Application for a Certificate of Environmental Compatibility

Rio Rico to Harshaw

138 Kilovolt Transmission Line Project

Prepared for:

Arizona Power Plant and
Transmission Line Siting Committee

Submitted by:

UNS Electric, Inc.

Date: March 3, 2023
Case No. 218

This page intentionally left blank

BEFORE THE

ARIZONA POWER PLANT AND TRANSMISSION LINE SITING COMMITTEE

In the matter of the Application of UNS Electric, Inc., in conformance with the requirements of A.R.S. § 40-360, et seq., for a Certificate of Environmental Compatibility authorizing the Rio Rico to Harshaw 138 kilovolt (kV) Transmission Line Project, which includes the construction of a new 138 kV transmission line originating at the planned Rio Rico Switchyard (Section 12, Township 23 S, Range 13 E), and terminating at the planned Harshaw Substation (Section 32, Township 22 S, Range 16 E), each located within Santa Cruz County, Arizona.	Docket No. L-00000F-23- -00218 Case No. 218

APPLICATION FOR

CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY

This page intentionally left blank

TABLE OF CONTENTS

TABLE OF CONTENTS iii
LIST OF FIGURES vi
LIST OF TABLES vi
LIST OF EXHIBITS vii
LIST OF ACRONYMS AND ABBREVIATIONS x
A. INTRODUCTION 1
A.1 PROJECT OVERVIEW 1
A.2 STUDY AREA DEVELOPMENT 1
A.3 PROJECT NEED 1
A.4 PROJECT PURPOSE AND BENEFITS 2
A.5 ENVIRONMENTAL STUDIES AND ROUTE SELECTION PROCESS OVERVIEW 3
A.6 PUBLIC INVOLVEMENT OVERVIEW 4
A.7 CONCLUSION 4
B. APPLICATION FOR CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY 7
B.1 Project Information 7
EXHIBIT A: LOCATION AND LAND USE MAPS A-1
EXHIBIT B: ENVIRONMENTAL REPORT B-1
B.1 Introduction B-1
B.2 Environmental Planning Process B-2
B.3 Environmental Statements B-2
EXHIBIT C: AREAS OF BIOLOGICAL WEALTH C-1
C.1 Introduction C-1
C.2 Biological Wealth C-2
C.2.1 Areas of Biological Wealth C-2
C.2.2 Special Status Species C-3
C.3 Summary Of Potential Effects C-4
C.3.1 Construction C-4
C.3.2 Operation and Maintenance C-4
C.4 Conclusion C-4
C.5 References C-5
EXHIBIT D: BIOLOGICAL RESOURCES D-1
D.1 Introduction D-1
D.2 Existing Conditions D-1
D.3 Effects of the Proposed Project D-4

D.4 Conclusion D-4

D.5 References D-4

EXHIBIT E: SCENIC AREAS, HISTORIC SITES AND STRUCTURES, AND ARCHAEOLOGICAL SITES E-1

E.1 Introduction E-1

E.2 Scenic Areas and Visual Resources E-2

E.2.1 Overview E-2

E.2.2 Visual Impact Assessment Protocol E-2

E.2.3 Landscape Setting E-3

E.2.4 Visual Impact Assessment Results E-4

E.3 Historic Sites and Structures, and Archaeological Sites E-8

E.3.1 Inventory Methods E-9

E.3.2 Inventory Results E-9

E.3.3 Assessment of Effects E-11

E.3.4 Conclusion E-12

E.3.5 References E-12

EXHIBIT F: RECREATIONAL PURPOSES AND ASPECTS F-1

F.1 Introduction F-1

F.2 Affected Environment F-1

F.3 Potential Effects F-3

F.4 Conclusion F-4

EXHIBIT G: CONCEPTS OF PROPOSED FACILITIES G-1

EXHIBIT H: EXISTING PLANS H-1

H.1 Introduction H-2

H.2 Existing Plan Review H-2

H.2.1 Land Ownership and Jurisdiction H-2

H.2.2 Land Use Plans and Development Plans H-3

H.3 Local Government Plans H-3

H.3.1 Santa Cruz County Comprehensive Plan H-3

H.3.2 Santa Cruz County Zoning and Development Code H-3

H.3.3 Unified Nogales Santa Cruz County Transportation Plan H-4

H.3.4 2015 Nogales International Airport Master Plan H-4

H.3.5 Arizona State Land Department (ASLD) H-4

H.4 Federal H-5

H.4.1 Coronado National Forest (CNF) H-5
H.4.2 Military H-6
H.4.3 Federal Aviation Administration (FAA) H-6
H.5 Tribal H-6
H.6 Private H-7
H.7 Existing Land Use H-7
H.8 Proposed Land Uses and Developments H-9
H.9 Potential Effects H-9
H.10 Conclusion H-9
H.11 References H-10
EXHIBIT I: ANTICIPATED NOISE AND INTERFERENCE WITH COMMUNICATION SIGNALS I-1
I.1 Introduction I-1
I.2 Audible Noise I-2
I.3 Corona Noise I-4
I.4 Radio Interference I-6
I.5 Communication Interference I-6
I.6 Television Interference I-6
I.7 Electric and Magnetic Field Effects I-7
I.7.1 Existing EMFs within the Preferred Alternative Route I-7
I.7.2 Electric and Magnetic Fields Background I-7
I.8 Conclusion I-9
I.9 References I-9
EXHIBIT J: SPECIAL FACTORS J-1
J.1 Introduction J-1
J.2 Public Involvement Program Summary J-2
J.2.1 Jurisdictional and Other Stakeholder Briefings J-2
J.2.2 Jurisdictional and Other Stakeholder Summaries J-3
J.2.3 News Media J-3
J.2.4 Newsletters/Postcards/Fact Sheets J-3
J.2.5 Public Open House J-4
J.2.6 Telephone Information Line J-6
J.2.7 Internet Website J-6

J.2.8 Comment Tracking Database J-6
J.3 Comments Received J-7
J.4 Social Media J-8
J.5 Undergrounding Transmission Studies J-8
J.6 Environmental Justice J-9

LIST OF FIGURES

Figure 1. Preferred Route 5
Figure 2. Key Observation Points for the Visual Simulation E-3
Figure 3. Comment Methods J-7
Figure 4. Public Comments and Concerns by Topic J-8
Figure 5. Census Tracts in the Project Area J-10
Figure 6. Median Household Income in Census Tracts in Project Area J-11
Figure 7. Race Percentages in Census Tracts in Project Area J-11

LIST OF TABLES

Table 1. Ten Year Filings 7
Table 2. Alternative Route Segment Distances 10
Table 3. Alternative Route Combined Distances 10
Table 4. Estimated Costs by Alternative Route 11
Table 5. Land Ownership Percentages* 14
Table 6. Federally Listed Species with Potential to occur in the Biological Study Area C-3
Table 7. Plants Observed During Field Visit October 2021* D-3
Table 8. Wildlife Observed During Field Visit October 2021* D-3
Table 9. Visual Impact Assessment Matrix E-5
Table 10. Visual Impact Assessment Scoring and Alternative Recommendation E-7
Table 11. Recreation Facilities within the Study Area F-2
Table 12. Percentage Land Use Along Alternative Routes H-8
Table 13. Typical Noise Levels for Construction Equipment I-2
Table 14. General Construction Noise Assessment Criteria Acceptable Limits I-3
Table 15. Traffic on Roads in the Project Area I-3
Table 16. Noise Generated by Traffic (dBA) at 50 feet I-3
Table 17. Construction Noise Level Estimates* I-4
Table 18. EMF Strength of Various Electrical Sources at Various Distances I-8
Table 19. Open House Information J-4
Table 20. Stakeholder Meeting Information J-4
Table 21. Open House Stations J-5

LIST OF EXHIBITS

		EXHIBIT PAGE #
	Introduction	
A	**Location and Land Use Maps**	
A-3	Location Map	
A-4	Land Use Map	
B	**Environmental Report**	
B-1	Siting Study	
B-2	Preferred Route Map	
C	**Areas of Biological Wealth**	
C-1	Biological Map	
C-2	Biological Evaluation	
D	**Biological Resources**	
E	**Scenic, Historic, Archaeological**	
E-1	Cultural Resources Inventory – Class I Private/State (Redacted)	
E-2	Cultural Resources Inventory – Class I USFS (Redacted)	
F	**Recreation**	
F-1	Recreation Map	
G	**Concepts of Proposed Facilities**	
G-1	Single Circuit 138 kV Tangent Typical Configuration	
G-2	Single Circuit 138 kV Deadend Typical Configuration	
G-3.1	Switchyard General Arrangement	
G-3.2	Switchyard Site Arrangement	
G-3.3	Switchyard Elevations	
G-4	Visual Simulations	
H	**Existing Plans**	
H-1	Military Airspaces Map	
H-2	Existing Land Use Map	
I	**Noise and Interference with Communication**	
I-1	Federal Communication Commission Towers Map	
I-2	Letter sent to FCC Tower Holders	
I-3.1	DoD Clearinghouse Informal Review Letter	
I-3.2	DoD Clearinghouse Email Response Letter	
J	**Special Factors**	
J-1	Master Stakeholder List	
J-2	Stakeholder Meeting 1 Attendance Report	
J-3	Stakeholder Meeting 1 Presentation	
J-4	Stakeholder Meeting 2 Attendance Report	
J-5	Stakeholder Meeting 2 Presentation	

		EXHIBIT PAGE #
J-6	Stakeholder Meeting 3 Attendance Report	
J-7	Stakeholder Meeting 3 Presentation	
J-8	Project Newsletters, Public Notices	
J-8.1	Newsletter 1	
J-8.1a	Newsletter 1 in Spanish	
J-8.2	Newsletter 2	
J-8.2a	Newsletter 2 in Spanish	
J-8.3	Newsletter 3	
J-8.3a	Newsletter 3 in Spanish	
J-8.4	Newsletter (Postcard) 4	
J-8.5	Newsletter 5	
J-8.5a	Newsletter 5 in Spanish	
J-8.6	Public Notice Open House 1	
J-8.7	Public Notice Open House 2	
J-8.8	Public Notice Open House 3	
J-8.9	Public Notice Open House 4	
J-8.10	Public Notice Open House 5	
J-8.11	Open House 5 Email Announcement	
J-9	Open House Meeting 1 Presentation	
J-10	Open House Meeting 2 Presentation	
J-11	Open House Meeting 3 Presentation	
J-12	Open House Meeting 4 Presentation	
J-13	Open House Meeting 5 Presentation	
J-14	Open House Meeting Posters	
J-15	Public Comments - Redacted	
J-16	Tribal Contacts	
J-17.1	MetroQuest Comments Map 2021	
J-17.2	MetroQuest Comments Map 2022	
J-17.3	MetroQuest Comments Map 2023	
J-18	ADOT Meeting Log	
J-19.1	Project Webpage – English	
J-19.2	Project Webpage – Spanish	
J-20.1	Lake Patagonia Estates Petition	
J-20.2	Lake Patagonia Estates Meeting Agenda	
J-20.3	Homeowners Group – Patagonia AZ Letter	
J-21.1	Magruder Letter	
J-21.2	Magruder Letter Response	
J-21.3	Magruder Questions for Open House 5	
J-22.1	Underground Memo S&L	
J-22.2	Underground Memo sent to USFS	
J-23.1	Nogales International Article August 2022	

		EXHIBIT PAGE #
J-23.2	Nogales International Article November 2022	
J-24	Facebook Ad	
J-25	EPA EJScreen Website Report	

LIST OF ACRONYMS AND ABBREVIATIONS

3d	3-dimensional
ACC	Arizona Corporation Commission
ADOT	Arizona Department of Transportation
AM	Amplitude modulation
AMI	Arizona Minerals Inc.
ARHP	Arizona Register of Historic Places
A.R.S.	Arizona Revised Statutes
ASLD	Arizona State Land Department
AZGFD	Arizona Game and Fish Department
AWLW	Arizona Wildlife Linkages Workgroup
BE	Biological Evaluation
CEC	Certificate of Environmental Compatibility
CNF	Coronado National Forest
COMMITTEE	Arizona Corporation Commission Power Plant and Line Siting Committee
dBA	A-weighted decibels
DoD	Department of Defense
EMA	Ecosystem Management Area
EMF	Electric and Magnetic Fields
EPM	Environmental Protection Measures
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FIRM	Flood Insurance Rate Maps
FM	Frequency Modulation
Forest Plan	Coronado National Forest Land and Resource Management Plan
GIS	Geographic Information System
HDMS	Heritage Data Management System

I-19	Interstate 19
IBA	Important Bird Area
IPaC	Information for Planning and Consultation
KOP	Key Observation Point
kV	Kilovolt
MBTA	Migratory Bird Treaty Act
mG	Milligauss
MOA	Military Operations Area
MTR	Military Training Route
MVA	Megavolt Ampere
MW	Megawatts
NEPA	National Environmental Policy Act
NESC	National Electrical Safety Code
NIEHS	National Institute of Environmental Health Sciences
NRHP	National Register of Historic Places
Project	Rio Rico to Harshaw 138 kV Transmission Line Project
ROW	Right-of-way
SHPO	State Historic Preservation Office
SR	State Route
SUA	Special Use Airspace
SUP	Special Use Permit
TEP	Tucson Electric Power
The Plan	Santa Cruz County Comprehensive Plan
UNSE	UniSource Electric, Inc.
USDOT	U.S. Department of Transportation
UPRR	Union Pacific Railroad
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
WHO	World Health Organization

A. INTRODUCTION

Pursuant to Arizona Revised Statutes (A.R.S.) Section 40-360 *et seq.*, UNS Electric, Inc. (UNSE), a subsidiary of UniSource Energy Services, submits this application for a Certificate of Environmental Compatibility (CEC) granting authority to construct the Rio Rico to Harshaw 138 kilovolt (kV) Transmission Line Project (Project).

A.1 PROJECT OVERVIEW

The Project will consist of building a new, single-circuit, 138 kV transmission line approximately 20 miles in length, depending on the alternative approved, to connect the existing UNSE 138 kV system to the planned Harshaw Substation through a planned 138 kV switchyard in Rio Rico, Santa Cruz County, Arizona.

The Project will cross land owned by Santa Cruz County, and the United States Forest Service (USFS) Coronado National Forest (CNF), as well as privately-owned land, using Arizona Department of Transportation (ADOT) and Santa Cruz County road rights-of-way (ROWs). UNSE plans to obtain ROWs, easements, and special use permit authorization for construction, operation and maintenance, in up to 100-foot-wide corridors.

The transmission line will serve the Hermosa Project, a mine exploration project owned by South32 Hermosa Inc. (also doing business as Arizona Minerals) or AMI, a subsidiary of South32 Limited. Any reference to AMI in the application or exhibits is a reference to South32 Hermosa Inc.

The transmission line also will improve reliability for electric customers in the area of the planned Harshaw Substation, including those in Flux Canyon, San Rafael Valley, Washington Camp, and Lochiel areas. UNSE's existing 13.2 kV distribution line is not adequate to support the area's future energy needs, including the Hermosa Project's anticipated requirements.

A.2 STUDY AREA DEVELOPMENT

UNSE identified a Study Area for analysis as the Project was being planned. The Project Study Area defines the area of notification, the area in which preliminary environmental studies were conducted for the Project, and the area where potential transmission line routes would be considered. The Project Study Area boundaries were determined by identifying the beginning, middle, and end points of the Project, identifying high level opportunities and constraints for a transmission line in the vicinity, and then applying a spatial buffer around those areas. Following a virtual public open house (virtual) in September 2020, the Study Area was expanded.

See Exhibit A-3 for the Project location and Project Study Area.

A smaller Study Area consisting of a one-mile buffer around all the alternatives brought forward in this application was created to re-focus the resource studies for the application.

A.3 PROJECT NEED

This Project was identified in response to a request from an existing UNSE customer, AMI, for the Hermosa Project, which desires an increased level of service to meet its future projected load of 87 megawatts (MW) (102.34 megavolt-ampere (MVA)). UNSE currently serves this area through a 13.2 kV radial

distribution circuit, with an average circuit load of 3.28 MVA, a peak load of 7.7 MVA, and a circuit rating of 10.1 MVA. Existing electrical demand, combined with the customer's projected need, is greater than the current distribution line can support and therefore a higher capacity line is required to be constructed to meet the service request.

UNSE conducted a System Impact Study to determine the impacts of the projected load on both the UNSE and Tucson Electric Power (TEP) Bulk Electric Systems (BES). The study identified system upgrades required to provide the service requested, including the need for a new 138 kV substation to serve the projected load, which would connect to the existing UNSE 138 kV system through a switchyard and a new 138 kV transmission circuit.

A 138 kV switchyard is planned for the Rio Rico area that would allow interconnection with the existing 138 kV transmission line that runs south from the Sonoita Substation to the Valencia Substation. The planned Harshaw Substation to be located near the Hermosa Project would step down to distribute power to the existing UNSE customers in the vicinity, and provide power to the Hermosa Project through the planned AMI private Hermosa Project Substation, which would be privately owned by AMI.

This Project will create a 138 kV transmission path through Santa Cruz County and reliably serve the need described in the UNSE 2023-2032 Ten Year Transmission Plan.

A.4 **PROJECT PURPOSE AND BENEFITS**

The Project will provide UNSE an increase in load-serving capacity to the central portion of Santa Cruz County. The increased capacity will be sufficient to meet the projected needs of the Hermosa Project, along with other existing customer needs, and provide the ability to serve future load increases in the area.

Further, the Project will improve service reliability and quality to customers in the area. The current distribution circuit, VA-6243, consistently performs poorly. Following the construction of the proposed Harshaw Substation, UNSE will reconfigure the VA-6243 distribution circuit by adding a line switch that would normally be open, conceptually located near Highway 82, in order to split the line, resulting in two separate circuits. One circuit would be sourced from the Valencia Substation in Nogales, as it is today. The second, a new circuit, would be sourced from the proposed Harshaw Substation. The new line switch could be closed, if needed, to tie the two circuits into a single circuit similar to the way the single circuit is configured today.

This reconfiguration would provide a number of benefits to approximately 159 existing distribution customers in the Flux Canyon, San Rafael Valley, Washington Camp, and Lochiel areas, as well as a primary meter to the Hermosa Project, and a primary meter that serves as a back-up source to a number of Comisión Federal de Electricidad (CFE) customers. Specific benefits include:

- Two much shorter circuits, which, due to length, would have less exposure to potential service interruptions (fewer power outages),
- Higher quality power (fewer flickering lights, etc.), and
- A secondary source to keep customers in power, simply by closing the line switch. This would result in feeding customers normally fed out of Nogales from the proposed Harshaw Substation,

or vice versa, feeding customers normally fed out of the proposed Harshaw Substation out of Nogales, and thus further increasing reliability and continuity of service.

Lastly, UNSE and AMI are both interested in opportunities to develop renewable generation. This proposed new 138 kV transmission line will allow UNSE and AMI the ability to develop renewable generation at an off-site location, and, through the interconnected transmission system associated with this Project, bring that power to the future mine site or other UNSE customers.

Construction of the Project will be funded entirely by AMI, assisting UNSE in meeting its obligation to provide reliable and affordable electric service to customers within its service territory, without passing those costs to all other UNSE customers.

A.5 **ENVIRONMENTAL STUDIES AND ROUTE SELECTION PROCESS OVERVIEW**

Considering input from stakeholders and the general public, UNSE performed a comprehensive evaluation process to identify potential routes for the Project and narrowed that selection to routes that were environmentally compatible and best conformed to additional criteria found to be of importance to UNSE and the public. As described in the Siting Study found in Exhibit B-1, UNSE implemented the selection process in sequential steps. This evaluation process started with the determination of a preliminary Study Area and continued with an analysis of opportunities and constraints for the placement of the transmission line and related facilities. The intent of this analysis was the identification of opportunities for locating the line, such as paralleling or using existing utility corridors, other linear features such as road ROW, and the avoidance of sensitive areas where locating the Project could have especially high impacts on existing land use, and biological, cultural, and/or visual resources. Next, UNSE identified preliminary segments or 'links' that could be combined to establish a route for the Project.

UNSE examined in greater detail the overall impact these links would have on the above-mentioned resources. This research included field visits and review of relevant land use planning documents. The methodology used to determine possible route corridors to interconnect the switchyard and two substations involved five phases: 1) Pre-analysis, 2) Data Inventory, 3) Suitability Assessment, 4) Compatibility Analysis, and 5) Concept Evaluation. Each phase relied heavily on geospatial analysis[1] and either direct public and stakeholder outreach or analysis of comments received through past outreach efforts.

This approach enabled UNSE to consider a broad range of alternative transmission line links at the beginning of the process. UNSE's analysis focused on environmental and land use impacts, public and stakeholder comments, existing utility corridors, and construction feasibility as part of the process of identifying alternative transmission line routes. The result of this process was the identification of one preferred route and three alternative route sections that satisfy the requirements of factors to be considered by the Arizona Power Plant and Transmission Line Siting Committee (Committee). All routes presented in the application meet the purpose and need of the Project.

[1] Geospatial analysis is the gathering, display, and manipulation of imagery, GPS, satellite photography and historical data, described explicitly in terms of geographic coordinates as they are applied to geographic models.

A.6 **PUBLIC INVOLVEMENT OVERVIEW**

Public participation is a vital part of UNSE's environmental planning process for siting of transmission lines; therefore, comprehensive public involvement and communication activities were conducted as a part of the route selection process discussed above in Section A.5. These activities started in September 2020 with efforts to notify and inform the public, agencies, community leaders, and other affected stakeholders about the need for and benefits of the Project. Public involvement activities continued through January 2023, and included three stakeholder group meetings; two in-person open houses, one hybrid virtual/in-person open house, and two purely virtual public meetings; regular updates of an online project website; and individual meetings with Santa Cruz County, ADOT, CNF, and various potentially impacted homeowners and other stakeholders.

Through the public involvement process, UNSE was able to gather feedback on the proposed links and the Project at large. In 2020, due to the COVID-19 pandemic, UNSE modified the format of its open houses and held them virtually to protect public health and safety, and comply with state and local directives regarding public interactions. The modified format allowed public outreach to continue, a necessary component in ensuring that the Project meets its scheduled in-service date.

Throughout the evaluation process, the public and stakeholders were given opportunities to provide comments through a variety of methods. Mailers (e.g., newsletters, postcards) were sent to provide background on the Project and any updates, announce the public open houses (both in-person and virtual), and solicit feedback on the Project. A telephone information line and a webpage with an online comment form and mapping survey were used to communicate information and receive comments. Social media platforms were also used to communicate with the public. Exhibit J contains a comprehensive overview details of UNSE's outreach for the Project.

A.7 **CONCLUSION**

The CEC requested in this application balances the need for reliable, affordable energy and the desire to minimize impacts on Arizona's environment and ecology. The Project is environmentally compatible and will allow UNSE to serve its customers within Santa Cruz County. As such, UNSE respectfully requests that the Committee grant, and the Arizona Corporation Commission (ACC) approve, a CEC for the preferred route presented in this application.

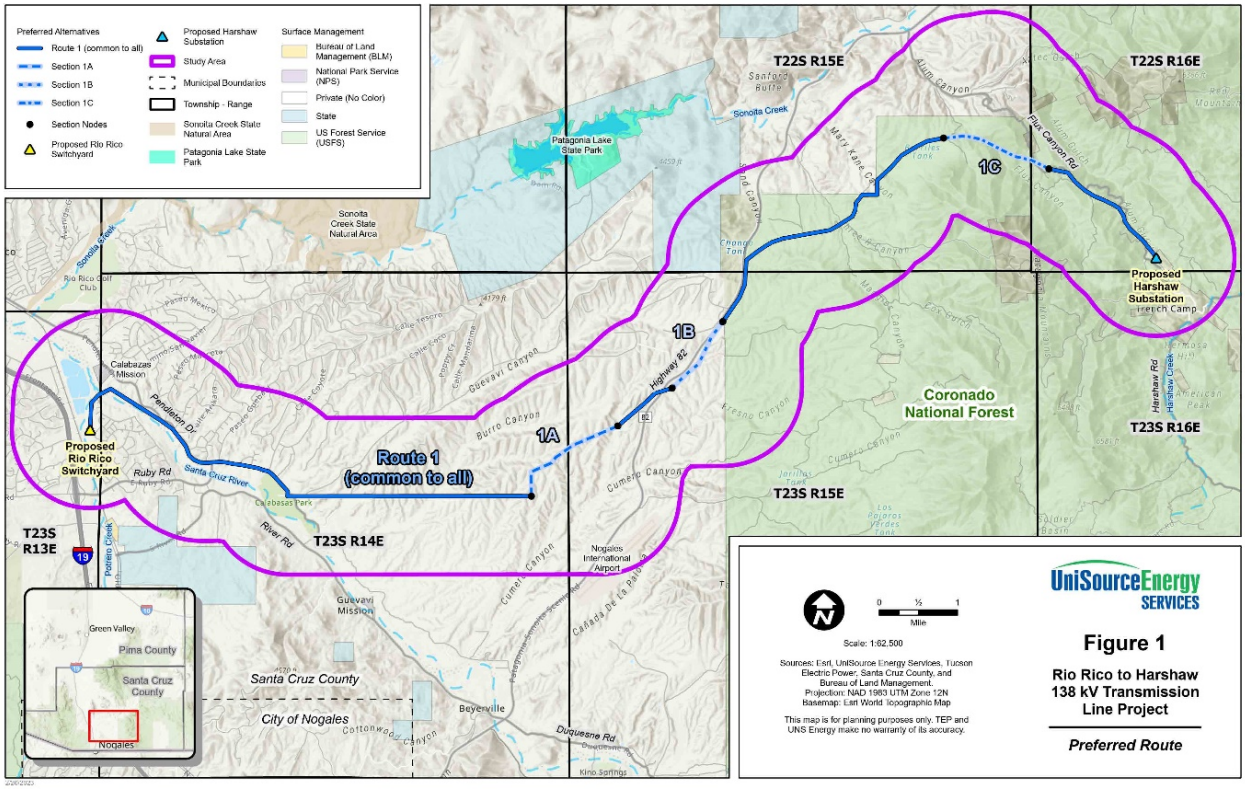


Figure 1. Preferred Route

This page intentionally left blank

B. APPLICATION FOR CERTIFICATE OF ENVIRONMENTAL COMPATIBILITY

(Pursuant to A.R.S. §§ 40-360.03 and 40-360.06)

B.1 Project Information

1. *Name and address of Applicant:*
   UNS Electric, Inc.
   88 East Broadway Blvd, Tucson, AZ 85701
   PO Box 711, Tucson, AZ 85702

2. *Name, address and telephone number of a representative of Applicant who has access to technical knowledge and background information concerning this application, and who will be available to answer questions or furnish additional information:*
   Clark Bryner
   Principal Program Manager, Transmission Line Siting
   UNS Electric, Inc.
   88 East Broadway Blvd, Tucson, AZ 85701
   PO Box 711, Tucson, AZ 85702
   Phone: (520) 401-1175

3. *Dates on which Applicant filed a Ten-Year Plan in compliance with A.R.S. § 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:*
   The Project was first identified in UNSE's Ten-Year Plan Transmission Projects for Years 2021-2030, filed in January 2021 under Docket No. E- 99999A-21-0009, and has been included in each subsequent filing (Table 1). (The Project was first identified as Rio Rico Switchyard – Harshaw 138 kV Transmission Line.)

Table 1. Ten Year Filings

Filing Year	TYP Date	Docket Number	Project Name	Point of Origin	Point of Termination
Jan 2021	2021-2030	E-99999A-21-0009	Rio Rico Switchyard – Harshaw 138 kV Transmission Line	Rio Rico Switchyard	Harshaw Substation
Jan 2022	2022-2031	E-99999A-21-0009	Rio Rico Switchyard – Harshaw 138 kV Transmission Line	Rio Rico Switchyard	Harshaw Substation
Jan 2023	2023-2032	E-99999A-23-0016	Rio Rico Switchyard – Harshaw 138 kV Transmission Line	Rio Rico Switchyard	Harshaw Substation

4. *Description of transmission line:*
   i. *Nominal voltage for which the lines are designed; description of the proposed structures and switchyards or substations; purpose for constructing:*
      Nominal Voltage

The nominal voltage of the single-circuit transmission line is 138 kV.

Description of Structures

The transmission line structures will be designed to accommodate one circuit of 138 kV transmission. The structures will be tubular, self-weathering steel monopole structures and the conductor will have a non-specular finish to reduce visibility. The structures will typically be 60 to 120 feet above ground, with the taller structures required for site specific clearance issues.

Description of Substation and Switchyards

The Project originates at the planned Rio Rico Switchyard, and terminates at the planned Harshaw 138 kV Substation. The Harshaw Substation will be located on private land, an inholding within the Coronado National Forest (CNF), and is planned to be in service by the end of 2024.

See Exhibits G-1 through G-2 for typical structures; Exhibit G-3 for switchyard plan and elevation; and Exhibit G-4 for visual simulations of the transmission line.

Project Purpose

The purpose of the Project is to respond to a request for service from AMI for their proposed Hermosa Project located on private land. The existing 13.2 kV distribution line, which provides power to customers within the CNF and to communities in the Flux Canyon, San Rafael Valley, Washington Camp and Lochiel areas, has insufficient capacity to serve the requested load.

The Project will provide UNSE an increase in load serving capacity to the central portion of Santa Cruz County. The increased capacity will be sufficient to meet the projected needs of the Hermosa Project, along with other existing customer needs, and enhance UNSE's the ability to serve future load increases in the area.

Further, the Project will improve service reliability and quality to customers in the area. The current distribution circuit, VA-6243 consistently performs poorly. Following the construction of the proposed Harshaw Substation, UNSE would reconfigure the VA-6243 distribution circuit, adding a line switch that would normally be open, conceptually located near Highway 82, and that would split the line, thus resulting in two separate circuits. One circuit would be sourced from the Valencia Substation in Nogales, as it is today. The second, a new circuit, would be sourced from the proposed Harshaw Substation. The new line switch could be closed, if needed, to tie the two circuits into a single circuit, similar to the way the single circuit is configured today.

This reconfiguration would provide a number of benefits to approximately 159 existing distribution customers in the Flux Canyon, San Rafael Valley, Washington Camp, and Lochiel areas, as well as a primary meter to the Hermosa Project, and a primary meter

that serves as a back-up source to a number of Comisión Federal de Electricidad (CFE) customers. Specific benefits include:

- Two much shorter circuits, which, due to length, would have less exposure to potential service interruptions (fewer power outages),
- Lead to Higher power quality (fewer flickering lights, etc.), and
- A secondary source to keep customers in power, simply by closing the line switch. This would result in feeding customers normally fed out of Nogales from the proposed Harshaw Substation, or vice versa, feeding customers normally fed out of the proposed Harshaw Substation out of Nogales, thereby further increasing reliability and continuity of service.

Lastly, UNSE and AMI are both interested in opportunities to develop renewable generation. The 138 kV transmission line will allow UNSE and AMI the ability to develop renewable generation at an off-site location, and, through the interconnected transmission system associated with this Project, bring that power to the future mine site or other UNSE customers.

Construction of the Project will be funded entirely by AMI, assisting UNSE in meeting its obligation to provide reliable and affordable electric service to customers within its service territory, without passing those costs to all other UNSE customers.

ii. Description of geographic points between which the transmission line will run; Straight-line distance between such geographic points; Length of the transmission line for each alternate route:

Description of Geographic Points

The western point of the Project is the planned Rio Rico Switchyard, located adjacent to the existing 138 kV line east of Interstate 19 (I-19). The eastern point of the Project is the planned Harshaw Substation, located on a private land in-holding within the CNF, at the end of Flux Canyon Road, approximately 4.5 miles south of State Route 82 (SR 82).

Straight-line Distance

The straight-line distance from the planned Rio Rico Switchyard to the planned Harshaw Substation is approximately 14 miles.

Length of Transmission Line Alternative Routes

The distances of the transmission line alternative routes are shown in Table 2, and range from a possible 17.49 miles to 19.20 miles, depending on which alternative sections are chosen.

Table 2. Alternative Route Segment Distances

ALTERNATIVE ROUTE	LENGTH (MILES)
PREFERRED ALTERNATIVE	
Route 1 (common to all)	13.39
Section 1A	1.58
Section 1B	1.08
Section 1C	1.44
ALTERNATIVE SECTIONS	
Section 2A	1.83
Section 2B	1.5
Section 2C	2.48

Table 3. Alternative Route Combined Distances

ROUTE ALTERNATIVES	LENGTH (MILES)
1+1A+1B+1C*	17.49
1+2A+1B+1C	17.74
1+2A+2B+1C	18.16
1+2A+2B+2C	19.20
1+1A+2B+1C	17.91
1+1A+2B+2C	18.95
1+1A+1B+2C	18.53
1+2A+1B+2C	18.78

*Preferred

iii. Nominal width of right-of-way required; nominal length of span; typical height of supporting structures above ground; minimum height of conductor above ground:

Nominal Width of Right-of-Way

In areas outside of existing road ROW, the applicant plans to acquire up to a 100-foot-wide ROW. UNSE is requesting a 500-foot-wide siting corridor for the approved route, with a 1500-foot-wide siting corridor through Section 1C to allow for routing flexibility.

Nominal Length of Span

The nominal length of span is 700 feet.

Typical Height of Supporting Structures

Supporting structures typically will range from 60 feet to 120 feet above grade for the transmission lines. There are several structures that will be required to be taller, to maintain National Electric Safety Code (NESC) clearance criteria. These few structures may be as tall as 120 feet above grade.

Minimum Height of Conductor

The minimum height of the 138 kV transmission line conductor above existing grade will be 25 feet at maximum sag.

iv. Estimated costs of the proposed transmission line and route:

Estimates for the routes are shown in Table 4. Variations in cost depend upon duration of construction and quantity of materials required, as well as mitigation of existing conflicts and acquisition of land rights. The total transmission line cost is anticipated to range between $46 and $51 million, depending on which alternative route is selected. Note that the construction and materials costs shown below include (as required) the construction of new transmission lines.

Table 4. Estimated Costs by Alternative Route

ALTERNATIVE ROUTE	LENGTH (MILES)	CONST COSTS	ROW COSTS	TOTAL COST	$ per mile
PREFERRED ALTERNATIVES					
Route 1 (common to all)	13.39	$31,833,564	$3,851,635	$35,685,199	$2,665,063
Section 1A	1.58	$3,756,313	$454,487	$4,210,800	$2,665,063
Section 1B	1.08	$2,567,606	$310,662	$2,878,268	$2,665,063
Section 1C	1.44	$3,423,475	$414,216	$3,837,691	$2,665,063
Total Preferred (Route 1+ Sections 1A+1B+1C)*	**17.49**	$41,580,959	$5,031,000	$46,611,959	$2,665,063
ALTERNATIVE SECTIONS					
Section 2A	1.83	$4,350,666	$526,400	$4,877,066	$2,665,063
Section 2B	1.5	$3,566,120	$431,475	$3,997,595	$2,665,063
Section 2C	2.48	$5,895,985	$713,372	$6,609,357	$2,665,063
COMBINED ROUTES					
1+1A+1B+1C*	17.49	$41,580,959	$5,031,000	$46,611,959	$2,665,063
1+2A+1B+1C	17.74	$42,175,312	$5,102,913	$47,278,225	$2,665,063
1+2A+2B+1C	18.16	$43,173,826	$5,223,726	$48,397,551	$2,665,063
1+2A+2B+2C	19.2	$45,646,336	$5,522,882	$51,169,217	$2,665,063

ALTERNATIVE ROUTE	LENGTH (MILES)	CONST COSTS	ROW COSTS	TOTAL COST	$ per mile
1+1A+2B+1C	17.91	$42,579,472	$5,151,813	$47,731,285	$2,665,063
1+1A+2B+2C	18.95	$44,053,469	$5,330,156	$49,383,625	$2,665,063
1+1A+1B+2C	18.53	$41,580,959	$5,031,000	$46,611,959	$2,665,063
1+2A+1B+2C	18.78	$44,647,822	$5,402,069	$50,049,891	$2,665,063
MAXIMUM	19.2	$ 45,646,336	$ 5,522,882	$ 51,169,217	$ 2,665,063
MINIMUM	17.49	$ 41,580,959	$ 5,031,000	$ 46,611,959	$ 2,665,063
Switchyard	-	$9,779,995	$2,638,210	$12,418,205	-

*Preferred route

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 following Preferred Route and additional alternative routes in the application were selected based on the results of a Siting Study, which was conducted in coordination with stakeholders and the public. Please see Exhibit B-1 for the Final Rio Rico to Harshaw 138 kV Transmission Line Project Siting Study.

Description of Switchyard Location

The proposed switchyard is located on a private parcel that UNSE will purchase from the current landowner. The parcel is located between I-19 and the Santa Cruz River, on vacant land adjacent to Potrero Creek and west of the intersection of Vereda Ortiz and Calle Hernandez. The switchyard will be situated on approximately three acres, but may require a larger site due to expected grading needs.

Description of Preferred Route

UNSE's Preferred Route is Route 1 plus Alternative Sections 1A, 1B and 1C.

Route 1 is common to all the alternatives. It originates at the switchyard, follows the parcel upslope of Potrero Creek to the Santa Cruz River, where it will completely span the river. The alignment turns southeast and continues between the Santa Cruz River and Pendleton Drive for approximately 2.8 miles. The route turns east at Sonoita Creek Ranch Road, opposite the Santa Cruz County Calabasas Park. The route continues due east along

parcel boundaries for approximately 3 miles, where it meets the junction of Sections 1A and 2A.

Section 1A turns northeast for approximately one mile, following an existing Kinder Morgan natural gas pipeline and dirt access road, then turning northeast 0.6 miles to meet the junction of Route 1 and Section 2A. Route 1 then continues northeast through a low-lying side canyon, to State Route 82 where it meets the junction of Sections 1B and 2B. Section 1B parallels State Route 82 for approximately 1 mile before the junction with Section 2B and Route 1.

Route 1 continues along State Route 82 for another mile and then turns to the east-northeast onto USFS land, where it follows the same Kinder Morgan natural gas pipeline easement paralleled in Section 1A. The preferred alignment departs from the gas pipeline easement at the junction of Sections 1C and 2C. Section 1C continues easterly and southeasterly on USFS land, for 1.44 miles through the geographic Flux Canyon to the eastern junction with Section 2C on Flux Canyon Road.

Route 1 continues from this junction southeast, roughly along the corridor of the existing UNSE 13.2 kV distribution line and parallel to Flux Canyon Road, to its termination at the planned Harshaw Substation.

Additional Alternative Routes:

Three sections of the Preferred Route have alternative alignments.

Section 2A proceeds easterly for 1 mile along parcel boundaries, then turns almost due north to follow a branch to Cumero Canyon containing a two-track road and an ephemeral wash, before joining again with Route 1.

Section 2B turns due east from State Route 82, for approximately 0.6 miles along parcel boundaries, to the USFS boundary, then turns due north for 0.8 miles along the boundary between USFS and private land, and joins Route 1 at State Route 82.

Section 2C turns due north from Route 1 at its northernmost point, and continues to parallel the Kinder Morgan natural gas pipeline easement for 0.25 miles, then turns due east for 0.3 miles along parcel boundaries, and then north for 0.3 miles where it meets Flux Canyon Road. It follows Flux Canyon Road for 0.15 miles, then continues along Acorn Drive for 0.15 miles, before turning south. It continues south and southeast for 0.3 miles until meeting Flux Canyon Road, where it roughly follows the road and the existing 13.2 kV distribution line to the southeast for 1 mile before meeting the junction of Section 1C and Route 1.

Reasons Alternative Routes 1, 1A, 1B and 1C are Preferred

UNSE selected **Route 1, and Sections 1A, 1B, and 1C** because that route best balances public comments and concerns, and preservation of all resources.

Alternative Section 1A was selected over Alternative Section 2A because:
Section 1A parallels an existing natural gas pipeline (linear corridor), whereas Section 2A would create a new linear utility corridor and create new disturbance over undisturbed land.
Alternative Section 1B was selected over Alternative Section 2B because:
Section 1B follows an existing roadway corridor (linear infrastructure) and avoids creating new disturbance over undisturbed land.

Alternative Section 1C was selected over Alternative Section 2C because:
Section 2C sites the line in proximity to and through a low-density residential area. Section 2C is the proposed alignment included originally in UNSE's SF-299 application to the USFS for a special use permit to construct and maintain the line on the CNF. However, following several rounds of public and stakeholder outreach, UNSE received considerable feedback in opposition to this route and a desire to explore an option through Flux Canyon that avoided the residential area. As a result, it was decided to pursue Section 1C, an alternative alignment that would lessen the impact to the public and the landowners, minimize impact to the environment, and remain constructable.

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

Land ownership percentages are shown in Table 5.

Table 5. Land Ownership Percentages*

ALTERNATIVE ROUTE	ACRES	Santa Cruz County	PRIVATE	ADOT	USFS**	Total
Route 1 (common to all)	162.93	100%	56%	0%	44%	100.00%
1A	19.29	100%	100%	0%	0%	100.00%
1B	13.32	100%	100%	0%	0%	100.00%
1C	17.59	100%	0%	0%	100%	100.00%
2A	22.3	100%	100%	0%	0%	100.00%
2B	18.37	100%	100%	0%	0%	100.00%
2C	30.2	100%	60%	0%	40%	100.00%

*Percent ownership based on total length of alternative route and the 100-foot-wide ROW.
**US Forest Service

5. *List the areas of jurisdiction [as defined in A.R.S. § 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 of such areas of jurisdiction.*

All portions of the Project are within the jurisdiction of Santa Cruz County. All the alternative routes are compatible with local land use plans and zoning.

6. *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.*

UNSE has conducted geographical reviews and environmental studies, including field studies and impact assessments, to support this application. Information and reports on these study efforts are contained in the following exhibits:

Exhibit A	Location and Land Use Maps
Exhibit B	Environmental Report
Exhibit C	Areas of Biological Wealth
Exhibit D	Biological Resources
Exhibit E	Scenic Areas, Historic Sites and Structures, and Archaeological Sites
Exhibit F	Recreational Purposes and Aspects
Exhibit G	Concepts of Proposed Facilities
Exhibit H	Existing Plans
Exhibit I	Anticipated Noise and Interference with Communication Signals
Exhibit J	Special Factors (Includes Public Involvement)

EXHIBIT A

This page intentionally left blank

EXHIBIT A: **LOCATION AND LAND USE MAPS**

1. *Where commercially available, a topographic map, 1:250,000 scale, showing the proposed plant site and the adjacent area within 20 miles thereof. If application is made for alternative plant sites, all sites may be shown on the same map, if practicable, designated by applicant's order of preference.*

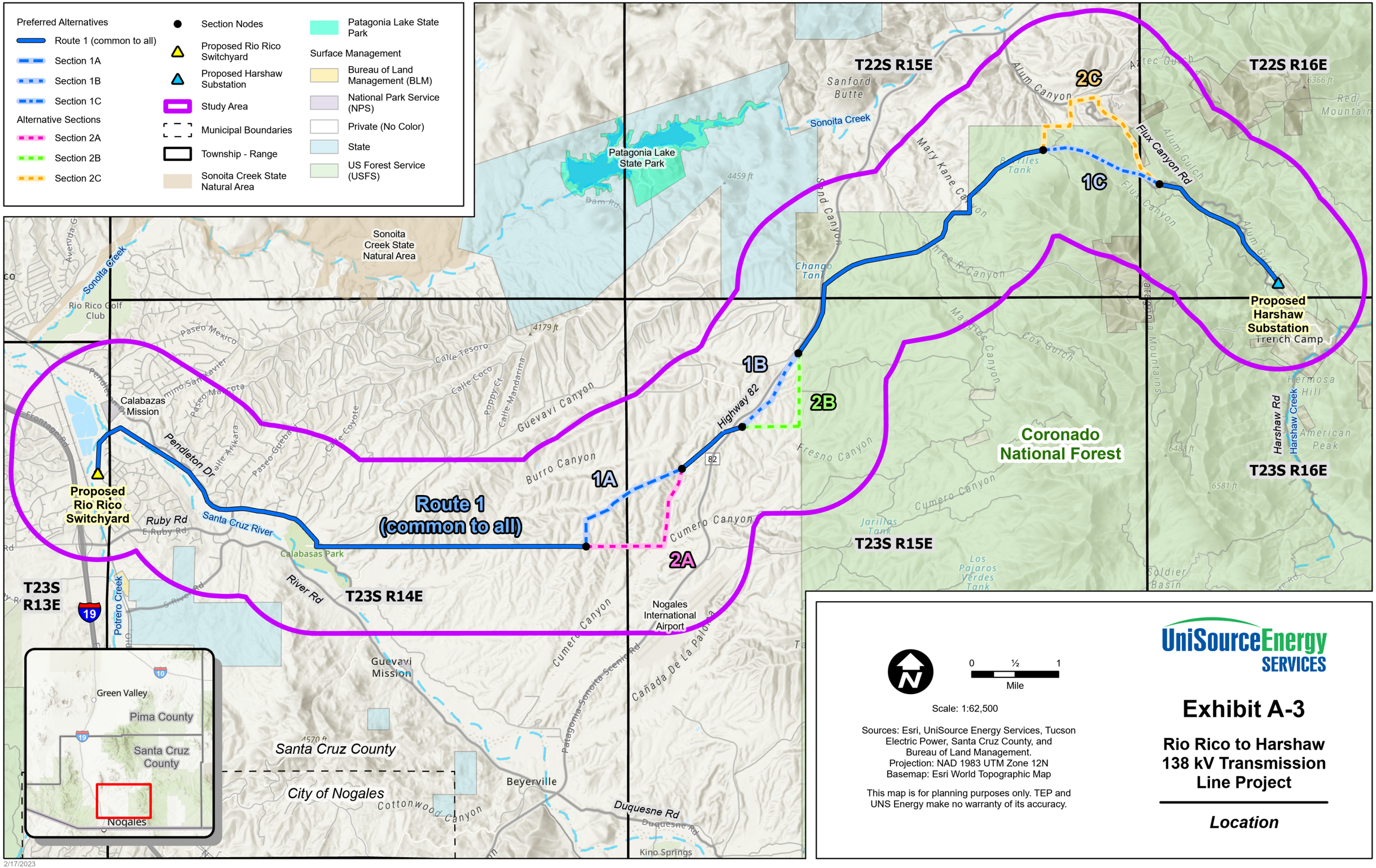
2. *Where commercially available, a topographic map, 1:62,500 scale, or each proposed plant site, showing the area within two miles thereof. The general land use plan within this area shall be shown on the map, which shall also show the areas of jurisdiction affected and any boundaries between such areas of jurisdiction. If the general land use plan is uniform throughout the area depicted, it may be described in the legend in lieu of an overlay.*

3. *Where commercially available, a topographic map, 1:250,000 scale, showing any proposed transmission line route of more than 50 miles in length and the adjacent area. For routes of less than 50 miles in length, use a scale of 1:62,500. If application is made for alternative transmission line routes, all routes may be shown on the same map, if practicable, designated by applicant's order of preference.*

4. *Where commercially available, a topographic map, 1:62,500 scale, of each proposed transmission line route of more than 50 miles in length showing that portion of the route within two miles of any subdivided area. The general land use plan within the area shall be shown on a 1:62,500 map required for Exhibit A-3, and for the map required by this Exhibit A-4, which shall also show the areas of jurisdiction affected and any boundaries between such areas of jurisdiction. If the general land use plan is uniform throughout the area depicted, it may be described in the legend in lieu of on an overlay.*

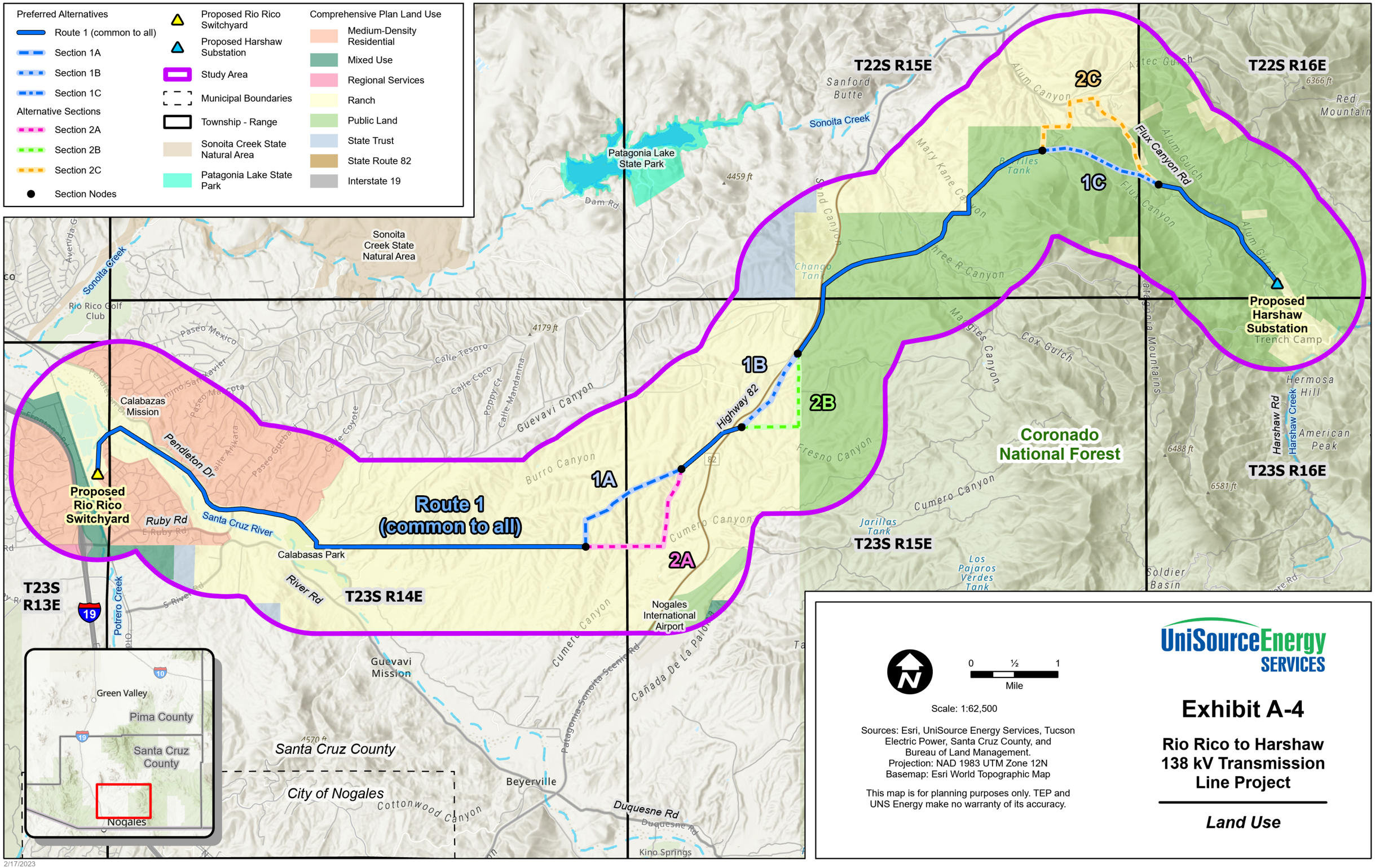
EXHIBIT	**CONTENTS**
A-1	n/a
A-2	n/a
A-3	138 kV Transmission Line and Substation Project – Location
A-4	138 kV Transmission Line and Substation Project – Land Use

This page intentionally left blank



Preferred Alternatives
Route 1 (common to all)
Section 1A
Section 1B
Section 1C
Alternative Sections
Section 2A
Section 2B
Section 2C
Section Nodes
Proposed Rio Rico Switchyard
Proposed Harshaw Substation
Study Area
Municipal Boundaries
Township - Range
Sonoita Creek State Natural Area
Patagonia Lake State Park
Surface Management
Bureau of Land Management (BLM)
National Park Service (NPS)
Private (No Color)
State
US Forest Service (USFS)
T22S R15E
T22S R16E
T23S R16E
T23S R15E
T23S R14E
T23S R13E
Sanford Butte
Sonoita Creek
Patagonia Lake State Park
Sonoita Creek State Natural Area
Rio Rico Golf Club
Calabazas Mission
Proposed Rio Rico Switchyard
Ruby Rd
Santa Cruz River
Calabasas Park
River Rd
Potrero Creek
Guevavi Mission
Santa Cruz County
City of Nogales
Beyerville
Nogales International Airport
Coronado National Forest
Proposed Harshaw Substation
Trench Camp
Harshaw Rd
Harshaw Creek
Flux Canyon Rd
Alum Canyon
Mary Kane Canyon
Sand Canyon
Chango Tank
Guevavi Canyon
Burro Canyon
Cumero Canyon
Fresno Canyon
Highway 82
Cox Gulch
Jarillas Tank
Los Pajaros Verdes Tank
Cañada De La Paloma
Duquesne Rd
Kino Springs
Green Valley
Pima County
Santa Cruz County
Nogales
Route 1 (common to all)
1A
1B
1C
2A
2B
2C
0 ½ 1
Mile
Scale: 1:62,500
Sources: Esri, UniSource Energy Services, Tucson Electric Power, Santa Cruz County, and Bureau of Land Management.
Projection: NAD 1983 UTM Zone 12N
Basemap: Esri World Topographic Map
This map is for planning purposes only. TEP and UNS Energy make no warranty of its accuracy.
UniSourceEnergy SERVICES
Exhibit A-3
Rio Rico to Harshaw 138 kV Transmission Line Project
Location
2/17/2023

This page intentionally left blank


Preferred Alternatives
Route 1 (common to all)
Section 1A
Section 1B
Section 1C
Alternative Sections
Section 2A
Section 2B
Section 2C
Section Nodes
Proposed Rio Rico Switchyard
Proposed Harshaw Substation
Study Area
Municipal Boundaries
Township - Range
Sonoita Creek State Natural Area
Patagonia Lake State Park
Comprehensive Plan Land Use
Medium-Density Residential
Mixed Use
Regional Services
Ranch
Public Land
State Trust
State Route 82
Interstate 19
T22S R15E
T22S R16E
T23S R13E
T23S R14E
T23S R15E
T23S R16E
Sonoita Creek
Patagonia Lake State Park
Sonoita Creek State Natural Area
Sanford Butte
Rio Rico Golf Club
Calabazas Mission
Proposed Rio Rico Switchyard
Pendleton Dr
Ruby Rd
Santa Cruz River
Calabasas Park
River Rd
Potrero Creek
Guevavi Mission
Nogales International Airport
Highway 82
Route 1 (common to all)
1A
1B
1C
2A
2B
2C
Coronado National Forest
Proposed Harshaw Substation
Trench Camp
Flux Canyon Rd
Harshaw Rd
Harshaw Creek
Hermosa Hill
American Peak
Red Mountain
Santa Cruz County
City of Nogales
Beyerville
Duquesne Rd
Kino Springs
Green Valley
Pima County
Santa Cruz County
Nogales
0 ½ 1
Mile
Scale: 1:62,500
Sources: Esri, UniSource Energy Services, Tucson Electric Power, Santa Cruz County, and Bureau of Land Management.
Projection: NAD 1983 UTM Zone 12N
Basemap: Esri World Topographic Map
This map is for planning purposes only. TEP and UNS Energy make no warranty of its accuracy.
UniSourceEnergy SERVICES
Exhibit A-4
Rio Rico to Harshaw 138 kV Transmission Line Project
Land Use
2/17/2023

This page intentionally left blank

EXHIBIT B

This page intentionally left blank

EXHIBIT B: **ENVIRONMENTAL REPORT**

As stated in Arizona Administrative Code R14-3-219 of the Rules of Practice and Procedure Before Power Plant and Transmission Line Siting Committee, Exhibits to Application, Exhibit B:

"Attach any environmental studies which applicant has made or obtained in connection with the proposed site(s) or route(s). If an environmental report has been prepared for any federal agency or if a federal agency has prepared an environmental statement pursuant to Section 102 of the National Environmental Policy Act, a copy shall be included as a part of this exhibit."

B.1 Introduction B-1
B.2 Environmental Planning Process B-2
B.3 Environmental Statements B-2

B.1 **Introduction**

The Project will consist of building a new 138 kV transmission line approximately 20 miles in length, depending on the alternative approved, to connect the planned Rio Rico Switchyard to the planned Harshaw Substation. The Project will interconnect the existing 138 kV transmission line to the planned Substation. The Project will cross private and USFS owned land, as well as Santa Cruz County Road and ADOT ROW. One preferred route alternative has been identified, resulting from line siting studies, analysis, and a public participation process that began in 2020, with three 1.5- to 2.5-mile alternative routing options in areas of elevated community sensitivity. The proposed alternative routes are identified as Preferred Route 1, and Alternative Routes 1A, 1B, and 1C, and are described in Section B.1-4 of the application. The new line will be built of self-weathering steel monopoles ranging from 60 to 120 feet above ground, with the taller structures required for site specific clearance issues.

Starting in 2020, UNSE conducted a study to identify preliminary links and later alternative routes to interconnect the existing 138 kV transmission line with the planned Harshaw Substation (see Siting Study in Exhibit B-1). The Siting Study is the foundation of detailed studies about the Project environment. All information about the analysis conducted is located in the Siting Study itself. Additional Project studies address a number of components such as biological resources, the built environment, cultural resources, visual resources, etc.

Study results are reported in exhibits as follows:

- Areas of biological wealth are addressed in Exhibit C
- Biological Resources are addressed in Exhibit D
- Scenic areas, historic sites and structures, and archaeological sites are addressed in Exhibit E
- Recreational purposes and aspects are addressed in Exhibit F
- Concepts of proposed facilities and Visual Simulations/Analysis are included in Exhibit G
- Existing Plans are presented in Exhibit H
- Anticipated noise and interference with communication signals is included in Exhibit I
- Special Factors are addressed in Exhibit J

B.2 **Environmental Planning Process**

The result of the processes outlined in the Siting Study is the preferred and alternative routes carried forward in this application (Exhibit B-2).

B.3 **Environmental Statements**

This project requires Special Use Permit authorization by the USFS, a federal agency, for the segment on USFS land. As a result of the Special Use Permit approval process, studies pursuant to Section 102 of the National Environmental Policy Act (NEPA) are applicable. The USFS will conduct an environmental review under NEPA. As of this date, CNF has not started its NEPA review of the Project. UNSE has requested issuance of the Special Use Permit by Q4 2023.

Application for a Certificate of Environmental Compatibility

Rio Rico to Harshaw

138 Kilovolt Transmission Line Project

Exhibit B-1

This page intentionally left blank

Rio Rico to Harshaw

138 kilovolt Transmission Line Project

Siting Study

UNS Electric, Inc.
February 2023

This page intentionally left blank

This page intentionally left blank

Table of Contents

1.0 Introduction 1
2.0 Objective and Methodology 1
3.0 Phase 1: Pre-Analysis 3
3.1 Study Area 3
3.2 Criteria 5
3.3 Opportunities/Constraints 6
3.4 Outreach 8
3.4.1 Public Open House #1 – September 24, 2020 8
3.4.2 Public Open House #2 – May 13, 2021 8
3.4.3 Public Open House #3 – August 25, 2022 9
3.4.4 Stakeholder Meeting #1 – August 18, 2022 11
3.5 Field Visits 11
3.6 Preliminary Links 12
4.0 Phase 2: Data Inventory 16
5.0 Phase 3: Suitability Assessment 17
5.1 Suitability Assessment 17
5.1.1 Suitability Assessment Procedure 17
5.2 Refined Links 32
5.3 Outreach 34
5.3.1 Public Open House #4 – November 17, 2022 34
5.3.2 Stakeholder Meeting #2 – November 15, 2022 36
6.0 Phase 4: Compatibility Analysis 37
7.0 Phase 5: Concept Evaluation 38
7.1 Outreach 38
7.1.1 Public Open House #5 – January 25, 2023 38
7.1.2 Stakeholder Meeting #3 – January 24, 2023 39
7.2 Final Alternative Routes to Include in CEC Application 40

LIST OF FIGURES

Figure 1. Siting Process 2
Figure 2. Preliminary Study Area 4
Figure 3. Preliminary links and revised study area presented in May 2021 5
Figure 4. Siting Opportunities 6
Figure 5. Siting Constraints 7
Figure 6. Preliminary links presented in August 2022 10
Figure 7. Entrance to Calabasas Park 12
Figure 8. Existing Kinder Morgan natural gas pipeline near Flux Canyon 12
Figure 9. Suitability Criteria and Model Legend 18
Figure 10. Criteria 1 – Existing Plans 19
Figure 11. Criteria 2 – Biological Resources 20
Figure 12. Criteria 3 – Noise & Communication 21
Figure 13. Criteria 4 – Scenic and Cultural Resources 23
Figure 14. Criteria 5 – Total Environment 25
Figure 15. Criteria 6 – Construction & Maintenance 26
Figure 16. Criteria 7 – Outreach 27
Figure 17. Criteria models are weighted differently based on targeted model objectives and added together to create composite suitability models 28
Figure 18. Balanced Model 29
Figure 19. Environmental Preferred Model 30
Figure 20. Public/Stakeholder Preferred Model 31
Figure 21. Construction & Maintenance Preferred Model 32
Figure 22. Revised links presented in November 2022 36
Figure 23. Final route alternatives presented in January 2023 39
Figure 24. Harshaw Road, just south of the Hermosa Project 40
Figure 25. Harshaw Road, south of the Hermosa Project 41
Figure 26. Duquesne Road, west of intersection with Harshaw Road 42

LIST OF TABLES

Table 1. Phase 1 Links Eliminated 13
Table 2. Phase 3 Links Eliminated 33

APPENDICES

A COMPATIBILITY ANALYSIS

B USFS LETTER

C SUITABILITY ASSESSMENT – POTENTIAL DUQUESNE/HARSHAW ROAD ROUTE

D COMPATIBILITY ANALYSIS – POTENTIAL DUQUESNE/HARSHAW ROAD ROUTE

E CONSERVATION EASEMENT CORRESPONDENCE

F FEDERAL AVIATION ADMINISTRATION NOTICE OF PRELIMINARY FINDINGS

1.0 Introduction

UNS Electric, Inc. (UNSE) a subsidiary of UniSource Energy Services, is developing plans for a new, single circuit, 138 kV transmission line totaling 20 to 30 miles in length, depending on the alternative approved, to connect the existing UNSE 138 kV system to the planned Harshaw Substation through a planned 138 kV switchyard in Rio Rico.

The Project will potentially cross land under private, Santa Cruz County, United States Forest Service (USFS), and Arizona State Land (ASLD) ownership, as well as Arizona Department of Transportation (ADOT) road right-of-way (ROW). UNSE plans to obtain ROW and easements up to 100-feet wide.

The line will serve the Hermosa Project, a mine exploration project owned by Arizona Minerals Inc. (AMI), a subsidiary of South32. The line also will improve reliability for electric customers in the area, including those in Flux Canyon, San Rafael Valley, Washington Camp and Lochiel areas. UNSE's existing 13.2 kV distribution line is not adequate to support the areas's future energy needs, including the Hermosa Project's anticipated requirements.

The Rio Rico to Harshaw 138-Kilovolt (kV) Transmission Line (the Project) will connect the existing Rio Rico Substation by tying in to the existing 138kV transmission line at a planned 138kV switchyard, and then connecting to the planned Harshaw Substation.

UNSE uses a siting methodology heavily influenced by public and stakeholder input, as well as those factors outlined by statute (A.R.S. 40-360.06) to be considered by the Arizona Power Plant and Line Siting Committee in issuing a Certificate of Environmental Compatibility (CEC) to identify potential transmission line routes. This Siting Study summarizes the processes, decisions, and results of each phase of that siting methodology.

2.0 Objective and Methodology

The final objective of this study is to identify alternative route corridors, including a preferred route, to connect the planned Harshaw Substation to the existing 138kV transmission system via a planned switchyard. These substations and the planned switchyard represent the fixed endpoints for the Project. The Harshaw Substation would be a UNSE substation designed to distribute power to customers in the area.

The methodology for siting the alternative routes includes five basic phases. These phases should be viewed as a cycle of processes which promote feedback between each other (see Figure 1).

UNSE's design philosophy, which is also considered, includes these guidelines:

- Design routes that will utilize linear features, including existing road ROWs and utility corridors, in an effort to minimize disturbance to surrounding areas.
- Move underground or retire existing distribution facilities where the proposed line is in the same alignment as existing infrastructure.
- Work with neighbors and other stakeholders to identify concerns and develop alternatives that are in the best interest of the community.

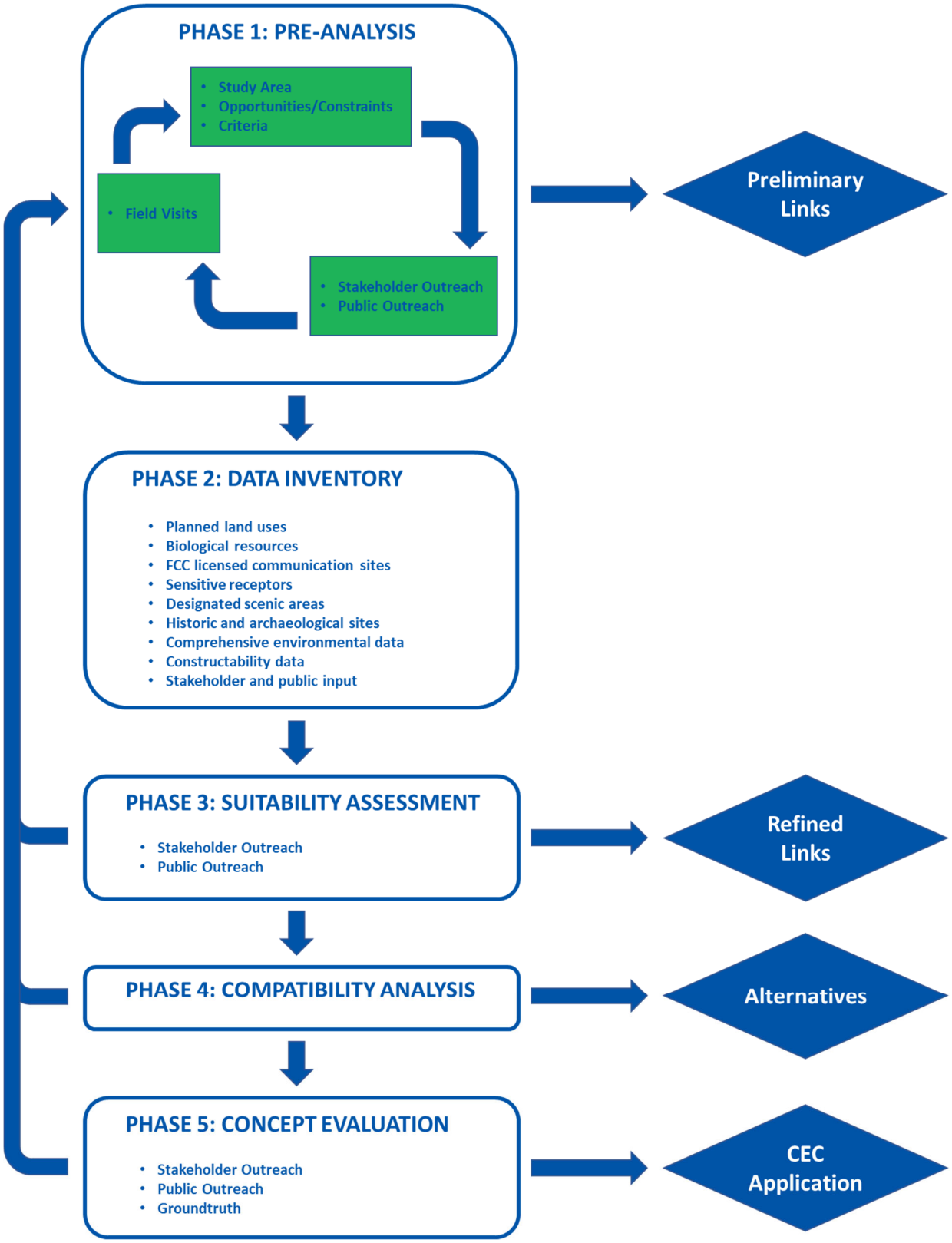


Figure 1. Siting Process

The methodology is consistent with the relevant regulatory framework and decision process, which for this study was the Arizona Corporation Commission (ACC) CEC requirements. The methodology identified a set of possible transmission line corridor alternatives within which the project could be routed. The results of this assessment were used to select route corridors that would be carried forward to the ACC CEC application.

3.0 Phase 1: Pre-Analysis

3.1 *Study Area*

The first step in the pre-analysis phase was to define the study area. UNSE took into consideration the following factors in the development of the Preliminary Study Area:

- The fixed end points of the Project at the planned locations of the Harshaw Substation and the planned switchyard.
- The interconnection with the existing 138kV transmission line.
- A desire for the most direct routes in order to reduce the overall cost of the Project.
- UNSE's design principle to first use established linear features (infrastructure corridors) that meet the Project objectives.

In the Project area, there are a variety of existing linear features (infrastructure corridors) in which a transmission line could be co-located. These existing infrastructure corridors include Santa Cruz County streets, USFS roads, ADOT highway corridors, Kinder Morgan gas pipeline, as well as the existing UNSE 138kV transmission line and 13.2kV distribution corridors.

Utilizing these factors, UNSE developed the Preliminary Study Area (Figure 2), which was presented to the stakeholders and the public at the virtual public open house meetings on September 24, 2020.

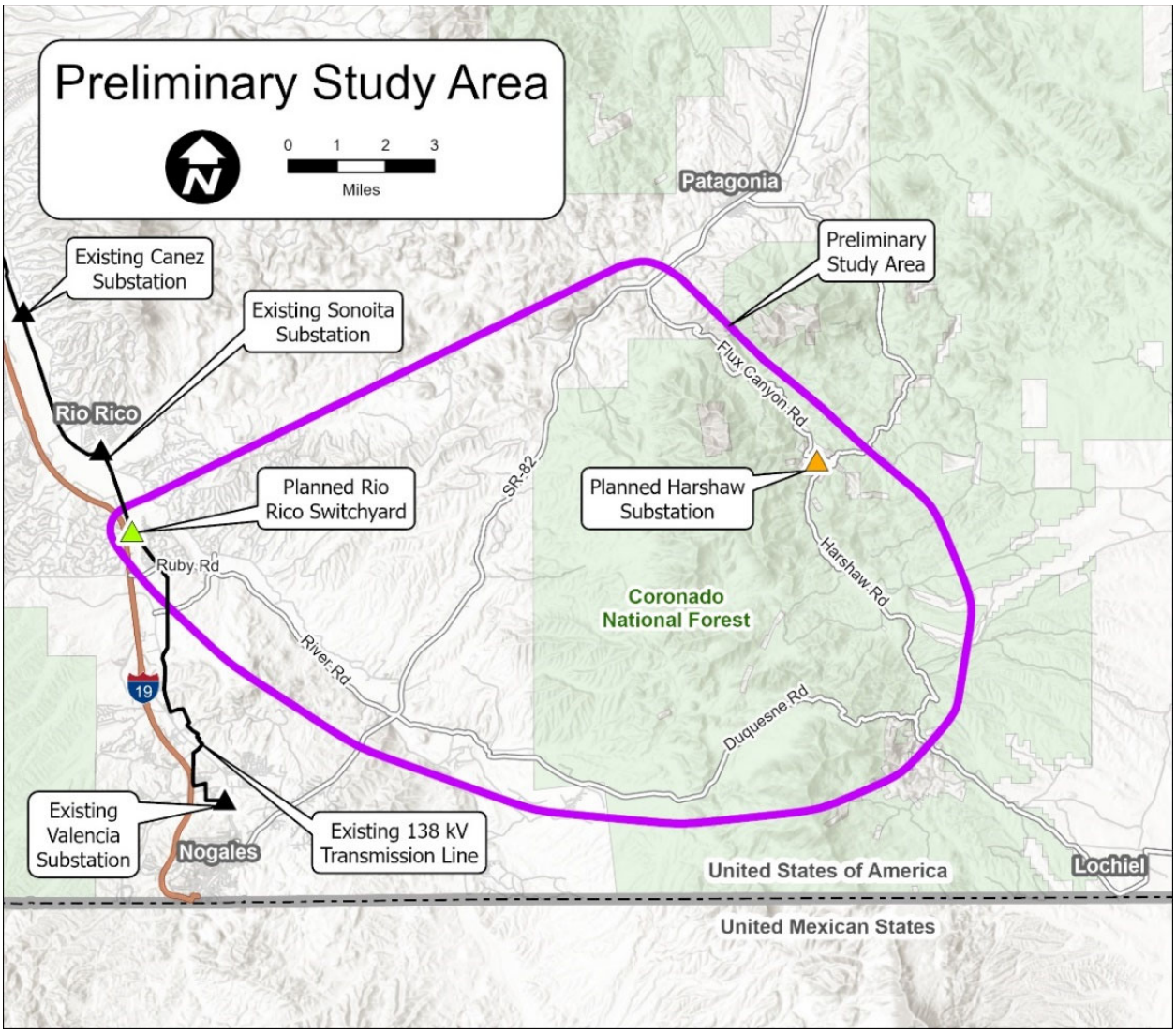


Figure 2. Preliminary Study Area

The study area was revised following the first public meeting to include an additional potential switchyard location in Nogales. The revised study area and preliminary links were provided to the public and stakeholders for review and comment at the virtual public open house on May 13, 2021 (Figure 3).

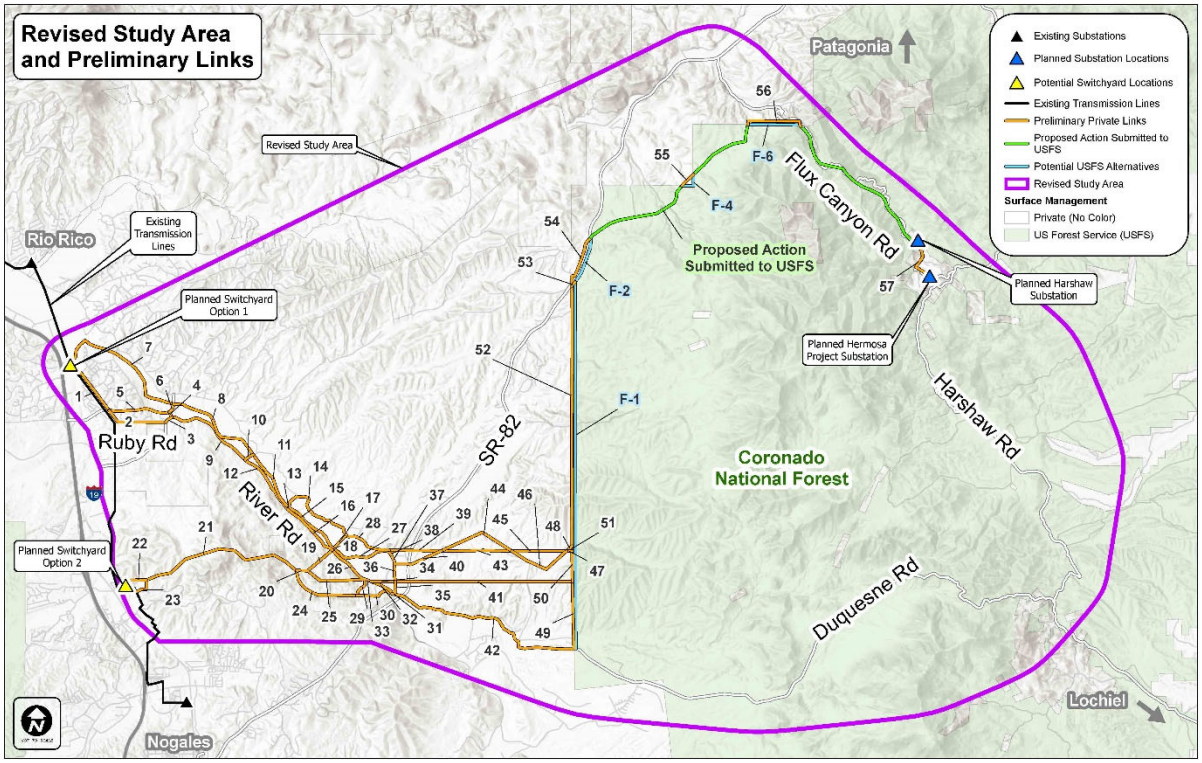


Figure 3. Preliminary links and revised study area presented in May 2021

3.2 *Criteria*

The second step was to define the criteria to consider during the analysis. UNSE identified 13 criteria to be used during the evaluation process. The criteria are aligned to the ACC CEC decision factors (Arizona Revised Statute § 40-360.06) and UNSE's design philosophy and standards and include the following:

1. Presence/ absence of an existing corridor and ability to use.
2. Existing and planned land use that is compatible with use as a transmission line corridor.
3. Residential use adjacent to the corridor, as measured by distance to existing residences and planned future development.
4. Listed historic properties and districts adjacent to the corridor, as measured by distance to existing listed historic properties.
5. Presence/absence of Sensitive Receptors as measured by distance to existing Sensitive Receptors and distance from corridor.
6. Room for separation from existing utilities in the corridor as measured by existing and planned utilities and ranked by degree of mitigation required (including FAA obstruction)
7. Viewshed associated with the corridor as measured by number of people viewing and type of viewing experience (i.e., commuter, recreationist, resident).
8. Known or potentially eligible cultural resources in the corridor as measured by documentation through previous survey effort and ranked by degree of mitigation required.
9. Special status species and/or habitat as measured by the presence/ absence of potentially suitable habitat, including five general biological resource areas: special status species, water resources, wildlife linkages, riparian habitat, and native plants.

10. 100-Year floodplain as measured by location and engineering design.
11. Presence/absence of extreme terrain that may impact construction and maintenance.
12. Ability to construct and maintain the transmission line.
13. Cost of construction.

3.3 *Opportunities/Constraints*

The third step was to identify opportunities to site a transmission line and constraints to site a transmission line within the study area. Opportunities generally include established linear features, such as roadways or other utilities. Constraints can be a number of factors such as less compatible land uses, land use regulations, terrain, or environmental sensitivities. One specific constraint, including a conservation easement on the Circle Z Ranch, prohibits new utility easements. See Appendix E for correspondence.

