENUE C	SAN MANUEL	AZ	85631
Interested Party	226 S AVENUE C	SAN MANUEL	AZ	85631
Interested Party	201 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	202 E 5TH PL	SAN MANUEL	AZ	85631
Interested Party	101 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	102 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	104 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	105 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	106 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	107 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	108 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	109 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	110 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	111 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	112 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	113 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	114 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	115 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	116 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	201 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	202 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	203 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	204 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	205 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	206 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	207 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	208 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	209 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	118 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	119 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	120 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	121 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	122 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	211 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	212 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	214 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	215 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	216 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	217 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	219 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	220 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	221 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	222 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	224 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	225 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	227 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	229 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	230 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	231 S AVENUE B	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	232 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	233 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	234 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	235 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	236 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	237 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	239 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	240 S AVENUE B	SAN MANUEL	AZ	85631
Interested Party	202 E 5TH ST	SAN MANUEL	AZ	85631
Interested Party	204 E 5TH ST	SAN MANUEL	AZ	85631
Interested Party	206 E 5TH ST	SAN MANUEL	AZ	85631
Interested Party	208 E 5TH ST	SAN MANUEL	AZ	85631
Interested Party	214 E 5TH ST	SAN MANUEL	AZ	85631
Interested Party	216 E 5TH ST	SAN MANUEL	AZ	85631
Interested Party	218 E 5TH ST	SAN MANUEL	AZ	85631
Interested Party	222 E 5TH ST	SAN MANUEL	AZ	85631
Interested Party	302 E 5TH ST	SAN MANUEL	AZ	85631
Interested Party	306 E 5TH ST	SAN MANUEL	AZ	85631
Interested Party	308 E 5TH ST	SAN MANUEL	AZ	85631
Interested Party	310 E 5TH ST	SAN MANUEL	AZ	85631
Interested Party	312 E 5TH ST	SAN MANUEL	AZ	85631
Interested Party	314 E 5TH ST	SAN MANUEL	AZ	85631
Interested Party	316 E 5TH ST	SAN MANUEL	AZ	85631
Interested Party	318 E 5TH ST	SAN MANUEL	AZ	85631
Interested Party	406 S LADERA PL	SAN MANUEL	AZ	85631
Interested Party	408 S LADERA PL	SAN MANUEL	AZ	85631
Interested Party	410 S LADERA PL	SAN MANUEL	AZ	85631
Interested Party	412 S LADERA PL	SAN MANUEL	AZ	85631
Interested Party	416 S LADERA PL	SAN MANUEL	AZ	85631
Interested Party	422 S LADERA PL	SAN MANUEL	AZ	85631
Interested Party	424 S LADERA PL	SAN MANUEL	AZ	85631
Interested Party	401 S LADERA PL	SAN MANUEL	AZ	85631
Interested Party	403 S LADERA PL	SAN MANUEL	AZ	85631
Interested Party	405 S LADERA PL	SAN MANUEL	AZ	85631
Interested Party	407 S LADERA PL	SAN MANUEL	AZ	85631
Interested Party	409 S LADERA PL	SAN MANUEL	AZ	85631
Interested Party	413 S LADERA PL	SAN MANUEL	AZ	85631
Interested Party	417 S LADERA PL	SAN MANUEL	AZ	85631
Interested Party	419 S LADERA PL	SAN MANUEL	AZ	85631
Interested Party	421 S LADERA PL	SAN MANUEL	AZ	85631
Interested Party	423 S LADERA PL	SAN MANUEL	AZ	85631
Interested Party	427 S LADERA PL	SAN MANUEL	AZ	85631
Interested Party	402 S ENCINA PL	SAN MANUEL	AZ	85631
Interested Party	404 S ENCINA PL	SAN MANUEL	AZ	85631
Interested Party	406 S ENCINA PL	SAN MANUEL	AZ	85631
Interested Party	410 S ENCINA PL	SAN MANUEL	AZ	85631
Interested Party	412 S ENCINA PL	SAN MANUEL	AZ	85631
Interested Party	416 S ENCINA PL	SAN MANUEL	AZ	85631
Interested Party	420 S ENCINA PL	SAN MANUEL	AZ	85631
Interested Party	422 S ENCINA PL	SAN MANUEL	AZ	85631
Interested Party	424 S ENCINA PL	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	407 S ENCINA PL	SAN MANUEL	AZ	85631
Interested Party	417 S ENCINA PL	SAN MANUEL	AZ	85631
Interested Party	425 S ENCINA PL	SAN MANUEL	AZ	85631
Interested Party	402 S TIERRA VERDE PL	SAN MANUEL	AZ	85631
Interested Party	406 S TIERRA VERDE PL	SAN MANUEL	AZ	85631
Interested Party	414 S TIERRA VERDE PL	SAN MANUEL	AZ	85631
Interested Party	416 S TIERRA VERDE PL	SAN MANUEL	AZ	85631
Interested Party	418 S TIERRA VERDE PL	SAN MANUEL	AZ	85631
Interested Party	422 S TIERRA VERDE PL	SAN MANUEL	AZ	85631
Interested Party	424 S TIERRA VERDE PL	SAN MANUEL	AZ	85631
Interested Party	401 S TIERRA VERDE PL	SAN MANUEL	AZ	85631
Interested Party	403 S TIERRA VERDE PL	SAN MANUEL	AZ	85631
Interested Party	405 S TIERRA VERDE PL	SAN MANUEL	AZ	85631
Interested Party	409 S TIERRA VERDE PL	SAN MANUEL	AZ	85631
Interested Party	411 S TIERRA VERDE PL	SAN MANUEL	AZ	85631
Interested Party	413 S TIERRA VERDE PL	SAN MANUEL	AZ	85631
Interested Party	415 S TIERRA VERDE PL	SAN MANUEL	AZ	85631
Interested Party	421 S TIERRA VERDE PL	SAN MANUEL	AZ	85631
Interested Party	409 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	410 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	412 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	413 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	414 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	415 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	416 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	417 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	402 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	402A S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	407 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	403 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	502 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	504 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	505 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	506 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	507 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	508 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	511 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	512 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	513 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	514 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	516 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	517 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	522 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	524 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	601 S SAN CARLOS ST	SAN MANUEL	AZ	85631
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Interested Party	607 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	608 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	610 S SAN CARLOS ST	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	611 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	613 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	614 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	615 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	617 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	618 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	619 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	620 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	621 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	622 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	623 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	624 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	626 S SAN CARLOS ST	SAN MANUEL	AZ	85631
Interested Party	623 S ENCINA ST	SAN MANUEL	AZ	85631
Interested Party	619 S ENCINA ST	SAN MANUEL	AZ	85631
Interested Party	614 S ENCINA ST	SAN MANUEL	AZ	85631
Interested Party	620 S ENCINA ST	SAN MANUEL	AZ	85631
Interested Party	626 S ENCINA ST	SAN MANUEL	AZ	85631
Interested Party	628 S ENCINA ST	SAN MANUEL	AZ	85631
Interested Party	519 S ENCINA ST	SAN MANUEL	AZ	85631
Interested Party	520 S ENCINA ST	SAN MANUEL	AZ	85631
Interested Party	521 S ENCINA ST	SAN MANUEL	AZ	85631
Interested Party	602 S ENCINA ST	SAN MANUEL	AZ	85631
Interested Party	603 S ENCINA ST	SAN MANUEL	AZ	85631
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Interested Party	609 S ENCINA ST	SAN MANUEL	AZ	85631
Interested Party	611 S ENCINA ST	SAN MANUEL	AZ	85631
Interested Party	612 S ENCINA ST	SAN MANUEL	AZ	85631
Interested Party	506 S ENCINA ST	SAN MANUEL	AZ	85631
Interested Party	507 S ENCINA ST	SAN MANUEL	AZ	85631
Interested Party	509 S ENCINA ST	SAN MANUEL	AZ	85631
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Interested Party	513 S ENCINA ST	SAN MANUEL	AZ	85631
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Interested Party	516 S ENCINA ST	SAN MANUEL	AZ	85631
Interested Party	313 E MADERA ST	SAN MANUEL	AZ	85631
Interested Party	315 E MADERA ST	SAN MANUEL	AZ	85631
Interested Party	325 E MADERA ST	SAN MANUEL	AZ	85631
Interested Party	329 E MADERA ST	SAN MANUEL	AZ	85631
Interested Party	501 S LADERA ST	SAN MANUEL	AZ	85631
Interested Party	507 S LADERA ST	SAN MANUEL	AZ	85631
Interested Party	331 E MADERA ST	SAN MANUEL	AZ	85631
Interested Party	508 S VISTA SIERRA ST	SAN MANUEL	AZ	85631
Interested Party	509 S VISTA SIERRA ST	SAN MANUEL	AZ	85631
Interested Party	511 S VISTA SIERRA ST	SAN MANUEL	AZ	85631
Interested Party	513 S VISTA SIERRA ST	SAN MANUEL	AZ	85631
Interested Party	515 S VISTA SIERRA ST	SAN MANUEL	AZ	85631
Interested Party	516 S VISTA SIERRA ST	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	521 S VISTA SIERRA ST	SAN MANUEL	AZ	85631
Interested Party	522 S VISTA SIERRA ST	SAN MANUEL	AZ	85631
Interested Party	523 S VISTA SIERRA ST	SAN MANUEL	AZ	85631
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Interested Party	606 S VISTA SIERRA ST	SAN MANUEL	AZ	85631
Interested Party	608 S VISTA SIERRA ST	SAN MANUEL	AZ	85631
Interested Party	610 S VISTA SIERRA ST	SAN MANUEL	AZ	85631
Interested Party	611 S VISTA SIERRA ST	SAN MANUEL	AZ	85631
Interested Party	612 S VISTA SIERRA ST	SAN MANUEL	AZ	85631
Interested Party	604 S MANZANITA ST	SAN MANUEL	AZ	85631
Interested Party	606 S MANZANITA ST	SAN MANUEL	AZ	85631
Interested Party	610 S MANZANITA ST	SAN MANUEL	AZ	85631
Interested Party	614 S MANZANITA ST	SAN MANUEL	AZ	85631
Interested Party	616 S MANZANITA ST	SAN MANUEL	AZ	85631
Interested Party	618 S MANZANITA ST	SAN MANUEL	AZ	85631
Interested Party	614 S VISTA SIERRA ST	SAN MANUEL	AZ	85631
Interested Party	616 S VISTA SIERRA ST	SAN MANUEL	AZ	85631
Interested Party	618 S VISTA SIERRA ST	SAN MANUEL	AZ	85631
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Interested Party	624 S VISTA SIERRA ST	SAN MANUEL	AZ	85631
Interested Party	625 S VISTA SIERRA ST	SAN MANUEL	AZ	85631
Interested Party	627 S VISTA SIERRA ST	SAN MANUEL	AZ	85631
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Interested Party	603 S LADERA ST	SAN MANUEL	AZ	85631
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Interested Party	518 S LADERA ST	SAN MANUEL	AZ	85631
Interested Party	519 S LADERA ST	SAN MANUEL	AZ	85631
Interested Party	522 S LADERA ST	SAN MANUEL	AZ	85631
Interested Party	301 E MADERA ST	SAN MANUEL	AZ	85631
Interested Party	303 E MADERA ST	SAN MANUEL	AZ	85631
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Interested Party	501 S TIERRA VERDE ST	SAN MANUEL	AZ	85631
Interested Party	502 S TIERRA VERDE ST	SAN MANUEL	AZ	85631
Interested Party	503 S TIERRA VERDE ST	SAN MANUEL	AZ	85631
Interested Party	505 S TIERRA VERDE ST	SAN MANUEL	AZ	85631
Interested Party	506 S TIERRA VERDE ST	SAN MANUEL	AZ	85631
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Interested Party	509 S TIERRA VERDE ST	SAN MANUEL	AZ	85631
Interested Party	517 S TIERRA VERDE ST	SAN MANUEL	AZ	85631
Interested Party	518 S TIERRA VERDE ST	SAN MANUEL	AZ	85631
Interested Party	520 S TIERRA VERDE ST	SAN MANUEL	AZ	85631
Interested Party	601 S TIERRA VERDE ST	SAN MANUEL	AZ	85631