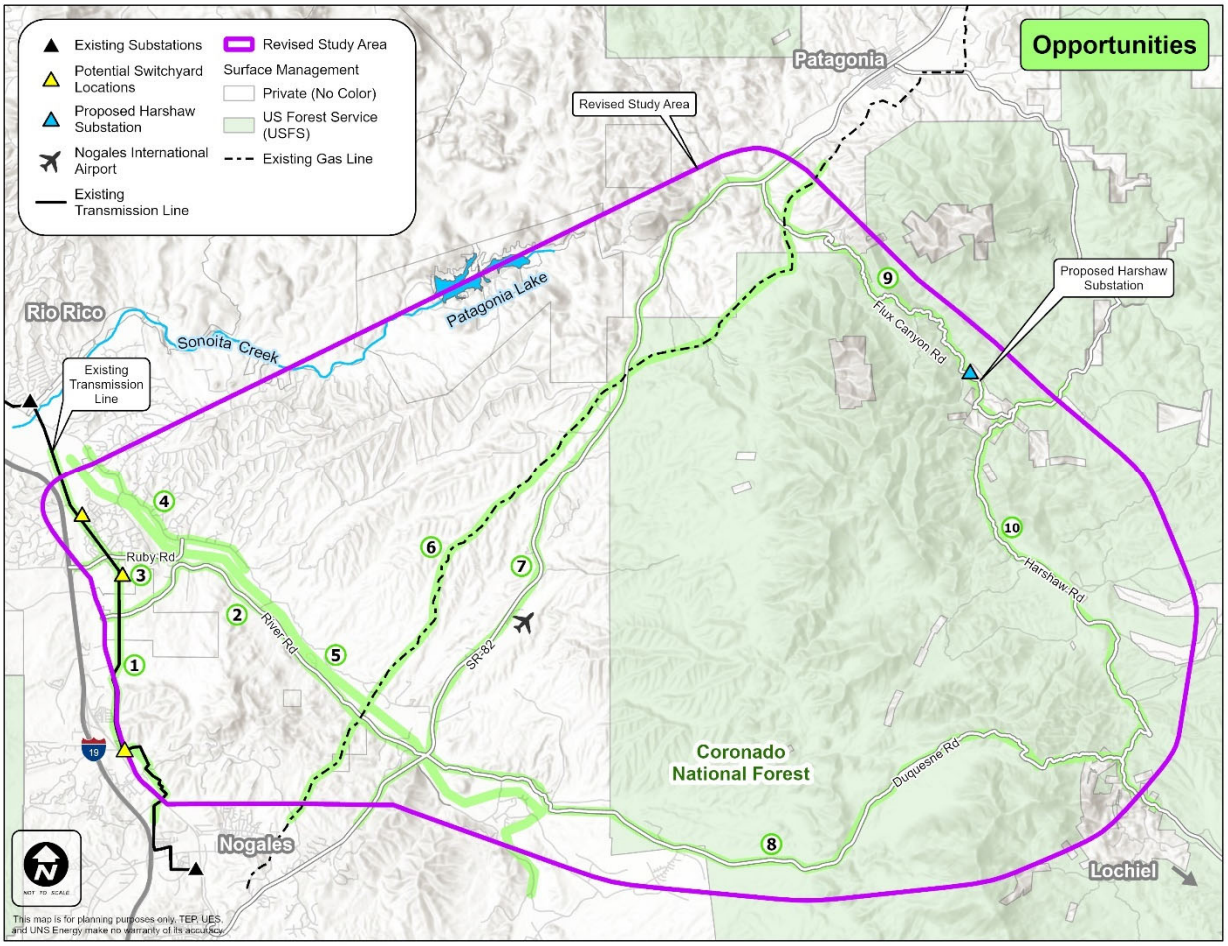


Figure 4. Siting Opportunities

1. Existing UNS Electric 138kV transmission line right-of-way/alignment
2. River Road right-of-way/alignment
3. Ruby Road right-of-way/alignment
4. Pendleton Road right-of-way/alignment
5. Santa Cruz River floodplain

6. Kinder Morgan gas pipeline/alignment
7. State Route 82/alignment
8. Duquesne Road right-of-way/alignment
9. Flux Canyon Road/13.2kV distribution line right-of-way/alignment
10. Harshaw Road right-of-way/alignment

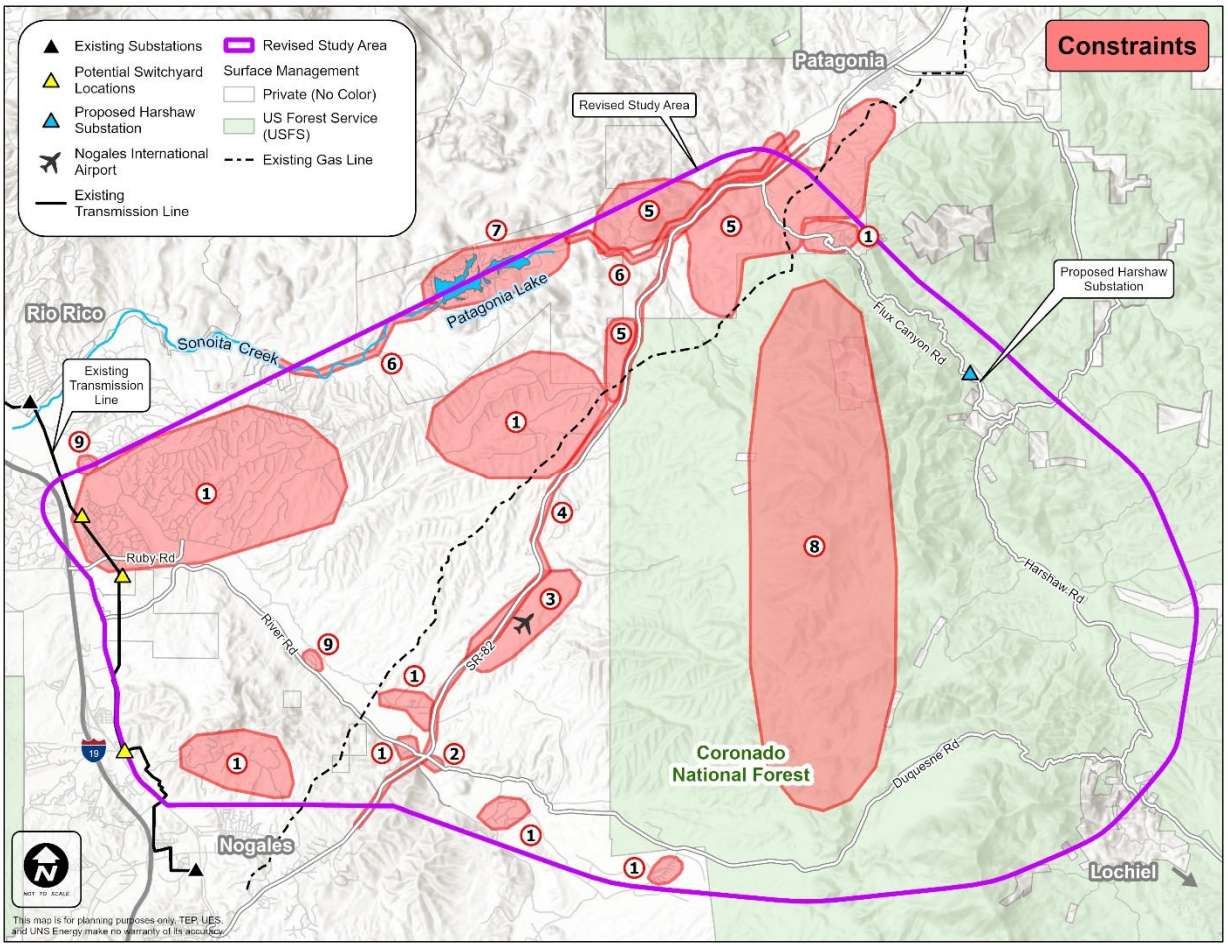


Figure 5. Siting Constraints

1. Residential areas
2. School
3. Nogales International Airport
4. State Route 82 Scenic Highway
5. Conservation easements
6. Sonoita Creek State Natural Area
7. Patagonia Lake State Park
8. Patagonia Mountains
9. Tumacácori National Historic Park

3.4 *Outreach*

Development of: 1) the study area, 2) siting criteria, and 3) opportunities and constraints was an iterative process which occurred both by the internal UNSE project team and as a result of public and stakeholder input. Three public open houses and one stakeholder meeting were held at this stage of the project.

3.4.1 Public Open House #1 – September 24, 2020

This meeting was held virtually and was the first public notice of the planned project. The objective of this first meeting was to introduce interested potentially affected parties in the area and interested members of the community to: 1) the project and details of the project, 2) the purpose and need for the project, 3) the proposed project study area (see Figure 2) within which the transmission line would be sited, and 4) the process UNSE would follow. UNSE solicited feedback on opportunities and constraints for siting a transmission line within the study area.

A number of comments were received either at the meeting or by written comment, expressing both concerns due to the project, as well as knowledge of the area, generally summarized as:

- Impact on wildlife and plants, especially threatened and endangered species
- Impact on unique habitat and riparian areas
- Impact on recreation, specifically hunting, hiking, and horseback riding
- Impact on water, both surface and sub surface water resources including the aquifer
- General impact on the environment
- Impact on scenic areas and the character of the landscape
- Impact on property values
- Impact on the cultural history and values of the area
- Impact on tourism
- Health concerns due to the transmission line
- Potential for wildfires igniting as a result of the transmission line
- A desire to respect the local community
- The Circle Z Ranch has been placed into a conservation easement restricting its use
- Any potential increase in traffic
- Project costs and who is paying for it
- Desire for the transmission line to be constructed underground both for wildfire prevention and scenic integrity
- General opposition to the Hermosa Mine and any associated work such as the planned transmission line or roads

These comments were incorporated into the siting criteria, previously listed, as well as the identification of opportunities and constraints. Additionally, all these comments were carried forward to inform further phases of project analysis.

3.4.2 Public Open House #2 – May 13, 2021

This meeting was held virtually. The objective of this meeting was to continue to engage interested parties in the area and interested members of the community in the process to identify potential transmission line routes. Key messages shared were: 1) an introduction of a revised project study area, 2) a map illustrating 63 potential line route links that had been identified within the revised study area (see Figure 3), and 3) communication that UNSE had submitted an application to the Forest Service for a route within the Forest. UNSE solicited continued feedback on opportunities and constraints for siting a transmission

line within the study area, any reason to expand the study area, and thoughts or concerns about specific line routes that had been presented.

A key item of note. Despite being noted as an opportunity, a potential route alignment parallel to Duquesne and Harshaw roads was not considered due to a letter issued by the Coronado National Forest (CNF) expressing a preference for the transmission line to utilize an existing utility path near Flux Canyon Road as the route is geographically the shortest and most direct and has an existing power line (Appendix B).

A number of comments were received either at the meeting, by written comment, or through a MetroQuest interactive survey, and are generally summarized as:

- Health concerns due to the transmission line
- Coordinate siting with planning efforts to attract industry to the area
- Impact on wildlife and plants, especially threatened and endangered species
- Importance of Patagonia Lake/Sonoita Creek area for migratory birds and identifying this as an important bird area
- Impact on unique habitat and riparian areas
- General impact on the environment
- Visual impacts
- Proximity to residential areas
- Potential for wildfires igniting as a result of the transmission line
- Impact on the Guevavi Mission Site, need for tribal consultation/outreach
- Preference to site line within an existing corridor
- Opposition to any route through the Circle Z Guest Ranch or The Nature Conservancy's preserve
- Preference for routes on east side of State Route 82
- Concern for link along Ruby Road

3.4.3 Public Open House #3 – August 25, 2022

This was a hybrid meeting, held both virtually and in-person. The objective of this meeting was to reengage interested parties in the area and interested members of the community in the process to identify potential transmission line routes.

UNSE shared a map (see Figure 6) which: 1) introduced 55 new links and showed the elimination of 51 links, and 2) introduced a new switchyard site option and showed the elimination of a switchyard site option that had previously been considered. UNSE solicited continued feedback on opportunities and constraints for siting a transmission line within the study area, and thoughts or concerns about specific preliminary links that had been presented.

A key item of note. Through the outreach process, UNSE learned of airspace conflicts with the Nogales International Airport which made a number of key links infeasible, resulting in them being eliminated from consideration and the need to further explore opportunities throughout the study area.

The virtual meeting was attended by 13 people. The in-person meeting was attended by 17 people, including a representative from the Rio Rico Fire District. A number of comments were received either at the meeting or by written comment, and are generally summarized as:

- Concern that line would obstruct scenic views
- Leave the distribution line in-service in Flux Canyon and feed it from the new substation to improve reliability, as opposed to removal

- Health concerns due to the transmission line
- Concern about impact on property values
- Concern about impacts on wildlife, specifically birds
- Effect on businesses in the area built around nature and the environment of the area
- Preference for routes away from homes
- Preference for a route that stays on Forest and avoids homes near Flux Canyon
- Opposition to any route through Lake Patagonia Ranch Estates
- Recommendation to explore a route through Soldier Basin
- Concern that UNSE and USFS have made up their mind on a route and residents have no say
- Desire for the transmission line to be constructed underground
- General opposition to the Hermosa Mine and any associated work
- Comments in opposition to Links F-6B1, F-6C, 05, 65A, 65B, 66A, 75, 76, 77, 78, 79, 80, 88, 92, 94, 95A, 98, 103, 104
- Comments in support of Links 02, 71, 74A, 88, 89A, 97A, 97B, F-2

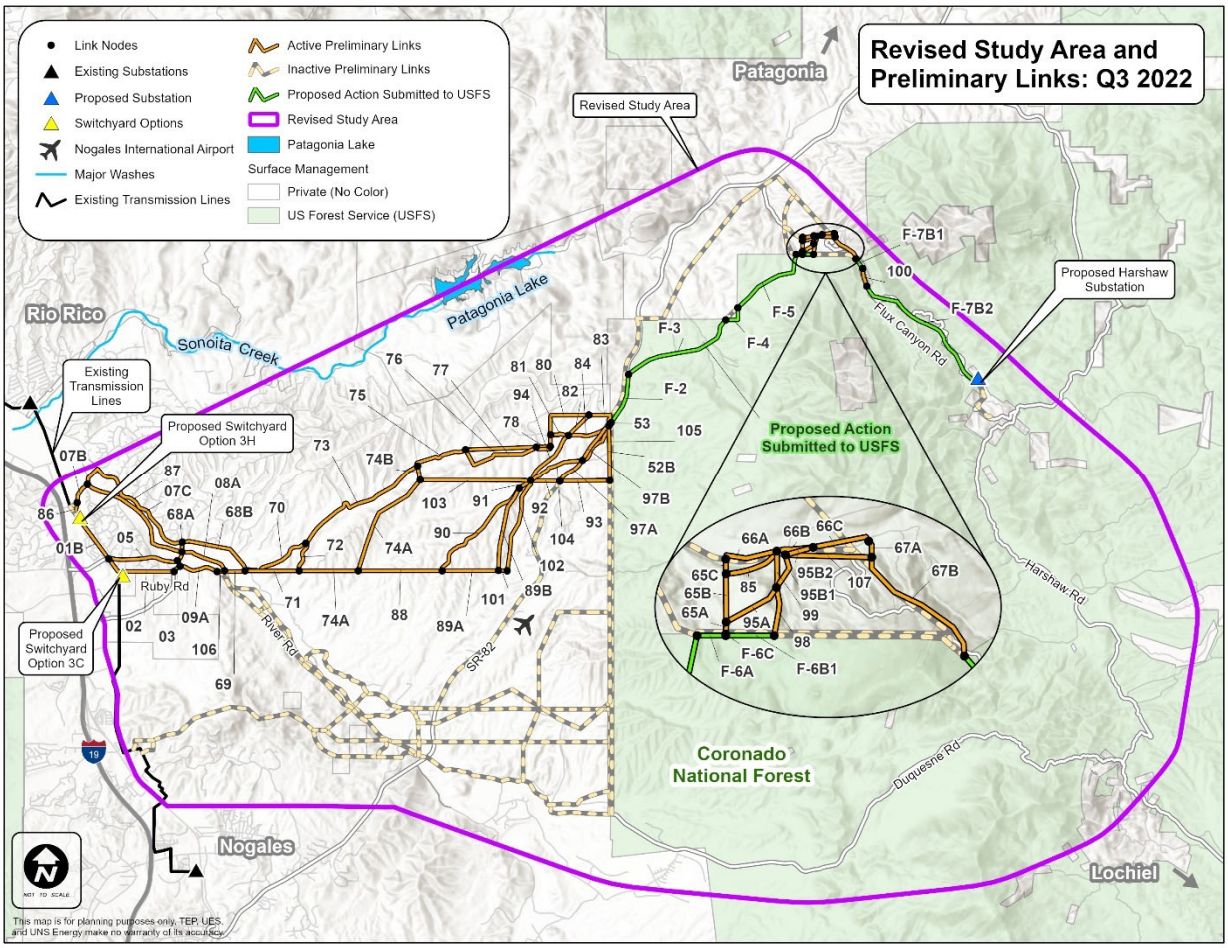


Figure 6. Preliminary links presented in August 2022

3.4.4 Stakeholder Meeting #1 – August 18, 2022

This meeting was held virtually and was the first general stakeholder meeting of the planned project. Stakeholders were comprised of state, county, and local elected officials and staff, government agencies, economic development groups, and utilities. The objective of this first meeting was to introduce stakeholders to: 1) the project and details of the project, 2) the purpose and need for the project, 3) the project study area (see Figure 6) within which the transmission line would be sited and preliminary links, and 4) the process UNSE would follow.

UNSE shared a map (see Figure 6) which: 1) introduced 55 new links and showed the elimination of 51 links, and 2) introduced a new switchyard site option and showed the elimination of a switchyard site option that had previously been considered. UNSE solicited continued feedback on opportunities and constraints for siting a transmission line within the study area, and thoughts or concerns about specific preliminary links that had been presented.

The meeting was attended by 13 people, representing 10 stakeholder groups. A number of comments were received at the meeting, and are generally summarized as:

- Project costs and who is paying for it
- Affect on existing land uses
- Consider on-site renewable energy as a solution
- Consider EV charging stations as part of the project scope
- Consider including broadband as part of the project scope

3.5 *Field Visits*

In addition to learning about the region and study area from the public and stakeholders, it was imperative that the internal UNSE project team and contractors working on this project become familiar first-hand with the study area, including the character and feel of the area, its geography, and the existing land uses in the area. Field visits occurred on a number of occasions during Phase 1 of the siting process, both as large and small groups, and by individual project team members.

Figure 7. Entrance to Calabasas Park

In addition to landscape characterization and gaining regional familiarity with the study area, a key component of the field visits included ground truthing. Through public and stakeholder engagement, as well as desktop mapping exercises, there were a number of opportunities and constraints identified, as well as potential links. Ground-truthing was required by a UNSE project team member prior to finalizing links.

Figure 8. Existing Kinder Morgan natural gas pipeline near Flux Canyon.

3.6 *Preliminary Links*

Phase 1 of the siting process is an iterative process within the larger process.

As mentioned previously, following initial outreach efforts, field visits, and research the initial study area was revised in order to accommodate perceived switchyard and transmission line opportunities further south than the original study area extended.

Additionally, following the second outreach effort, a number of links were presented. At the time, these would have been considered the "Preliminary Links", or the ultimate product of Phase 1. However, due to proximity to the Nogales International Airport it was determined that an FAA obstruction evaluation was required. Initial Obstruction Evaluation/Airport Airspace Analysis was submitted to the FAA by the UNSE project team in October of 2021. In February 2022, the FAA indicated that the overhead line, as proposed, would constitute an obstruction to navigation at the airport (see Appendix F). After the notice of potential hazard was received, UNSE retained the services of the expert firm Capital Airspace to assist in the FAA obstruction evaluation.

In response, the UNSE project team reviewed opportunities to site a transmission line that that would avoid the FAA obstruction evaluation area around the airport in accordance with known opportunities and constraints, and the line siting criteria that had been developed. And as a result, many links were eliminated from consideration and many new links were created.

A potential route through Soldier Basin in the Patagonia Mountains was identified through public outreach that might avoid the FAA obstruction evaluation area. The route was reviewed in detail, both in the field and in the office. It was ultimately never considered as a viable route link because new utility structures and power lines are not allowed under the land use designation through the CNF of "Wild Backcountry" according to the current Forest Plan.

A total of 57 links were identified as final "Preliminary Links" to connect from one of two potential switchyard locations in the Rio Rico area to the planned Harshaw Substation. These preliminary links (Figure 6) were provided to the stakeholders at a virtual meeting on August 18, 2022 and to the public for review and comment at a hybrid public open house on August 25, 2022.

As part of Phase 1, 64 links were identified, evaluated, and eliminated from consideration. These eliminated links and rationale for eliminations are summarized in Table 1.

Table 1. Phase 1 Links Eliminated

Link No.	Reason for Elimination
LO2	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
LO1	Eliminated directly as a result of FAA height restrictions.
F-1	Eliminated directly as a result of FAA height restrictions.
F-6B2	Eliminated due to extreme terrain and constructability/maintainability concerns.
F-7A	Eliminated because no longer a viable link due to elimination of Link F-6B2
01A	Eliminated because there is not sufficient space to construct a separate line within existing 138kV transmission line ROW and a double circuit line is not preferred from an operational/reliability standpoint.
08B	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
09B	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.

Link No.	Reason for Elimination
10	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
11	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
12	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
13	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
14	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
15	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
16	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
17	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
18	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
19	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
20	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
21	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
22	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
23	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
24	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
25	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
26	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
27	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
28	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
29	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
30	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
31	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.

Link No.	Reason for Elimination
32	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
33	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
34	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
35	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
36	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
37	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
38	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
39A	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
39B	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
40	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
41	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
42	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
43	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
44	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
45	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
46	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
47	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
48	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
49	Eliminated indirectly as a result of FAA height restrictions and lack of an alternative north/south connection.
50	Eliminated directly as a result of FAA height restrictions.
51	Eliminated directly as a result of FAA height restrictions.
52A	Eliminated directly as a result of FAA height restrictions.
54	Eliminated due to conservation easement restricting installation of utilities.
55	Eliminated due to conservation easement restricting installation of utilities.

Link No.	Reason for Elimination
57	Eliminated due to change in the planned location of the private Hermosa Substation.
58	Eliminated due to conservation easement restricting installation of utilities.
59	Eliminated due to conservation easement restricting installation of utilities.
60	Eliminated due to conservation easement restricting installation of utilities.
61	Eliminated due to preliminary engineering.
62	Eliminated due to conservation easement restricting installation of utilities.
63	Eliminated due to conservation easement restricting installation of utilities.
64	Eliminated due to conservation easement restricting installation of utilities.
07A	Eliminated because no longer a viable link due to elimination of Link 01A.
96	Eliminated directly as a result of FAA height restrictions.

4.0 Phase 2: Data Inventory

Per statute (ARS 40-360.06) certain factors are taken into consideration when issuing a Certificate of Environmental Compatibility. As a part of the siting process, UNSE sought to evaluate potential alternative links based on these factors, and ultimately to identify a preferred alternative based on the route that minimizes impacts to these factors to the extent possible.

In order to analyze impacts to these factors data needed to be collected and then applied in Phase 3 to create specific data models.

Phase 2 of the siting process was that data collection effort. This phase did not directly involve public or stakeholder outreach, but as part of the data collection effort included a compilation of the various comments and concerns received through outreach efforts.

Data gathered included:

- Land use as designated in the Santa Cruz County Comprehensive Plan
- Platted subdivisions
- Specific plans approved by Santa Cruz County
- Critical habitat for Threatened and Endangered species
- Habitat for Forest Service Sensitive species
- Landcover
- Perennial water/open water
- Riparian areas
- Wildlife refuges
- Conservation easements
- FCC licensed communications antennas
- Sensitive receptors: schools, hospitals, adult/child care facilities, and churches
- Scenic roads, viewpoints, or areas managed for scenic integrity such as a National Park
- Designated historic sites
- Class I cultural resource survey data – eligible sites
- Existing land uses
- Existing well sites
- Existing linear features – pipelines, railroads, roads, canals, etc.

- Geology and soils
- Air quality – nonattainment area for PM 2.5, PM 10, or Ozone
- Socioeconomic data – poverty levels, minority populations
- Digital Elevation Model (DEM)
- FAA airspace height limitations
- Public input
- Stakeholder input
- State/Federal/Local Jurisdictions/Agency input
- Native American Tribes/Nations input

5.0 Phase 3: Suitability Assessment

5.1 *Suitability Assessment*

Phase 3 of the siting process applied the raw data collected in Phase 2 to create spatial models through which alternative transmission line links could be evaluated for higher or lower levels of suitability.

Using ESRI ArcGIS Pro GIS software, seven specific criteria data models were created. These criteria data models were then combined and weighted based on different factors in order to create four composite suitability models used to evaluate links best suited to minimize impacts based on different goals.

5.1.1 Suitability Assessment Procedure

All datasets used a raster cell size, or resolution of 10 meters.

1. Create the following criteria models:
   a. **Criteria 1 – Existing Plans**: Existing plans of this state, local government and private entities for other developments at or in the vicinity of the proposed site.

      Notes:

      - Note A – define vicinity as within ¼ mile, implies some sort of adjacency.
      - Note B – plans should be treated the same as an existing land use of the same type

      Data Required:

      - General/Comprehensive Plan
      - Platted, but not developed
      - Specific Plans – identified through meetings with jurisdictions and/or public (within ¼ mile)

      Procedure:

      Create buffers as noted above; combine platted land and specific plans into a single Specific Plans dataset; add a new field "Cell_Value" as type Double to each of the datasets listed above – assign appropriate cell values as noted below; union those results with "Clip_Area" for each dataset; use those results with Feature to Raster classifying by "Cell_Value"; then create a composite raster by weighting each of the datasets as indicated below and adding the results together.

      - General/Comprehensive Plan (50% weight)
        - Cell Value = 10: High Density Residential, Institutional
        - Cell Value = 8: Low/Medium Density Residential
        - Cell Value = 6: Commercial/Mixed Use

  - Cell Value = 4: Industrial
  - Cell Value = 3: Parks and Recreation/Preservation
  - Cell Value = 2: Agriculture/Ranching
  - Cell Value = 1: Open Space/Public Lands
  - Cell Value = 0: all other cells
- Specific Plan (50% weight)
  - Cell Value = 10: High Density Residential, Institutional
  - Cell Value = 8: Low/Medium Density Residential
  - Cell Value = 6: Commercial/Mixed Use
  - Cell Value = 4: Industrial
  - Cell Value = 3: Parks and Recreation/Preservation
  - Cell Value = 2: Agriculture/Ranching
  - Cell Value = 1: Open Space/Public Lands
  - Cell Value = 0: all other cells

The results of the Criteria 1 model are illustrated in Figure 10. Overlaid on the model are the "Preliminary Links" removed shown in a dashed red line and the "Refined Links" shown in black that were carried forward to the next phase of the siting. This criteria model was presented to the public and stakeholders at outreach meetings held in November 2022. Figure 9 provides a legend, common to all proceeding criteria and suitability models (Figures 10 – 21).

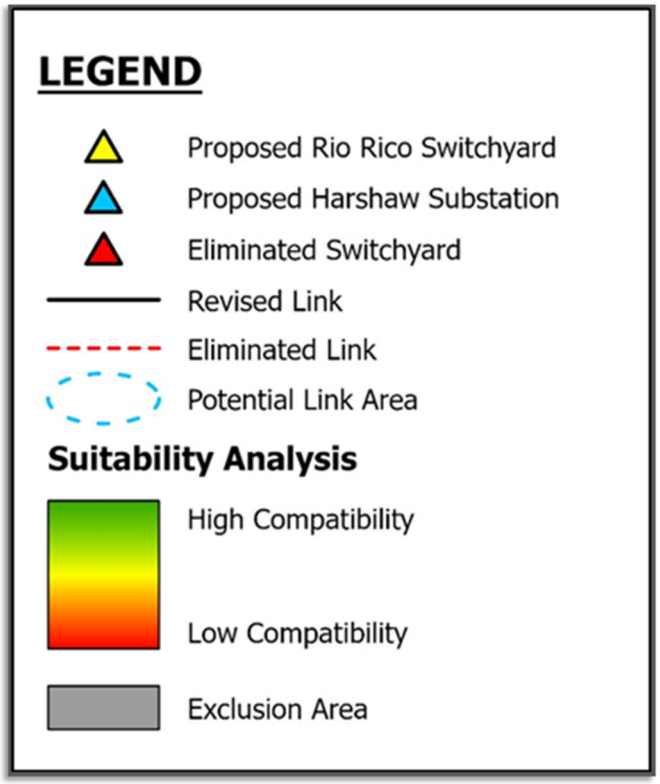


Figure 9. Suitability Criteria and Model Legend

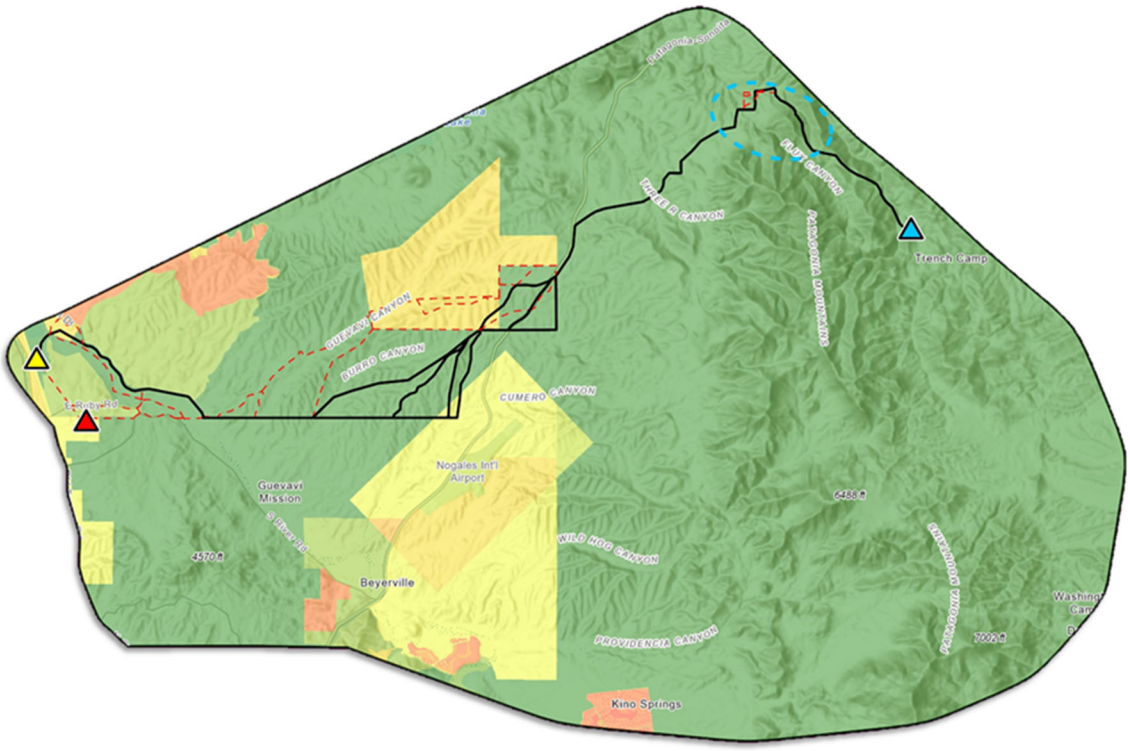


Figure 10. Criteria 1 – Existing Plans

b. **Criteria 2 – Biological Resources**: Fish, wildlife and plant life and associated forms of life on which they are dependent.

Data Required:

- Critical habitat for threatened and endangered (T&E) species
- Habitat for Forest Service Sensitive Species
- Landcover – Forest & Woodland classification
- Perennial water/open water (within 250')
- Riparian Areas
- Wildlife Refuges

Procedure:

Create buffers as noted above; combine critical habitat for T&E species and habitat for forest sensitive species into a single Critical Habitat dataset, with T&E critical habitat taking precedent with any conflict; Combine riparian areas, open water, and land cover and into a single Land Cover dataset prioritized in that order if conflicts exist; add a new field "Cell_Value" as type Double to each of the datasets listed above – assign appropriate cell values as noted below; union those results with "Clip_Area" for each dataset; use those results with Feature to Raster classifying by "Cell_Value"; then create a composite raster by weighting each of the datasets as indicated below and adding the results together.

- Critical Habitat (60% weight)
  - Cell Value = 10: critical habitat for T&E Species

  - Cell Value = 6: habitat for forest sensitive species
  - Cell Value = 0: all other cells
- Land Cover (40% weight)
  - Cell Value = 10: riparian area
  - Cell Value = 8: buffered area for perennial/open water
  - Cell Value = 4: forest and woodland
  - Cell Value = 0: all other cells
- Wildlife Refuge (20% weight) – NA
  - Cell Value = 10: located within a designated wildlife refuge
  - Cell Value = 0: all other cells

The results of the criteria 2 model are illustrated in Figure 11. Overlaid on the model are the "Preliminary Links" removed shown in a dashed red line and the "Refined Links" shown in black that were carried forward to the next phase of the siting. This criteria model was presented to the public and stakeholders at outreach meetings held in November 2022.

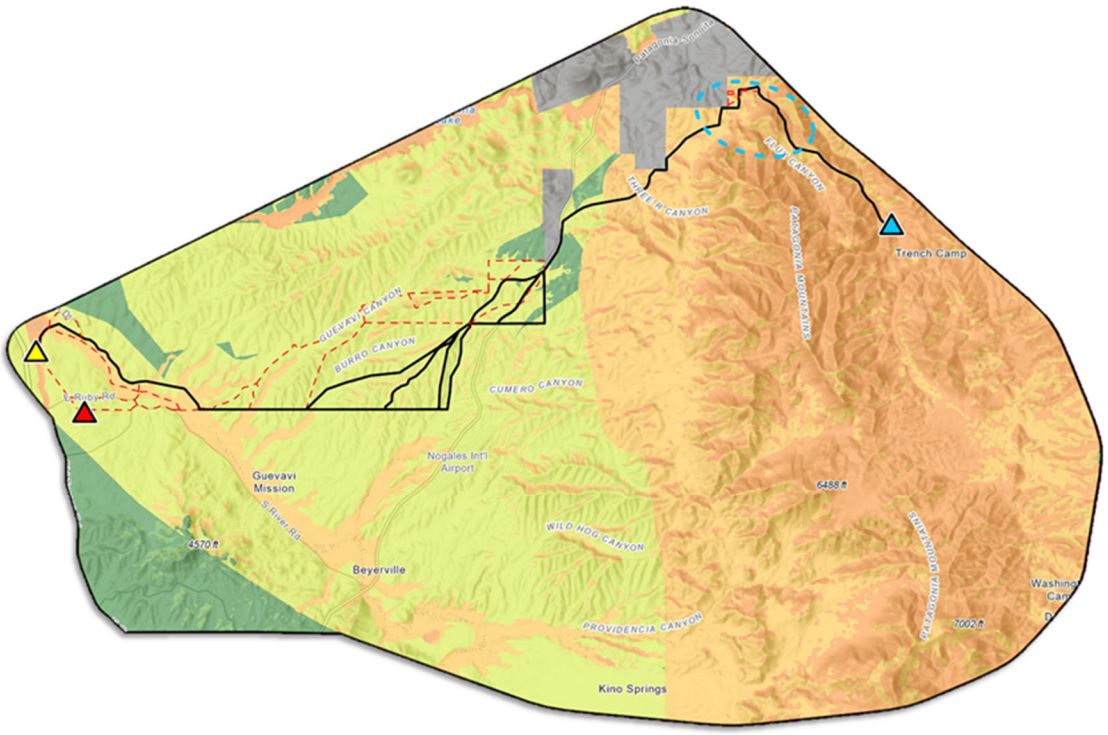


Figure 11. Criteria 2 – Biological Resources

c. **Criteria 3 – Noise & Communication**: Noise emission levels and interference with communication signals.

Data Required:

- FCC data on licensed antennas (within 250' of antenna)
- Sensitive receptors: schools, hospitals, adult/child care facilities, churches (within 500' of property boundary)

Procedure:

Procedure to create criteria 3 dataset: create 250 foot buffer around FCC licensed antenna sites; create 500 foot buffer around sensitive receptor locations; add a new field "Cell_Value" as type Double to each of the datasets listed above – assign appropriate cell values as noted below; union each of these layers, with layers with highest cell value ranked in priority order; union those results with "Clip_Area"; finally use those results with Feature to Raster classifying by "Cell_Value".

- Cell Value = 10: cell is located within buffered area for FCC licensed antennas
- Cell Value = 8: cell is located within buffered area for sensitive receptors
- Cell Value = 0: all other cells

The results of the criteria 3 model are illustrated in Figure 12. Overlaid on the model are the "Preliminary Links" removed shown in a dashed red line and the "Refined Links" shown in black that were carried forward to the next phase of the siting. This criteria model was presented to the public and stakeholders at outreach meetings held in November 2022.

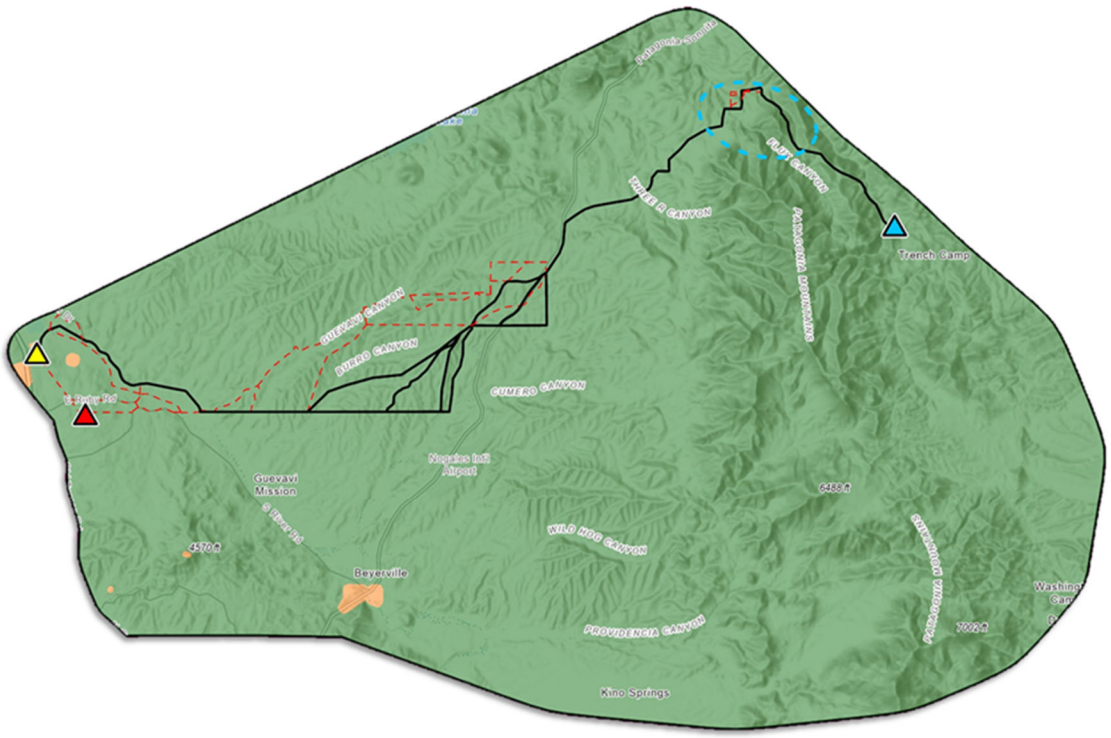


Figure 12. Criteria 3 – Noise & Communication

d. **Criteria 4 – Scenic & Cultural Resources**: Existing scenic areas, historic sites and structures or archaeological sites at or in the vicinity of the proposed site.

Data Required:

- Scenic roads, viewpoints, or areas designated for this such as a National Park (within ¼ mile, ½ mile, and 1 mile – to capture viewshed)

- Existing designated historic sites (within 200', 500', and 1000' – to capture visual impacts)
- Class I Survey Data – eligible sites (within 250' – within or adjacent to)

Procedure:

Procedure to create Criteria 4 dataset: create buffers as noted above; add a new field "Cell_Value" as type Double to each of the datasets listed above – assign appropriate cell values as noted below; union those results with "Clip_Area" for each dataset; use those results with Feature to Raster classifying by "Cell_Value"; then create a composite raster by weighting each of the datasets as indicated below and adding the results together.

- Scenic Areas (40% weight)
  - Cell Value = 10: cell is located within ¼ mile buffered scenic area
  - Cell Value = 6: cell is located within ½ mile buffered scenic area
  - Cell Value = 4: cell is located within 1 mile buffered scenic area
  - Cell Value = 0: all other cells
- Designated Historic Sites (40% weight)
  - Cell Value = 10: cell is located within 200' buffered historic area
  - Cell Value = 6: cell is located within 500' buffered historic area
  - Cell Value = 4: cell is located within 1000' buffered historic area
  - Cell Value = 0: all other cells
- Eligible Sites (20% weight)
  - Cell Value = 10: cell is located within 250' buffered area of eligible site
  - Cell Value = 0: all other cells
- Exclusion Area
  - Cell Value = 1000: transmission structure would be within a designated historic site/structure

The results of the Criteria 4 model are illustrated in Figure 13. Overlaid on the model are the "Preliminary Links" removed shown in a dashed red line and the "Refined Links" shown in black that were carried forward to the next phase of the siting. This criteria model was presented to the public and stakeholders at outreach meetings held in November 2022.

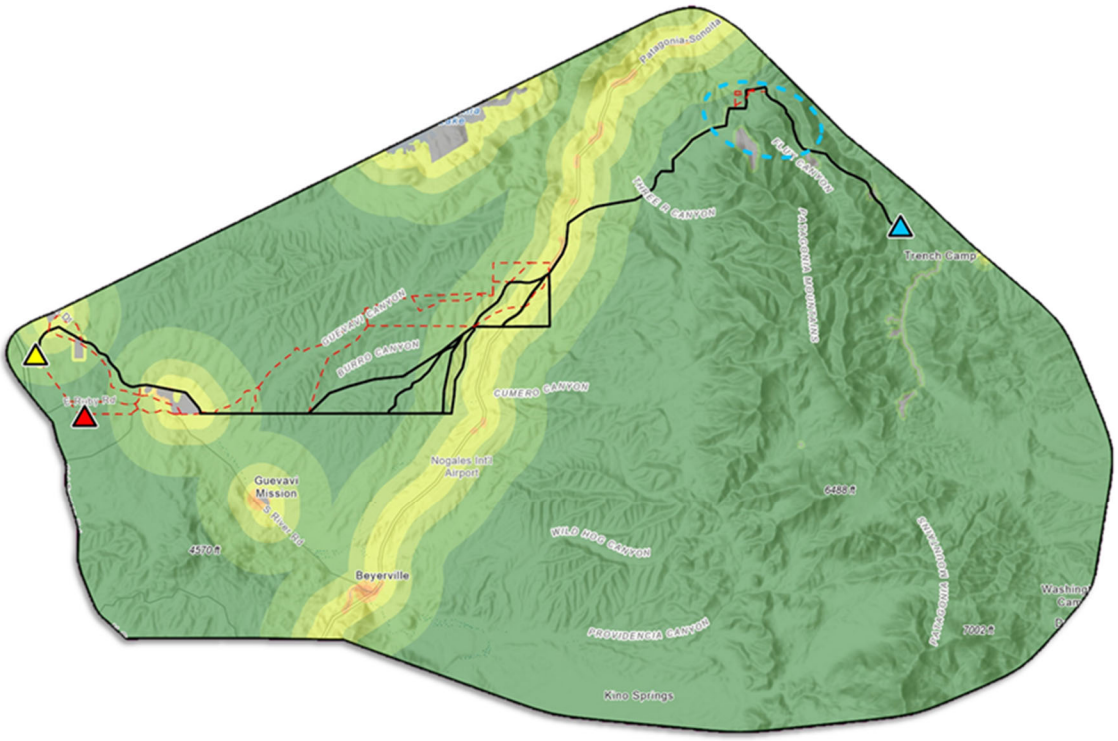


Figure 13. Criteria 4 – Scenic and Cultural Resources

e. **Criteria 5 – Total Environment**: Total environment of the area.

Data Required:

- Existing land uses
- Existing well sites (within 100')
- Existing linear features – pipelines, railroads, roads, canals, etc. (within 500')
- Existing licensed antennas (incorporated from Criteria 3)
- Sensitive Noise Receptors (incorporated from Criteria 3)
- Geology and soils
- Water resources (incorporated from Criteria 2)
- Biological resources (incorporated from Criteria 2)
- Cultural resources (incorporated from Criteria 4)
- Air quality
- Visual resources (incorporated from Criteria 4)
- Socioeconomic conditions

Procedure:

Procedure to create criteria 5 dataset: create buffers as noted above; add a new field "Cell_Value" as type Double to each of the datasets listed above – assign appropriate cell values as noted below; union those results with "Clip_Area" for each dataset; use those results with Feature to Raster classifying by "Cell_Value"; then create a composite raster by weighting each of the datasets as indicated below and adding the results together.

- Existing Land Uses/Well Sites/Linear Features (30% weight)

  - Cell Value = 10: High Density Residential, Public/Quasi Public
  - Cell Value = 8: Low/Medium Density Residential
  - Cell Value = 6: Commercial/Mixed Use
  - Cell Value = 4: Industrial
  - Cell Value = 3: Parks and Recreation/Golf Course
  - Cell Value = 2: Agriculture/Ranching
  - Cell Value = 1: Open Space
  - Cell Value = 10: cell is located within buffered well site
  - Cell Value = 5: cell is not located within buffered existing linear facilities
  - Cell Value = 0: all other cells
- Existing License Antennas/Sensitive Noise Receptors (10% weight)
  - Cell Value – Criteria 3 model
  - Geology and Soils (10% weight)
  - Farmland (50% weight)
    - Cell Value = 5: Prime Farmland
    - Cell Value = 0 – all other cells
  - Erosive Soils (50% weight)
    - Cell Value = 10: Very Severe Erosion
    - Cell Value = 7: Severe Erosion
    - Cell Value = 5: Moderate Erosion
    - Cell Value = 2: Light Erosion
    - Cell Value = 0: all other cells
  - Water/Biological Resources (10% weight)
    - Cell Value – Criteria 2 model
  - Cultural/Visual Resources (10% weight)
    - Cell Value – Criteria 4 model
  - Air Quality (10% weight)
    - Cell Value = 2 – Nonattainment Area for PM 2.5, PM 10, or Ozone
    - Cell Value = 0 – all other cells
  - Socioeconomic Conditions (20% weight)
    - Cell Value = 10 – % census tract at or below poverty level is > 1.5x % county at or below poverty level
    - Cell Value = 5 – ≥ % census tract at or below poverty level is > % county at or below poverty level
    - Cell Value = 10 – % census tract classified as a minority population is > 1.5x % county classified as a minority population
    - Cell Value = 5 – % census tract classified as a minority population is > % county classified as a minority population
    - Cell Value = 0 – all other cells

The results of the Criteria 5 model are illustrated in Figure 14. Overlaid on the model are the “Preliminary Links” removed shown in a dashed red line and the “Refined Links” shown in black that were carried forward to the next phase of the siting. This criteria model was presented to the public and stakeholders at outreach meetings held in November 2022.

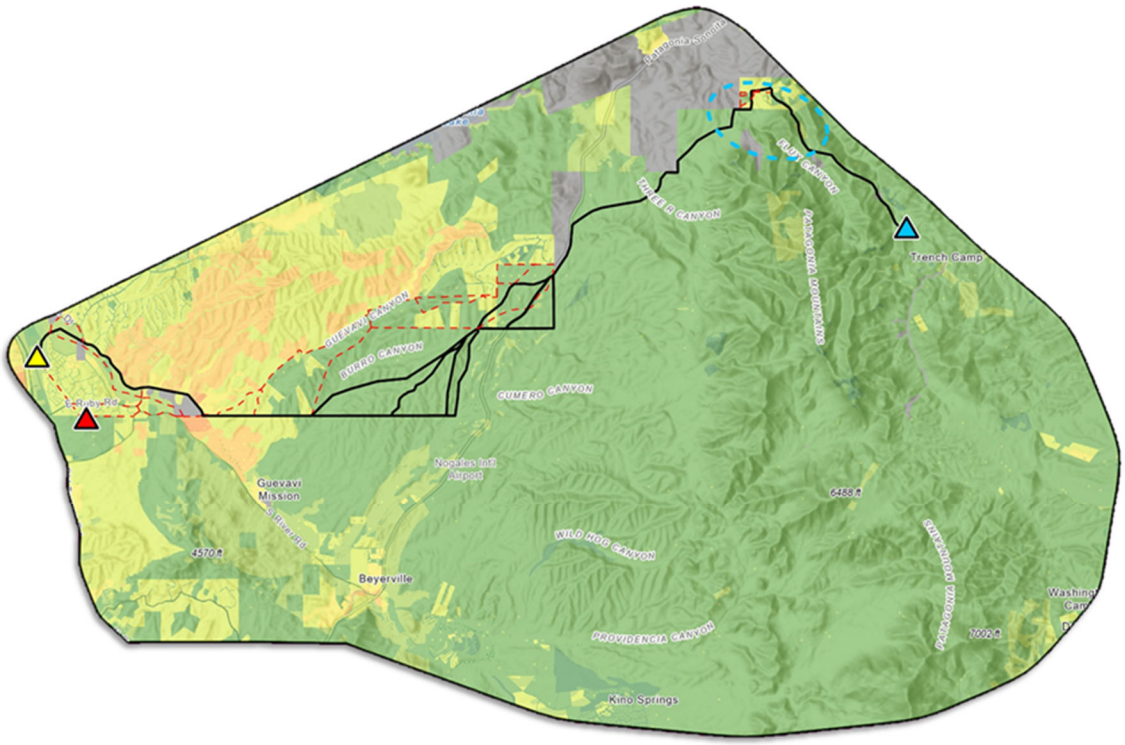


Figure 14. Criteria 5 – Total Environment

f. **Criteria 6 – Construction & Maintenance**: The technical practicability of achieving a proposed objective and the previous experience with equipment and methods available for achieving a proposed objective.

Data Required:

- Digital Elevation Model (DEM)
- Airspace height limitations

Procedure:

Procedure to create criteria 6 dataset: create slopes from DEM; add a new field "Cell_Value" as type Double to each of the datasets listed above – assign appropriate cell values as noted below; union those results with "Clip_Area" for each dataset; use those results with Feature to Raster classifying by "Cell_Value"; then create a composite raster by weighting each of the datasets as indicated below and adding the results together.

- Digital Elevation Model (50% weight)
  - Cell Value = 10: slopes ≥ 75 and ≤ 90
  - Cell Value = 8: slopes ≥ 50 and < 75
  - Cell Value = 6: slopes ≥ 35 and < 50
  - Cell Value = 4: slopes ≥ 20 and < 35
  - Cell Value = 0: all other cells
- Airspace height limitations (50% weight
  - Cell Value = 10: height limitation ≤ 50 and > 0
  - Cell Value = 8: height limitation ≤ 75 and > 50

- Cell Value = 4: height limitation ≤ 95 and > 75
- Cell Value = 2: height limitation ≤ 140 and > 95
- Cell Value = 0: all other cells

- Exclusion Area
  - Cell Value = 1000: FAA structure height limitation ≤ 0

The results of the criteria 6 model are illustrated in Figure 15. Overlaid on the model are the "Preliminary Links" removed shown in a dashed red line and the "Refined Links" shown in black that were carried forward to the next phase of the siting. This criteria model was presented to the public and stakeholders at outreach meetings held in November 2022.

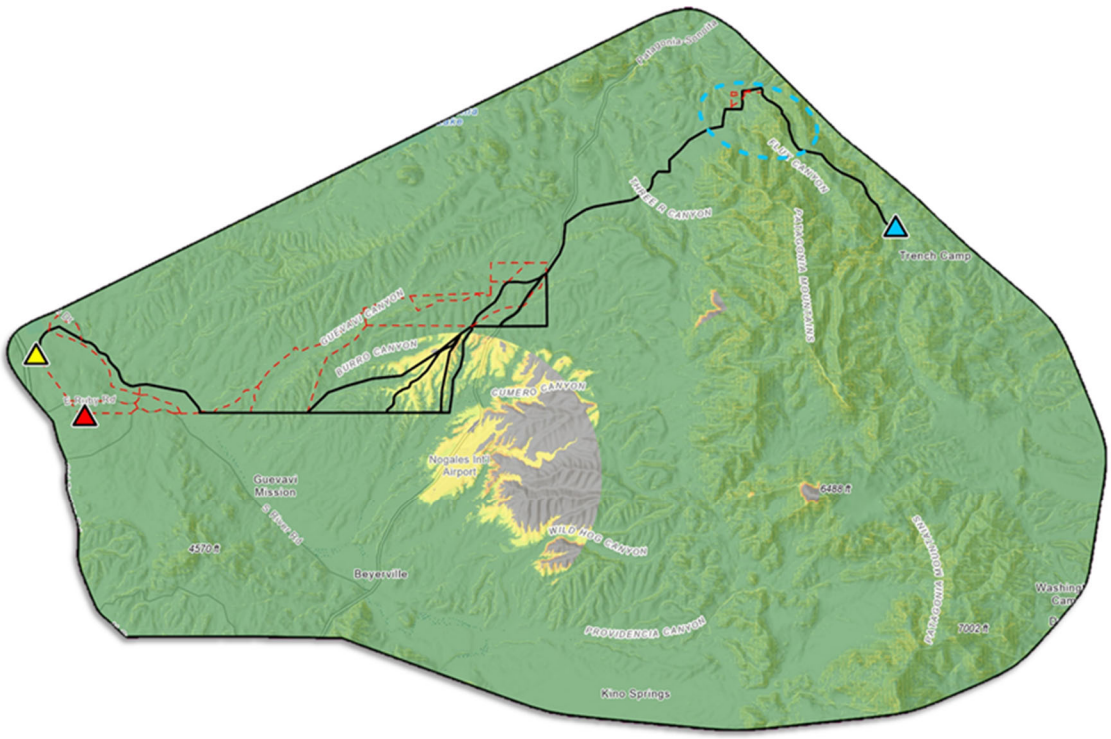


Figure 15. Criteria 6 – Construction & Maintenance

g. **Criteria 7 – Outreach**: Any additional factors that require consideration under applicable federal and state laws pertaining to any such site.

Data Required

- Public Input (weight other factors based on importance to public – in a public preferred alternative)
- Stakeholder Input
- State/Federal/Local Jurisdictions/Agency Input
- Native American Tribes/Nations Input

Procedure:

Procedure to create criteria 7 dataset: create a single dataset and map any geographic areas of concern and count number of comments on this area; count non-geographic

concerns/issues which will be used to weight environmental and land use factors in alternative evaluations; add a new field "Cell_Value" as type Double to the dataset listed above – assign appropriate cell values as noted below; union those results with "Clip_Area" for the dataset; use those results with Feature to Raster classifying by "Cell_Value".

- Cell Value = 10: > 50 comments of concern on area
- Cell Value = 8: ≥ 10 and < 50 comments of concern on area
- Cell Value = 6: ≥ 5 and < 10 comments of concern on area
- Cell Value = 4: ≥ 2 and < 5 comments of concern on area
- Cell Value = 2: ≥ 1 and < 2 comments of concern on area
- Cell Value = 0: all other cells
- Exclusion Area
    - Cell Value = 1000: a comment for a specific area that indicates a valid reason that construction and maintenance of transmission line would not be feasible.

The results of the Criteria 7 model are illustrated in Figure 16. Overlaid on the model are the "Preliminary Links" removed shown in a dashed red line and the "Refined Links" shown in black that were carried forward to the next phase of the siting. This criteria model was presented to the public and stakeholders at outreach meetings held in November 2022.

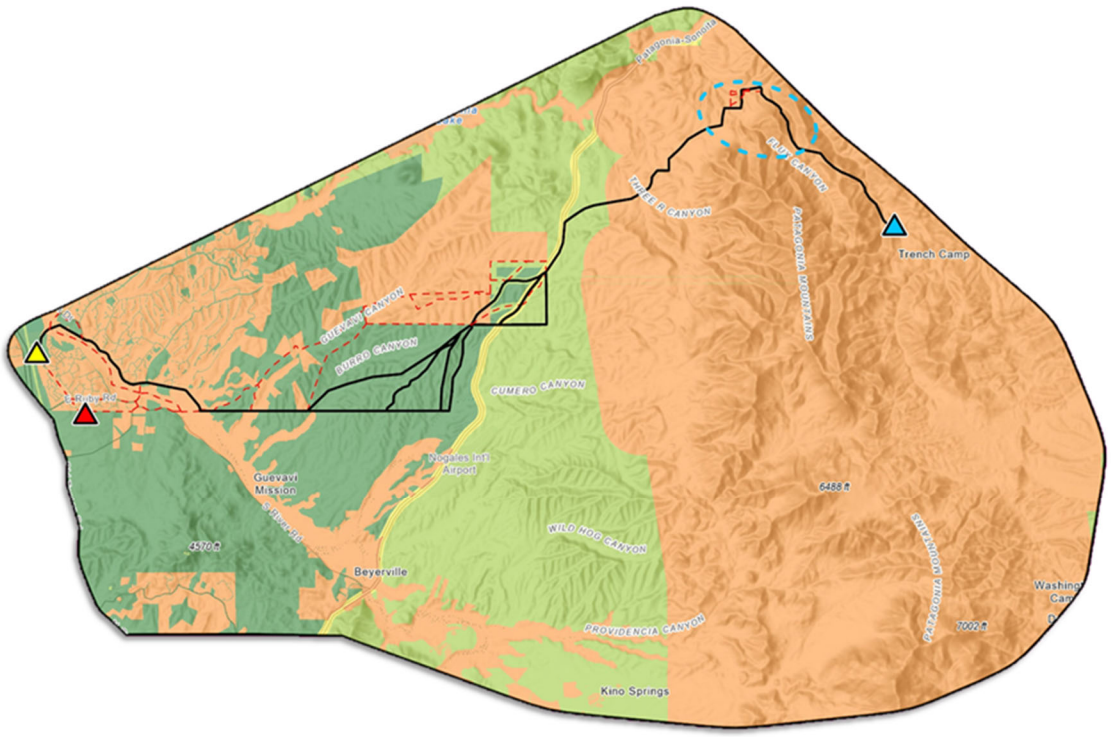


Figure 16. Criteria 7 – Outreach

2. Create the following composite data models:

Using the seven criteria models, several composite models were created in order to evaluate the suitability of transmission line links with respect to the environmental, land use, and other factors considered by statute in granting a Certificate of Environmental Compatibility.

The raster calculator tool was used in ArcGIS Pro to add each of the criteria models together, with the appropriate weights to create the composite models (see Figure 17).

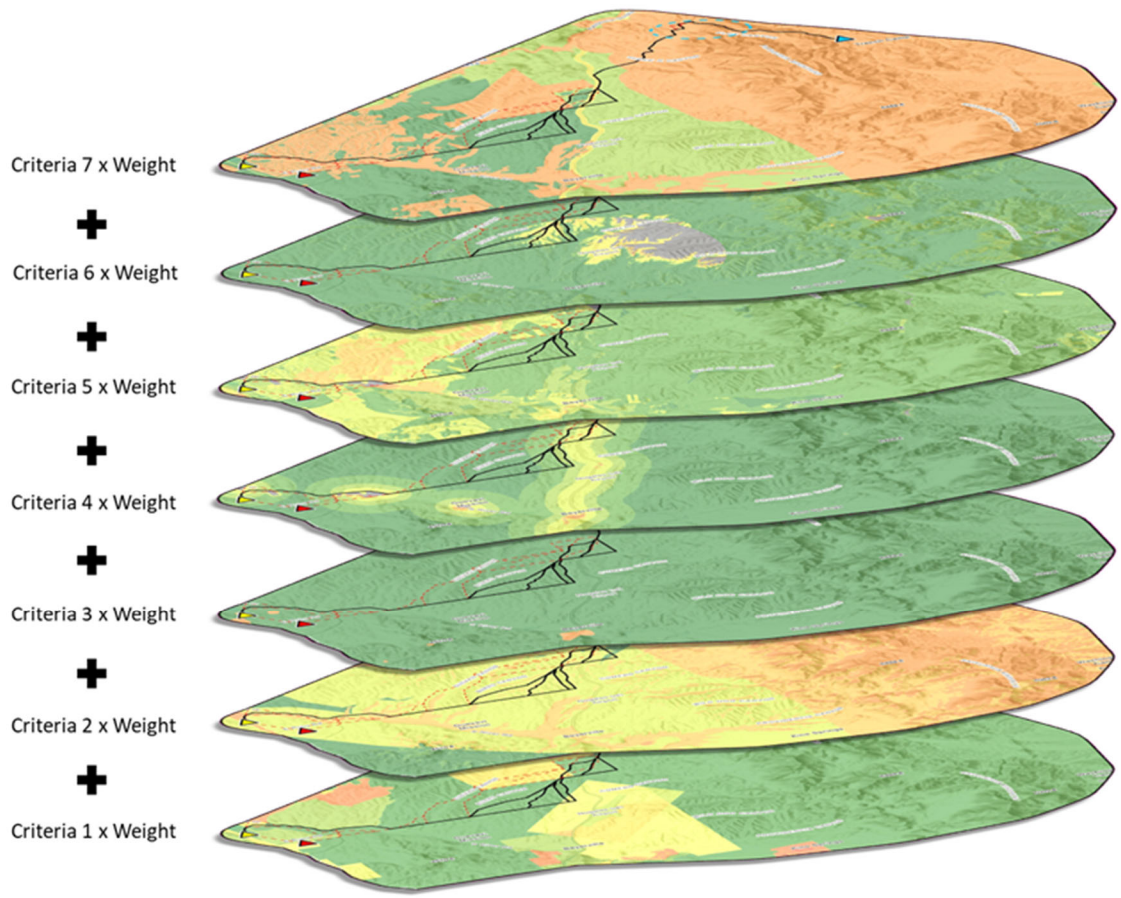


Figure 17. Criteria models are weighted differently based on targeted model objectives and added together to create composite suitability models.

Four composite suitability models were created as described below.

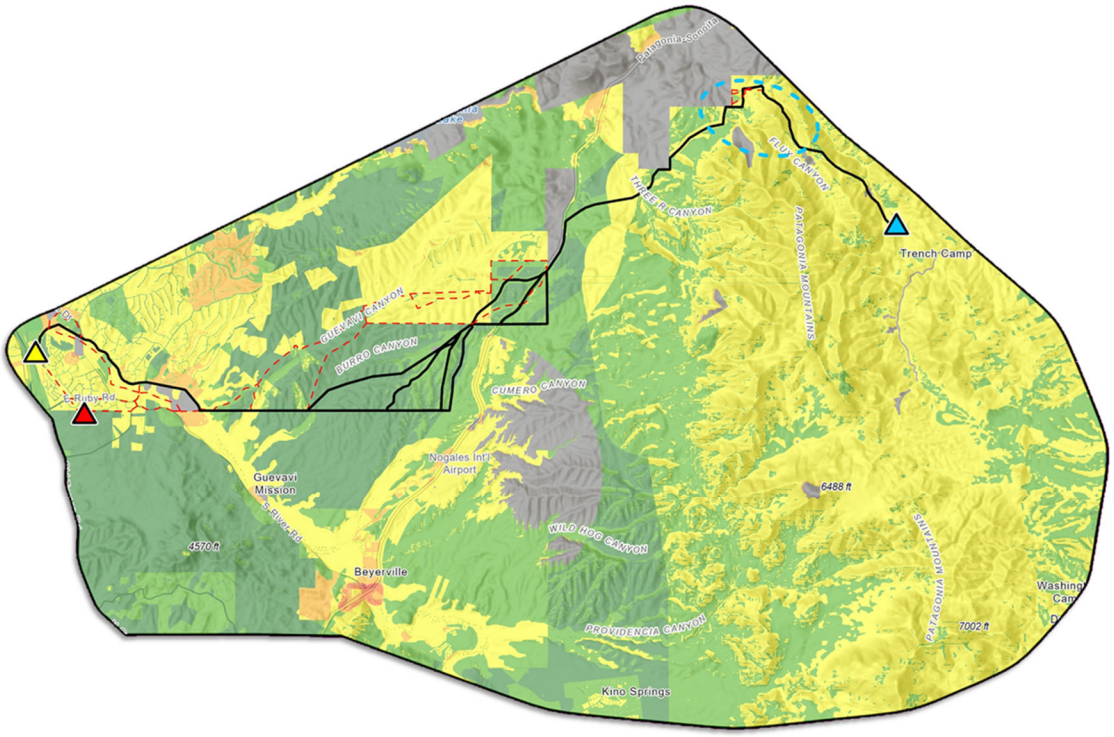


Figure 18. Balanced Model

a. Balanced Suitability Model (Figure 18)
   - Criteria 1: Existing Plans (1/7 weight)
   - Criteria 2: Biological Resources (1/7 weight)
   - Criteria 3: Noise & Communication (1/7 weight)
   - Criteria 4: Scenic & Cultural Resources (1/7 weight)
   - Criteria 5: Total Environment (1/7 weight)
   - Criteria 6: Construction & Maintenance (1/7 weight)
   - Criteria 7: Outreach (1/7 weight)

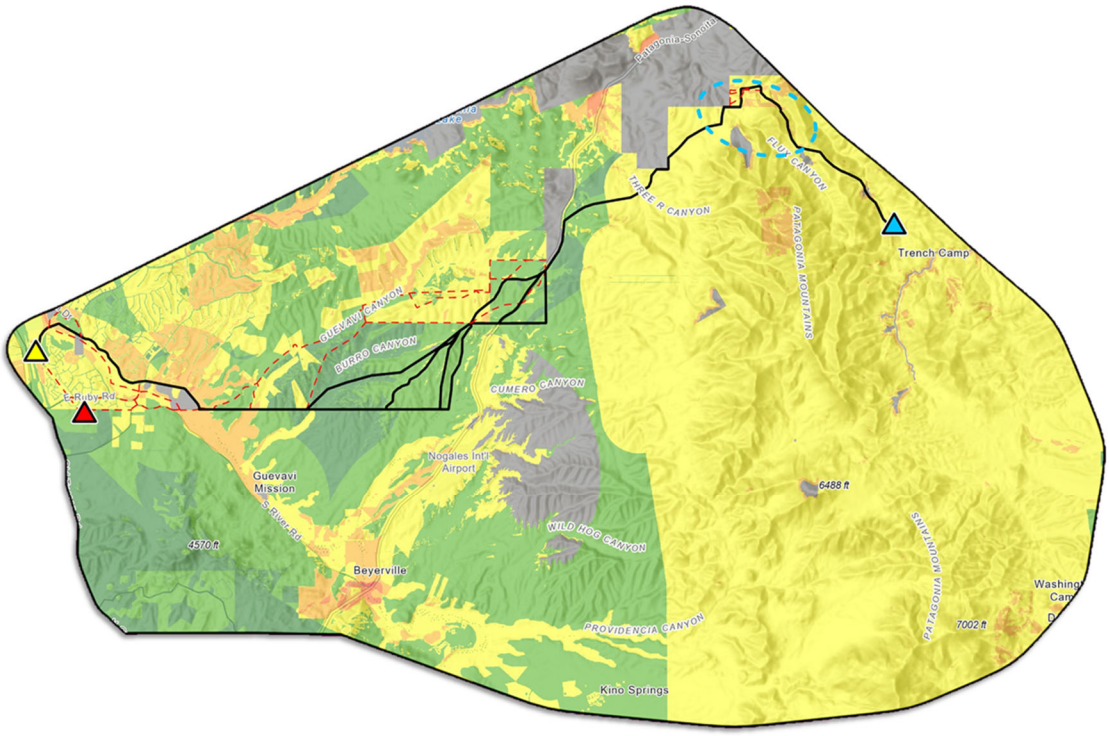


Figure 19. Environmental Preferred Model

b. Environmental Preferred Model (Figure 19)
   - Criteria 1: Existing Plans (10% weight)
   - Criteria 2: Biological Resources (25% weight)
   - Criteria 3: Noise & Communication (10% weight)
   - Criteria 4: Scenic & Cultural Resources (10% weight)
   - Criteria 5: Total Environment (25% weight)
   - Criteria 6: Construction & Maintenance (10% weight)
   - Criteria 7: Outreach (10% weight)

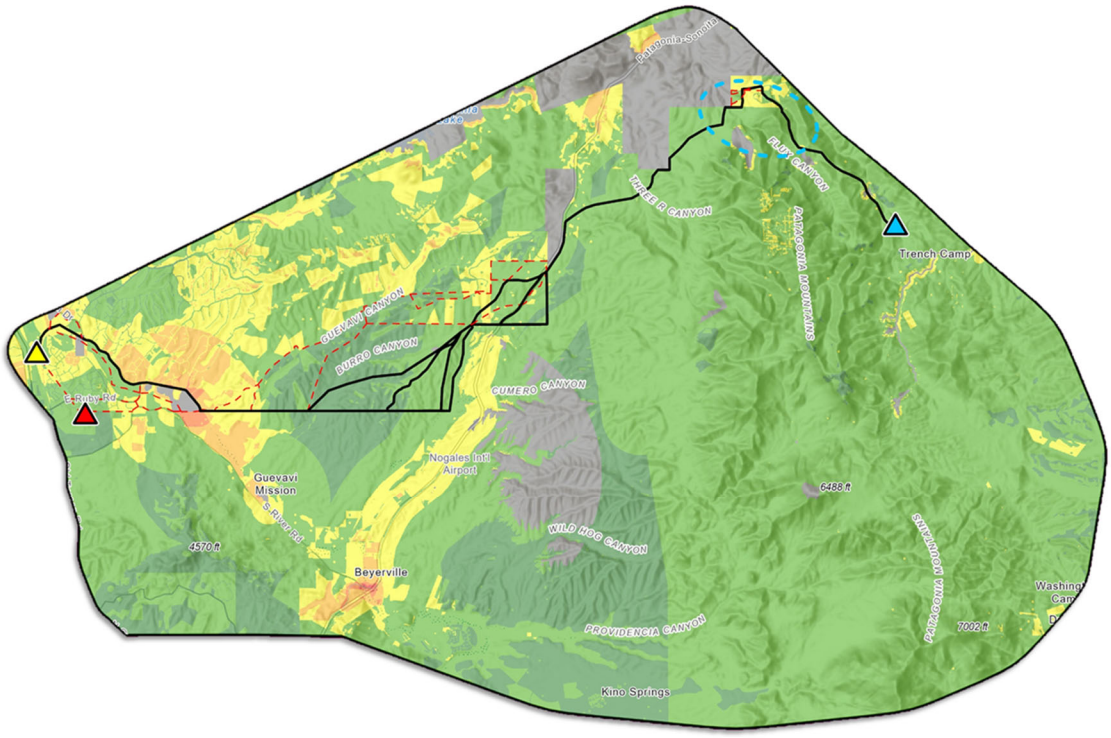


Figure 20. Public/Stakeholder Preferred Model

c. Public, Stakeholder, and Agency Preferred Model (Figure 20)

Weights are based on the proportion of public and stakeholder comments received on each criteria, with a minimum weight of 5% for each criteria model.

- Criteria 1: Existing Plans (5% Weight)
- Criteria 2: Biological Resources (14% Weight)
- Criteria 3: Noise & Communication (5% Weight)
- Criteria 4: Scenic & Cultural Resources (24% Weight)
- Criteria 5: Total Environment (47% Weight)
- Criteria 6: Construction & Maintenance (5% Weight)
- Criteria 7: N/A

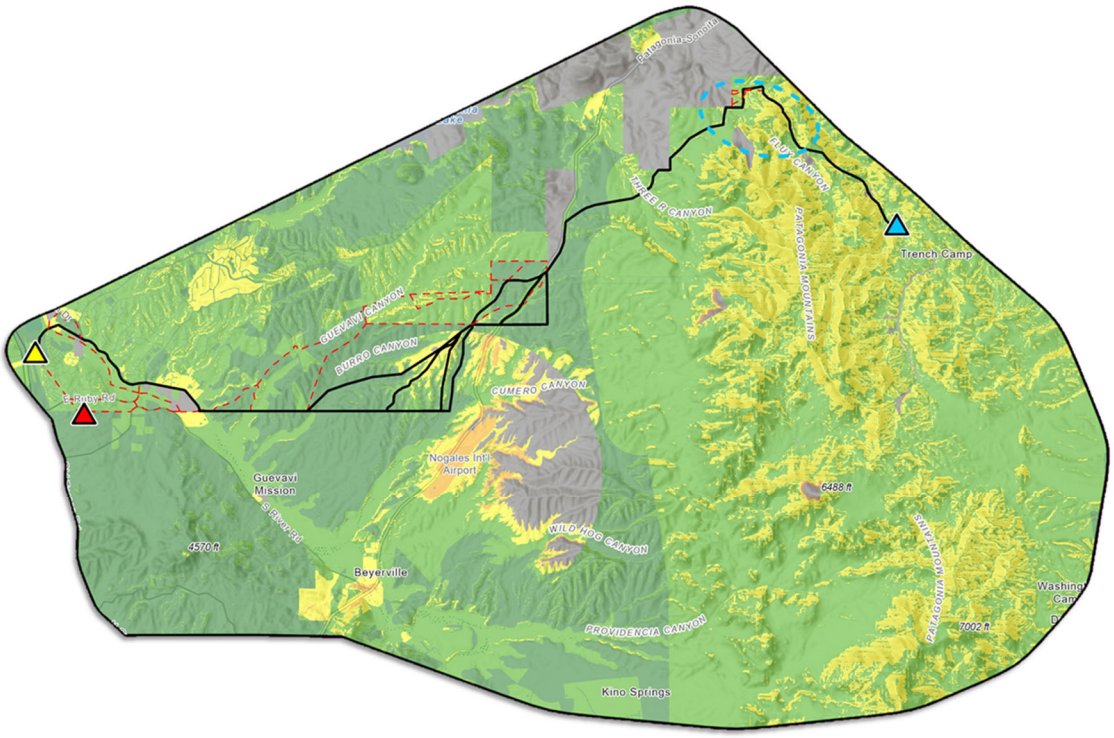


Figure 21. Construction & Maintenance Preferred Model

d. Construction and Maintenance Preferred Model (Figure 21)
   - Criteria 1: Existing Plans (10% weight)
   - Criteria 2: Biological Resources (10% weight)
   - Criteria 3: Noise & Communication (10% weight)
   - Criteria 4: Scenic & Cultural Resources (10% weight)
   - Criteria 5: Total Environment (10% weight)
   - Criteria 6: Construction & Maintenance (40% weight)
   - Criteria 7: Outreach (10% weight)

5.2 *Refined Links*

The product of Phase 3 of the siting process was a set of refined links.

Once the composite suitability models were created, the 57 preliminary links were overlaid on top of the models. A visual evaluation of each link, on each model, was completed to determine which routes were most suitable and alternatively which links would potentially result in the highest impact. This exercise resulted in the elimination of 42 links. These eliminated links and rationale for eliminations are summarized in Table 2.

In addition, one new link was introduced during this phase. This link was Link 108 and was added through landowner input to mitigate visual impacts and also avoid potential FAA lighting and marking requirements.

Table 2. Phase 3 Links Eliminated

Link No.	Reason for Elimination
F-6C	Eliminated due to lower suitability.
01B	Eliminated because there is not sufficient space to construct a separate line within existing 138kV transmission line ROW and a double circuit line is not preferred from an operational/reliability standpoint.
2	Eliminated because there is not sufficient space to construct a separate line within existing 138kV transmission line ROW and a double circuit line is not preferred from an operational/reliability standpoint and the potential switchyard site south of Ruby Road was eliminated so no direct connection from north routes to this link.
3	Eliminated because no longer a viable link due to elimination of Link 02.
4	Eliminated because no longer a viable link due to elimination of Links 02 and 05.
5	Eliminated because no longer a viable link due to elimination of Link 02 and the potential switchyard site south of Ruby Road was eliminated so no direct connection from north routes to this link. Further, a number of comments were received opposing an alignment on Ruby Road.
6	Eliminated because no longer a viable link due to elimination of Link 05.
08A	Eliminated due to location within Santa Cruz River. Since transmission system is not looped, there are concerns about accessibility during storms or when river is running.
09A	Eliminated because no longer a viable link due to elimination of Links 02 and 05.
103	Eliminated due to lower suitability.
104	Eliminated due to lower suitability.
105	Eliminated due to lower suitability.
106	Eliminated because no longer a viable link due to elimination of Links 02 and 05.
107	Eliminated due to lower suitability.
65A	Eliminated due to lower suitability.
65B	Eliminated due to lower suitability.
65C	Eliminated due to lower suitability.
66A	Eliminated due to lower suitability.
68A	Eliminated because no longer a viable link due to elimination of Links 07C and 08A.
69	Eliminated because no longer a viable link due to elimination of Links 08A and 106.
70	Eliminated due to lower suitability.
72	Eliminated due to lower suitability.
73	Eliminated due to lower suitability.
74A	Eliminated due to lower suitability.

Link No.	Reason for Elimination
74B	Eliminated due to lower suitability.
75	Eliminated due to lower suitability.
76	Eliminated due to lower suitability.
77	Eliminated due to lower suitability.
78	Eliminated due to lower suitability.
79	Eliminated due to lower suitability.
07B	Eliminated because no longer a viable link due to elimination of Link 07C.
07C	Eliminated due to location within Santa Cruz River. Since transmission system is not looped, there are concerns about accessibility during storms or when river is running.
80	Eliminated due to lower suitability.
81	Eliminated due to lower suitability.
82	Eliminated due to lower suitability.
83	Eliminated due to lower suitability.
84	Eliminated due to lower suitability.
85	Eliminated due to lower suitability.
87	Eliminated due to lower suitability and an adjusted alignment to be further removed from Calabasas Mission site.
95A	Eliminated due to lower suitability.
95B1	Eliminated due to lower suitability.
95B2	Eliminated due to lower suitability.

5.3 *Outreach*

5.3.1 Public Open House #4 – November 17, 2022

This was the first meeting held exclusively in-person. The objective of this meeting was to provide a project update and share a pared back set of links, or revised links based on: 1) comments that had been received from members of the public and stakeholders on the preliminary links, and 2) the suitability assessment.

UNSE shared a map (see Figure 22) which: 1) introduced 1 new link and showed the elimination of 42 links, and 2) showed the elimination of a switchyard site option that had previously been considered. UNSE solicited continued feedback on opportunities and constraints for siting a transmission line within the study area, and thoughts or concerns about specific revised links that had been presented. In particular, UNSE sought feedback on the desire to consider a link that avoided the residential area near the mouth of Flux Canyon and remained on Forest Service land.

The meeting was attended by 42 people. A number of comments were received either at the meeting or by written comment, and are generally summarized as:

- Impact on wildlife and plants, especially habitat of threatened and endangered species
- Health concerns due to the transmission line
- Impact on property values
- Impact on existing land uses, including ranchlands
- Concern that line would obstruct scenic views, consider use of galvanized structures as mitigation

- Concern that line would change the natural beauty, views, and quiet environment
- Concern about impacts on wildlife, birds, and livestock
- Impact on biodiversity and wildlife migration
- Concern of wildfire hazards due to line
- Concern about noise
- Preference for routes away from homes on abundant open space
- Effect on businesses in the area built around nature and the environment of the area
- Preference for a route that stays on Forest through Flux Canyon "west" and avoids homes near Flux Canyon
- Preference for a route near the Nogales International Airport
- Preference for least environmentally destructive route
- Preference for use of existing rights-of-way versus creation of new corridors
- Opposition to any route through Lake Patagonia Ranch Estates
- Both opposition to and support for routes along State Route 82
- Both opposition to and support for routes on the Coronado National Forest
- Desire for the transmission line to be constructed underground, particular mention through residential areas, airport, and entrance to Lake Patagonia Road
- Recommended following a canyon south of Link 92 rather than link 92
- General opposition to the Hermosa Mine and any associated work
- Comments in opposition to Links F-6A, F-6B1, 84, 94, 98
- Comments in support of Links 52B, 53, 71, 74A, 88, 89A, 89B, 92, 93, 101, 102

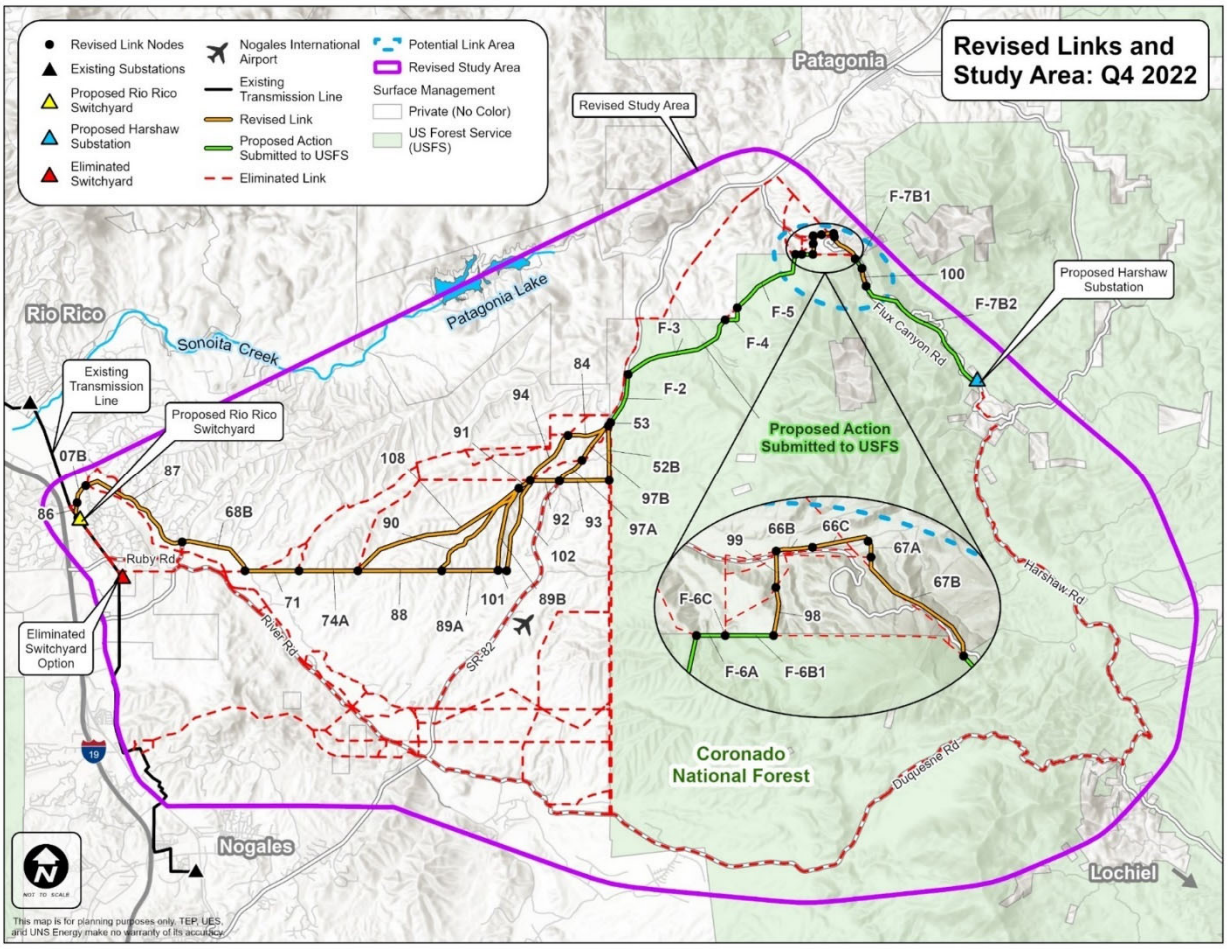


Figure 22. Revised links presented in November 2022

5.3.2 Stakeholder Meeting #2 – November 15, 2022

This meeting was held virtually. The objective of this meeting was to provide a project update and share a pared back set of links, or revised links based on: 1) comments that had been received from members of the public and stakeholders on the preliminary links, and 2) the suitability assessment.

UNSE shared a map (see Figure 22) which: 1) introduced 1 new link and showed the elimination of 42 links, and 2) showed the elimination of a switchyard site option that had previously been considered. UNSE solicited continued feedback on opportunities and constraints for siting a transmission line within the study area, and thoughts or concerns about specific revised links that had been presented. In particular, UNSE sought feedback on the desire to consider a link that avoided the residential area near the mouth of Flux Canyon and remained on Forest Service land.

The meeting was attended by 13 people, representing 8 stakeholder groups. UNSE did not receive any comments at the meeting.

6.0 Phase 4: Compatibility Analysis

As a result of feedback received at public meetings in November, UNSE researched the viability of two new transmission line links. The first was a modified link near State Route 82 and Cumero Canyon. The second was a link near Flux Canyon that remained on land under the jurisdiction of the CNF.

UNSE met with the landowner of the Oro Blanco Ranch and reviewed the side canyon to Cumero Canyon that was identified in the November 2022 public meeting. While this link would not follow existing infrastructure, the route appeared to be a good route that would mitigate a number of concerns that were raised with respect to visual impacts and proximity to residential areas. It accomplished this by keeping the transmission line a little lower on the skyline and pushed it further from existing residential areas. Preliminary engineering was completed on this link and it was confirmed to be viable and added to the list for consideration.

The link south of the Flux Canyon neighborhood had been commented on by the public previously. As a result, UNSE had previously explored a potential route through Flux Canyon proper. Preliminary engineering was completed on this link and it was confirmed to be a viable route. UNSE approached the CNF about the possibility of including this link as an alternative to the proposed action that had been submitted to them previously for a Special Use Permit to construct the line on the CNF. The CNF was agreeable to this and UNSE updated Exhibit A to its application which was subsequently accepted by the CNF.

Once changes to the refined links were made, as a result of public outreach efforts, the UNSE team pivoted to the compatibility analysis. Each of the potential transmission line links that were still active were assessed for compatibility with respect to the factors considered by statue (ARS 40-360.06) to determine the environmental compatibility of the project. For purposes of this evaluation, “Additional Factors” listed in the statute included any feedback received from public and stakeholder outreach.

Subject matter experts on each of these factors reviewed each link one by one, and using research and studies that had been conducted, familiarity gained through field visits of each link, and cumulative experience assessed the compatibility of constructing and maintaining a transmission line in that particular link, including potential impacts, of each link and rated them with a 1, 2, 3, or 100. These numbers are generically interpreted as follows:

- 1 = compatible
- 2 = possible negative impact
- 3 = known negative impact
- 100 = unacceptable impacts that likely could not be mitigated

These compatibility scores were then summarized across each of the factors and averaged, to provide an overall compatibility score generally between 1 and 3. With 1 being most compatible and 3 being least compatible. Any average score greater than 3 meant that the link had some type of an impact that was unacceptable, or in other words, the link was not compatible and should be eliminated.

Since public and stakeholder input is so crucial to the line siting process, a weighted average compatibility score was also created. Similar to the overall compatibility score, the results were between 1 and 3, with 1 being most compatible and 3 being least compatible. But prior to summarizing each of the individual compatibility factors, the scores were weighted according to public and stakeholder feedback on that particular link.

The overall scores were then reviewed and links were either eliminated from consideration or identified as segments of alternative routes to be included in the application for a CEC. Where multiple alternative

routes were under consideration. Those that were most compatible and fit best with the line siting criteria established were identified as the preferred route.

The compatibility assessment resulted in the elimination of six links from consideration. Complete results of the Phase 5 compatibility analysis are included in Appendix A to this report.

7.0 Phase 5: Concept Evaluation

The final phase of the siting process is Concept Evaluation. The purpose of this phase was to share the results of the siting effort in the form of the final proposed routes, including the preferred transmission line route and asking stakeholders and members of the public if these results address the feedback that was received to date. At this phase, comment inform the project team if the process produced an acceptable output, or since the siting process is iterative, if there is need to step back and revisit an earlier phase of the process.

In order to receive comment, one last round of public and stakeholder outreach occurred.

7.1 *Outreach*

7.1.1 Public Open House #5 – January 25, 2023

This meeting was held in-person. The objective of this meeting was to share the final route alternatives, including UNSE's preferred route, proposed to be included in an application for a CEC.

UNSE shared a map (see Figure 23) which: 1) showed the elimination of 8 links as a result of the compatibility analysis, 2) introduced a preferred route, and 3) three alternative route segments. Based on public input, two potential route links were revised. First, a route link was added on USFS land south of Flux Canyon. Second, modifications were made to route links south of the Lake Patagonia Ranch Estates neighborhood and west of State Route 82 to minimize visual impacts; those links now follow an unnamed side canyon in a northeast-to-southwest orientation from Cumero Canyon to State Route 82.

Prior to finalizing its CEC application, UNSE solicited feedback on: 1) the final route alternatives, 2) its selection of a preferred route, and 3) if the results of the siting process addressed their comments.

The meeting was attended by 28 people, including Mayor Maldonado from the City of Nogales and Supervisor Bracker from Santa Cruz County. A number of comments were received either at the meeting or by written comment, and are generally summarized as:

- Concern about proximity to residential land uses
- Concern about impact on property values
- Appearance/visibility of the transmission line and impacts on viewsheds
- Concern about wildfire hazards as a result of the transmission line
- Concern with the lack of hard requirements in the line siting regulation regarding public and environmental protection
- Concern over visibility of the line from State Route 82
- Concern about soil disturbance leading to further erosion near Flux Canyon Road due to construction and mobilization of heavy metals
- Request to consider galvanized poles to help poles fade into the landscape
- Request to build transmission line underground along State Route 82
- Preference for alternative sections 2A and 2B over preferred sections 1A and 1B
- Impact on recreation and ecotourism
- Lack of coordination between the State and Federal permitting processes

- Questions on project costs and who is paying for it
- Concern over lack of alternatives, specifically a Duquesne/Harshaw road alternative
- Impacts of project on UNSE's overall distribution and transmission system
- General environmental impacts and mitigation measures
- Concern over lack of transparency/documentary record on siting process and recommendations
- Concern over timing of project in order to meet the stated project need
- Desire for the transmission line to be constructed underground in particular locations

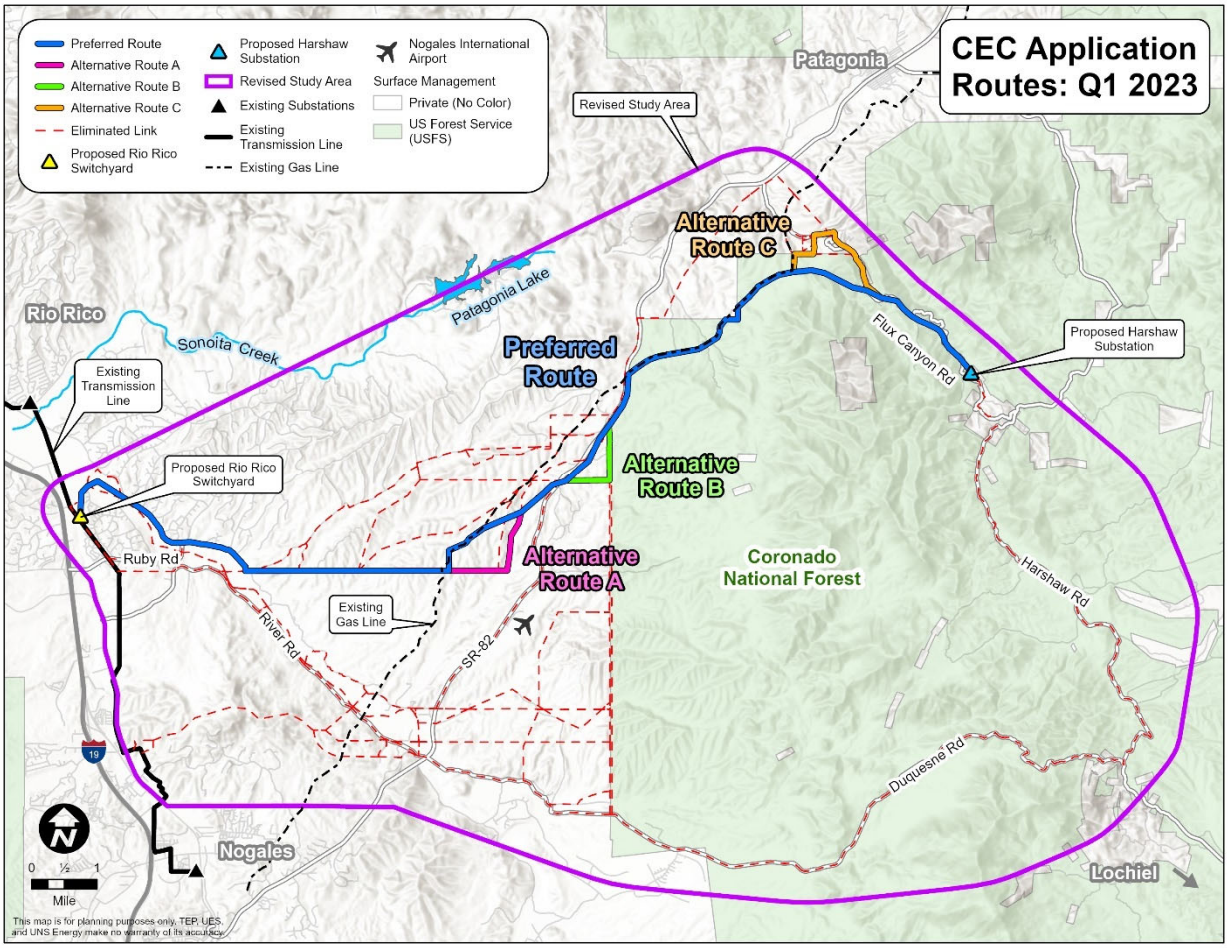


Figure 23. Final route alternatives presented in January 2023

7.1.2 <u>Stakeholder Meeting #3 – January 24, 2023</u>

This meeting was held virtually. The objective of this meeting was to share the final route alternatives, including UNSE's preferred route, proposed to be included in an application for a CEC.

Prior to finalizing its CEC application, UNSE solicited feedback on: 1) the final route alternatives, 2) its selection of a preferred route, and 3) if the results of the siting process addressed their comments.

The meeting was attended by 16 people, representing 12 stakeholder groups. UNSE did not receive any comments at the meeting.

7.2 *Final Alternative Routes to Include in CEC Application*

As a result of feedback received from the public with respect to the dismissal of a potential alternative route along Duquesne and Harshaw Roads (see Section 3.4.2), UNSE felt it prudent to explore this route further. UNSE conducted both a field visit of the potential route and evaluated it using the same filtering criteria applied to the other proposed links as detailed in the Siting Study.

Field Visit – Potential Duquesne/Harshaw Road Route

Two significant observations were made during the field visit. First, the potential route just south of the Hermosa Project along Harshaw Creek passes through several miles of mature riparian habitat (See Figure 24 and Figure 25). Building the transmission line along Harshaw Road would require clear cutting a 100-foot-wide corridor through this habitat. This could also have a potentially significant impact to designated critical habitat and for a number of T&E species. Second, the terrain is very rugged (see Figure 26) along Duquesne Road west of the intersection with Harshaw Road and the western foothills of the Patagonia Mountains (approximately 5 miles in length). While a line could be engineered through this terrain, doing so would require several long access roads spurring from Duquesne Road for both construction and maintenance, resulting in substantially increased ground disturbance.

Figure 24. Harshaw Road, just south of the Hermosa Project

Figure 25. Harshaw Road, south of the Hermosa Project

Figure 26. Duquesne Road, west of intersection with Harshaw Road

Suitability Assessment – Potential Duquesne/Harshaw Road Route

Using the same suitability models described under Phase 3, a suitability assessment of the potential Duquesne/Harshaw Road route found that it would have crossed 90% more lands with a lower suitability rating compared to the Preferred Alternative route. In addition, it would have crossed two miles of "Exclusion Areas" – areas that would have been immediately eliminated from consideration due to various biological, cultural, or land use considerations. Further, it would have been approximately 28 miles in length, including 17 miles on NFS land which is almost 10 miles more than the Preferred Alternative route. Maps illustrating the composite suitability models with the potential Duquesne/Harshaw Road route overlain are included in Appendix C of this report.

Compatibility Analysis – Potential Duquesne/Harshaw Road Route

Like the suitability assessment that was conducted on the potential Duquesne/Harshaw Road route, UNSE conduced a compatibility analysis of the route in the same manner described under Phase 2. Results indicated that this route is also less compatible overall than the Preferred Alternative route with respect to (1) biological factors, (2) cultural/historic factors, and (3) public comment received with respect to those specific links and other resources commented on by the public that are present in the area, including impacts on T&E species, loss of habitat and associated impacts on plants and wildlife (which would be substantial greater than other alternatives as noted from the field visit). A table documenting the results of the compatibility analysis for the potential Duquesne/Harshaw Road route is included in Appendix D of this report.

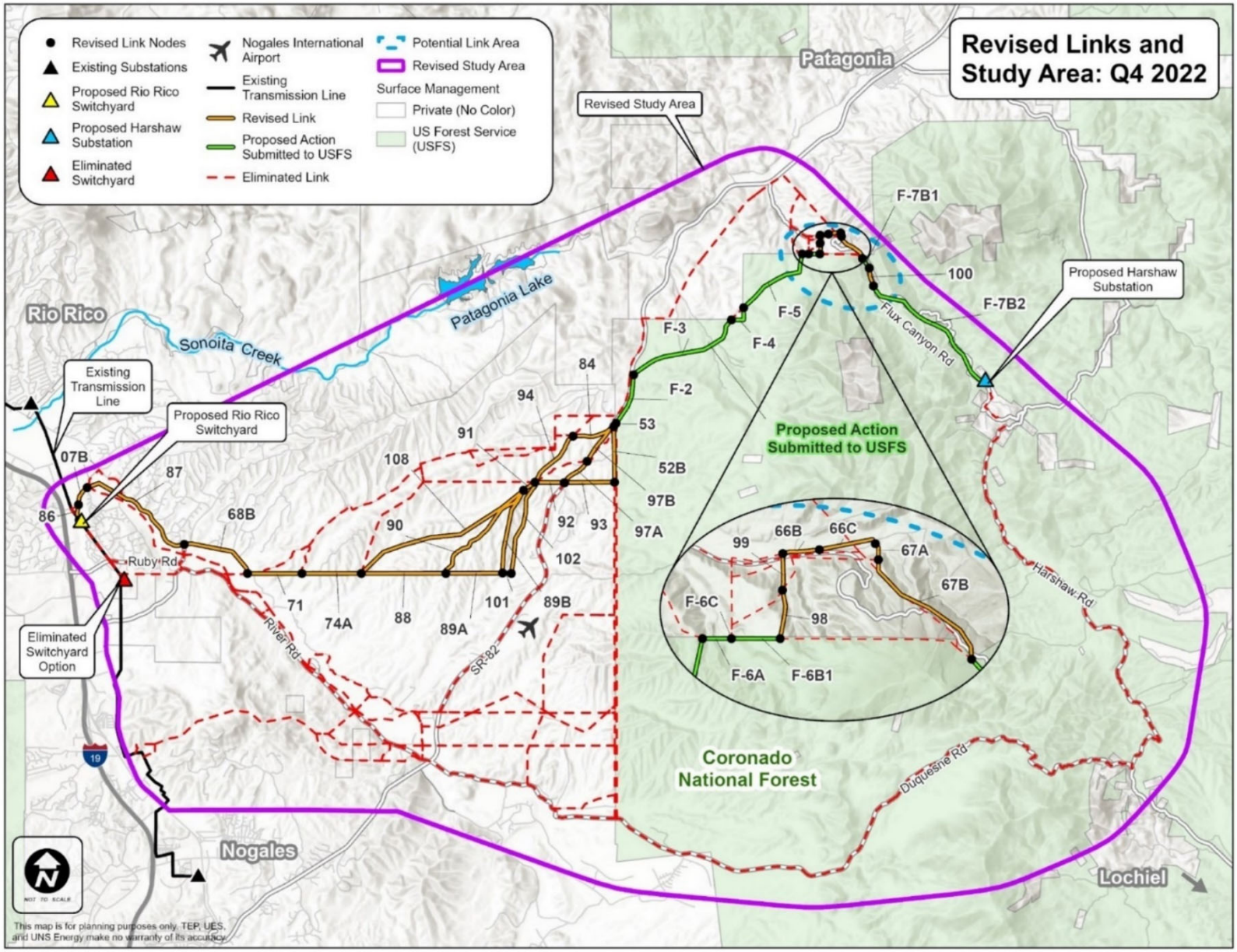
As a result of public and stakeholder outreach efforts in January 2023, and following further analysis of the potential Duquesne/Harshaw Road route, UNSE confirmed the final alternatives and the preferred route, as proposed. A few comments were received expressing a preference for alternative sections 2A and 2B to mitigate visual impacts. UNSE acknowledges these route sections would likely result in a smaller impact visually. However, UNSE believes the overall impacts would be greater because route sections 1A and 1B are located within an existing utility corridor. As a result, UNSE has made the determination to move forward with the routes identified through this siting process, including the Preferred Route, as illustrated in Figure 22.

This page intentionally left blank

APPENDIX A

COMPATIBILITY ANALYSIS

This page intentionally left blank


Revised Links and Study Area: Q4 2022
Revised Link Nodes
Existing Substations
Proposed Rio Rico Switchyard
Proposed Harshaw Substation
Eliminated Switchyard
Nogales International Airport
Existing Transmission Line
Revised Link
Proposed Action Submitted to USFS
Eliminated Link
Potential Link Area
Revised Study Area
Surface Management
Private (No Color)
US Forest Service (USFS)
Revised Study Area
Patagonia
Rio Rico
Sonoita Creek
Patagonia Lake
Existing Transmission Line
Proposed Rio Rico Switchyard
Eliminated Switchyard Option
Proposed Harshaw Substation
Proposed Action Submitted to USFS
Coronado National Forest
Nogales
Lochiel
Ruby Rd
River Rd
SR-82
Flux Canyon Rd
Harshaw Rd
Duquesne Rd
F-7B1
F-7B2
100
F-5
F-4
F-3
F-2
84
94
91
53
52B
97B
97A
108
90
92
93
102
101
89B
89A
88
74A
71
68B
87
07B
86
99
66B
66C
67A
67B
98
F-6C
F-6A
F-6B1
19
This map is for planning purposes only. TEP, UES, and UNS Energy make no warranty of its accuracy.

Link No.	Existing and Planned Land Use	Fish, Wildlife, Plants, includes T&E Species	Scenic Area	Historical/ Archaeological	Noise	Communication Signal Interference	Engineering/ Construction	ROW Acquisition	Public/ Stakeholder Feedback	Overall Average	Overall Avg. Weighted by Comment	Comments
86	1	2	1	1	1	1	1	1	1	1.11	1.35	Preferred because it is the only route under consideration. Impacts are expected to be minimal, will be located to the east of riparian area and down the hill from residential area.
07B	1	2	1	1	1	1	1	1	1	1.11	1.35	Preferred because it is the only route under consideration. Impacts are expected to be minimal, will be located to the east of riparian area and down the hill from residential area.
87	1	3	1	3	1	1	1	1	1	1.44	1.76	Preferred because it is the only route under consideration. Crosses through some riparian areas, some PPC habitat, and a couple of known cultural sites.
68B	1	3	2	3	1	1	1	1	1	1.56	1.99	Preferred because it is the only route under consideration. Crosses through some riparian areas, some PPC habitat, a couple of known cultural sites, and a county/city park.
71	1	2	2	2	1	1	2	1	2	1.56	1.61	Preferred because it is the only route under consideration. A little more challenging from an engineering perspective due to terrain. Crosses through some riparian areas, some PPC habitat, a couple of known cultural sites, and a county/city park.
74A	1	2	1	1	1	1	1	1	1	1.11	1.35	Preferred because it is the only route under consideration.
88	1	2	1	1	1	1	1	1	1	1.11	1.35	Preferred because it is the only route under consideration.
89A	1	2	1	1	1	1	1	1	1	1.11	1.35	Selected as an alternative route primarily because it would be located in a virgin corridor, where the preferred route is co-located with an existing gas pipeline.
101	1	2	1	1	1	1	1	1	1	1.11	1.35	Selected as an alternative route primarily because it would be located in a virgin corridor, where the preferred route is co-located with an existing gas pipeline.
102	1	2	1	1	1	1	2	1	1	1.22	1.35	Selected as an alternative route primarily because it would be located in a virgin corridor, where the preferred route is co-located with an existing gas pipeline.

Link No.	Existing and Planned Land Use	Fish, Wildlife, Plants, includes T&E Species	Scenic Area	Historical/ Archaeological	Noise	Communication Signal Interference	Engineering/ Construction	ROW Acquisition	Public/ Stakeholder Feedback	Overall Average	Overall Avg. Weighted by Comment	Comments
110	1	2	2	1	1	1	2	2	1	1.44	1.59	Selected as preferred because it has similar impacts, but appeals to the preference of Lake Patagonia Estates residents to be further from community and down lower.
111	1	2	2	1	1	1	2	2	1	1.44	1.59	Selected as preferred because, similar to Link 110 it keeps the route further from residents in Lake Patagonia Estates pursuant to comments received, and otherwise has similar impacts.
108	1	2	1	1	1	1	2	1	1	1.22	1.35	Eliminated because all routes in this area affect the same landowner who has been deferential to UNSE to this point and while the Lake Patagonia Estates residents did not specifically comment on this link, they verbally expressed preference for other links further from community.
90	1	1	1	1	1	1	1	2	1	1.11	1.00	Lake Patagonia Estates residents did not specifically comment on this link, but verbally expressed preference for other links further from community. Despite this, route was selected as the preferred because it co-located the line with an existing gas pipeline and is preferred from an engineering standpoint.
89B	1	1	2	1	1	1	1	1	1	1.11	1.24	Lake Patagonia Estates residents did not specifically comment on this link, but verbally expressed preference for other links further from community. Eliminated because it affects same landowners as link 102, but is located on ridgeline with greater potential impacts to aviation and views.
91	2	1	2	1	1	1	1	1	2	1.33	1.57	Eliminated because all routes in this area affect the same landowner who has been deferential to UNSE to this point and while the Lake Patagonia Estates residents did not specifically comment on this link, they verbally expressed preference for other links further from community.

Link No.	Existing and Planned Land Use	Fish, Wildlife, Plants, includes T&E Species	Scenic Area	Historical/ Archaeological	Noise	Communication Signal Interference	Engineering/ Construction	ROW Acquisition	Public/ Stakeholder Feedback	Overall Average	Overall Avg. Weighted by Comment	Comments
92	2	2	2	1	1	1	1	2	1	1.44	1.92	Eliminated because all routes in this area affect the same landowner who has been deferential to UNSE to this point and while the Lake Patagonia Estates residents did not specifically comment on this link, they verbally expressed preference for other links further from community.
93	1	2	3	1	1	1	2	2	1	1.56	1.83	Selected as an alternative route primarily because it would be located in a virgin corridor, where the preferred route is co-located within an existing linear corridor (SR 82).
52B	1	2	2	1	1	1	2	2	1	1.44	1.59	Selected as an alternative route primarily because it would be located in a virgin corridor, where the preferred route is co-located within an existing linear corridor (SR 82).
94	3	2	2	1	1	1	1	3	3	1.89	2.25	Eliminated due to strong opposition from residents in the area and there are two other viable options in the area with otherwise similar impacts.
84	3	2	3	1	1	1	1	3	3	2.00	2.49	Eliminated due to strong opposition from residents in the area and there are two other viable options in the area with otherwise similar impacts.
97A	1	2	3	1	1	1	2	2	2	1.67	1.83	Preferred route because it is co-located with existing linear infrastructure (SR 82). SR 82 is designated scenic.
97B	1	3	3	1	1	1	2	2	2	1.78	2.18	Preferred route because it is co-located with existing linear infrastructure (SR 82). SR 82 is designated scenic.
F-2	2	2	3	1	1	1	2	2	2	1.78	2.16	Preferred because it is the only route under consideration.
F-3	2	2	1	1	1	1	1	2	1	1.33	1.69	Preferred because it is the only route under consideration.
F-4	2	2	1	1	1	1	1	2	1	1.33	1.69	Preferred because it is the only route under consideration.
F-5A	2	2	1	1	1	1	1	2	1	1.33	1.69	Preferred because it is the only route under consideration.

Link No.	Existing and Planned Land Use	Fish, Wildlife, Plants, includes T&E Species	Scenic Area	Historical/ Archaeological	Noise	Communication Signal Interference	Engineering/ Construction	ROW Acquisition	Public/ Stakeholder Feedback	Overall Average	Overall Avg. Weighted by Comment	Comments
F-5B	2	2	1	1	1	1	1	2	1	1.33	1.69	Despite being the proposed action in UNSE's application to the USFS for a special use authorization, selected as an alternative because it would have greater land use impacts than the preferred, but would otherwise result in similar impacts, and has strong opposition from area residents.
F-6A	3	3	1	1	1	1	2	3	3	2.00	2.37	Despite being the proposed action in UNSE's application to the USFS for a special use authorization, selected as an alternative because it would have greater land use impacts than the preferred, but would otherwise result in similar impacts, and has strong opposition from area residents.
F-6B1	3	3	1	1	1	1	2	3	3	2.00	2.37	Despite being the proposed action in UNSE's application to the USFS for a special use authorization, selected as an alternative because it would have greater land use impacts than the preferred, but would otherwise result in similar impacts, and has strong opposition from area residents.
98	3	1	1	1	1	1	1	3	3	1.67	1.66	Despite being the proposed action in UNSE's application to the USFS for a special use authorization, selected as an alternative because it would have greater land use impacts than the preferred, but would otherwise result in similar impacts, and has strong opposition from area residents.
99	3	2	1	1	1	1	1	3	3	1.78	2.02	Despite being the proposed action in UNSE's application to the USFS for a special use authorization, selected as an alternative because it would have greater land use impacts than the preferred, but would otherwise result in similar impacts, and has strong opposition from area residents.
66B	3	3	1	1	1	1	1	3	3	1.89	2.37	Despite being the proposed action in UNSE's application to the USFS for a special use authorization, selected as an alternative because it would have greater land use impacts than the preferred, but would otherwise result in similar impacts, and has strong opposition from area residents.

Link No.	Existing and Planned Land Use	Fish, Wildlife, Plants, includes T&E Species	Scenic Area	Historical/ Archaeological	Noise	Communication Signal Interference	Engineering/ Construction	ROW Acquisition	Public/ Stakeholder Feedback	Overall Average	Overall Avg. Weighted by Comment	Comments
66C	3	3	1	1	1	1	1	3	3	1.89	2.37	Despite being the proposed action in UNSE's application to the USFS for a special use authorization, selected as an alternative because it would have greater land use impacts than the preferred, but would otherwise result in similar impacts, and has strong opposition from area residents.
67A	3	3	1	1	1	1	3	3	3	2.11	2.37	Despite being the proposed action in UNSE's application to the USFS for a special use authorization, selected as an alternative because it would have greater land use impacts than the preferred, but would otherwise result in similar impacts, and has strong opposition from area residents.
67B	3	2	1	1	1	1	3	3	3	2.00	2.02	Despite being the proposed action in UNSE's application to the USFS for a special use authorization, selected as an alternative because it would have greater land use impacts than the preferred, but would otherwise result in similar impacts, and has strong opposition from area residents.
F-7B1	2	3	1	1	1	1	2	2	1	1.56	2.04	Despite being the proposed action in UNSE's application to the USFS for a special use authorization, selected as an alternative because it would have greater land use impacts than the preferred, but would otherwise result in similar impacts, and has strong opposition from area residents.
100	1	3	1	1	1	1	2	1	1	1.33	1.71	Despite being the proposed action in UNSE's application to the USFS for a special use authorization, selected as an alternative because it would have greater land use impacts than the preferred, but would otherwise result in similar impacts, and has strong opposition from area residents.
F-7B2	2	3	1	3	1	1	3	2	2	2.00	2.09	Preferred because it is the only route under consideration.
F-8	2	3	1	1	1	1	3	2	1	1.67	2.04	Preferred because it would avoid residential Flux Canyon neighborhood.

APPENDIX B

USFS LETTER

This page intentionally left blank

USDA United States Department of Agriculture | Forest Service | Coronado National Forest Supervisor's Office

300 West Congress St.
Tucson, AZ 85701
520-388-8300
Fax: 520-388-8305

File Code: 5590
Date: March 2, 2018

The Honorable John McCain
United States Senator
c/o Nick Matiella
218 Russell Senate Building
Washington, DC 20510

Dear Senator McCain:

Thank you for your letter dated February 26, 2018, regarding determination of ownership of roads existing on the Coronado National Forest (CNF) within Santa Cruz County (the County).

Many, if not all, of the roads appear to possess sufficient historical background to succeed in a County RS2477 claim. The County has been apprised of the method to seek federal court recognition of these nascent claims, or alternatively of the method to seek an administrative determination of that likely status through the USDA Forest Service Southwestern Regional Office.

The CNF supports formal recognition of the RS2477 nascent claims should they be legally or administratively sufficient. In the meantime, the County continues to operate and maintain the roads as it has previously done.

The CNF recognizes County maintenance of these roads as a benefit, does not desire to upset the current maintenance arrangement, and is not opposed to improvements to this roadway. However, the CNF would like to ensure all required documentation is in place in compliance with the current regulatory framework in an effort to eliminate any liability or legal vulnerabilities.

The County has been advised of a National Forest Road and Trail Act (FRTA) easement as a preferred alternative to the RS2477 claim validation. The advantage of a FRTA easement is that it can be granted in a more timely manner and can be granted for the existing road prism as well as improvements outside of this prism, whereas, RS2477 rights could pertain only to the road footprint at the time the road was declared a county public road in the year 1900. It should be noted that pursuing a FRTA easement does not extinguish the right to assert RS2477 rights and this more lengthy process could be pursued concurrently with the FRTA easement process.

The County and the Taylor Mining Project Proponent (Arizona Mining Inc. (AMI)) have been made aware that private utility installations on the CNF are not 'covered' by a road easement, road right-of-way, or RS2477 claim or title. A Special Use Permit (SUP) is required for these installations.

The U.S. Forest Service (USFS) has been aware of substantial historical documentation supporting potential RS2477 rights-of-way. This includes the three existing roads which access the Taylor Mining Project area from paved highways outside the Forest. To date, the County has not responded to the USFS concerning which method, if any, they wish to pursue to 'perfect' their rights-of-ways sufficient for USFS recognition.

The USFS believes the most logical road and utility route to the Taylor Mine Project inholding is along Flux Canyon (this route is geographically the shortest and most direct and has an existing utility easement and powerline). AMI representatives indicated agreement with this belief in a recent February 2, 2018 meeting between AMI and USFS District, lands, and engineering personnel.

Flux Canyon Road on the Coronado is not currently operated and maintained by the County but the County reportedly possesses sufficient historical basis for an RS2477 claim or administrative determination approach (or a potential FRTA easement option). The County believes they have perpetual legal access from the Arizona Department of Transportation highway through private land to the Forest boundary and then through one or more private inholdings that the Flux Canyon route runs through.

Flux Canyon also currently hosts a 13.2 kV electrical transmission line which currently supplies, among other locations, the Taylor Mining Project inholding. AMI has indicated that this transmission line needs an upgrade to supply power sufficient for the project to proceed. CNF has informed AMI that such an upgrade would require an amendment to the existing powerline SUP (held by Unisource Energy) on National Forest System lands which would include some level of National Environmental Policy Act (NEPA) analysis. To date, an SUP application for this amendment has not been received by CNF.

AMI has expressed the need for a fiber optic line to the project inholding. CNF believes the preferred alignment of this line would be up Flux Canyon and has informed AMI that this requires an SUP (separate from the powerline SUP) and would include some level of NEPA analysis. To date, an SUP application for this project has not been received by CNF.

Thank you for your inquiry, and please let me know if you need further clarification or information on your constituent's request.

Sincerely,

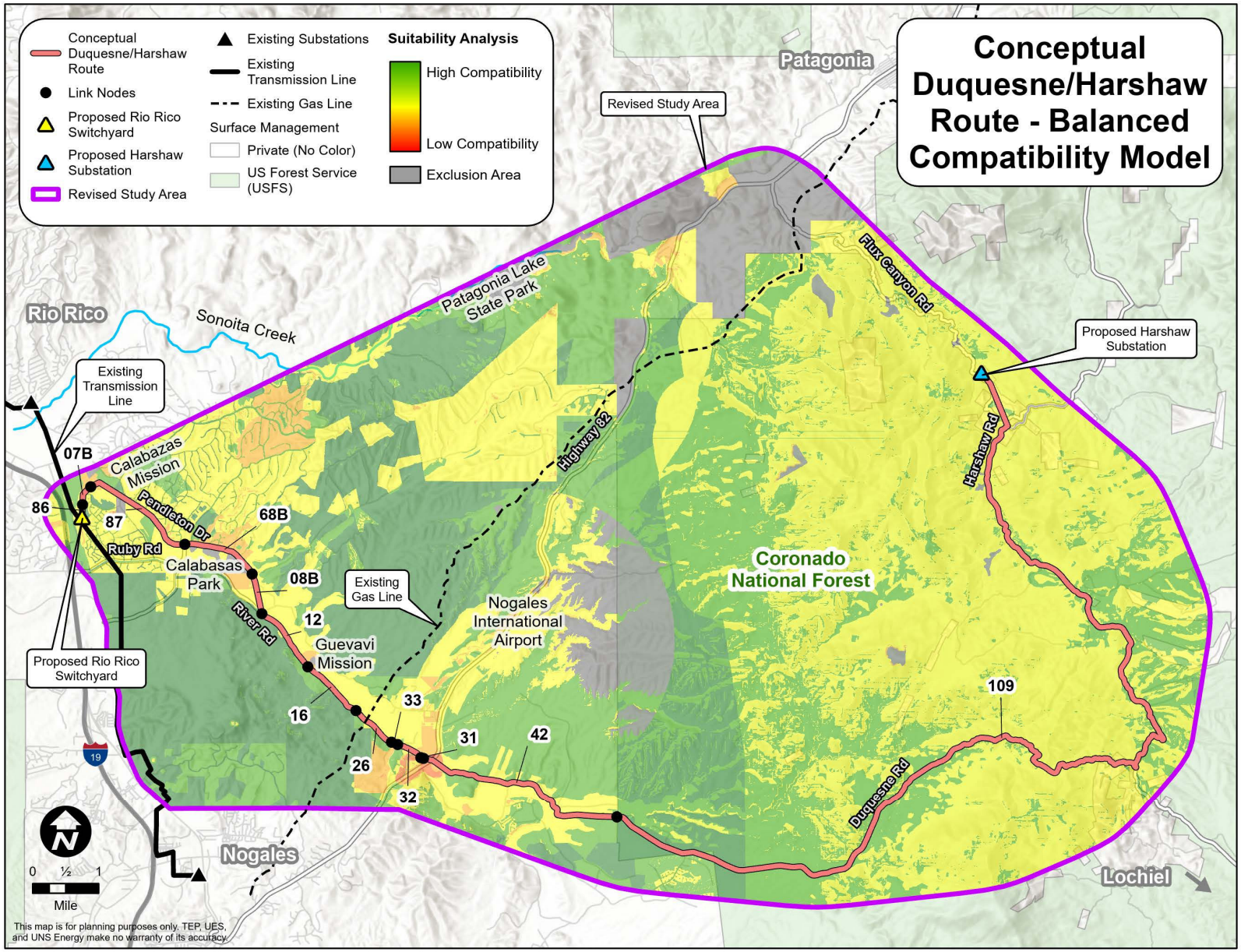
Kerwin S. Dewberry

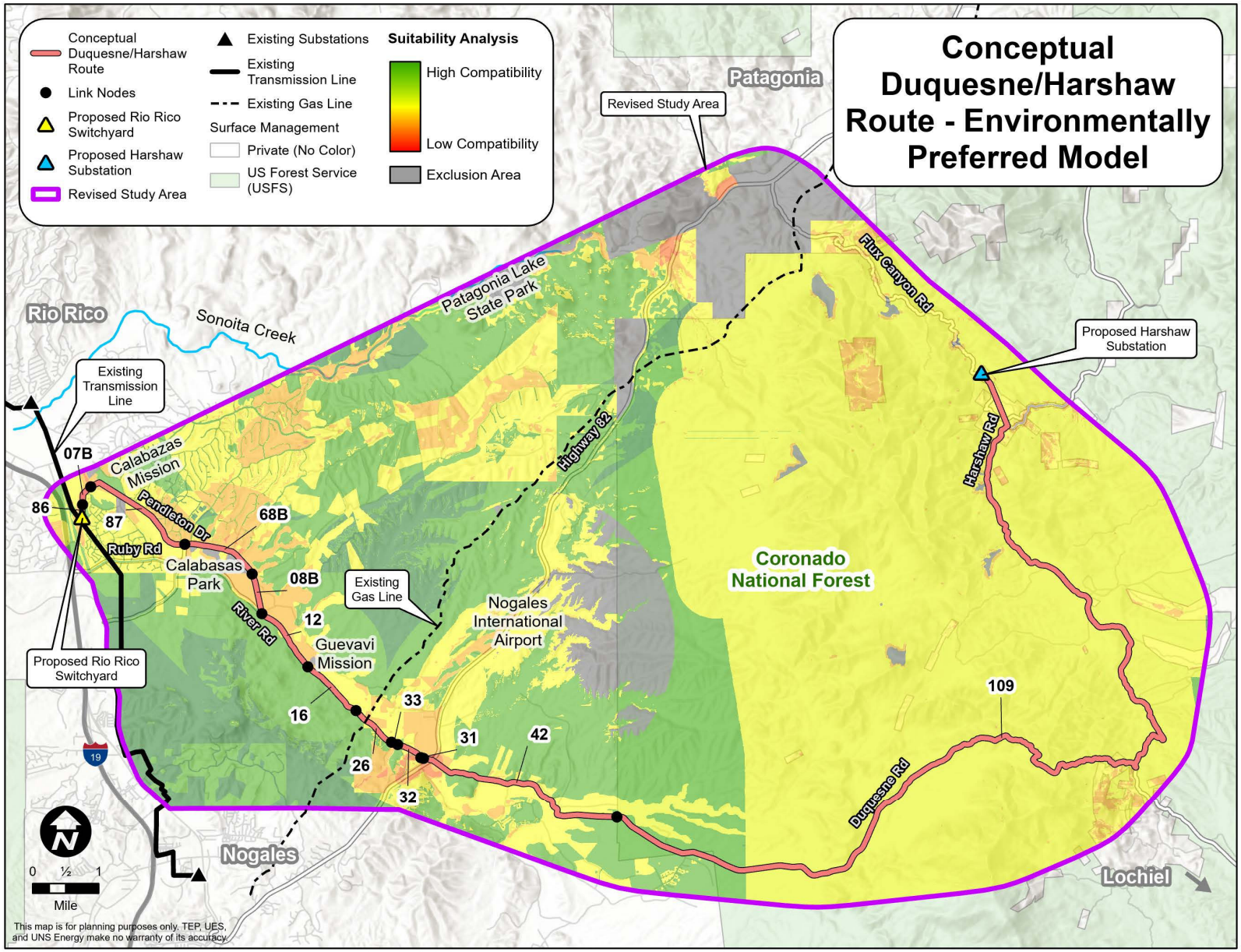
KERWIN S. DEWBERRY
Forest Supervisor

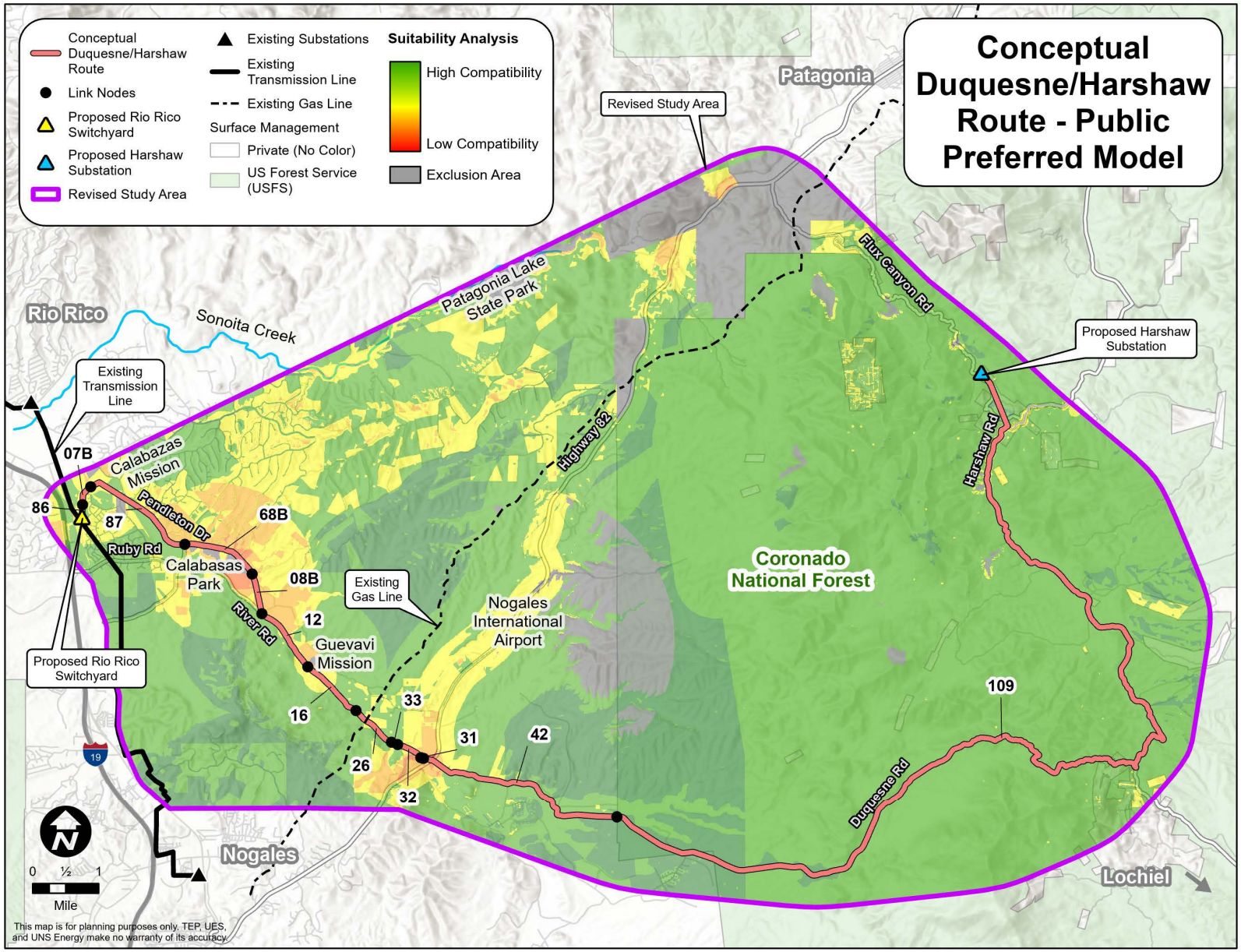
APPENDIX C

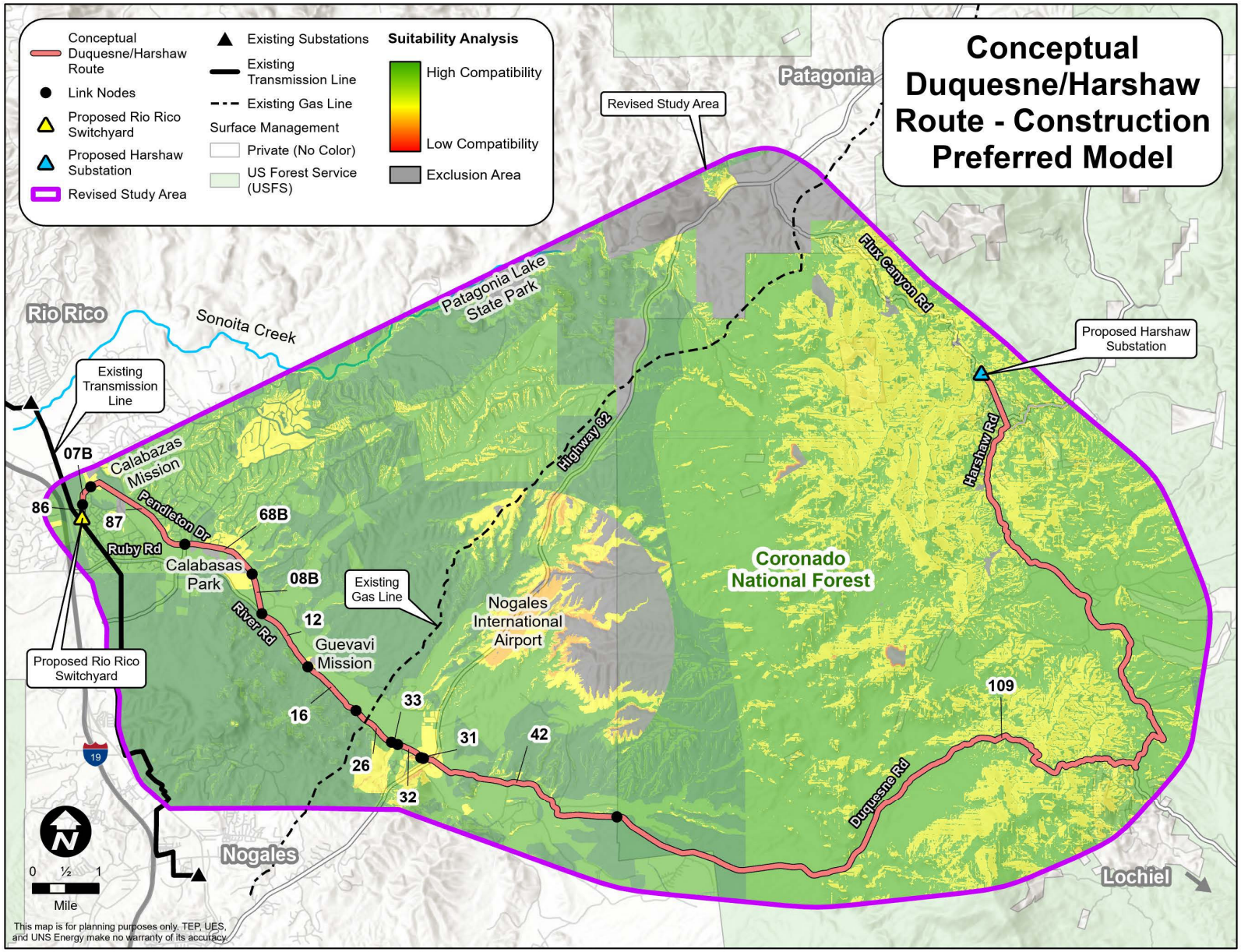
SUITABILITY ASSESSMENT – POTENTIAL DUQUESNE/HARSHAW ROAD ROUTE

This page intentionally left blank


Conceptual Duquesne/Harshaw Route - Balanced Compatibility Model
Conceptual Duquesne/Harshaw Route
Link Nodes
Proposed Rio Rico Switchyard
Proposed Harshaw Substation
Revised Study Area
Existing Substations
Existing Transmission Line
Existing Gas Line
Surface Management
Private (No Color)
US Forest Service (USFS)
Suitability Analysis
High Compatibility
Low Compatibility
Exclusion Area
Patagonia
Revised Study Area
Rio Rico
Sonoita Creek
Patagonia Lake State Park
Flux Canyon Rd
Proposed Harshaw Substation
Existing Transmission Line
Calabazas Mission
07B
86
87
Pendleton Dr
68B
Ruby Rd
Calabasas Park
08B
Highway 82
Harshaw Rd
Existing Gas Line
Coronado National Forest
River Rd
12
Nogales International Airport
Guevavi Mission
Proposed Rio Rico Switchyard
16
33
31
42
109
26
32
Duquesne Rd
Nogales
Lochiel
0 ½ 1
Mile
This map is for planning purposes only. TEP, UES, and UNS Energy make no warranty of its accuracy.


Conceptual Duquesne/Harshaw Route - Environmentally Preferred Model
Conceptual Duquesne/Harshaw Route
Link Nodes
Proposed Rio Rico Switchyard
Proposed Harshaw Substation
Revised Study Area
Existing Substations
Existing Transmission Line
Existing Gas Line
Surface Management
Private (No Color)
US Forest Service (USFS)
Suitability Analysis
High Compatibility
Low Compatibility
Exclusion Area
Patagonia
Revised Study Area
Rio Rico
Sonoita Creek
Patagonia Lake State Park
Existing Transmission Line
Proposed Harshaw Substation
Flux Canyon Rd
Harshaw Rd
Highway 82
07B
86
87
Calabazas Mission
Pendleton Dr
68B
Ruby Rd
Calabasas Park
08B
Existing Gas Line
River Rd
12
Guevavi Mission
Nogales International Airport
Coronado National Forest
Proposed Rio Rico Switchyard
16
33
31
42
26
32
109
Duquesne Rd
Nogales
Lochiel
0 ½ 1
Mile
This map is for planning purposes only. TEP, UES, and UNS Energy make no warranty of its accuracy.

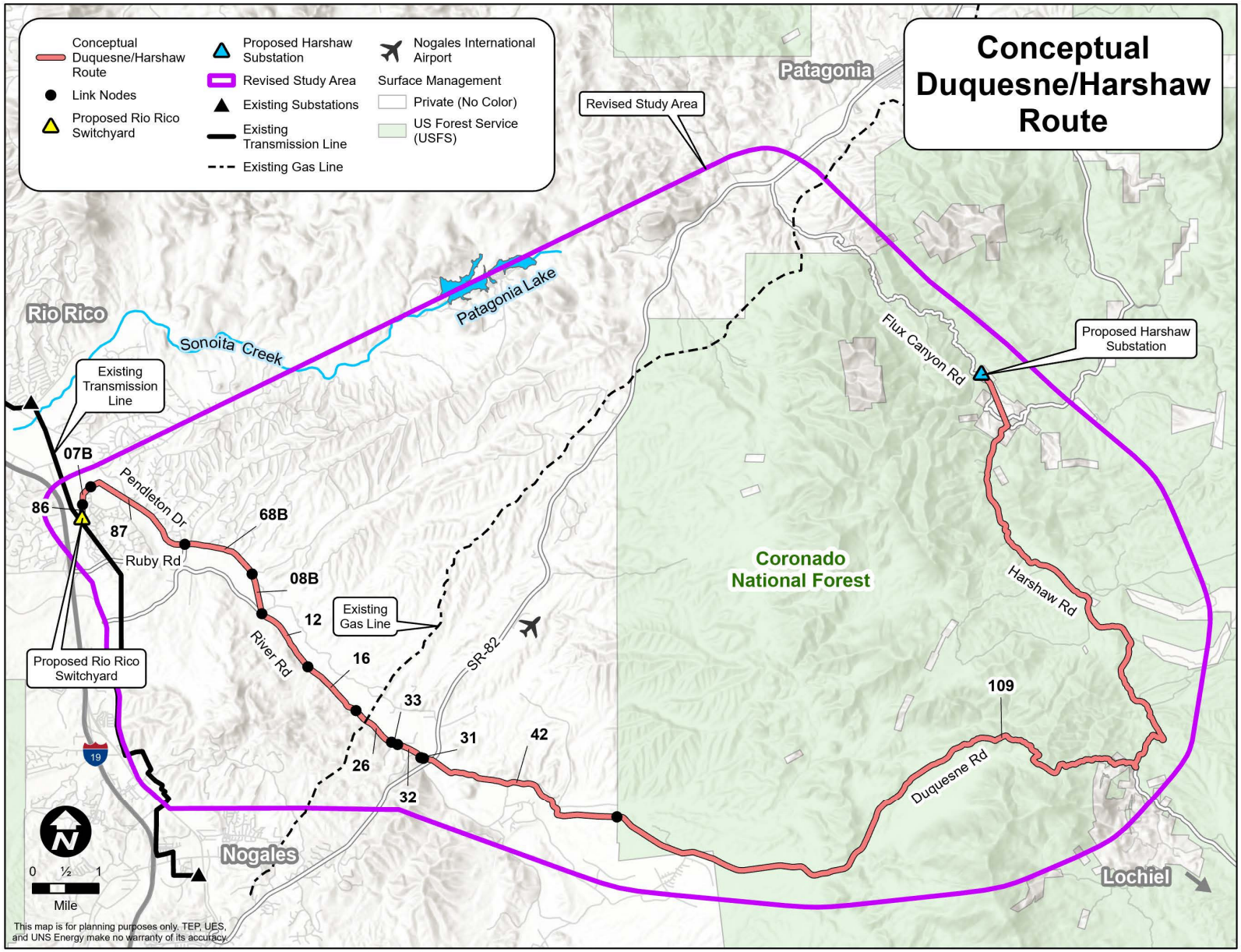

Conceptual Duquesne/Harshaw Route - Public Preferred Model
Conceptual Duquesne/Harshaw Route
Link Nodes
Proposed Rio Rico Switchyard
Proposed Harshaw Substation
Revised Study Area
Existing Substations
Existing Transmission Line
Existing Gas Line
Surface Management
Private (No Color)
US Forest Service (USFS)
Suitability Analysis
High Compatibility
Low Compatibility
Exclusion Area
Patagonia
Revised Study Area
Rio Rico
Sonoita Creek
Patagonia Lake State Park
Flux Canyon Rd
Proposed Harshaw Substation
Existing Transmission Line
Calabazas Mission
Pendleton Dr
Ruby Rd
Calabasas Park
Highway 82
Harshaw Rd
Coronado National Forest
Existing Gas Line
Nogales International Airport
River Rd
Guevavi Mission
Proposed Rio Rico Switchyard
07B
86
87
68B
08B
12
16
33
31
42
26
32
109
Duquesne Rd
Nogales
Lochiel
0 ½ 1
Mile
This map is for planning purposes only. TEP, UES, and UNS Energy make no warranty of its accuracy.


Conceptual Duquesne/Harshaw Route - Construction Preferred Model
Conceptual Duquesne/Harshaw Route
Link Nodes
Proposed Rio Rico Switchyard
Proposed Harshaw Substation
Revised Study Area
Existing Substations
Existing Transmission Line
Existing Gas Line
Surface Management
Private (No Color)
US Forest Service (USFS)
Suitability Analysis
High Compatibility
Low Compatibility
Exclusion Area
Patagonia
Revised Study Area
Rio Rico
Sonoita Creek
Patagonia Lake State Park
Flux Canyon Rd
Proposed Harshaw Substation
Existing Transmission Line
Calabazas Mission
Pendleton Dr
Ruby Rd
Calabasas Park
Highway 82
Harshaw Rd
Coronado National Forest
Existing Gas Line
Nogales International Airport
River Rd
Guevavi Mission
Proposed Rio Rico Switchyard
07B
86
87
68B
08B
12
16
33
31
42
26
32
109
Duquesne Rd
Nogales
Lochiel
0 ½ 1
Mile
This map is for planning purposes only. TEP, UES, and UNS Energy make no warranty of its accuracy.

APPENDIX D

COMPATIBILITY ANALYSIS – POTENTIAL DUQUESNE/HARSHAW ROAD ROUTE

This page intentionally left blank


Conceptual Duquesne/Harshaw Route
Conceptual Duquesne/Harshaw Route
Link Nodes
Proposed Rio Rico Switchyard
Proposed Harshaw Substation
Revised Study Area
Existing Substations
Existing Transmission Line
Existing Gas Line
Nogales International Airport
Surface Management
Private (No Color)
US Forest Service (USFS)
Revised Study Area
Patagonia
Patagonia Lake
Rio Rico
Sonoita Creek
Existing Transmission Line
Flux Canyon Rd
Proposed Harshaw Substation
07B
86
87
Pendleton Dr
Ruby Rd
68B
08B
12
Existing Gas Line
River Rd
16
SR-82
33
31
42
26
32
Proposed Rio Rico Switchyard
Coronado National Forest
Harshaw Rd
109
Duquesne Rd
Nogales
Lochiel
19
0 ½ 1
Mile
This map is for planning purposes only. TEP, UES, and UNS Energy make no warranty of its accuracy.

Link No.	Existing and Planned Land Use	Fish, Wildlife, Plants, includes T&E Species	Scenic Area	Historical/ Archaeological	Noise	Communication Signal Interference	Engineering/ Construction	ROW Acquisition	Public/ Stakeholder Feedback	Overall Average	Overall Avg. Weighted by Comment
86	1	2	1	1	1	1	1	1	1	1.11	1.35
07B	1	2	1	1	1	1	1	1	1	1.11	1.35
87	1	3	1	3	1	1	1	1	1	1.44	1.76
68B	1	3	2	3	1	1	1	1	1	1.56	1.99
8B	1	3	1	3	1	1	1	1	3	1.67	1.76
12	1	3	3	3	1	1	1	1	3	1.89	2.23
16	1	3	3	3	1	1	1	1	3	1.89	2.23
26	1	3	1	1	1	1	1	1	3	1.44	1.71
33	1	3	1	1	1	1	1	1	3	1.44	1.71
32	3	3	1	1	3	1	1	2	3	2.00	2.46
31	3	3	1	3	3	1	1	2	3	2.22	2.51
42	2	3	1	1	1	1	1	2	2	1.56	2.04
109	2	3	1	3	1	1	3	3	2	2.11	2.09

APPENDIX E

CONSERVATION EASEMENT CORRESPONDENCE

This page intentionally left blank

October 8, 2020
Richard and Diana Nash
[redacted]

Re: Rio Rico-Harshaw Transmission Line

To whom it may concern

We are submitting our comments of concern over parcels which are within the high voltage transmission line preliminary study area. We represent the Circle Z Ranch Associates and Lucia Nash, owners of parcels, 106-01-015, 106-01-017, 106-01-018. These parcels fall within your study area.

We are adamantly opposed to the construction of this line across any of the aforementioned parcels. First of all, 3625 acres within this study are protected by a perpetual conservation easement, established and recorded on September 19, 2013 between Lucia Nash and the Arizona Land and Water Trust. This property possesses important wildlife habitat, biological diversity, ranching and its ranching heritage, plus significant riparian areas that are of great importance to the residents of Santa Cruz County and the state of Arizona. A high voltage transmission line through our property would adversely affect the well established and recognized value of this properties contribution to the inherent conservation values.

Secondly, Circle Z Ranch is the oldest continuously operating dude ranch in the state of Arizona. Established in 1926 we contribute greatly to the tourism industry in this area. The reason people from around the world to our ranch and are attracted to this area is due to the unobstructed vistas, the conservation values, and for the enjoyment of a protected open space that has become quite rare in our society. A high voltage transmission line would adversely affect the tourism value of our land and would more than likely severely affect our ability to offer the quality vacations our guests have been accustomed to.

Thirdly, the Hermosa mining executives have in the past put pressure on us to sell property for their use, and we have adamantly refused their pressure. Subsequently they have purchased numerous properties surrounding us, often paying way more than market value for these purchases. They have also said numerous times they could easily undo the conservation easement on our property. This is a legally binding document and cannot be dismissed, even for the mining industry. When the mining executives first approached us with their “plan”, it was to purchase our property in Flux Canyon so they could construct a solar based power generation facility that would power their mining operation. Now that they have purchased many parcels of land in and around Patagonia and in the Flux Canyon area, why are they not constructing their own power generation facilities? Why should this area become an industrial complex with high voltage power lines polluting the vistas?

We are very concerned with the construction of this power line and encourage the Unisource to help the mines identify less intrusive and more sustainable power resources.

Sincerely

Rick and Diana Nash

ARIZONA LAND AND WATER TRUST

Since 1978

President
Diana Freshwater

Vice President
Ben Brophy

Secretary
Chuck Pettis

Treasurer
Britton Simmons

Laura Brown
Les Corey
Fred Frelinghuysen
Charlotte Hanson
Fritz Jandrey
Pat Lopez, III
Nanette Pageau
Karen Riggs
Bill Roe
Peggy Rowley
George Ruyle
Bill Shaw

President Emeritus
Jeff Hampton

Executive Director
Liz Petterson

November 1, 2021

Richard & Diana Nash
[redacted]

Re: Unisource Power Line

Dear Richard & Diana,

Thank you for meeting with Cameron and I regarding the possible easements for new electric lines. As we discussed, it is our understanding that Unisource Energy, or one of its affiliates, is seeking to establish a route for a new high voltage power line to serve other customers that may require locating additional utility easements across the Circle Z Ranch. Arizona Land & Water Trust holds, as a result of your generous partnership, a conservation easement over the Ranch. Although existing utility easements may be maintained under the conservation easement, the property owner is specifically prohibited from granting any new utility easements and/or lines. Additionally, we are concerned that the construction and installation of the necessary support facilities for such lines would significantly impact the conservation values we are obligated to protect. Since the specific routes are still being discussed and reviewed by the utility, we have not attempted to analyze the existing easements which have been proposed as parallel corridors for the new utility lines.

We know from our meeting that you are concerned about this as well. We thought, however, it best to convey to you in writing our opposition to any new high voltage power lines going through, over, or across the property reserved for the conservation easement.

We appreciate your considerations and assistance with this matter.

Sincerely,

Liz Petterson
Executive Director

ACCREDITED LAND TRUST ACCREDITATION COMMISSION

APPENDIX F

FEDERAL AVIATION ADMINISTRATION NOTICE OF PRELIMINARY FINDINGS

This page intentionally left blank

Mail Processing Center
Federal Aviation Administration
Southwest Regional Office
Obstruction Evaluation Group
10101 Hillwood Parkway
Fort Worth, TX 76177

Aeronautical Study No.
2021-AWP-16183-OE

Issued Date: 02/22/2022

Diana Sandoval
Tucson Electric Power Co.
3950 E. Irvington Road
Tucson, AZ 85714

**** NOTICE OF PRELIMINARY FINDINGS ****

The Federal Aviation Administration has conducted an aeronautical study under the provisions of 49 U.S.C., Section 44718 and if applicable Title 14 of the Code of Federal Regulations, part 77, concerning:

Structure:	Transmission Line Tower RR-HS-A21
Location:	Patagonia, AZ
Latitude:	31-24-27.27N NAD 83
Longitude:	110-49-29.02W
Heights:	4160 feet site elevation (SE) 95 feet above ground level (AGL) 4255 feet above mean sea level (AMSL)

Initial findings of this study indicate that the structure as described exceeds obstruction standards and/or would have an adverse physical or electromagnetic interference effect upon navigable airspace or air navigation facilities. Pending resolution of the issues described below, the structure is presumed to be a hazard to air navigation.

To pursue a favorable determination at the originally submitted height, further study would be necessary. Further study entails distribution to the public for comment, and may extend the study period up to 120 days. The outcome cannot be predicted prior to public circularization.

If you would like the FAA to conduct further study, you must make the request within 60 days from the date of issuance of this letter.

See Attachment for Additional information.

NOTE: PENDING RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE, THE STRUCTURE IS PRESUMED TO BE A HAZARD TO AIR NAVIGATION. THIS LETTER DOES NOT AUTHORIZE CONSTRUCTION OF THE STRUCTURE EVEN AT A REDUCED HEIGHT. ANY RESOLUTION OF THE ISSUE(S) DESCRIBED ABOVE MUST BE COMMUNICATED TO THE FAA SO THAT A FAVORABLE DETERMINATION CAN SUBSEQUENTLY BE ISSUED.

IF MORE THAN 60 DAYS FROM THE DATE OF THIS LETTER HAS ELAPSED WITHOUT ATTEMPTED RESOLUTION, IT WILL BE NECESSARY FOR YOU TO REACTIVATE THE STUDY BY FILING A NEW FAA FORM 7460-1, NOTICE OF PROPOSED CONSTRUCTION OR ALTERATION.

If we can be of further assistance, please contact Bill Ratts, at (816) 329-2544, or William.M.Ratts@faa.gov. On any future correspondence concerning this matter, please refer to Aeronautical Study Number 2021-AWP-16183-OE.

Signature Control No: 498042841-513381425 (NPF)
Mike Helvey
Manager, Obstruction Evaluation Group

Attachment(s)
Additional Information
Map(s)

Abbreviations

AGL - above ground level
AMSL - above mean sea level
RWY - runway
VFR - visual flight rules
IFR - instrument flight rules
NM - nautical mile
ASN- Aeronautical Study Number
CAT - category aircraft
MDA - minimum descent altitude
DA - decision altitude
Part 77 - Title 14 Code of Federal Regulations (CFR) Part 77, Safe, Efficient Use and Preservation of the Navigable Airspace

A list of commonly used acronyms and abbreviations is available at the end of this document. A full list is available at the FAA's public website at https://oeaaa.faa.gov/oeaaa/downloads/external/content/FAA_Acronyms.pdf.

1. PROPOSAL DESCRIPTION

Proposed is a transmission line near Nogales International Airport (OLS) Nogales, AZ. The OLS airport elevation is 3955 feet AMSL. For the sake of efficiency, 17 of the 23 proposed structures in this project that have similar impacts are included in this narrative.

The proposed wind turbines' described heights and locations are expressed in Above Ground Level (AGL) height, Above Mean Sea Level (AMSL) height and latitude (LAT)/longitude (LONG).

ASN	AGL	AMSL	LAT	LONG
2021-AWP-16183-OE	95	4255	31-24-27.27N	110-49-29.02W
2021-AWP-16184-OE	95	4321	31-24-32.22N	110-49-29.02W
2021-AWP-16185-OE	95	4425	31-24-37.17N	110-49-29.02W
2021-AWP-16186-OE	95	4388	31-24-54.45N	110-49-29.03W
2021-AWP-16187-OE	95	4233	31-25-00.30N	110-49-29.03W
2021-AWP-16188-OE	95	4179	31-25-05.55N	110-49-29.04W
2021-AWP-16189-OE	95	4116	31-25-15.23N	110-49-29.04W
2021-AWP-16190-OE	95	4144	31-25-21.70N	110-49-29.04W
2021-AWP-16191-OE	95	4191	31-25-26.65N	110-49-29.05W
2021-AWP-16192-OE	95	4250	31-25-31.23N	110-49-29.05W
2021-AWP-16193-OE	95	4223	31-25-39.16N	110-49-29.05W
2021-AWP-16194-OE	95	4286	31-25-44.07N	110-49-29.05W
2021-AWP-16197-OE	95	4162	31-26-13.25N	110-49-29.06W
2021-AWP-16198-OE	95	4203	31-26-19.66N	110-49-29.07W
2021-AWP-16199-OE	95	4215	31-26-26.02N	110-49-29.07W
2021-AWP-16200-OE	95	4265	31-26-30.97N	110-49-29.08W
2021-AWP-16201-OE	95	4327	31-26-36.57N	110-49-29.08W

2. TITLE 14 CFR PART 77 - OBSTRUCTION STANDARDS EXCEEDED

a. Section 77.19 (b): Conical Surface: a surface extending outward and upward from the periphery of the Part 77 Horizontal Surface at a slope of 20:1 for a horizontal distance of 4,000 feet. The proposed structures would exceed the OLS Conical Surface by the following:

ASN Exceeds by (feet):

2021-AWP-16183-OE	17
2021-AWP-16184-OE	101
2021-AWP-16185-OE	223
2021-AWP-16186-OE	249
2021-AWP-16187-OE	112
2021-AWP-16188-OE	73
2021-AWP-16197-OE	9
2021-AWP-16198-OE	26
2021-AWP-16199-OE	13
2021-AWP-16200-OE	43
2021-AWP-16201-OE	82

b. Section 77.19 (a): Horizontal Surface: a height exceeding a horizontal plane 150 feet above the established airport elevation. The proposed structures would exceed the OLS Horizontal Surface by the following:

ASN	Exceeds by (feet):
2021-AWP-16189-OE	11
2021-AWP-16190-OE	39
2021-AWP-16191-OE	86
2021-AWP-16192-OE	145
2021-AWP-16193-OE	118
2021-AWP-16194-OE	181

This structure would exceed the OLS VFR Traffic Pattern Airspace in the Part 77 Conical Surface as defined in FAA 7400.2, 6-3-8, Evaluating Effect on VFR Operations by the following:

ASN	Exceeds by (feet):
2021-AWP-16183-OE	17
2021-AWP-16184-OE	101
2021-AWP-16185-OE	223
2021-AWP-16186-OE	249
2021-AWP-16187-OE	112
2021-AWP-16188-OE	73
2021-AWP-16197-OE	9
2021-AWP-16198-OE	26
2021-AWP-16199-OE	13
2021-AWP-16200-OE	43
2021-AWP-16201-OE	82

This structure would exceed the OLS VFR traffic pattern airspace in the Part 77 Horizontal Surface as defined in FAA 7400.2, 6-3-8, Evaluating Effect on VFR Operations by the following:

ASN	Exceeds by (feet):
2021-AWP-16189-OE	11
2021-AWP-16190-OE	39
2021-AWP-16191-OE	86
2021-AWP-16192-OE	145
2021-AWP-16193-OE	118
2021-AWP-16194-OE	181

3. CONDITIONS AND OPTIONS FOR THE DESCRIBED PROPOSAL

a. For the following ASNs you must resolve the VFR Traffic Pattern Airspace penetration of the OLS VFR TPA Transitional or Horizontal Surface by lowering the structure height, with all appurtenances, to a maximum height listed below Penetrations of the visual traffic pattern protected airspace (TPA) are considered by the FAA to be hazards to air navigation.

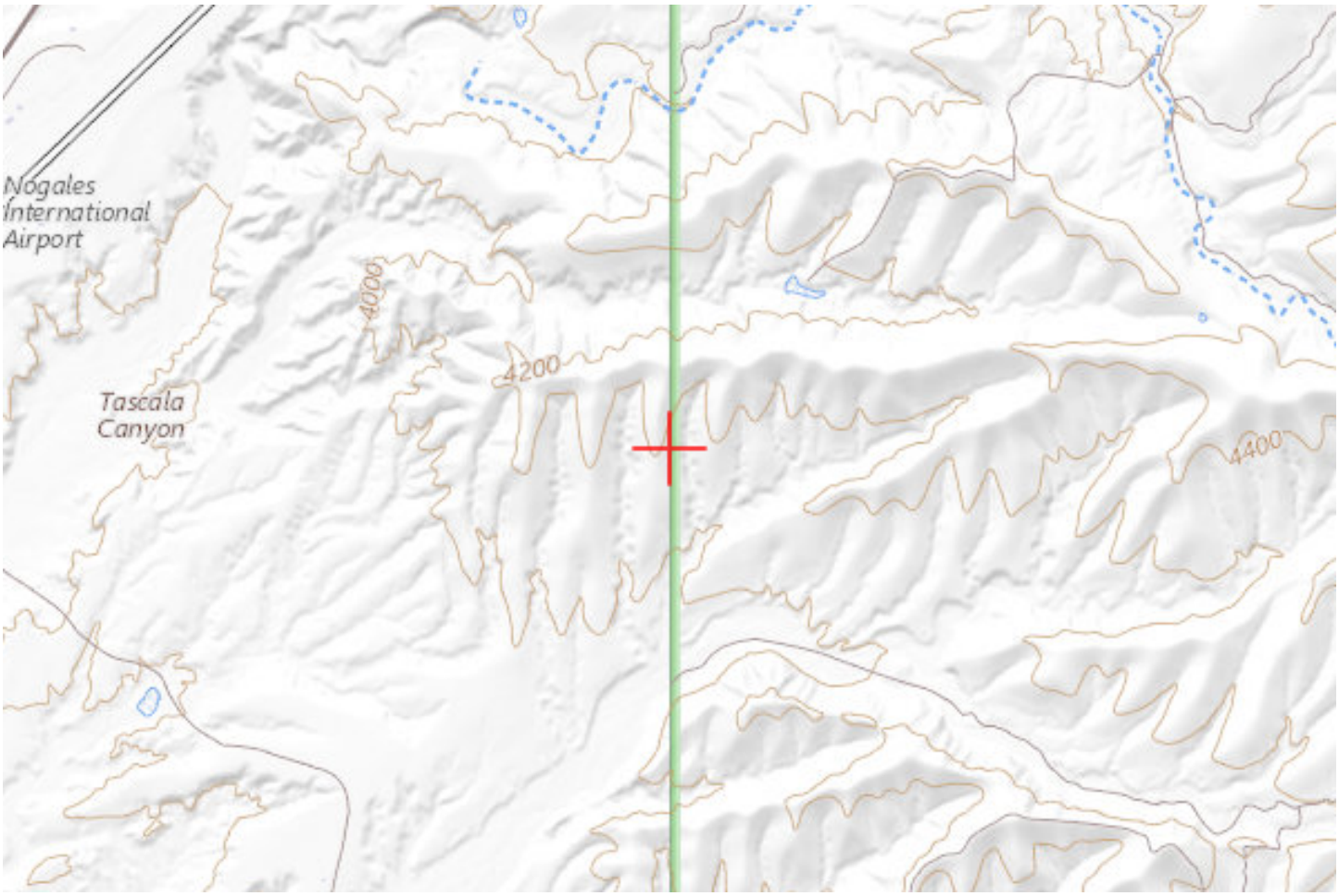
ASN	Maximum Height (feet)
2021-AWP-16183-OE	78(4238 AMSL)
2021-AWP-16184-OE	0 (4226 AMSL)
2021-AWP-16185-OE	0 (4330 AMSL)
2021-AWP-16186-OE	0 (4293 AMSL)
2021-AWP-16187-OE	0 (4138 AMSL)
2021-AWP-16188-OE	22 (4106 AMSL)
2021-AWP-16189-OE	84 (4105 AMSL)
2021-AWP-16190-OE	56 (4105 AMSL)
2021-AWP-16191-OE	9 (4105 AMSL)
2021-AWP-16192-OE	0 (4155 AMSL)
2021-AWP-16193-OE	0 (4128 AMSL)
2021-AWP-16194-OE	0 (4191 AMSL)
2021-AWP-16197-OE	86 (4153 AMSL)
2021-AWP-16198-OE	69 (4177 AMSL)
2021-AWP-16199-OE	82 (4202 AMSL)
2021-AWP-16200-OE	52 (4222 AMSL)
2021-AWP-16201-OE	13 (4245 AMSL)

b. If you agree to reduce the structures to the AGL listed in section 3a and terminate the studies on which any structure height would impact the traffic pattern, a favorable determination can be issued.

c. You can terminate the proposals at these locations.

Please email me at William.M.Ratts@faa.gov or call, 816-329-2544 with any questions you might have regarding these aeronautical studies.