Public Mailing Lists
San Manuel

Interested Party	602 S TIERRA VERDE ST	SAN MANUEL	AZ	85631
Interested Party	603 S TIERRA VERDE ST	SAN MANUEL	AZ	85631
Interested Party	605 S TIERRA VERDE ST	SAN MANUEL	AZ	85631
Interested Party	608 S TIERRA VERDE ST	SAN MANUEL	AZ	85631
Interested Party	611 S TIERRA VERDE ST	SAN MANUEL	AZ	85631
Interested Party	612 S TIERRA VERDE ST	SAN MANUEL	AZ	85631
Interested Party	613 S TIERRA VERDE ST	SAN MANUEL	AZ	85631
Interested Party	614 S TIERRA VERDE ST	SAN MANUEL	AZ	85631
Interested Party	616 S TIERRA VERDE ST	SAN MANUEL	AZ	85631
Interested Party	619 S TIERRA VERDE ST	SAN MANUEL	AZ	85631
Interested Party	620 S TIERRA VERDE ST	SAN MANUEL	AZ	85631
Interested Party	621 S TIERRA VERDE ST	SAN MANUEL	AZ	85631
Interested Party	622 S TIERRA VERDE ST	SAN MANUEL	AZ	85631
Interested Party	623 S TIERRA VERDE ST	SAN MANUEL	AZ	85631
Interested Party	625 S TIERRA VERDE ST	SAN MANUEL	AZ	85631
Interested Party	626 S TIERRA VERDE ST	SAN MANUEL	AZ	85631

...ted States Postal Service
...Statement
...Standard Mail

List: Sierra Southwest Postcard #118313

USPS: Note Mail Arrival Date & Time

Permit Holder | Phone (520)-571-1329 Ext 11

MAILER

Arizona Jet-Mail Services
3710 E. 43rd Pl., Ste. 101
Tucson AZ 85713

CAPS Cust Ref No.

Customer No.

Mailing Agent | Phone (520)-571-1329 Ext 22
Arizona Jet-Mail Services-Stacy Valdez
3710 E 43rd Pl., Ste. 101
Tucson AZ 85713

Customer No.

Prepared For
Southwest Transmission Cooperative Inc
Po Box 2195
Benson AZ 85602-2195
WO#118313

Customer No.

MAILING

PO of Mailing	Processing Category	Mailing Date	Fed Agcy Cost Cde	Statement Sequence #*
Tucson AZ 85726	[X]Letters [ ]CMM [ ]Flats [ ]NFM	2/19/2009	541	SIERRA

Type of Postage: [X]Permit [ ]Precanceled [ ]Metered

[ ]Parcels - Machinable
[ ]Parcels - Irregular
[ ]Letters Pd as NFMs
[ ]ECR Ltrs Pd as Flats

Wt of a Single Pc	Total Pieces	Total Weight
0.0075 pounds	1,654	12.4050

Permit # 541

For mail enclosed within another class: [ ]Periodicals [ ]Bound Printed Matter [ ]Library Mail [ ]Media Mail [ ]Parcel Post

If Sacked, Based on [ ]125 pcs [ ]15 lbs [ ]Both

Number of Containers

1' MM	4
2' MM	1
2' EMM	
Tot Trays	5
Flat Trays	
Sacks	
Pallets	
Other	

For Auto Price Pcs Enter Date of Address Matching & Coding	For ECR Price Pcs Enter Date of Address Matching & Coding	For ECR Price Pcs Enter Date of Carrier Route Sequencing	Move Update Method
2/19/2009	2/19/2009	2/19/2009	[ ]ASE [ ]FASTforward [X]NCOALink [ ]ACS [ ]Alternate [ ]Multiple

POSTAGE

Parts Completed (Select all that apply) [X]A [ ]B [ ]C [X]D [ ]E [ ]F [ ]G [ ]H [ ]I [ ]J [ ]K [ ]L [ ]S

Price Affixed [ ]Correct [ ]Lowest [ ]Neither pcs x $ = Total Postage / Postage Affixed / Net Postage Due: 304.01

For USPS Use Only: Additional Postage Payment (State reason)

Total Adjusted Postage Affixed

Postmaster: Report Total Postage in AIC 130 (Permit Imprint Only)

Total Adjusted Postage Permit Imprint

CERTIFICATION

The mailer's signature certifies acceptance of liability for and agreement to pay any revenue deficiencies assessed on this mailing, subject to appeal. If an agent signs this form, the agent certifies that he or she is authorized to sign on behalf of the mailer, and that the mailer is bound by the certification and agrees to pay any deficiencies. In addition, agents may be liable for any deficiencies resulting from matters within their responsibility, knowledge, or control. The mailer hereby certifies that all information furnished on this form is accurate, truthful, and complete; that the mail and the supporting documentation comply with all postal standards and that the mailing qualifies for the prices and fees claimed; and that the mailing does not contain any matter prohibited by law or postal regulation. I understand that anyone who furnishes false or misleading information on this form or who omits information requested on this form may be subject to criminal and/or civil penalties, including fines and imprisonment. Privacy Notice: For information regarding our Privacy Policy visit www.usps.com.

Signature of Mailer or Agent	Printed Name of Mailer or Agent Signing Form	Telephone
Stacy Valdez	Arizona Jet-Mail Services-Stacy Valdez	(520)-571-1329 Ext 22

USPS USE ONLY

Weight of a Single Piece ___ ___.___ ___ ___ ___ pound

Are postage figures at left adjusted from mailer's entries? If "Yes" state reason: [ ] Yes [ ] No

Total Pieces	Total Weight	Total Postage

Round Stamp (Required)

Stacy 2-19-09

Presort Verification Performed? (Check One)	Date Mailer Notified	Contact	By (Initials)
[ ] Yes [ ] No			

I CERTIFY that this mailing has been inspected concerning: (1) eligibility for postage rates claimed; (2) proper preparation (and presort where required); (3) proper completion of postage statement; and (4) payment of annual fee (if required).

Verifying Employee's Signature	Print Verifying Employee's Name	Time
		AM PM

Exhibit K-2

AGENCY SCOPING LETTER

SWCA
ENVIRONMENTAL CONSULTANTS
Sound Science. Creative Solutions.

Tucson Office
343 West Franklin Street
Tucson, AZ 85701
Tel 520.325.9194 Fax 520.325.2033
www.swca.com

January 18, 2008

Shela McFarlin
Bureau of Land Management
Tucson Field Office
300 W. Congress
Tucson, AZ 85701

Dear Ms. McFarlin:

Southwest Transmission Cooperative, Inc. (SWTC) is a rural electric cooperative that operates and maintains a 603-mile transmission system. There currently is rapid growth in the SWTC system in the area of Pinal County where SWTC supports delivery of electricity to one of its member systems, Trico Electric Cooperative, Inc. (Trico). In response to this growth, SWTC is proposing the San Manuel Interconnect Project in Pinal County, Arizona. SWTC would interconnect to Arizona Public Service's (APS) San Manuel Substation from the existing Apache to Hayden 115 kilovolt (kV) transmission line. The proposed transmission line would be a double circuit 115 kV line built to 230 kV specifications in the event of future demands. This interconnection would provide benefits to both entities and with the increasing Trico loads in southeast Pinal County, SWTC would be able to import power from APS and adequately support its system.

The project would consist of a double circuit 115 kV transmission line extending approximately 4.5 miles from the APS San Manuel Substation to the Apache to Hayden 115 kV transmission line (see attached map). The transmission line would connect to the existing line in Southwest ¼ of Section 12, Township 9 South, Range 17 East and run through Sections 14, 15, 21, 22 and 28, Township 9 South, Range 17 East before terminating at the San Manuel Substation in Section 29, Township 9 South, Range 17 East. The installation of the line would require a 100-foot-wide right-of-way. There already is an access road to a portion of the proposed new transmission line; approximately 1.5 miles of new access road would be needed.

SWTC is required to prepare and submit an Environmental Assessment (EA) for this project to the Rural Utilities Service, an agency of the U.S. Department of Agriculture, as part of regulations promulgated to implement the National Environmental Policy Act. The purpose of the EA is to describe the potential environmental impacts of the proposed project and to identify any extraordinary circumstances that may result in a significant environmental effect. As part of this process, SWTC is soliciting letters of response from agencies, governments, Native American tribes, and individuals that have a potential interest in the project. SWCA Environmental Consultants (SWCA) has been contracted to conduct scoping activities, identify and address potential issues of concern, ensure that all mitigation opportunities are discussed, and prepare the EA.