TOPO Map for ASN 2021-AWP-16183-OE



Sectional Map for ASN 2021-AWP-16183-OE

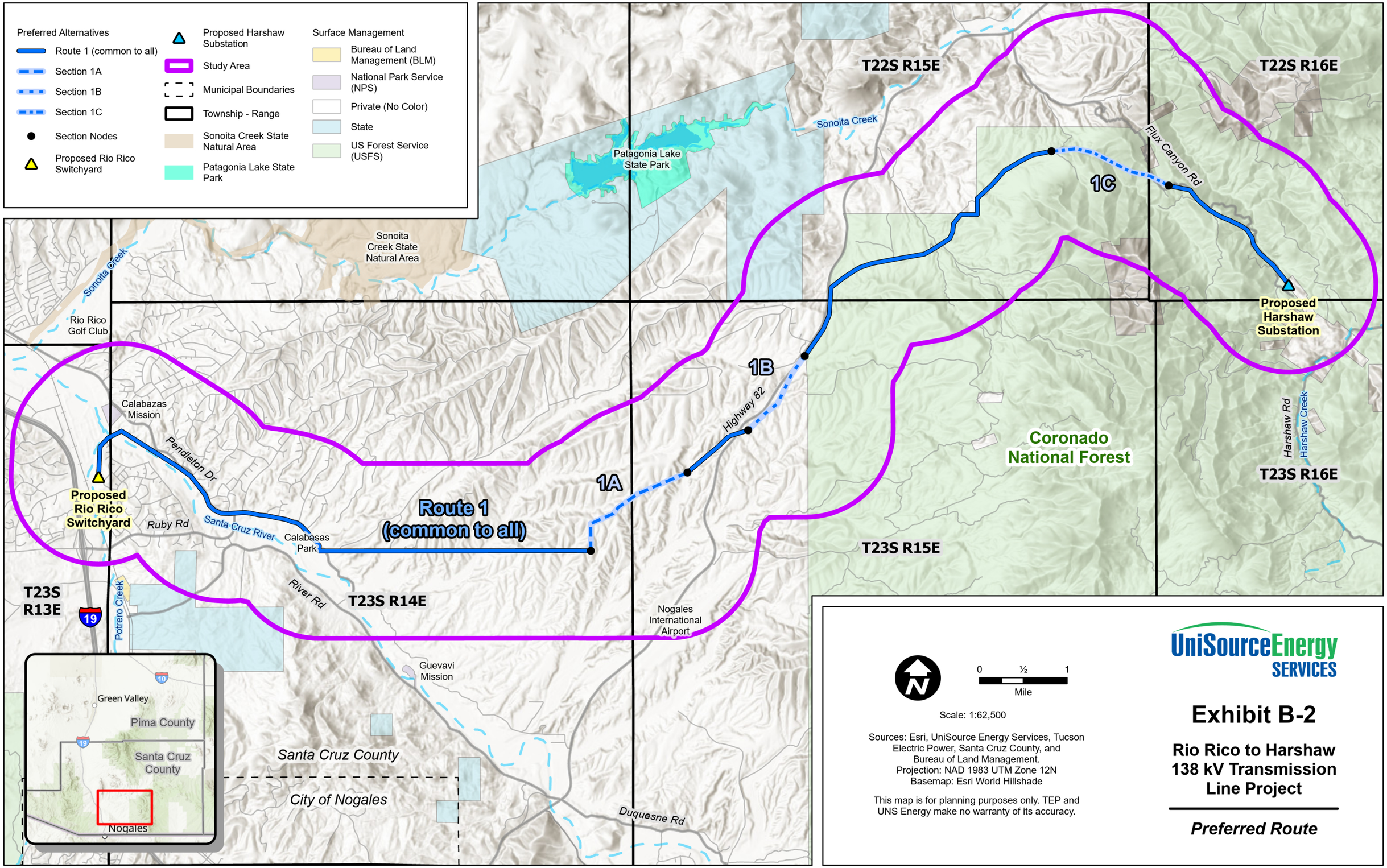
Application for a Certificate of Environmental Compatibility

Rio Rico to Harshaw

138 Kilovolt Transmission Line Project

Exhibit B-2

This page intentionally left blank


Preferred Alternatives
Route 1 (common to all)
Section 1A
Section 1B
Section 1C
Section Nodes
Proposed Rio Rico Switchyard
Proposed Harshaw Substation
Study Area
Municipal Boundaries
Township - Range
Sonoita Creek State Natural Area
Patagonia Lake State Park
Surface Management
Bureau of Land Management (BLM)
National Park Service (NPS)
Private (No Color)
State
US Forest Service (USFS)
T22S R15E
T22S R16E
T23S R15E
T23S R16E
T23S R14E
T23S R13E
Sonoita Creek
Patagonia Lake State Park
Sonoita Creek State Natural Area
Rio Rico Golf Club
Calabazas Mission
Pendleton Dr
Ruby Rd
Santa Cruz River
Calabasas Park
River Rd
Potrero Creek
Proposed Rio Rico Switchyard
Route 1 (common to all)
1A
1B
1C
Highway 82
Flux Canyon Rd
Proposed Harshaw Substation
Coronado National Forest
Harshaw Rd
Harshaw Creek
Nogales International Airport
Guevavi Mission
Duquesne Rd
Santa Cruz County
City of Nogales
Green Valley
Pima County
Santa Cruz County
Nogales
0 ½ 1
Mile
Scale: 1:62,500
Sources: Esri, UniSource Energy Services, Tucson Electric Power, Santa Cruz County, and Bureau of Land Management.
Projection: NAD 1983 UTM Zone 12N
Basemap: Esri World Hillshade
This map is for planning purposes only. TEP and UNS Energy make no warranty of its accuracy.
UniSourceEnergy SERVICES
Exhibit B-2
Rio Rico to Harshaw 138 kV Transmission Line Project
Preferred Route
2/10/2023

This page intentionally left blank

EXHIBIT C

This page intentionally left blank

EXHIBIT C: **AREAS OF BIOLOGICAL WEALTH**

As stated in Arizona Administrative Code R14-3-219 of the Rules of Practice and Procedure Before Power Plant and Transmission Line Siting Committee, Exhibits to Application, Exhibit C:

Describe any areas in the vicinity of the proposed site or route which are unique because of biological wealth or because they are habitats for rare and endangered species. Describe the biological wealth or species involved and state the effects, if any, the proposed facilities will have thereon.

C.1 Introduction C-1
C.2 Biological Wealth C-2
C.2.1 Areas of Biological Wealth C-2
C.2.2 Special Status Species C-3
C.3 Summary Of Potential Effects C-4
C.3.1 Construction C-4
C.3.2 Operation and Maintenance C-4
C.4 Conclusion C-4
C.5 References C-5

C.1 **Introduction**

The Project will consist of building a new 138 kV transmission line approximately 20 miles in length, depending on the alternative approved, to connect the planned Rio Rico Switchyard to the planned Harshaw Substation. The Project will interconnect the existing 138 kV transmission line to the planned Substation. The Project will cross private and USFS owned land, as well as Santa Cruz County Road and ADOT ROW. One preferred route alternative has been identified, resulting from line siting studies, analysis, and a public participation process that began in 2020, with three 1.5- to 2.5-mile alternative routing options in areas of elevated community sensitivity. The proposed alternative routes are identified as Preferred Route 1, and Alternative Routes 1A, 1B, and 1C, and are described in Section B.1-4 of the application. The new line will be built of self-weathering steel monopoles ranging from 60 to 120 feet above ground, with the taller structures required for site specific clearance issues.

The following analysis describes impacts to areas of biological wealth within the Biological Study Area, which is one mile on either side of the route centerlines analyzed for the Project.

C.2 **Biological Wealth**

Exhibit C-1 maps the routes in relation to major washes and riparian habitat. The Biological Evaluation (BE) in Exhibit C-2 (WestLand, 2023), and this section provide a general description of the existing environment with respect to vegetation, wildlife, and the potential for special status species to occur in the Study Area.

Areas of biological wealth in the vicinity of the Study Area include designated critical habitat, important bird areas (IBA), and wildlife linkage corridors. These are described in more detail below.

The information analyzed includes a list of special status species obtained from the U.S. Fish and Wildlife Service (USFWS), Information for Planning and Consultation (IPaC) online database, and species lists, ranges, and habitat data obtained from the Arizona Game and Fish Department (AZGFD), Heritage Database Management System (HDMS) On-line Environmental Review tool, the USFS Region 3 Regional Forester's Sensitive Species List for the CNF, National Wetlands Inventory Maps, Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), and review of habitat and life history requirements. The BE analyzed the entire Biological Study Area.

C.2.1 Areas of Biological Wealth

The following areas of biological wealth are present in or near the Biological Study Area.

Critical Habitat

The USFWS has designated critical habitat for three federally listed species within the Study Area, the yellow-billed cuckoo, jaguar, and Mexican spotted owl. All alternative routes cross designated critical habitat, and would have the same impact. The Project may affect, but is not likely to destroy or adversely modify designated critical habitat. By implementing Environmental Protection Measures (EPMs) during construction, there would be no impact to or degradation of the designated critical habitat. The EPMs are outlined in the BE Section 2.3 (Exhibit C-2).

Important Bird Areas

One IBA has been identified within the Study Area, the Patagonia Mountains IBA, a State-level IBA. This IBA provides habitat for at least 115 bird species, including 18 special conservation status species found in the IBA in substantial numbers. The IBA is important due to its unusual "sky island" properties of a high elevation area vegetated with oak and oak-juniper surrounded by lower elevation grasslands and desert. The goal/mission of the Patagonia Mountains IBA is to conserve and protect a unique example of a Madrean Occidental sky island and the populations of special status species that depend on it (AZIBA, 2021).

The Arizona IBA program has prepared four habitat conservation plans/guides for Arizona IBAs, as well as a riparian habitat management guide for landowners (AZIBA, 2021). The Arizona IBA programs works in partnership with AZGFD as well as non-Governmental organizations (NGOs) and federal agencies to conserve bird habitat and provide community education and engagement (AZIBA, 2023).

All alternative routes cross the IBA and would have the same effect. EPMs to protect removal of important vegetation would be followed to avoid reducing the available habitat within the IBA.

Wildlife Linkage Corridors

The Arizona Wildlife Linkages Workgroup (AWLW) has identified wildlife linkage corridors that may provide connectivity between habitats for wildlife species, which is essential to many wildlife population structures and movement. The Santa Rita – Tumacacori Wildlife Connectivity Linkage is north of Sonoita Creek, with connectivity fingers extending south along the Santa Cruz River. Most of the identified corridor is outside of the Study Area, and not impacted by the project. The Santa Cruz River portions extend south of the main linkage design along the Santa Cruz River to the international boundary. The Project will cross the Santa Cruz River just east of Rio Rico.

The linkage design includes installation of crossing structures over highways and roads, removal of barriers to wildlife movement, and increasing riparian habitat to improve connections to streams and rivers. Mitigations to stream impediments include maintaining natural flood regimes, reducing ATV and OHV use in riparian vegetation in the floodplain, and removing non-native and invasive plants and animals.

To support the linkage design, the Project would span the Santa Cruz River (thus avoiding placement of structures within the riverbanks), minimize access through riparian vegetation for construction and maintenance, and follow EPMs to avoid introduction of non-native invasive plants and animals.

C.2.2 Special Status Species

Desktop research identified special status species from three different agencies: USFWS, USFS, and AZGFD. Of the 13 federally protected species with the potential to occur in the vicinity of the Study Area, 2 species were determined to be present within the Study Area itself, 2 were possible to occur, and 3 were unlikely to occur; the remaining 6 are not anticipated to occur within the Study Area (Table 6).

Table 6. Federally Listed Species with Potential to occur in the Biological Study Area

Scientific Name	Common Name	Status*	Potential to Occur
BIRDS			
Coccyzus americanus	yellow-billed cuckoo	T, 1A, CH	Present
Aquila chrysaetos	golden eagle	BGEPA	Possible
Strix occidentalis lucida	Mexican spotted owl	T, 1A, CH	Present
MAMMALS			
Panthera onca	jaguar	E, CH	Unlikely
Leopardus pardalis	ocelot	E	Unlikely
INSECTS			
Danaus plexippus plexippus	Monarch butterfly	Cand	Possible
PLANTS			
Coryphantha scheeri var. *robustispina*	Pima pineapple cactus	E	Possible
Pectis imberbis	beardless chinchweed	Prop E	Unlikely

Note: From (WestLand, 2023)*, Section 6, Table 6*

*Key: E = Endangered (U.S. Fish and Wildlife Service); T = Threatened (U.S. Fish and Wildlife Service); Prop E = Proposed Endangered (U.S. Fish and Wildlife Service); CH = designated Critical Habitat in Study Area; Cand = Candidate for listing; BGEPA = Bald and Golden Eagle Protection Act

Sensitive species listed by the CNF and subject to the Migratory Bird Treaty Act (MBTA) are listed in Appendices C and E of the BE (Exhibit C-2).

The western burrowing owl is not protected under the Endangered Species Act (ESA), but it is listed by the USFWS as a National Bird of Conservation Concern. It is also listed as endangered, threatened, or as a species of concern in nine states. All owls in Arizona are protected federally by the MBTA and by Arizona state law (A.R.S. Title 17). It is anticipated that construction of the Project would not impact the western burrowing owl, but a western burrowing owl survey will be conducted prior to construction of the Project (Exhibit C-2, Section 2.3.5).

C.3 **Summary Of Potential Effects**

The potential for the Project's activities to affect any of the special status species was evaluated in the BE. The impacts are similar between all alternatives. Though there is the potential for five special status species to occur in the Study Area, there were no individuals observed, and no forage species were present during field reviews within the Study Area. The project may affect, but is not likely to destroy or adversely modify designated critical habitat for the yellow-billed cuckoo or the Mexican spotted owl. The Project would have "No Effect" on other federally species listed under the ESA, based upon lack of suitable habitat in the Project area, or implementation of EPMs, or would otherwise require pre-construction surveys.

C.3.1 Construction

Construction of the proposed transmission line would have no effect on species listed under the ESA, is not likely to have impacts on water resources, would have no impacts on riparian habitat, and would not likely have any long-term impacts on urban wildlife movement or create barriers to wildlife. Construction activities may impact native plants through trimming or removal to gain equipment access. UNSE will implement appropriate pre-construction surveys to reduce potential impacts to wildlife.

C.3.2 Operation and Maintenance

Potential impacts from operation and maintenance activities would be similar in nature to those previously described above for construction activities. However, the scope of impacts would be lower in magnitude than those for construction as there would be less equipment and fewer people working. Under normal circumstances, operation and maintenance impacts would be temporary, and would occur once or twice per year over the life of the Project.

C.4 **Conclusion**

Overall, the effects on federally listed or candidate species would be similar among the alternatives. The Project may affect, but is not likely to adversely affect, the candidate monarch butterfly and the threatened Pima pineapple cactus. The Project may affect, but is not likely to destroy or adversely modify designated critical habitat for the threatened yellow-billed cuckoo and Mexican spotted owl. The Project would have no effect on any other federally listed species based on lack of suitable habitat or implementation of EPMs that limit construction outside the breeding or occupancy period. Habitat for sensitive species within areas of biological wealth, such as washes or riparian habitat, is not anticipated to be significantly impacted.

C.5 **References**

AZIBA. (2021). Important Bird Areas: Mini Conservation Plan Patagonia Mountains. Tucson: Arizona Important Bird Areas Program.

AZIBA. (2023, Jan). About the Arizona IBA Program. Retrieved from Arizona Important Bird Areas Program: https://aziba.org

WestLand. (2023). Biological Evaluation - Rio Rico to Harshaw 138-kV Transmission Line. Tucson: WestLand Engineering & Environmental Services.

WRCC. (2018, August). Arizona Climate Summaries: Tucson Univ of Arizona, Arizona: NCDC 1981-2010 Monthly Normals. Retrieved from Western Region Climate Center: http://wrcc.dri.edu/summary/climsmaz.html

This page intentionally left blank

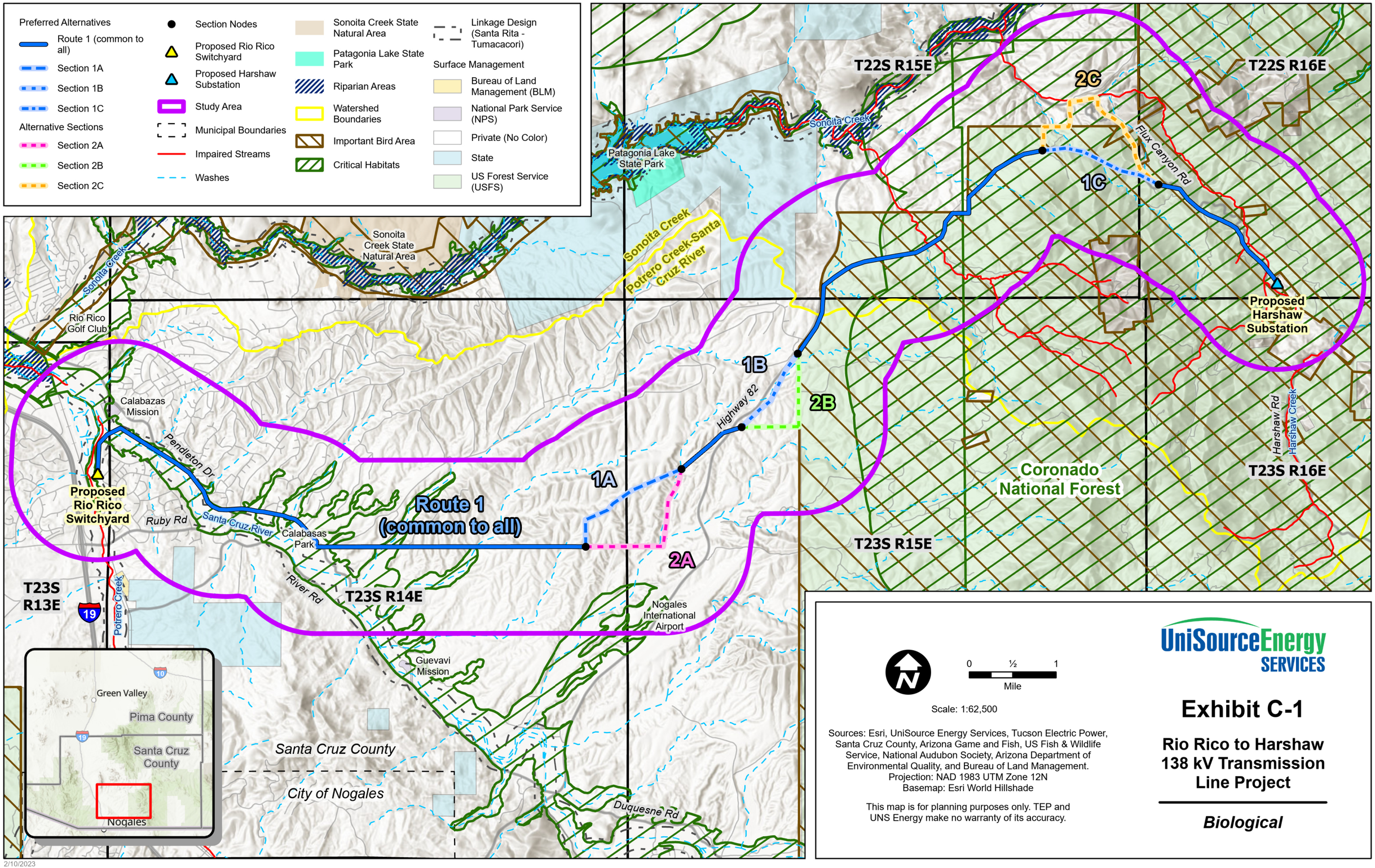
Application for a Certificate of Environmental Compatibility

Rio Rico to Harshaw

138 Kilovolt Transmission Line Project

Exhibit C-1

This page intentionally left blank


Preferred Alternatives
Route 1 (common to all)
Section 1A
Section 1B
Section 1C
Alternative Sections
Section 2A
Section 2B
Section 2C
Section Nodes
Proposed Rio Rico Switchyard
Proposed Harshaw Substation
Study Area
Municipal Boundaries
Impaired Streams
Washes
Sonoita Creek State Natural Area
Patagonia Lake State Park
Riparian Areas
Watershed Boundaries
Important Bird Area
Critical Habitats
Linkage Design (Santa Rita - Tumacacori)
Surface Management
Bureau of Land Management (BLM)
National Park Service (NPS)
Private (No Color)
State
US Forest Service (USFS)
T22S R15E
T22S R16E
T23S R16E
T23S R15E
T23S R14E
T23S R13E
Sonoita Creek
Patagonia Lake State Park
Sonoita Creek State Natural Area
Sonoita Creek
Potrero Creek-Santa Cruz River
Flux Canyon Rd
Rio Rico Golf Club
Calabazas Mission
Pendleton Dr
Proposed Rio Rico Switchyard
Ruby Rd
Santa Cruz River
Calabazas Park
River Rd
Potrero Creek
Highway 82
Route 1 (common to all)
1A
1B
1C
2A
2B
2C
Proposed Harshaw Substation
Harshaw Rd
Harshaw Creek
Coronado National Forest
Nogales International Airport
Guevavi Mission
Duquesne Rd
Santa Cruz County
City of Nogales
Green Valley
Pima County
Santa Cruz County
Nogales
0 ½ 1
Mile
Scale: 1:62,500
Sources: Esri, UniSource Energy Services, Tucson Electric Power, Santa Cruz County, Arizona Game and Fish, US Fish & Wildlife Service, National Audubon Society, Arizona Department of Environmental Quality, and Bureau of Land Management.
Projection: NAD 1983 UTM Zone 12N
Basemap: Esri World Hillshade
This map is for planning purposes only. TEP and UNS Energy make no warranty of its accuracy.
UniSourceEnergy SERVICES
Exhibit C-1
Rio Rico to Harshaw 138 kV Transmission Line Project
Biological
2/10/2023

This page intentionally left blank

Application for a Certificate of Environmental Compatibility

Rio Rico to Harshaw

138 Kilovolt Transmission Line Project

Exhibit C-2

This page intentionally left blank

Biological Evaluation
Rio Rico to Harshaw 138-kV Transmission Line

Prepared for:
UNS Electric, Inc.
3950 E. Irvington Road RC-131 – Tucson, Arizona 85714

Prepared by:
WestLand Engineering & Environmental Services
4001 E. Paradise Falls Drive – Tucson, Arizona 85712
+1 520-206-9585

WestLand Project Number: 1610.283

February 16, 2023

WestLand
100% EMPLOYEE OWNED
Engineering & Environmental Services

Table of Contents

1. INTRODUCTION 1
2. PROJECT DESCRIPTION 1
2.1. Location 1
2.2. Proposed Project 2
2.3. Environmental Protection Measures 3
2.3.1. Erosion Control and Vegetation Management 3
2.3.2. Fire Prevention 3
2.3.3. Protection of Nesting Migratory Birds 4
2.3.4. Protection of Bats 4
2.3.5. Preconstruction Surveys 4
3. ENVIRONMENTAL SETTING OF THE STUDY AREA 5
3.1. Physiographic and Climatic 5
3.2. Land Use and Management 6
3.3. Surface Water 6
3.4. Soil 7
3.5. Vegetation 7
3.6. Wildlife and Areas of Biological Wealth 8
3.6.1. Important Bird Areas 8
3.6.2. Wildlife Connectivity Linkage 9
3.6.3. Critical Habitats 10
4. SPECIAL-STATUS SPECIES AND SPECIES OF INTEREST SCREENING METHODS 12
5. POTENTIAL FOR SPECIAL-STATUS SPECIES AND SPECIES OF INTEREST TO OCCUR 13
5.1. ESA Species 13
5.2. BGEPA Listed Species 13
5.3. MBTA Species 13
5.4. CNF Sensitive Species 14
5.5. Other Special-Status Species and Species of Interest 14
6. EFFECTS ON SPECIAL-STATUS SPECIES AND SPECIES OF INTEREST 14
6.1. Project Effects 14
6.2. Effects Determinations 16
7. SUMMARY OF EFFECTS ON AREAS OF BIOLOGICAL WEALTH, SPECIAL-STATUS SPECIES, AND SPECIES OF INTEREST 31
7.1. Areas of Biological Wealth 31
7.1.1. Important Bird Areas 32
7.1.2. Wildlife Connectivity Linkage 32
7.1.3. Critical Habitat 33

7.2. Federally Listed Species 33
7.3. MBTA, CNF, and Other Special-Status Species and Species of Interest 33
8. REFERENCES CITED 34

Tables

Table 1. Mammal Species that May Occur in the Area 10
Table 2. Bird Species that May Occur in the Area 11
Table 3. Reptile and Amphibian Species that May Occur in the Area 11
Table 4. ESA Species Screening Analysis 19
Table 5. BGEPA Species Screening Study 30
Table 6. Acres Affected by Alternative for Vegetation Type and Areas of Biological Wealth 31

Figures

(follow text)

Figure 1. Vicinity Map
Figure 2. Aerial Overview
Figure 3. National Wetland Inventory Map
Figure 4. Vegetation Map
Figure 5. Wildlife and Areas of Biological Wealth in the Study Area

Appendices

Appendix A. NRCS Soil Map—Santa Cruz and Parts of Cochise and Pima Counties, Arizona
Appendix B. U.S. Fish and Wildlife Service Arizona Ecological Services Field Office Information, Planning, and Conservation System Online Query Report
Appendix C. Arizona Game and Fish Department Heritage Data Management System Online Environmental Review Tool Query Report
Appendix D. U.S. Forest Service Coronado National Forest Sensitive Species with Potential to Occur in the Study Area
Appendix E. U.S. Forest Service Coronado National Forest Sensitive Species (Common Name) with Potential to Occur in Ecosystem Response Unit (ERU) Habitat Types within the Study Area
Appendix F. Other Special-Status Species and Species of Interest with Records within 3 Miles of the Project

1. INTRODUCTION

Pursuant to Arizona Revised Statutes ("ARS") §§ 40-360, et seq., UNS Electric, Inc. (UNSE; "Applicant") this Biological Evaluation has been prepared to support the Application for a Certificate of Environmental Compatibility ("CEC") to be reviewed by the Arizona Corporation Commission ("ACC") for an overhead 138-kilovolt (kV) transmission line between Rio Rico, Arizona, and Harshaw, Arizona (the "Project"). UNSE is a subsidiary of UniSource Energy Services (UES). The proposed Project would run approximately 20 to 30 miles across private and U.S. Forest Service (USFS) Coronado National Forest (CNF) land and connect the planned Rio Rico switchyard to the planned Harshaw Substation, which is located on an inholding parcel surrounded by CNF land (**Figure 1**). This report evaluates the potential occurrence of special-status species and describes areas of biological wealth within a defined Study Area. For the purpose of this report, special-status species are defined as species designated by the U.S. Fish and Wildlife Service (USFWS) as Endangered, Threatened, Proposed for listing, or Candidate for listing under the Endangered Species Act (ESA), and species protected under the Bald and Golden Eagle Protection Act (BGEPA). Other special-status species and species of interest evaluated include CNF and Bureau Land Management (BLM) sensitive species, bird species protected under the Migratory Bird Treaty Act (MBTA), state-protected native plants, and other species with no official status but identified by U.S Fish and Wildlife Service (USFWS) as Species of Concern (SC) and/or the Arizona Game and Fish Department (AGFD) as Species of Greatest Conservation Need (SGCN). Areas of biological wealth include lands with special designations as wildlife habitat, areas of biodiversity, and designated or proposed critical habitat for ESA listed or proposed species. A 1-mile buffer surrounding the preferred and alternative alignments defines the Study Area for this report (**Figure 2**).

The following sections provide: a description and location of the Project (**Section 2**); the environmental setting of the Study Area (**Section 3**); special-status species and species of interest screening methods (**Section 4**); special-status species and species of interest potential to occur (**Section 5**); effects on special-status species and species of interest (**Section 6**); summary of effects on areas of biological wealth, special-status species, and species of interest (**Section 7**); and references cited (**Section 8**).

2. PROJECT DESCRIPTION

2.1. LOCATION

The Project consists of a 138-kV overhead transmission line that would run approximately 20 to 30 miles between Rio Rico, Arizona, and Harshaw, Arizona (**Figure 1**). This transmission line would cross private and federal lands managed by the CNF and connect the planned Rio Rico switchyard to the planned Harshaw Substation, which is located on an inholding parcel surrounded by CNF land. In addition to the preferred route, three alternative routes have been identified all of which are contained within the Study Area boundary.

2.2. PROPOSED PROJECT

The proposed transmission line would serve the Hermosa Project, a mine exploration project in Santa Cruz County owned by Arizona Minerals Inc. (AMI), a subsidiary of South32, while improving service reliability for residential and other electric customers in the vicinity, including the Flux Canyon, San Rafael Valley, Washington Camp, and Lochiel areas. UNSE's existing 13.2-kV distribution line does not have sufficient capacity to support current and future energy needs in these areas while also satisfying the Hermosa Project's anticipated energy requirements. Construction vehicles would access the Project from existing roads to the maximum extent possible, e.g., Flux Canyon Road. New spur roads from existing roads would be required to provide access to poles not located adjacent to existing roadways. All storage and equipment lay down yards would be on private or UNSE property.

The proposed Project would consist of 138-kV conductors strung on self-weathering steel monopole structures ranging in height from 75 feet (ft) to 110 ft, with spans averaging between 750 ft and 1,000 ft, depending on topography. The 138-kV line would include a fiber optical ground wire that would solely relay communication information related to line function back to UNSE. The siting of facilities would blend into the landscape as much as possible and incorporate screening by vegetation and topographic relief to the extent practicable. Existing utility corridors would be used to minimize impacts to surface resources. Estimated disturbance footprints include pads at pole locations, temporary pulling and tensioning sites located at directional changes along the line, and road improvement or new construction to access each pole where necessary.

Routine maintenance activities would be scheduled and coordinated with other transmission facilities to avoid service interruption to those served by the line, ensure reliable electric service, and reduce the potential threat of fire associated with powerline operations. Emergency repairs and maintenance would take place as needed.

Noise associated with construction would be temporary and occur during day-time hours. Design features would be implemented to mitigate potential noise effects to receivers during construction activities where reasonable and practicable.

Disturbance associated with poles or pulling/tensioning sites would not be located within drainage features or other bodies of water. No permanent control or structural changes to any drainage or body of water is expected. Where necessary, stream or drainage crossings for construction access would be temporary and implemented in accordance with approved Best Management Practices (BMPs) to minimize effects and in compliance with any necessary Clean Water Act permits.

Impacts to vegetation and soils would be temporary at each transmission line structure, except for the actual location of the transmission line structures where vegetation would be removed permanently. Removal of vegetation and soil disturbance would also be permanent along new access roads. Disturbance at pulling

and tensioning sites would be temporary and would be reclaimed with native vegetation following construction. Any incompatible vegetation would be removed to allow clearance from the conductor (line) accounting for maximum sag and horizontal wind displacement conditions. Construction of the Project would include BMPs that control erosion and reduce potential for soil instability.

2.3. ENVIRONMENTAL PROTECTION MEASURES

To reduce or eliminate potential Project impacts on the environment, UNSE would implement five categories of Environmental Protection Measures (EPMs): Erosion Control and Vegetation Management (**Section 2.3.1**), Fire Prevention (**Section 2.3.2**), Protection of Nesting Migratory Birds (**Section 2.3.3**), Protection of Bats (**Section 2.3.4**), and Preconstruction Plant Surveys (**Section 2.3.5**). These EPMs would also address impacts on special-status species and species of interest, as described in further detail in **Table 4** and throughout **Sections 6 and 7** of this report.

2.3.1. Erosion Control and Vegetation Management

The following EPMs would be incorporated into the Project to control erosion and sedimentation and to avoid adverse effects on surface water quality:

- Water bars would be constructed on access roads across contours to reduce stormwater velocity and divert flows in a more natural pattern.
- Weed-free straw wattle would be used along slopes to control sediment and minimize erosion.
- Soil would be scarified to assist with vegetation establishment.
- Existing trees that require removal would be chipped and spread over the land or on access routes to enhance soil stabilization and reduce erosion.
- Disturbed areas would be re-seeded with native species.
- Construction equipment would be washed prior to entering the Project work site and monitoring for noxious weeds would occur after Project completion.
- Removal of large trees would be avoided where practicable and would be avoided completely or minimized in designated critical habitat for listed species.
- Notification would be provided to Arizona Department of Agriculture to allow salvage of protected native plants on private lands and UNSE would coordinate with interested parties on salvage of specific plant materials as practicable.

2.3.2. Fire Prevention

UNSE would take all practicable precautions to prevent wildland fires and would adhere to any fire restrictions imposed by the CNF. Maintenance work would be avoided during fire season to the extent practicable. If maintenance work must take place:

- UNSE will maintain the line in accordance with the National Electric Safety Code (NESC) adopted by the State of Arizona that requires electric utilities to prune vegetation away from line/equipment (North American Electric Reliability Corporation 2021).
- Work vehicles would not be parked in a manner that blocks access for emergency vehicles.
- Vehicles would not be parked atop tall growing vegetation.
- Each crew would have ready access to fire equipment, including a fire extinguisher, portable water pump, shovel rake, and Pulaski.

2.3.3. Protection of Nesting Migratory Birds

The following EPMs would be implemented to avoid take of birds protected under the MBTA:

- If construction were to occur between March 1 and August 31, a pre-construction nesting bird survey would be completed no more than 10 days prior to vegetation removal activities. If active bird nests were located, a 50-ft avoidance buffer would be maintained until nests were no longer active.
- If nesting raptors are identified in the Project vicinity, the appropriate spatial buffer listed in the USFWS Guidelines for Raptor Protection from Human and Land Use Disturbances (Romin and Muck 2002) would be established to avoid disturbance. Nest monitoring would occur to allow construction to proceed once the nest is empty.
- The Project would follow Edison Electric Institute's Avian Power Line Interaction Committee (APLIC) recommendations.

2.3.4. Protection of Bats

Portions of the Study Area are within 500 ft of known bat roosts. To minimize disturbance to potentially roosting bats, work would occur during the day light hours to avoid impacts to nightly foraging activities and removal of large broad-leafed trees in the Study Area would be minimized to the extent practicable.

2.3.5. Preconstruction Surveys

Comprehensive surveys would be conducted for federally-listed plant species in portions of the Study Area affected by Project construction and maintenance activities. Surveys would be completed only in suitable habitat on previously unsurveyed land for the following species:

- Beardless chinchweed (*Pectis imberbis*)
- Bartram's stonecrop (*Graptopetalum bartramii*)
- Pima pineapple cactus (*Coryphantha scheeri* var. *robustispina*)

During the comprehensive plant surveys, habitat suitability will also be evaluated for:

- Western burrowing owl (*Athene cunicularia hypugaea*)
- Southwestern willow flycatcher (*Empidonax traillii extimus*)

- Monarch butterfly (*Danaus plexippus)*
- Other special-status species and species of interest

A formal, yellow-billed cuckoo (*Coccyzus americanus*) protocol survey would be conducted in suitable habitat along the Santa Cruz River in the western portion of the Study Area.

Formal surveys for yellow-billed cuckoo and Mexican spotted owl (*Strix occidentalis lucida*) would be conducted in suitable habitat within the eastern part of the Study Area.

Pre-construction surveys would be completed for nesting birds protected under the MBTA no more than 10 days prior to vegetation removal or clearing.

Pre-construction surveys would be used to avoid or minimize impacts to listed species, other special-status species, and species of interest through temporal or spatial avoidance of breeding/occurrence areas or facilities or access siting to minimize impacts to individuals.

3. ENVIRONMENTAL SETTING OF THE STUDY AREA

3.1. PHYSIOGRAPHIC AND CLIMATIC

The Project is located in the Patagonia Mountains, Patagonia Water Gap, and Nogales area physiographic provinces (Trapp and Reynolds 1995). Elevations within the Study Area range from approximately 3,900 ft to 7,000 ft above mean sea level (amsl). The eastern portion of the Study Area is dominated by the Patagonia Mountains, which contain complex Basin and Range geology with units ranging from Precambrian to Holocene. The Patagonia Mountains contain numerous drainage features through volcanic and sedimentary rock, trailing to mildly sloping hills in the middle of the Study Area. The eastern portion of the Study Area contains the Sonoita Creek Watershed, which is bounded by the Patagonia and Santa Rita Mountain ranges and ultimately drains into Sonoita Creek then on to the Santa Cruz River near Rio Rico, Arizona. Bedrock in the Study Area is primarily composed of limestone and biotite rhyolite tuff (Graybeal et al. 2015).

Climatic conditions are characterized by hot summers (95.4°Fahrenheit [F] average temperature in June, the hottest month), mild winters (27.3°F average temperature in January, the coldest month) and low precipitation. The average annual precipitation in the Town of Patagonia is 17.65 inches and 16.98 inches in Nogales (WRCC 2015, accessed online January 10, 2023).

3.2. LAND USE AND MANAGEMENT

The Study Area contains a portion of the CNF and private lands (**Figure 2**). Within the portion of the CNF overlapping with the Study Area, there is one land use zone identified: Roaded Backcountry. The Roaded Backcountry zone is managed for dispersed motorized, nonmotorized, and quiet recreational uses. The CNF allows for construction of new utility structures and power lines, but recommends that they should be located within existing communications sites and utility corridors, except for as needed statutory requirements, such as mining law or laws to protect public health and safety (USFS 2018).

The town of Rio Rico is along the western edge of the Study Area with rural development, including residential communities, shopping plazas, gas stations, and existing utility corridors/infrastructure that surround portions of the Study Area. Numerous roads cross the Study Area including Arizona State Route (SR) 82. There are several ranches within and adjacent to the Study Area, and portions of the Study Area are used for livestock grazing. Land use also includes recreation and mining. Areas of biological wealth within the Study Area are discussed in **Section 3.6.**

3.3. SURFACE WATER

The Study Area is located within Sonoita Creek HUC 10 (1505030102), and the Potrero Creek-Santa Cruz River HUC 10 (1505030103; USGS 2021). Surface water features in the Study Area include: a small portion of the Santa Cruz River, which crosses the western portion of the Study Area; Harshaw Creek, which crosses the eastern most perimeter of the Study Area; Potrero Creek which flows through the western portion of the Study Area adjacent to SR 89, and other small drainage features (**Figure 3**). While the National Wetlands Inventory (NWI) has characterized many of these drainages as “intermittent,” i.e., “surface water flowing continuously during certain times of the year and more than in direct response to precipitation,” the NWI datasets are seldom verified by field investigations. For this reason, ephemeral drainage features are often mischaracterized as intermittent features.

WestLand’s field observations within the Study Area suggest that Harshaw Creek is best described as “spatially and temporally intermittent,” depending on precipitation. Large reaches of the creek usually dry between precipitation and runoff events, with areas of persistent pools or sustained flow for small reaches along its length. There are also multiple ephemeral drainages that drain into the Harshaw Creek along its extent.

The headwaters of the Santa Cruz River originate in the San Rafael basin (east of the Study Area), flowing south into Mexico and crossing back into the United States near Nogales, flowing northwest through the Study Area. Groundwater sustains low flows only in the portion of the Santa Cruz River present in the Study Area, and the streamflow can be extremely variable from year to year (de la Torre 1970). The streambeds of the Santa Cruz River and its main tributaries are highly permeable, and for this reason, a large volume of water is lost to subsurface flow as the water moves downstream (NextGen Engineering 2017).

The drainages in the Study Area drain to Harshaw Creek, Sonoita Creek and the larger Santa Cruz River outside of the Study Area (**Figure 3**). Given landscape setting and known climatic conditions in the Study Area, most small drainages in the Study Area are likely to be ephemeral. Support for this determination of flow regime is provided based on an observed lack of riparian vegetation along these drainages, vegetation along the drainages occurring in similar densities to the surrounding uplands and known low groundwater connectivity outside of the Santa Cruz River mainstem. Although observed to be largely ephemeral, portions of Alum Gulch and reaches of Flux Canyon are known to support localized seeps and springs that provide groundwater flow to portions of their channels. In these areas of flow, drainages may therefore be considered spatially intermittent.

3.4. SOIL

The Study Area consists of numerous soils, and a full list of the soils are included in **Appendix A**. Of the soils identified, the predominant soil types are the White House-Caralampi complex, Comoro soils, and Lampshire-Chiricahua association. The typical profile of these soils is gravelly loam, sandy loam and associated bedrock with medium runoff capacity (Soil Survey Staff 2022; accessed December 2, 2022).

3.5. VEGETATION

The Study Area is mapped within three biotic communities: Semidesert Grassland; Madrean Evergreen Forest and Woodland; and Plains Grassland, Shortgrass Communities (The Nature Conservancy 2012).

Ecological Response Units (ERUs) represent all major ecosystem types of the Southwest region, and represent a stratification of biophysical themes by integrating site potential (soil physical and chemical properties, geology, geomorphology, aspect, slope, climate variables, and geographic location), fire regime (historic and contemporary), neighboring vegetation communities, and seral state sequence (Wahlberg et al. 2014).

Four ERU vegetation types: Semi-Desert Grassland, Juniper Grass, Madrean Encinal Woodland, and Fremont Cottonwood/Shrub (as outlined by Wahlberg et al. 2014), are present within the Study Area (**Figure 4**) and described as follows:

- **Semi-Desert Grassland:** This ERU occurs throughout southeastern Arizona and southern New Mexico at elevations ranging from 3,000 ft to 4,500 ft. These grasslands are bounded by Sonoran or Chihuahuan desert at the lowest elevations and woodlands or chaparral at the higher elevations. Species composition and dominance vary with soil and topography, but dominant grassland associations are black grama (*Bouteloua eriopoda*) grassland, blue grama (*B. gracilis*) grassland, curly mesquite (*Hilaria belangeri*) grassland, tobosa (*Pleuraphis mutica*) grassland, giant sacaton (*Sporobolus wrightii*) grassland, mixed native perennial grassland, and non-native perennial grassland. Shrubs also occupy these grasslands, and their abundance and species composition also varies.

- **Juniper Grass:** This ERU is typically found in warmer and drier settings beyond the environmental limits of pinyon, and just below and often integrating with the pinyon-juniper zone. Trees occur as individuals or in smaller groups and range from young to old. A dense herbaceous matrix of native grasses and forbs characterize this ERU. The tree and grass species composition varies, often consisting of a mix of one or more juniper species. Typically, native understory grasses are perennial species, while forbs consist of both annuals and perennials. Shrubs are characteristically absent or scattered.
- **Madrean Encinal Woodland:** This ERU is found in the Madrean Province, and occurs on foothills, canyons, bajadas and plateaus between the Semi-Desert Grasslands and Madrean Pinyon-Oak woodlands. This ERU is dominated by Madrean evergreen oaks such as Arizona white oak (*Quercus arizonica*), Emory oak (*Q. emoryi*), gray oak (*Q grisea*), Mexican blue oak (*Q. oblongifolia*), and Toumey oak (*Q. toumeyi*). Madrean pine (*Pinus spp*.), Arizona cypress (*Cupressus arizonica*), pinyon pine (*Pinus subg. Strobus*) and juniper (*Juniperus spp*.) trees and interior chaparral species may be present, but do not co-dominate. The ground cover is dominated by warm season grasses such as threeawns (i.e. *Aristida ternipes*, and *A. schiedeana* var. *orcuttiana*), blue grama (*Bouteloua gracilis*), sideoats grama (*Bouteloua curtipendula*), Rothrock grama (*Bouteloua rothrockii*), Arizona cottontop (*Digitaria californica*), plains lovegrass (*Eragrostis intermedia*), curly-mesquite (*Hilaria belangeri*), green sprangletop (*Leptochloa dubia*), muhly grasses (i.e. *Muhlenbergia emerslyi*, *M. pauciflora*, and *M. setifolia*), or Texas bluestem (*Schizachyrium cirratum*).
- **Fremont Cottonwood / Shrub**: This ERU is typically found at elevations ranging from 1,000 ft to 7,600 ft. Some areas of this ERU are dominated by Goodding's willow (*Salix gooddingii*) and velvet ash (*Fraxinus velutina*) and have the potential for cottonwood regeneration. Other riparian species commonly found in this ERU include willow species (*Salix* spp.), box elder (*Acer negundo*), and desert willow (*Chilopsis linearis*).

The majority of the Study Area is mapped as Semi-Desert Grassland which encompasses the western foothills of the Patagonia Mountains west across the valley, towards Rio Rico.

3.6. WILDLIFE AND AREAS OF BIOLOGICAL WEALTH

There are three types of areas of biological wealth within the Study Area: Important Bird Areas (IBAs), wildlife connectivity linkages, and designated critical habitat for ESA-listed species.

3.6.1. Important Bird Areas

The Arizona Important Bird Areas Program, a non-regulatory, non-government organization (NGO) designated program, identifies one IBA in the Study Area, the Patagonia Mountains IBA (AZIBA 2014) (**Figure 5**). Within the Study Area, the Patagonia Mountains IBA is located primarily on USFS land. The

Patagonia Mountains IBA covers the whole of the Patagonia Mountains, extending down the foothills until intersecting SR 82. The Patagonia Mountains IBA provides habitat for a variety of bird species including those protected by the MBTA and is described as extensive oak-juniper biome with many canyons and drainages lined with sycamores and other riparian vegetation (AZIBA 2014). Higher in elevation, the vegetation becomes more oak-pine and pine oak dominated. These mountains exhibit “sky island” properties of a high elevation area (in this case primarily oak and oak-juniper) surrounded by grasslands and desert. The Patagonia Mountains provide habitat for Madrean Occidental “Sky Island” breeding and resident birds and serve as an important stopover point for migrants. The IBA survey teams found 115 species of birds in the Patagonia Mountains. Of those, 18 are special conservation status species found in significant numbers.

Some of the birds associated with the Patagonia Mountains IBA include: grasshopper sparrow (*Ammodramus savannarum*), merlin (*Falco columbarius*), red-tailed hawk (*Buteo jamaicensis*), Northern gray hawk, Mexican jay (*Aphelocoma wollweberi*), red-winged blackbird (*Agelaius phoeniceus*), Western meadowlark (*Sturnella neglecta*), American kestrel (*Falco sparverius*), chestnut-collared longspur (*Calcarius ornatus*), great horned owl (*Bubo virginianus*), Montezuma quail (*Cyrtonyx montezumae*), redhead (*Aythya americana*), whiskered screech-owl (*Megascops trichopsis*), American pipit (*Anthus rubescens*), Chihuahuan raven (*Corvus cryptoleucus*), great-tailed grackle (*Quiscalus mexicanus*), mourning dove (*Zenaida macroura*), ring-necked duck (*Aythya collaris*), white-crowned sparrow (*Zonotrichia leucophrys*), Arizona woodpecker (*Dryobates arizonae*), chipping sparrow (*Spizella passerina*), greater roadrunner (*Geococcyx californianus*), Northern flicker (*Colaptes auratus*), ruby-crowned kinglet (*Regulus calendula*), white-tailed kite (*Elanus leucurus*), Baird's sparrow (*Ammodramus bairdii*), common merganser (*Mergus merganser*), horned lark (*Eremophila alpestris*), Northern goshawk (*Accipiter gentilis*), ruddy duck (*Oxyura jamaicensis*), yellow-billed cuckoo, barn swallow (*Hirundo rustica*), common raven (*Corvus corax*), juniper titmouse (*Baeolophus ridgwayi*), Northern harrier (*Circus hudsonius*), rufous-crowned sparrow (*Aimophila ruficeps*), yellow-rumped warbler (*Setophaga coronate*), black phoebe (*Sayornis nigricans*), curve-billed thrasher (*Toxostoma curvirostre*), killdeer (*Charadrius vociferus*), Northern mockingbird (*Mimus polyglottos*), and Savannah sparrow (*Passerculus sandwichensis*) (Arizona Important Bird Areas Program 2014).

3.6.2. Wildlife Connectivity Linkage

According to the Arizona Wildlife Linkages Workgroup (AWLW), a non-regulatory, NGO designated program, the Santa Rita – Tumacacori Wildlife Connectivity Linkage occurs in the general vicinity of the Study Area (The Arizona Wildlife Linkages Workgroup 2006). The AWLW identified Wildlife Linkage Corridors that may provide connectivity between habitats for wildlife species, with the idea that such connectivity is essential to metapopulation structure and movement behaviors of wildlife. The primary goal is to inform planning such that wildlife connectivity issues are considered and incorporated at an early stage of the planning process. The Santa Rita – Tumacacori Wildlife Connectivity Linkage is reported to include the following species: Gila

topminnow (*Poeciliopsis occidentalis*), jaguar (*Panthera onca*), javelina (*Dicotyles tajacu*), longfin dace (*Agosia chrysogaster*), Mexican spotted owl, mountain lion (*Puma concolor*), mule deer (*Odocoileus hemionus crooki*), Northern gray hawk (*Buteo plagiatus*), Northern Mexican gartersnake (*Thamnophis eques megalops*), Southwestern willow flycatcher, thick-billed kingbird (*Tyrannus crassirostris*), yellow-billed cuckoo, and white-tailed deer (*Odocoileus virginianus*) (AGFD 2022).

3.6.3. Critical Habitats

Designated critical habitat for three federally listed species occurs in the Study Area: yellow-billed cuckoo, jaguar, and Mexican spotted owl (**Figure 5**). The vast majority of critical habitat within the Study Area occurs on USFS land. Critical habitat designations affect only federal agency actions or federally funded or permitted activities. Critical habitat designations do not affect activities by private landowners if there is no federal nexus (i.e., funding or authorization). Federal agencies are required to avoid “destruction” or “adverse modification” of designated critical habitat. Critical habitat designations typically exclude developed areas such as buildings, roads, airports, parking lots, piers, and similar facilities.

The Arizona Game and Fish Department (AGFD) also identified eight species of economic and recreational importance that are predicted to be found within the Study Area and an additional 107 species of greatest conservation need that are predicted to be found within the Study Area based on Predicted Range Models (**Appendix C**).

Based on Brown (1982), **Tables 1, 2, and 3** list species typically associated with the biotic community (Semidesert Grassland) in which the Study Area predominately lies. The occurrence of these species has not been verified in the field and some of these species may not occur within this Study Area though the tables provide a general listing of the more common species that may be encountered in Semidesert Grassland biotic communities.

Table 1. Mammal Species that May Occur in the Area

Species Name	Common Name
Antilocapra americana	Pronghorn
Canis latrans	Coyote
Dicotyles tajacu	Javelina
Dipodomys merriami	Merriam’s kangaroo rat
D. ordii	Ord’s kangaroo rat
D. spectabilis	Banner-tailed kangaroo rat
Lepus californicus	Black-tailed jackrabbit
Neotoma albigula	White-throated woodrat
N. micropus	Southern plains woodrat
Odocoileus hemionus crooki	Mule deer
O. virginianus	White-tailed deer
Onychomys torridus	Southern grasshopper mouse
Chaetodipus hispidus	Hispid pocket mouse
Peromyscus leucopus	White-footed mouse
Sigmodon fulviventer	Tawny-bellied cotton rat

Species Name	Common Name
S. hispidus	Hispid cotton rat
Spermophilus spilosoma	Spotted ground squirrel
Taxidea taxus	Badger

Table 2. Bird Species that May Occur in the Area

Species Name	Common Name
Aimophila cassinii	Cassin's sparrow
Amphispiza bilineata	Black-throated sparrow
Athene cunicularia	Burrowing owl
Auriparus flaviceps	Verdin
Buteo swainsoni	Swainson's hawk
Callipepla squamata	Scaled quail
Campylorhynchus brunneicapillus	Cactus wren
Carpodacus mexicanus	House finch
Chondestes grammacus	Lark sparrow
Corvus cryptoleucus	White-necked raven
Eremophila alpestris	Horned lark
Falco mexicanus	Prairie falcon
F. sparverius	American kestrel
Geococcyx californianus	Greater roadrunner
Hirundo rustica	Barn swallow
Icterus parisorum	Scott's oriole
Lanius ludovicianus	Loggerhead shrike
Lophortyx gambelii	Gambel's quail
Mimus polyglottos	Northern mockingbird
Molothrus ater	Brown-headed cowbird
Myiarchus cinerascens	Ash-throated flycatcher
Phalaenoptilus nuttallii	Poorwill
Picoides scalaris	Ladder-backed woodpecker
Polioptila melanura	Black-tailed gnatcatcher
Sayornis saya	Say's phoebe
Sturnella neglecta	Western meadowlark
S. magna	Eastern meadowlark
Toxostoma curvirostre	Curve-billed thrasher
Tyrannus verticalis	Western kingbird
Zenaida macroura	Mourning dove

Table 3. Reptile and Amphibian Species that May Occur in the Area

Species Name	Common Name
Bufo debilis insidior	Western green toad
Cnemidophorus uniparens	Desert grassland whiptail
Heterodon nasicus	Western hooknose snake
H. nasicus kennerlyi	Mexican hognose snake
Holbrookia texana scitula	Southwestern earless lizard
Terrapene ornate luteola	Desert box turtle

4. SPECIAL-STATUS SPECIES AND SPECIES OF INTEREST SCREENING METHODS

A screening analysis was completed to evaluate the potential for special-status species, proposed or designated critical habitat, and species of interest to occur within the Study Area. ESA species (listed, proposed, or candidate) and critical habitat considered for evaluation are those that were identified in the USFWS Information for Planning and Consultation (IPaC) report generated for the Project (**Appendix B**). Other special-status species and species of interest considered for evaluation were those identified in the AGFD Heritage Data Management System (HDMS) online environmental review tool query as having been recorded within 3 miles of the Project (**Appendix C**) and USFS CNF sensitive species (**Appendix D**). The determinations of potential for special-status species and species of interest to occur within the Study Area were based on a review of:

- The natural history and known geographical and elevational ranges of the species.
- Other occurrence records in published or grey literature, including citizen science data, and unpublished data.
- Presence of suitable habitat based on available information and previously completed field evaluations.

The criteria used to determine the potential of occurrence of each species included in this screening analysis are defined as follows:

Present: The species has been observed to occur within the Study Area, the Study Area is within the known range and distribution of the species, and habitat characteristics required by the species are present.

Possible: There are no known records of the species within the Study Area, but the known, current distribution of the species includes the Study Area and the required habitat characteristics of the species appear to be present in the Study Area. Given the uncertainty associated with species identification and accuracy of the location of observations from eBird and other citizen science databases, observations associated with citizen science databases are evidence that a species is possible within the Study Area.

Unlikely: The known, current distribution of the species does not include the Study Area, but the distribution of the species is close enough such that the Study Area may be within the dispersal or foraging distance of the species, and they may show up as transients. The habitat characteristics required by the species may be present in the Study Area.

None: The Study Area is outside of the known distribution of the species, or the habitat characteristics required by the species are not present.

5. POTENTIAL FOR SPECIAL-STATUS SPECIES AND SPECIES OF INTEREST TO OCCUR

The results of the special-status species screening analyses for ESA, BGEPA, CNF sensitive, and MBTA species are summarized in the following sections. A more detailed summary of potential to occur for ESA and BGEPA is included in **Tables 6 and 7**, respectively, providing an overview of the federal protection status, known suitable habitat, total range, distribution in Arizona, and potential to occur within the Study Area. Potential to occur for CNF sensitive species is described in **Appendix D**, and to support these conclusions, the CNF Sensitive Species by ERU within Study Area provided in **Appendix E**. The potential to occur for all other special-status species and species of interest is provided in **Appendix F**.

5.1. ESA SPECIES

The USFWS IPaC list generated for this Project (**Appendix B**) included 13 ESA species. Of these 13 species, two species were determined to have the potential to occur of **Present** (yellow-billed cuckoo, and Mexican spotted owl), two species had the potential to occur of **Possible** (monarch butterfly and Pima pineapple cactus), three species were determined to have the potential to occur of **Unlikely** (jaguar, ocelot [*Leopardus* (=*Felis*) *pardalis*], and beardless chinchweed [*Pectis imberbis*]), and six were determined to have the potential to occur of **None** (Sonoran pronghorn [*Antilocapra americana sonoriensis*], Southwestern willow flycatcher, Northern Mexican gartersnake, Chiricahua leopard frog [*Rana chiricahuensis*], Gila topminnow, and Huachuca water-umbel [*Lilaeopsis schaffneriana* var. *recurva*]). These determinations and explanations for these findings are provided in **Table 4**.

5.2. BGEPA LISTED SPECIES

BGEPA species include golden eagle (*Aquila chrysaetos*) and bald eagle (*Haliaeetus leucocephalus*); the bald eagle has been recorded within 3 miles of the Study Area (**Appendix C**) but is determined to have a potential to occur in the Study Area of **None**. The golden eagle does not have HDMS records within 3 miles of the Study Area (**Appendix C**) but there are numerous eBird records within the Study Area and has a potential to occur of **Possible**. The potential for occurrence of these species is detailed in **Table 5.**

5.3. MBTA SPECIES

As described in **Section 3.6**, the Study Area includes the Patagonia Mountains IBA and numerous bird species and individuals protected by the MBTA nest or forage within and/or migrate through the Study Area both within and outside the boundaries of the IBA. The HDMS query (**Appendix C**) lists a total of 50 MBTA species with potential to occur within the Study Area, based on habitat modeling. A total of 115 bird species have been found documented in the Patagonia IBA (AZIBA 2014).

5.4. CNF SENSITIVE SPECIES

CNF sensitive species include those identified on the USFS Region 3 Regional Forester's Sensitive Species List for the CNF. CNF sensitive species with the potential to occur within the ERUs identified in the Study Area are listed in **Appendix E**. An overview of the known suitable habitat, total range, distribution in Arizona, and potential to occur within the Study Area is provided in **Appendix D**. Of the 143 CNF species identified, 10 are **Present** within the Study Area, 50 are **Possible**, 25 are **Unlikely** and 58 have a potential to occur of **None**. The CNF sensitive species present within the Study Area include: whiskered screech owl, Gould's wild turkey (*Meleagris gallopavo Mexicana*), Abert's towhee (*Pipilo aberti*), sulphur-bellied flycatcher (*Myiodynastes luteiventris*), Arizona woodpecker, elegant trogon, thick-billed kingbird, large-flowered blue star (*Phlebodium aureum*), Coleman's crested coralroot (*Hexalectris colemanii*), and green ratsnake (*Gonyosoma oxycephalum*) as described in **Appendix D.**

5.5. OTHER SPECIAL-STATUS SPECIES AND SPECIES OF INTEREST

The HDMS listing of special-status species documented within 3 miles of the Project (**Appendix C**) includes 16 species not already discussed in the previous sections. An overview of the known suitable habitat, total range, distribution in Arizona, and potential to occur within the Study Area is provided in **Appendix F**.

6. EFFECTS ON SPECIAL-STATUS SPECIES AND SPECIES OF INTEREST

6.1. PROJECT EFFECTS

Potential effects of the Project on special-status species, encompassing the extent of all direct effects and delayed consequences related to the Project, were evaluated by considering the results of the Screening Analysis alongside the Project's possible impacts from 1) surface disturbance, 2) noise, 3) dust, and 4) installation and maintenance of permanent infrastructure.

Surface Disturbance

Surface disturbance would consist of selective clearing with plant salvage for constructing a 100-ft-wide right of way (ROW) corridor for 20 to 30 miles. Access to the Project for construction would be from existing roads to the maximum extent possible. New access roads would be required to access pole locations that are not directly adjacent to existing roads. All storage and equipment lay down yards would be on private or UNSE property.

Impacts to vegetation and soils would be temporary at each transmission line structure, except for the actual location of the transmission structure where vegetation would be removed permanently. Removal of vegetation and soil disturbance would be permanent along access roads. Disturbance at pulling and tensioning sites would be temporary and would be reclaimed following construction. Incompatible

vegetation would be removed to allow for line sag and blow out. Construction of the Project includes EPMs that control erosion and reduce potential for soil instability.

Noise

Anthropogenic noise would increase within and adjacent to the Study Area over the short period of Project construction; post-construction noise is expected to be negligible, related to low-level facility maintenance activities. Construction noise disturbances would extend beyond the immediate work areas from construction equipment, but because noise attenuates with distance (ISO 1996), any potential effects of Project-associated noise would be restricted to areas immediately surrounding noise sources.

Examples of typical construction noise for the Project include operation of a backhoe or bulldozer, which generate approximately 85 dBA, as measured at 50 ft (U.S. Department of Transportation 2006). Constant noise generation during daily construction activity is expected to be within that range, with no louder, short-term noise from explosives anticipated. Noise from a point source in an open field attenuates at a rate of 6 dBA for every doubling of distance (U.S. Department of Transportation 2006). Based on the calculation, peak noise levels at 1,000 ft from a construction machine would be 59 dBA (WKC Group 2023; accessed online January 6, 2023), less than the 69 dBA level above which USFWS recommends noise reduction measures for special-status species (USFWS 2012b). Therefore, substantial increases in noise levels would be limited to areas within approximately 800 ft of the Study Area.

Dust

Fugitive dust may be generated as a result of the Project, though dust deposition attenuates with distance and a majority is typically deposited near the source. For example, dust loads produced within an area decrease exponentially with distance, such that more than 70 percent of the total dust is deposited within 33 ft (10 m) of the dust production area, and more than 90 percent within 98 ft (30 m) (Walker and Everett 1987). Dust can affect the growth processes of vegetation and alter the structure of plant communities in an area (Farmer 1993), thus potentially affecting wildlife habitat. However, considering that the Project would minimize fugitive dust through dust suppression efforts, the potential effects of dust on wildlife and vegetation are not expected to be substantially different from current conditions within the Study Area.

Installation of Permanent Infrastructure and Future Maintenance Activities

The installation of the Project infrastructure has a permanent impact to habitat. In addition to removal of habitat, the power lines and poles pose potential electrical and collision hazards for wildlife. For any powerlines built, proper design and construction of the transmission line would prevent or minimize risk of electrocution of raptors owls, vultures, and golden or bald eagles per the EPMs described in **Section 2.3**.

UNSE would complete a ground inspection of the transmission line a minimum of once each year. The ground inspection would use existing access roads and would be completed in a four-wheel drive vehicle, utility task vehicle (UTV), on foot, or a combination of these methods. The inspection would identify any

maintenance requirements. Routine maintenance activities include replacing broken insulators, repairing damaged conductor, and tightening nuts and bolts. Routine maintenance is non-ground disturbing and would be completed from a standard bucket truck. Minor road maintenance may be necessary on occasion, to ensure adequate access for maintenance vehicles. If UNSE crews or subcontractors damage access roads, UNSE would repair them as needed. Long-term noise impacts from transmission line operation and maintenance activities are expected to be minimal. Vegetation clearing under the line may impact species and habitat, but these clearing activities are expected to have a minimal impact. Due to the Project EPMs and minimal maintenance activity proposed, the potential effects of maintenance and permanent structures on wildlife and vegetation are not expected to have a substantially different effect from current conditions within the Study Area.

6.2. EFFECTS DETERMINATIONS

Discrete Project effects determinations were used for each of three categories of special-status species (ESA, BGEPA, and other special-status species and species of interest). Effects on critical habitat for ESA listed or proposed species were also analyzed.

ESA Species

A subset of the special-status species evaluated are listed, proposed, or candidate under the ESA and effects to these species were analyzed per five potential effects determinations:

- **No effect**
- **May affect, not likely to adversely affect**
- **May affect likely to adversely affect**
- **Likely to jeopardize the continued existence (for proposed and candidate species)**
- **Not likely to jeopardize the continued existence (for proposed and candidate species)**

The analysis of effects on critical habitat was based on the following determinations:

- **No effect**
- **May affect, not likely to destroy or adversely modify critical habitat**
- **May affect, is likely to destroy or adversely modify critical habitat**

BGEPA Species

Two species are protected under the BGEPA. Effects to BGEPA species were analyzed to determine whether any proposed Project activities would violate the BGEPA. The BGEPA prohibits unpermitted activities to “take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or in any manner any bald eagle commonly known as the American eagle or any golden eagle, alive or dead, or any part, nest, or egg thereof of the foregoing eagles…”. Under the BGEPA, “take” is defined as to “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb” (16

U.S.C. 668c). Disturb is further defined as "…to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available: (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior." Permits may be granted for eagle takes that are "associated with, but not the purpose of, the activity; and cannot practicably be avoided" (50 C.F.R. 22.26). Per the definition of take above, the three potential effects determinations include:

- **No take**
- **Not likely to result in take**
- **Likely to result in take**

MBTA Species

The MBTA makes it illegal for anyone to take, possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or the parts, nests, or eggs of such a bird except under the terms of a valid permit issued pursuant to federal regulations. Per the definition of "take" above, the three potential effects determinations include:

- **No take**
- **Not likely to result in take**
- **Likely to result in take**

CNF Sensitive Species

USFS sensitive species include those taxa occurring on National Forests in Arizona which are considered sensitive by the Regional Forester. Effects to CNF sensitive species were analyzed across four effects categories based on the extent of whether the Project is expected to result in the loss of viability or a trend towards listing under the ESA for any of the species.

- **No impact**
- **Beneficial impact**
- **May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing**
- **Likely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing**

Other Special-Status Species and Species of Interest

Other special-status species and species of interest evaluated for effects were those not otherwise federally listed, proposed or candidate or BGEPA that have been recorded within 3 miles of the preferred and alternative routes. These included:

- **1A, 1B**: These have no official status but are identified by AGFD as Species of Greatest Conservation Need (SGCN)
- **SC Species of Concern**: The terms "Species of Concern" or "Species at Risk" should be considered as terms-of-art that describe the entire realm of taxa whose conservation status may be of concern to the US Fish and Wildlife Service, but neither term has official status (currently includes all former C2 and delisted species).
- **BLM S Sensitive**: those taxa occurring on BLM Field Office Lands in Arizona which are considered sensitive by the Arizona State Office.
- **Plants**
  - **HS Highly Safeguarded**: no collection allowed
  - **SR Salvage Restricted**: collection only with permit
  - **ER Export Restricted:** transport out of State prohibited
  - **SA Salvage Assessed**: permits required to remove live trees
  - **HR Harvest Restricted**: permits required to remove plant by-products

Effects were analyzed to determine whether the Project is expected to result in the loss of viability or a trend towards listing under the ESA (Summarized in **Section 7** and evaluated in detail in **Appendix F**). Three potential effects determinations were considered:

- **No effect**
- **May impact individuals, but unlikely to result in a loss of viability or result in a trend toward federal listing**
- **Likely to result in a loss of viability or result in a trend toward federal listing**

Table 4. ESA Species Screening Analysis

Species Name	Federal Status	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
AMPHIBIANS						
Lithobates chiricahuensis Chiricahua leopard frog	Threatened (USFWS 2002, USFWS 2012a); designated critical habitat (USFWS 2012a).	Breeds in perennial to semi-permanent montane aquatic environments including cattle tanks, creeks, cienegas, pools, rivers, springs, lakes and reservoirs (USFWS 2011a). Larvae are obligate on aquatic habitats whereas adults are primarily aquatic but also utilize terrestrial habitats (USFWS 2012a). May disperse from occupied habitat 1 mile overland, 3 miles along intermittent drainages, and 5 miles along permanent water courses, or some combination thereof (USFWS 2012a). Elevation: 3,200–8,890 ft (USFWS 2012a).	Occurs in Arizona and New Mexico, U.S. and Sonora, Chihuahua and Durango, Mexico (USFWS 2012a).	In Arizona, this species distribution is split into two areas, one within montane areas across the Mogollon Rim and the second in the mountains and valleys south of the Gila River (AGFD 2015). At the time of the initial listing (USFWS 2002), the frog was likely extant at an estimated 87 localities in Arizona. Surveys between 2002 and 2009 suggest that there has been a modest increase in the number of breeding sites (USFWS 2011a).	**None** The majority of the Study Area occurs in the intervening valley between the Patagonia Mountains and the Atascosa Mountains and does not contain montane aquatic habitat. The eastern portion of the Study Area encompasses a portion of the Patagonia Mountains and contains montane aquatic environments including stock tanks, drinkers, and some intermittent flow, and while HDMS records indicate that there have been detections of this species within 3 miles of the Study Area (**Appendix A),** the USFWS has determined that bullfrogs and other non-native predatory species currently preclude CLF from becoming established in the Patagonia Mountains and San Rafael Valley (USFWS 2016a). Targeted surveys for CLF and other riparian herpetofauna within the Patagonia Mountains since 2012 have failed to detect CLF in the area. The Study Area is outside designated critical habitat for this species.	**Chiricahua leopard frog** **No effect** This species is not anticipated to occur within the Study Area. **Designated critical habitat** **No effect** The Study Area does not contain designated critical habitat for the Chiricahua leopard frog.

Species Name	Federal Status	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
BIRDS						
***Coccyzus americanus* (western Distinct Population Segment)** Yellow-billed cuckoo	Threatened (USFWS 2014b); designated critical habitat (USFWS 2021b).	In Arizona, most commonly found in lowland riparian woodlands where Fremont cottonwood, willow, velvet ash, Arizona walnut, mesquite, and tamarisk are dominant (USFWS 2013c). Also utilizes drier woodlands including mesquite bosques, drainages in desert scrub and desert grassland with a tree component, and Madrean evergreen woodlands in perennial, intermittent or ephemeral drainages (USFWS 2020c). This species typically occurs at elevations less than 6,600 ft amsl (AGFD 2011b). Western yellow-billed cuckoos may migrate along riparian corridors and surrounding upland vegetation (Hughes 2020). Elevation: Typically below 6,600 ft (AGFD 2011b).	This species is a long-distance neotropical migrant (Hughes 2020). At the species level, breeds throughout temperate North America south to Mexico and the Greater Antilles (Hughes 2020). The western DPS breeds west of the Continental Divide and the watershed boundary between the Rio Grande and Pecos River and the Chihuahuan Desert. The USFWS considers the historical breeding range to include southern British Columbia, Canada and in Washington, Idaho, Nevada, Oregon, Utah, western Colorado, southwestern Wyoming, California, Arizona, western New Mexico, and Texas, U.S. Breeding range extends into the Cape Region of Baja California Sur, Sonora, Sinaloa, western Chihuahua and northwestern Durango, Mexico (USFWS 2014b). Winters in South America, east of the Andes and typically south of the Amazon Basin in southern Brazil, Paraguay, Uruguay, eastern Bolivia and northern Argentina (USFWS 2014b).	More common in southern, central and the extreme northeastern portion of state, but occurs throughout the state where suitable habitat exists (AGFD 2011b).	**Present** Yellow-billed cuckoos have been consistently documented in major drainages throughout the Patagonia Mountains since 2012, including portions of the Study Area. There are HDMS records for yellow-billed cuckoo within 3 miles of the Study Area (**Appendix A).** The Study Area contains riparian and woodland habitat that may be used by this species for breeding and foraging. The Study Area overlaps designated critical habitat for this species.	**Yellow-billed cuckoo** **No effect.** Planned Project construction in areas of suitable habitat would occur prior to May 15 or after September 30 outside of the YBC occupancy period in southern Arizona, and as such planned construction would have no direct impacts on individual YBCs. Vegetation removal would be minimal and confined primarily to upland areas, around the existing distribution line poles, which would not affect the availability of potential foraging habitat for YBC within the Study Area. Tree trimming along major drainage features within the Study Area will be limited and as such no impacts to potential YBC breeding habitat are expected. The risk of potential impacts from Project maintenance activities in the Study Area are unlikely to increase above baseline levels. Based on these considerations, the Project would have no effect on YBC. **Designated critical habitat** **May affect, but not likely to destroy or adversely modify** The Project overlaps designated critical habitat for YBC along the Santa Cruz River but trimming of trees would be limited and removal of larger trees would be avoided or minimized (see EPMs in **Section 2.3.1**).

Species Name	Federal Status	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Strix occidentalis lucida Mexican spotted owl	Threatened (USFWS 1993b); designated critical habitat (USFWS 2004).	Prefers old-growth mixed conifer or pine-oak forests, or such forests with complex structure. Also uses narrow canyons with cliffs and conifer or riparian woodlands (Gutiérrez, Franklin, and Lahaye 2020). In Arizona, canyon habitats typically contain Madrean evergreen oak or Madrean pine-oak woodlands (Wise-Gervais 2005). In forested areas, nests in large trees whereas in canyon habitats, will nest in trees, caves or on rocky ledges (USFWS 2012b). Primarily forages for rodents in a range of forest or woodland habitats, but diet also includes lagomorphs, bats, birds, reptiles and arthropods (AGFD 2005, Gutiérrez, Franklin, and Lahaye 2020, USFWS 2012b). This species has large home ranges, with single owls in Arizona utilizing an average of 1,600 acres and pairs an average of 2,000 acres (AGFD 2005). Migration is variable within areas and among years (AGFD 2005, Gutiérrez, Franklin, and Lahaye 2020). When winter movements do occur, this species may move locally, primarily to lower elevations and more open sites with pinyon pine-juniper woodlands, open mountain shrub habitat, conifer forests or deciduous riparian trees (AGFD 2005, Gutiérrez, Franklin, and Lahaye 2020). Elevation: 2,720–10,000 ft (AGFD 2005).	This species is primarily non-migratory, although there may be some short distance (12 to 30 miles) or altitudinal movement (Gutiérrez, Franklin, and Lahaye 2020). Occurs patchily in Colorado, Utah, Arizona, New Mexico and western Texas. Range extends from the international border southward along the Sierra Madre Occidental and Oriental to Michoacán (Gutiérrez, Franklin, and Lahaye 2020, USFWS 2012b).	Occurs patchily in the southeastern, central, and northern portions of the state (USFWS 2012b, Wise-Gervais 2005). Range includes the Carrizo, Chuska, Galiuro, Patagonia, Santa Teresa, Whetstone, White and Winchester mountains, along the Mogollon Rim region, Black Mesa, Tsegi Canyon, Canyon de Chelly and side drainages of the Grand Canyon (Wise-Gervais 2005).	**Present** The eastern portion of the Study Area overlapping with the Patagonia Mountains contains the complex forest structure and canyons required by this species for breeding or for suitable roosting habitat. There are HDMS occurrence records of this species within 3 miles of the Study Area (**Appendix C).** This species has been consistently detected within the Patagonia Mountains since 2013, including portions of the Study Area and currently, there are five known roosting locations for this species. The western portion of the Study Area in the valley intervening the Patagonia Mountains and the Atascosa Mountains does not support the required habitat for this species. There is critical habitat for this species within the Study Area.	**Mexican spotted owl** **No effect.** The Study Area contains Madrean pine-oak woodland and canyon habitats. This species has been documented within 3 miles (**Appendix C**). The proposed alignment of the transmission line corridor or the alternative routes are not anticipated to affect roosting or nesting habitat. Because Project construction would occur only during daylight hours and MSO is a primarily nocturnal species (USFWS 2012b), no disturbances to owls that may forage in areas close to the Project are anticipated. The nearest known roost site is more than one mile from the preferred and any alternate routes, therefore noise generated from construction equipment would attenuate such that no disturbances to daytime roosting behaviors within PACs are anticipated. **Designated critical habitat** **May affect, but not likely to destroy or adversely modify** Removal of vegetation in areas that support the primary constituent elements of designated critical habitat would be minimized during construction and maintenance of the transmission line (see EPMs in **Section 2.3.1**).

Species Name	Federal Status	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Empidonax traillii extimus Southwestern willow flycatcher	Endangered (USFWS 1995); designated critical habitat (USFWS 2013a).	Breeds in successional stands of dense riparian vegetation composed of trees and shrubs along rivers or lakes (AGFD 2002c, USFWS 2013a). In Arizona, this species occurs between 75 and 9,180 ft amsl (AGFD 2002c). Migrates along riparian habitats, including those with shorter or more sparse vegetation or smaller patches than would be suitable for nesting (USFWS 2013a). This species is a long-distance neotropical migrant and winters in habitats outside of the U.S. (Sedgwick 2020). Elevation: In Arizona, 75–9,180 ft (AGFD 2002c).	This species is a long-distance neotropical migrant (Sedgwick 2020). Breeds in Arizona, California, Colorado, New Mexico, Nevada, Texas and Utah, U.S. Winters in southern Mexico and south to northern South America (USFWS Sedgwick 2020, 2013a).	Breeds in localized populations along the Big Sandy River, Bill Williams River, Cienega Creek, Colorado River in the Grand Canyon and south of Yuma, Empire Gulch, Salt River, Verde River, Gila River, Hassayampa River, Little Colorado River, the headwaters of the Little Colorado River near Greer and Eagar, Salt River, San Francisco River, San Pedro River, Santa Maria River, middle to lower San Pedro River, upper San Francisco River near Alpine, Tonto Creek, Verde River, and the Virgin River (AGFD 2002c, USFWS 2013a).	**None** This species has not been documented within 3 miles of the Study Area (**Appendix C**). There is no suitable riparian habitat for this species in the Study Area. The Study Area is outside designated critical habitat for this species.	**Southwestern willow flycatcher** **No effect.** This species is not expected to occur within the Study Area. **Designated critical habitat** **No effect** There is no designated critical habitat for this species in the Study Area.
INSECTS						
Danaus plexippus plexippus Monarch butterfly	Candidate. (USFWS 2020a)	Monarch caterpillars feed exclusively on plants in the subfamily Asclepiadoideae (milkweed) and adults forage for nectar on a wide variety of flowers. This species can be found wherever milkweed occurs. Overwintering populations use the leaves, branches and trunks of large trees within forested groves. In California, both native tree species and eucalyptus trees are utilized (Jepsen et al. 2015). Elevation: In Arizona, found at all elevations (Morris, Kline, and Morris 2015).	*D. plexippus* occurs in North America, Central America, the Caribbean south to South America, Hawaii, Australia, some Pacific Islands, parts of Asia, Africa and southern Europe. Populations outside of the Americas may be non-native (Zhan et al. 2014). Most populations of the *plexippus* subspecies are migratory and breed in southern-most portions of all Canadian provinces except Newfoundland and Labrador, the conterminous U.S. states and the Mexican states of Baja California, Chihuahua, Coahuila, Nuevo Léon, Sonora and Tamaulipas. The wintering range of migratory populations includes coastal California and southern Florida, U.S. and the Mexican states of Baja California, Mexico and Michoacán (Jepsen et al. 2015).	Breeding and migratory populations occur throughout the state. Some adults overwinter in the low deserts of Arizona in areas where food resources are abundant. These areas are generally represented by urban environments including Yuma, Phoenix and Tucson (Morris, Kline, and Morris 2015).	**Possible** There are HDMS occurrence records of this species within 3 miles of the Study Area (**Appendix C**). This species has been documented in the Patagonia Mountains along Harshaw Road and adjacent to the Study Area (The Xerces Society for Invertebrate Conservation 2021). There is no critical habitat designated for this species**.**	**May affect, not likely to adversely affect.** Monarch butterfly has been documented within 3 miles of the Analysis Area (**Appendix C**), and the Analysis Area includes flowering plants that may provide foraging opportunities for adult monarch butterflies. Project surface disturbance activities are not anticipated to cause long-term degradation of potentially suitable monarch butterfly habitat or result in a substantial change in landscape characteristics from baseline levels therefore, the Project does not significantly increase the risk of monarch butterfly road mortality. To address effects on nectar plants that may be used by monarch butterflies, disturbed areas would be re-seeded with native species (see EPMs in **Section 2.3.1**).