For adequate consideration, we would appreciate your response prior to February 22, 2008. If you require additional information or have any questions regarding this project, please contact Ken Kertell (SWCA) at (520) 325-9194 (kkertell@swca.com) or Walter Yosin (SWTC) at (520) 586-5158 (wyosin@ssw.coop). Thank you for your prompt consideration of this proposed project.

Sincerely,

Ken Kertell
SWCA Project Manager

Enclosure

Exhibit K-3

PUBLIC OPEN HOUSE INVITATION

Southwest Transmission COOPERATIVE, INC

SWCA® ENVIRONMENTAL CONSULTANTS
Sound Science. Creative Solutions.

PLEASE JOIN US

For a Public Open House Meeting on the Proposed

SAN MANUEL INTERCONNECT PROJECT

Southwest Transmission Cooperative staff members and consultants are providing you with information and details regarding the proposed project. Information on project schedules and design will be available. We welcome your questions, comments and concerns regarding this proposed project during the public open house meeting on

Tuesday, March 10, 2009
5:30 pm to 7:00 pm

BHP Conference Center - 111 W 5th Ave, San Manuel, AZ

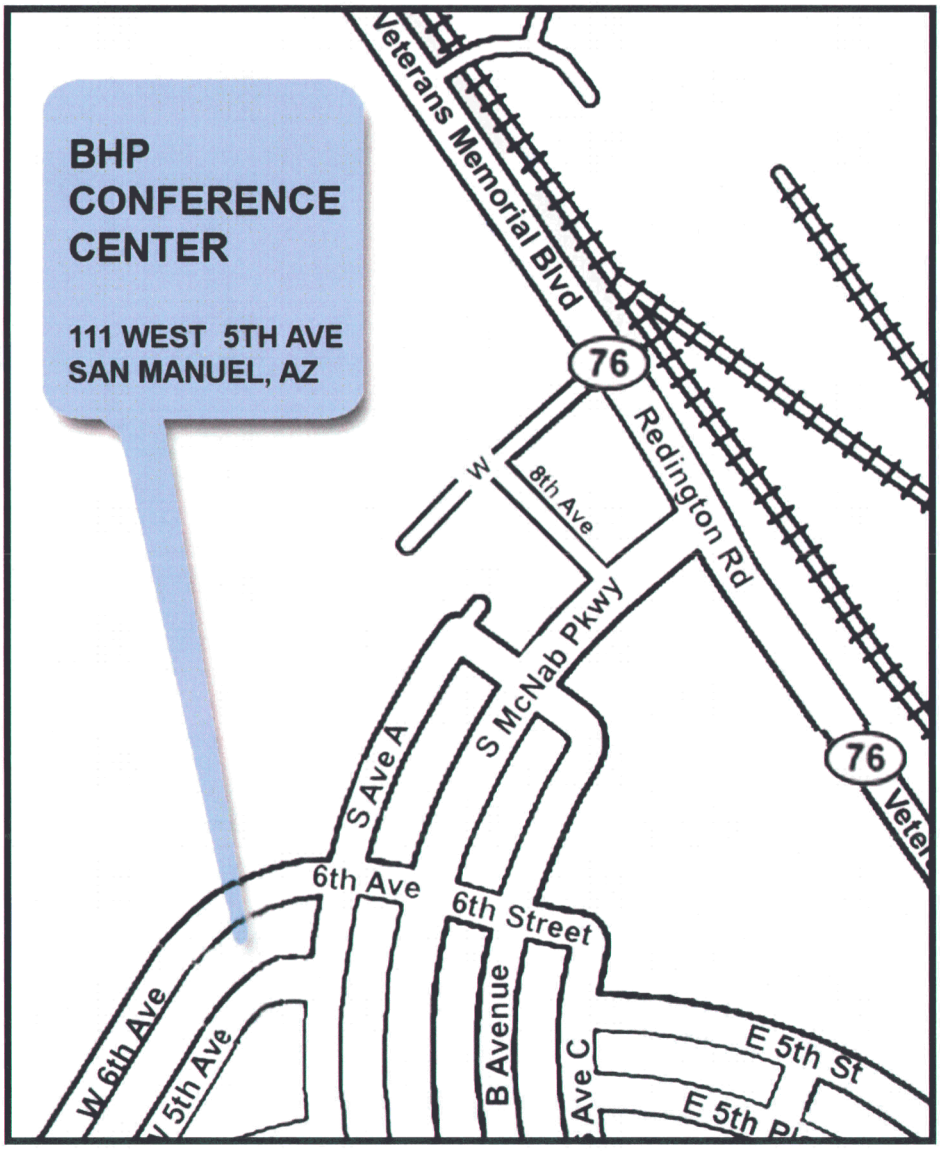
Additional information can be obtained online at www.southwesttransmission.coop or 520-586-5457

Los servicios billingües estarán disponibles

Southwest Transmission Cooperative, Inc.
P.O. Box 2195
Benson AZ 85602-2195

PUBLIC OPEN HOUSE MEETING

Tuesday, March 10, 2009
5:30 pm - 7:00 pm
BHP Conference Center



Southwest Transmission COOPERATIVE, INC

SWCA ENVIRONMENTAL CONSULTANTS
Sound Science. Creative Solutions.

Exhibit K-4

PUBLIC OPEN HOUSE SIGN-IN SHEET

Southwest Transmission Cooperative, Inc

San Manuel Interconnect Project

SWCA Environmental Consultants
Sound Science. Creative Solutions.

Sign In Form

March 2009

Name	Mailing Address	Phone Number	Email Address

Copies of this sign-in form may become part of the public record associated with this proposed project. Individuals requesting that their name and address be withheld from public review or from disclosure under the Freedom of Information Act will be honored to the extent allowed by law.

Southwest Transmission Cooperative, Inc

San Manuel Interconnect Project

SWCA Environmental Consultants — Sound Science. Creative Solutions.

Sign In Form

March 2009

Name	Mailing Address	Phone Number	Email Address
[illegible]	[illegible] 5th	385-2500	[illegible]
[illegible]	105 San Pedro	385-4770	
[illegible]	922-4th Ave	385-4676	
[illegible]	123 W. 5th Place	385-4463	[illegible]
[illegible]	1214 San Pedro	385-2369	
[illegible]			
T.A. BAST	203 Ave J	928 567 2248	
[illegible]	419 Moffat Pkwy	520 385-4659	[illegible]
BERNIE [illegible]	101 AVENUE I	3854079	[illegible]
Mike [illegible]	P.O. Box 1492 Tempe 85280		
[illegible]	204 Ave C	810-835-6103	
[illegible]	122 W. 4th	520-385-1274	
[illegible]	204 Ave B.	520 385-9995	
Ken McBrom	112 Ave H	520-385-2196	
Vito Konur	6600 N. Montrose Tucson-85741	520-742-0934	Konur@comcast.net
Hazel Cooper	624 W. Third Ave San Manuel	520-385-4586	
Nancy Morgan	150 6th Ave	520-385-9222	
[illegible]	202 Ave C		
[illegible]	32622 [illegible] Rd	520-212-6457	info@desertranch.net
Celeste Andresen	PO Box 444 San Manuel AZ	520 385 1495	celesteandresen@msn.com
Jim Bergstrom	" "	928 300 7777	

Copies of this sign-in form may become part of the public record associated with this proposed project. Individuals requesting that their name and address be withheld from public review or from disclosure under the Freedom of Information Act will be honored to the extent allowed by law.

Southwest Transmission Cooperative, Inc

San Manuel Interconnect Project

SWCA Environmental Consultants — Sound Science. Creative Solutions.

Sign In Form

March 2009

Name	Mailing Address	Phone Number	Email Address
Freddie Chisin	Globe	(928) 425-8034	Freddie.Chisin@AZ.Gov
[illegible]	San Manuel	385-6844	
[illegible]	" "	385-4331	—
[illegible]	San Manuel	385-4748	
[illegible]	603 S San Carlos	520-820-5749	luvduke127@yahoo.com
[illegible]	102 W 3rd	385-7876	
[illegible]	129 4th Ave S.M.	385 2569	
C. [illegible]	116 McNab	4507	—
R. Butler	206 S. Ave C S.M.	385 2022	
F. Lopez	915 W 1st Ave.	520-904-8835	104960@Hotmail.com
M. A. Kelemen	236 McNab	520 385 1231	—
Maxine Allegre	110 Park Place S.M.	520 385-4626	
Elias Vigil	129 Ave - A	520-385-4019	
James Sherman	920 5th Ave San Manuel	520-385-4449	
Max Pangot	803 W 1st Ave S.M.		
Jack Kelly	PB333 N San Pedro River Rd	520-212-2020	
Gerry Brunskill	216 Ave I San Manuel Az	520.385-3241	
Jesus Marquez	119 W 6th Avenue	520-385-3007	
Robert Mayol	715 W [illegible]	520 385 4028	
Frank Torres	521 6th Ave San Manuel	520-385-4775	
Wendy Torres	" "		

Copies of this sign-in form may become part of the public record associated with this proposed project. Individuals requesting that their name and address be withheld from public review or from disclosure under the Freedom of Information Act will be honored to the extent allowed by law.

Southwest Transmission Cooperative, Inc

San Manuel Interconnect Project

SWCA Environmental Consultants — Sound Science. Creative Solutions.