Species Name	Federal Status	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
MAMMALS						
Panthera onca Jaguar	Endangered (USFWS 1997b); designated critical habitat (USFWS 2014a).	Range wide this species uses wide variety of habitat types. Jaguars use lowland wet vegetative communities, including marshy savanna and tropical rainforest. This species is also found in arid regions where it is found in tropical dry forest, thornscrub, desertscrub, chaparral, semi-desert grassland, Madrean evergreen woodland, deciduous forest, and conifer forest (USFWS 2018b). Elevation: This species has been recorded from as high as 9,186 ft in the northern extent of its range (USFWS 2018b).	Occurs in southern Arizona, southern New Mexico and southern Texas, U.S. Range extends southward through Mexico to northern Argentina (USFWS 2018b).	Historically (i.e., prior to 1965), jaguars were reported at numerous locations in Arizona, as far north as the Grand Canyon; however, all Arizona records since 1965 have been in the southern portion of the state (Brown and López-González 2001, Wildlife Conservation Society 2021, accessed February 1, 2021). One record is from near Globe, and the remaining records are from the Atascosa, Baboquivari, Dos Cabezas, Huachuca, Patagonia, Peloncillo, Santa Rita and Whetstone mountains in the southeastern portion of the state. Between 1965 and 1986, only three jaguars were documented (and all were killed) in Arizona: in the Patagonia Mountains (1965), near the Santa Cruz River (1971), and in the Dos Cabeza Mountains (1986). No jaguars were reported in Arizona for 10 years between 1986 and 1996, but the number of sightings of this species in the southwestern U.S. has been on the rise since 1996. Seven possibly eight, individual jaguars were documented in the U.S. between 1996 and 2021: two in New Mexico and five or six in Arizona (Wildlife Conservation Society 2021). A single male jaguar has been documented in the Dos Cabeza and Chiricahua Mountains as recently as 2021 (Wildlife Conservation Society 2021). Because female jaguars have not been documented in the state for many years, individuals detected in Arizona are interpreted as part of a population that primarily occurs in adjoining regions of Mexico (USFWS 2018b).	**Unlikely** Historical records document the presence of jaguars in the Patagonia Mountains. However, the only recent records are of a male known to use the Santa Rita Mountains that has not been observed since 2015, a possible male in the Huachuca Mountains, and a possible third male in the Dos Cabezas Mountains (AGFD 2016, USFWS 2017a). Moreover, the individual reported from the Huachuca Mountains is believed to have been killed in Mexico (Davis 2018). There are no HDMS occurrence records within 3 miles of the Study Area (**Appendix C).** The Study Area overlaps designated critical habitat for this species.	**<u>Jaguar</u>** **No effect.** Project construction activities would occur during daylight hours and would not disrupt nocturnal productivity of this species. Given the relatively small spatial extent and limited time span of the Project and the extremely low potential for this species to occur in the Study Area, particularly during Project disturbance activities, the Project would have no effect on this species. **<u>Designated critical habitat</u>** **No effect** The Project would have **no effect** on the primary constituent elements (PCEs) of designated critical habitat for the jaguar. Due to the limited nature of disturbance, the Project would have no effect on habitat connectivity to Mexico (PCE 1), adequate levels of native prey species (PCE 2), surface water sources (PCE 3), Madrean evergreen woodland canopy cover (PCE 4), rugged terrain below 2,000 m in elevation (PCEs 5 and 6), or minimal to no human population density, no major roads, or no stable nighttime lighting (PCE 7) (USFWS 2014a, 2021a).

Species Name	Federal Status	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Leopardus pardalis Ocelot	Endangered (USFWS 1982); no critical habitat.	Uses a wide range of densely vegetated habitats throughout its range including desertscrub, thornscrub, grasslands, marshlands, coastal tropical forest, dry tropical forest, tropical rain forest, oak woodlands, piedmont/montane scrub, cloud forest, pine-oak forests, palm savanna, sandhills, shrub woodlands, deciduous forest and gallery forest (AGFD 2010, USFWS 2016b). Elevation: In Arizona, generally below 4,000 ft (AGFD 2010) but has been documented from sites as high as 9,514 ft in Mexico (USFWS 2016b).	Occurs in southern Arizona and Texas, U.S. Range extends southward through Mexico to Argentina and Uruguay, South America (USFWS 2016b).	Since the 1970s, a total of six ocelots (all from 2009 and later) have been documented in the Huachuca, Patagonia, Whetstone and Santa Rita Mountain ranges. This includes five live and one deceased ocelot (all males). The dead specimen of uncertain origin was found in 2010 next to a highway near Globe between the Pinal and Superstition Mountain ranges(USFWS 2018a; Tim Snow, AGFD, personal communication to D. Cerasale, WestLand Resources, June 29, 2018). A 2-year camera-trap study in the area near Globe, Arizona, did not photograph any additional ocelots (Featherstone et al. 2013) The first live ocelot was detected in the Whetstone Mountains in April of 2009 (Avila-Villegas and Lamberton-Moreno 2013). The second live specimen was first detected in the Huachuca Mountains in 2011 and subsequently observed in the Patagonia Mountains in 2012 and last detected in the Huachuca Mountains in 2013 (Culver 2016). The third live specimen was detected in the Huachuca Mountains in 2012 and has been detected repeatedly in the Huachuca's, most recently in January 2021. In 2014, a fourth live specimen was observed in the Santa Rita Mountains. Additionally, an ocelot was detected in December 2013 in the Santa Rita Mountains; however, it is unknown if this was the same as the fourth ocelot described above or a different ocelot. The fifth live specimen was observed in 2018 in the Huachuca Mountains and was later found dead due to injuries associated with a vehicle collision. The nearest known breeding population occurs at Rancho El Aribabi in Sonora, Mexico (Rorabaugh et al. 2020).	**Unlikely** One individual was documented in the Patagonia Mountains in 2012, but was most recently seen in the Huachuca Mountains in 2021 (Phoenix Fox 10 News 2021, USFWS 2016b). There are no HDMS occurrence records within three miles for the Study Area (**Appendix C**). Given the rarity of this species across the landscape, it is unlikely that an individual of this species would occur in the Study Area. There is no critical habitat designated for this species.	**No effect.** Project construction activities would occur during daylight hours and are unlikely to disrupt the behavior of this generally nocturnal species (AGFD 2010). Given the relatively small spatial extent and limited time span of the Project and the extremely low potential for this species to occur in the Study Area, particularly during Project disturbance activities, the Project would have no effect on this species.

Species Name	Federal Status	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Antilocapra americana sonoriensis Sonoran pronghorn	Endangered (USFWS 1967); non-essential experimental population (USFWS 2011b); no critical habitat	In the winter months, prefers flat and open areas that facilitate detection and escape from predators. In summer months, require denser vegetation to provide moister forage and thermal cover to reduce heat stress. Move nomadically to access water and favorable foraging areas. Forage on a wide variety of plant species. Occur within the Lower Colorado River Valley and Arizona upland subdivisions of Sonoran Desertscrub (USFWS 2016c). Elevation: 400–1,600 ft (AGFD 2002b).	Occurs in Arizona, U.S. and Sonora, Mexico (USFWS 2016c).	There are four populations (including non-essential experimental), all of which occur in the extreme southwestern portion of the state in the Cabeza Prieta National Wildlife Refuge, Organ Pipe Cactus National Monument and Barry M. Goldwater Range (USFWS 2016c). The non-essential experimental population is located "north of Interstate 8 and south of Interstate 10, bounded by the Colorado River on the west and Interstate 10 on the east; and an area south of Interstate 8, bounded by Highway 85 on the west, Interstates 10 and 19 on the east, and the United States-Mexico border on the south" (USFWS 2011b). Specifically, the two non-essential experimental populations occur in the Kofa National Wildlife Refuge, U.S. Army Yuma Proving Grounds and the Barry M. Goldwater Range East (USFWS 2016c).	**None** The Study Area is outside of the geographic and elevational range for this species. There are no HDMS occurrence records within three miles for the Study Area (**Appendix C**). There is no critical habitat designated for this species.	**No effect.** This species is not expected to occur within the Study Area.

Species Name	Federal Status	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
PLANTS						
Pectis imberbis Beardless chinchweed	Endangered (USFWS 2019); designated critical habitat (USFWS 2021c)	This species typically grows in eroding limestone or granite soils and rocky outcrops on steep, sunny or partially shady slopes in desert grassland, oak savannas and oak woodland (USFWS 2018e). Additionally, this species occurs in areas with some level of disturbance and reduced vegetation such as along washes, road cuts, trails, animal paths or mine tailings (USFWS 2018e). Elevation: Currently 3,799–4,900 ft (USFWS 2018e). AGFD (2012a) reports 3,600–6,475 ft which likely includes extirpated populations.	Occurs in Arizona, U.S. and the Mexican states (current status unknown) of Chihuahua and Sonora (USFWS 2018e).	In Arizona, at the time of the proposed rule, there were seven known extant populations that occur in Cochise, Pima and Santa Cruz counties (USFWS 2018e). These populations include one population in the Atascosa-Pajarito mountains along Ruby Road, one population in the Canelo hills at the Audubon Research Ranch, two populations in the Huachuca Mountains in Scotia Canyon and the Coronado National Memorial, and two sub-populations in the Santa Rita Mountains in McCleary Canyon-Wasp Canyon and McCleary Canyon-Gunsight Pass which are both part of the McCleary Canyon drainage (USFWS 2018e). Recent surveys have documented additional extant populations near Pena Blanca Lake and Lampshire Well that were assumed by USFWS to have been extirpated. Additionally, the Coronado National Forest conducted surveys in 2020, and have documented an additional, previously unknown, extant population on the Sierra Vista Ranger District near the Coronado National Memorial and the U.S./Mexico border (Angela Dahlby, USFS pers. comm. to J. Diamond, January 4, 2021).	**Unlikely** The Patagonia Mountains overlapping with the Study Area is within the geographic distribution for this species and provides suitable habitat of oak woodlands at higher elevations and desert grasslands at lower elevations. This species has not been detected during recent targeted surveys within potential habitat in the Patagonia Mountains or incidentally during other plant surveys in the area. A focused survey in 2021 for this species within the Study Area for this project did not detect any beardless chinchweed (WestLand 2022). The Study Area is outside designated critical habitat for this species.	**Beardless chinchweed** **May affect, not likely to adversely effect.** While this species has a potential to occur of possible within the Study Area, a survey for beardless chinchweed conducted in a portion of the Study Area during the flowering period in 2021 detected no individuals. Pre-construction survey that would be completed for this species on USFS lands would result in avoidance or minimization of impacts (see EPMs in **Section 2.3.5**). **Designated critical habitat** **No effect.** There is no designated critical habitat for this species in the Study Area.
Coryphantha scheeri* var. *robustispina [Note: *C. s.* var *robustispina* is considered to be a synonym of *Coryphantha robustispina* ssp. *robustispina* (Integrated Taxonomic Information System 2019, accessed October 15, 2019)] Pima pineapple cactus	Endangered (USFWS 1993a), no critical habitat.	Occurs on flat ridges and alluvial fans with deep, silty and gravely soils, in semi-desert grassland and Sonoran desertscrub (AGFD 2001b, USFWS 2018c). Most commonly found on coppice mounds in Holocene or Pleistocene substrates (USFWS 2018c). Elevation: 2,300–5,000 ft (AGFD 2001b) but typically below 4,200 ft (USFWS 2018c).	Occurs in south-central Arizona, U.S. and north-central Sonora, Mexico (AGFD 2001b, USFWS 2018c).	Found in the Altar and Santa Cruz valleys in Pima and Santa Cruz counties (USFWS 2018c).	**Possible** The Study Area is within the species' known distribution and contains suitable habitat of Semidesert Grassland and gravely and silty alluvium. There are HDMS occurrence records within 3 miles of the Study Area (**Appendix C).** There is no designated or proposed critical habitat for this species.	**May affect, not likely to adversely affect** Given the relatively small spatial extent and limited disturbance and anticipated avoidance of any plants during construction, the Project is not anticipated to result in adverse effects to this species.

Species Name	Federal Status	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Lilaeopsis schaffneriana* var. *recurva Huachuca water-umbel	Endangered (USFWS 1997a), designated critical habitat (USFWS 1999).	Found in shallow and slow-flowing cienegas, rivers, streams and springs or within active stream channels in areas that escape scouring during flood events (USFWS 2017b). Elevation: 2,001–7,100 ft (USFWS 2017b).	Occurs in southeastern Arizona, U.S. and Sonora and Chihuahua, Mexico (SEINet Portal Network 2019, accessed Janauary 11, 2019, USFWS 2017b).	Found at 17 localities within the Santa Cruz, San Pedro and Rio Yaqui watersheds. Within the Santa Cruz River basin this species occurs at six locations including Bear Canyon, Huachuca Canyon, Las Cienegas, Scotia Canyon, Sunnyside Canyon and upper Sonoita Creek. Within the San Pedro River basin there are nine locations including the Babocomari River, Gardner Canyon, Lone Mountain Canyon, McClure Canyon, Sawmill Canyon, Sycamore Spring, Wakefield Mine springbox and the mainstem of the San Pedro River. Within the Rio Yaqui basin this species occurs in Black Draw and Leslie Canyon (USFWS 2017b).	**None** There are HDMS records for this species within 3 miles of the Study Area (**Appendix C**). Multiple years of surveys along a wetted reach of Harshaw Creek have not recorded this species. Suitable habitat is not present in the Study Area. The Study Area is outside designated critical habitat for this species.	**Huachuca water umbel** **No effect.** This species is not expected to occur within the Study Area. **Designated critical habitat** **No effect.** There is no designated critical habitat for this species in the Study Area.
Graptopetalum bartramii Bartram's stonecrop	Threatened (USFWS 2019); no critical habitat.	This species typically grows above the floodline near seeps, spring or intermittent streams in shady canyons in Madrean evergreen woodlands (USFWS 2018d). Plants are found in crevices of rock ledges or cliffs, often in areas with accumulated leaf litter (USFWS 2018d). Elevation: 3,500–6,700 ft (USFWS 2018d).	Occurs in Arizona, U.S. and Chihuahua and Sonora, Mexico (USFWS 2018d).	There are 26 known populations spread across 10 mountain ranges in Cochise, Pima and Santa Cruz counties (USFWS 2018d). Below, we list each population by mountain range. In the Baboquivari Mountains, this species occurs in Brown and Thomas canyons. In the Chiricahua Mountains, this species occurs in Echo Canyon. In the Dragoon Mountains, this species occurs in Jordan Canyon, Sheephead, Slavin Gulch, and the east and west branches of Stronghold Canyon. In the Mule Mountains, this species is found at Juniper Flat. In the Pajarito-Atascosa mountains this species is found in Alamo, Holden, Sycamore and Warsaw canyons. In the Patagonia Mountains this species is found in Alum Canyon (includes Flux Canyon). In the Rincon Mountains, this species is found in Chimenea-Madrona and south Happy Valley. In the Santa Rita Mountains this species is found in Adobe, Gardner, Josephine, Madera, Sycamore and Walker canyons, and Squaw and Temporal gulches. In the Whetstone Mountains this species is found in Deathtrap and French Joe canyons (USFWS 2018d). Many of these populations are composed of several subpopulations that are detailed in the proposed rule (USFWS 2019).	**Present.** This species has been documented to occur in shady canyon habitat near seeps, springs, or intermittent streams within the Study Area boundaries.	**No effect.** The preferred and alternative routes are not anticipated to impact mesic canyon habitats where this species is found. EPMs requiring pre-construction plant surveys for special-status plants and erosion control measures would prevent any direct or indirect effects on Bartram's stonecrop (see EPMs in **Sections 2.3.1** and **2.3.5**)

Species Name	Federal Status	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
REPTILES						
Thamnophis eques megalops Northern Mexican gartersnake	Threatened (USFWS 2014c); designated critical habitat (USFWS 2020b, USFWS 2021a)	This species is strongly associated with water due to its primarily aquatic prey base and is heavily dependent on fish species. Occurs near or in ponds, cienegas, lowland river riparian forests and woodlands, and upland stream gallery forests. Avoids steep mountain canyons. Most abundant in densely vegetated habitat. Associated with a variety of biotic communities including Sonoran Desertscrub, Semidesert Grasslands, Interior Chaparral, Madrean Evergreen Woodland and into the lower reaches of Petran Montane Conifer Forest (AGFD 2012b, USFWS 2013b). Northern Mexican gartersnakes may be found up to one mile (or more) away from water, using terrestrial habitat for brumation, digestion, or for thermoregulatory needs such as developing young (Jeff Servoss, USFWS pers. comm. to D. Cerasale, April 18, 2016). Elevation: 130–8,497 ft (USFWS 2014c) but is most common below 5,000 ft (AGFD 2012b).	Occurs in Arizona and New Mexico, U.S. (USFWS 2014c). Although it is poorly known, the range extends into Mexico and is thought to include Sonora, Chihuahua, Durango, Coahuila, Zacatecas, Guanajuato, Nayarit, Hidalgo, Jalisco, San Luis Potosí, Aguascalientes, Tlaxcala, Puebla, México, Michoacán, Oaxaca, Veracruz, and Querétaro (AGFD 2012b).	Occurs in fragmented populations south of Hwy I-40. There are five populations where individuals are reliably detected and include Page Springs and Bubbling Ponds State Fish Hatcheries along Oak Creek, lower Tonto Creek, the upper Santa Cruz River in the San Rafael Valley, the Bill Williams River and the upper and middle Verde River. This species is irregularly detected along the Agua Fria River, Little Ash Creek, the Black River, Big Bonito Creek, Redrock Canyon, Sonoita Creek, Scotia Canyon, Parker Canyon, Las Cienegas National Conservation Area and Cienega Creek Natural Preserve, Buenos Aires National Wildlife Refuge, Bear Creek, San Pedro River, Babocomari River and Cienega, Canelo Hills-Sonoita Grasslands Area, and the San Bernardino National Wildlife Refuge. The species is likely extirpated from the Lower Colorado River, the Lower Salt River, Sycamore Creek (Yavapai and Coconino counties), and the Lower Santa Cruz River (USFWS 2014c).	**None** There are HDMS records within 3 miles of the Study Area (**Appendix C**). Although this species is reliably detected within the San Rafael Valley east of the Study Area, there are limited perennial water features for this species to disperse into from the valley into the Study Area. The maximum reported longitudinal distances traveled by adult snakes is less than a mile, and dispersal data does not exist for juveniles (USFWS 2020b). Sites that this species might use include stock tanks on the fringe of the San Rafael Valley USFWS has indicated that the species is not present in Harshaw Creek (Jeff Servoss, USFWS pers. comm. to D. Cerasale, November 8, 2019). There are no known records of this species in other portions of the Study Area. Together, these data indicate that Northern Mexican gartersnakes do not occur in the Study Area. Extensive aquatic surveys in the Patagonia Mountains have not detected this species. The Study Area is outside designated critical habitat for this species.	**Northern Mexican gartersnake** **No effect.** This species is not expected to occur within the Study Area. **Designated critical habitat** **No effect**. There is no designated critical habitat for this species in the Study Area.

Species Name	Federal Status	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
FISH						
Poeciliopsis occidentalis Gila topminnow (including Yaqui)	Endangered (USFWS 1967); no critical habitat.	Occurs in springs, cienegas, permanent and intermittent streams and the margins of large rivers. Prefers warm, shallow and slow-moving water but can occur in lentic habitats or lotic habitats with moderate current. Additionally, favors areas with algal mats or debris along stream margins (USFWS 1998). Elevation: Below 5,000 ft (AGFD 2001a).	Occurs in the Gila, Concepción and Yaqui river basins of Arizona and New Mexico, U.S. and Sonora, Mexico (Cobble 1995, USFWS 1998).	As of 2017, there are 11 to 15 natural populations and 40 reestablished wild populations of the *occidentalis* subspecies. Within the Santa Cruz River Basin this includes Monkey Spring, Cottonwood Spring, Fresno Canyon, Coalmine Canyon, Parker Canyon, the Santa Cruz River north of Nogales, Cienega Creek at Las Cienegas National Conservation Area, Cienega Creek north of I-10. Additionally, natural populations may be present in Sonoita Creek above and below Patagonia Lake and in the Santa Cruz River at Tucson. Within the Gila River Basin natural populations are found above Coolidge Dam in Bylas Spring, Middle Spring and Salt Creek. Reestablished wild populations occur in the San Pedro River Basin, Santa Cruz River Basin and the Gila River Basin above and below the Coolidge Dam (AGFD 2018). The *sonoriensis* subspecies occurs in the extreme southeastern portion of the state in the Yaqui River Basin in the San Bernardino and Leslie Canyon Wildlife Refuges (Cobble 1995, Minckley and Marsh 2009, p. 252).	**None** The Study Area lacks suitable habitat. There are HDMS records for this species within 3 miles of the Study Area (**Appendix C**) but multiple years of aquatic surveys have not detected this species in the Patagonia Mountains. There are historic records of this species from Potrero Creek in the western portion of the Study Area. There are also more recent records from the Santa Cruz River downstream of the Study Area There is no critical habitat designated for this species.	**No effect.** This species is not expected to occur within the Study Area. The Project would not affect aquatic habitat in Potrero Creek or the Santa Cruz River (see EPMs in **Section 2.3.1**). **Designated critical habitat** **No effect** There is no designated critical habitat for this species in the Study Area.

Table 5. BGEPA Species Screening Study

Species Name	Federal Status	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	
Haliaeetus leucocephalus Bald Eagle	Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c)	Breeding is concentrated in coastal areas, along rivers, lakes or reservoirs. Typically breeds in forested areas with edge habitat within 1.3 miles of aquatic habitats suitable for foraging. Prefers areas of shallow water and shorelines for fishing and hunting wide variety of waterfowl, and small aquatic and terrestrial mammals. Fish are preferred prey, but carrion is used extensively whenever encountered. Nests away from human disturbance in large trees and rarely on cliff ledges or on the ground when trees are absent. Winters primarily in coastal areas or along major river systems with adequate prey availability and large trees for perching (Buehler 2020). Elevation: In Arizona, 460–7,930 ft (AGFD 2011a).	Migratory behavior varies among populations and age groups (Buehler 2020). Breeds south of the tundra throughout Canada and the U.S., excluding Hawaii. Additionally, small breeding populations occur in Baja California, Sonora and Chihuahua, Mexico (Buehler 2020). Winter range appears to be expanding as populations increase in size. Most populations are year-round residents with only the northern most populations in Alaska, U.S. and Canada withdrawing southward or to coastal areas (Fink et al. 2018).	A small resident population occupies the central part of the state, and a wintering population occurs in central and northern Arizona. Breeding territories occur at most large lakes and reservoirs and along portions of large rivers and creeks, including the Agua Fria, Bill Williams, Colorado, Little Colorado, Gila, Salt, San Carlos, San Francisco and Verde Rivers (AGFD 2011a, McCarty, Licence, and Jacobsen 2018).	**None** The Study Area is in the southern limit of this species wintering range and there are HDMS records within 3 miles of the Study Area (**Appendix C**). Bald eagles have been seen consistently along Sonoita Creek, but the Study Area lacks suitable habitat.	**No take.** This species is not expected to occur within the Study Area.
Aquila chrysaetos Golden eagle	Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c)	Range-wide, breeds in a wide variety of open habitats, with nests typically on cliffs, and avoids heavily forested areas (Katzner et al. 2020). In Arizona, prefers pinyon-juniper woodlands and Sonoran desertscrub (Driscoll 2005). Constructs large nests on cliff ledges, rock outcrops, tall trees or, rarely, transmission towers (Driscoll 2005). Golden eagles are known to forage within 4.4 miles of the nest (Tesky 1994), generally in open habitats where prey is available (Katzner et al. 2020). Primarily feeds on small mammals (greater than 80% of prey items) but also consumes birds, reptiles and fish (Katzner et al. 2020). In the western U.S. average territory size ranges from 22 to 55 square miles (AGFD 2002a). Elevation: In Arizona, typically breeds between 1,300–9,000 ft (Driscoll 2005).	This species is a short to medium-distance partial migrant with a Holarctic distribution (Katzner et al. 2020). In North America, primarily breeds in western portion of the continent from Alaska to central Mexico. Northern most populations are typically migratory. Year-round and non-breeding populations occur from central Saskatchewan to British Columbia, Canada and south throughout its range and sparsely in the eastern U.S. (Katzner et al. 2020).	Found in suitable habitat throughout the state (Driscoll 2005) but tend to vacate low desert areas during the summer (AGFD 2002a).	**Possible** This species has not been documented within 3 miles of the Study Area (**Appendix C**) but there are eBird records within the Study Area (eBird 2022; accessed online 12/2/2022) along the Santa Cruz River, and within the Patagonia Mountains. The Study Area contains some foraging habitat, including open habitat and may include cliffs, ledges, and tall trees for potential breeding. There are no known active nest sites in Santa Cruz county based on AGFD 2002 survey (McCarty, Presler, and Jacobson 2020).	**Not likely to result in take** The Study Area does not include suitable nesting habitat. Potential foraging habitat occurs, but the Project has no potential to result in take. No Project impacts to cliffs, large trees, undisturbed forest habitat, water resources, or roadways are anticipated that might affect the quality or availability of bald eagle breeding or foraging habitat. Ground disturbance would be confined to a small footprint, and construction durations would only occur as necessary. Project construction noise has the potential to cause golden eagles to temporarily vacate or avoid the Study Area if individuals happen to be present during construction. Electric line construction would incorporate avian-safe design elements that would project golden eagles from electrocution (see EPMs in Section **2.3.3**).

7. SUMMARY OF EFFECTS ON AREAS OF BIOLOGICAL WEALTH, SPECIAL-STATUS SPECIES, AND SPECIES OF INTEREST

7.1. AREAS OF BIOLOGICAL WEALTH

Effects of the Project alternatives, per section, are summarized in **Table 6**. The Preferred Route includes Route 1, Section 1A, Section 1B and Section 1C; Alternate Route A includes Route 1, Section 2A, Section 1B and Section 1C; Alternate Route B includes Route 1, Section 2B, Section 1A and Section 1C, and Alternate Route C includes Route 1, Section 2C, Section 1A and Section 1B**.**

Overall, the effects on species would be similar among the alternatives, with the vast majority of critical habitats and the Patagonia Mountains IBA located on USFS lands. However, Alternative Route C would have a slightly higher impact to jaguar critical habitat and Mexican spotted owl critical habitat but a slightly lower impact to the Patagonia Mountains IBA.

Table 6. Acres Affected by Alternative for Vegetation Type and Areas of Biological Wealth

Alternative ID	Vegetation	Critical Habitat	Patagonia Mountains IBA	Santa Rita - Tumacacori Wildlife Linkage
Summary by Routing Segment				
Route 1 (common to all)	Woodland - Madrean Encinal Woodland; 8.41 acres	Jaguar; 52.24 acres	71.54 acres	24.47 acres
	Grassland - Semi-Desert Grassland; 138.45 acres	Mexican spotted owl; 38.10 acres		
	Riparian - Fremont Cottonwood / Shrub; 0.84 acres	Yellow-billed cuckoo; 37.05 acres		
	Woodland - Juniper Grass; 14.51 acres			
Section 1A	Grassland - Semi-Desert Grassland; 19.01 acres			
Section 1B	Grassland - Semi-Desert Grassland; 13.13 acres			
Section 2A	Grassland - Semi-Desert Grassland; 22.12 acres			
Section 2B	Grassland - Semi-Desert Grassland; 18.07 acres		0.31 acres	
Section 1C	Woodland - Madrean Encinal Woodland; 1.4 acres	Jaguar; 17.39 acres	17.39 acres	
	Woodland - Juniper Grass; 4.05 acres	Mexican spotted owl; 17.39 acres		
	Grassland - Semi-Desert Grassland; 11.95 acres			
Section 2C	Grassland - Semi-Desert Grassland; 20.55 acres	Jaguar; 30.02 acres	12.27 acres	
	Woodland - Juniper Grass; 9.12 acres	Mexican spotted owl; 30.02 acres		
	Woodland - Madrean Encinal Woodland; 0.34 acres			

Alternative ID	Vegetation	Critical Habitat	Patagonia Mountains IBA	Santa Rita - Tumacacori Wildlife Linkage
Summary by Alternative				
Preferred Route	Woodland - Madrean Encinal Woodland; 9.81 acres	Yellow-billed cuckoo; 37.05 acres	88.93 acres	24.47 acres
	Grassland - Semi-Desert Grassland; 182.54 acres	Jaguar: 69.64 acres		
	Riparian - Fremont Cottonwood / Shrub; 0.84 acres	Mexican spotted owl: 55.49 acres		
	Woodland - Juniper Grass; 18.56 acres			
Alternative A	Woodland - Madrean Encinal Woodland; 9.81 acres	Yellow-billed cuckoo; 37.05 acres	88.93 acres	24.47 acres
	Grassland - Semi-Desert Grassland; 187.48 acres	Jaguar: 69.64 acres		
	Riparian - Fremont Cottonwood / Shrub; 0.84 acres	Mexican spotted owl: 55.49 acres		
	Woodland - Juniper Grass; 18.56 acres			
Alternative B	Woodland - Madrean Encinal Woodland; 9.81 acres	Yellow-billed cuckoo; 37.05 acres	89.24 acres	24.47 acres
	Grassland - Semi-Desert Grassland; 187.48 acres	Jaguar: 69.64 acres		
	Riparian - Fremont Cottonwood / Shrub; 0.84 acres	Mexican spotted owl: 55.49 acres		
	Woodland - Juniper Grass; 18.56 acres			
Alternative C	Woodland - Madrean Encinal Woodland; 8.75 acres	Yellow-billed cuckoo; 37.05 acres	83.81 acres	24.47 acres
	Grassland - Semi-Desert Grassland; 191.14 acres	Jaguar: 82.26 acres		
	Riparian - Fremont Cottonwood / Shrub; 0.84 acres	Mexican spotted owl: 68.12 acres		
	Woodland - Juniper Grass; 23.63 acres			

7.1.1. Important Bird Areas

The Preferred Route and Alternate Route A would have the same impact to the Patagonia Mountains IBA (88.93 acres), while Alternate Route B would have a slightly higher impact (89.24 acres), and Alternate Route C would have a lower impact (83.81 acres) to the IBA. Thus, Alternate Route B would have a slightly higher impact to the IBA, while Alternate Route C would have a slightly lower impact to the IBA.

7.1.2. Wildlife Connectivity Linkage

All of the alternatives would have the same impact (24.47 acres) to the Santa Rita – Tumacacori Wildlife Linkage, as Route 1, which crosses the Wildlife Linkage, is common to all of the alternatives.

7.1.3. Critical Habitat

All alternatives would cross critical habitat for jaguar, Mexican spotted owl, and yellow-billed cuckoo. All alternatives would impact the same amount of yellow-billed cuckoo habitat (37.05 acres). The Preferred Route and Alternate Routes A and B would impact 69.64 acres of jaguar critical habitat and 55.49 acres of Mexican spotted owl habitat, while Alternate Route C would impact 82.26 acres of impact to jaguar critical habitat and 68.12 acres of Mexican spotted owl critical habitat.

7.2. FEDERALLY LISTED SPECIES

Overall, the effects on federally listed or candidate species would be similar among the alternatives. The Project may affect, but is not likely to adversely affect, the candidate monarch butterfly and the threatened Pima pineapple cactus. The Project may affect, but is not likely to destroy or adversely modify designated critical habitat for, the threatened yellow-billed cuckoo and Mexican spotted owl. The Project would have no effect on any other federally listed species based on lack of suitable habitat or implementation of EPMs that limit construction outside the breeding or occupancy period.

7.3. MBTA, CNF, AND OTHER SPECIAL-STATUS SPECIES AND SPECIES OF INTEREST

Impacts to vegetation types by each Project alternative vary slightly, but all cross the same four types of vegetation communities, and effects to MBTA, CNF, other special-status species, and species of interest would be similar. Although no targeted surveys were conducted for the purpose of this BE, the Study Area contains suitable habitat for MBTA, CNF, other special-status species, and species of interest, and there is potential for these species to be impacted by the Project (**Table 6**). The Project would result in ground disturbance and vegetation removal. The Project EPMs (**Section 2.3**) would help to avoid and/or minimize potential effects to MBTA, CNF, other special-status species, species of interest, and their habitat. Planned construction activities would take place during daylight hours, which would reduce or eliminate disruptions to nocturnal or crepuscular wildlife behavior. The Project would not impact perennial or near-permanent surface water features; therefore, no impacts to aquatic or riparian-obligate plants and wildlife are anticipated. The Project would not impact caves, abandoned mines, or other underground refugia that may provide potential bat roosting habitat. Construction noise would be temporary; therefore, the Project would not cause a substantial or long-term increase in ambient noise levels in the Study Area. Preconstruction surveys would be completed to detect and avoid impacts to nesting birds. Coordination with CNF is ongoing, including the need for any additional surveys. Given the limited spatial and temporal Project impacts and the incorporation of EPMs, no substantial impacts to MBTA, CNF, other special-status species, and species of interest are anticipated; therefore, it is determined that the Project is not expected to result in the loss of viability or a trend towards listing for any MBTA, CNF, other special-status species, and species of interest.

8. REFERENCES CITED

Arizona Game and Fish Department. 2001a. Gila Topminnow (*Poeciliopsis occidentalis occidentalis*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 7 pp.

_____. 2001b. Pima Pineapple Cactus (*Coryphantha scheeri* var. *robustispina*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. December 12, 2001. 5 pp.

_____. 2002a. Golden Eagle (*Aquila chrysaetos*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. July 27, 2002. 5 pp.

_____. 2002b. Sonoran Pronghorn Antelope (*Antilocapra americana sonoriensis*) Draft. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. December 23, 2002. 8 pp.

_____. 2002c. Southwestern Willow Flycatcher (*Empidonax traillii extimus*) Draft. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. November 11, 2002. 7 pp.

_____. 2005. Mexican Spotted Owl (*Strix occidentalis lucida*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. April 26, 2005. 12 pp.

_____. 2010. Ocelot (*Leopardus pardalis*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. February 17, 2010. 8 pp.

_____. 2011a. Bald Eagle (*Haliaeetus leucocephalus*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. September 2, 2011. 9 pp.

_____. 2011b. Yellow-billed Cuckoo (*Coccyzus americanus*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. October 31, 2011. 6 pp.

_____. 2012a. Beardless Chinch Weed (*Pectis imberbis*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. October 5, 2012. 6 pp.

_____. 2012b. Northern Mexican Gartersnake (*Thamnophis eques megalops*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. July 20, 2012. 8 pp.

_____. 2015. Chiricahua Leopard frog *(Lithobates chiricahuensis*). *Unpublished Abstract Compiled and Edited by the Heritage Data Management Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. October 7, 2015. 12 pp.

_____. 2016. Jaguar photograph taken by Fort Huachuca trail camera. *Website*. Phoenix, Arizona: Arizona Game and Fish Department. December 7, 2016.

_____. 2018. Petition to Reclassify Gila Topminnow, *Poeciliopsis occidentalis*, from Endangered to Threatened Status. Phoenix, Arizona: Arizona Game and Fish Department. May 11, 2018.

_____. 2022. "Willcox Playa Wildlife Area." Arizona Game and Fish Department. https://www.azgfd.com/wildlife/viewing/wheretogo/wilcoxplaya/.

Arizona Important Bird Areas Program. 2014. Patagonia Mountains IBA. *Website*. May 2014.

Avila-Villegas, Sergio, and Jessica Lamberton-Moreno. 2013. "Wildlife Survey and Monitoring in the Sky Island Region with an Emphasis on Neotropical Felids." *Merging Science and Management in a Rapidly Changing World: Biodiversity and Management of the Madrean Archipelago III* Proceedings RMRS-P-67:7.

Brown, David E. 1982. Biotic Communities: Southwestern United States and Northwestern Mexico. Salt Lake City: University of Utah Press Reprinted in 1994.

Brown, David E., and López-González, Carlos A. 2001. *Borderland Jaguars Tigres de la Frontera*: University of Utah Press.

Buehler, David A. 2020. "Bald Eagle (*Haliaeetus leucocephalus*), version 1.0." The Cornell Lab of Ornithology. https://doi.org/10.2173/bow.baleag.01. Ithaca, New York.

Cobble, Kevin S. 1995. Yaqui Fishes Recovery Plan. San Bernardino National Wildlife Refuge. Douglas, Arizona: U.S. Fish and Wildlife Service March 29, 1995.

Culver, Melanie. 2016. Jaguar Surveying and Monitoring in the United States *Open-File Report 2016–1095, Version 1.1*: U.S. Geological Survey. November 2016.

Davis, Tony. 2018. Jaguar that roamed Huachuca Mountains shown dead in photo, officials say. *Arizona Daily Star*: Arizona Daily Star. June 22, 2018.

de la Torre, Alberto Condes 1970. Streamflow in the Upper Santa Cruz River Basin, Santa Cruz and Pima Counties, Arizona. *Geological Survey Water-Supply Paper 1939-A*, U.S. Geological Survey, City of Tucson, U.S. Bureau of Reclamation and The University of Arizona. Washington, D.C.: U.S. Department of the Interior.

Driscoll, James T. 2005. "Golden Eagle (*Aquila chrysaetos*)." In *Arizona Breeding Bird Atlas*, edited by Troy E. Corman and Cathryn Wise-Gervais. Albuquerque, New Mexico: University of New Mexico. p. 150-151.

eBird. 2022. "eBird: An Online Database of Bird Distribution and Abundance." Cornell Lab of Ornithology. https://ebird.org/home. Ithaca, New York.

Farmer, Andrew M. 1993. "The Effects of Dust on Vegetation - A Review." *Environmental Pollution* 79:63-75.

Featherstone, Roger, Sky Jacobs, Sergio Avila-Villegas, and Sandra Doumas. 2013. "Wildlife Surveys and Monitoring with the use of Remote Camera Traps in the Greater Oak Flat Watershed near Superior, Arizona." In *Merging Science and Management in a Rapidly Chaning World: Biodiversity and Management of the Madrean Archipelago*, edited by G. J. Gottfried, B. S. Folliott, L. G. Eskew and L. C. Collins. Fort Collions, Colorado: U.S. Departpment of Agriculture, Forest Service. RMRS-P-67 441-447.

Fink, D., T. Auer, A. Johnston, M. Strimas-Mackey, M. Iliff, and S. Kelling. 2018. "eBird Status and Trends." Cornell Lab of Ornithology. https://ebird.org/science/status-and-trends. Ithaca, New York.

Graybeal, Frederick T., Lorre A. Moyer, Peter G. Vikre, Pamela Dunlap, and John C. Wallis. 2015. Geologica Map of the Patagonia Mountains, Santa Cruz County, Arizona. *Open-File Report 2015-1023*. Reston, Virginia: U.S. Geological Society. 10 pp.

Gutiérrez, R J, A B Franklin, and W S Lahaye. 2020. "Spotted Owl (*Strix occidentalis*), version 1.0." In *Birds of the World*, edited by A. F. Poole and F. B. Gill. Ithaca, New York: Cornell Lab of Ornithology.

Hughes, Janice M. 2020. "Yellow-billed Cuckoo (*Coccyzus americanus*), version 1.0." In *The Birds of the World [online]*, edited by P.G. Rodewald. Ithaca, New York: Cornell Lab of Ornithology.

Integrated Taxonomic Information System. 2019. "Integrated Taxonomic Information System online database." http://www.itis.gov.

International Organization for Standardization. 1996. Acoustics-Attenuation of Sound During Propogation Outdoors-Part 2: General Method of Calculation. *ISO 9613-2:1996*. Geneva, Switzerland: International Organization for Standardization. December 15, 1996.

Jepsen, S., D. F. Schweitzer, B. Young, N. Sears, M. Ormes, and S. H. Black. 2015. Conservation Status and Ecology of Monarchs in the United States. Arlington, Virginia and Portland, Oregon: NatureServe and Xerces Society for Invertebrate Conservation. January 2015.

Katzner, T. E., M. N. Kochert, K. Steenhof, C. L. Mcintyre, and E. H. Craig. 2020. "Golden Eagle (*Aquila chrysaetos*), version 2.0." In *Birds of the World*, edited by P. G. Rodewald and B. K. Keeney. Ithaca, New York: Cornell Lab of Ornithology.

McCarty, Kyle M., Kurt L. Licence, and Kenneth V. Jacobsen. 2018. Arizona Bald Eagle Management Program 2018 Summary Report. *Technical Report 321 Nongame and Endangered Wildlife Program*. Phoenix, Arizona: Arizona Game and Fish Department. December 2018.

McCarty, Kyle M., Jennifer K. Presler, and Kenneth V. Jacobson. 2020. Arizona Golden Eagle Nest Survey. *Technical Report 334*, Arizona Game and Fish Department. Phoenix, Arizona. December 2020.

Minckley, W. L., and P.C. Marsh. 2009. *Inland Fishes of the Greater Southwest - Chronicle of a Vanishing Biota*. Tucson, Arizona: University of Arizona Press.

Morris, Gail M., Christopher Kline, and Scott Morris. 2015. "Status of *Danaus Plexippus* Population in Arizona." *Journal of the Lepidopterists' Society* 69 (2):1-17.

NextGen Engineering. 2017. Final Sonoita Creek Watershed Management Plan Phase 1. *Prepared for The Town of Patagonia, Arizona*. Tucson, Arizona: NextGen Engineering. May 12, 2017.

North American Electric Reliability Corporation. 2021. Wildfire Mitigation Reference Guide. January 2021.

Phoenix Fox 10 News. 2021. "AZGFD: Jaguar, Ocelot Spotted Roaming in Southern Arizona." https://www.fox10phoenix.com/news/azgfd-jaguar-ocelot-spotted-roaming-in-southern-arizona.

Romin, Laura A., and James A. Muck. 2002. Utah Field Office Guidelines for Raptor Protection From Human and Land Use Distrubances. Salt Lake City, Utah: U.S. Fish and Wildlife Service Utah Field Office. January 2002.

Rorabaugh, J.C., J. Schipper, S. Avila-Villegas, J.A. Lamberton-Moreno, and T. Flood. 2020. "Ecology of an Ocelot Population at the Northern Edge of the Species' Distribution in Northern Sonora, Mexico." *PeerJ* 8:e8414.

Sedgwick, James A. 2020. "Willow Flycatcher (*Empidonax traillii*), version 1.0." In *The Birds of the World [online]*, edited by A. F. Poole and F. B. Gill. Ithaca, New York: Cornell Lab of Ornithology.

SEINet Portal Network. 2019. http://swbiodiversity.org/seinet/index.php. SEINet Portal Network.

Soil Survey Staff, Natural Resources Conservation Service. 2022. "Web Soil Survey." U.S. Department of Agriculture. https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx.

Tesky, Julie L. 1994. *Aquila chrysaetos*. *Fire Effects Information System [online]*. Rocky Mountain Research Station: U.S. Department of Agriculture, U.S. Forest Service.

The Arizona Wildlife Linkages Workgroup. 2006. Arizona's Wildlife Linkages Assessment. December 2006. 22 pp.

The Nature Conservancy. 2012. Brown and Lowe's Biotic Communities of the Southwest. *Digital version of David E. Brown and Charles H. Lowe's 1981 Map*: The Nature Conservancy of Arizona. June 27, 2012.

The Xerces Society for Invertebrate Conservation. 2021. "Milkweed Biology Western Milkweeds." Partnership of the Xerces Society for Invertebrate Conservation, Idaho Department of Fish and Game, Washington Department of Fish and Wildlife, National Fish and Wildlife Foundation, and US Fish and Wildlife Service. https://www.monarchmilkweedmapper.org/app/#/combined/map.

Trapp, R.A., and J.S. Reynolds. 1995. Map Showing Names and Outlines of Physiographic Areas in Arizona used by the Arizona Geological Survey with Comprehenisve Base Map. *Open File Report-95-2a*: Arizona Geological Survey.

U.S. Department of Transportation. 2006. Construction Noise Handbook. *Federal Highway Administration*. Washington, D.C.: U.S. Department of Transportation. August 2006.

U.S. Fish and Wildlife Service. 1967. Native Fish and Wildlife; Endangered Species. U.S. Department of the Interior. March 11, 1967. *Federal Register*, 32:4001.

_____. 1982. Endangered and Threatened Wildlife and Plants; Endangered Status for U.S. Population of the Ocelot, Final Rule. U.S. Fish and Wildlife Service. July 21, 1982. *Federal Register*, 47:31670-31672.

_____. 1993a. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Plant Pima Pineapple Cactus (*Coryphantha scheeri* var. *robustispina*). U.S. Department of the Interior. September 23, 1993. *Federal Register*, 58:49875-49880.

_____. 1993b. Endangered and Threatened Wildlife and Plants; Final Rule to List the Mexican Spotted Owl as a Threatened Species. U.S. Department of the Interior. March 16, 1993. *Federal Register*, 58:14248-14271.

_____. 1995. Final Rule Determining Endangered Status for the Southwestern Willow Flycatcher. February 27, 1995. *Federal Register*, 60:10694-10715.

_____. 1997a. Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for Three Wetland Species Found in Southern Arizona and Northern Sonora, Mexico; Final Rule. *Federal Register*, 62:665-689.

_____. 1997b. Endangered and Threatened Wildlife and Plants; Final Rule To Extend Endangered Status for the Jaguar in the United States. U.S. Fish and Wildlife Service. *Federal Register*, 62:39147-39157.

_____. 1998. Gila Topminnow, *Poeciliopsis occidentalis occidentalis*, Revised Recovery Plan. Albuquerque, New Mexico: U.S. Fish and Wildlife Services.

_____. 1999. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Huachuca Water Umbel, A Plant; Final Rule. U.S. Fish and Wildlife Service. Monday, July 12, 1999. *Federal Register*, 64:37441-37453.

_____. 2002. Endangered and Threatened Wildlife and Plants; Listing of the Chiricahua Leopard Frog (*Rana chiricahuensis*); Final Rule. U.S. Department of the Interior. June 13, 2002. *Federal Register*, 67:40790-40811.

_____. 2004. Endangered and Threatened Wildlife and Plants; Final Designation of Critical Habitat for the Mexican Spotted Owl; Final Rule. August 31, 2004. *Federal Register*, 69:53182-53230.

_____. 2011a. Chiricahua Leopard Frog (*Lithobates* [=*Rana*] *chiricahuensis*) 5-year Review: Summary and Evaluation. Phoenix, Arizona: Arizona Ecological Services Office. January 28, 2011.

_____. 2011b. Endangered and Threatened Wildlife and Plants; Establishment of a Nonessential Experimental Population of Sonoran Pronghorn in Southwestern Arizona. Final Rule. U.S. Department of Interior. May 5, 2011. *Federal Register*, 76:25593-25611.

_____. 2012a. Endangered and Threatened Wildlife and Plants; Listing and Designation of Critical Habitat for the Chiricahua Leopard Frog Final Rule. U.S. Department of the Interior. March 20, 2012. *Federal Register*, 77:16324–16424.

_____. 2012b. Final Recovery Plan for the Mexican Spotted Owl (*Strix occidentalis lucida*), First Revision. *Southwest Region*. Albuquerque, New Mexico: U.S. Fish and Wildlife Service. September 2012.

_____. 2013a. Endangered and Threatened Wildlife and Plants, Designation of Critical Habitat for Southwestern Willow Flycatcher, Final Rule. January 3, 2013. *Federal Register*, 78:344-534.

_____. 2013b. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Northern Mexican Gartersnake and Narrow-headed Gartersnake; Proposed Rule. U.S. Department of the Interior. July 10, 2013. *Federal Register*, 78:41550-41608.

_____. 2013c. Endangered and Threatened Wildlife and Plants; Proposed Threatened Status for the Western Distinct Population Segment of the Yellow-billed Cuckoo (*Coccyzus americanus*); Proposed Rule. U.S. Department of Interior. October 3, 2013. *Federal Register*, 78:61622-61666.

_____. 2014a. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Jaguar; Final Rule. U.S. Department of the Interior. March 5, 2014. *Federal Register*, 79:12571-12654.

_____. 2014b. Endangered and Threatened Wildlife and Plants; Determination of Threatened Status for the Western Distinct Population Segment of the Yellow-billed Cuckoo (*Coccyzus americanus*); Final Rule. U.S. Department of Interior. October 3, 2014. *Federal Register*, 79:59992-60038.

_____. 2014c. Endangered and Threatened Wildlife and Plants; Threatened Status for the Northern Mexican Gartersnake and Narrow-Headed Gartersnake; Final Rule. *Federal Register*: U.S. Department of the Interior. July 8, 2014. 38678-38746.

_____. 2016a. Amended Final Reinitiated Biological and Conference Opinion for the Rosemont Copper Mine, Pima County, Arizona. *AESO/SE 22410-2009-F-0389R1*. Phoenix, Arizona. April 28, 2016.

_____. 2016b. Recovery Plan for the Ocelot (*Leopardus pardalis*) First Revision. Albuquerque, New Mexico: U.S. Fish and Wildlife Service. Original edition, Initial publication August 22, 1990; Revised July 2016.

_____. 2016c. Recovery Plan for the Sonoran Pronghorn (*Antilocapra americana sonoriensis*) Second Revision. Albuquerque, New Mexico: Southwest Region. Original edition, Initial publication 1982; Revised 1998; Amended 2002.

_____. 2017a. Jaguar photographed in southern Arizona's Cochise County. *Press Release*. Phoenix, Arizona. March 2, 2017.

_____. 2017b. Recovery Plan for *Lilaeopsis schaffneriana* ssp. *recurva* (Huachuca water umbel). Tucson, Arizona: U.S. Fish and Wildlife Service, Arizona Ecological Services Field Office.

_____. 2018a. 5-Year Review: Summary and Evaluation Ocelot (*Leopardus pardalis*). *Laguna Atascosa National Wildlife Refuge*. Los Fresnos, Texas: U.S. Fish and Wildlife Service. July 24, 2018.

_____. 2018b. Jaguar Recovery Plan (*Panthera onca*). Southwest Region. Albuquerque, New Mexico: U.S. Fish and Wildlife Service.

_____. 2018c. Recovery Plan for Pima Pineapple Cactus (*Coryphantha scheeri* var. *robustispina*). Tucson, Arizona: Arizona Ecological Services Field Office. August 2018.

_____. 2018d. Species Status Assessment Report for *Graptopetalum bartramii* (Bartram's Stonecrop). Tucson, Arizona: U.S. Fish and Wildlife Service, Arizona Ecological Services Office.

_____. 2018e. Species Status Assessment Report for *Pectis imberbis* (Beardless Chinchweed). Tucson, Arizona: U.S. Fish and Wildlife Service, Arizona Ecological Services Office. April 2018.

_____. 2019. Endangered and Threatened Wildlife and Plants; Endangered Species Status for Beardless Chinchweed with Designation of Critical Habitat, and Threatened Species Status for Bartram's Stonecrop with Section 4(d) Rule; Proposed Rule. U.S. Fish and Wildlife. December 6, 2019. *Federal Register*, 84:67060-67103.

_____. 2020a. Endangered and Threatened Wildlife and Plants; 12-Month Finding for the Monarch Butterfly; Notice of 12-Month Finding. U.S. Department of the Interior. December 17, 2020. *Federal Register*, 85:81813-81822.

_____. 2020b. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Northern Mexican Gartersnake and Narrow-Headed; Revised Proposed Rule. U.S. Department of the Interior. April 28, 2020. *Federal Register*, 85:23608-23668.

_____. 2020c. Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Western Distinct Population Segment of the Yellow-Billed Cuckoo; Proposed Rule. U.S. Department of Interior. February 27, 2020. *Federal Register*, 85:11458-11594.

_____. 2021a. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Northern Mexican Gartersnake; Final Rule. U.S. Department of the Interior. April 28, 2021. *Federal Register*, 86:22518-22580.

_____. 2021b. Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for the Western Distinct Population Segment of the Yellow-Billed Cuckoo; Final Rule. U.S. Department of the Interior. April 21, 2021. *Federal Register*, 86:20798-21005.

_____. 2021c. Endangered and Threatened Wildlife and Plants; Endangered Status for the Beardless Chinchweed and Designation of Critical Habitat; Final Rule. U.S. Department of the Interior. June 15, 2021. *Federal Register*, 86:31830-31868.

U.S. Forest Service. 2018. Coronado National Forest National Forest Land and Resource Management Plan. *Southwest Region*. Albuquerque, New Mexico: U.S. Department of Agriculture. 270.

U.S. Geological Survey. 2021. Hydrologic Unit Maps. *Water Resources of the United States*: U.S. Department of the Interior.

Wahlberg, Maximilian M., F. Jack Triepke, Steve H Stringer, Don Vandendriesche, Esteban H. Muldavin, and Jim R. Malusa. 2014. Ecological Response Units of the Southwestern United States [Draft]. *FR-R3-XX-XX*, U.S. Forest Service. Albuquerque, New Mexico: United States Department of Agriculture.

Walker, D. A., and K. R. Everett. 1987. "Road Dust and its Environmental Impact on Alaskan Taiga and Tundra." *Arctic and Alpine Research* 19 (4):479-489.

Western Regional Climate Center. 2015. "Patagonia, Arizona (026280) Period of Record Monthly Climate Summary; Period of Record : 07/01/1921 to 08/31/2015." https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?az6280.

WestLand. 2022. Beardless Chinchweed Survey Rio Rico to Harshaw 138kV Transmission Line Project. *Prepared for UNS Electric, Inc.* Tucson, Arizona: WestLand Engineering & Environmental Services. February 17, 2022.

Wildlife Conservation Society. 2021. "Jaguar Observations Database." https://jaguardata.info/.

Wise-Gervais, Cathryn. 2005. "Spotted Owl (*Strix occidentalis*)." In *Arizona Breeding Bird Atlas*, edited by Troy E. Corman and Cathryn Wise-Gervais. Albuquerque, New Mexico: University of New Mexico. p. 224-225.

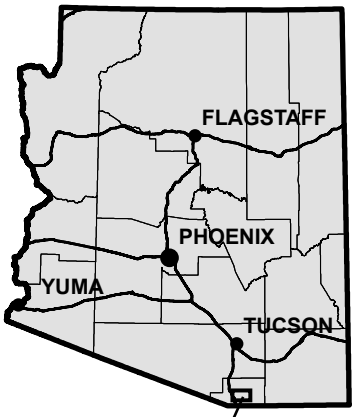
WKC Group. 2023. "Sound Attenuation – Inverse Square Law." https://www.wkcgroup.com/tools-room/inverse-square-law-sound-calculator/.

Zhan, Shuai, Wei Zhang, Kristjan Niitepõld, Jeremy Hsu, Juan Fernández Haeger, Myron P. Zalucki, Sonia Altizer, Jacobus C. de Roode, Steven M. Reppert, and Marcus R. Kronforst. 2014. "The Genetics of Monarch Butterfly Migration and Warning Colouration." *Nature* 514 (7522):317-321.

Q:\Jobs\1600's\1610.283\ENV\Bio_Report\20230216_Submittal\20230216_1610.283_RR-Harshaw_BE.docx

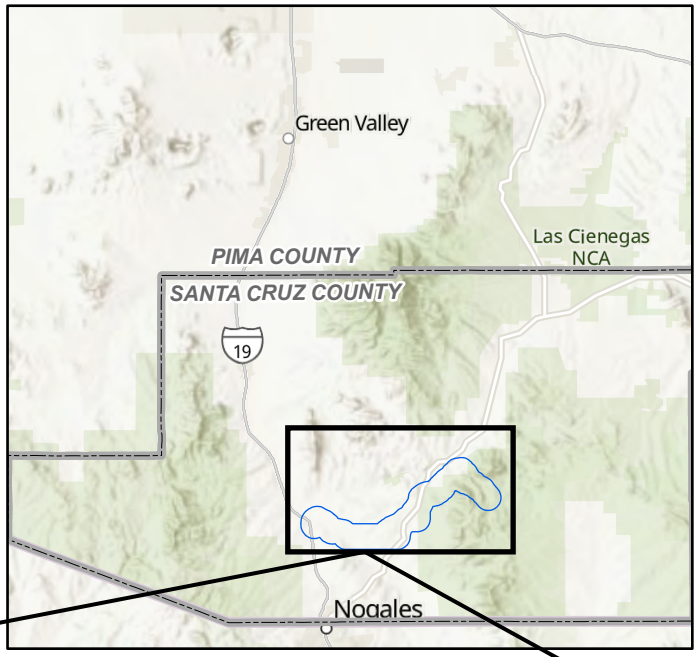
FIGURES

ARIZONA

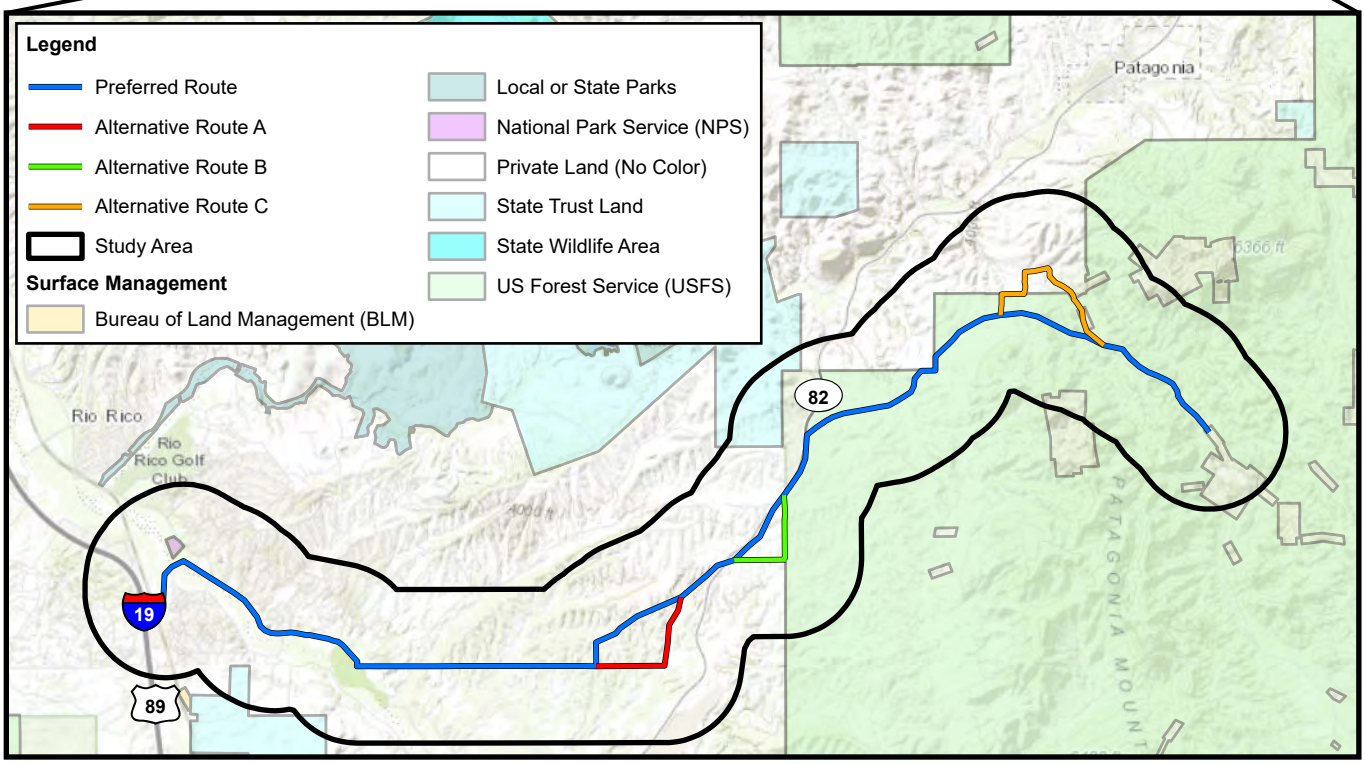


PROJECT LOCATION

PROJECT VICINITY



Approximate Scale 1 inch equals 15 miles



T22S, R13E, R15E, and R16E;
T23S, R13E, R14E, R15E, and R16E;
Santa Cruz County, Arizona,
Projection: NAD 1983 UTM Zone 12N
Surface Management: BLM 2019, (WRI Modified 2022)
Data Source: TEP
Image Source: ArcGIS Online, World Topographic Map

UNS ENERGY CORPORATION
Biological Evaluation
Rio Rico to Harshaw
138 kV Transmission Line

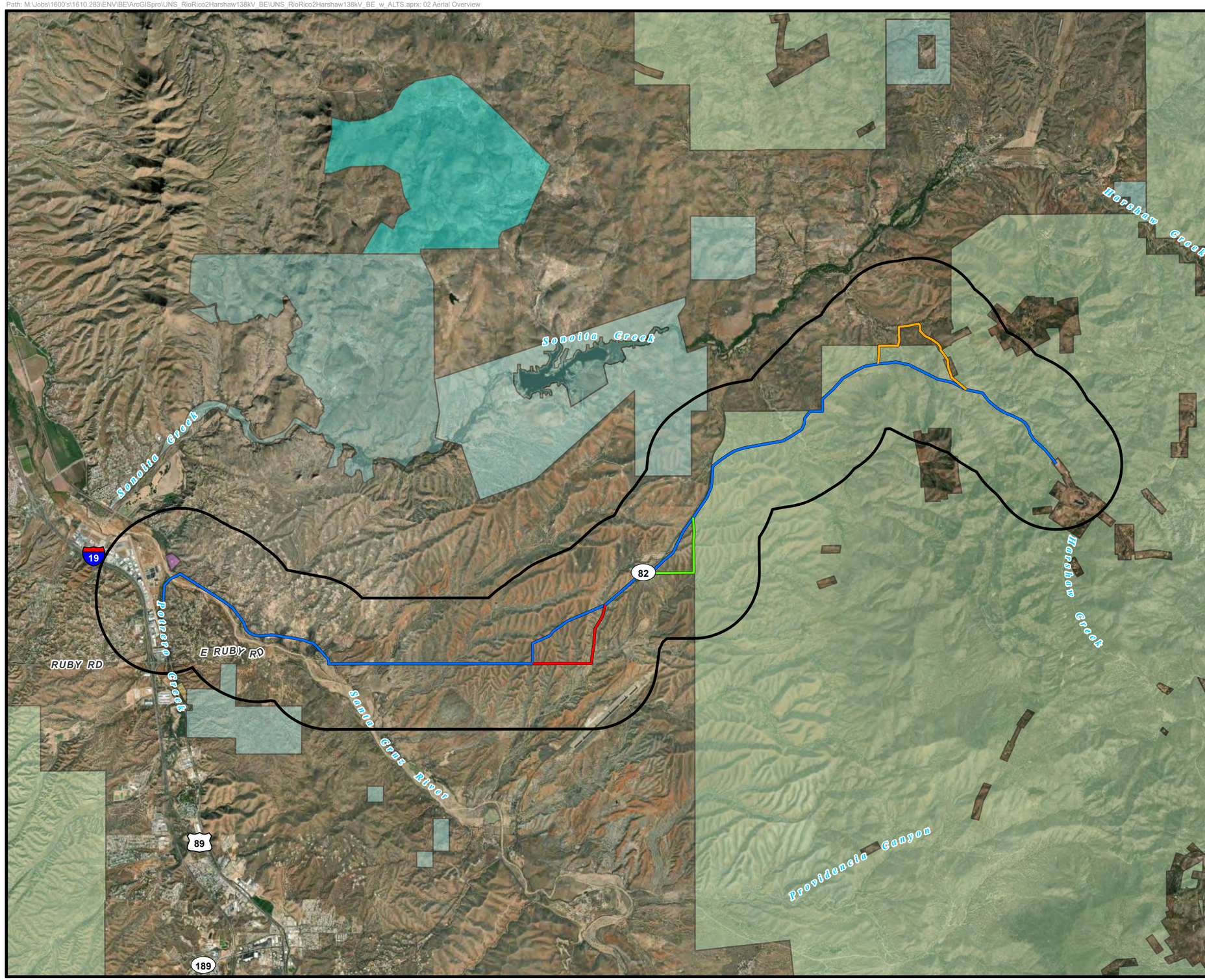
VICINITY MAP
Figure 1

WestLand
100% EMPLOYEE OWNED
Engineering & Environmental Services

N

0 1.25 2.5 Miles

0 2 4 Kilometers



T22S, R13E, a Portion of Section 36,
T22S, R15E, Portions of Sections 13, 14, 22-29, and 32-36,
T22S, R16E, Portions of Sections 18-20 and 28-33,
T23S, R13E, Portions of Sections 1, 2, and 11-13,
T23S, R14E, Portions of Sections 1, 4-18, and 20-24,
T23S, R15E, a Portion of Section 2 (Unsurveyed Protracted)
T23S, R15E, Portions of Sections 3-9, and 17-20,
T23S, R16E, Portions of Sections 4-6 (Unsurveyed Protracted)
Santa Cruz County, Arizona,
Projection: NAD 1983 UTM Zone 12N
Surface Management: BLM 2019, (WRI Modified 2022)
Data Source: TEP
Image Source: Maxar 11/28/2018-05/11/2021

Legend

- Preferred Route
- Alternative Route A
- Alternative Route B
- Alternative Route C
- Study Area

Surface Management

- Bureau of Land Management (BLM)
- Local or State Parks
- National Park Service (NPS)
- Private Land (No Color)
- State Trust Land
- State Wildlife Area
- US Forest Service (USFS)

N

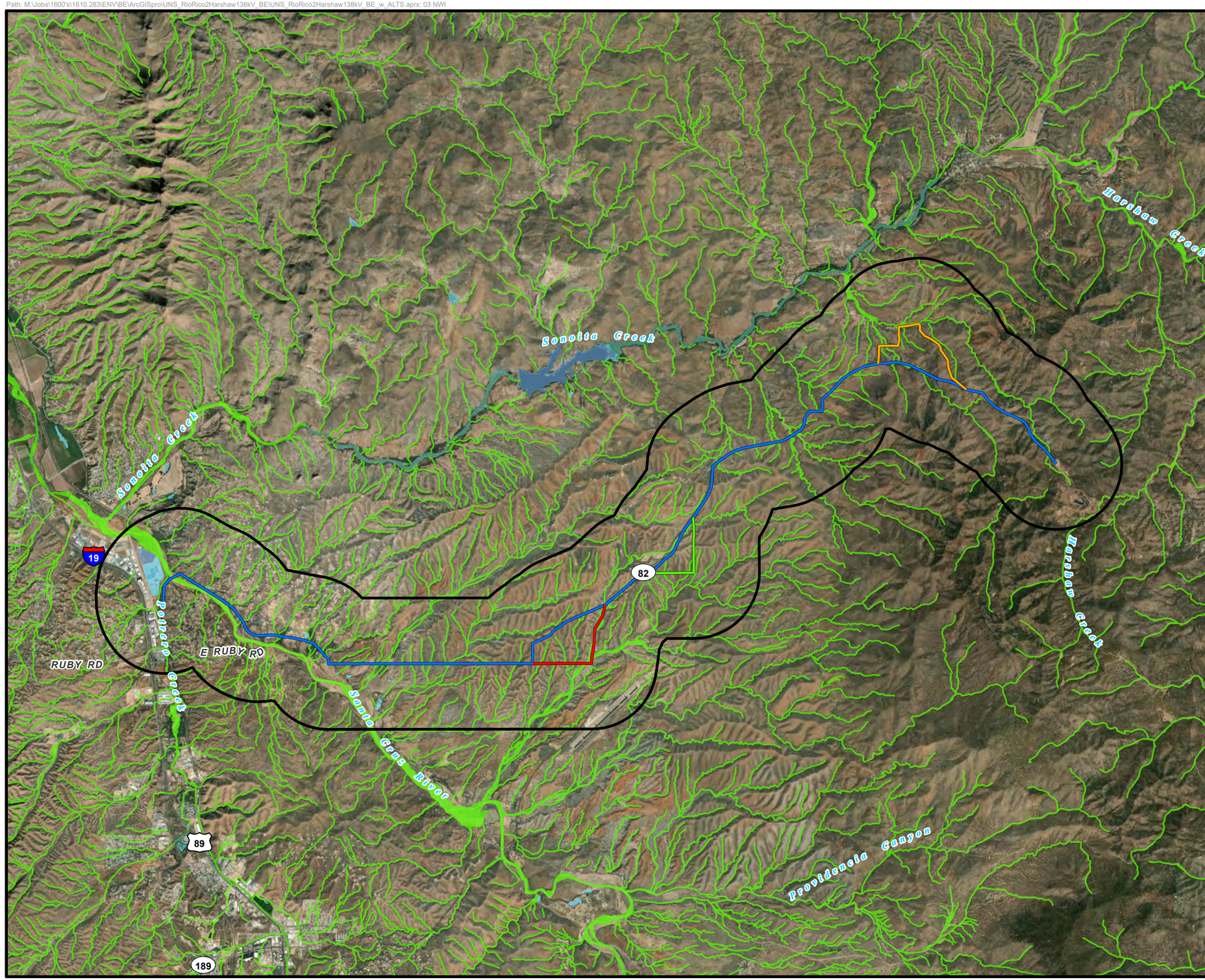
0 0.75 1.5 Miles

0 1.5 3 Kilometers

WestLand 100% EMPLOYEE OWNED Engineering & Environmental Services

UNS ENERGY CORPORATION
Biological Evaluation
Rio Rico to Harshaw
138 kV Transmission Line

AERIAL OVERVIEW
Figure 2



T22S, R13E, a Portion of Section 36,
T22S, R15E, Portions of Sections 13, 14, 22-29, and 32-36,
T22S, R16E, Portions of Sections 18-20 and 28-33,
T23S, R13E, Portions of Sections 1, 2, and 11-13,
T23S, R14E, Portions of Sections 1, 4-18, and 20-24,
T23S, R15E, a Portion of Section 2 (Unsurveyed Protracted)
T23S, R15E, Portions of Sections 3-9, and 17-20,
T23S, R16E, Portions of Sections 4-6 (Unsurveyed Protracted)
Santa Cruz County, Arizona,
Projection: NAD 1983 UTM Zone 12N
Data Source: TEP
National Wetlands Inventory: USFWS downloaded 01/07/2022
Image Source: Maxar 11/28/2018-05/11/2021

Legend

- Preferred Route
- Alternative Route A
- Alternative Route B
- Alternative Route C
- Study Area

Wetland Type

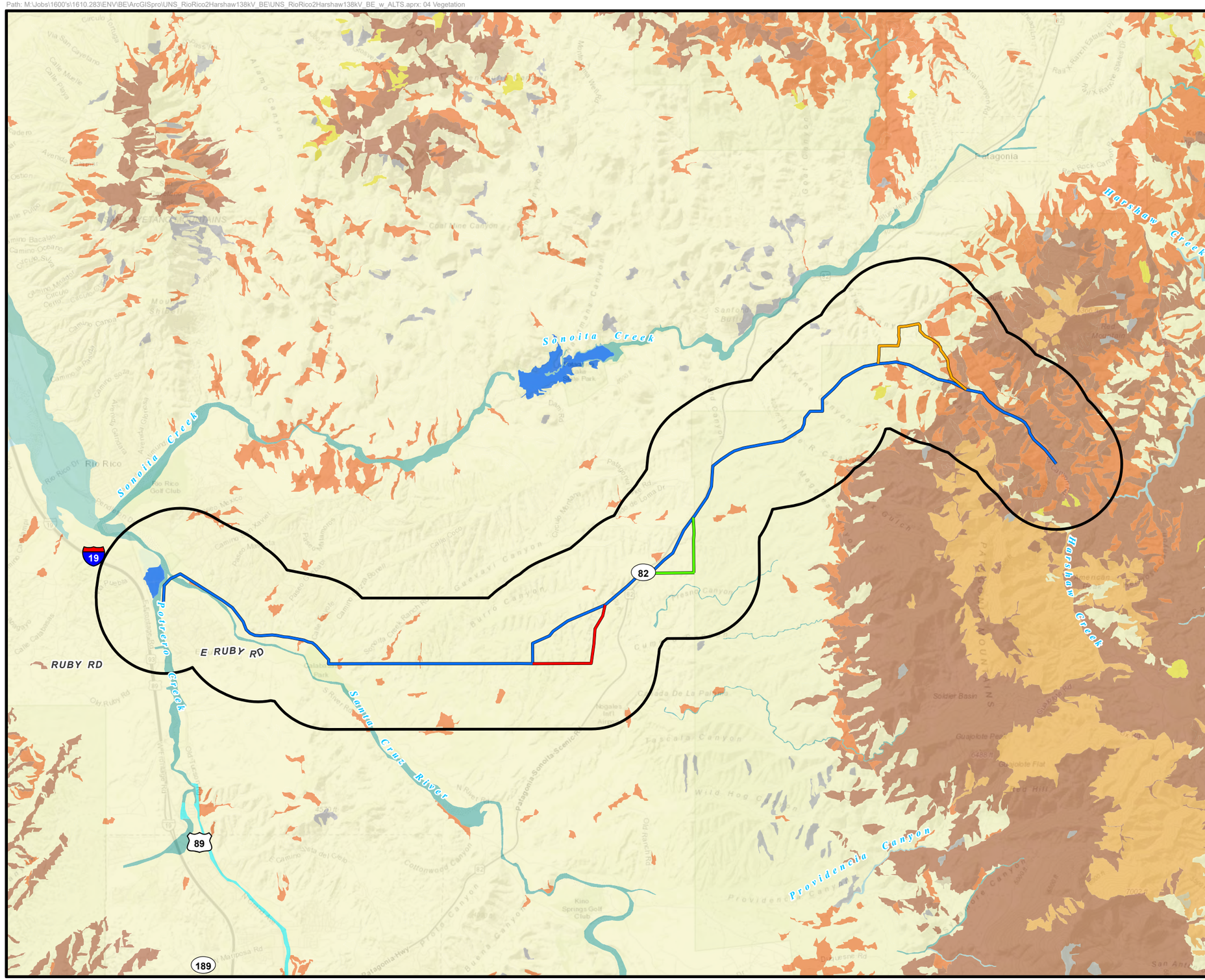
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Lake
- Riverine

N
0 0.75 1.5 Miles
0 1.5 3 Kilometers

WestLand 100% EMPLOYEE OWNED | Engineering & Environmental Services

UNS ENERGY CORPORATION
Biological Evaluation
Rio Rico to Harshaw
138 kV Transmission Line

NATIONAL WETLAND INVENTORY MAP
Figure 3



T22S, R13E, a Portion of Section 36,
T22S, R15E, Portions of Sections 13, 14, 22-29, and 32-36,
T22S, R16E, Portions of Sections 18-20 and 28-33,
T23S, R13E, Portions of Sections 1, 2, and 11-13,
T23S, R14E, Portions of Sections 1, 4-18, and 20-24,
T23S, R15E, a Portion of Section 2 (Unsurveyed Protracted)
T23S, R15E, Portions of Sections 3-9, and 17-20,
T23S, R16E, Portions of Sections 4-6 (Unsurveyed Protracted)
Santa Cruz County, Arizona,
Projection: NAD 1983 UTM Zone 12N
Data Source: TEP
Ecological Response Units: USFS Region 3, modified 07/29/2022
Image Source: ArcGIS Online, World Topographic Map

Legend

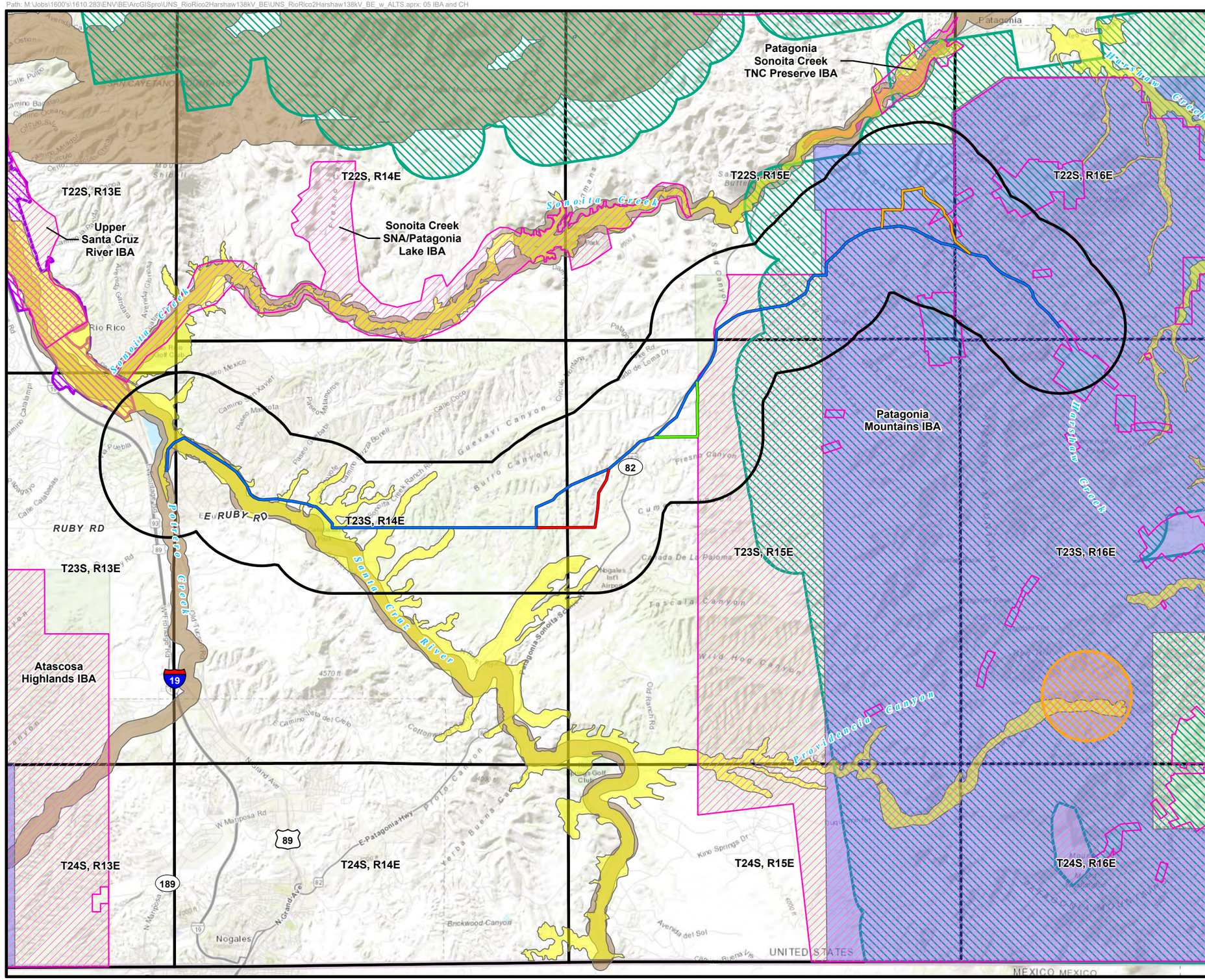
Label
- Preferred Route
- Alternative Route A
- Alternative Route B
- Alternative Route C
- Study Area
- Great Plains - Shortgrass Prairie
- Grassland - Semi-Desert Grassland
- Human / Other - Sparsely Vegetated
- Human / Other - Water
- Riparian - Desert Willow
- Riparian - Fremont Cottonwood / Shrub
- Riparian - Historic Riparian - Agriculture
- Riparian - Historic Riparian - Residential/Urban
- Riparian - Sycamore - Fremont Cottonwood
- Riparian / wetland - Fremont Cottonwood / Shrub
- Shrubland - Chihuahuan Desert Scrub
- Shrubland - Interior Chaparral
- Woodland - Juniper Grass
- Woodland - Madrean Encinal Woodland
- Woodland - Madrean Pinyon-Oak Woodland

N
0 0.75 1.5 Miles
0 1.5 3 Kilometers

WestLand Engineering & Environmental Services
100% EMPLOYEE OWNED

UNS ENERGY CORPORATION
Biological Evaluation
Rio Rico to Harshaw
138 kV Transmission Line

VEGETATION MAP
Figure 4



T22S, R13E, a Portion of Section 36,
T22S, R15E, Portions of Sections 13, 14, 22-29, and 32-36,
T22S, R16E, Portions of Sections 18-20 and 28-33,
T23S, R13E, Portions of Sections 1, 2, and 11-13,
T23S, R14E, Portions of Sections 1, 4-18, and 20-24,
T23S, R15E, a Portion of Section 2 (Unsurveyed Protracted)
T23S, R15E, Portions of Sections 3-9, and 17-20,
T23S, R16E, Portions of Sections 4-6 (Unsurveyed Protracted)
Santa Cruz County, Arizona,
Projection: NAD 1983 UTM Zone 12N
Surface Management: BLM 2019, (WRI Modified 2022)
Data Source: TEP, Audubon, Arizona Game and Fish, NAU, USFWS
Image Source: ArcGIS Online, World Topographic Map

Legend

- Preferred Route
- Alternative Route A
- Alternative Route B
- Alternative Route C
- Study Area
- Arizona Important Bird Area
- Santa Rita - Tumacacori Wildlife Linkage

Designated Critical Habitat

- Beardless Chinchweed
- Northern Mexican Gartersnake
- Jaguar
- Mexican Spotted Owl
- Southwestern Willow Flycatcher
- Yellow-billed Cuckoo

N

0 0.75 1.5 Miles

0 1.5 3 Kilometers

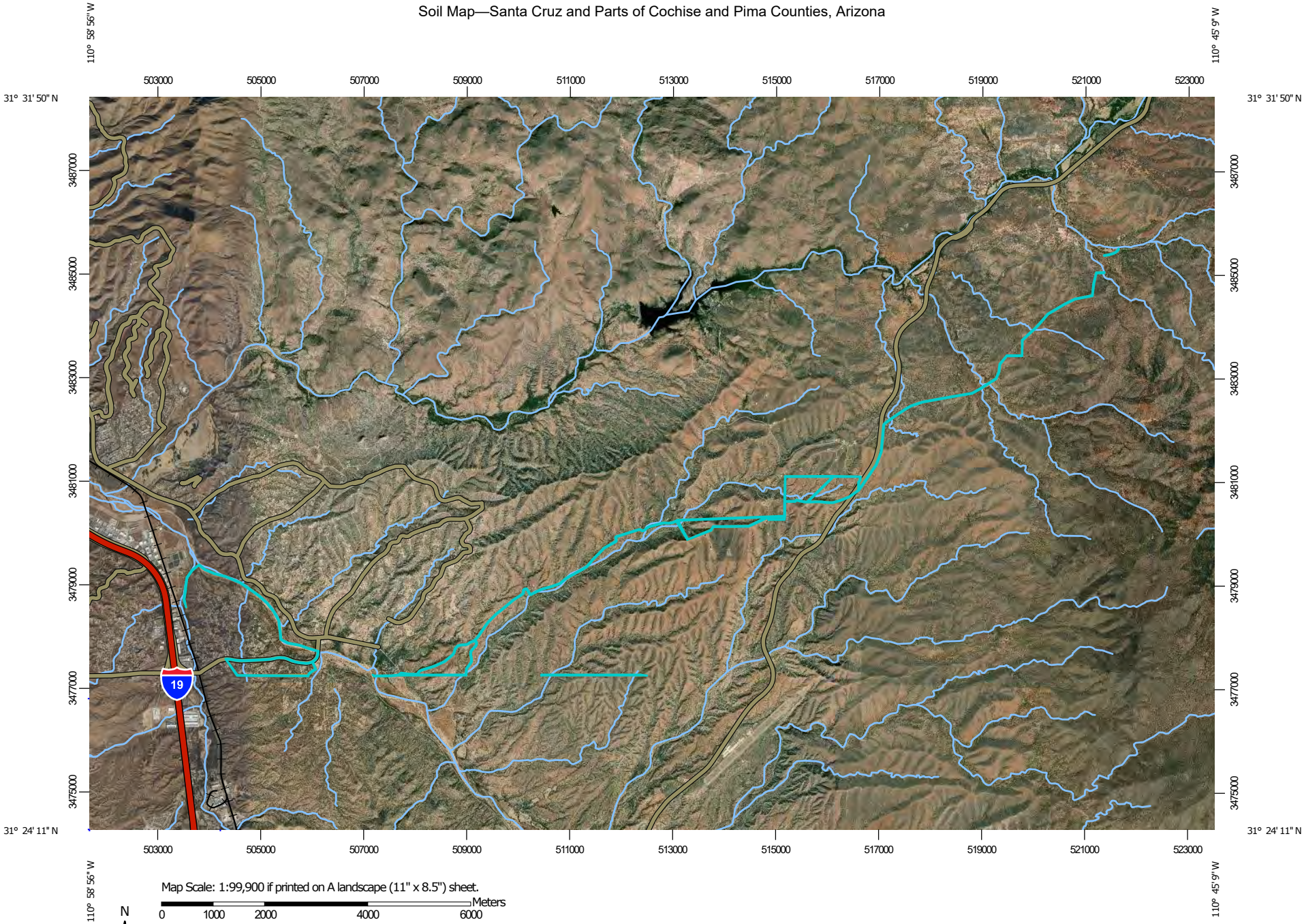
WestLand Engineering & Environmental Services
100% EMPLOYEE OWNED

UNS ENERGY CORPORATION
Biological Evaluation
Rio Rico to Harshaw
138 kV Transmission Line

WILDLIFE AND AREAS OF BIOLOGICAL WEALTH
IN THE STUDY AREA
Figure 5

APPENDIX A
NRCS Soil Map—Santa Cruz and Parts of Cochise and Pima Counties, Arizona

Soil Map—Santa Cruz and Parts of Cochise and Pima Counties, Arizona



MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Santa Cruz and Parts of Cochise and Pima Counties, Arizona
Survey Area Data: Version 15, Aug 29, 2022

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Dec 31, 2009—Dec 18, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CrD	Chiricahua-Lampshire association, rolling	10.4	5.9%
CtB	Comoro soils, 0 to 5 percent slopes	21.0	12.0%
LcF	Lampshire-Chiricahua association, steep	19.7	11.2%
Pm	Pima soils	4.7	2.7%
Th	Torrifluvents and haplustolls	11.9	6.8%
WhC	White House cobbly sandy loam, 1 to 15 percent slopes	11.4	6.5%
WoE	White House-Caralampi complex, 10 to 35 percent slopes	79.9	45.5%
WtF	White house-hathaway association, steep	16.7	9.5%
Totals for Area of Interest		**175.7**	**100.0%**

APPENDIX B
USFWS Arizona Ecological Services Field Office
IPaC System Online Query Report

IPaC resource list

This report is an automatically generated list of species and other resources such as critical habitat (collectively referred to as *trust resources*) under the U.S. Fish and Wildlife Service's (USFWS) jurisdiction that are known or expected to be on or near the project area referenced below. The list may also include trust resources that occur outside of the project area, but that could potentially be directly or indirectly affected by activities in the project area. However, determining the likelihood and extent of effects a project may have on trust resources typically requires gathering additional site-specific (e.g., vegetation/species surveys) and project-specific (e.g., magnitude and timing of proposed activities) information.