Sign In Form

March 2009

Name	Mailing Address	Phone Number	Email Address
LaNorma Braaum	111 Park Pl	385-1484	johnandla@msn.com
Brian Lindenlaub	4861 E Paradise Falls Dr Tucson	(520) 206-9585	blindenlaub@westland-resources.com
Henry Velasquez	920 W 6th Ave San Manuel AZ	520 385-2408	
Carolina Heavy	620 E. Rimrock Place 85704	742-1083	choag@grk.com
Jayron Beam	3275 W. Ina Rd Tucson, AZ 85741	544-3688	jbegay@grk.com
Ed Villegas	107 2nd Ave	385-2114	villegas107@q.com
Susan Bernal	12661 E. Broadway Tucson 85749	258-7200	
Kristen Duarte	12661 E. Broadway 85748	258-7200	
John Ruiz	350 Dunkgrowers Rd Winkelman	402-6251	Jon@copperconnect
William Lower	1022 Alvord Dr. San Manuel	385-4589	
Jennifer Carnes	San Manuel Miner	425-6606	Jennifer@copperaxis.com

Copies of this sign-in form may become part of the public record associated with this proposed project. Individuals requesting that their name and address be withheld from public review or from disclosure under the Freedom of Information Act will be honored to the extent allowed by law.

Exhibit K-5

INFORMATION PRESENTED AT PUBLIC OPEN HOUSE AND ON THE INTERNET

Southwest Transmission COOPERATIVE, INC

SWCA® ENVIRONMENTAL CONSULTANTS

Sound Science. Creative Solutions.

Welcome

To the Public Open House Meeting on the Proposed

SAN MANUEL INTERCONNECT PROJECT

Southwest Transmission Cooperative staff members and consultants are providing you with information and details regarding the proposed project. Information on the project schedule and design is available. We welcome your questions, comments and concerns regarding this proposed project during the meeting.

Los servicios billingües estarán disponibles

Southwest Transmission COOPERATIVE, INC

SWCA® ENVIRONMENTAL CONSULTANTS

Sound Science. Creative Solutions.

Who is Southwest Transmission Cooperative, Inc.?

- Southwest Transmission Cooperative, Inc. is a non-profit transmission cooperative owned by six Class A members.
- These Class A members are non-profit distribution cooperatives that deliver power at retail to the rural areas of Arizona and other parts of the Southwest.
- Southwest Transmission Cooperative, Inc. transmits power to its members primarily from the Arizona Electric Power Cooperative Apache Generating Station, located near Cochise, Arizona.

Southwest Transmission COOPERATIVE, INC

SWCA ENVIRONMENTAL CONSULTANTS Sound Science. Creative Solutions.

Providing Comments

- Fill out the comment form tonight and leave with a Southwest Transmission Cooperative Staff member
- Visit www.southwesttransmission.coop for a downloadable comment form.
- Call 1-520-586-5457 and discuss with Southwest Transmission Cooperative staff.
- Mail comment form to:

  Southwest Transmission Cooperative
  Re: San Manuel Interconnect Project
  Attn: Kevin Barnes, Environmental Planner
  P.O. Box 2165
  Benson AZ 85602

- Email comments to kbarnes@ssw.coop

Southwest Transmission COOPERATIVE, INC

SWCA® ENVIRONMENTAL CONSULTANTS

Sound Science. Creative Solutions.

What are we proposing to do?

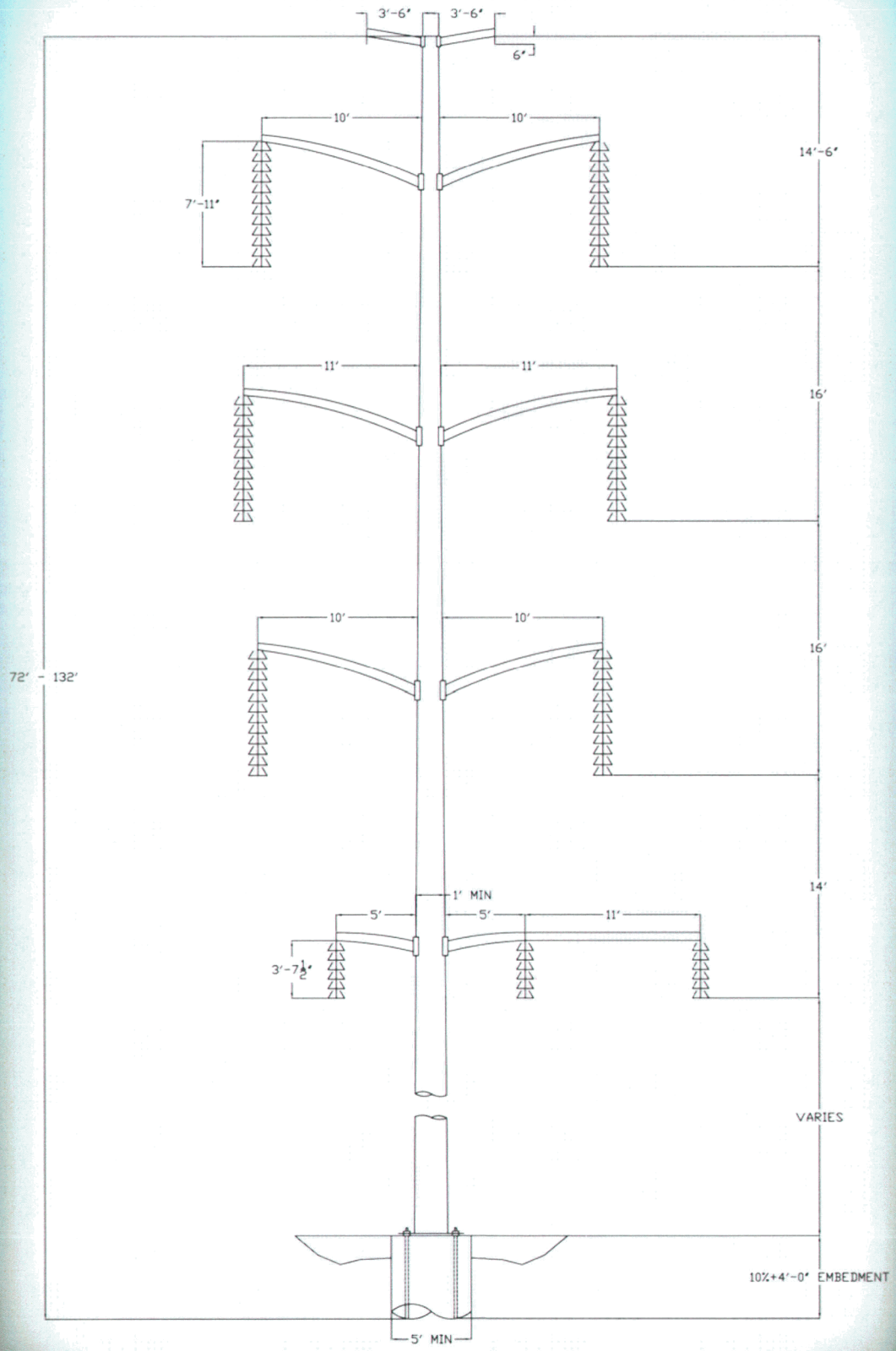
- Southwest Transmission Cooperative, Inc. proposes to construct, operate, and maintain a new double-circuit 115-kilovolt (kV) transmission line which will be built to 230-kV specifications in San Manuel, Pinal County, Arizona.
- The 115-kV line is being built to 230-kV specifications using 230-kV post insulators in the event of future demand.
- The establishment of a new transmission line will allow Apache Generating Station to transmit power to southeastern Pinal County, San Manuel Substation, via a small fraction of the existing Arizona Public Service 115-kV system.

San Manuel Interconnect Project

Where are we in the process?

				We Are Here		
Step 1: Determine Need	*Step 2: Identify Feasible Alternatives*	*Step 3: Scoping*	*Step 4: Detail Study of Alternatives*	*Step 5: Alternative Selection*	*Step 6: Application for Regulatory Approvals*	*Step 7: Initiate Construction Activities*
Southwest Transmission Cooperative, Inc. Planning and Engineering Departments identify the need for improved reliability in the area.	Engineering and Environmental Departments select route alternatives that appear compatible with surrounding land uses, and meet safety and engineering requirements.	Southwest Transmission Cooperative, Inc staff meets with governmental agencies to identify any concerns with the proposed alternatives. Additionally, in this stage information scoping letters are sent to various agencies.	Collect information from a variety of sources including cultural and biological surveys, meetings with agencies, and aerial imagery.	Use the information collected during Steps 3 and 4 for alternative selection. Selection criteria are based on biological and cultural resources, visual resources, system/engineering requirements, and compatibility with surrounding land uses. The Preferred Alternative is selected after considering and comparing potential impacts between different routes.	Prepare and submit applications to appropriate agencies.	Anticipated Fall 2009

San Manuel Interconnect Project



Proposed Transmission Line Structure

Southwest Transmission COOPERATIVE, INC

SWCA® ENVIRONMENTAL CONSULTANTS

Sound Science. Creative Solutions.

Why are we doing it?

- The proposed project is necessary to support existing local electric needs.
- Southwest Transmission Cooperative, Inc. has proposed the San Manuel Interconnect project to support increased loads in southeastern Pinal County.
- It is anticipated that the ability to deliver power from the Westwing Substation, located in the Phoenix area, to the San Manuel Substation will become more constrained as population growth and development continues.
- The addition of the new transmission line will allow a direct transmission path from Apache Station to the San Manuel Substation rather than transmitting power from the Westwing Substation to southeastern Pinal County.

Exhibit K-6

AGENCY AND PUBLIC SCOPING RESPONSE LETTERS AND PHONE LOG

THE STATE OF ARIZONA
GAME AND FISH DEPARTMENT
5000 W. CAREFREE HIGHWAY
PHOENIX, AZ 85086-5000
(602) 942-3000 • WWW.AZGFD.GOV

GOVERNOR
JANET NAPOLITANO
COMMISSIONERS
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DIRECTOR
DUANE L. SHROUFE
DEPUTY DIRECTOR
STEVE K. FERRELL

January 28, 2008

RECEIVED JAN 31 2008

SWCA
Ken Kertell
343 W. Franklin St.
Tucson, A 85701

RE: SWTC 115 kV Line, San Manuel substation

Dear Mr. Franklin:

The Arizona Game and Fish Department (Department) has reviewed your letter dated January 18, 2008, regarding the proposed Apache to Hayden 115 kV transmission line.A list of special status species within the project area is provided as an attachment. This information provided is now generated utilizing an interactive Environmental Review on-line tool (Tool). The Tool is an interactive web-based application that provides our customer's the opportunity to submit land and water projects on-line by following a few simple steps (refer to the Tool application homepage for instructions and help pages) http://www.azgfd.gov/hgis/.