Below is a summary of the project information you provided and contact information for the USFWS office(s) with jurisdiction in the defined project area. Please read the introduction to each section that follows (Endangered Species, Migratory Birds, USFWS Facilities, and NWI Wetlands) for additional information applicable to the trust resources addressed in that section.

NOT FOR CONSULTATION

Location

Santa Cruz County, Arizona

Local office

Arizona Ecological Services Field Office

(602) 242-0210
(602) 242-2513

9828 North 31st Ave
#c3
Phoenix, AZ 85051-2517

NOT FOR CONSULTATION

Endangered species

This resource list is for informational purposes only and does not constitute an analysis of project level impacts.

The primary information used to generate this list is the known or expected range of each species. Additional areas of influence (AOI) for species are also considered. An AOI includes areas outside of the species range if the species could be indirectly affected by activities in that area (e.g., placing a dam upstream of a fish population even if that fish does not occur at the dam site, may indirectly impact the species by reducing or eliminating water flow downstream). Because species can move, and site conditions can change, the species on this list are not guaranteed to be found on or near the project area. To fully determine any potential effects to species, additional site-specific and project-specific information is often required.

Section 7 of the Endangered Species Act **requires** Federal agencies to "request of the Secretary information whether any species which is listed or proposed to be listed may be present in the area of such proposed action" for any project that is conducted, permitted, funded, or licensed by any Federal agency. A letter from the local office and a species list which fulfills this requirement can **only** be obtained by requesting an official species list from either the Regulatory Review section in IPaC (see directions below) or from the local field office directly.

For project evaluations that require USFWS concurrence/review, please return to the IPaC website and request an official species list by doing the following:

1. Draw the project location and click CONTINUE.
2. Click DEFINE PROJECT.
3. Log in (if directed to do so).
4. Provide a name and description for your project.
5. Click REQUEST SPECIES LIST.

Listed species[1] and their critical habitats are managed by the Ecological Services Program of the U.S. Fish and Wildlife Service (USFWS) and the fisheries division of the National Oceanic and Atmospheric Administration (NOAA Fisheries[2]).

Species and critical habitats under the sole responsibility of NOAA Fisheries are **not** shown on this list. Please contact NOAA Fisheries for species under their jurisdiction.

---

1. Species listed under the Endangered Species Act are threatened or endangered; IPaC also shows species that are candidates, or proposed, for listing. See the listing status page for more information. IPaC only shows species that are regulated by USFWS (see FAQ).

NOT FOR CONSULTATION

2. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

The following species are potentially affected by activities in this location:

Mammals

NAME	STATUS
Jaguar Panthera onca Wherever found There is **final** critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/3944	Endangered
Ocelot Leopardus (=Felis) pardalis Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4474	Endangered
Sonoran Pronghorn Antilocapra americana sonoriensis No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4750	EXPN

Birds

NAME	STATUS
Mexican Spotted Owl Strix occidentalis lucida Wherever found There is **final** critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/8196	Threatened
Southwestern Willow Flycatcher Empidonax traillii extimus Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/6749	Endangered
Yellow-billed Cuckoo Coccyzus americanus There is **final** critical habitat for this species. Your location overlaps the critical habitat. https://ecos.fws.gov/ecp/species/3911	Threatened

NOT FOR CONSULTATION

Reptiles

NAME	STATUS
Northern Mexican Gartersnake *Thamnophis eques megalops* Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/7655	Threatened

Amphibians

NAME	STATUS
Chiricahua Leopard Frog *Rana chiricahuensis* Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/1516	Threatened

Fishes

NAME	STATUS
Gila Topminnow (incl. Yaqui) *Poeciliopsis occidentalis* Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/1116	Endangered

Insects

NAME	STATUS
Monarch Butterfly *Danaus plexippus* Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/9743	Candidate

Flowering Plants

NAME	STATUS
Beardless Chinchweed *Pectis imberbis* Wherever found There is **final** critical habitat for this species. https://ecos.fws.gov/ecp/species/1348	Endangered

NOT FOR CONSULTATION

Huachuca Water-umbel Lilaeopsis schaffneriana var. recurva Wherever found There is **final** critical habitat for this species. Your location does not overlap the critical habitat. https://ecos.fws.gov/ecp/species/1201	Endangered
Pima Pineapple Cactus Coryphantha scheeri var. robustispina Wherever found No critical habitat has been designated for this species. https://ecos.fws.gov/ecp/species/4919	Endangered

Critical habitats

Potential effects to critical habitat(s) in this location must be analyzed along with the endangered species themselves.

This location overlaps the critical habitat for the following species:

NAME	TYPE
Jaguar Panthera onca https://ecos.fws.gov/ecp/species/3944#crithab	Final
Mexican Spotted Owl Strix occidentalis lucida https://ecos.fws.gov/ecp/species/8196#crithab	Final
Yellow-billed Cuckoo Coccyzus americanus https://ecos.fws.gov/ecp/species/3911#crithab	Final

NOT FOR CONSULTATION

Migratory birds

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

1. The Migratory Birds Treaty Act of 1918.

2. The Bald and Golden Eagle Protection Act of 1940.

Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NOT FOR CONSULTATION

NAME	BREEDING SEASON
Arizona Woodpecker Picoides arizonae This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 10 to Jun 30
Bald Eagle Haliaeetus leucocephalus This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Oct 15 to Jul 31

Black-chinned Sparrow Spizella atrogularis — Breeds Apr 15 to Jul 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9447

Black-throated Gray Warbler Dendroica nigrescens — Breeds May 1 to Jul 20

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Chestnut-collared Longspur Calcarius ornatus — Breeds elsewhere

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Elegant Trogon Trogon elegans — Breeds Apr 1 to Aug 31

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Evening Grosbeak Coccothraustes vespertinus — Breeds May 15 to Aug 10

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

Golden Eagle Aquila chrysaetos — Breeds Jan 1 to Aug 31

This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.
https://ecos.fws.gov/ecp/species/1680

Grace's Warbler Dendroica graciae — Breeds May 20 to Jul 20

This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA

Lewis's Woodpecker Melanerpes lewis — Breeds Apr 20 to Sep 30

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.
https://ecos.fws.gov/ecp/species/9408

Mexican Whip-poor-will Antrostomus arizonae — Breeds May 1 to Aug 20

This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.

NOT FOR CONSULTATION

Olive-sided Flycatcher Contopus cooperi This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/3914	Breeds May 20 to Aug 31
Rufous-winged Sparrow Aimophila carpalis This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Jun 15 to Sep 30
Varied Bunting Passerina versicolor This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 25 to Sep 30
Virginia's Warbler Vermivora virginiae This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9441	Breeds May 1 to Jul 31
Western Grebe aechmophorus occidentalis This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/6743	Breeds Jun 1 to Aug 31
Whiskered Screech-owl Megascops trichopsis This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 15 to Jul 31

NOT FOR CONSULTATION

Probability of Presence Summary

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

To see a bar's probability of presence score, simply hover your mouse cursor over the bar.

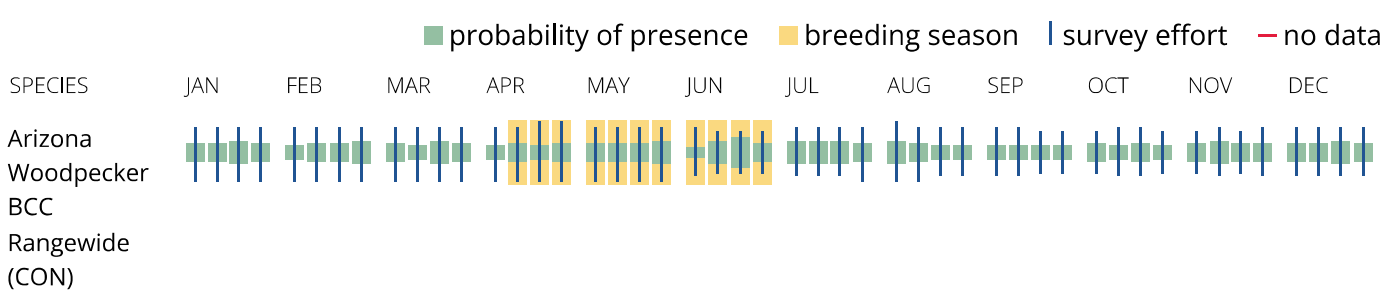
Breeding Season ( )
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort (|)
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

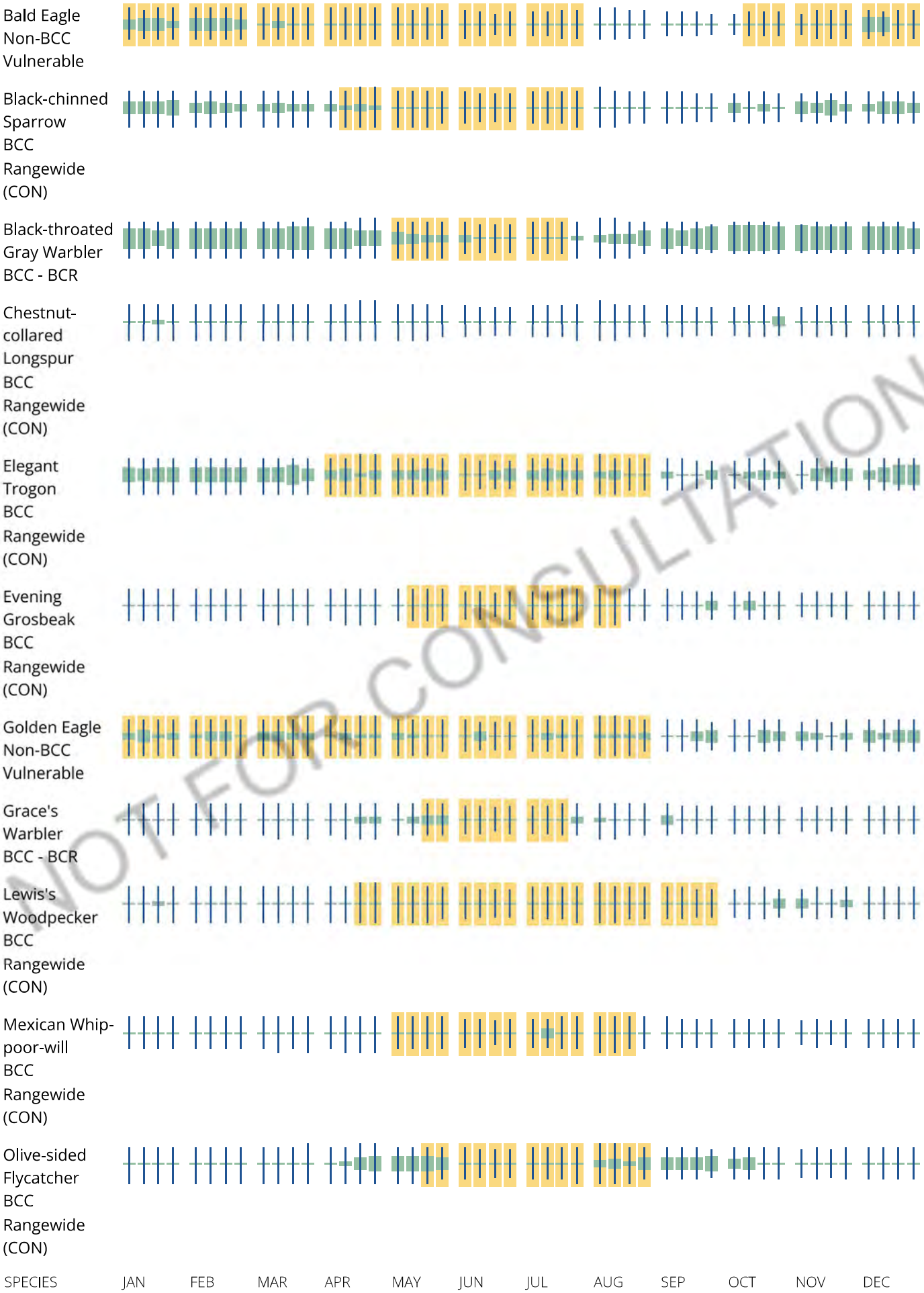
To see a bar's survey effort range, simply hover your mouse cursor over the bar.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.



NOT FOR CONSULTATION



NOT FOR CONSULTATION

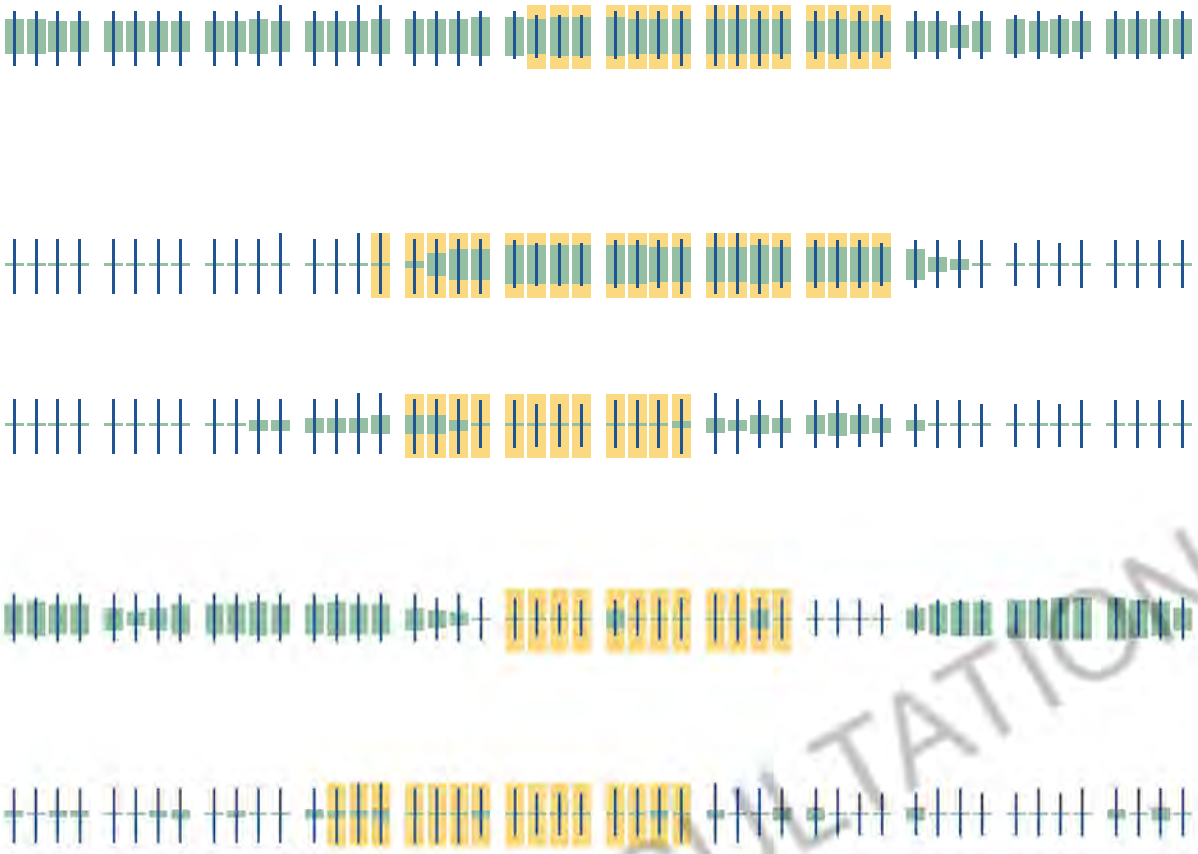
Rufous-winged Sparrow BCC Rangewide (CON)

Varied Bunting BCC Rangewide (CON)

Virginia's Warbler BCC Rangewide (CON)

Western Grebe BCC Rangewide (CON)

Whiskered Screech-owl BCC Rangewide (CON)



NOT FOR CONSULTATION

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?

The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?

The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?

To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files

NOT FOR CONSULTATION

underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

NOT FOR CONSULTATION

Coastal Barrier Resources System

Projects within the John H. Chafee Coastal Barrier Resources System (CBRS) may be subject to the restrictions on Federal expenditures and financial assistance and the consultation requirements of the Coastal Barrier Resources Act (CBRA) (16 U.S.C. 3501 et seq.). For more information, please contact the local Ecological Services Field Office or visit the CBRA Consultations website. The CBRA website provides tools such as a flow chart to help determine whether consultation is required and a template to facilitate the consultation process.

There are no known coastal barriers at this location.

Data limitations

The CBRS boundaries used in IPaC are representations of the controlling boundaries, which are depicted on the official CBRS maps. The boundaries depicted in this layer are not to be considered authoritative for in/out determinations close to a CBRS boundary (i.e., within the "CBRS Buffer Zone" that appears as a hatched area on either side of the boundary). For projects that are very close to a CBRS boundary but do not clearly intersect a unit, you may contact the Service for an official determination by following the instructions here: https://www.fws.gov/service/coastal-barrier-resources-system-property-documentation

Data exclusions

CBRS units extend seaward out to either the 20- or 30-foot bathymetric contour (depending on the location of the unit). The true seaward extent of the units is not shown in the CBRS data, therefore projects in the offshore areas of units (e.g., dredging, breakwaters, offshore wind energy or oil and gas projects) may be subject to CBRA even if they do not intersect the CBRS data. For additional information, please contact CBRA@fws.gov.

NOT FOR CONSULTATION

Facilities

National Wildlife Refuge lands

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

There are no refuge lands at this location.

Fish hatcheries

There are no fish hatcheries at this location.

Wetlands in the National Wetlands Inventory (NWI)

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

This location did not intersect any wetlands mapped by NWI.

NOTE: This initial screening does **not** replace an on-site delineation to determine whether wetlands occur. Additional information on the NWI data is provided below.

Data limitations

The Service's objective of mapping wetlands and deepwater habitats is to produce reconnaissance level information on the location, type and size of these resources. The maps are prepared from the analysis of high altitude imagery. Wetlands are identified based on vegetation, visible hydrology and geography. A margin of error is inherent in the use of imagery; thus, detailed on-the-ground inspection of any particular site may result in revision of the wetland boundaries or classification established through image analysis.

The accuracy of image interpretation depends on the quality of the imagery, the experience of the image analysts, the amount and quality of the collateral data and the amount of ground truth verification work conducted. Metadata should be consulted to determine the date of the source imagery used and any mapping problems.

Wetlands or other mapped features may have changed since the date of the imagery or field work. There may be occasional differences in polygon boundaries or classifications between the information depicted on the map and the actual conditions on site.

Data exclusions

Certain wetland habitats are excluded from the National mapping program because of the limitations of aerial imagery as the primary data source used to detect wetlands. These habitats include seagrasses or submerged aquatic vegetation that are found in the intertidal and subtidal zones of estuaries and nearshore coastal waters. Some deepwater reef communities (coral or tuberficid worm reefs) have also been excluded from the inventory. These habitats, because of their depth, go undetected by aerial imagery.

Data precautions

Federal, state, and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, state, or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, state, or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

NOT FOR CONSULTATION

APPENDIX C
AGFD HDMS Online Environmental Review Tool Query Report

Arizona Environmental Online Review Tool Report

Arizona Game and Fish Department Mission
To conserve Arizona's diverse wildlife resources and manage for safe, compatible outdoor recreation opportunities for current and future generations.

Project Name:
confidential

Project Description:
confidential

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

Contact Person:
Samantha Blonder

Organization:
WestLand Resources Inc.

On Behalf Of:
PRIVATE

Project ID:
HGIS-17886

Please review the entire report for project type and/or species recommendations for the location information entered. Please retain a copy for future reference.

Disclaimer:

1. This Environmental Review is based on the project study area that was entered. The report must be updated if the project study area, location, or the type of project changes.
2. 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. This review is also not intended to replace environmental consultation (including federal consultation under the Endangered Species Act), land use permitting, or the Departments review of site-specific projects.
3. The Departments 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. HDMS data contains information about species occurrences that have actually been reported to the Department. 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. HabiMap Arizona data, specifically Species of Greatest Conservation Need (SGCN) under our State Wildlife Action Plan (SWAP) and Species of Economic and Recreational Importance (SERI), represent potential species distribution models for the State of Arizona which are subject to ongoing change, modification and refinement. The status of a wildlife resource can change quickly, and the availability of new data will necessitate a refined assessment.

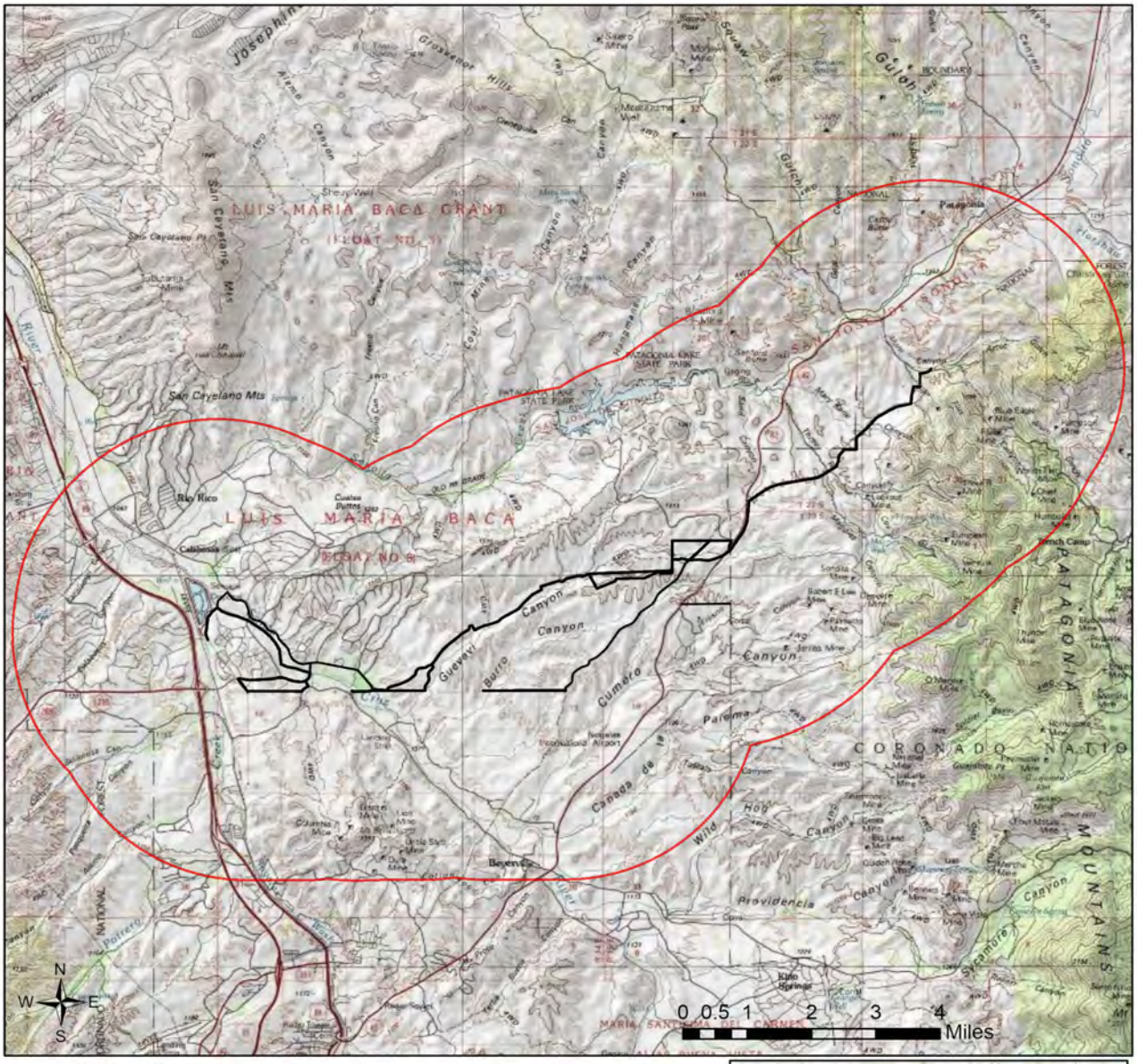
Locations Accuracy Disclaimer:
Project locations are assumed to be both precise and accurate for the purposes of environmental review. The creator/owner of the Project Review Report is solely responsible for the project location and thus the correctness of the Project Review Report content.

Recommendations Disclaimer:

1. The Department is interested in the conservation of all fish and wildlife resources, including those species listed in this report and those that may have not been documented within the project vicinity as well as other game and nongame wildlife.
2. 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).
3. Potential impacts to fish and wildlife resources may be minimized or avoided by the recommendations generated from information submitted for your proposed project. These recommendations are preliminary in scope, designed to provide early considerations on all species of wildlife.
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. Further coordination with the Department requires the submittal of this Environmental Review Report 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). Once AGFD had received the information, please allow 30 days for completion of project reviews. Send 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
   Or
   PEP@azgfd.gov
6. Coordination may also be necessary under the National Environmental Policy Act (NEPA) and/or Endangered Species Act (ESA). Site specific recommendations may be proposed during further NEPA/ESA analysis or through coordination with affected agencies

confidential

USA Topo Basemap With Locator Map



Buffered Project Boundary

Project Boundary

Project Size (acres): 175.61

Lat/Long (DD): 31.4558 / -110.8497

County(s): Santa Cruz

AGFD Region(s): Tucson

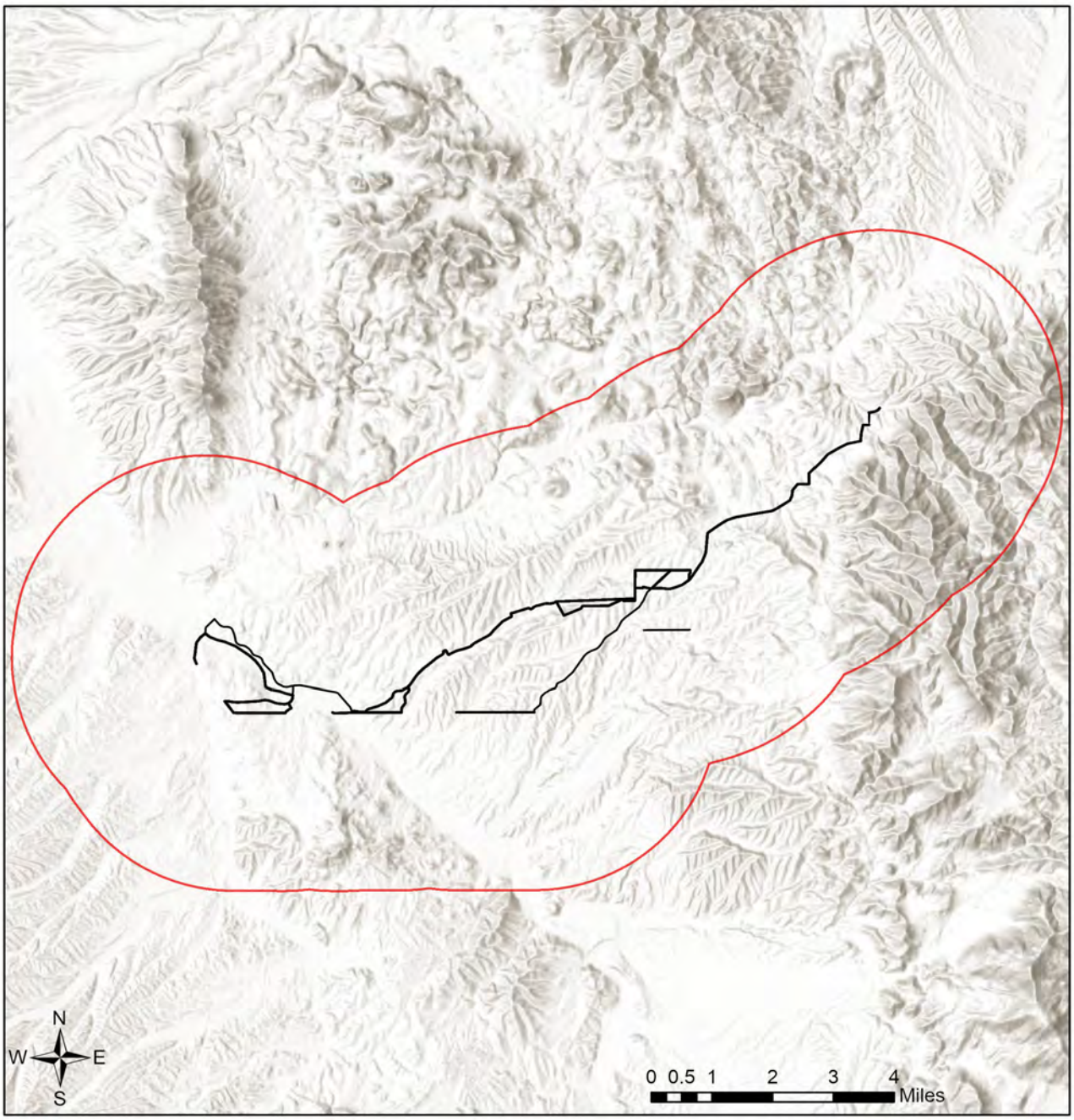
Township/Range(s): T22S, R15E; T23S, R14E +

USGS Quad(s): CUMERO CANYON; PATAGONIA +

Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community

confidential

Web Map As Submitted By User



Buffered Project Boundary

Project Boundary

Project Size (acres): 175.61

Lat/Long (DD): 31.4558 / -110.8497

County(s): Santa Cruz

AGFD Region(s): Tucson

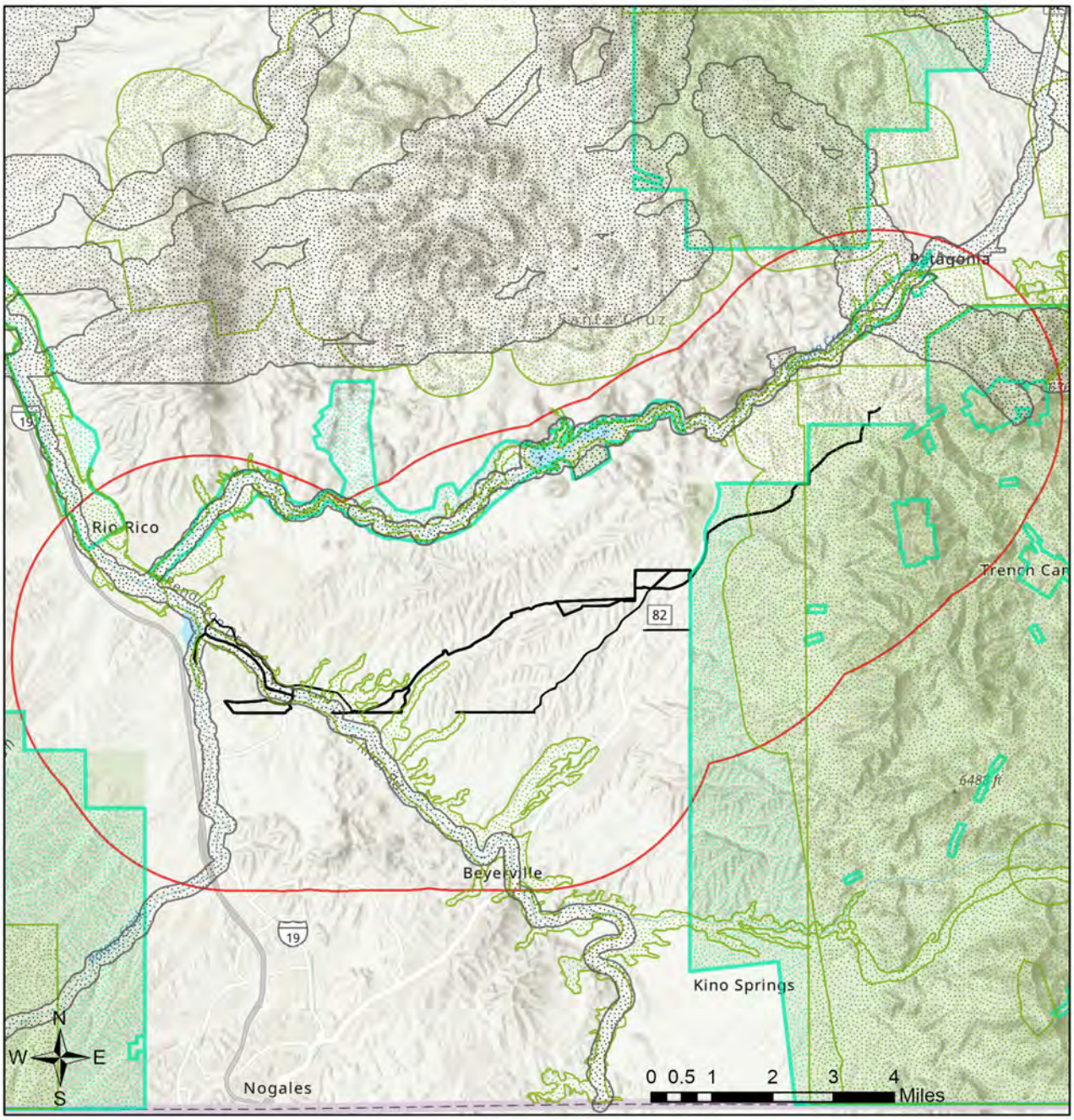
Township/Range(s): T22S, R15E; T23S, R14E +

USGS Quad(s): CUMERO CANYON; PATAGONIA +

Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community

confidential

Important Areas



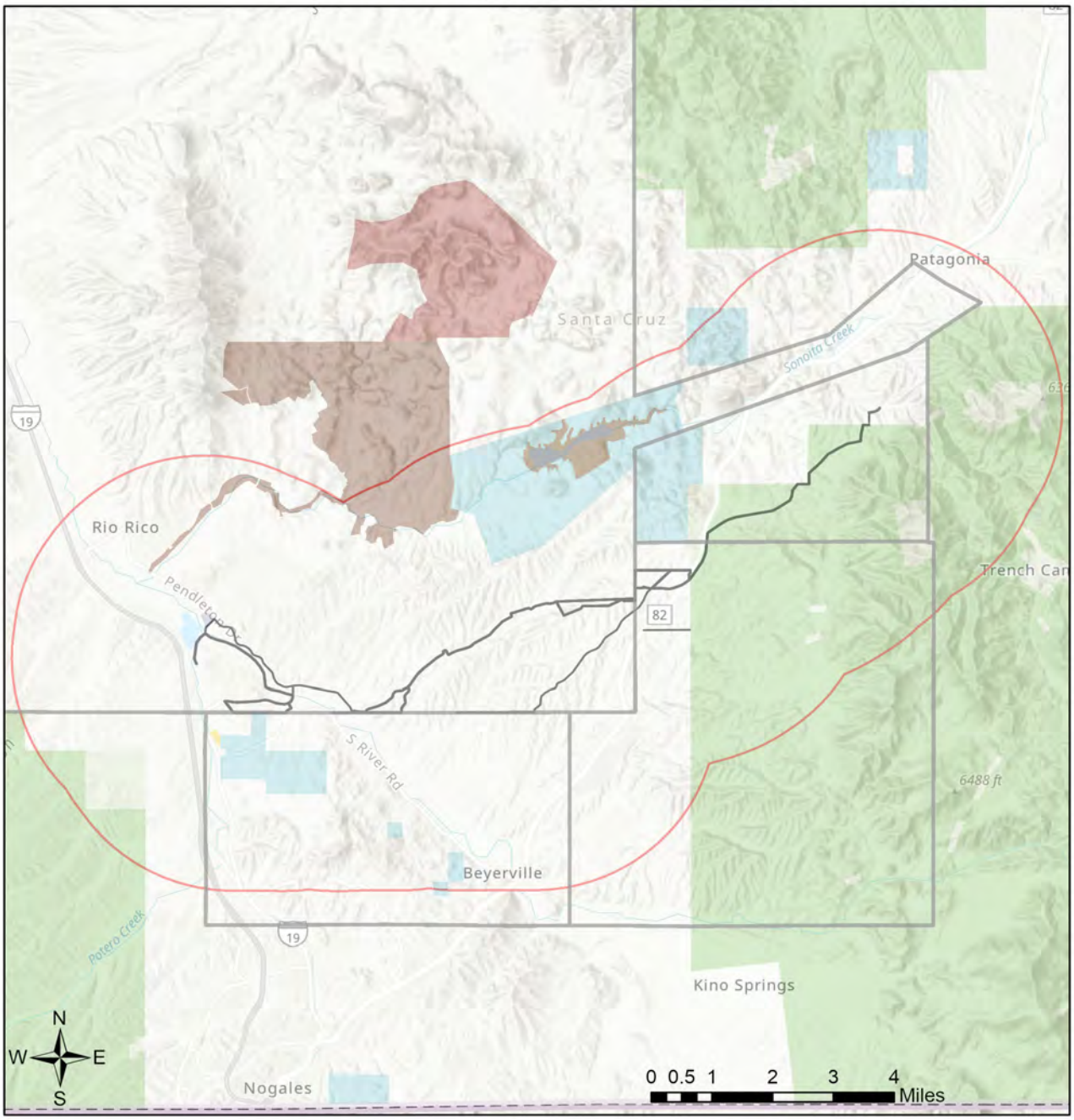
Buffered Project Boundary
Project Boundary
Important Bird Areas
Critical Habitat
Pinal County Riparian
Important Connectivity Zones
Wildlife Connectivity

Project Size (acres): 175.61
Lat/Long (DD): 31.4558 / -110.8497
County(s): Santa Cruz
AGFD Region(s): Tucson
Township/Range(s): T22S, R15E; T23S, R14E +
USGS Quad(s): CUMERO CANYON; PATAGONIA +

Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community
Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

confidential

Township/Ranges and Land Ownership



- Buffered Project Boundary
- Project Boundary
- AZ Game & Fish Dept.
- BLM
- BOR
- Indian Res.
- Military
- Mixed/Other
- National Park/Mon.
- Private
- State & Regional Parks
- State Trust
- US Forest Service
- Wildlife Area/Refuge
- Township/Ranges

Project Size (acres): 175.61

Lat/Long (DD): 31.4558 / -110.8497

County(s): Santa Cruz

AGFD Region(s): Tucson

Township/Range(s): T22S, R15E; T23S, R14E +

USGS Quad(s): CUMERO CANYON; PATAGONIA +

Sources: Esri, Airbus DS, USGS, NGA, NASA, CGIAR, N Robinson, NCEAS, NLS, OS, NMA, Geodatastyrelsen, Rijkswaterstaat, GSA, Geoland, FEMA, Intermap and the GIS user community
Sources: Esri, HERE, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

Special Status Species Documented within 3 Miles of Project Vicinity

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Agave parviflora ssp. parviflora	Santa Cruz Striped Agave	SC	S		HS	
Agosia chrysogaster chrysogaster	Gila Longfin Dace	SC		S		1B
Ammodramus savannarum ammolegus	Arizona grasshopper sparrow		S	S		1B
Amphispiza quinquestriata	Five-striped Sparrow					1B
Amsonia grandiflora	Large-flowered Blue Star	SC	S			
Aspidoscelis stictogramma	Giant Spotted Whiptail	SC	S			1B
Astragalus hypoxylus	Huachuca Milkvetch	SC	S	S	SR	
Baiomys taylori	Northern Pygmy Mouse		S			
Bat Colony						
Buteo plagiatus	Gray Hawk	SC				
Camptostoma imberbe	Northern Beardless-Tyrannulet		S			
Catostomus clarkii	Desert Sucker	SC	S	S		1B
Catostomus insignis	Sonora Sucker	SC	S	S		1B
Choeronycteris mexicana	Mexican Long-tongued Bat	SC	S	S		1C
Coccyzus americanus	Yellow-billed Cuckoo (Western DPS)	LT	S	S		1A
Coryphantha recurvata	Santa Cruz Beehive Cactus		S		HS	
Coryphantha scheeri var. robustispina	Pima Pineapple Cactus	LE			HS	
Cynanthus latirostris	Broad-billed Hummingbird		S			1B
Danaus plexippus	Monarch	C		S		
Echinocereus santaritensis	Santa Rita Hedgehog Cactus				SR	
Falco peregrinus anatum	American Peregrine Falcon	SC	S	S		1A
Gastrophryne mazatlanensis	Sinoloan Narrow-mouthed Toad			S		1C
Glaucidium brasilianum cactorum	Cactus Ferruginous Pygmy-owl	PT	S	S		1B
Gopherus morafkai	Sonoran Desert Tortoise	CCA	S	S		1A
Graptopetalum bartramii	Bartram Stonecrop	LT	S	S	SR	
Gyalopion quadrangulare	Thornscrub Hook-nosed Snake		S			1B
Haliaeetus leucocephalus (wintering pop.)	Bald Eagle - Winter Population	SC, BGA	S	S		1A
Hypsiglena sp. nov.	Hooded Nightsnake					1B
Kinosternon sonoriense sonoriense	Desert Mud Turtle			S		1B
Lampropeltis nigrita	Mexican Black Kingsnake					1B
Lasiurus xanthinus	Western Yellow Bat		S			1B
Leptonycteris yerbabuenae	Lesser Long-nosed Bat	SC				1A
Leucolia violiceps	Violet-crowned Hummingbird		S			1B
Lilaeopsis schaffneriana ssp. recurva	Huachuca Water-umbel	LE			HS	
Lithobates chiricahuensis	Chiricahua Leopard Frog	LT				1A
Lithobates yavapaiensis	Lowland Leopard Frog	SC	S	S		1A

Special Status Species Documented within 3 Miles of Project Vicinity

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Macroptilium supinum	Supine Bean	SC	S		SR	
Metastelma mexicanum	Wiggins Milkweed Vine	SC	S			
Myotis thysanodes	Fringed Myotis	SC				
Pachyramphus aglaiae	Rose-throated Becard		S			1B
Plestiodon callicephalus	Mountain Skink		S			
Poeciliopsis occidentalis occidentalis	Gila Topminnow	LE				1A
Polioptila nigriceps	Black-capped Gnatcatcher					1B
Rhinichthys osculus	Speckled Dace	SC		S		1B
Sciurus arizonensis	Arizona Gray Squirrel					1B
Senticolis triaspis intermedia	Northern Green Ratsnake		S			1B
Sigmodon ochrognathus	Yellow-nosed Cotton Rat	SC				1C
Strix occidentalis lucida	Mexican Spotted Owl	LT				1A
Tadarida brasiliensis	Brazilian Free-tailed Bat					1B
Tantilla yaquia	Yaqui Black-headed Snake		S			1B
Terrapene ornata luteola	Desert Box Turtle			S		1A
Thamnophis eques megalops	Northern Mexican Gartersnake	LT	S			1A
Tragia laciniata	Sonoita Noseburn		S			
Tyrannus crassirostris	Thick-billed Kingbird		S			1B

Note: Status code definitions can be found at https://www.azgfd.com/wildlife/planning/wildlifeguidelines/statusdefinitions/
.

Special Areas Documented that Intersect with Project Footprint as Drawn

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
CH for Coccyzus americanus	Yellow-billed Cuckoo Designated Critical Habitat					
CH for Panthera onca	Jaguar Designated Critical Habitat					
CH for Strix occidentalis lucida	Mexican Spotted Owl Designated Critical Habitat					
Patagonia Mountains IBA	Important Bird Area					
Santa Rita - Tumacacori Linkage Design	Wildlife Connectivity					

Note: Status code definitions can be found at https://www.azgfd.com/wildlife/planning/wildlifeguidelines/statusdefinitions/
.

Species of Greatest Conservation Need Predicted that Intersect with Project Footprint as Drawn, based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Agosia chrysogaster	Longfin Dace	SC		S		1B
Aix sponsa	Wood Duck					1B

Species of Greatest Conservation Need Predicted that Intersect with Project Footprint as Drawn, based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Amazilia violiceps	Violet-crowned Hummingbird		S			1B
Ammodramus savannarum ammolegus	Arizona grasshopper sparrow		S	S		1B
Ammodramus savannarum perpallidus	Western Grasshopper Sparrow					1B
Ammospermophilus harrisii	Harris' Antelope Squirrel					1B
Anthus spragueii	Sprague's Pipit	SC				1A
Aquila chrysaetos	Golden Eagle	BGA		S		1B
Aspidoscelis stictogramma	Giant Spotted Whiptail	SC	S			1B
Aspidoscelis xanthonota	Red-backed Whiptail	SC	S			1B
Athene cunicularia hypugaea	Western Burrowing Owl	SC	S	S		1B
Botaurus lentiginosus	American Bittern					1B
Buteo regalis	Ferruginous Hawk	SC		S		1B
Buteo swainsoni	Swainson's Hawk					1C
Callipepla squamata	Scaled Quail					1C
Calypte costae	Costa's Hummingbird					1C
Catostomus clarkii	Desert Sucker	SC	S	S		1B
Catostomus insignis	Sonora Sucker	SC	S	S		1B
Chordeiles minor	Common Nighthawk					1B
Cistothorus palustris	Marsh Wren					1C
Coccyzus americanus	Yellow-billed Cuckoo (Western DPS)	LT	S			1A
Colaptes chrysoides	Gilded Flicker			S		1B
Coluber bilineatus	Sonoran Whipsnake					1B
Corynorhinus townsendii pallescens	Pale Townsend's Big-eared Bat	SC	S	S		1B
Craugastor augusti	Barking Frog					1B
Crotalus lepidus	Rock Rattlesnake					1A
Crotalus tigris	Tiger Rattlesnake					1B
Crotalus willardi	Ridge-nosed Rattlesnake	PS				1A
Cynanthus latirostris	Broad-billed Hummingbird		S			1B
Cynomys ludovicianus	Black-tailed Prairie Dog	CCA		S		1A
Cyprinodon macularius	Desert Pupfish	LE				1A
Cyrtonyx montezumae	Montezuma Quail					1C
Dipodomys spectabilis	Banner-tailed Kangaroo Rat			S		1B
Empidonax wrightii	Gray Flycatcher					1C
Euderma maculatum	Spotted Bat	SC	S	S		1B
Eumops perotis californicus	Greater Western Bonneted Bat	SC		S		1B
Falco peregrinus anatum	American Peregrine Falcon	SC	S	S		1A
Glaucidium gnoma gnoma	Mountain Pygmy-owl					1B
Gopherus morafkai	Sonoran Desert Tortoise	CCA	S	S		1A

Species of Greatest Conservation Need Predicted that Intersect with Project Footprint as Drawn, based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Gyalopion quadrangulare	Thornscrub Hook-nosed Snake		S			1B
Haliaeetus leucocephalus	Bald Eagle	SC, BGA	S	S		1A
Heloderma suspectum	Gila Monster					1A
Hypsiglena sp. nov.	Hooded Nightsnake					1B
Incilius alvarius	Sonoran Desert Toad					1B
Kinosternon sonoriense sonoriense	Desert Mud Turtle			S		1B
Lampropeltis nigrita	Mexican Black Kingsnake					1B
Lasiurus blossevillii	Western Red Bat		S			1B
Lasiurus xanthinus	Western Yellow Bat		S			1B
Leopardus pardalis	Ocelot	LE				1A
Leptonycteris yerbabuenae	Lesser Long-nosed Bat	SC				1A
Lepus alleni	Antelope Jackrabbit					1B
Lithobates chiricahuensis	Chiricahua Leopard Frog	LT				1A
Lithobates tarahumarae	Tarahumara Frog	SC	S			1A
Lithobates yavapaiensis	Lowland Leopard Frog	SC	S	S		1A
Macrotus californicus	California Leaf-nosed Bat	SC		S		1B
Megascops trichopsis	Whiskered Screech-owl		S			1B
Melanerpes uropygialis	Gila Woodpecker					1B
Meleagris gallopavo mexicana	Gould's Turkey		S			1B
Melospiza lincolnii	Lincoln's Sparrow					1B
Melozone aberti	Abert's Towhee		S			1B
Micrathene whitneyi	Elf Owl					1C
Micruroides euryxanthus	Sonoran Coralsnake					1B
Myiarchus tuberculifer	Dusky-capped Flycatcher					1B
Myiarchus tyrannulus	Brown-crested Flycatcher					1C
Myiodynastes luteiventris	Sulphur-bellied Flycatcher		S			1B
Myotis occultus	Arizona Myotis	SC		S		1B
Myotis velifer	Cave Myotis	SC		S		1B
Myotis yumanensis	Yuma Myotis	SC				1B
Notiosorex cockrumi	Cockrum's Desert Shrew					1B
Nyctinomops femorosaccus	Pocketed Free-tailed Bat					1B
Odocoileus virginianus	White-tailed Deer					1B
Oreoscoptes montanus	Sage Thrasher					1C
Oreothlypis luciae	Lucy's Warbler					1C
Oxybelis aeneus	Brown Vinesnake		S			1B
Pachyramphus aglaiae	Rose-throated Becard		S			1B
Panthera onca	Jaguar	LE				1A
Passerculus sandwichensis	Savannah Sparrow					1B

Species of Greatest Conservation Need Predicted that Intersect with Project Footprint as Drawn, based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Patagioenas fasciata	Band-tailed Pigeon					1C
Peucaea botterii arizonae	Arizona Botteri's Sparrow			S		1B
Peucaea carpalis	Rufous-winged Sparrow					1B
Phrynosoma solare	Regal Horned Lizard					1B
Picoides arizonae	Arizona Woodpecker		S			1B
Poeciliopsis occidentalis occidentalis	Gila Topminnow	LE				1A
Polioptila nigriceps	Black-capped Gnatcatcher					1B
Rhinichthys osculus	Speckled Dace	SC		S		1B
Sceloporus slevini	Slevin's Bunchgrass Lizard		S	S		1B
Sciurus arizonensis	Arizona Gray Squirrel					1B
Senticolis triaspis	Green Ratsnake		S			1B
Setophaga petechia	Yellow Warbler					1B
Sialia sialis fulva	Azure Bluebird					1B
Sorex arizonae	Arizona Shrew	SC	S			1B
Sphyrapicus nuchalis	Red-naped Sapsucker					1C
Sphyrapicus thyroideus	Williamson's Sapsucker					1C
Spizella breweri	Brewer's Sparrow					1C
Strix occidentalis lucida	Mexican Spotted Owl	LT				1A
Sturnella magna	Eastern Meadowlark					1C
Tadarida brasiliensis	Brazilian Free-tailed Bat					1B
Tantilla wilcoxi	Chihuahuan Black-headed Snake		S			1B
Tantilla yaquia	Yaqui Black-headed Snake		S			1B
Terrapene ornata	Ornate Box Turtle					1A
Thamnophis eques megalops	Northern Mexican Gartersnake	LT	S			1A
Thomomys umbrinus intermedius	Southern Pocket Gopher					1B
Troglodytes pacificus	Pacific Wren					1B
Trogon elegans	Elegant Trogon		S			1B
Tyrannus crassirostris	Thick-billed Kingbird		S			1B
Vireo bellii arizonae	Arizona Bell's Vireo					1B
Vulpes macrotis	Kit Fox	No Status				1B

Species of Economic and Recreation Importance Predicted that Intersect with Project Footprint as Drawn

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Callipepla gambelii	Gambel's Quail					
Cyrtonyx montezumae	Montezuma Quail					1C
Odocoileus virginianus	White-tailed Deer					1B
Patagioenas fasciata	Band-tailed Pigeon					1C

Species of Economic and Recreation Importance Predicted that Intersect with Project Footprint as Drawn

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Pecari tajacu	Javelina					
Puma concolor	Mountain Lion					
Zenaida asiatica	White-winged Dove					
Zenaida macroura	Mourning Dove					

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

Project Type Recommendations:
Minimize the potential introduction or spread of exotic invasive species, including aquatic and terrestrial plants, animals, insects and pathogens. Precautions should be taken to wash and/or decontaminate all equipment utilized in the project activities before entering and leaving the site. See the Arizona Department of Agriculture website for a list of prohibited and restricted noxious weeds at https://www.invasivespeciesinfo.gov/unitedstates/az.shtml and the Arizona Native Plant Society https://aznps.com/invas for recommendations on how to control. To view a list of documented invasive species or to report invasive species in or near your project area visit iMapInvasives - a national cloud-based application for tracking and managing invasive species at https://imap.natureserve.org/imap/services/page/map.html.

- To build a list: zoom to your area of interest, use the identify/measure tool to draw a polygon around your area of interest, and select “See What’s Here” for a list of reported species. To export the list, you must have an account and be logged in. You can then use the export tool to draw a boundary and export the records in a csv file.

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.

For any powerlines built, proper design and construction of the transmission line is necessary to prevent or minimize risk of electrocution of raptors, owls, vultures, and golden or bald eagles, which are protected under state and federal laws. Limit project activities during the breeding season for birds, generally March through late August, depending on species in the local area (raptors breed in early February through May). Conduct avian surveys to determine bird species that may be utilizing the area and develop a plan to avoid disturbance during the nesting season. For underground powerlines, trenches should be covered or back-filled as soon as possible. Incorporate escape ramps in ditches or fencing along the perimeter to deter small mammals and herpetofauna (snakes, lizards, tortoise) from entering ditches. 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.

Based on the project type entered, coordination with State Historic Preservation Office may be required (https://azstateparks.com/).

Based on the project type entered, coordination with U.S. Fish and Wildlife Service (Migratory Bird Treaty Act) may be required (https://www.fws.gov/office/arizona-ecological-services).

Vegetation restoration projects (including treatments of invasive or exotic species) should have a completed site-evaluation plan (identifying environmental conditions necessary to re-establish native vegetation), a revegetation plan (species, density, method of establishment), a short and long-term monitoring plan, including adaptive management guidelines to address needs for replacement vegetation.

Project Location and/or Species Recommendations:
Analysis indicates that your project is located in the vicinity of an identified ***wildlife habitat linkage corridor***. The **Arizona Missing Linkages** represent ideal connections within or between intact blocks or core habitats. The blocks are currently disconnected or isolated and the linkages should be examined for improving permeability, or are currently intact and in need of preservation and/or enhancement. The reports provide recommendations for opportunities to preserve or enhance permeability. Project planning and implementation efforts should focus on maintaining and improving opportunities for wildlife permeability. For information pertaining to the linkage assessment and wildlife species that may be affected, please refer to: https://www.azgfd.com/wildlife/planning/habitatconnectivity/identifying-corridors/. Please contact the Project Evaluation Program (pep@azgfd.gov) for specific project recommendations.

HDMS records indicate that one or more native plants listed on the **Arizona Native Plant Law and Antiquities Act** have been documented within the vicinity of your project area. Please contact:
Arizona Department of Agriculture
1688 W Adams St.
Phoenix, AZ 85007
Phone: 602.542.4373
https://agriculture.az.gov/sites/default/files/Native%20Plant%20Rules%20-%20AZ%20Dept%20of%20Ag.pdf starts on page 44

HDMS records indicate that **Chiricahua Leopard Frogs** have been documented within the vicinity of your project area. Please review the Chiricahua Leopard Frog Management Guidelines found at: https://s3.amazonaws.com/azgfd-portal-wordpress/PortalImages/files/wildlife/planningFor/wildlifeFriendlyGuidelines/FINALLithchirHabitatGdlns.pdf

The analysis has detected one or more **Important Bird Areas** within your project vicinity. Please see http://aziba.org/?page_id=38 for details about the Important Bird Area(s) identified in the report.

HDMS records indicate that **Lesser Long-nosed Bats** have been documented within the vicinity of your project area. Please review the Lesser Long-nosed Bat Management Guidelines at: https://s3.amazonaws.com/azgfd-portal-wordpress/PortalImages/files/wildlife/planningFor/wildlifeFriendlyGuidelines/FINALlecuyeHabitatGdln.pdf

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. The Endangered Species Act (ESA) gives the US Fish and Wildlife Service (USFWS) regulatory authority over all federally listed species. Please contact USFWS Ecological Services Offices at https://www.fws.gov/office/arizona-ecological-services or:

Phoenix Main Office
9828 North 31st Avenue #C3
Phoenix, AZ 85051-2517
Phone: 602-242-0210
Fax: 602-242-2513

Tucson Sub-Office
201 N. Bonita Suite 141
Tucson, AZ 85745
Phone: 520-670-6144
Fax: 520-670-6155

Flagstaff Sub-Office
SW Forest Science Complex
2500 S. Pine Knoll Dr.
Flagstaff, AZ 86001
Phone: 928-556-2157
Fax: 928-556-2121

HDMS records indicate that **Peregrine Falcons** have been documented within the vicinity of your project area. Please review the Peregrine Falcon Management Guidelines at: https://s3.amazonaws.com/azgfd-portal-wordpress/PortalImages/files/wildlife/planningFor/wildlifeFriendlyGuidelines/peregrineFalconConservGuidelines.pdf.

HDMS records indicate that **Sonoran Desert Tortoise** have been documented within the vicinity of your project area. Please review the Tortoise Handling Guidelines found at: https://www.azgfd.com/wildlife/nongamemanagement/tortoise/

APPENDIX D
USFS CNF Sensitive Species with Potential to Occur in the Study Area

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
AMPHIBIANS					
Craugastor augusti cactorum Western barking frog	Occurs in areas with limestone, rhyolite, and other rock outcrops or caves in scrubby oak or pine-oak woodlands. Permanent water is not required (AGFD 2009). Elevation: 4,200–6,200 ft (Rorabaugh 2008a).	Occurs in southern Arizona, U.S. and Jalisco, Nayarit, Sinaloa and Sonora (AGFD 2009, Streicher et al. 2014)	Known to occur in the Quinlan, Santa Rita, Patagonia, Huachuca and Pajarito mountains (AGFD 2009). Potentially occurs in the Peloncillo, Mule, Whetstone and Baboquivari mountains (Rorabaugh 2008a). Rorabaugh (2008a) and AGFD (2009) consider the historic record from the Sierra Ancha Mountains to be unsubstantiated.	**Possible** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.
Hyla wrightorum (Huachuca-Canelo Hills population) [Note: *H. wrightorum* is a synonym of *Dryophytes wrightorum* (ITIS 2019, accessed October 18, 2019).] Arizona treefrog	Normally found in coniferous forests near ponds, pools, and streams (AGFD 2013a). Seeps, cienegas and temporary pools are also used by this species (USFWS 2016b). Ephemeral or perennial waters with abundant aquatic or emergent vegetation used for breeding (USFWS 2016b). Inhabit the shrubs and trees that occur near bodies of water (AGFD 2013a) but can also be found on the ground in moist areas under rocks or logs (USFWS 2016b). Forages on various arthropods and may also feed on beetles and grass. Larvae feed on algae and plant tissue (AGFD 2013a). The Huachuca-Canelo Hills population is typically found in Madrean oak woodland or savannah, pine-oak woodland and mixed conifer forests. The nearby population at Rancho Los Fresnos, Sonora, occurs in Plains grassland (USFWS 2016b). Elevation: Range-wide, 2,985–9,514 ft (Hammerson 2017). The Huachuca-Canelo Hills population, 5,000–8,500 ft (USFWS 2016b).	Occurs in Arizona and New Mexico, U.S. Although poorly known, the range extends southward into Mexico in Sonora, Chihuahua (USFWS 2016b) and possibly as far south as Mexico City (Hammerson 2017).	The forested plateau north of the Mogollon Rim and isolated populations in the Huachuca Mountains and Canelo Hills (AGFD 2013a). In Arizona, the historic distribution of the Huachuca-Canelo population includes Miller Canyon, Bear Spring or Bear Canyon, Scotia Canyon and tributaries, Huachuca Canyon one of its tributaries, Oversite Canyon, Sunnyside Canyon, Whiner Tank (head waters of Turkey Creek), Hannah Tank, upper Gardner Canyon (Huachuca Mountains), and a cave south of Scheelite Canyon. Additionally, recent efforts have detected several additional populations in drainages of the Canelo Hills (Mims et al. 2016, USFWS 2016b).	**Unlikely** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**No impact.** The short temporal duration and small spatial footprint of the Project and EPMs to avoid impact to aquatic areas, the Project will result in no impact to this species.
Lithobates tarahumarae Tarahumara frog	Likely requires perennial water sources for metamorphosis (AGFD 2006g). Typically occurs in canyons with deep plunge pools, tinajas or slow flowing streams (AGFD 2006g, Rorabaugh 2008b). Found in riparian habitats within areas of oak and pine-oak woodlands, Sinaloan thornscrub, semi-desert grassland and tropical deciduous forest (AGFD 2006g, Rorabaugh 2013b). Elevation: Range-wide, as low as 1,500 ft. In Arizona, 3,500–6,200 (AGFD 2006g).	Occurs in extreme south-central Arizona, U.S. and eastern Sonora, southwestern Chihuahua and Sinaloa, Mexico (AGFD 2006g, Rorabaugh 2013b).	Historic range in Arizona included the Santa Rita, Pajarito, Atascosa and Tumacacori mountains. This species was extirpated from the state in the 1980s (AGFD 2006g). Reintroductions have occurred in the Santa Rita and Pajarito mountains (AGFD 2006g, Rorabaugh 2013b). There are modern records from Sycamore Canyon, Big Casa Blanca Canyon, Adobe Canyon and Gardner Canyon (Rorabaugh 2013b).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Lithobates yavapaiensis Lowland leopard frog	Occurs in a variety of perennial to near perennial waters in desert grasslands to pinyon juniper biotic communities (AGFD 2006e). Inhabits large rivers, streams, canals, cienegas, cattle tanks or other aquatic features (Rorabaugh 2008b). Can survive in semi-permanent aquatic systems by retreating into deep mud cracks, mammal burrows, or rock fissures, but large pools are required for adult survival and reproductive efforts (Lower Colorado River Multi-Species Conservation Program 2016). Elevation: In Arizona, from 480–6,200 ft (AGFD 2006e).	Historic range included Arizona, California, Nevada, New Mexico, U.S. and extreme northeastern Baja California, northern Sonora, and possibly northwestern Chihuahua, Mexico (AGFD 2006e, Lower Colorado River Multi-Species Conservation Program 2016). Current range is restricted to southern Arizona and adjacent portions of Sonora (Lower Colorado River Multi-Species Conservation Program 2016).	Found in central and southeastern Arizona (AGFD 2006e). Commonly found in the interior portion of the state, south and west of the Mogollon Rim, but additional populations occur in the western Grand Canyon and the southeast (Lower Colorado River Multi-Species Conservation Program 2016).	**None**	**None.** This species is not expected to occur within the Study Area**.**
ARACNIDS					
Tuberochernes ubicki A cave obligate pseudoscorpion	This species is poorly understood. Occurs in cave environments at moderately high elevations. This species feeds on other invertebrates (AGFD 2005a). Elevation: 5,250 ft (AGFD 2005a).	Arizona endemic (AGFD 2005a).	Only known from Fly Cave in Sawmill Canyon, a tributary to Gardner Canyon in the Santa Rita Mountains (AGFD 2005a, Muchmore 1997).	**None**	**None.** This species is not expected to occur within the Study Area**.**

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
BIRDS					
Accipiter gentilis Northern goshawk	Breeds in old growth deciduous, coniferous or mixed forests. The most suitable areas have high canopy cover and open understories (Squires and Reynolds 1997). In Arizona, most commonly breeds in ponderosa pine forests but is also found in mixed-conifer, ponderosa pine-Gambel's oak, Madrean pine-oak woodland habitats (Wise-Gervais 2005a). Forages on a variety of prey types (birds, small mammals, etc.) that are spotted from perches (AGFD 2013e) in a range of habitats from sagebrush to dense forest, including riparian areas (Squires and Reynolds 1997). Migratory and wintering habitat is poorly known. However, during the winter this species has been documented to use Sycamore – Fremont Cottonwood forests, aspen groves, spruce-fir forests, pine forests and open habitats (Squires and Reynolds 1997). Elevation: In Arizona, 4,750–9,120 ft (AGFD 2013e).	This species is a partial migrant that breeds throughout the Holarctic region wherever suitable habitat exists (Squires and Reynolds 1997). In the U.S., breeds in Alaska, Arizona, California, Colorado, Connecticut, Idaho, Maine, Maryland, Massachusetts, Michigan, Minnesota, Montana, Nevada, New Hampshire, New Jersey, New Mexico, New York, Oregon, Pennsylvania, South Dakota, Utah, Vermont, Washington, West Virginia, Wisconsin and Wyoming (Squires and Reynolds 1997). Winter range is as per the breeding range and irregularly south (AGFD 2013e).	Found in most of the high elevation, heavily forested regions of the state (Wise-Gervais 2005a). One of the highest breeding densities known is on the Kaibab Plateau (AGFD 2013e). Most individuals are residents but may move to lower elevations during the winter (Wise-Gervais 2005a).	**Possible** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**No impact.** The short temporal duration and small spatial footprint of the Project and the migratory bird nest avoidance EPM's will result in no impact to this species.
Amazilia violiceps Violet-crowned hummingbird	Range-wide this species uses riparian habitats in a variety of vegetative communities, oak woodlands, pine-oak forests, forest edges, urban areas, agricultural fields and orchards (Wethington 2002). In Arizona, this species is a riparian obligate and nests in foothill drainages and canyons with tall broadleaf trees. Sycamores provide favored habitat, but this species also uses areas with walnut, cottonwood, willow, ash, juniper or Madrean evergreen oaks (Corman 2005q). Commonly forages in along woodland edges or adjacent areas with agaves, yuccas, others desert shrubs or feeding stations (AGFD 2002i, Corman 2005q). There is insufficient data to determine the habitat types used during migration (Wethington 2002). This species winters in habitats outside of the U.S. (Wethington 2002). Elevation: In Arizona, 2,800–5,800 ft (AGFD 2002i, Corman 2005q).	This species is a partial migrant, with the northern most populations withdrawing southward in the winter (Wethington 2002). Breeds in southern Arizona and southwestern New Mexico, U.S. and northern Sonora, northern Chihuahua and western and south-central Mexico through Guerrero, Oaxaca and Michoacán. Outside of the breeding season U.S. populations and those in northern Sonora and northern Chihuahua are presumed to move further south into Mexico (Wethington 2002). However, a few individuals may remain in the northern most extent of the breeding range (Corman 2005q).	Breeds in the Santa Rita, Huachuca, Mule, Chiricahua, and Peloncillo mountains; also breeds along Sonoita Creek (AGFD 2002i). Additionally, occurs in Guadalupe Canyon, along the upper San Pedro River and in the Baboquivari, Santa Catalina and Whetstone mountains (Corman 2005q).	**Unlikely** **ERU Habitat(s):** Sycamore – Fremont Cottonwood Fremont Cottonwood / Shrub	**No impact.** The short temporal duration and small spatial footprint of the Project and the migratory bird nest avoidance EPM's will result in no impact to this species.
Ammodramus bairdii Baird's Sparrow	Breeds in northern mixed-grass and fescue prairie with low scattered shrubs (Green et al. 2020). This species does not breed in Arizona (Green et al. 2020). Migratory habitat includes grassland, agricultural fields and barren ground surrounding watercourses (Green et al. 2020). Winter habitat is poorly known but this species has been observed using areas with expansive grasslands (Green et al. 2020). In Arizona, this species winters in areas with dense grass and scattered, shrubby, mesquites and in mixed-oak grasslands (AGFD 2013b). Elevation: In Arizona, 4,140–4,900 ft (AGFD 2013b).	This species is a medium- to long-distance migrant (Green et al. 2020). Breeding range includes southern Alberta and southern Saskatchewan, Canada and Montana, North Dakota, northern South Dakota, and western Minnesota, U.S. Winters in southeastern Arizona, southern New Mexico, and southwestern Texas, U.S.. Winter ranges extends into northeastern Sonora, extreme northwestern Chihuahua, Coahuila, northeastern Durango and extreme northern Zacatecas, Mexico (Green et al. 2020).	Does not breed in Arizona. Winters in the Sonoita Plains, Altar and San Rafael valleys, and in the Chiricahua, Huachuca, Santa Rita and Patagonia Mountains. Typically use winter habitat from September to early April (AGFD 2013b).	**None**	**None.** This species is not expected to occur within the Study Area**.**

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Ammodramus savannarum ammolegus Arizona grasshopper sparrow	Dependent on open grasslands with patches of bare ground (Vickery 1996). In Arizona, breeds in semi-desert grasslands with low scattered shrubs and in grasslands or the margins of alfalfa fields without shrubs (Corman 2005h). Prefers areas with medium height grasses and avoid areas with dense woody cover, and extremely tall or short grass (AGFD 2010a). During the migratory and wintering period, this species uses habitat similar to that used for breeding (Vickery 1996). It is unknown if the *ammolegus* subspecies has habitat requirements that differ from the species as a whole. Elevation: In Arizona, 3,800–5,300 ft (AGFD 2010a).	This species is a partial migrant, with northern populations being strongly migratory (Vickery 1996). Breeds primarily east of the Rocky Mountains from extreme southern Canada to the upper coastal plain of North and South Carolina, central Georgia, Alabama, Mississippi, extreme northern Louisiana and most of Texas (Vickery 1996). This species occurs only localized populations west of the Rocky Mountains (Corman 2005h) from southern British Columbia, Canada to Arizona in every state except New Mexico (Vickery 1996). Isolated resident populations occur in southeastern Arizona, Florida, Mexico, Central America and the Caribbean (Corman 2005h). Northern limits of the wintering range are poorly known but likely extends from eastern North Carolina, South Carolina, northern Georgia, northern Alabama, northern Mississippi, northern Louisiana, southern Texas, extreme southern Arizona and extreme southern California. Winter range extends southward through Mexico to Panama (Vickery 1996).	Breeding is limited to the southeastern portion of the state (Pima, Santa Cruz and Cochise counties), except for an isolated population in Chino Valley, Yavapai County (Corman 2005h). Specifically, this species typically breeds in the Altar Valley, Babocomari Valley, Buenos Aries National Wildlife Refuge, San Bernardino Valley, the upper San Pedro River drainage southeast of Sierra Vista, San Rafael Valley, the Sonoita Plains north to upper Cienega Creek and the Sulphur Springs Valley north to Wilcox (AGFD 2010a, Corman 2005h). Historically, also breed in the Santa Cruz Valley (AGFD 2010a). Migrants may be observed throughout the state as they move to wintering grounds in western and southern portions of the state (Corman 2005h). Southeastern populations are likely year-round residents (Corman 2005h). Breeding populations within Arizona likely belong to the *ammolegus* subspecies, but other subspecies may migrate through or winter in the state (Vickery 1996).	**Possible** **ERU Habitat(s):** Semi-desert grassland	**No impact.** The short temporal duration and small spatial footprint of the Project and the migratory bird nest avoidance EPM's will result in no impact to this species.
Antrostomus [=Caprimulgus] ridgwayi Buff-collared nightjar	Prefers arid and densely vegetated areas and is often found in ravines, washes or rocky canyons (Bowers and Dunning 1997). In Arizona, this species typically breeds in drainages with small trees and shrubs in Sonoran desertscrub and semi-desert grasslands. However, it also utilizes area with thickets of hackberry, mesquite or oaks adjacent to intermittent drainages with scattered sycamores or cottonwoods (Corman 2005e). Buff-collared nightjars do not build nests and instead lay eggs directly on the ground (Bowers and Dunning 1997). There is no information about habitat use during migration and this species winters in habitats outside of the U.S. (Bowers and Dunning 1997). Elevation: 3,000–4,600 ft (Corman 2005e).	Migratory behavior of this species is poorly understood, but it is a suspected partial migrant with the northern most populations likely migratory (Bowers and Dunning 1997). Breeding range includes southeastern Arizona and extreme southwestern New Mexico, U.S. Breeding range extends southward into Mexico through eastern Sonora, western Chihuahua, Sinaloa, western Durango, south on the Pacific Slope to Oaxaca, northern Guerrero, Morelos, central Chiapas and central Vera Cruz. Additional breeding populations occur in central Guatemala, west-central Honduras and possibly central Nicaragua. Winter range is similar to the breeding range except the northern most populations withdraw from the US, north and central Sonora, Chihuahua and Durango (Bowers and Dunning 1997).	This species appears to be expanding its range northward and was first reported from Arizona in 1960 (Bowers and Dunning 1997). Modern breeding records exist from the Atascosa, Baboquivari, Santa Catalina, Santa Rita and Pajarito mountains and Arivaca Creek and Aravaipa Canyon (Corman 2005e). Due to restricted periods of vocalization, this species is difficult to detect and may have additional undetected breeding locations in the southern portion of the state (Corman 2005e).	**Possible** **ERU Habitat(s):** Semi-desert Grassland Juniper grass Sycamore – Fremont Cottonwood	**No impact.** The short temporal duration and small spatial footprint of the Project and the migratory bird nest avoidance EPM's will result in no impact to this species.
Calothorax lucifer Lucifer hummingbird	Range-wide, this species primarily occurs in arid habitats including desertscrub, densely vegetated dry washes, lava fields, volcanic hills, rocky slopes but occasionally uses deciduous riparian woodland (Scott 1994). In Arizona, this species breeds in arid and open landscapes including dry washes with scattered trees and shrubs and rocky slopes with grasses, agave, yucca, sotol, Nolina, ocotillo or cholla. Additionally, uses intermittent drainages with scattered cottonwoods and mesquites and foothill areas with scattered evergreen oaks (Corman 2005j). There is no information on migratory habitat and this species winters outside of the U.S. (Scott 1994). However, individuals have been reported from feeding stations in drainages dominated by sycamores, Madrean evergreen oak woodlands or pine-oak forest during the presumably post-breeding period (Corman 2005j). Elevation: Range-wide 2,625–7,220 ft (Scott 1994). In Arizona, 3,800–5,800 ft (Corman 2005j).	Migratory behavior is poorly understood, but this species is likely primarily migratory (Scott 1994). There are sparse breeding populations in southeastern Arizona, extreme southwestern New Mexico and the Big Bend region of Texas, U.S. The breeding range extends along the Sierra Madre Occidental and Oriental in northeastern Sonora, Chihuahua, Durango, Coahuila and Nuevo Leon to the Central Plateau and possibly as far south as Puebla (Scott 1994). Winters in central and southwestern Mexico in Jalisco, Guanajuato, Querétaro, Guerrero, Oaxaca, Colima, Michoacán and Morelos (Scott 1994).	A rare breeder and sparse visitor to the mountain ranges in the southeastern portion of the state including the Baboquivari, Chiricahua, Dragoon, Mule, Huachuca, Santa Rita, Swisshelm, Pajarito, Peloncillo and Whetstone mountains and near Sonoita and Patagonia (Corman 2005j, Scott 1994).	**Possible** **ERU Habitat(s):** Semi-desert Grassland Sycamore – Fremont Cottonwood Chihuahuan Desert Scrub	**No impact.** The short temporal duration and small spatial footprint of the Project and the migratory bird nest avoidance EPM's will result in no impact to this species.