The project "receipt" (attached) provides special status species information, along with critical habitat designations, tribal entities on or in proximity to your project boundaries, appropriate state, tribal, and/or federal contacts, special handling guidelines for desert tortoise and/or burrowing owls, and preliminary project type recommendations. Please note this species information can now be provided to almost instantaneously and is designed to replace the need for requests via writing by fax, mail, or email for most projects. However, there are circumstances where it would be necessary to submit the project through the normal mailing process (please refer to the Tool application for further instructions).

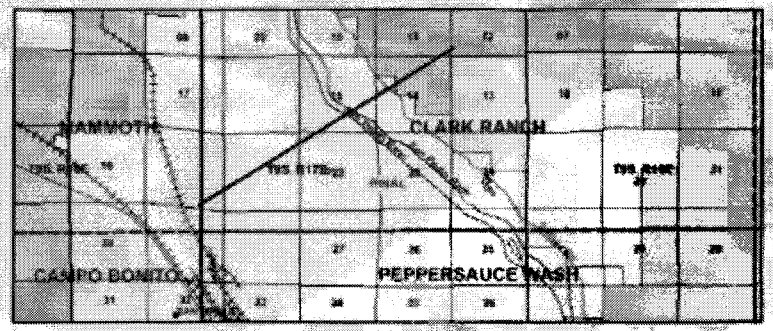
The Department appreciates the opportunity to provide comments early in the planning and design stages of the proposed roadway construction project. We would like to continue this coordinated effort and offer additional site-specific guidance that will help conserve wildlife and their habitats, including sensitive, threatened, non-game and game species. If you have any questions regarding this letter, please contact me at 602-789-3606.

Sincerely,

Daniel E. Nelson
Project Evaluation Specialist

Arizona's On-line Environmental Review Tool
Search ID: 20080128005040
Project Name: SWTC 115kV line San Manuel substation.
Date: 1/28/2008 7:46:43 AM

Project Location



Project Name: SWTC 115kV line San Manuel substation.
Submitted By: PEP Project Evaluation Program
On behalf of: CONSULTING
Project Search ID: 20080128005040
Date: 1/28/2008 7:46:33 AM
Project Category: Energy Storage/Production/Transfer,Energy Transfer,Power line/electric line (new)
Project Coordinates (UTM Zone 12-NAD 83): NaN, NaN meter
Project Length: 6354.516 meter
County: PINAL
USGS 7.5 Minute Quadrangle ID: 1584
Quadrangle Name: CLARK RANCH
Project locality is not anticipated to change

Location Accuracy Disclaimer

Project locations are assumed to be both precise and accurate for the purposes of environmental review. The creator/owner of the Project Review Receipt is solely responsible for the project location and thus the correctness of the Project Review Receipt content.

The Department appreciates the opportunity to provide in-depth comments and project review when additional information or environmental documentation becomes available.

Special Status Species Occurrences/Critical Habitat/Tribal Lands within 3 miles of Project Vicinity:

Name	Common Name	ESA	USFS	BLM	State
Buteo nitidus maxima	Northern Gray Hawk	SC	S		WSC
CH for Empidonax traillii extimus	Designated Critical Habitat for southwestern willow flycatcher				
Empidonax traillii extimus	Southwestern Willow Flycatcher	LE	S		WSC
Eriogonum capitare	San Carlos Wild-buckwheat	SC			SR
Euphorbia gracillima	Mexican Broomspurge		S		
Gopherus agassizii (Sonoran Population)	Sonoran Desert Tortoise	SC			WSC
Ictinia mississippiensis	Mississippi Kite				WSC
Rana yavapaiensis	Lowland Leopard Frog	SC	S		WSC

 APPLICATION INITIALS: _____

Janet Napolitano
Governor

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1110 West Washington Street • Phoenix, Arizona 85007
(602) 771-2300 • www.azdeq.gov

Stephen A. Owens
Director

RECEIVED FEB 21 2008

February 15, 2008

Ken Kertell, Project Manager
SWCA Environmental Consultants
343 West Franklin Street
Tucson, AZ 85701

RE: San Manuel SWTC Interconnect Project in Pinal County
(100 foot-wide ROW and 1.5 miles of new access road)

Dear Mr. Kertell:

The Air Quality Division has received the project, as described in your scoping letter, dated January 18, 2008, for the intent of preparing an Environmental Assessment. The proposed project, in which SWTC would interconnect to APS San Manuel Substation from the existing Apache to Hayden 115 KV transmission line, would require the installation of the power line as well as the construction of an expanded access road 1.5 miles, is not in a PM_{10} nonattainment or maintenance area. However, the project is located in the San Manuel SO_2 Nonattainment Area. Currently, this area is scheduled to be redesignated to attainment by direct final rule on March 18, 2008, unless the U.S. EPA receives adverse comments by February 19, 2008 (73 FR 3396, January 18, 2008). Once redesignated, the San Manuel will be in an SO_2 Maintenance Area.

To comply with applicable air pollution control requirements and minimize any possible adverse impacts on public health and welfare, the following information is provided for your consideration in developing an environmental assessment that will be included in the Environmental Impact Statement.

REDUCE REGIONAL HAZE

Particulate Matter contributes to Regional Haze that impairs visibility at national parks and monuments (Federal Class I areas), including Grand Canyon National Park on the Colorado Plateau. Although no specific Regional Haze reduction measures are in effect in the proposed project area at this time, measures that reduce disturbance of Particulate Matter also reduce Regional Haze.

The information identified below is provided to assist in complying with any applicable air pollution control requirements and minimize adverse impacts on public health and welfare.

REDUCE DISTURBANCE of PARTICULATE MATTER during CONSTRUCTION

This action, plan or activity may temporarily increase ambient particulate matter (dust) levels. Particulate matter 10 microns in size and smaller can penetrate the lungs of human beings and animals and is subject to a National Ambient Air Quality Standard (NAAQS) to protect public health and welfare. Particulate matter 2.5 microns in size and smaller is difficult for lungs to expel and has been linked to increases in death rates; heart attacks by disturbing heart rhythms and increasing plaque and clotting; respiratory infections; asthma attacks and cardiopulmonary obstructive disease (COPD) aggravation. It is also subject to a NAAQS.

The following measures are recommended to reduce disturbance of particulate matter, including emissions caused by strong winds as well as machinery and trucks tracking soil off the construction site:

I. Site Preparation and Construction

A. Minimize land disturbance;
B. Suppress dust on traveled paths which are not paved through wetting, use of watering trucks, chemical dust suppressants, or other reasonable precautions to prevent dust entering ambient air
C. Cover trucks when hauling soil;
D. Minimize soil track-out by washing or cleaning truck wheels before leaving construction site;
E. Stabilize the surface of soil piles; and
F. Create windbreaks

II. Site Restoration

A. Revegetate any disturbed land not used;
B. Remove unused material; and
C. Remove soil piles via covered trucks.

The following rules applicable to reducing dust during construction, demolition and earth-moving activities are enclosed:

- Arizona Administrative Code R18-2-604 through -607
- Arizona Administrative Code R18-2-804

Should you have further questions, please do not hesitate to call David Lillie at (602) 771-4461 or Dave Biddle at (602) 771-2376 of the Planning Section Staff.

Very truly yours,

Diane L Arnst, Manager
Air Quality Planning Section

Enclosures (2)

cc: Henry R. Darwin, EV Administrative Counsel
David H. Lillie, Economist
File No. 175697

c. If the burning would occur at a solid waste facility in violation of 40 CFR 258.24 and the Director has not issued a variance under A.R.S. § 49-763.01.

E. Open outdoor fires of dangerous material. A fire set for the disposal of a dangerous material is allowed by the provisions of this Section, when the material is too dangerous to store and transport, and the Director has issued a permit for the fire. A permit issued under this subsection shall contain all provisions in subsection (D)(3) except for subsections (D)(3)(e) and (D)(3)(f). The Director shall permit fires for the disposal of dangerous materials only when no safe alternative method of disposal exists, and burning the materials does not result in the emission of hazardous or toxic substances either directly or as a product of combustion in amounts that will endanger health or safety.

F. Open outdoor fires of household waste. An open outdoor fire for the disposal of household waste is allowed by provisions of this Section when permitted in writing by the Director or a delegated authority. A permit issued under this subsection shall contain all provisions in subsection (D)(3) except for subsections (D)(3)(e) and (D)(3)(f). The permittee shall conduct open outdoor fires of household waste in an approved waste burner and shall either:

1. Burn household waste generated on-site on farms or ranches of 40 acres or more where no household waste collection or disposal service is available; or
2. Burn household waste generated on-site where no household waste collection and disposal service is available and where the nearest other dwelling unit is at least 500 feet away.

G. Permits issued by a delegated authority. The Director may delegate authority for the issuance of open burning permits to a county, city, town, air pollution control district, or fire district. A delegated authority may not issue a permit for its own open burning activity. The Director shall not delegate authority to issue permits to burn dangerous material under subsection (E). A county, city, town, air pollution control district, or fire district with delegated authority from the Director may assign that authority to one or more private fire protection service providers that perform fire protection services within the county, city, town, air pollution control district, or fire district. A private fire protection provider shall not directly or indirectly condition the issuance of open burning permits on the applicant being a customer. Permits issued under this subsection shall comply with the requirements in subsection (D)(3) and be in a format prescribed by the Director. Each delegated authority shall:

1. Maintain a copy of each permit issued for the previous five years available for inspection by the Director;
2. For each permit currently issued, have a means of contacting the person authorized by the permit to set an open fire if an order to extinguish open burning is issued; and
3. Annually submit to the Director by May 15 a record of daily burn activity, excluding household waste burn permits, on a form provided by the Director for the previous calendar year containing the information required in subsections (D)(3)(e) and (D)(3)(f).

H. The Director shall hold an annual public meeting for interested parties to review operations of the open outdoor fire program and discuss emission reduction techniques.

I. Nothing in this Section is intended to permit any practice that is a violation of any statute, ordinance, rule, or regulation.

Historical Note

Adopted effective May 14, 1979 (Supp. 79-1). Amended effective October 2, 1979 (Supp. 79-5). Correction, subsection (C) repealed effective October 2, 1979, not shown (Supp. 80-1). Former Section R9-3-602 renumbered without change as Section R18-2-602 (Supp. 87-3). Amended effective September 26, 1990 (Supp. 90-3). Former Section R18-2-602 renumbered to R18-2-802, new Section R18-2-602 renumbered from R18-2-401 effective November 15, 1993 (Supp. 93-4). Amended by final rulemaking at 10 A.A.R. 388, effective March 16, 2004 (Supp. 04-1).

R18-2-603. Repealed

Historical Note

Adopted effective May 14, 1979 (Supp. 79-1). Former Section R9-3-603 renumbered without change as Section R18-2-603 (Supp. 87-3). Amended effective September 26, 1990 (Supp. 90-3). Former Section R18-2-603 renumbered to R18-2-803, new Section R18-2-603 renumbered from R18-2-403 effective November 15, 1993 (Supp. 93-4). Repealed effective October 8, 1996 (Supp. 96-4).

R18-2-604. Open Areas, Dry Washes, or Riverbeds

A. No person shall cause, suffer, allow, or permit a building or its appurtenances, or a building or subdivision site, or a driveway, or a parking area, or a vacant lot or sales lot, or an urban or suburban open area to be constructed, used, altered, repaired, demolished, cleared, or leveled, or the earth to be moved or excavated, without taking reasonable precautions to limit excessive amounts of particulate matter from becoming airborne. Dust and other types of air contaminants shall be kept to a minimum by good modern practices such as using an approved dust suppressant or adhesive soil stabilizer, paving, covering, landscaping, continuous wetting, detouring, barring access, or other acceptable means.

B. No person shall cause, suffer, allow, or permit a vacant lot, or an urban or suburban open area, to be driven over or used by motor vehicles, trucks, cars, cycles, bikes, or buggies, or by animals such as horses, without taking reasonable precautions to limit excessive amounts of particulates from becoming airborne. Dust shall be kept to a minimum by using an approved dust suppressant, or adhesive soil stabilizer, or by paving, or by barring access to the property, or by other acceptable means.

C. No person shall operate a motor vehicle for recreational purposes in a dry wash, riverbed or open area in such a way as to cause or contribute to visible dust emissions which then cross property lines into a residential, recreational, institutional, educational, retail sales, hotel or business premises. For purposes of this subsection "motor vehicles" shall include, but not be limited to trucks, cars, cycles, bikes, buggies and 3-wheelers. Any person who violates the provisions of this subsection shall be subject to prosecution under A.R.S. § 49-463.

Historical Note

Adopted effective May 14, 1979 (Supp. 79-1). Former Section R9-3-604 renumbered without change as Section R18-2-604 (Supp. 87-3). Amended effective September 26, 1990 (Supp. 90-3). Former Section R18-2-604 renumbered to R18-2-804, new Section R18-2-604 renumbered from R18-2-404 and amended effective November 15, 1993 (Supp. 93-4).

R18-2-605. Roadways and Streets

A. No person shall cause, suffer, allow or permit the use, repair, construction or reconstruction of a roadway or alley without taking reasonable precautions to prevent excessive amounts of particulate matter from becoming airborne. Dust and other particulates shall be kept to a minimum by employing temporary paving, dust suppressants, wetting down, detouring or by other reasonable means.

B. No person shall cause, suffer, allow or permit transportation of materials likely to give rise to airborne dust without taking reasonable precautions, such as wetting, applying dust suppressants, or covering the load, to prevent particulate matter from becoming airborne. Earth or other material that is deposited by trucking or earth moving equipment shall be removed from paved streets by the person responsible for such deposits.

Historical Note

Adopted effective May 14, 1979 (Supp. 79-1). Former Section R9-3-605 renumbered without change as Section R18-2-605 (Supp. 87-3). Amended effective September 26, 1990 (Supp. 90-3). Former Section R18-2-605 renumbered to R18-2-505, new Section R18-2-605 renumbered from R18-2-405 effective November 15, 1993 (Supp. 93-4).

R18-2-606. Material Handling

No person shall cause, suffer, allow or permit crushing, screening, handling, transporting or conveying of materials or other operations likely to result in significant amounts of airborne dust without taking reasonable precautions, such as the use of spray bars, wetting agents, dust suppressants, covering the load, and hoods to prevent excessive amounts of particulate matter from becoming airborne.

Historical Note

Section R18-2-606 renumbered from R18-2-406 effective November 15, 1993 (Supp. 93-4).

R18-2-607. Storage Piles

A. No person shall cause, suffer, allow, or permit organic or inorganic dust producing material to be stacked, piled, or otherwise stored without taking reasonable precautions such as chemical stabilization, wetting, or covering to prevent excessive amounts of particulate matter from becoming airborne.

B. Stacking and reclaiming machinery utilized at storage piles shall be operated at all times with a minimum fall of material and in such manner, or with the use of spray bars and wetting agents, as to prevent excessive amounts of particulate matter from becoming airborne.

Historical Note

Section R18-2-607 renumbered from R18-2-407 effective November 15, 1993 (Supp. 93-4).

R18-2-608. Mineral Tailings

No person shall cause, suffer, allow, or permit construction of mineral tailing piles without taking reasonable precautions to prevent excessive amounts of particulate matter from becoming airborne. Reasonable precautions shall mean wetting, chemical stabilization, revegetation or such other measures as are approved by the Director.

Historical Note

Section R18-2-608 renumbered from R18-2-408, new Section R18-2-408 adopted effective November 15, 1993 (Supp. 93-4).

R18-2-609. Agricultural Practices

A person shall not cause, suffer, allow, or permit the performance of agricultural practices outside the Phoenix and Yuma planning areas, as defined in 40 CFR 81.303, which is incorporated by reference in R18-2-210, including tilling of land and application of fertilizers without taking reasonable precautions to prevent excessive amounts of particulate matter from becoming airborne.

Historical Note

Section R18-2-609 renumbered from R18-2-409 effective November 15, 1993 (Supp. 93-4). Amended by final rulemaking at 6 A.A.R. 2009, effective May 12, 2000 (Supp. 00-2). Amended by final rulemaking at 11 A.A.R. 2210, effective July 18, 2005 (Supp. 05-2).

R18-2-610. Definitions for R18-2-611

The definitions in Article 1 of this Chapter and the following definitions apply to R18-2-611:

1. "Access restriction" means restricting or eliminating public access to noncropland with signs or physical obstruction.
2. "Aggregate cover" means gravel, concrete, recycled road base, caliche, or other similar material applied to noncropland.
3. "Artificial wind barrier" means a physical barrier to the wind.
4. "Best management practice" means a technique verified by scientific research, that on a case-by-case basis is practical, economically feasible, and effective in reducing PM_{10} emissions from a regulated agricultural activity.
5. "Chemical irrigation" means applying a fertilizer, pesticide, or other agricultural chemical to cropland through an irrigation system.
6. "Combining tractor operations" means performing two or more tillage, cultivation, planting, or harvesting operations with a single tractor or harvester pass.
7. "Commercial farm" means 10 or more contiguous acres of land used for agricultural purposes within the boundary of the Maricopa PM_{10} nonattainment area.
8. "Commercial farmer" means an individual, entity, or joint operation in general control of a commercial farm.
9. "Committee" means the Governor's Agricultural Best Management Practices Committee.
10. "Cover crop" means plants or a green manure crop grown for seasonal soil protection or soil improvement.
11. "Critical area planting" means using trees, shrubs, vines, grasses, or other vegetative cover on noncropland.
12. "Cropland" means land on a commercial farm that:
    a. Is within the time-frame of final harvest to plant emergence;
    b. Has been tilled in a prior year and is suitable for crop production, but is currently fallow; or
    c. Is a turn-row.

ARTICLE 8. EMISSIONS FROM MOBILE SOURCES (NEW AND EXISTING)

R18-2-801. Classification of Mobile Sources

A. This Article is applicable to mobile sources which either move while emitting air contaminants or are frequently moved during the course of their utilization but are not classified as motor vehicles, agricultural vehicles, or agricultural equipment used in normal farm operations.

B. Unless otherwise specified, no mobile source shall emit smoke or dust the opacity of which exceeds 40%.

Historical Note

Adopted effective February 26, 1988 (Supp. 88-1). Amended effective September 26, 1990 (Supp. 90-3). Amended effective February 3, 1993 (Supp. 93-1). Former Section R18-2-801 renumbered to Section R18-2-901, new Section R18-2-801 renumbered from R18-2-601 effective November 15, 1993 (Supp. 93-4).

R18-2-802. Off-road Machinery

A. No person shall cause, allow or permit to be emitted into the atmosphere from any off-road machinery, smoke for any period greater than 10 consecutive seconds, the opacity of which exceeds 40%. Visible emissions when starting cold equipment shall be exempt from this requirement for the first 10 minutes.

B. Off-road machinery shall include trucks, graders, scrapers, rollers, locomotives and other construction and mining machinery not normally driven on a completed public roadway.

Historical Note

Adopted effective February 26, 1988 (Supp. 88-1). Amended effective September 26, 1990 (Supp. 90-3). Former Section R18-2-802 renumbered to Section R18-2-902, new Section R18-2-802 renumbered from R18-2-602 effective November 15, 1993 (Supp. 93-4).

R18-2-803. Heater-planer Units

No person shall cause, allow or permit to be emitted into the atmosphere from any heater-planer operated for the purpose of reconstructing asphalt pavements smoke the opacity of which exceeds 20%. However three minutes' upset time in any one hour shall not constitute a violation of this Section.

Historical Note

Adopted effective February 26, 1988 (Supp. 88-1). Amended effective September 26, 1990 (Supp. 90-3). Former Section R18-2-803 renumbered to Section R18-2-903, new Section R18-2-803 renumbered from R18-2-603 effective November 15, 1993 (Supp. 93-4).

R18-2-804. Roadway and Site Cleaning Machinery

A. No person shall cause, allow or permit to be emitted into the atmosphere from any roadway and site cleaning machinery smoke or dust for any period greater than 10 consecutive seconds, the opacity of which exceeds 40%. Visible emissions when starting cold equipment shall be exempt from this requirement for the first 10 minutes.