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Camptostoma imberbe Northern beardless tyrannulet	This species occurs in arid to semi-humid brushy areas, thickets and forest edges, commonly along streams and dry washes (Tenney 2000). In Arizona, found in lowland cottonwood-willow riparian woodlands and in higher elevation drainages with sycamores, evergreen oaks and scattered cottonwood, willow, ash, mesquite and hackberry. Additionally, this species uses mesquite bosque and intermittent foothill drainages or dry washes with mesquite and netleaf hackberry (Corman 2005k). Habitat use during migration is poorly known but has been reported in areas with desertscrub. Wintering habitat is similar to breeding habitat and includes lowland riparian woodland and adjacent habitats, chaparral and mesquite (Tenney 2000). Elevation: In Arizona, breeds 1,920–4,600 ft (Corman 2005k).	This species is a partial migrant, with northern-most populations being short-distance migrants (Tenney 2000). Breeds locally in southcentral and southeastern Arizona, extreme southwestern New Mexico and in south Texas along the Rio Grande Valley. Range extends southward from U.S. populations through Mexico to Guatemala, although is absent from western Sonora, northwestern Sinaloa, the north Central Plateau and the highlands of southeastern Chiapas. Additionally, occurs in El Salvador, Honduras, Nicaragua and Costa Rica (Tenney 2000). Winter range is the same as the breeding range with only a portion of the populations in the northern-most extent of the range withdrawing (Tenney 2000).	In Arizona, most populations are migratory, although there are some local residents (Corman 2005k). In Arizona, breeds along Arivaca Creek, Bonita Creek, the San Pedro River, and its tributaries, to the confluence with the Gila River, Sonoita Creek and the upper Santa Cruz River. Additionally, found in foothill drainages of the Atascosa, Baboquivari, Santa Catalina and Santa Rita mountains. This species is possibly expanding its range northward and has visited the Boyce Thompson Arboretum nearly annually and are occasionally encountered along the lower Verde and Hassayampa rivers (Corman 2005k).	**Possible** **ERU Habitat(s):** Sycamore – Fremont Cottonwood Fremont Cottonwood/Shrub	**No impact.** The short temporal duration and small spatial footprint of the Project and the migratory bird nest avoidance EPM's will result in no impact to this species.
Cynanthus latirostris Broad-billed hummingbird	This species uses a wide variety of habitats across its range including riparian forest, thorn forest, tropical deciduous forest, pine-oak forest and successional or disturbed habitats (Powers and Wethington 1999). In Arizona, this species occurs along perennial drainages or other water features with sycamore, cottonwood, willow or mesquite woodlands. Additionally, uses densely vegetated washes with mesquite, netleaf hackberry, juniper or oaks, parks and residential areas (Corman 2005c). There is no information on habitat use during migration. This species winters in habitats outside of the U.S. (Powers and Wethington 1999). Elevation: Range-wide 490–9,840 ft (Powers and Wethington 1999). In Arizona, breeds 1,700–5,800 ft (Corman 2005c).	This species is a partial migrant, with the northern most populations withdrawing southward (Powers and Wethington 1999). This species breeds in southeastern Arizona, extreme southwestern New Mexico and rarely in southwestern Texas, U.S. Range extends southward into Mexico in eastern Sonora, western Chihuahua, Sinaloa, extreme western Durango, Nayarit, west Zacatecas, Aguascalientes, Jalisco, Guanajuato, Querétaro, Hidalgo, Colima, Michoacán, México D. F., northern Guerrero, northern Puebla, extreme western Vera Cruz, Oaxaca, extreme southwestern Chiapas, San Luis Potosí, extreme western Tamaulipas, and extreme southern Nuevo León (Powers and Wethington 1999). During the winter, most individuals leave the US, northern Sonora and Nuevo León (Corman 2005c, Powers and Wethington 1999).	This species breeds in the southeastern portion of the state from the Baboquivari Mountains and north to the Boyce Thompson Arboretum near Superior, and east to Gila Box Riparian National Conservation Area, the Dos Cabezas Mountains and Guadalupe Canyon (Corman 2005c).	**Possible** **ERU Habitat(s):** Sycamore – Fremont Cottonwood Fremont Cottonwood/Shrub Madrean Encinal Woodland Madrean Pinyon-Oak Woodland	**No impact.** The short temporal duration and small spatial footprint of the Project and the migratory bird nest avoidance EPM's will result in no impact to this species.
Empidonax fulvifrons Buff-breasted flycatcher	Range-wide this species uses wide mountain drainages with open forests of pine or oak (Bowers and Dunning 1994). In Arizona, this species prefers Madrean pine-oak woodlands (Corman 2005d), particularly with ponderosa or Chihuahua pines or sycamores (AGFD 2013d). This species avoids dense vegetation (AGFD 2013d) and is often found along forest edges or ridgetops, in recently burned areas, or near riparian areas (Bowers and Dunning 1994, Corman 2005d). There is no information on habitat use during migration and this species winters in habitats outside of the U.S. (Bowers and Dunning 1994). Elevation: In Arizona, 5,380–8,625 ft (AGFD 2013d, Corman 2005d).	This species is a partial migrant, with the northern populations withdrawing southward whereas other populations moving altitudinally (Bowers and Dunning 1994). Breeds in southeastern Arizona and rarely New Mexico, U.S. The breeding range extends southward in Mexico in eastern Sonora, Chihuahua, Durango, Sinaloa, Zacatecas, San Luis Potosí, Guanajuato, Hidalgo and mountainous regions of most southern states. Additionally, breeds in Guatemala, El Salvador and Honduras (Bowers and Dunning 1994). Winter range is as per the breeding range except for the withdrawal of U.S. and northern Sonoran populations (Bowers and Dunning 1994).	This species commonly breeds in the Chiricahua and Huachuca mountains. Additionally, it is less frequently encountered in the Santa Rita, Santa Catalina and Rincon mountains (Corman 2005d).	**Unlikely** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland	**No impact.** The short temporal duration and small spatial footprint of the Project and the migratory bird nest avoidance EPM's will result in no impact to this species.
Euptilotis neoxenus Eared quetzal	This species occurs in forested canyons, dry open structured forests and on forested mesas with pine-oak, pure stands of pine, pine-aspen or fir stands (Gulson 2012). In Arizona, this species has been observed in Madrean pine-oak woodlands and mountain drainages or canyons with pine, Douglas fir, evergreen oak, juniper, Arizona madrone, maple or sycamore (Corman 2005n). This species uses similar habitats year-round (Gulson 2012). Elevation: Generally, 5,900–10,170 ft (Gulson 2012). In Arizona, 5,040–7,200 ft (AGFD 2002f).	This species is non-migratory (Gulson 2012). Its range extends along the Sierra Madre Occidental and adjacent portions of the Pacific Slope, Mexico in northeastern Sonra, northwestern Chihuahua, Sinaloa, Durango, Zacatecas, Nayarit and western Michoacán. Sporadically reported from southeastern Arizona and New Mexico (Gulson 2012).	The species is endemic to Mexico and only sporadically occurs in Arizona (Gulson 2012). When present, primarily found in the Huachuca, Chiricahua and Santa Rita mountains (Corman 2005n). However, this species has been reported as far north as the Mogollon Rim (AGFD 2002f) near Hospital Ridge, along the Black River and in the Sierra Ancha Mountains (Corman 2005n). As of late October, 2019 the most recent eBird (2019) report for this species occurred in 2013.	**Unlikely**	**No impact.** The short temporal duration and small spatial footprint of the Project and the migratory bird nest avoidance EPM's will result in no impact to this species.

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Falco peregrinus anatum American peregrine falcon	Breeds in a wide range of open habitats (White et al. 2002). Prefer steep cliffs that overlook woodlands and riparian areas. Habitat selection is mainly driven by the abundance of prey (birds and occasionally bats). The peregrine dives from cliffs to ambush prey. Usually forages within 9 miles of the nest site, but foraging distances of 15 miles are common (Luensmann 2010). This species can be found in less optimal habitats, such as small, broken cliffs or cliffs in xeric areas, when preferred habitat is not available. Will roost on tall buildings when prey is abundant (Arizona Game and Fish Department 2002a). In Arizona, this species is most often found in forested regions from pinyon pine-juniper and evergreen oaks to ponderosa pine and mixed conifer, to cold-temperate desertscrub and Sonoran desertscrub (AGFD 2002a, Burger 2005). Migratory and overwintering habitats are diverse and include similar habitats to those used during breeding and areas devoid of cliffs (White et al. 2002). Elevation: In Arizona, 400–9,000 ft (AGFD 2002a).	F. peregrinus occurs on every continent expect Antarctica (White et al. 2002). The *anatum* subspecies is a partial migrant and breeds throughout North America south of the tundra, excluding coastal Pacific Northwest, to northern Mexico (White et al. 2002). Winter range includes portions of the breeding range where prey is abundant year-round and extends south through Central America and South America through Chile (AGFD 2002a, White et al. 2002).	Breeds throughout the state wherever there is suitable habitat (AGFD 2002a, Burger 2005). Breeding densities are greatest in areas with large cliff features including the Mogollon Rim, the Grand Canyon and portions of the Colorado Plateau (AGFD 2002a). Some individuals remain near breeding territories year-round, while others move to lowlands or migrate south to for the winter (AGFD 2002a, Burger 2005).	**Possible** **ERU Habitat(s):** Sycamore – Fremont Cottonwood Fremont Cottonwood/Shrub Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**No impact.** No nesting habitat occurs in the Analysis Area.
Glaucidium brasilianum cactorum[1] Cactus ferruginous pygmy owl	Range-wide this species utilizes a broad range of arid to humid habitats from desertscrub to rainforest edges (Proudfoot and Johnson 2000). The cactorum subspecies commonly occurs in desertscrub, thornscrub, dry deciduous forests and lowland riparian habitats (USFWS 2011b). In Arizona, this species occurs in cottonwood and willow riparian habitats, mesquite bosques, heavily wooded dry washes, and suburban or rural areas with native vegetation (Corman 2005g). Nests in cavities of saguaro cacti or broad leaf riparian tree species (AGFD 2001c, Corman 2005g). This species resides in same habitat types year-round (Proudfoot and Johnson 2000). Elevation: In Arizona, historically 450–4,200 ft (Corman 2005g).	This species is non-migratory (Proudfoot and Johnson 2000). The *cactorum* subspecies ranges from southern Arizona and southern Texas, U.S. and south into Mexico. Occurs along the Pacific Slope in Sonora, Sinaloa, Nayarit, Jalisco, Colima and Michoacán and along Atlantic Slope in Nuevo Leon and Tamaulipas (USFWS 2011b). However, there is uncertainty if the Texas and Atlantic Slope population are best described as the *cactorum* or *ridgwayi* subspecies (Proudfoot and Johnson 2000, USFWS 2011b).	Modern records for this species primarily occur in Pima County including the Altar Valley, Avra Valley, Tohono O'odham tribal lands and Organ Pipe Cactus National Monument (Corman 2005g, USFWS 2011b). Additionally, this species occurs near Oracle Junction, Pinal County (Corman 2005g).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Hylocharis leucotis White-eared hummingbird	This species breeds in pine, pine-oak and mixed conifer forests particularly in edge habitats or clearings (Arizmendi et al. 2015). In Arizona, this species occurs in forested mountain canyons and in shrubby, previously burned or otherwise disturbed areas. These habitats may include broadleaf or coniferous trees such as Arizona sycamore, bigtooth maple, Gambel's or Madrean evergreen oak, pines, Douglas Fir or locust (Corman 2005r). Arizona populations winter in habitats outside of the U.S. (Arizmendi et al. 2015). Elevation: In Arizona, 4,900–8,400 ft (Corman 2005r).	This species is partial migrant, with the northern most populations withdrawing southward (Arizmendi et al. 2015). Breeds from southeastern Arizona, U.S. and southward through highlands of Mexico, Guatemala, El Salvador, Honduras and Nicaragua (Arizmendi et al. 2015, Corman 2005r). May also breed in portions of New Mexico and Texas (Arizmendi et al. 2015). During the winter, this species withdraws from the U.S. and Sonora, Chihuahua and Nuevo León, Mexico (Arizmendi et al. 2015).	This species is considered an uncommon summer visitor and breeder in the state and has been recorded from the Chiricahua, Huachuca, Santa Catalina, Santa Rita, and Pinaleño mountains (Corman 2005r).	**Unlikely**	**No impact.** The short temporal duration and small spatial footprint of the Project and the migratory bird nest avoidance EPM's will result in no impact to this species.

[1] Listing not warranted (USFWS 2011b).

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Junco phaeonotus Yellow-eyed junco	Range-wide, this species utilizes open conifer forest, ponderosa pine forest, pine-oak forests, scrubby or brushy areas, pastures or other fields (Sullivan 2018). In Arizona, this species primarily occurs in Madrean pine-oak forests and cool slopes or shaded canyons with mixed conifer forests. Less frequently, it can be found in the transition zone between pine-oak forests and sycamore dominated drainages, Madrean evergreen oak woodlands, ponderosa pine forests and sub-alpine coniferous forests. This species is typically absent from the more arid mountain ranges in the state. During the winter, may move to lower elevations sites with oak-pine woodland, oak-woodland or chaparral (Corman 2005s). Elevation: In Arizona, breeds between 5,900–10,000 ft (Corman 2005s). Range-wide occurs between 3,940–11,480 ft (Sullivan 2018).	This species is typically non-migratory (Sullivan 2018). The range extends from southeastern Arizona and extreme southwestern New Mexico, U.S. and southward into Mexico. In Mexico, this species in a two-pronged distribution from northeastern Sonora and western Chihuahua, and western Nuevo León and southwestern Tamaulipas, south to central Oaxaca. Also found in Chiapas, and adjacent southwestern Guatemala (Sullivan 2018).	The northern most population of this species occurs in the Pinal mountains. Additionally, the species is known from and often nests in the Pinaleño, Santa Catalina, Rincon, Santa Rita, Chiricahua, Mule and Huachuca mountains (Corman 2005s). This species is year-round resident of the Arizona but may move to lower elevations during the winter (Sullivan 2018).	**Possible** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland Interior Chaparral	**No impact.** The short temporal duration and small spatial footprint of the Project and the migratory bird nest avoidance EPM's will result in no impact to this species.
Megascops trichopsis Whiskered screech owl	Range-wide, this species breeds in montane habitats including riparian forest, tropical deciduous dry forests, mixed coniferous forests, cloud forest, pine-oak woodland and Madrean oak woodland (Gehlbach et al. 2017). In Arizona, this species occurs in Madrean oak woodlands, pine-oak woodlands and montane drainages with sycamores, oaks, pines and junipers (Wise-Gervais 2005b). Nests in natural cavities or those excavated by woodpeckers (Gehlbach et al. 2017). Utilizes that same habitats year-round (Gehlbach et al. 2017). Elevation: Occasionally breeds as low as 3,800 ft but typically 5,000–7,600 ft (Wise-Gervais 2005b).	This species is non-migratory (Gehlbach et al. 2017). Occurs in southeastern Arizona and southwestern New Mexico, U.S. and northeastern Sonora, western Chihuahua, Durango, San Luis Potosi, Nuevo Leon and south through the highlands of Mexico to Guatemala, El Salvador, Honduras and northern Nicaragua (Gehlbach et al. 2017).	Found in the mountains of southeastern Arizona from the Baboquivari Mountains, north to the Galiuro Mountains and east to the Chiricahua Mountains (Wise-Gervais 2005b).	**Present** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland Sycamore – Fremont Cottonwood	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.
Meleagris gallopavo mexicana Gould's wild turkey	The *mexicana* subspecies occupies arid environments (McRoberts, Wallace, and Eaton 2014). In Arizona, *M. gallopavo* breeds in ponderosa pine forest, ponderosa pine and Gambel's oak forests, mixed conifer forests, evergreen oak woodlands, Madrean pine-oak forests and drainages dominated by sycamores (Moors 2005). Often forage in clearings or at forest edges and often roost in large trees on steep slopes or in large riparian trees such as sycamores and cottonwoods (McRoberts, Wallace, and Eaton 2014, Moors 2005). This species is considered non-migratory, although local seasonal movements for favorable microclimates and food sources (McRoberts, Wallace, and Eaton 2014). Elevation: In Arizona, *M. gallopavo* occurs between 3,800–9,300 ft (Moors 2005).	*M. gallopavo* is non-migratory (McRoberts, Wallace, and Eaton 2014). The *mexicana* subspecies occurs in southeastern Arizona and extreme southwestern New Mexico, U.S. (BISON-M 2017b). The range extends southward in Sonora, Chihuahua, Durango, Sinaloa, Zacatecas, Nayarit and northern Jalisco, Mexico (McRoberts, Wallace, and Eaton 2014, Schemnitz and Zeedyk 1992).	The *mexicana* subspecies occurs in the Chiricahua, Galiuro Huachuca and Santa Catalina mountains (Moors 2005). Although the subspecies is not confirmed, Gould's turkey potentially occurs in the Peloncillo Mountains, Guadalupe Canyon and the San Bernardino National Wildlife Refuge (Moors 2005).	**Present** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland Sycamore – Fremont Cottonwood Fremont Cottonwood/Shrub	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.
Melozone aberti Abert's towhee	Found in riparian areas with cottonwood-willow woodlands, mesquite bosque, marshes and mixed exotic-native vegetation within the lower Sonoran life zone. Prefers a dense understory (Tweit and Finch 1994). This species is most abundant in low-elevation riparian vegetation with cottonwood, willows and mesquite or dry washes with dense thickets. Additionally, utilizes areas with dense stands of tamarisk, patches of dense shrubs along irrigation ditches or run-off retention ponds in agricultural areas and densely vegetated suburban areas (Corman 2005a). This species occurs in the same habitat year-round (Tweit and Finch 1994). Elevation: In Arizona, below 4,900 ft (Corman 2005a).	This species is non-migratory (Tweit and Finch 1994). The core of this species range is in Arizona, but also extends into adjacent portions of southeastern California, southwestern New Mexico, southeastern Nevada and extreme southwestern Utah, U.S. Additionally, there are populations just south of the international border in Baja California and Sonora, Mexico (Corman 2005a, Tweit and Finch 1994).	More than 80 percent of this species range occurs within the state (Corman 2005a). This species can be found wherever suitable habitat exists in the western, southern and central portion of the state. Additionally, there is an isolated population in the Virgin River drainage in the northwestern portion of the state (Corman 2005a).	**Present** **ERU Habitat(s):** Sycamore – Fremont Cottonwood Fremont Cottonwood/Shrub	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Myiodynastes luteiventris Sulphur-bellied flycatcher	Throughout its range, this species is primarily associated with tropical deciduous forest, gallery forest, thornscrub and the edges of tropical lowland evergreen forests (Lowther and Stotz 1999). In Arizona, the species breeds in tall riparian woodlands and forests although they are known to forage in adjacent pine or oak woodlands. Additionally, occasionally uses canyons with mixed Madrean pine-oak and sycamore-maple forests (Corman 2005m). The species is a secondary cavity nester (Corman 2005m). This species is a neotropical migrant and winters in habitats outside of the U.S. (Lowther and Stotz 1999). In Arizona, this species avoids lowland areas during migration and instead uses habitats similar to those used for breeding (Lowther and Stotz 1999). Elevation: In Arizona, breeds between 3,640–7,500 ft (Corman 2005m).	This species is a short to medium-distance migrant (Lowther and Stotz 1999). Breeds in southeastern Arizona, U.S. and southward from eastern Sonora and western Chihuahua on the Pacific Slope and southeastern Nuevo León and southern Tamaulipas and south along both slopes to Mexico's southern border, Belize, Guatemala, El Salvador, Honduras, Nicaragua and northern Costa Rica (Lowther and Stotz 1999). Winters in South America from eastern Ecuador through Peru to northern Bolivia (Lowther and Stotz 1999).	The species most frequently breeds in the southeastern portion of the state but is a sparse summer resident north of Pima and Cochise counties to the Mogollon Rim. Specifically, this species has been observed in the Baboquivari, Chiricahua, Galiuro, Huachuca, Mule, Natanes , Pajarito ,Pinaleño, Rincon , Santa Rita and Sierra Ancha mountains and along Christopher Creek near the base of the Mogollon Rim, Fossil Creek west of Strawberry and Oak Creek Canyon north of Sedona (Corman 2005m).	**Present** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland Sycamore – Fremont Cottonwood	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.
Pachyramphus aglaiae Rose-throated becard	Range-wide this species occurs in deciduous forest, tropical evergreen woodlands, riverine gallery forest, arid riparian woodland, low-elevation cloud forest and pine-oak woodland (Greenlaw 2014). Key habitat characteristics include edge habitats that permit hawking for insects from the lower crowns of trees and high nest sites (Greenlaw 2014). In Arizona, this species breeds in tall riparian woodlands with intermittent or perennial water and large sycamores, cottonwoods or velvet ash (Corman 2005l). Arizona populations are migratory and winter in habitats outside of the U.S. (Greenlaw 2014). There is no description of habitat use during migration (Greenlaw 2014). Elevation: In Arizona, 3,400–5,000 ft (Corman 2005l).	This species is a partial migrant, with northern most populations withdrawing southward in the winter (Greenlaw 2014). Breeds from the borderlands of southeastern Arizona and southeastern Texas, U.S. and south through the Pacific and Atlantic slope of Mexico to Belize, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica and possibly Panama. During the winter, the northern most populations at least partially withdraw from the U.S. and Sonora. It is uncertain if the species also withdraws from norther Tamaulipas and northern Nuevo Leon, Mexico (Greenlaw 2014).	This species is known to occur along Arivaca Creek, Sonoita Creek, occasionally from Harshaw Canyon (Patagonia Mountains), Sycamore Canyon (Pajarito Mountains) (Corman 2005l). There are historic records from lower Ramsey Canyon (Huachuca Mountains), Guadalupe Canyon and near Tucson (AGFD 2001k, Corman 2005l). Occasionally reported from Madera and Box canyons in the Santa Rita Mountains (Corman 2005l).	**Possible** **ERU Habitat(s):** Sycamore – Fremont Cottonwood	**No impact.** The short temporal duration and small spatial footprint of the Project and the migratory bird nest avoidance EPM's will result in no impact to this species.
Passerina versicolor Varied bunting	Range-wide this species breeds in densely vegetated areas with desertscrub, thornscrub, scrubby woodlands, forest edges, and overgrown clearings (Groschupf and Thompson 2020). In Arizona, most breeding records are from arid slopes adjacent to drainages with mesquite and netleaf hackberry and from areas with dense Sonoran desertscrub (Corman 2005p). During migration this species uses habitat similar to that used for breeding (Groschupf and Thompson 2020). This species winters in habitats outside of the U.S. (Groschupf and Thompson 2020). Elevation: In Arizona, breeds between 1,350–5,100 ft (Corman 2005p).	This species is a partial migrant (Groschupf and Thompson 2020). Breeding range includes south-central and southeastern Arizona, southern New Mexico and southern Texas, U.S. The range extends southward to northern Michoacán, Mexico and locally in Guatemala. During the winter, northern populations withdraw southward and this species can be found in Mexico from southern Sonora on the Pacific Slope, Guanajuato in the interior and northern Tamaulipas and eastern Nuevo León on the Atlantic Slope and southward through the breeding range (Groschupf and Thompson 2020).	Breeds where suitable habitat exists in southern Arizona, primarily east of the Baboquivari Mountains and south of the Boyce Thompson Arboretum in Pinal County (Corman 2005p).	**Possible** **ERU Habitat(s):** Semi-desert Grassland Juniper Grass Chihuahuan Desert Scrub	**No impact.** The short temporal duration and small spatial footprint of the Project and the migratory bird nest avoidance EPM's will result in no impact to this species.
Picoides arizonae Arizona Woodpecker	Range-wide, this species breeds in oak or pine-oak woodlands or forests and adjacent riparian habitats (Johnson et al. 2018). In Arizona, this species breeds in Madrean evergreen woodland and the transitions zones between Madrean evergreen woodland to semi-arid grasslands or pine forest. This species frequently uses mountain drainages and canyons dominated by oaks and sycamore and more rarely, higher elevation drainages with pines, fir, maples and scattered oaks (Corman 2005b). This species uses similar habitat year-round but may move to slightly low elevations in the winter (Corman 2005b, Johnson et al. 2018). Elevation: In Arizona, 4,000–8,000 ft (Johnson et al. 2018).	This species is non-migratory (Johnson et al. 2018). Occurs in southeastern Arizona and extreme southwestern New Mexico, U.S. Range extends along the Sierra Madre Occidental of Mexico in Sonora, Chihuahua, Sinaloa, Durango, Nayarit, Jalisco, Colima, Zacatecas and Michoacán (Johnson et al. 2018).	This species occurs in the southeastern portion of the state west to the Baboquivari Mountains north to the Santa Catalina, Galiuro and Pinaleño mountains (Corman 2005b). During the last breeding bird atlas period this species was not detected in the Mule or Whetstone mountains (Corman 2005b).	**Present** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland Sycamore – Fremont Cottonwood	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Trogon elegans Elegant trogon	This species is most common tropical deciduous forest (Williams 2011) but uses a wide variety of habitats including semi-arid pine-oak woodland, xeroriparian areas in thornscrub, thorn forest, pine and pine-oak forests, riparian woodlands, montane rainforest and plantations (Kunzmann, Hall, and Johnson 1998). In Arizona, this species breeds in canyons with large sycamores and Madrean pine-oak woodlands and, less frequently, in lower elevation canyons with sycamores and adjacent slopes with scattered oaks, pinyon pine or juniper (Corman 2005f). Arizona populations are typically migratory and winter in habitats outside of the U.S. (Corman 2005f). There is no information on habitat use during migration (Kunzmann, Hall, and Johnson 1998, Williams 2011). Elevation: In Arizona, typically 3,400–6,800 ft (AGFD 2014a) but have been observed above 7,000 ft (Corman 2005f).	This species is a partial migrant, with only the northern most populations withdrawing southward (Kunzmann, Hall, and Johnson 1998, Williams 2011). Breeds from southeastern Arizona and southwestern New Mexico, U.S. south through Mexico from Sonora and Chihuahua along the Pacific Slope and from Tamaulipas and Nuevo León to southern Oaxaca. Additionally, occurs in southeastern Guatemala, El Salvador, western Honduras, Nicaragua and northwestern Costa Rica (Kunzmann, Hall, and Johnson 1998). During the winter, U.S. and northern Sonora populations withdraw southwards (Williams 2011).	This species breeds regularly in the Atascosa, Chiricahua, Huachuca and Santa Rita mountains (AGFD 2014a). This species has also confirmed to breed in the Pajarito Mountains (Corman 2005f) and has been regularly reported from the Atascosa and Patagonia mountains (Arizona Important Bird Areas Program 2017, 2018, 2019). Occasionally reported from the Baboquivari, Rincon and Santa Catalina mountains during the post-breeding or migratory period (Corman 2005f).	**Present** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland Sycamore – Fremont Cottonwood	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.
Tyrannus crassirostris Thick-billed kingbird	This species prefers low elevation gallery forest and edge habitats in tropical deciduous forest. The gallery forest may be surrounded by subtropical thorn scrub, desertscrub or oak woodland (Lowther, Pyle, and Patten 2020). In Arizona, breeds in broad drainages at the edges of riparian woodland with large sycamores or cottonwoods. Also uses areas with tall cottonwoods around manmade ponds. Frequently forages in adjacent brushy areas (Corman 2005o) including oak-pine woodland or mesquite grassland (AGFD 2010c). This species winters in habitats outside of the US. Migratory habitat is unknown but is expected to be similar to that used for breeding (Lowther, Pyle, and Patten 2020). Elevation: Range-wide, occurs below 6,070 ft (Lowther, Pyle, and Patten 2020). In Arizona, 2,100–4,300 ft (AGFD 2010c), with an isolated record from 5,400 ft (Corman 2005o).	This species is a partial migrant with only the northernmost populations withdrawing southward (Lowther, Pyle, and Patten 2020). Breeds from southeaster southeastern Arizona and extreme southwestern New Mexico, U.S. and south along the Pacific Slope of Mexico from eastern Sonora and western Chihuahua to Guerrero, México D.F., Morelos, southern Puebla and central Oaxaca. Winters from southeastern Sonora, through the remainder of the breeding range to southwestern Chiapas. Rarely found as far south as Guatemala (Lowther, Pyle, and Patten 2020).	Breeds along Sonoita Creek, near Patagonia, in Sycamore Canyon of the Atascosa Mountains, Guadalupe Canyon, and along the lower San Pedro from Cascabel to Dudleyville (AGFD 2010c). Additionally, breeds near Arivaca, Nogales, Kino Spring near Tubac, Skeleton Canyon in the Peloncillo Mountains and Cave Creek Canyon in the Chiricahua Mountains (Corman 2005o). Rarely, a few individuals have overwintered in the state along the Colorado River near Parker and the Laguna Dam (AGFD 2010c).	**Present** **ERU Habitat(s):** Sycamore – Fremont Cottonwood Fremont Cottonwood/Shrub	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.
Vireo vicinior Gray vireo	This species preferred breeding habitat includes pinyon pine-juniper woodlands, oak scrub and chaparral in arid mountain ranges and high plains (Barlow, Leckie, and Baril 2020). In Arizona, this species most commonly breeds in pinyon pine-juniper habitats and in adjacent cold-temperate grasslands. Occasionally occurs in chaparral dominated slopes and Madrean evergreen oak woodlands with only scattered pinyon pine or junipers (Corman 2005i). Habitat used during migration is likely similar to the breeding and wintering habitats. In Arizona, wintering habitat includes lowland Sonoran desertscrub and rocky canyons in desert mountains. Elsewhere in the wintering range this species uses Chihuahuan desertscrub and lowland riparian areas with willow and cottonwood near springs or intermittent streams (Barlow, Leckie, and Baril 2020). Elevation: In Arizona, typically breeds 3,500–6,800 feet (Corman 2005i), winters much lower (Barlow, Leckie, and Baril 2020).	This species is a short-distance migrant (Barlow, Leckie, and Baril 2020). Breeds from central and southern Utah and western Colorado, south to southern Nevada, Arizona, and New Mexico, U.S. Isolated populations also breed in southern California, Baja California, western Texas, U.S. and in Mexico in northwestern Coahuila and possibly north-central Durango. Wintering range is poorly known, but this species has been reported from south-central Arizona, western Sonora, Baja California Sur and western Texas (Barlow, Leckie, and Baril 2020).	This species breeds in the northern and central portions of the state and locally south including the Santa Teresa, Galiuro, Winchester, Santa Catalina, Pinaleño, Dos Cabezas and Chiricahua mountains (Corman 2005i). Winters locally in the Kofa Mountains and occasionally Tucson (Barlow, Leckie, and Baril 2020).	**Unlikely** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland Chihuahuan Desert Scrub Interior Chaparral	**No impact.** The short temporal duration and small spatial footprint of the Project and the migratory bird nest avoidance EPM's will result in no impact to this species.

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
FISH					
Campostoma ornatum Mexican stoneroller	Found in pools over sand, streams with gravelly bottoms, and in shallow riffles and runs over cobble substrates. May also be found along undercut banks or in the flowing segments of pools (AGFD 2003f). Elevation: In Arizona, 2,625–6,560 ft (AGFD 2003f).	Occurs in southeastern Arizona and the Big Bend region of Texas, U.S. and in the Mexican states of Sonora, Durango, Chihuahua, and Zacatecas (Minckley and Marsh 2009).	Found in Rucker Canyon in the Chiricahua Mountains and San Bernardino Creek, Cochise County (AGFD 2003f).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Catostomus clarkii Desert sucker	Typically occurs in flowing pools and rapids of small to medium sized creeks, streams and canals (AGFD 2002e, Desert Fishes Team 2004). Prefer river bottoms of rubble with sandy silt in the interstices. Live in pools as adults and move to swift runs to feed on diatoms and algae. Young stay in riffles and feed on midge larvae (AGFD 2002e). This species either avoids or cannot persist in reservoirs or lakes (Minckley and Marsh 2009). Can tolerate high water temperatures but is less tolerant of low dissolved oxygen levels than other native fish (AGFD 2002e). Elevation: 480–8,840 ft (AGFD 2002e).	Occurs in Arizona, southeastern Nevada, west-central New Mexico and southwestern Utah, U.S. and northern Sonora, Mexico (NatureServe and Lyons 2019b).	Found in the lower Colorado River downstream of the Grand Canyon, and in the Bill Williams, Salt, Gila, and San Francisco river drainages (AGFD 2002e).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Catostomus insignis Sonora sucker	Occurs in small to moderate sized streams and rivers but does not persist in impoundments (Desert Fishes Team 2004). Prefers deep, quiet waters with gravelly or rocky bottoms. Adults remain under cover during the day and move to runs and riffles at night. Young occur in runs and quiet eddies throughout the day and night (AGFD 2002g). Spawns in areas with shallow riffles (Minckley and Marsh 2009). Elevation: 1,210–8,730 ft (AGFD 2002g).	Occurs in Arizona and New Mexico, U.S. and in northern Sonora, Mexico (AGFD 2002g, NatureServe and Lyons 2019a).	Endemic to the Bill Williams and upper Gila River Basin. Never reported from the Gila River downstream of the Phoenix area (Minckley and Marsh 2009). AGFD (2002g) indicates that this species is rare to absent in the Salt River Basin although Holderman (2016) considers this species to be present in the Salt River.	**None**	**None.** This species is not expected to occur within the Study Area**.**
INSECTS					
Adopaeoides prittwitzi Sunrise skipper	Found in cienegas, marshes and springs in arid grasslands (AGFD 2014b, Butterflies and Moths of North America 2019c). Only one recorded larval host species (*Paspalum distichum*) (AGFD 2014b). Larvae spend their entire development on this grass (AGFD 2014b, Glassberg 2001). Adults nectar at flowers including watercress and Bidens (Butterflies and Moths of North America 2019c). Males patrol emergent grasses and flowers in wetlands and are rarely observed flying over dry land (AGFD 2014b).	Occurs in southeastern Arizona, southwestern New Mexico and southwestern Texas, U.S. (AGFD 2014b, Butterflies and Moths of North America 2019c). Range in Mexico is poorly known but includes Sonora, Chihuahua, Durango and Tamaulipas (Butterflies and Moths of North America 2019c, Glassberg 2001).	Currently known from Pima, Cochise, and Santa Cruz counties (AGFD 2014b, Butterflies and Moths of North America 2019c).	**Possible** **ERU Habitat(s):** Semi desert Grassland Sycamore – Fremont Cottonwood Fremont Cottonwood / Shrub	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.
Agathymus evansi Huachuca giant-skipper	Occurs in pine-oak-juniper woodland with agave. *Agave parryi* var. *huachucensis* is the only known larval host plant. Eggs are laid on the agave, and the larvae burrow into the leaves and feed on the plant. Adults often perch on cliff and rock overhangs (AGFD 2001f). Females do not feed but males display puddling behavior where they consume moisture and potentially salts and minerals (Butterflies and Moths of North America 2019b). Elevation: In Arizona, 5,600–5,800 ft (AGFD 2001f).	Occurs in southeastern Arizona, U.S. and Mexico (AGFD 2001f). The range in Mexico is poorly known but includes Sonora, Chihuahua and Durango (AGFD 2001f, Butterflies and Moths of North America 2019b).	Known from the Chiricahua and Huachuca mountains and their immediate vicinity (AGFD 2001f, Butterflies and Moths of North America 2019b). Additionally, potentially occurs in the Dragoons and Santa Rita mountains (Butterflies and Moths of North America 2019b).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Argia sabino[2] Sabino Canyon damselfly	Found in arid canyons with plunge pools with smooth rock bottoms and streams with large boulders near the edge. Feeds on various insects (Abbot and Paulson 2018, AGFD 2001l). Elevation: In Arizona, 3,000–5,000 ft (AGFD 2001l).	Occurs in southeastern Arizona, U.S. and although the distribution in Mexico is poorly known this species has been recorded from Sonora, Aguascalientes and Jalisco (Abbot and Paulson 2018).	Known from 8 sites in 5 mountain ranges including, the Santa Catalinas, Santa Ritas, Atascosa, Galiuro and North Comobabi mountains (Abbot and Paulson 2018).	**None**	**None.** This species is not expected to occur within the Study Area**.**

[2] Positive 90-day finding (USFWS 2009).

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Atrytonopsis cestus Cestus skipper	Grassy thorn forest, transition areas between Sonoran desertscrub with saguaros and mesquite grasslands, open woodland, and in gullies and canyons with thornscrub vegetation (AGFD 2002d). The grass bamboo muhly (Muhlenbergia dumosa) is the only known larval host. The eggs, larvae, and pupae of this skipper have all been found on this grass species (Allen, Brock, and Glassberg 2005). However, this larvae of this species may feed on additional grass species (AGFD 2002d, Butterflies and Moths of North America 2019a). Adults nectar at flowers (AGFD 2002d, Butterflies and Moths of North America 2019a).	Occurs in southeastern Arizona and western Texas, U.S. Range extends southward into northern Mexico including Sonora (Butterflies and Moths of North America 2019a).	Found in the Baboquivari, Atascosa, Tumacacori, Santa Catalina, and Galiuro mountains (AGFD 2002d).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Cymbiodyta arizonica Chiricahua water scavenger beetle	Larvae live in the water and pupate in adjacent terrestrial habitats. Adults return to habitats in and at the water's edge. Larvae feed on small organisms, sometimes other larvae, and adults feed on algae and decaying plant material (AGFD 2003d).	Arizona endemic (AGFD 2003d).	Only found in the Chiricahua Mountains (AGFD 2003d).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Eumorsea pinaleño Pinaleño monkey grasshopper	Little is known about this species. It is found in the pine forests of the Pinaleño Mountains (AGFD 2001j). Elevation: Above 8,980 ft (AGFD 2001j).	Arizona endemic (AGFD 2001j).	The species is only known from four specimens collected on or near Mount Graham in the Pinaleño Mountains (AGFD 2001j).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Heterelmis stephani Stephan's heterelmis riffle beetle	There is little information about the biology of this species (USFWS 2016c). The type specimen was collected from wet soil beneath a leaking pipe by a water storage tank at a campground. This species has also been found at a site with seeps and low volume springs with leaf litter, waterlogged wood and detritus (USFWS 2016c) within oak woodland (AGFD 2002h). Brown (1972) described the habitat as drying each year but the USFWS (2016c) suggested that this species instead occupied areas with perennial water. Elevation: 5,000–7,000 ft (AGFD 2002h).	Arizona endemic (AGFD 2002h, USFWS 2016c).	Only known from Bog Springs Campground and Sylvester Spring in Madera Canyon in the Santa Rita Mountains (AGFD 2002h). Last detected in 1993 and believed to be extinct (USFWS 2016a).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Limnephilus granti A Caddisfly	There is little information about this species, but caddisflies have aquatic larvae and terrestrial adults. The larvae of this species have not been described (Nimmo 1991, Ruiter 2007). Adults have been collected near springs or streams in ponderosa pine forests (Coleman 2018). Elevation: 8,280–9,000 ft (Blinn and Ruiter 2009, Nimmo 1991, Ruiter 2007).	Arizona endemic (Coleman 2018).	Known only from type locality and a few additional locations. The type locality is described as "Grant Ck, Hospital Flat campground, Graham Mountains, Graham County" (Nimmo 1991). This potentially corresponds to Big Creek or Grant Creek on Mount Graham in the Pinaleño Mountains. This species has additionally been collected from Government Spring, West Fork of the Little Colorado and Rosey Creek near Greer, Apache County (Blinn and Ruiter 2009, Ruiter 2007).	**None**	**None.** This species is not expected to occur within the Study Area**.**

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
MAMMALS					
Baiomys taylori ater [Note: *B. t. ater* is considered a junior synonym to *B. taylori* (ITIS 2019, accessed October 28, 2019)] Northern pygmy mouse	*B. taylori* occurs in areas with dense ground over in a variety of prairie habitats, mixed-desert shrub communities, prickly pear-short grass habitats, oak savanna, pine-oak forests and oak-hickory woodlands (Timm et al. 2016). In Arizona, the *ater* subspecies occurs in plains grassland and desert grassland communities (Hoffmeister 1986). Swales, roadsides or other areas that receive run-off may that result in an abundant supply of seeds and provide overhead vegetation be particularly favorable for this species (Hoffmeister 1986). Elevation: *B. taylori* occurs below 8,000 ft (Timm et al. 2016).	*B. taylori* occurs in southeastern Arizona, southwestern New Mexico, southern Oklahoma and central and eastern Texas, U.S.. The range extends southward from U.S. populations to Michoacán, central Hidalgo and central Veracruz (Light, Ostroff, and Hafner 2016). The *ater* subspecies occurs in southeastern Arizona and southwestern New Mexico, U.S. and northeastern Sonora and northwestern Chihuahua (Light, Ostroff, and Hafner 2016). However, recent molecular analyses suggest that the range of the ater subspecies may extend as far south as northern Durango (Light, Ostroff, and Hafner 2016).	Occurs in the southeastern portion of the state in Santa Cruz, eastern Pima, Cochise, southern Graham and southern Greenlee counties (Hoffmeister 1986).	**Possible** **ERU Habitat(s):** Semidesert Grassland Juniper Grass Shortgrass Prairie	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.
Choeronycteris mexicana Mexican long-tongued bat	Roosts in caves, abandoned mines, and shallow rock shelters. Prefers canyon areas with mixed oak-conifer vegetation adjacent to desert grasslands. This species forages on nectar, pollen, possibly insects, and occasionally feeds on the fruit of columnar cacti. They especially prefer to feed on flowers of paniculate agaves (AGFD 2006f). Additionally, uses hummingbird feeders and ornamental plantings in residential areas (Noel and Cryan 2005). Elevation: In Arizona, 2,540–7,320 ft but most common 4,000–6,000 ft (AGFD 2006f).	Occurs in southern California, southern Arizona, southwestern New Mexico and southern Texas, U.S.. The range extends southward through Mexico to El Salvador and Honduras (Noel and Cryan 2005).	Found in the Chiricahua, Santa Catalina, and Baboquivari mountains (AGFD 2006f) and northward to the Boyce Thompson Arboretum near Superior (AGFD personal communication to G. Diamond (WestLand), July 11, 2019).	**Possible** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project may result in some temporary disturbance to shelter habitat (i.e., abandoned mine features in the site) that may support bat colonies however due to the short temporal duration and small spatial footprint of the Project and the bat EPMs, the Project is unlikely to result in a loss of viability or result in a trend toward federal listing.
Corynorhinus townsendii pallescens Pale Townsend's big-eared bat	The *pallescens* subspecies prefers desertscrub, oak woodland, pinyon-juniper and coniferous forests. Roosts in caves, mines, and abandoned buildings with open ceilings. Does not use cracks or crevices for roosts. Forages on small moths found on leaves in trees along forested edges (AGFD 2003g). Maternity colonies are present from May through July and disperse in August (Lutch 2000). AGFD (2003g) reports the pallescens subspecies as foraging up to 5 miles from roost sites, however, *C. townsendii* has been reported to have a large home range and foraging distances (up to 93 miles) (Sherwin and Piaggio 2005). Elevation: In Arizona, 550–7,520 ft (AGFD 2003g).	*C. townsendii* is found from southern British Columbia, Canada south along the Pacific Coast to central Mexico and east to the Great Plains of the U.S. (Sherwin and Piaggio 2005). The *pallescens* subspecies occurs in New Mexico and Colorado, U.S. (Piaggio, Navo, and Stihler 2009).	A single subspecies of *C. townsendii* occurs throughout the state (Hoffmeister 1986). Previously, this subspecies was thought to be pallescens (AGFD 2003g), however recent molecular analyses suggest that the *townsendii* subspecies occurs in Arizona whereas the *pallescens* subspecies occurs in New Mexico and Colorado (Piaggio, Navo, and Stihler 2009).	**Possible** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project may result in some temporary disturbance to shelter habitat (i.e., abandoned mine features in the site) that may support bat colonies however due to the short temporal duration and small spatial footprint of the Project and the bat EPMs, the Project is unlikely to result in a loss of viability or result in a trend toward federal listing.
Idionycteris phyllotis Allen's big-eared bat/lappet-browed bat	This species occurs in Mojave desertscrub, mesquite grassland, scrub oak, ponderosa pine, pinyon-juniper, white fir forests and riparian areas with sycamores, cottonwood or willows. Roosts in boulder piles, rock crevices, caves, abandoned mineshafts and under exfoliating bark of snags. In Arizona, have been documented foraging up to 30 miles from their roost sites (AGFD 2001a, O'Farrell, Brown, and Lewis 2005). Elevation: 1,320–9,800 ft but most common between 3,500–7,500 ft (AGFD 2001a).	Occurs in southern Utah, southern Nevada, Arizona and New Mexico, U.S. (O'Farrell, Brown, and Lewis 2005). Range extends southward Mexico D.F. and Michoacán, Mexico (Arroyo-Cabrales and Álvarez-Castañeda 2017).	This species is one of the rarest bats in North America (O'Farrell, Brown, and Lewis 2005). In Arizona, occurs in all but the southwestern deserts. Most detections in Arizona have been from the southern Colorado Plateau, the Mogollon Rim and adjacent mountain ranges. There are known maternity roosts near Union Pass in the Black Mountains and Aravaipa Canyon area in the Galiuro Mountains (AGFD 2001a, O'Farrell, Brown, and Lewis 2005).	**None**	**None.** This species is not expected to occur within the Study Area**.**

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Lasiurus blossevillii Western red bat	Roosts in dense foliage of riparian (e.g., cottonwood or sycamore) or woodland trees in areas with heavily shaded overstories and open understories. Occasionally found roosting in saguaro boots and cave-like areas. This species forages in the treetops and below, to within a few feet of the ground, on a variety of insects, up to 1 km (0.6 miles) from its roost site (AGFD 2011d). Elevation: 1,900–7,200 ft (AGFD 2011d).	Occurs from southern British Columbia, Canada and south through much of the western US, Mexico, Central America to Argentina and Chile in South America (Bolster 2005), including some offshore islands (AGFD 2011d).	Typically found in the south-central, southern and southeastern portions of the state but with occasional records from along the Colorado River near the confluence with the Bill Williams River and in the Grand Canyon. Historically observed in the Canelo Hills, Grand Canyon, Huachuca Mountains, Peloncillo Mountains, Queen Creek, San Bernardino Ranch, San Pedro Valley, Santa Rita Mountains, and the Sierra Ancha Mountains (AGFD 2011d).	**Possible** **ERU Habitat(s):** Sycamore – Fremont Cottonwood Fremont Cottonwood/Shrub	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project may result in some temporary disturbance to shelter habitat (i.e. abandoned mine features in the site) that may support bat colonies however due to the short temporal duration and small spatial footprint of the Project and the bat EPMs, the Project is unlikely to result in a loss of viability or result in a trend toward federal listing.
Lasiurus xanthinus Western yellow bat	Habitat requirements are poorly understood but typically occur in extremely arid to dry areas (Arroyo-Cabrales and Álvarez-Castañeda 2016). Occur in woodland habitats comprised of palm tree groves and riparian habitats composed of broad-leaved trees. Roost in Washington fan palms and other leafy vegetation including sycamores, hackberries, and cottonwoods. This species is thought to feed on a variety of small to medium sized night-flying insects (AGFD 2011e). Elevation: In Arizona, 550–6,000 ft (AGFD 2011e).	Occurs in southern California, southern Nevada, western Arizona and southwestern New Mexico, U.S. and Baja California, west and central Mexico (Arroyo-Cabrales and Álvarez-Castañeda 2016, Bolster and Williams 2005).	Found throughout southern Arizona including the Chiricahua and Santa Catalina mountains, along the Hassayampa River, in the Kofa Mountains, Galiuro Mountains, and along the Lower Colorado River (AGFD 2011e).	**Possible** **ERU Habitat(s):** Sycamore – Fremont Cottonwood Fremont Cottonwood/Shrub	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint, a short duration, and Bat EPMs which is not likely to adversely affect the species.
Leptonycteris curasoae yerbabuenae [Note: This taxa has been elevated to full species status as *L. yerbabuenae* (ITIS 2019, accessed December 2, 2019)].[3] Lesser long-nosed bat	Occurs in thornscrub or Sonoran desertscrub and through semi-desert grasslands and into oak woodlands or deciduous forest where columnar cacti and agaves are present (AGFD 2011b, Medellín 2016). Roosts in caves, abandoned mines, vegetation and occasionally old buildings (AGFD 2011b, USFWS 2018b). Forages at night on nectar and pollen of columnar cacti and agaves (AGFD 2011b, USFWS 2018b). In some portions of its range, fruits of cacti are commonly consumed. Additionally, this species readily finds and utilizes hummingbird feeders. Sometimes bypass foraging areas close to roost sites in favor of distant areas and have been documented travelling greater than 40 miles from known roosts. In Arizona, this species has been documented between 1,200 ft and 7,300 ft amsl but is most commonly encountered below 5,500 ft in elevation (AGFD 2011b). The Arizona population is migratory, arriving in early April to give birth to young and migrating south at the beginning of September and into October (USFWS 2018b). Elevation: In Arizona 1,200 – 7,300 ft., usually below 5,500 ft. (AGFD 2011b). Range-wide, it has been reported as high as 8,530 ft but is typically found below 5,905 ft (Medellín 2016).	In the U.S.: southern Arizona and extreme southwestern New Mexico. Outside the U.S.: south from the U.S. border through Mexico (including Baja), Guatemala, El Salvador and Honduras (NatureServe 2020, accessed May 7, 2020). Note that USFWS (2018b) indicates that the range outside of the U.S. only extends as far south as southern Mexico.	Occurs from the Phoenix area and the Pinaleño Mountains southwest to Agua Dulce Mountains and southeast to the Galiuro and Chiricahua Mountains (AGFD 2011b). Primarily occurs south of the Gila River (USFWS 2018b).	**Possible** **ERU Habitat(s):** Semi-desert Grassland Juniper Grass Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project may result in some temporary disturbance to shelter habitat (i.e. abandoned mine features in the site) that may support bat colonies however due to the short temporal duration and small spatial footprint of the Project and the bat EPMs, the Project is unlikely to result in a loss of viability or result in a trend toward federal listing.

[3] Delisted due to recovery (USFWS 2018a).

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Mephitis macroura milleri Hooded skunk	*M. macroura* occurs in low elevation arid habitats, deciduous forests, ponderosa pine-forest, forest edges, pastures and riparian areas (Hwang and Larivière 2001). Also uses areas with human disturbance (Cuarón et al. 2016). Dens in rock crevices, burrows, or low brushy areas (Hwang and Larivière 2001). In Arizona, the *milleri* subspecies occurs at intermediate elevations in areas with rocky ledges, canyons and near streams (Hoffmeister 1986). Elevation: *M. macroura* typically occurs below 8,000 ft (Cuarón et al. 2016) but the *milleri* subspecies has been reported as high as 8,600 ft (Hoffmeister 1986).	*M. macroura* occurs from southeastern Arizona, southwestern New Mexico and western Texas, U.S.. Range extends south through most of Mexico, excluding the Yucatan Peninsula, Guatemala, El Salvador, Honduras to northern Nicaragua (Cuarón et al. 2016). The *milleri* subspecies occurs in the U.S. portion of the range and south through Sonora, Chihuahua, Coahuila, Sinaloa and northern Durango (Hwang and Larivière 2001).	Occurs in the southeastern portion of the state as far north as Camp Verde, Yavapai County and northern Greenlee County (Hoffmeister 1986).	**Possible** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland Sycamore – Fremont Cottonwood Fremont Cottonwood/Shrub	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.
Microtus longicaudus leucophaeus [Note: There are no currently recognized subspecies of *M. longicaudus* (ITIS 2019, accessed October 28, 2019)] White-bellied long-tailed vole	*Microtus longicaudus* uses a wide variety of habitats including conifer forests, alpine tundra, sagebrush habitats, forest-edges, wet meadows and along watercourses. Also utilizes disturbed areas including clear-cuts, burned areas and surface mines (Cassola 2016). The *leucophaeus* subspecies occurs in grassy alpine meadows, ciénegas, wet stream bottoms, openings in coniferous forests, along roadsides and bunchgrass covered slopes. Builds runways in vegetation between grassy areas foraging areas and burrows located near logs, stumps of dense vegetation (AGFD 2014c). This species is a strong swimmer and diver (AGFD 2014c). Elevation: The *leucophaeus* subspecies occurs from 6,000–10,696 ft (AGFD 2014c) but *Microtus longicaudus* occurs from sea level to 11,975 ft (Cassola 2016).	*M. longicaudus* occurs from east-central Alaska and south through western Canada and the western U.S. through California, Arizona and New Mexico, and east to Colorado (Cassola 2016). The *leucophaeus* subspecies is an Arizona endemic (AGFD 2014c).	The *leucophaeus* subspecies is only known from Pinaleño Mountains in Graham County (AGFD 2014c)	**None**	**None.** This species is not expected to occur within the Study Area**.**
Peromyscus merriami Merriam's mouse	Prefers dense brush or mesquite bosque in riparian or low desert habitats. Consumes seeds, plants and invertebrates (AGFD 2011c). Elevation: In Arizona, 1,390–1,425 ft (AGFD 2011c).	Occurs from south-central Arizona, U.S. and south through western Sonora to central Sinaloa, Mexico (AGFD 2011c).	Hoffmeister (1986) lists the range as from Lukeville, Pima County, north to the Florence area, Pinal County, and east to just south-east of Tucson, Pima County. However, AGFD (2011c) indicates that this species currently only occurs in Pima County.	**None**	**None.** This species is not expected to occur within the Study Area**.**
Sciurus nayaritensis chiricahuae Chiricahua fox squirrel	Nests in hollows or holes of trees in Apache pine-oak forest with broadleaf deciduous trees, often in the dense growth of canyon bottoms. Avoids areas dominated by oaks unless acorns are particularly abundant. Forages on pine and fir seeds, acorns, walnut, flowers, and fungi. They forage both in the canopy and along the forest bottom and are thought to occasionally rob bird nests of eggs and harvest invertebrates while rummaging on the forest floor (AGFD 2011a). Elevation: 5,280–8,400 ft (AGFD 2011a).	*S. nayaritensis* occurs in extreme southeastern Arizona, U.S. and the Sierra Madre Occidental of Mexico in Sonora, Chihuahua, Sinaloa, Durango, Zacatecas, Nayarit and Jalisco (AGFD 2011a). The *chiricahuae* subspecies is endemic to Arizona (Pasch and Koprowski 2011).	Found in the Chiricahua Mountains in Cochise County (AGFD 2011a).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Sorex arizonae Arizona shrew	While the habitat of this species is poorly known, they are usually found in riparian areas with heavy ground cover and dense vegetation; usually close to surface water (AGFD 1999a). This species has been found in areas with pines, walnuts, oaks, maples and Douglas fir in rocky canyons or in patches of Equisetum (Hoffmeister 1986). Forage on arthropods, earthworms, slugs, and similar invertebrates (AGFD 1999a). Elevation: 5,168–9,187 ft (AGFD 1999a).	Occurs in southeastern Arizona and extreme southwestern New Mexico, U.S. and Chihuahua, Mexico (Woodman, Matson, and Castro-Arellano 2016).	Found in the Huachuca, Santa Rita, and Chiricahua Mountains (AGFD 1999a).	**Unlikely** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland Sycamore – Fremont Cottonwood	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
PLANTS					
Abutilon parishii Pima/Parish's Indian mallow	Occurs on steep rocky slopes, at cliff bases, in canyon bottoms and ledges in mesic soils and full sun within higher-elevation Sonoran desertscrub, and in semidesert grassland. In riparian areas, it occurs on flat terraces above canyon bottoms (AGFD 2000d, Arizona Rare Plant Committee 2001). Elevation: 1,700–4,900 ft (AGFD 2000d).	Occurs in Arizona, U.S. and Sonora, Mexico (AGFD 2000d, Fryxell and Hill 2016)	Found in mountain ranges of central and southeastern Arizona including in Maricopa, Pinal, Pima, Santa Cruz and Yavapai counties. Specifically, the species has been found in the Superstition, Santa Catalina, Rincon, Silverbell, Tucson, Picacho, Tortolita, Dripping Springs, Santa Rita and Tumacacori mountains as well as Mineral Hills, Little Shipp Wash, and Cottonwood Creek (AGFD 2000d).	**Possible** **ERU Habitat(s):** Semi-desert Grassland Juniper Grass	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.
Agave parviflora ssp. parviflora Santa Cruz striped agave	Gravelly, rocky areas on mountain slopes, desert grassland and oak woodland (AGFD 2003i, Reveal and Hodgson 2002a). Often found in areas with sparse shrubs and grasses (AGFD 2003i). Elevation: In Arizona, 3,560 to 5,200 ft (AGFD 2003i). Range-wide 2,950 to 7,869 ft (AGFD 2003i, Reveal and Hodgson 2002a).	Occurs in southern Arizona, U.S. and northern Sonora, Mexico (AGFD 2003i).	This species can be found in the vicinity of Arivaca Lake and Sonoita Creek and in the Las Guijas, Pajarito, Patagonia, Pozo Verde, San Luis, and Santa Rita mountains (AGFD 2003i).	**Possible** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland Semi-desert Grassland Juniper Grass	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.
Agave schottii var. treleasei Trelease agave	Gravelly or rocky places in high elevation desertscrub, grassland, and juniper-oak woodland communities (Reveal and Hodgson 2002b). Elevation: 3,560–5,200 ft (AGFD 2005c).	Arizona endemic (AGFD 2005c).	Only known to occur in the Santa Catalina Mountains (AGFD 2005c), near Bull Spring in Reddington Pass, and to the north of the Johnny Lyon Hills (SEINet Portal Network 2018, accessed December3, 2018).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Allium gooddingii Goodding's onion	Grows on steep, rocky slopes in spruce-fir, mixed conifer forests or areas with Gambel oak tickets (Arizona Rare Plant Committee 2001, McNeal and Jacobsen 2002, Roth 2008). Typically occurs in moist and shady bottoms of perennial to ephemeral drainages with well-developed soils (AGFD 1999c, Arizona Rare Plant Committee 2001). Occasionally occurs in semi-open areas in edge habitats such as along streams or at the edge of clearings (AGFD 1999c). Elevation: In Arizona, 7,000–10,600 (AGFD 1999c). Range-wide 6,400–11,300 ft (AGFD 1999c, Roth 2008).	Occurs in southern and eastern Arizona and southwestern and south-central New Mexico, U.S. (AGFD 1999c, McNeal and Jacobsen 2002).	Found in the White and Santa Catalina Mountains (AGFD 1999c, Arizona Rare Plant Committee 2001). This species is extirpated from Canyon del Muerto in the Chuska Mountains (AGFD 1999c) but apparently persists in Canyon de Chelly (Roth 2008).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Amoreuxia gonzalezii Saiya	Grows in a variety of habitats including steep, rocky limestone hillsides in the transition zone between Sonoran desertscrub and grassland, on the sandy banks of small drainages in grassy areas of oak woodland, on granitic talus slopes, deserts and cliffs (USFWS Johnson-Fulton and Watson 2016, 2011a). Elevation: In Arizona, 4,200–4,600 ft, elsewhere as low as 1,312 ft (USFWS Johnson-Fulton and Watson 2016, 2011a).	Occurs in Arizona, U.S. and the Mexican states of Sonora and Sinaloa (Johnson-Fulton and Watson 2016).	This species is very rare with fewer than five known populations in the U.S. (Johnson-Fulton and Watson 2016). Found in the vicinity of Devils Cashbox in the Santa Rita Mountains, Thomas Canyon in the Baboquivari Mountains (USFWS 2011a) and the Rincon Mountains (SEINet Portal Network 2019, accessed November 4, 2019).	**Unlikely** **ERU Habitat(s):** Semi-desert Grassland Juniper Grass Madrean Encinal Woodland	**No impact.** **T**he Project has a small footprint and short duration, and therefore is anticipated to have no impact on this species.
Amsonia grandiflora Large-flowered blue star	This species grows in sand or gravelly alluvial soils and on rocky hillsides in full sun to partial shade (AGFD 2003e). Found in canyons and hillsides in oak woodlands (AGFD 2003e, McLaughlin 1993). "Adapted to rock fall disturbance" (AGFD 2003e). Elevation: 3,685–4,500 ft (AGFD 2003e, McLaughlin 1993).	Occurs in southern Arizona, U.S. and Sonora and Durango, Mexico (AGFD 2003e, McLaughlin 1993).	This is a rare species (McLaughlin 1993). Known to occur near Pena Blanca Lake, Sonoita Creek, and the Santa Cruz River. This species also occurs in the Patagonia, Atascosa, Pajarito, San Luis and Tumacacori mountains and Mt Benedict (AGFD 2003e).	**Present** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** Species is rare and the Project has a short duration and footprint, which is unlikely to affect the species.

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Asclepias lemmonii Lemmon milkweed	Occurs in canyons, open woodlands, and along roadsides in oak-woodland mountainous areas (AGFD 2006d, Sundell 1993). Often found on north and east-facing slopes with limestone substrates but likely occurs on other substrates (AGFD 2006d). Elevation: In Arizona, 5,050–7,200 ft but occurs as low as 3,934 ft elsewhere in the range (AGFD 2006d).	Occurs in southern Arizona, U.S. and south into the Mexican states of Sonora, Chihuahua, Durango and south to Jalisco (AGFD 2006d, SEINet Portal Network 2019, accessed October 29, 2019, Sundell 1993).	Known to occur in the Huachuca, Chiricahua, Baboquivari, and Santa Rita mountains (AGFD 2006d).	**Possible** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** Species is rare and the Project has a short duration and footprint, which is unlikely to affect the species.
Asclepias uncialis* ssp. *uncialis [Note: There are no currently recognized subspecies or varieties of *A. uncialis* (ITIS 2019, accessed October 28, 2019)] Greene milkweed	Occurs on open hills and lower slopes of mesas, canyons, and bluffs in bare, open patches of soil within shortgrass communities, other types of grassland, savanna or open coniferous woodlands (AGFD 2006c, Decker 2006). In Arizona this species occurs in disturbed areas, high desertscrub and open, grassy areas within Madrean evergreen and pinyon-juniper woodlands (AGFD 2006c, Sundell 1993). Elevation: 3,920–7,640 ft (Decker 2006).	Occurs in Arizona, Colorado, New Mexico, Texas and possibly Wyoming, U.S. (AGFD 2006c, Decker 2006) and Sonora, Mexico (SEINet Portal Network 2019, accessed October 29, 2019).	This species is known to occur in the White Mountains near Springerville, Apache County, and in the foothills of the Patagonia Mountains, Santa Cruz County (Sundell 1993). There are additional occurrences in the Pat Hills, Cochise County, and the Appleton-Whittell Research Ranch, Pima County (SEINet Portal Network 2019, accessed October 29, 2019). The AGFD (2006c) reports that this species also occurs in Coconino County.	**Possible** **ERU Habitat(s):** Semi-desert Grassland Juniper Grass Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** Species is rare and the Project has a short duration and footprint, which is unlikely to affect the species.
Astragalus cobrensis* var. *maguirei Maguire's (coppermine) milkvetch	Grows in full sun or partial shade along dry creeks beds, near steams, canyon sides or dry open slopes (AGFD 1999b, Arizona Rare Plant Committee 2001, Bleakly 1999). Occurs within pinyon-juniper, oak-juniper and pine-oak woodlands (Arizona Rare Plant Committee 2001). Elevation: 5,080–7,450 ft (AGFD 1999b).	Occurs in Arizona and New Mexico, U.S. (AGFD 1999b).	Found in the Chiricahua and Peloncillo mountains (Arizona Rare Plant Committee 2001). Additionally, this species possibly occurs in the Pinaleño Mountains (AGFD 1999b).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Astragalus hypoxylus Huachuca milkvetch	Grows in rocky, limestone derived soils in oak savannah and oak-juniper-pinyon woodland (USFWS 2011a). Sites are generally unshaded hillsides or drainages, with slopes of 25 to 30 percent (AGFD 1999d, Arizona Rare Plant Committee 2001). This species may be tolerant of or dependent on moderate disturbance (AGFD 1999d, USFWS 2011a). Elevation: 5,300–6,200 ft (AGFD 1999d, Arizona Rare Plant Committee 2001).	Occurs in Arizona, U.S. and Sonora, Mexico (USFWS Johnson 2013, 2011a).	Known to occur in the vicinity of Harshaw in the Patagonia Mountains, in Collins Canyon in the Canelo Hills and from Scotia, Bear and Sycamore canyons in the Huachuca mountains (USFWS 2011a).	**Possible** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** Species is rare and the Project has a short duration and footprint, which is unlikely to affect the species.
Ayenia jaliscana Ayenia	Grows in canyon bottoms, along rocky slopes or hillsides in dessert grassland (AGFD 2010b, Dorr 2015). Elevation: In Arizona, 3,920–3,970 ft (AGFD 2010b).	Occurs in Arizona, U.S. and in the Mexican states of Baja California, Baja California Sur, Chiapas, Chihuahua, Jalisco, Sinaloa and Sonora (AGFD 2010b, Dorr 2015).	Found in the Las Guijas and Santa Rita mountains of Pima and Santa Cruz counties (AGFD 2010b).	**Unlikely** **ERU Habitat(s):** Semi-desert Grassland Juniper Grass	**No impact.** The Project has a small footprint and short duration, and therefore is anticipated to have no impact on this species.
Browallia eludens Bush-violet	Grows in wet soils in meadows, near seeps, and along intermittent or perennial streams (Oliver 2015). Associated with riparian areas or other areas with wet soils in Madrean evergreen woodland (AGFD 2003b, Oliver 2015). Elevation: In Arizona, 5,065–5,250 ft (AGFD 2003b). Range-wide 4,595–6,890 ft (Oliver 2015).	Occurs in Arizona, U.S. and Sonora and Chihuahua, Mexico (AGFD 2003b, Oliver 2015).	Only found in the Canelo Hills, Santa Cruz County, which are the apparent northern most limit of this species range (AGFD 2003b, Oliver 2015).	**Unlikely** **ERU Habitat(s):** Madrean Encinal Woodland Sycamore – Fremont Cottonwood	**No impact.** The Project has a small footprint and short duration, and therefore is anticipated to have no impact on this species.
Capsicum annuum* var. *glabriusculum Chiltepin	In Arizona, occurs in canyons and adjacent slopes of riparian areas in mesquite and oak woodlands (AGFD 2003c). Elevation: In Arizona, 3,600–4,400 ft (AGFD 2003c).	Found along east coast from New York to Florida through Alabama, Louisiana, south Texas, and southern Arizona, U.S.. Additionally, occurs in Mexico, Bahamas, Columbia, Costa Rica, Guatemala, Nicaragua and Panama (AGFD 2003c).	There are only a few known populations in the state which occur in the Ajo, Baboquivari, Chiricahua and Tumacacori mountains (AGFD 2003c).	**None**	**None.** This species is not expected to occur within the Study Area**.**

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Carex chihuahuensis Chihuahuan sedge	Typically occurs in north- and northwest-facing slopes in wet soils in streambeds, wet meadows, springs and cienegas (AGFD 2004d, Standley 2002a). Elevation: In Arizona, 3,600–7,200 ft. Range-wide, 1,110–9,840 ft (AGFD 2004d, Standley 2002a).	Occurs in Arizona and New Mexico, U.S. and the Mexican states of Baja California Sur, Chihuahua and Sonora (AGFD 2004d, Nordman 2018a).	Found in the southeastern portion of the state. Specifically, this species is known to occur in the Chiricahua, Huachuca, Pinaleño, Santa Catalina, San Luis, Rincon, Atascosa, Santa Rita, and Sierra Ancha mountains. It also occurs along the Santa Cruz River and in the San Bernardino Valley (AGFD 2004d).	**Possible** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland Sycamore – Fremont Cottonwood	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** Species is rare and the Project has a short duration and footprint, which is unlikely to affect the species.
Carex ultra [Note: *C. ultra* is considered to be a synonym of *C. spissa* (ITIS 2019, accessed April 8, 2019).] Arizona Giant Sedge	Associated with saturated soils near or in perennial seeps, streams, and springs (AGFD 2000a). Often occurs in shaded areas with alluvial or serpentine soils (AGFD 2000a, Standley 2002b). Elevation: In Arizona, 2,000–6,000 ft (AGFD 2000a).	*Carex ultra* occurs in Arizona and New Mexico, U.S. and the Mexican states of Sonora and Coahuila (AGFD 2000a).	Small and widely separated populations occur in Aravaipa Canyon, the Rincon Valley and the Atascosa, Chiricahua, Dragoon, Galiuro, Hieroglyphic, Huachuca, Mazatzal, and Santa Rita mountains (AGFD 2000a).	**Unlikely** **ERU Habitat(s):** Sycamore – Fremont Cottonwood Fremont Cottonwood/Shrub	**No impact.** The Project has a small footprint and short duration, and therefore is anticipated to have no impact on this species.
Castilleja nervata Trans-pecos indian paintbrush	Grows on dry, rocky slopes, mesas and cliff bases in areas with scattered oaks and bunchgrass or pine-oak woodlands (Egger et al. 2019). Elevation: 5,900–7,785 ft (Egger et al. 2019).	Occurs in Arizona and possibly Texas, U.S. and in the Mexican states of Aguascalientes, Chihuahua, Colima, Durango, Guerrero, Jalisco, México, Michoacán, Morelos, Nayarit, Oaxaca, Puebla, Sonora and Veracruz (Egger et al. 2019, SEINet Portal Network 2018, accessed December 3, 2018).	Currently found in the Chiricahua Mountains but there are historical records from the Rincon and Santa Rita mountains (Egger et al. 2019) and Paradise Creek on Fort Apache Tribal Lands (SEINet Portal Network 2018, accessed December 3, 2018).	**Unlikely** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**No impact.** The Project has a small footprint and short duration, and therefore is anticipated to have no impact on this species.
Choisya mollis [Note: *C. mollis* synonym of *C. dumosa* var. *mollis* (ITIS 2019, accessed November 5, 2019).] Santa Cruz star leaf	Grows in sandy, gravelly and cobbly loam in shady sites along canyon bottoms and adjacent slopes in chaparral or Madrean evergreen woodland (Arizona Rare Plant Committee 2001, Tomaino 2018b). Elevation: 3,500–5,000 ft (Tomaino 2018b).	Arizona endemic (Arizona Rare Plant Committee 2001, Tomaino 2018b).	There are approximately 10 known populations in the Atascosa, Pajarito and Tumacacori mountains (Arizona Rare Plant Committee 2001, Tomaino 2018b).	**Possible** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland Interior Chaparral	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** Species is rare and the Project has a short duration and footprint, which is unlikely to affect the species.
Conioselinum mexicanum Mexican hemlock parsley	Occurs in cool, shady areas on north and east facing slopes within pine-oak and mixed-conifer forest communities (AGFD 2001i). Elevation: In Arizona, 3,800–9,000 ft (AGFD 2001i).	Occurs in southern Arizona, U.S. and Sonora, Sinaloa and Chihuahua, Mexico In the U.S.: southern Arizona. In Mexico: Sonora, Sinaloa, and Chihuahua (AGFD 2001i, SEINet Portal Network 2018, accessed December 6, 2018).	The species is known to occur in the Huachuca and Santa Rita mountains as well as along the San Francisco River (AGFD 2001i).	**Unlikely** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland	**No impact.** The Project has a small footprint and short duration, and therefore is anticipated to have no impact on this species.
Coryphantha recurvata Santa Cruz beehive cactus	Grows in rock crevices or on rocky hillsides or mesas in desert grassland and oak woodland (AGFD 2001m, Zimmerman and Parfitt 2003). Elevation: 3,500–6,000 ft (AGFD 2001m).	Occurs in Arizona, U.S. and Sonora, Mexico (Zimmerman and Parfitt 2003).	This species is known to occur in the Atascosa, Pajarito and Tumacacori mountains of Santa Cruz County (Arizona Rare Plant Committee 2001).	**Possible** **ERU Habitat(s):** Semi-desert Grassland Juniper Grass Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration which is not likely to affect the species.
Coursetia glabella Smooth baby-bonnets	Dry, shaded slopes in oak-woodland, oak-juniper, and pine-oak forests (AGFD 2001n, Arizona Rare Plant Committee 2001). Elevation: In Arizona, 5,000–7,200 ft but as low as 800 ft elsewhere (AGFD 2001n, Nordman 2018c).	Occurs in Arizona, U.S. and in the Mexican states of Chihuahua, Coahuila, Durango, Nuevo Leon and Sonora (AGFD 2001n, Nordman 2018c).	Known to occur in the Huachuca, Chiricahua, and Patagonia mountains and in the Canelo Hills (AGFD 2001n, Arizona Rare Plant Committee 2001).	**Possible** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration which is not likely to affect the species.