B. In addition to complying with subsection (A), no person shall cause, allow or permit the cleaning of any site, roadway, or alley without taking reasonable precautions to prevent particulate matter from becoming airborne. Reasonable precautions may include applying dust suppressants. Earth or other material shall be removed from paved streets onto which earth or other material has been transported by trucking or earth moving equipment, erosion by water or by other means.

Historical Note

Adopted effective February 26, 1988 (Supp. 88-1). Amended effective September 26, 1990 (Supp. 90-3). Amended effective February 3, 1993 (Supp. 93-1). Former Section R18-2-804 renumbered to Section R18-2-904, new Section R18-2-804 renumbered from R18-2-604 effective November 15, 1993 (Supp. 93-4).

R18-2-805. Asphalt or Tar Kettles

A. No person shall cause, allow or permit to be emitted into the atmosphere from any asphalt or tar kettle smoke for any period greater than 10 consecutive seconds, the opacity of which exceeds 40%.

B. In addition to complying with subsection (A), no person shall cause, allow or permit the operation of an asphalt or tar kettle without minimizing air contaminant emissions by utilizing all of the following control measures:

1. The control of temperature recommended by the asphalt or tar manufacturer;
2. The operation of the kettle with lid closed except when charging;
3. The pumping of asphalt from the kettle or the drawing of asphalt through cocks with no dipping;
4. The dipping of tar in an approved manner;
5. The maintaining of the kettle in clean, properly adjusted, and good operating condition;
6. The firing of the kettle with liquid petroleum gas or other fuels acceptable to the Director.

Historical Note

Adopted effective February 26, 1988 (Supp. 88-1). Amended effective September 26, 1990 (Supp. 90-3). Former Section R18-2-805 renumbered to Section R18-2-905, new Section R18-2-805 renumbered from R18-2-605 effective November 15, 1993 (Supp. 93-4).

Janet Napolitano
Governor

ARIZONA DEPARTMENT OF ENVIRONMENTAL QUALITY

1110 West Washington Street • Phoenix, Arizona 85007
(602) 771-2300 • www.azdeq.gov

Stephen A. Owens
Director

February 14, 2008

RECEIVED FEB 21 2008

Ken Kertell, Project Manager
SWCA Environmental Consultants
343 W. Franklin Street
Tucson, AZ 85701

Re: San Manuel Interconnect Project

Dear Mr. Kertell:

We received your request for comments on the above-mentioned project on February 5, 2008. You requested comments on a proposal to interconnect to Arizona Public Service's (APS) San Manuel Substation from the existing Apache to Hayden 115 kV transmission line. The proposed transmission line would be a double circuit 115 kV line built to 230kV specifications in anticipation of future demands.

The project would consist of a double circuit 115 kV transmission line extending approximately 4.5 miles from the APS San Manuel substation to the Apache to Hayden 115 kV transmission line. The installation will require a 100-foot right-of-way. There is currently an access road to a portion of the new line, but 1.5 miles of new access road will be needed.

Our comments relative to water quality requirements are as follows:

Any point source discharge to surface waters of the U.S. requires AZPDES permit coverage. From the maps it appears that the project primarily crosses ephemeral drainages in addition to crossing the San Pedro River.

1. Stormwater discharges associated with construction activities (clearing, grading, or excavating) which disturb one acre or more must obtain coverage under the AZPDES Construction Stormwater General Permit (AZG2003-001). From the length of the project, it is clear that more than one acre will be disturbed. Please refer to the enclosed "Steps to Obtain Coverage" document for directions on how to file for permit coverage. The Construction Stormwater Permit, further information, and associated forms are available on ADEQ's website at: http://www.azdeq.gov/environ/water/permits/stormwater.html#const For questions on stormwater issues or the Construction General Permit for this project, please contact Shirley Conard at 602-771-4632or by e-mail at sc4@azdeq.gov

2. This project may require an Army Corps of Engineers (ACOE) Section 404 Permit. If an individual 404 Permit is required, ADEQ will be asked to provide a CWA Section 401 water quality certification for the permits. The ACOE will include the conditions of the CWA 401 certification as requirements of the Section 404 permit to ensure that the permitted activities will not result in a violation of the State's surface water quality standards. Such conditions may include: restrictions on vehicular access to stream crossings when flow is present, and/or use of Best Management Practices to ensure water quality standards are being protected. For questions relating to CWA 401/404 please contact Bob Scalamera at 602-771-4502 or by e-mail at RS3@azdeq.gov.

ADEQ appreciates the opportunity to review and comment on this application. Please contact the staff members noted for the specific program, or contact me directly at 602-771-4416 for further assistance.

Sincerely,

Linda Taunt, Deputy Director
Water Quality Division

Enclosure

ER08-0005

STEPS TO OBTAIN COVERAGE UNDER ADEQ'S GENERAL PERMIT FOR STORMWATER DISCHARGES ASSOCIATED WITH CONSTRUCTION

ADEQ
Arizona Department of Environmental Quality

1. Print and read the Construction General Permit (CGP). This general permit applies to every regulated construction project in Arizona (except those on Indian lands). Note that the CGP is a "general permit" that was developed to provide permit coverage for the thousands of various construction projects in Arizona. Thus, the permit requirements are the same for everyone subject to this permit. You can download the permit at http://www.azdeq.gov/function/forms/appswater.html#cgp. **Read the permit and keep a copy of the permit and related documents at the construction site.**

2. Develop a Stormwater Pollution Prevention Plan (SWPPP) for your project. Part IV of the CGP describes the requirements for developing and implementing a SWPPP. Although the SWPPP requirements listed in the CGP are the same for everyone, your SWPPP must be specific to your project (i.e. tailored to the specific types of construction activities for the project) and specific to your site (i.e. tailored to the specific conditions of the site). No specific format is required. However, the SWPPP must contain all of the information specified in Part IV of the CGP, including a copy of the CGP, the completed NOI application, and the Certificate authorizing permit coverage. To help ensure that the SWPPP contains all of the required elements, refer to the CGP during development of the SWPPP. The SWPPP requirements are also summarized in a SWPPP Checklist available at http://www.azdeq.gov/function/forms/appswater.html#cgp.

   You are not required to submit your SWPPP to ADEQ in advance of permit authorization, unless your project, or a portion of your project, is within ¼ mile of a water body that has been designated as a "Unique Water" (A.A.C. R18-11-112) or an "Impaired Water" (A.A.C. R18-11-601 – R18-11-606). A map of unique and impaired waters is available at https://az.gov/webapp/noi/map.do.

   Local jurisdictions may require you to submit a copy of the SWPPP to them for review. In any case, the SWPPP must always be kept at the construction site (in construction trailer or supervisor's truck) and be available for review as necessary.

3. Submit a complete Notice of Intent (NOI) application to ADEQ. The NOI application contains general information about your project and certifies that you will comply with the conditions of the CGP. The fastest way to obtain permit coverage is to submit a NOI electronically to ADEQ using the Smart NOI System at http://az.gov/adeq/noi.

   If you use the Smart NOI system, the Certificate authorizing permit coverage is usually provided to you at the time of electronic submittal. The Authorization Certificate provides the project reference number (AZCON-XXXXXX) and a permit authorization (approval) date. You must be able to print the documents you complete during use of the Smart NOI system. By submitting the NOI to ADEQ electronically, you have the option of "e-signing" the NOI application, or mailing or faxing a signed copy to ADEQ within 10 days in order to retain the authorization for permit coverage. (Don't forget to print out a copy of these documents for your SWPPP and for posting requirements.)

   If you prefer, the "paper" NOI application and instructions are available at http://www.azdeq.gov/function/forms/appswater.html#cgp. This document has been designed so that you can type directly into the form. Send the completed NOI application to ADEQ by fax

at (602) 771-4674 or by mail. ADEQ will reply with a Certificate authorizing permit coverage for the construction project.

Generally, ADEQ processes NOI applications on the same day they are received. You can check the status of your NOI application by searching the on-line construction database at http://www.azdeq.gov/databases/azpdessearch.html.

In a few cases, permit authorization may be delayed:

a. If the NOI application is incomplete, ADEQ will send you a deficiency letter requiring revisions to the NOI application. Permit authorization will be delayed until all of the necessary information is received.
b. If the project is located within ¼ mile of an impaired water or unique water, ADEQ will process your NOI application once your SWPPP is received. The NOI application will receive an initial approval date of 32 business days after the date ADEQ receives the SWPPP. ADEQ will review the project SWPPP and will notify you whether the SWPPP needs revisions.
c. If the project is located within an area of concern to the U.S. Fish and Wildlife Service (USFWS), ADEQ will reply with information on contacting the USFWS and will delay permit authorization for approximately 32 business days while the NOI application is reviewed for water quality issues by both agencies.

Submit your NOI as soon as possible in case of unexpected delays in obtaining permit coverage for the project.

In addition to submitting the NOI to ADEQ, local jurisdictions may require you to provide them with a copy of the NOI and Authorization Certificate. Don't forget to keep a copy of the NOI and Certificate for your records and as part of the SWPPP.

4. Implement your SWPPP on your project site. Modify and update the SWPPP as necessary in accordance with the permit. Be prepared to provide a copy of the SWPPP to any inspector visiting your site. Post the required information about your project at the entrance of the site according to Part IV.J.2 of the CGP.

5. Submit a Notice of Termination form (NOT) to terminate permit coverage according to Part II.C of the CGP. A Construction Notice of Termination form may be obtained at http://www.azdeq.gov/function/forms/appswater.html#cgp. Complete the NOT form, and submit it to ADEQ by fax or mail. Upon receipt of the NOT form, ADEQ will provide you with an acknowledgement letter confirming the project termination.

Additional Program Information
Arizona Department of Environmental Quality
Surface Water Section/Stormwater NOI Processing Center
1110 W. Washington Street, Mailcode 5415A-1
Phoenix, AZ 85007
Contact: Shirley Conard
Tel: (602) 771-4632
Fax: (602) 771-4674
e-mail: sc4@azdeq.gov
Web site: www.azdeq.gov

White Mountain Apache Tribe Heritage Program
PO Box 507 Fort Apache,AZ 85926

To: Ken Kertell, SWTC Project Manager.
Date: February 22, 2008
Proposed Project: San Manuel Interconnect Transmission Line Project

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The White Mountain Apache Historic Preservation Office (THPO) appreciates receiving information on the proposed project, dated January 18, 08 In regards to this, please attend to the checked items below;

▶ There is no need to send additional information unless project planning or implementation results in the discovery of sites and/or items having known or suspected Apache Cultural affiliation.

☐ The proposed project is located within an area of probable cultural or historical importance to the White Mountain Apache Tribe (WMAT). As part of the effort to identify historical properties that maybe affected by the project we recommend an ethnohistorical study and interviews with Apache Elders. The Cultural Resource Director, ***Mr. Ramon Riley*** would be the contact person at (928) 338-4625 should this become necessary.

☐ The proposed project is located within or adjacent to a known historic property of cultural concern and/or historical importance to the White Mountain Apache Tribe and will most likely result in adverse affect to said property. Considering this, please refrain from further steps in project planning and/or implementation.

▶ Please refer to the attached additional notes in regards to the proposed project.

We have received and reviewed the information regarding the proposed San Manuel Interconnect Transmission Line Project in Pinal County, and we have determined the project ***will not have an effect*** on the tribe's Cultural Heritage Resources and/or historic properties. The project may proceed with the understanding that all ground disturbance be monitored *if* there are reasons to believe subsurface artifacts are present, and in the event subsurface materials and/or human remains are encountered all construction activities are to be stopped and the proper authorities and/or affiliated tribe(s) be notified to evaluate the situation.

We look forward to continued collaborations in the protection and preservation of places of cultural and historical significance.

Sincerely,

Mark T. Altaha
White Mountain Apache Tribe
Historic Preservation Officer
1 (928) 338-3033 Fax: 338-6055

SHPO-2008-0104(35293)

SWCA
ENVIRONMENTAL CONSULTANTS

Tucson Office
343 West Franklin Street
Tucson, Arizona 85701
Tel 520.325.9194 Fax 520.325.2033
www.swca.com

RECEIVED
JAN 22 2008
STATE PARKS S.H.P.O.

January 18, 2008

JoAnne Medley
Compliance Specialist/Archaeologist
State Historic Preservation Office
Arizona State Parks
1300 W. Washington
Phoenix, AZ 85007

Dear Ms. Medley:

Southwest Transmission Cooperative, Inc. (SWTC) is a rural electric cooperative that operates and maintains a 603-mile transmission system. There currently is rapid growth in the SWTC system in the area of Pinal County where SWTC supports delivery of electricity to one of its member systems, Trico Electric Cooperative, Inc. (Trico). In response to this growth, SWTC is proposing the San Manuel Interconnect Project in Pinal County, Arizona. SWTC would interconnect to Arizona Public Service's (APS) San Manuel Substation from the existing Apache to Hayden 115 kilovolt (kV) transmission line. The proposed transmission line would be a double circuit 115 kV line built to 230 kV specifications in the event of future demands. This interconnection would provide benefits to both entities and with the increasing Trico loads in southeast Pinal County, SWTC would be able to import power from APS and adequately support its system.

The project would consist of a double circuit 115 kV transmission line extending approximately 4.5 miles from the APS San Manuel Substation to the Apache to Hayden 115 kV transmission line (see attached map). The transmission line would connect to the existing line in Southwest ¼ of Section 12, Township 9 South, Range 17 East and run through Sections 14, 15, 21, 22 and 28, Township 9 South, Range 17 East before terminating at the San Manuel Substation in Section 29, Township 9 South, Range 17 East. The installation of the line would require a 100-foot-wide right-of-way. There already is an access road to a portion of the proposed new transmission line; approximately 1.5 miles of new access road would be needed.

SWTC is required to prepare and submit an Environmental Assessment (EA) for this project to the Rural Utilities Service, an agency of the U.S. Department of Agriculture, as part of regulations promulgated to implement the National Environmental Policy Act. The purpose of the EA is to describe the potential environmental impacts of the proposed project and to identify any extraordinary circumstances that may result in a significant environmental effect. As part of this process, SWTC is soliciting letters of response from agencies, governments, Native American tribes, and individuals that have a potential interest in the project. SWCA Environmental Consultants (SWCA) has been contracted to conduct scoping activities, identify and address potential issues of concern, ensure that all mitigation opportunities are discussed, and prepare the EA.

For adequate consideration, we would appreciate your response prior to February 22, 2008. If you require additional information or have any questions regarding this project, please contact Ken Kertell (SWCA) at (520) 325-9194 (kkertell@swca.com) or Walter Yosin (SWTC) at (520) 586-5158 (wyosin@ssw.coop). Thank you for your prompt consideration of this proposed project.

Sincerely,

Ken Kertell
SWCA Project Manager

We look forward to consulting pursuant to Section 106 of the National Historic Preservation Act and implementing regulations at 36 CFR 800.

JoAnne Medley for SHPO
Feb. 12, 2008

THE HOPI TRIBE
P.O. Bo 123
Kykotsmovi, AZ 86039
(928) 734-3000

Benjamin H. Nuvamsa
CHAIRMAN

Todd Honyaoma, Sr.
VICE-CHAIRMAN

RECEIVED FEB 07 2008

February 4, 2008

Ken Kertell, Project Manager
SWCA Environmental Consultants, Tucson Office
343 West Franklin Street
Tucson, Arizona 85701

Dear Mr. Kertell,

Thank you for your correspondence on behalf of the Rural Utilities Service, Southwest Transmission Cooperative, Inc., and Trico Electric Cooperative, Inc. dated January 18, 2008, regarding the proposed 4.5 mile San Manuel Interconnect Project in Pinal County. The Hopi Tribe claims cultural affiliation prehistoric cultural groups in Arizona, and the Hopi Cultural Preservation Office supports the identification and avoidance of prehistoric archaeological sites and Traditional Cultural Properties. We therefore appreciate your solicitation of our input and your efforts to address our concerns.

Therefore, if a cultural resources survey of the area of potential effect identifies prehistoric cultural resources that will be adversely affected by project activities, please provide us with copies of the survey report and any proposed treatment plans for review and comment. We also recommend that if any cultural features or deposits are encountered during project activities, these activities must be discontinued in the immediate area of the remains and the State Historic Preservation Office must be consulted to evaluate their nature and significance. If any Native American human remains or funerary objects are discovered during construction they shall be immediately reported as required by law.

If you have any questions or need additional information, please contact Terry Morgart at the Hopi Cultural Preservation Office. Thank you again for your consideration.

Respectfully,

Leigh J. Kuwanwisiwma, Director
Hopi Cultural Preservation Office

xc: Arizona State Historic Preservation Office

AK-CHIN INDIAN COMMUNITY

Cultural Resources Office

42507 W Peters & Nall Road • Maricopa, Arizona 85239 • Telephone: (520) 568-1369 • Fax: (520) 568-1366

January 31, 2008

RECEIVED FEB 01 2008

Ken Kertell
Project Manager
SWCA Environmental Consultants
Tucson Office
343 West Franklin Street
Tucson, Arizona 85701

Re: San Manuel Interconnect (115kV Line) Project

Dear Mr. Kertell:

The Ak-Chin Cultural Resources Office did receive a letter dated January 18, 2008 regarding the above-referenced undertaking.

At this time, our office will defer comments to the Tohono O'Odham Nation.

Thank you for informing our office about this project. If you have any questions, please contact me at (520) 568-1369.

Sincerely,

Gary Gilbert
Cultural Resources Technician II
Cultural Resources Office
Ak-Chin Indian Community

Southwest Transmission Cooperative Inc

San Manuel Interconnect Project

SWCA Environmental Consultants
Sound Science. Creative Solutions.

We would like your input:

We welcome your questions, comments and concerns regarding the proposed project during the public open house meeting on Tuesday, March 10, 2009 at the BHP Conference Center at 111 W. 5th Ave, San Manuel, Arizona.

Please describe any issues or concerns that should be addressed for the proposed project.

HIRE Local people - increase construction costs into San Manuel, Mammoth, Train new people for possible jobs in this area

Archalogical person from Oracle State Park
Tiona Acosta

San Manuel Interconnect Public Comments Correspondence Log			
Name	**Date**	**Comment Concern**	**Resolution**
William Lower 1023 N. Webb Dr. San Manuel, AZ 85631	February 21, 2009	Wanted information sent to him via mail	520-385-4589 Sent information packet on February 24, 2009
Jim Karender 111 B Avenue San Manuel, AZ 85631	February 21, 2009	Left a voicemail wanting to discuss project	520-385-2649 Returned his call on Tuesday February 24, 2009 at 10 AM. Was very appreciative of the call and simply wanted to know where the project was located. He will be attending the open house.
Mark Dixon	February 23, 2009	Left a voicemail wanting to discuss project	520-212-6457 Returned his call on Tuesday February 24, 2009 at 10:10 AM. Mark simply wanted to know basic project details. Wanted information on the proposed solar project. He will be attending the open house.
Ann Swart 908 W. 5th Ave San Manuel, AZ 85631	February 23, 2009	Left a voicemail wanting to discuss project	520-385-4042 Returned her call on Tuesday February 24, 2009 12:00. She is retired and does not have internet and will not be attending the meeting. She requested a mailed copy of the news letter. Mailed information on February 24, 2009
Al Gutierrez Regional Manager for Sun Life Family Health Center Inc PO Box L San Manuel, AZ 85631	February 24, 2009	Called to ask about what the project will bring to the San Manuel Community	Explained project to him. He also wanted to know what the project will bring to the community. I explained contractors would have to live and eat while on the job.
Unknown female Caller	February 24, 2009	Called at 5:40 PM and said msg being recorded and that I was always unavailable and didn't return her email. Did not leave a contact number or name to return her call.	No Resolution
Sandra Kuntz Missoula, Montana	February 25, 2009	Called at 8:30 left voicemail requesting information regarding the project.	406-542-5161 I answered some basic questions regarding the project and explained the mailing buffers. I directed her to the web page and indicated that if she had any additional questions she could call back. Sandra is very interested in the project, but does not know whether or not she can attend the meeting.
Clint Magee	February 26, 2009	Called at 8:33 Wanted to know what the project was and how we were affiliated with AEPCO	I explained that it was a new electric transmission line and how we are affiliated with AEPCO. He explained that he was related to SMR.