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Dalea tentaculoides Gentry indigo bush	Grows in canyon bottoms and on cobble terraces that are prone to periodic flooding. Often found on sandy, gravelly loam substrates in oak-juniper and Madrean evergreen woodland (AGFD 2001e). Elevation: 3,600–4,580 ft (AGFD 2001e).	Occurs in Arizona, U.S. and Sonora, Mexico (AGFD 2001e, Schuetze 2011).	Known to occur in Sycamore Canyon in the Pajarito mountains. Additionally, there are historic records from the Baboquivari Mountains and Mendoza Canyon in the Coyote Mountains (AGFD 2001e).	**Unlikely** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**No impact.** The Project has a small footprint and short duration, and therefore is anticipated to have no impact on this species.
Desmodium metcalfei Metcalfe's tick-trefoil	Occurs on rocky slopes or canyons within grassland, oak-juniper woodland, and riparian areas (AGFD 2016c). Given the range of elevations at which this species occurs it is likely associated with additional vegetative communities. Elevation: In Arizona, 2,760–8,200 ft (AGFD 2016c).	Occurs in Arizona and Mexico, U.S. and Sinaloa, Mexico (AGFD 2016c).	The species is rare but widely distributed and is known to occur in Coconino, Yavapai, Gila, Greenlee, Santa Cruz, and Cochise counties (AGFD 2016c).	**Possible** **ERU Habitat(s):** Semi-desert Grassland Juniper Grass Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration which is not likely to affect the species.
Erigeron arisolius Arid throne fleabane	Found in grasslands, roadsides or open, grassy areas with oak, juniper or mesquite (Nesom 2006a). Often occurs in moist, rocky soils (AGFD 2001b). Elevation: Typically, 4,265–5,650 ft (AGFD 2001b).	Occurs in Arizona and possibly southwestern New Mexico, U.S. and Sonora, Mexico (AGFD 2001b, Nesom 2006a, SEINet Portal Network 2019).	Known to occur in the Cochise, Pima, and Santa Cruz counties (AGFD 2001b), with an additional historical occurrence in Apache County (SEINet Portal Network 2019, accessed January 4, 2019).	**Possible** **ERU Habitat(s):** Semi-desert Grassland Juniper Grass Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration which is not likely to affect the species.
Erigeron heliographis Heliograph peak fleabane	Occurs on granite, crevices of rocky cliffs or outcrops in oak, pine-fir forest and mixed-conifer forest communities (AGFD 2003h, Nesom 2006b). The habitat is usually moderately mesic (Arizona Rare Plant Committee 2001). Elevation: 8,200–10,500 ft (Nesom 2006b).	Arizona endemic (Nesom 2006b).	Restricted to the Pinaleño Mountains in Graham County. Populations occur on Heliograph and Plain View peaks, Mt. Graham, near Moonshine creek, Post Canyon and Riggs Lake (AGFD 2003h).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Erigeron kuschei Chiricahua fleabane	Occurs on shady, north-facing slopes in rocky outcrops, crevices, and cliff bases. Commonly seen in moss carpets in pine and mixed coniferous forests (Arizona Rare Plant Committee 2001, Nesom 2006c). Elevation: 6,890–9,500 ft (Nesom 2006c).	Arizona endemic (Nesom 2006c).	Known from four populations found in the Chiricahua Mountains (Arizona Rare Plant Committee 2001).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Gentianella wislizeni Wislizeni gentian	Found on partially shaded slopes and open meadows in pine-oak and mixed conifer forests (Arizona Rare Plant Committee 2001, Mason 1998). Elevation: 6,500–9,600 ft (Arizona Rare Plant Committee 2001, Mason 1998).	Occurs in Arizona, U.S. and the Mexican states of Chihuahua, Durango and Sonora (Arizona Rare Plant Committee 2001).	Found in the Chiricahua and White mountains (Arizona Rare Plant Committee 2001).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Heterotheca rutteri Rutter's false goldenaster, Huachuca golden aster	Grows in level and open grasslands, mesquite grasslands and oak woodland (Arizona Rare Plant Committee 2001, Semple 2006). Often found along roads, flood plains or other disturbed areas (AGFD 2001g, Semple 2006). Elevation: 3,280–6,500 ft (AGFD 2001g, Semple 2006).	Occurs in Arizona, U.S. and Sonora, Mexico (AGFD 2001g, Semple 2006).	Known to occur in the Altar, Empire, San Pedro and San Rafael valleys, Sonoita, Kino Springs, Canelo Hills, Gardner Canyon, Buenos Aires National Wildlife Refuge and the Huachuca and Patagonia mountains (AGFD 2001g, Arizona Rare Plant Committee 2001).	**Possible** **ERU Habitat(s):** Semi-desert Grassland Juniper Grass Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration which is not likely to affect the species.
Heuchera glomerulata Arizona alum root	Grows on shady, rocky slopes in oak, pine-oak and pinyon juniper woodlands and near streams, seeps or riparian areas (AGFD 2004b, Elvander 1992, Forston Wells and Greene Shipes 2009). Elevation: 4,000–9,000 ft (AGFD 2004b).	Occurs in Arizona and New Mexico, U.S. (AGFD 2004b, Forston Wells and Greene Shipes 2009).	Found in small isolated populations in the Pinaleño, Santa Theresa and Galiuro mountains in Graham County, the Santa Catalina Mountains (Pima County), Chiricahua (Cochise County) and Pinal (Gila County) mountains (AGFD 2004b, Forston Wells and Greene Shipes 2009). Additionally, occurs in Greenlee, southern Apache and southern Navajo counties (AGFD 2004b, Elvander 1992).	**None**	**None.** This species is not expected to occur within the Study Area**.**

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Hexalectris arizonica [Note: Kennedy and Watson (2010) elevated *H. spicata* var. *arizonica* to full species status but apparently did not submit the information to ITIS (2019, accessed October 15, 2019)] Arizona coralroot	Found on hillsides or within canyons and drainages in shady oak woodlands (USFWS 2013). Often occur under trees in areas with heavy leaf litter or on rocky outcrops or cliffs (USFWS 2013). Additionally, occurs in juniper or pine woodlands (Catling and Engel 1993). This species is a myco-heterotroph and is dependent upon the presence of Sebacinaceae fungi and suitable host plants (Kennedy, Taylor, and Watson 2011). Elevation: As low as 330 ft in Texas up to 6,560 ft in the western portions of the range (Goldman et al. 2003). Possibly occurs as high as 6,950 ft in Arizona (AGFD 2005b).	Occurs in Arizona, New Mexico and Texas, U.S. and in Coahuila, Mexico (Catling and Engel 1993, Kennedy, Taylor, and Watson 2011, Kennedy and Watson 2010).	Found in the southeastern portion of the state in the Chiricahua, Dragoon, Huachuca, Rincon, Santa Rita and Whetstone mountains (Catling and Engel 1993, WestLand Resources 2012). AGFD indicates that there is *H. spicata* var. *spicata* in Yavapai County (AGFD 2005b), but recent molecular analyses suggest that these records likely represent *H. arizonica* (Kennedy and Watson 2010).	**Possible** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration which is not likely to affect the species.
Hexalectris colemanii [Note: Kennedy and Watson (2010) elevated *Hexalectris revoluta* var. *colemanii* to full species status but apparently did not submit the information to ITIS] Coleman's crested coralroot	Found on hillsides or within canyons and drainages in shady oak woodlands (USFWS 2013). Often occur under trees in areas with heavy leaf litter or on rocky outcrops or cliffs (USFWS 2013). This species is a myco-heterotroph and is dependent upon the presence of Sebacinaceae fungi and suitable host plants (Kennedy, Taylor, and Watson 2011). Elevation: 4,315–5,990 ft (USFWS 2013).	Occurs in southeastern Arizona and southwestern New Mexico (USFWS 2013).	Found throughout the southeastern portion of the state in the Baboquivari, Chiricahua, Dragoon, Patagonia, Peloncillo, Santa Rita, and Whetstone mountains (USFWS 2013).	**Present** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration which is not likely to affect the species.
Hexalectris warnockii Texas purple-spike, Purple-spike Coralroot	Grows in shady canyon bottoms in humus, often along stream beds under fallen oaks and rocks. Associated with mixed oak or oak-juniper-pinyon pine woodland plant communities (AGFD 2001o, Goldman et al. 2003). This species is a myco-heterotroph and is dependent upon the presence of Sebacinaceae fungi and suitable host plants (Kennedy, Taylor, and Watson 2011). Elevation: In Arizona, 5,000–7,000 ft (AGFD 2001o). Range-wide, occurs at much lower elevations, including at sea-level in Texas (Goldman et al. 2003).	Occurs in southeastern Arizona, New Mexico and western Texas, U.S.. Range extends southward in Baja California, Baja California Sur, Coahuila, and Sonora, Mexico (ARPC 2001, Kennedy and Watson 2010, SEINet Portal Network 2018, accessed December 6, 2018).	Found in the Chiricahua, Mule, and Huachuca mountains (AGFD 2001o, ARPC 2001).	**Unlikely** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**No impact.** The Project has a small footprint and short duration, and therefore is anticipated to have no impact on this species.
Hieracium abscissum Rusby's hawkweed	Occurs in shady areas and openings in pine, oak, pine-oak and mixed conifer forests (AGFD 2004j, Strother 2006). Additionally, occurs in disturbed areas (Strother 2006). Elevation: In Arizona, 8,000–9,300 ft (AGFD 2004j, Arizona Rare Plant Committee 2001) but Strother (2006) reports 6,560–8,530 ft range-wide.	Occurs in southeastern Arizona and west-central New Mexico, U.S. and southward through Mexico and Central America (Arizona Rare Plant Committee 2001, Strother 2006).	Known to occur in the Santa Catalina, Chiricahua, Huachuca and Pinaleño mountains (AGFD 2004j, Arizona Rare Plant Committee 2001).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Hosackia [=Lotus] alamosana Alamos deer vetch	This is an obligate wetland species (Lichvar et al. 2016). Semi-aquatic and grows in wet soils and sand in springs, seeps and streams. In Arizona, this species is associated with cottonwood-willow riparian and oak woodlands (Nordman 2018d). Elevation: 2,950–7,8750 ft (Nordman 2018d).	Occurs in Arizona, U.S. and the Mexican states of Sonora, Chihuahua, Sinaloa and Durango (Nordman 2018d).	Herbarium records exist from Sycamore Canyon in the Pajarito Mountains and from the Miller Spring in the Patagonia Mountains (SEINet Portal Network 2018, accessed December 6, 2018).	**Possible** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland Sycamore – Fremont Cottonwood	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration which is not likely to affect the species
Hymenoxys ambigens var. neomexicana New Mexico bitterweed	Grows in rocky soils on hillsides or canyon bottoms in oak woodland, pine forest, and intermittent drainages with cypress, walnut or sycamore (Mygatt 2000). Elevation: 5,250–7,250 ft (Bierner 2006, Mygatt 2000).	New Mexico endemic (Bierner 2006, Mygatt 2000).	Not known to occur in Arizona (Bierner 2006, Mygatt 2000). However, this species is present in the Peloncillo Mountains in New Mexico (Bierner 2006, Mygatt 2000) and it is possible that its range may extend into Arizona.	**None**	**None.** This species is not expected to occur within the Study Area**.**

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Lilium parryi Lemon lily	Grows in saturated soils in shady canyon bottoms along perennial streams or near springs in shady canyons (Arizona Rare Plant Committee 2001). Additionally, this species grows in meadows and willow thickets in mixed conifer forests (Skinner 2002). Elevation: In Arizona, 5,500–7,800 ft but between 4,000–9,000 ft elsewhere (AGFD 2001h).	Occurs in Arizona and California, U.S. and Sonora, Mexico (AGFD 2001h, Skinner 2002).	Found in the Huachuca, Chiricahua, and Santa Rita mountains (AGFD 2001h).	**Unlikely** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**No impact.** The Project has a small footprint and short duration, and therefore is anticipated to have no impact on this species.
Limosella pubiflora Chiricahua mudwort	Barringer (2019) considers *L. pubiflora* to be a synonym of *L. aquatica*. This species grows in the muddy banks of streams, ponds, vernal pools and estuaries (Barringer 2019) and is a wetland obligate species throughout its range (Lichvar et al. 2016). Elevation: Below 10,500 ft (Barringer 2019).	*L. aquatica* occurs in Asia, Europe, and much of North America including all Canadian provinces and territories, the Northern Plains and western U.S. and Mexico (Barringer 2019). *L. pubiflora* was historically reported from Arizona and New Mexico, U.S. but not extant populations are known (Ladyman 1999).	There are herbarium specimens for L. aquatica from Apache, Coconino, Graham and Santa Cruz counties (SEINet Portal Network 2019). L. pubiflora was reported from Cave Creek Canyon in the Chiricahua Mountains, Cochise County but no populations have been located since at least 1981 (Ladyman 1999).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Lupinus huachucanus Huachuca mountain lupine	Grows on moderate to steep slopes in canyons, gorges, washes and on roadcuts in pine and oak-pine forest (Annable 2017, AGFD 2000b, Arizona Rare Plant Committee 2001). Elevation: In Arizona, 5,000–6,700 ft and up to 7,600 ft elsewhere (AGFD 2000b).	Occurs in Arizona, U.S. and the Mexican states of Sonora, Chihuahua and Durango (AGFD Annable 2017, 2000b).	Found in the Chiricahua, Huachuca, and Santa Rita mountains (Annable 2017, AGFD 2000b, Arizona Rare Plant Committee 2001).	**Unlikely** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**No impact.** The Project has a small footprint and short duration, and therefore is anticipated to have no impact on this species.
Lupinus lemmonii Lemmon's lupine	Grows in grassland and pine-oak-juniper woodlands and ponderosa pine forest (Annable and Oliver 2017). Elevation: 4,000–8,530 ft (Annable and Oliver 2017, Kearney and Peebles 1960).	Historically occurred in Arizona and Nevada, U.S. and Sonora, Mexico (Annable and Oliver 2017).	Herbarium records exist from the Quinlan, Chiricahua, Dragoon, Winchester, Santa Rita and Santa Catalina mountains. Additional historic records (+50 years ago) exist from Coconino county (SEINet Portal Network 2018, accessed December 6, 2018). The validity of this species is uncertain (Annable and Oliver 2017).	**Unlikely** **ERU Habitat(s):** Semi-desert Grassland Juniper Grass Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**No impact.** The Project has a small footprint and short duration, and therefore is anticipated to have no impact on this species.
Macroptilium supinum Supine bean	Grows in sandy loam on slopes and ridgetops in semidesert grassland and openings within oak-juniper woodland (Arizona Rare Plant Committee 2001). Elevation: 3,600–4,900 ft (Arizona Rare Plant Committee 2001).	Occurs, in Arizona, U.S. and Sonora and Nayarit, Mexico (Arizona Rare Plant Committee 2001).	Found in the Atascosa, Pajarito, San Luis, and Patagonia mountains as well as the southern portion of the Santa Cruz River drainage (Arizona Rare Plant Committee 2001).	**Possible** **ERU Habitat(s):** Semi-desert Grassland Juniper Grass Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**No impact.** There is little suitable habitat in the Analysis Area and the Project has a small footprint and short duration, and therefore is anticipated to have no impact on this species.
Manihot davisiae Arizona manihot	Often occurs on rocky limestone slopes in desert scrub, thorn scrub, oak woodlands and grasslands (ARPC 2001, Hayden 2016). Elevation: In Arizona, 3,500–4,000 ft (ARPC 2001).	Occurs in southeastern Arizona, U.S. and Sonora, Chihuahua and Sinaloa, Mexico (Hayden 2016, SEINet Portal Network 2018, accessed December 7, 2018).	Found in the Santa Catalina, Santa Rita, and Baboquivari mountains (ARPC 2001).	**Unlikely** **ERU Habitat(s):** Semi-desert Grassland Juniper Grass Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**No impact.** The Project has a small footprint and short duration, and therefore is anticipated to have no impact on this species.
Metastelma mexicanum Wiggin's milkweed vine	Occurs in open slopes or canyons in oak woodland (Arizona Rare Plant Committee 2001, Sundell 1993). Often found twining on grasses or shrubs (Arizona Rare Plant Committee 2001). Elevation: 3,500–5,550 ft (AGFD 2000c, Arizona Rare Plant Committee 2001).	Occurs in southeastern Arizona and possibly southwestern New Mexico, U.S. and Sonora, Mexico (Arizona Game and Fish Department 2000c, Arizona Rare Plant Committee 2001, Sundell 1993).	This species is found in Atascosa, Pajarito, Patagonia, Mule, Baboquivari, Coyote, and Santa Catalina mountains (AGFD 2000c, Arizona Rare Plant Committee 2001).	**Possible** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** **T**he Project has a small footprint and duration, which is not likely to adversely affect the species.

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Muhlenbergia elongate Sycamore canyon muhly	Grows in rhyolitic conglomerate and volcanic substrates on rocky slopes, on damp rock walls, cliffs, rock outcrops and along canyon bottoms in riparian, oak, and pine-oak woodlands and the transition zone between Sonora desertscrub and semi-desert grassland (AGFD 2000f, Herrera Arrieta and Peterson 2018, Peterson 2003a). Occurs near seeps or is otherwise associated with water (AGFD 2000f). Elevation: In Arizona, 3,520–6,000 ft (AGFD 2000f), range-wide 2,789–7,874 ft (Herrera Arrieta and Peterson 2018, Peterson 2003a).	Occurs in Arizona, U.S. and the Mexican states of Chihuahua, Hidalgo and Sonora (Herrera Arrieta and Peterson 2018, Peterson 2003a).	Known to occur in the Santa Catalina, Rincon, Santa Rita, Tumacacori, Baboquivari, and Sycamore Canyon of the Pajarito mountains (AGFD 2000f).	**Possible** **ERU Habitat(s):** Semi-desert Grassland Madrean Pinyon-Oak Woodland Madrean Encinal Woodland Sycamore – Fremont Cottonwood Fremont Cottonwood/Shrub	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** **T**he Project has a small footprint and duration, which is not likely to adversely affect the species.
Muhlenbergia palmeri Southwestern muhly	Grows in shallow pockets of soil and sandy or gravelly soils along canyon bottoms and crevices in adjacent cliffs or rocky hillsides (AGFD 2000e, Arizona Rare Plant Committee 2001, Peterson 2003b). This species occurs in riparian areas with cottonwood, willow and ash within Sonoran desertscrub, Madrean evergreen woodland and semi-desert grasslands (AGFD 2000e) or in dry oak woodland canyons (Arizona Rare Plant Committee 2001). Elevation: 2,750–6,890 ft (AGFD 2000e, Peterson 2003b).	Occurs in Arizona and New Mexico, U.S. and Sonora, Mexico (AGFD 2000e, Schuetze 2013).	Found in the Santa Rita, Santa Catalina, Baboquivari, Pajarito, and Huachuca mountains and in the Canelo Hills (AGFD 2000e). However, many of the records are historic (Schuetze 2013).	**Possible** **ERU Habitat(s):** Semi-desert Grassland Juniper Grass Madrean Pinyon-Oak Woodland Madrean Encinal Woodland Sycamore – Fremont Cottonwood Fremont Cottonwood/Shrub	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** **T**he Project has a small footprint and duration, which is not likely to adversely affect the species.
Packera neomexicana* var. *toumeyi Toumey groundsel	This variety is associated with loose, well drained, rocky soil in oak chaparral or pine forest (AGFD 2004n, Trock 2006). Elevation: 5,500–9,200 ft (AGFD 2004n).	Occurs in Arizona and New Mexico, U.S. (Trock 2006).	The toumeyi variety is found in the Santa Catalina, Chiricahua, Huachuca, and Pinal mountains (AGFD 2004n, Trock 2006).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Paspalum virletii Virlet paspalum	Found in disturbed areas with dry, sandy soils (Allen and Hall 2003) in oak, oak-juniper and pine-oak woodlands, thornscrub and desert grasslands (Nordman 2018e). Often found along canyon bottoms, streams, hillsides and roadcuts (Nordman 2018e). Elevation: In Arizona, 2,600–3,850 ft (SEINet Portal Network 2018, accessed December 7, 2018).	Occurs in Arizona, U.S. and the Mexican states of Chiapas, Guanajuato, Hidalgo, Nayarit, Nuevo León, Puebla, Querétaro, San Luis Potosí, Sinaloa, Sonora, Tamaulipas and Veracruz (Nordman 2018e).	Found in the Pajarito Mountains, Santa Cruz County (Nordman 2018e) and Brawley Wash, Pima County (SEINet Portal Network 2018, accessed December 7, 2018).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Passiflora arizonica Arizona passionflower	Occurs on granite substrates on rocky, desert hillsides, outcrops, cliffs, and arroyos in semi-desert grasslands and oak savanna (AGFD 2006a, Goldman and MacDougal 2016). Elevation: In Arizona, 3,281–5,906 ft (AGFD 2006a).	Occurs in Arizona, U.S. and Sonora, Mexico (AGFD 2006a, Goldman and MacDougal 2016).	This species is found in the Baboquivari, Las Guijas, and Pozo Verde mountains and Arivaca in Pima County. Additionally, occurs in the Pajarito and Tumacacori mountains, Santa Cruz County (AGFD 2006a, SEINet Portal Network 2019, accessed November 4, 2019).	**Unlikely** **ERU Habitat(s):** Semi-desert Grassland Juniper Grass Madrean Encinal Woodland	**No impact.** **T**he Project has a small footprint and short duration, and therefore is anticipated to have no impact on this species.
Pediomelum pentaphyllum Chihuahua scurfpea	Occurs in sandy soils, upland coppice dunes, and alluvial deposits in ephemeral washes (USFWS 2018c). The species may be associated to some degree with areas of disturbance in desertscrub or desert grasslands (Spellenberg 1999, USFWS 2018c). Elevation: In Arizona, 3,600–4,500 ft and up to 6,600 ft elsewhere (AGFD 2001d).	Occurs in Arizona, New Mexico and Texas (historic), U.S. and Chihuahua, Mexico (USFWS 2018c).	Found in Sulfur Springs and San Simon valleys in Cochise and Graham counties (USFWS 2018c).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Pennellia [=Arabis] tricornuta Chiricahua rockcress	Occurs along roadsides, sand banks and on dry, rocky slopes in pine woodland communities (AGFD 2006b, Fuentes-Soriano and Al-Shehbaz 2010). Elevation: In Arizona, approximately 6,000–8,840 ft (AGFD 2006b). However, the treatment in the Flora of North America reports 4,265–9,185 ft (Fuentes-Soriano and Al-Shehbaz 2010).	Reported as an Arizona endemic (AGFD 2006b, Fuentes-Soriano and Al-Shehbaz 2010). southern Arizona endemic (AGFD 2006b). However, SEINet (2018, accessed December 3, 2018) indicates there are records in Sonora, Mexico.	Known to occur in the Huachuca, Santa Rita, Rincon, and Chiricahua mountains (AGFD 2006b). SEINet (2018, accessed December 3, 2018) additionally shows a historical record from the vicinity of Luna Lake in Apache County.	**None**	**None.** This species is not expected to occur within the Study Area**.**

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Penstemon discolor Catalina beardtongue	Grows in rock crevices in bedrock openings within chaparral, pine-oak and pinyon-juniper woodland vegetation communities (Arizona Rare Plant Committee 2001, Freeman 2019). Elevation: 4,400–7,200 ft (Arizona Rare Plant Committee 2001).	Arizona endemic (Arizona Rare Plant Committee 2001, Freeman 2019).	This species is found in the Atascosa, Dragoon, Galiuro, Santa Catalina, Santa Teresa, Tumacacori and Winchester mountains (Arizona Rare Plant Committee 2001, Freeman 2019).	**Unlikely** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Interior Chaparral	**No impact.** **T**he Project has a small footprint and short duration, and therefore is anticipated to have no impact on this species.
Perityle cochisensis Chiricahua rockdaisy	Grows in crevices on granite cliffs or canyons (Arizona Rare Plant Committee 2001, Yarborough and Powell 2006). Sites are often moist and north facing (Arizona Rare Plant Committee 2001). Elevation: 5,500–7,000 ft (Arizona Rare Plant Committee 2001).	Arizona endemic (Arizona Rare Plant Committee 2001, Yarborough and Powell 2006).	Found in the Chiricahua and Dos Cabeza mountains (Arizona Rare Plant Committee 2001).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Phemeranthus humilis [=Talinum humile] Piños altos flame flower	Grows in shallow, rocky soil on or near outcrops (Arizona Rare Plant Committee 2001, Bair et al. 2006, Kiger 2003). Typically found on rock benches on slopes or pockets of soil overlying rock on level terrain in semi-desert grassland and oak or pinyon-juniper woodlands (AGFD 2004h, Ferguson 2002). Elevation: In Arizona, 4,000–5,100 ft (AGFD 2004h, Arizona Rare Plant Committee 2001). Range-wide occurs as high as 5,900 ft (Ferguson 2002).	Occurs in southeastern Arizona and southwestern New Mexico, U.S. and the Mexican states of Chihuahua, Durango, and Mexico (AGFD 2004h, Bair et al. 2006, Kiger 2003).	Known from four isolated locations in the Canelo Hills (Arizona Rare Plant Committee 2001) including the Sierra Grande and Appleton-Whittell Research ranches (AGFD 2004h).	**Unlikely** **ERU Habitat(s):** Semi-desert Grassland Juniper Grass Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**No impact.** The Project has a small footprint and short duration, and therefore is anticipated to have no impact on this species.
Phemeranthus marginatus [=Talinum marginatum] Tepic flame flower	Grows in very shallow soil pockets on exposed bedrock forming ledges or terraces in openings in Madrean evergreen woodland, semi-desert grassland (AGFD 2004m, Arizona Rare Plant Committee 2001). Sites are usually unshaded and typically devoid of other perennial plant species (AGFD 2004m). Elevation: In Arizona 5,000–7,000 ft but up to 8,853 ft elsewhere (AGFD 2004m).	Occurs in southern Arizona, U.S. and south into Mexico along the Sierra Madre Occidental in Chihuahua, Durango, Nayarit and Sonora (AGFD 2004m, Bair et al. 2006).	This species is known from Carr Canyon and the Reef in the Canelo Hills and Ramsey, Bear and Brown canyons in the Huachuca Mountains, and near Sonoita (AGFD 2004m).	**Possible** **ERU Habitat(s):** Semi-desert Grassland Juniper Grass Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and duration, which is not likely to adversely affect the species.
Physalis latiphysa Broadleaf ground cherry	Little is known about this species. Occurs in granitic, gravelly soils in washes, often in the shade, and in desertscrub or grassland communities (AGFD 2004c). Elevation: 3,000–4,700 ft (AGFD 2004c).	AGFD considers this species to be endemic to southern Arizona (2004c). However, there are herbarium specimens from Sonora, Mexico (SEINet Portal Network 2018, accessed December 7, 2018).	Known to occur in the San Bernardino Valley, the Pinaleño Mountains, and near Arivaca Creek and the Santa Cruz River (AGFD 2004c).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Polemonium pauciflorum* ssp. *hinckleyi Hinckley's polemonium	Grows in moist organic soils along streams or on rocky slopes in oak, oak-conifer and conifer forests (Poole 2011, Wilken and Porter 2005). Elevation: 5,000 –8,900 ft (Wilken and Porter 2005).	Occurs in highly disjunct populations in Arizona and Texas, U.S. and Nuevo León, Mexico (Poole 2011).	There are only 11 documented occurrences in the US, with 8 of those occurring in the Chiricahua Mountains (Poole 2011).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Potentilla albiflora White-flowered cinquefoil	Grows on open, rocky slopes in pine-oak woodlands and mixed-conifer forests (Ertter 2014a). Elevation: 5,905–10,500 ft (Ertter 2014a).	Arizona endemic (Ertter 2014a).	There are nine known populations in the Huachuca, Pinaleño, Rincon and Santa Catalina mountains and along the Mogollon Rim (Tomaino 2018a).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Potentilla rhyolitica* var. *chiricahuensis Chiricahua cinquefoil	Occurs in rocky openings within mixed-conifer forest (AGFD 2015a, Ertter 2007). Elevation: 8,500–9,650 ft (AGFD 2015a, Ertter 2007).	Arizona endemic (Ertter 2014b).	The variety *chiricahuensis* is only known from the Chiricahua Mountains (AGFD 2015a, Ertter 2014b).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Potentilla rhyolitica* var. *rhyolitica Huachuca cinquefoil	Grows on quarzitic and rhyolitic outcrops in open pine and mixed-conifer forests (AGFD 2015d, Ertter 2007, 2014c). Elevation: 8,450–9,515 ft (AGFD 2015d, Ertter 2014c).	Arizona endemic (Ertter 2014c).	The variety *rhyolitica* is only known from the Santa Rita and Huachuca mountains (AGFD 2015d, Ertter 2014c).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Psilactis gentry Mexican tansy aster	Occurs in moist habitats within woodland plant communities (AGFD 2004g). Found in highland meadows, fields, along roads, canyon bottoms and rocky streamsbeds (AGFD 2004g). Elevation: 5,580–9,180 ft (AGFD 2004g, Morgan 2006).	Occurs in Arizona, U.S. and south into the Mexican states of Chihuahua, Sonora, Hidalgo, Durango and Mexico (Morgan 2006).	This species has been reported from the Huachuca Mountains (AGFD 2004g), in Bog Hole Cienega and the Pat Hills of Santa Cruz and Cochise counties (SEINet Portal Network 2018, accessed December 13, 2018).	**Unlikely** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**No impact.** The Project has a small footprint and short duration, and therefore is anticipated to have no impact on this species.

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Psilotum nudum Whisk fern	Grows on rocky slopes, hammocks, swamps, thickets and mesic woods (Thieret 1993). This species is terrestrial in Arizona but may be epiphytic elsewhere (Gutierrez 2007). Weedy in greenhouse environments (Thieret 1993). Elevation: In Arizona, occurs at approximately 3,600 ft (Gutierrez 2007) but elsewhere occurs as low as sea level (Thieret 1993).	Occurs in Alabama, Arizona, Florida, Georgia, Louisiana, Mississippi, South Carolina, Texas and possibly New Mexico, U.S.. Also occurs in Mexico, the West Indies, Central America, South America, and tropical areas of Asia and Africa (Thieret 1993).	Found in Santa Cruz County (Gutierrez 2007).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Rumex orthoneurus Blumer's dock	This species grows along streams, cienegas, springs, shallowly inundated areas and other habitats with moist organic soils (AGFD 2002c, Arizona Rare Plant Committee 2001, Mosyakin 2005). Most commonly found adjacent to perennial water sources within Madrean subalpine grassland meadows or Interior southwestern riparian deciduous forest. Thought to be intolerant of shading, but have been found in deep, shaded canyons at some sites (AGFD 2002c). Elevation: 4,480–9,660 ft (AGFD 2002c).	Occurs in Arizona and New Mexico, U.S. and Sonora, Mexico (Mosyakin 2005).	Found in central, east-central and in isolated locations in the southeastern portion of the state. Known to occur in the Sierra Ancha, White, San Francisco, Pinaleño, Chiricahua, and Huachuca mountains (AGFD 2002c, Arizona Rare Plant Committee 2001). Additionally, there are introduced populations in the vicinity of the Mogollon Rim (AGFD 2002c).	**Unlikely** **ERU Habitat(s):** Sycamore – Fremont Cottonwood	**No impact.** The Project has a small footprint and short duration, and therefore is anticipated to have no impact on this species.
Salvia amissa Aravaipa/Galiuro sage	Occurs in shady canyon bottoms, near perennial or intermittent streams with an overstorey of sycamore, ash, walnut or mesquite. Substrates include alluvium comprised of gravel, sand and silt AGFD \, 2002 #1900;Arizona Rare Plant Committee, 2001 #3238}. Elevation: 1,500–5,000 ft (AGFD 2002b).	Arizona endemic (AGFD 2002b).	Found in the Aravaipa, Bass, Double R, Keilberg, Oak Grove, Rattlesnake, Redfield, Sycamore and Turkey Creek canyons in the Galiuro Mountains and Fish Creek in the Superstition Mountains. Additionally, there is a historic record from the Santa Catalina Mountains (AGFD 2002b) and herbarium records along Eagle Creek near Morenci (SEINet Portal Network 2019, accessed November 4, 2019).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Samolus vagans Chiricahua mountain brookweed	Requires a permanent water source. Occurs in wet, sandy soils and muddy areas near stream sides, brooks, springs, and seeps. Associated with Madrean evergreen woodland and Madrean montane conifer forest plant communities (AGFD 2015b). Elevation: In Arizona, 3,700–7,740 ft (AGFD 2015b).	Occurs in southeastern Arizona, U.S. and Baja California Sur, Chihuahua, Durango and Sonora, Mexico (AGFD 2015b, SEINet Portal Network 2018, accessed December 13, 2018).	Found in the Santa Catalina, Rincon, Santa Rita, Pajarito, Huachuca, and Chiricahua mountains (AGFD 2015b, SEINet Portal Network 2018, accessed December 13, 2018).	**Possible** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and duration, which is not likely to adversely affect the species.
Senecio multidentatus var. huachucanus Huachuca groundsel	Occurs in areas of relatively poor soil development on steep, rocky mountain slopes and in canyons of pine-oak or mixed-conifer dominated forests. Typically found on north and north-facing and northwest-facing slopes, in moist areas with patchy to moderate canopy cover. Associated with areas of intermediate disturbance (AGFD 2004e). Elevation: Range-wide 5,900–9,500 ft. In Arizona, 7,000–9,500 ft (AGFD 2004e, Barkley 2006).	Occurs in Arizona, U.S. and Mexico (Chihuahua or Sonora) (AGFD 2004e).	Found in the Huachuca, Chiricahua, and Santa Rita mountains (AGFD 2004e).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Sisyrinchium cernuum Nodding blue-eyed grass	This species is a facultative wetland species (Natural Resources Conservation Service 2019, accessed October 28, 2019). It grows in or along ephemeral pools, wet meadows, seeps, streams banks in oak or pine woodland communities (Cholewa and Henderson 1993, 2002). Elevation: 3,300–8,000 ft (Cholewa and Henderson 2002).	Occurs in Arizona, U.S. and Aguascalientes, Baja California Sur, Chihuahua, Colima, Durango, Guanajuato, Jalisco, México D.F., Sinaloa, and Sonora, Mexico (Cholewa and Henderson 1993, 2002, SEINet Portal Network 2018, accessed December 13, 2018).	Known to occur in the Chiricahua, Mule, Huachuca, Santa Rita, and Rincon mountains (Cholewa and Henderson 1993, SEINet Portal Network 2018, accessed December 13, 2018).	**Possible** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and duration, which is not likely to adversely affect the species.

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Stellaria porsildii Porsild's starwort	This species occurs in willow thickets, open meadows, roadside, forest edges and partially shaded areas with pine, Douglas fir and oak (AGFD 2004i, Morton 2005). Elevation: In Arizona approximately 8,000–9,200 ft (AGFD 2004i). Range-wide 7,000–11,810 ft (Arizona Rare Plant Committee 2001, Morton 2005).	Occurs in Arizona and New Mexico, U.S. (Morton 2005).	Found at Rustler Park in the Chiricahua Mountains (AGFD 2004i).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Stevia lemmonii Lemmon's stevia	Occurs in sandy or rocky substrate on north-facing canyon slopes, ravines, roadcuts and along streams. Associated with oak, oak-juniper, pine-oak, cottonwood-sycamore woodland communities (AGFD 2004f, Nesom 2006d). Elevation: In Arizona, 3,000–4,580 ft. Range-wide, 2,950–5,900 ft (AGFD 2004f).	Occurs in Arizona, U.S. and the Mexican states of Sonora, Chihuahua, Sinaloa and Durango (AGFD 2004f, Nesom 2006d).	This species has been recorded in the Santa Catalina, Rincon, Quinlan, Santa Rita, Pajarito and Patagonia mountains (AGFD 2004f, SEINet Portal Network 2018, accessed December 14, 2018).	**Possible** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and duration, which is not likely to adversely affect the species.
Thelypteris puberula var. sonorensis Aravaipa woodfern	Occurs in in moist soils in mesic canyons, along riverbanks, seeps and meadow habitats in shade and often associated with boulders (AGFD 2004a, Yatskievych and Windham 2009). Elevation: In Arizona, 2,220–4,500 ft (AGFD 2004a). Elsewhere this species occurs as low as 330 ft (Smith 1993).	Occurs in Arizona and California, U.S. and western Mexico (AGFD 2004a, Yatskievych and Windham 2009).	Disjunct populations are found in Coconino, Gila, Mojave, Maricopa, Pima, Pinal and Yavapai counties (AGFD 2004a, Yatskievych and Windham 2009).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Tragia laciniata Sonoran noseburn	Grows along streams, in ravines and canyon bottoms in open oak woodlands and mixed conifer forests (AGFD 2004l, Urtecho 2016). Elevation: 3,280–6,557ft (AGFD 2004l).	Occurs in Arizona, U.S. and the Mexican states of Chihuahua and Sonora (AGFD 2004l, Urtecho 2016).	Found in the Huachuca, Santa Rita, Atascosa, Pajarito, and Patagonia mountains and the Canelo Hills (AGFD 2004l).	**Possible** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.
Tumamoca macdougalii Tumamoc globeberry	This species occurs in xeric habitats, often in the shade of nurse plants in saltbush flats or along gullies and sandy washes (AGFD 2004o, Arizona Rare Plant Committee 2001, Nesom 2015). Found in Sonoran desertscrub, Sinaloan thornscrub and semidesert grasslands (AGFD 2004o, Nesom 2015). Elevation: AGFD (2004o) reports that this species occurs below 3,000 ft but Nesom (2015) reports 2,396–3,280 ft.	Occurs in southern Arizona, U.S. and Sonora and Sinaloa Mexico (AGFD 2004o, Arizona Rare Plant Committee 2001, Nesom 2015).	Known to occur in extreme southern Pinal and Maricopa counties, and throughout Pima County (AGFD 2004o, Arizona Rare Plant Committee 2001). Known localities include the Tucson, Puerto Blanco, Santa Catalina, Santa Rita and Silverbell mountains and Avra, Vekol, and Santa Rosa valleys (Arizona Rare Plant Committee 2001).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Viola umbraticola Shade violet	Occurs in shady canyon bottoms in areas where leaf litter builds up (AGFD 2004k). Associated with riparian ponderosa pine forest and mixed oak woodlands (AGFD 2004k, Little and McKinney 2016). Elevation: In Arizona, 5,200–7,500 ft but occurs up to 7,875 ft elsewhere (AGFD 2004k, Little and McKinney 2016).	Occurs in Arizona, U.S. and in Mexico south to the states of Tlaxcala, Mexico and Veracruz (AGFD 2004k, Nordman 2018b)	This species has two varieties, one of which extends into Arizona (Little and McKinney 2016). The *glaberrima* variety occurs in the Chiricahua, Huachuca, Santa Catalina, Rincon and Santa Rita mountains (AGFD 2004k, Nordman 2018b).	**None**	**None.** This species is not expected to occur within the Study Area**.**

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
REPTILES					
Aspidoscelis stictogramma [Note: The names of species in this genus are in flux. ITIS (2019, accessed April 11, 2019) considers *Cnemidophorus burti stictogrammus* to be the valid name but CSESN (2017) accepts *A. stictogramma*] Giant spotted whiptail	In Arizona, prefers dense, shrubby vegetation in Madrean evergreen woodland, semi-desert grassland and riparian areas with intermittent or perennial streams in Sonoran and Chihuahuan desertscrub (AGFD 2013c, Brennan 2008b). Additionally, occurs in sycamore or cottonwood dominated riparian habitats, inland chaparral and along streams in lowland dry thornscrub (Hammerson 2019). Elevation: In Arizona, 2,300–4,800 ft (Brennan 2008b). Elsewhere, sea level–6,245 ft (AGFD 2013c, Hammerson 2019).	Occurs in Arizona and New Mexico, U.S. and in the Mexican states of Sinaloa and Sonora (Hammerson 2019).	Found in the southeastern portion of the state from the Baboquivari and Quinlan mountains northeast to the Santa Catalina, Santa Teresa and Pinaleño mountains including riparian areas along the Santa Cruz River north to Tucson and the San Pedro River. However, there are no known records from the Chiricahua, Dos Cabezas, Huachuca, Mule and Patagonia mountains (Rorabaugh 2019a).	**Possible** **ERU Habitat(s):** Semidesert Grassland Juniper Grass Madrean Pinyon-Oak Woodland Madrean Encinal Woodland Sycamore – Fremont Cottonwood Chihuahuan Desert Scrub	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.
Aspidoscelis xanthonota [Note: The names of species in this genus are in flux. ITIS (2019, accessed April 11, 2019) considers *Cnemidophorus xanthonotus* to be the valid name but CSESN (2017) accepts *A. xanthonota*] Red-backed whiptail	Inhabits areas with Sonoran desertscrub, semi-desert grassland and oak-juniper woodland (AGFD 2013f, Brennan 2008e, Rorabaugh 2019c). This species is typically found along canyon bottoms and adjacent rocky slopes or upper portions of bajadas (Brennan 2008e, Rorabaugh 2019c). Often in dense occurs near springs, tinajas or other sources of water (AGFD 2013f, Brennan 2008e). Elevation: In Arizona, 2,000–4,300 ft (AGFD 2013f, Brennan 2008e). Rorabaugh (2019c) reports and elevational range of 1,300–4,600 ft.	Occurs in Arizona, U.S. and Sonora, Mexico (AGFD 2013f).	This species is found in Pima and Maricopa counties (AGFD 2013f). Brennan (2008e) indicates that this species is also found in Pinal County. There are records of this species from the Ajo Range, Quitobaquito Hills, Martina Mountain and Agua Dulce, Cimarron, Growler, Puerto Blanco, Sand Tank, Sauceda, Sierra Estrellas and the Table Top mountains (AGFD 2013f, Rorabaugh 2019c).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Crotalus pricei Twin-spotted rattlesnake	In Arizona, inhabits rocky outcrops and talus slopes in pine-oak woodland, mixed conifer and spruce-fir forests (AGFD 2012, Brennan 2008i, Rorabaugh 2019e). However, this species also uses flat areas without rocky features (AGFD 2012, Brennan 2008i). Elsewhere in this species range it also inhabits grassy and shrubby mountain valleys and areas with scrub oak and agaves (Hammerson, Vazquez Díaz, and Quintero Díaz 2007a). Elevation: Above 6,000 ft (AGFD 2012).	Occurs in Arizona, U.S. and south into Mexico in Aguascalientes, Chihuahua, Coahuila, Durango, Jalisco, Nayrit, Nuevo Leon, San Luis Potosi, Sonora, Tamaulipas (AGFD 2012, Hammerson, Vazquez Díaz, and Quintero Díaz 2007a, McCraine 1980, Rorabaugh 2019e).	Found in the southeastern portion of the state in the Chiricahua, Huachuca, Pinaleño and the Santa Rita mountains (AGFD 2012). Additionally, there is an unconfirmed report from the Dos Cabezas mountains (Rorabaugh 2019e).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Crotalus willardi Arizona ridgenose rattlesnake	Inhabits oak scrub, oak-juniper, pine-oak and pinyon-juniper woodlands, pine-fir forests and canyon bottoms in these habitats with broadleaf deciduous trees (Brennan 2008f, Hammerson, Vazquez Díaz, and Quintero Díaz 2007b, Villa 2019). Favors drainages with sycamore, alder, box elder and maples and areas that provide rocky crevices in woodlands and forests (AGFD 2016a, Brennan 2008f). Occasionally occurs in the transition zone between semi-desert grassland and oak woodlands (AGFD 2016a). Elevation: 4,800–9,000 ft but most common between 5,400–7,500 ft (AGFD 2016a).	The *willardi* subspecies occurs in Arizona and New Mexico, U.S. and Sonora Mexico (AGFD 2016a, Hammerson, Vazquez Díaz, and Quintero Díaz 2007b).	The *willardi* subspecies is found in the Canelo Hills and the Huachuca, Patagonia, Santa Rita and Whetstone mountains (AGFD 2016a, Brennan 2008f).	**Possible** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and duration, which is not likely to adversely affect the species.

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Gyalopion quadrangulare Thornscrub hook-nosed snake	Prefers deciduous and semi-deciduous forest but also inhabits creosote flats, shrubby grasslands, thornscrub, dry tropical and subtropical forest (Hammerson, Frost, and Gadsden 2007). In Arizona, inhabits oak and mesquite grasslands and Madrean evergreen woodlands (AGFD 1997, Brennan 2008h). This species burrows in loose soils and is often encountered along canyons and outwash plains (AGFD 1997, Brennan 2008h, Hammerson, Frost, and Gadsden 2007). Elevation: In Arizona, 3,400–5,000 ft but as low as sea level elsewhere in the range (AGFD 1997, Brennan 2008h).	Occurs in Arizona, U.S. and the Mexican states of Sonora, Sinaloa and Nayarit (Hammerson, Frost, and Gadsden 2007).	This species has a very limited distribution in the state and is only known from the Patagonia-Pajarito mountain areas in Santa Cruz County (AGFD 1997). This species has been recorded from Peña Blanca Canyon to just north of Rio Rico and the town of Patagonia (Rorabaugh 2019d).	**Possible** **ERU Habitat(s):** Semidesert Grassland Juniper Grass Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.
Oxybelis aeneus Brown vinesnake	In the core of this species range it occurs in a variety of lowland tropical and subtropical habitats (Brennan 2008k, Van Devender, Lowe, and Lawler 1994) including moist and dry forest, arid scrub, coffee or banana plantations, orchards, brushy areas, residential areas, sand dunes and riparian areas near streams, ponds or lakes (Hammerson 2005). In Arizona, this species has been found in semi-desert grassland, Madrean evergreeen and pine-oak woodland, riparian deciduous woodland dominated by sycamore, oak and walnut (AGFD 2003a, Brennan 2008k, Van Devender, Lowe, and Lawler 1994). This species spends a majority of its time in in trees or shrubs (AGFD 2003a, Brennan 2008k). Appears to tolerate some level of human disturbance (Hammerson 2005). Elevation: In Arizona, 3,000–5,800 ft (AGFD 2003a).	Occurs in Arizona, U.S. and southward through Mexico, Central America and South America to Brazil, Peru and Bolivia (AGFD 2003a).	This species is found in the extreme south-central portion of the state in the Atascosa, Patagonia, Pajarito, Santa Rita and Tumacacori mountains and in the vicinity of Arivaca Lake (AGFD 2003a, Brennan 2008k, Van Devender, Lowe, and Lawler 1994).	**Possible** **ERU Habitat(s):** Semidesert Grassland Juniper Grass Madrean Pinyon-Oak Woodland Madrean Encinal Woodland Sycamore – Fremont Cottonwood	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.
Plestiodon callicephalus [Note: This name is accepted by CSESN (2017) but ITIS (2019, accessed April 11, 2019) considers *Eumeces callicephalus* to be the valid name.] Mountain skink	In Arizona, this species inhabits Madrean evergreen woodlands and adjacent portions of semi-desert grassland and rocky areas of oak-pine woodlands (Brennan 2008d, Edwards and Swann 2003). Most commonly found in drainages or hillsides (Hammerson et al. 2007). Elsewhere in the range, this species occupies foothills, barrancas and coastal plains (Hammerson et al. 2007). Elevation: In Arizona, 3,500–6,500 ft (Brennan 2008d). Elsewhere occurs down to sea-level (Edwards and Swann 2003).	Occurs in Arizona and New Mexico, U.S. and the Mexican states of Chihuahua, Durango, Jalisco, Nayarit, Sinaloa, Sonora and Zacatecas (Hammerson et al. 2007).	Found in the Atascosa, Baboquivari, Huachuca, Pajarito, Peloncillo and Santa Rita mountains (Brennan 2008d).	**Possible** **ERU Habitat(s):** Semidesert Grassland Juniper Grass Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.
Sceloporus slevini Slevin's bunchgrass lizard	In Arizona, this species primarily occurs in coniferous forests within open areas of bunchgrasses (AGFD 2003j). Less frequently occurs in Madrean evergreen woodland and grassland (Brennan 2008g). This species is commonly associated with tufts of bunchgrasses in Arizona and shows much lower numbers in areas impacted by heavy grazing, however, bunchgrass does not seem to be a key element of habitats used outside of the U.S. (Hammerson, Vazquez Díaz, and Quintero Díaz 2007c, Watkins-Colwell, Smith, and Chiszar 2003). Elevation: In Arizona, 4,300–9,480 ft (AGFD 2003j), elsewhere up to 11,000 ft (Hammerson, Vazquez Díaz, and Quintero Díaz 2007c).	Occurs in Arizona and New Mexico, U.S. and in the Mexican states of Chihuahua, Durango and Sonora (Bezy 2004, Watkins-Colwell, Smith, and Chiszar 2003). AGFD (2003j) states that the range extends to Pueblo, Mexico.	Found in the Chiricahua, Dragoon, Huachuca, Santa Rita and Whetstone mountains and the Babocomari, Canelo, Empire and Sonoita grasslands (AGFD 2003j, Bezy 2004, Brennan 2008g).	**Possible** **ERU Habitat(s):** Semidesert Grassland Juniper Grass Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Senticolis triaspis Green ratsnake	Inhabits a variety of habitats including woodlands, chaparral, mesophytic and xeric forests and agricultural and residential areas (Hammerson et al. 2015). In Arizona, this species is primarily found in Madrean evergreen woodland and adjacent semi-desert grassland and the transition zone (Brennan 2008c). Less commonly uses the transition zone between desertscrub and semi-desert grassland and riparian areas with desertscrub (Rorabaugh 2019b). This species frequents rocky slopes (Brennan 2008c, Rorabaugh 2019b). Elevation: In Arizona, 3,600–8,000 ft (Brennan 2008c), but elsewhere occurs to sea level (Hammerson et al. 2015).	Occurs in Arizona and New Mexico, U.S. and south from U.S. populations and Tamaulipas through Mexico, Guatemala, Belize, Honduras, El Salvador, Nicaragua and Costa Rica (Hammerson et al. 2015, Price 1991).	This species is found in the southeastern portion of the state in the Atascosa, Baboquivari, Chiricahua, Dos Cabezas, Empire, Pajarito, Patagonia, Pedregosa, Peloncillo, Pinaleño, Quinlan, Santa Rita and Swisshelm mountains (Brennan 2008c, Rorabaugh 2019b).	**Present** **ERU Habitat(s):** Semidesert Grassland Juniper Grass Madrean Pinyon-Oak Woodland Madrean Encinal Woodland Interior Chaparral	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.
Tantilla wilcoxi Chihuahuan black-headed snake	This species uses both shady rocky canyons and sunny rocky slopes in grassland, oak and pine-oak woodlands and montane canyons with mixed-conifer or pine forest. Typically found hiding under rocks or other surface debris (AGFD 2016b, Brennan 2008l, Rorabaugh 2013a). Elevation: In Arizona, typically 5,068–6,150 ft (Rorabaugh 2013a). Range-wide 3,000–8,000 ft (AGFD 2016b).	Occurs in Arizona, U.S. and south through the Mexican states of Coahuila, Durango, Jalisco, Sinaloa, Sonora, Nuevo Leon, San Luis Potosi and Zacatecas (AGFD 2016b, Rorabaugh 2013a).	Found in the Huachuca, Santa Rita, and Patagonia mountains (AGFD 2016b, Rorabaugh 2013a).	**Possible** **ERU Habitat(s):** Madrean Pinyon-Oak Woodland Madrean Encinal Woodland	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.
Tantilla yaquia Yaqui black-headed snake	In Arizona, this species primarily uses rocky, wooded canyons and rolling hillsides in Madrean evergreen woodlands but also uses Chihuahuan desertscrub, semi-desert grassland and pine-oak woodlands (AGFD 2016d, Brennan 2008j, Rorabaugh 2013c). Elsewhere in the range, this species also uses Sonoran desertscrub, foothills and coastal thornscrub and tropical deciduous forest (Rorabaugh 2013c). Most commonly encountered under rocks or surface litter (Rorabaugh 2013c). Elevation: In Arizona, 3,300–6,000 ft. Elsewhere occurs at elevations as low as sea-level (AGFD 2016d).	Occurs in Arizona and New Mexico, U.S. and in the Mexican states of Chihuahua, Sinaloa, Sonora and Nayarit (AGFD 2016d).	Found in the southeastern portion of the state in Cochise and Santa Cruz counties (AGFD 2016d, Brennan 2008j). Known from the Canelo Hills, localities near Nogales and Sonoita and the Atascosa, Chiricahua, Dos Cabezas, Mule, Pajarito, Patagonia, Pedregosa, Peloncillo, Santa Rita and Swisshelm mountains (AGFD 2016d, Brennan 2008j, Rorabaugh 2013c).	**Possible** **ERU Habitat(s):** Semidesert Grassland Juniper Grass Madrean Pinyon-Oak Woodland Madrean Encinal Woodland Chihuahuan Desert Scrub	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.
Xantusia bezyi Bezy's night lizard	Primarily associated with crevices found in rock outcrops, cliff faces, and boulder fields in Arizona Upland Sonoran desertscrub, Semi-desert Grassland, Interior Chaparral, and oak woodland communities (Brennan 2008a, Leavitt et al. 2007). Elevation: 2,400–5,800 ft (Brennan 2008a).	Arizona endemic (AGFD 2018).	Little is known about this species current distribution patterns (Bezy 2005, Brennan 2008a). Found in a few disjunct localities from the Mazatzal to the Galiuro mountains in the central portion of the state (Bezy 2005). Known localities include in the vicinity of the Agua Fria National Monument, the Aravaipa Canyon Preserve, Tonto National Monument, Sycamore Creek (Mazatzal Mountains), Sugarloaf Mountain west of Phoenix, and Queen Creek Canyon near Superior (AGFD 2018, Holderman 2016).	**None**	**None.** This species is not expected to occur within the Study Area**.**
SNAILS					
Oreohelix barbata Bearded mountain snail	Inhabits creek bottoms with riparian vegetation, rocky rubble, and accumulated leaf litter (BISON-M 2017a).	Occurs in Arizona and New Mexico, U.S. (BISON-M 2017a).	Found in the Chiricahua Mountains (BISON-M 2017a).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Oreohelix grahamensis Pinaleño mountain snail	This species is typically found in leaf litter in the vicinity of talus slopes (AGFD 2015g). Elevation: 6,590–10,080 ft (AGFD 2015g).	Arizona endemic (AGFD 2015g).	Range extends from the Clark Peak area southeast to the Heliograph Peak area, Twilight Canyon and Wet Canyon in the Pinaleño Mountains, Graham County (AGFD 2015g).	**None**	**None.** This species is not expected to occur within the Study Area**.**

Species Name	Known Suitable Habitat	Total Range	Distribution in Arizona	Potential to Occur	Effects
Pyrgulopsis thompsoni Huachuca springsnail	Inhabits marshy springs and cienegas with aquatic and emergent plants in Plains grassland, oak and pine-oak woodland and coniferous forest. Most frequently found in areas of shallow water or rocky seep areas near the source of the spring (AGFD 2015e). Elevation: 4,500–7,000 ft (AGFD 2015e).	Occurs in Arizona, U.S. and Sonora, Mexico (AGFD 2015e).	Found in the San Pedro River and Santa Cruz River basins. Specifically, within the San Pedro River Basin this species is known to occur in Bear Creek and Blacktail, Gardner, Huachuca, McClure, O'Donnell, Ramsey and Sawmill canyons. In the Santa Cruz Basin this species is known to occur in Scotia Canyon, Sheehy Spring and Sonoita Creek (AGFD 2015e).	**Unlikely** **ERU Habitat(s):** Semidesert Grassland Juniper Grass Madrean Pinyon-Oak Woodland Madrean Encinal Woodland Sycamore – Fremont Cottonwood	**May impact individuals, but unlikely to result in a loss of viability on National Forest System lands or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.
Sonorella christenseni Clark Peak talussnail	Inhabits talus slopes, streamside colluvial rock or mesic rocky hillsides within pine-oak or conifer forests (AGFD 2015c). Elevation: 6,520–9,100 ft (AGFD 2015c).	Arizona endemic (AGFD 2015c).	Only known population occurs on Clark Peak in the northern portion of the Pinaleño Mountains in Graham County (AGFD 2015c, Weaver, Weaver, and Guralnick 2010).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Sonorella grahamensis[4] Pinaleño talussnail	Inhabits talus slopes, colluvial rock along streams or mesic areas on hillsides with leaf litter in pine-oak and conifer forests (AGFD 2015h). Elevation: 6,000–10,000 ft (AGFD 2015h).	Arizona endemic (AGFD 2015h).	Only known from a single site near Heliograph Peak in the Pinaleño Mountains, Graham County (AGFD 2015h, Weaver, Weaver, and Guralnick 2010).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Sonorella hachitana peloncillensis [Note: There are no currently recognized subspecies of *S. hachitana* (ITIS 2019, accessed April 8, 2019). Was elevated to full species as *S. peloncillensis* by Lang and Gilberston (2010) but not submitted to ITIS.] New Mexico Talussnail	Inhabits rock outcrops and slopes within pinyon-oak-juniper plant communities (BISON-M 2017c, Lang and Gilbertson 2010). Elevation: In Arizona, 4,800–4,900 ft (based on description of known localities).	Occurs in Arizona and New Mexico, U.S. (BISON-M 2017c).	The *peloncillensis* subspecies is only known from Skull Canyon in the Peloncillo Mountains (BISON-M 2017c, Lang and Gilbertson 2010).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Sonorella imitator Mimic talussnail	Occurs in rockslides, colluvial rock along streams, and the mesic areas on rocky hillsides with leaf litter in pine-oak and conifer forests (AGFD 2015f). Elevation: 6,200–9,185 ft (AGFD 2015f).	Arizona endemic (AGFD 2015f).	This species is found in the Pinaleño Mountains, Graham County (AGFD 2015f).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Sonorella macrophallus[5] Wet canyon talussnail	Inhabits rockslides, colluvial rock along streams, and the mesic areas on rocky hillsides with leaf litter pine-oak and conifer forests. Seems to prefer wetter areas compared to other talussnails in Arizona (AGFD 2015i). Elevation: 6,200–9,185 ft (AGFD 2015i).	Arizona endemic (AGFD 2015i).	This species is found in the southern Pinaleño Mountains (AGFD 2015i).	**None**	**None.** This species is not expected to occur within the Study Area**.**
Sonorella magdalenensis[6] Sonoran talussnail	Prefers taluses of broken rock, generally found in crevices below the surface. Feeds on plant material and microorganisms that live in the vegetation (AGFD 2008). Elevation: 2,750–6,000 ft (AGFD 2008, USFWS 2012).	Occurs in Arizona, U.S. and Sonora, Mexico (AGFD 2008, USFWS 2012).	Found in the San Cayetano, Santa Rita, Tucson and Tumacacori mountains (AGFD 2008).	**None**	**None.** This species is not expected to occur within the Study Area**.**

[4] Positive 90-day finding (USFWS 2009).
[5] Positive 90-day finding (USFWS 2009).
[6] Positive 90-day finding (USFWS 2012).

REFERENCES

Abbot, J.C., and D.R. Paulson. 2018. Sabino Dancer (*Argia sabino*). *The IUCN Red List of Threatened Species 2018*. 8 pp.

Allen, Charles D., and David H. Hall. 2003. "*Paspalum virletii*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. New York and Oxford. 20+ vols. Vol. 25 Volume 25, p.

Allen, Thomas J., Jim P. Brock, and Jeffrey Glassberg. 2005. *Caterpillars in the Field and Garden: A Field Guide to the Butterfly Caterpillars of North America*. New York, New York: Oxford University Press.

Annable, C. 2017. Huachuca Mountain Lupine (*Lotus huachucanus*). *NatureServe Explorer*. December 7, 2017.

Annable, C., and C. Oliver. 2017. Lemmon's Lupine (*Lupinus lemmonii*). *NatureServe Explorer*.

Arizmendi, M. D. C., C. I. Rodríguez-Flores, C. A. Soberanes-Gonzáles, and T. S. Schulenberg. 2015. "White-Eared Hummingbird (*Hylocharis leucotis*), version 1.0." In *Neotropical Birds Online*, edited by T. S. Schulenberg. Ithaca, New York: Cornell Lab of Ornithology.

Arizona Game and Fish Department. 1997. Thornscrub Hook-nosed Snake (*Gyalopion quadrangulare*) Draft. *Unpublished abstract compiled by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department,. March 6, 1997. 4 pp.

_____. 1999a. Arizona Shrew (*Sorex arizonae*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 5 pp.

_____. 1999b. Coppermine Milkvetch (*Astragalus cobrensis* var. *maguirei*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 3.

_____. 1999c. Goodding Onion (*Allium gooddingii)*. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. December 20, 1999. 6 pp.

_____. 1999d. Huachuca Milk-vetch (*Astragalus hypoxylus*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. August 13 1999. 4.

_____. 2000a. Arizona Giant Sedge (*Carex ultra*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. February 18, 2000. 4 pp.

_____. 2000b. Huachuca Mountain Lupine (*Lupinus huachucanus*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. March 21, 2000. 3 pp.

_____. 2000c. Milkweed Vine (*Metastelma mexicanum*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 4 pp.

_____. 2000d. Pima Indian Mallow (*Abutilon parishii*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. March 23, 2000. 6 pp.

_____. 2000e. Southwestern Muhly (*Muhlenbergia dubioides*). *Unpublished abstract compiled by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department,. March 23, 2000. 3 pp.

_____. 2000f. Sycamore Canyon Muhly (*Muhlenbergia xerophila*). *Unpublished abstract compiled by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. March 23, 2000. 4 pp.

_____. 2001a. Allen's Lappet-Browed Bat (*Idionycteris phyllotis)*. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. October 3, 2001. 4 pp.

_____. 2001b. Arid Throne Fleabane (*Erigeron arisolius*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix: Arizona Game and Fish Department. March 7, 2001. 3 pp.

_____. 2001c. Cactus Ferruginous Pygmy-Owl (*Glaucidium brasilianum cactorum*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. June 8, 2001. 6 pp.

_____. 2001d. Chihuahua Scurfpea (*Pediomelum pentaphyllum*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. December 27, 2001. 5 pp.

_____. 2001e. Gentry Indigo Bush (*Dalea tentaculoides*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 6 pp.

_____. 2001f. Huachuca Giant-Skipper (*Agathymus evansi*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. February 2001. 3 pp.

_____. 2001g. Huachuca Golden Aster (*Heterotheca rutteri*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix: Arizona Game and Fish Department. December 21, 2001. 4 pp.

_____. 2001h. Lemon Lily (*Lilium parryi*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. December 26, 2001. 4 pp.

_____. 2001i. Mexican Hemlockparsley (*Conioselinum mexicanum*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. December 11, 2001. 3 pp.

_____. 2001j. Pinaleno Monkey Grasshopper (*Eumorsea pinaleno*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. February 2001. 3 pp.

_____. 2001k. Rose-throated Becard (*Pachyramphus aglaiae*) Draft. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 5 pp.

_____. 2001l. Sabino Canyon Damselfly (*Argia sabino*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. February 2001. 4 pp.

_____. 2001m. Santa Cruz Beehive Cactus (*Coryphantha recurvata*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 5 pp.

_____. 2001n. Smooth Babybonnets (*Coursetia glabella*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 3 pp.

_____. 2001o. Texas Purple Spike (*Hexalectris warnockii*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. December 21, 2001. 4 pp.

_____. 2002a. American Peregrine Falcon (*Falco peregrinus anatum*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. December 3, 2002. 6 pp.

_____. 2002b. Aravaipa Sage (*Salvia amissa*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. January 7, 2002. 4 pp.

_____. 2002c. Blumer's Dock (*Rumex orthoneurus*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. January 4, 2002. 6 pp.

_____. 2002d. Cestus Skipper (*Atrytonopsis cestus*) Draft. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. May 31, 2002. 4 pp.

_____. 2002e. Desert Sucker (*Catostomus* (=*Pantosteus*) *clarki*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. December 4, 2002. 5 pp.

_____. 2002f. Eared Quetzal (*Euptilotis neoxenus*) Draft. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. February 12, 2002. 4 pp.

_____. 2002g. Sonora Sucker (*Catostomus insignis*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. December 4, 2002. 5 pp.

_____. 2002h. Stephan's Heterelmis Riffle Beetle (*Heterelmis stephani*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. August 28, 2002. 5 pp.

_____. 2002i. Violet-crowned Hummingbird (*Amazilia violiceps*) Draft. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. February 14, 2002. 4 pp.

_____. 2003a. Brown Vinesnake (*Oxybelis aeneus*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. April 3, 2003. 4 pp.

_____. 2003b. Bush Violet (*Browallia eludens*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. September 11, 2003. 5 pp.

_____. 2003c. Chiltepin (*Capsicum annuum* var. *glabriusculum*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. September 11, 2003. 5 pp.

_____. 2003d. Chiricahua Water Scavenger Beetle (*Cymbiodyta arizonica*). *Unpublished abstract compiled by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. July 18, 2003. 4 pp.

_____. 2003e. Large-flowered Bluestar (*Amsonia grandiflora*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. June 26, 2003. 6 pp.

_____. 2003f. Mexican Stoneroller (*Campostoma ornatum*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. May 16, 2003. 6 pp.

_____. 2003g. Pale Townsend's Big-eared Bat (*Corynorhinus townsendii pallescens*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 6 pp.

_____. 2003h. Pinaleno Fleabane (*Erigeron heliographis*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 4 pp.

_____. 2003i. Santa Cruz Striped Agave (*Agave parviflora* ssp. *parviflora*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 7 pp.

_____. 2003j. Slevin's Bunchgrass Lizard (*Sceloporus slevini*) Draft. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. December 22, 2003. 4 pp.

_____. 2004a. Aravaipa Woodfern (*Thelypteris puberula* var. *sonorensis*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. March 4, 2004. 4 pp.

_____. 2004b. Arizona Alum Root (*Heuchera glomerulata*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 4 pp.

_____. 2004c. Broadleaf Groundcherry (*Physalis latiphysa*). *Draft Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. April 20, 2004. 3 pp.

_____. 2004d. Chihuahuan Sedge (*Carex chihuahuensis*) Draft. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. March 5 2004. 4 pp.

_____. 2004e. Huachuca Groundsel (*Senecio huachucanus*). *Draft Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. May 6, 2004. 6 pp.

_____. 2004f. Lemmon's Stevia (*Stevia lemmonii*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 4 pp.

_____. 2004g. Mexican Tansy Aster (*Psilactis gentryi*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. April 29, 2004. 4 pp.

_____. 2004h. Pinos Altos Flame Flower (*Talinum humile)*. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. May 20, 2004. 6 pp.

_____. 2004i. Porsild's Starwort (*Stellaria porsildii*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 5 pp.

_____. 2004j. Rusby's Hawkweed (*Hieracium rusbyi*). *Draft Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. April 8, 2004. 4 pp.

_____. 2004k. Shade Violet (*Viola umbraticola*) Draft. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. July 8, 2004. 5 pp.

_____. 2004l. Sonoran Noseburn (*Tragia laciniata*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 4 pp.

_____. 2004m. Tepic Flame Flower (*Talinum marginatum)*. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. May 20, 2004. 6 pp.

_____. 2004n. Toumey Groundsel (*Senecio neomexicana* var. *toumeyi*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 4 pp.

_____. 2004o. Tumamoc Globeberry (*Tumamoca macdougalii*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. July 8, 2004. 6 pp.

_____. 2005a. A Cave Obligate Pseudoscorpion (*Tuberochernes ubicki*) Draft. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 4 pp.

_____. 2005b. Crested Coral Root (*Hexalectris spicata*). *Draft Unpublished abstract compiled and edited by Arizona Game and Fish Department*. Phoenix, Arizona: Arizona Game and Fish Department. 6 pp.

_____. 2005c. Trelease Agave (*Agave schottii var. treleasei*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. February 17, 2005. 6 pp.

_____. 2006a. Arizona Passionflower (*Passiflora arizonica*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. October 10, 2006. 7 pp.

_____. 2006b. Chiricahua Rockcress (*Arabis tricornuta*). *Unpublished Abstract Compiled and Edited by the Heritage Data Management*. Phoenix, Arizona: Arizona Game and Fish Department. May 4, 2006. 4 pp.

_____. 2006c. Greene Milkweed (*Asclepias uncialis*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 6 pp.

_____. 2006d. Lemmon's Milkweed (*Asclepias lemmonii*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 5 pp.

_____. 2006e. Lowland Leopard Frog (*Lithobates yavapaiensis*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. October 26, 2006. 10 pp.

_____. 2006f. Mexican Long-tongued bat (*Choeronycteris mexicana*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 8 pp.

_____. 2006g. Tarahumara Frog (*Lithobates tarahumarae*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. October 12, 2006. 8 pp.

_____. 2008. Sonoran Talussnail (*Sonorella magdalenensis*) Draft. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. April 3, 2008. 4 pp.

_____. 2009. Western Barking Frog (*Craugastor augusti cactorum*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. December 30, 2009. 8 pp.

_____. 2010a. Arizona Grasshopper Sparrow (*Ammodramus savannarum ammolegus*) Draft. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. December 7, 2010. 8 pp.

_____. 2010b. Ayenia (*Ayenia jaliscana*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 4 pp.

_____. 2010c. Thick-billed Kingbird (*Tyrannus crassirostris*) Draft. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 4 pp.

_____. 2011a. Chiricahua Fox Squirrel (*Sciurus nayaritensis chiricahuae*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix: Arizona Game and Fish Department. 5 pp.

_____. 2011b. Lesser Long-nosed Bat *(Leptonycteris curasoae yerbabuenae)*. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 9 pp.

_____. 2011c. Merriam's Deermouse (*Peromyscus merriami*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix: Arizona Game and Fish Department. 4.

_____. 2011d. Western Red Bat (*Lasiurus blossevillii*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 7 pp.

_____. 2011e. Western Yellow Bat (*Lasiurus xanthinus*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. January 13 2011. 6 pp.

_____. 2012. Twin-spotted Rattlesnake (*Crotalus pricei*) Draft. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. June 13, 2012. 4 pp.

_____. 2013a. Arizona Treefrog (*Hyla wrightorum*) Draft. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. November 8, 2013. 5 pp.

_____. 2013b. Baird's Sparrow (*Ammodramus bairdii*) Draft. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. March 16, 2001. 6 pp.

_____. 2013c. Giant Spotted Whiptail (*Aspidoscelis stictogrammus*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. June 4, 2013. 5 pp.

_____. 2013d. Northern Buff-breasted Flycatcher (*Empidonax fulvifrons pygmaeus*) Draft. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. November 14, 2013. 5 pp.

_____. 2013e. Northern Goshawk (*Accipiter gentilis*) Draft. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. November 14, 2013. 8 pp.

_____. 2013f. Redbacked Whiptail (*Aspidoscelis xanthonota*) Draft. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. November 12, 2013. 4 pp.

_____. 2014a. Elegant Trogon (*Trogon elegans*) Draft. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 7 pp.

_____. 2014b. Sunrise Skipper (*Adopaeoides prittwitzi*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. January 31, 2014. 4 pp.

_____. 2014c. White-bellied Long-tailed Vole (*Microtus longicaudus leucophaeus*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 5 pp.

_____. 2015a. Chiricahua Cinquefoil (*Potentilla rhyolitica* var. *chiricahuensis*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 3 pp.

_____. 2015b. Chiricahua Mountain Brookweed (*Samolus vagans*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 5 pp.

_____. 2015c. Clark Peak Talussnail (*Sonorella christenseni*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. August 14, 2015. 5 pp.

_____. 2015d. Huachuca Cinquefoil (*Potentilla rhyolitica* var. *rhyolitica*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 3 pp.

_____. 2015e. Huachuca Springsnail (*Pyrgulopsis thompsoni*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. December 7, 2015. 7 pp.

_____. 2015f. Mimic Talussnail (*Sonorella imitator*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. August 14, 2015. 5 pp.

_____. 2015g. Pinaleño Mountainsnail (*Oreohelix grahamensis*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix: Arizona Game and Fish Department. 4 pp.

_____. 2015h. Pinaleño Talussnail (*Sonorella grahamensis*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. August 14, 2015. 5 pp.

_____. 2015i. Wet Canyon Talussnail (*Sonorella macrophallus*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. August 14, 2015. 5 pp.

_____. 2016a. Arizona Ridge-nosed Rattlesnake (*Crotalus willardi willardi*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. July 12, 2016. 6 pp.

_____. 2016b. Chihuahuan Black-headed Snake (*Tantilla wilcoxi*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. July 14, 2016. 5 pp.

_____. 2016c. Metcalf's Tick-trefoil (*Desmodium metcalfei*) Draft. *Unpublished Abstract Compiled and Edited by the Heritage Data Management Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. November 21, 2016. 5 pp.

_____. 2016d. Yaqui Black-Headed Snake (*Tantilla yaquia*). *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 5 pp.

_____. 2018. Bezy's Night Lizard (*Xantusia bezyi*) Draft. *Unpublished abstract compiled and edited by the Heritage Data Management System*. Phoenix, Arizona: Arizona Game and Fish Department. 4 pp.

Arizona Important Bird Areas Program. 2017. 2017 Elegant Trogon Survey Results.

_____. 2018. 2018 Elegant Trogon Survey Results.

_____. 2019. 2019 Elegant Trogon Survey Results.

Arizona Rare Plant Committee. 2001. *Arizona Rare Plant Field Guide: A Collaboration of Agencies and Organizations*. Washington, D.C.: U.S. Government Printing Office.

Arroyo-Cabrales, J., and S.T. Álvarez-Castañeda. 2016. *Lasiurus xanthinus*, Western Yellow Bat. *The IUCN Red List of Threatened Species 2017: e.T41532A22004260*.

_____. 2017. *Idionycteris phyllotis,* Allen's Big-eared Bat. *The IUCN Red List of Threatened Species 2017: e.T10790A21990019*.

Bair, Allison, Marissa Howe, Daniela Roth, Robin Taylor, Tina Ayers, and Robert W. Kiger. 2006. "Vascular Plants of Arizona: Portulacaceae." *Canotia* 2 (1):1-22.

Barkley, T. M. 2006. "*Senecio multidentatus* var. *huachucanus*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. 20+. 20 Volume 20, p. 567.

Barlow, Jon C., Sheridan N. Leckie, and Colette T. Baril. 2020. "Gray Vireo (*Vireo vicinior*)." In *Birds of the World*, edited by A.F. Poole and F.B. Gill. Ithaca, New York: Cornell Lab of Ornithology.

Barringer, Kerry A. 2019. "*Limosella aquatica*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. New York and Oxford. 20+ vols. Vol. 17 Volume 17, p. 339.

Bezy, R.L. 2005. "The Night Lizards (*Xantusia*) of Arizona." *Sonoran Herpetologist* 18 (2):14-19 pp.

Bezy, Robert. 2004. "Slevin's Bunchgrass Lizard (*Sceloporus slevini*)." *Sonoran Herpetologist* 17 (6):62-63.

Bierner, Mark W. 2006. "*Hymenoxys ambigens* var. *neomexicana*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. 20+. 21 Volume 21, p. 439.

BISON-M. 2017a. "Bearded Mountainsnail (*Oreohelix barbata*)." Biota Information System of New Mexico [BISON-M]. https://bison-m.org/. Santa Fe, New Mexico.

_____. 2017b. "Gould's Wild Turkey (*Meleagris gallopavo*)." Biota Information System of New Mexico [BISON-M]. https://bison-m.org/. Santa Fe, New Mexico.

_____. 2017c. "New Mexico Talussnail (*Sonorella hachitana peloncillensis*)." Biota Information System of New Mexico [BISON-M]. https://bison-m.org/. Santa Fe, New Mexico.

Bleakly, David. 1999. Maguire's milkvetch (*Astragalus cobrensis* var. *maguirei*). *New Mexico Rare Plant List*. Albuquerue, New Mexico: New Mexico Rare Plant Technical Council.

Blinn, Dean W., and David E. Ruiter. 2009. "Caddisfly (Trichoptera) Assemblages along Major River Drainages in Arizona." *Western North American Naturalist* 69 (3):299-308.

Bolster, Betsy C. 2005. "Western Red Bat (*Lasiurus blossevillii*)." Western Bat Working Group. http://wbwg.org/western-bat-species/.

Bolster, Betsy C., and Jason A. Williams. 2005. "Western Yellow Bat (*Lasiurus xanthinus*)." Western Bat Working Group. http://wbwg.org/western-bat-species/.

Bowers, R. K. Jr., and J. B. Jr. Dunning. 1994. "Buff-Breasted Flycatcher (*Empidonax fulvifrons*), version 2.0." In *The Birds of North America [online]*, edited by A. F. Poole and F. B. Gill. Ithaca, New York: Cornell Lab of Ornithology.

_____. 1997. "Buff-collared Nightjar (*Antrostomus ridgwayi*), version 2.0." In *The Birds of North America [online]*, edited by A. F. Poole and F. B. Gill. Ithaca, New York: Cornell Lab of Ornithology.

Brennan, T.C. 2008a. "Bezy's Night Lizard *Xantusia bezyi*." Online Field Guide to the Reptiles and Amphibians of Arizona. T.C. Brennan. http://www.reptilesofaz.org/lizards.html.

_____. 2008b. "Canyon Spotted Whiptail *Aspidoscelis burti*." Online Field Guide to the Reptiles and Amphibians of Arizona. T.C. Brennan. http://www.reptilesofaz.org/Lizards-Subpages/h-a-burti.html.

_____. 2008c. "Green Ratsnake *Senticolis triaspis*." Online Field Guide to the Reptiles and Amphibians of Arizona. T.C. Brennan. http://www.reptilesofaz.org/Snakes-Subpages/h-s-triaspis.html.

_____. 2008d. "Mountain Skink *Plestiodon callicephalus*." Online Field Guide to the Reptiles and Amphibians of Arizona. T.C. Brennan. http://www.reptilesofaz.org/Lizards-Subpages/h-p-callicephalus.html.

_____. 2008e. "Red-backed Whiptail *Aspidoscelis xanthonota*." Online Field Guide to the Reptiles and Amphibians of Arizona. T.C. Brennan. http://www.reptilesofaz.org/Lizards-Subpages/h-a-xanthonota.html.

_____. 2008f. "Ridge-nosed Rattlesnake *Crotalus willardi*." Online Field Guide to the Reptiles and Amphibians of Arizona. T.C. Brennan. http://www.reptilesofaz.org/Snakes-Subpages/h-c-willardi.html.

_____. 2008g. "Slevin's Bunchgrass Lizard *Sceloporus slevini*." Online Field Guide to the Reptiles and Amphibians of Arizona. T.C. Brennan. http://www.reptilesofaz.org/Lizards-Subpages/h-s-slevini.html.

_____. 2008h. "Thornscrub Hook-nosed Snake *Gyalopion quadrangulare*." Online Field Guide to the Reptiles and Amphibians of Arizona. T.C. Brennan. http://www.reptilesofaz.org/Snakes-Subpages/h-g-quadrangulare.html.

_____. 2008i. "Twin-Spotted Rattlesnake *Crotalus pricei*." Online Field Guide to the Reptiles and Amphibians of Arizona. T.C. Brennan. http://www.reptilesofaz.org/Snakes-Subpages/h-c-pricei.html.

_____. 2008j. "Yaqui Black-Headed Snake *Tantilla yaquia*." Online Field Guide to the Reptiles and Amphibians of Arizona. T.C. Brennan. http://www.reptilesofaz.org/Snakes-Subpages/h-t-yaquia.html.

Brennan, Thomas C. 2008k. "Brown Vinesnake *Oxybelis aeneus*." Online Field Guide to the Reptiles and Amphibians of Arizona. T.C. Brennan. http://www.reptilesofaz.org/Snakes-Subpages/h-o-aeneus.html.

_____. 2008l. "Chihuahuan Black-Headed Snake *Tantilla wilcoxi*." Online Field Guide to the Reptiles and Amphibians of Arizona. T.C. Brennan. http://www.reptilesofaz.org/Snakes-Subpages/h-t-wilcoxi.html.

Brown, Harley P. 1972. "Synopsis of the Genus *Heterelmis* Sharp in the United States, with Description of a New Species from Arizona (Coleoptera, Dyropoidea, Elmidae)." *Entomological News* 83:229-238.

Burger, Bill. 2005. "Peregrine Falcon (*Falco peregrinus*)." In *Arizona Breeding Bird Atlas*, edited by Troy E. Corman and Cathryn Wise-Gervais. Albuquerque, New Mexico: University of New Mexico. p. 156-157.

Butterflies and Moths of North America. 2019a. "Cestus Skipper *Atrytonopsis cestus* (W.H. Edwards, 1884)." Metalmark Web and Data. http://www.butterfliesandmoths.org/.

_____. 2019b. "Huachuca Giant-Skipper *Agathymus evansi* (H.A. Freeman, 1950)." Metalmark Web and Data. http://www.butterfliesandmoths.org/.

_____. 2019c. "Sunrise Skipper *Adopaeoides prittwitzi* (Plotz, 1884)." Metalmark Web and Data. http://www.butterfliesandmoths.org/.

Cassola, F. 2016. *Microtus longicaudus* (errata version published in 2017). *The IUCN Red List of Threatened Species 2016*. e.T42627A115196586.

Catling, P. M., and V. S. Engel. 1993. Systematics and distribution of Hexalectris spicata var. arizonica (Orchidaceae). *Lindleyana 8: 119–125*. 119–125.

Cholewa, Anita F., and Douglass M. Henderson. 1993. "Iridaceae Iris Family: Part One, Sisyrinchium L." *Journal of the Arizona-Nevada Academy of Science* 27 (2):215-218.

_____. 2002. "*Sisyrinchium cernuum*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. 20+. 26 Volume 26, p. 357.

Coleman, Stephanie M. 2018. Aquatic Specialist Report. *Four Forest Restoration Initiative Rim Country*: U.S. Department of Agriculture, U.S. Forest Service. November 2, 2018. 183 pp.

Committee on Standard English and Scientific Names. 2017. Scientific and Standard English Names of Amphibians and Reptiles of North America north of Mexico, with Comments Regarding Confidence in our Understanding. Eighth Edition. *Herpetological Circular No. 43*. Shoreview, Minnesota: Society for the Study of Amphibians and Reptiles. September 2017. 102 pp.

Corman, Troy E. 2005a. "Abert's Towhee (*Pipilo aberti*)." In *Arizona Breeding Bird Atlas*, edited by Troy E. Corman and Cathryn Wise-Gervais. Albuquerque, New Mexico: University of New Mexico Press. p. 500-501.

_____. 2005b. "Arizona Woodpecker (*Picoides arizonae*)." In *Arizona Breeding Bird Atlas*, edited by Troy E. Corman and Cathryn Wise-Gervais. Albuquerque, New Mexico: University of New Mexico. p. 286-287.

_____. 2005c. "Broad-Billed Hummingbird (*Cynathus latirostris*)." In *Arizona Breeding Bird Atlas*, edited by Troy E. Corman and Cathryn Wise-Gervais. Albuquerque, New Mexico: University of New Mexico Press. p. 242-243.

_____. 2005d. "Buff-Breasted Flycatcher (*Empidonax fulvifrons*)." In *Arizona Breeding Bird Atlas*, edited by Troy E. Corman and Cathryn Wise-Gervais. Albuquerque, New Mexico: University of New Mexico. p. 310-311.

_____. 2005e. "Buff-collared Nightjar (*Camprimulgus ridgwayi*)." In *Arizona Breeding Bird Atlas*, edited by Troy E. Corman and Cathryn Wise-Gervais. Albuquerque, New Mexico: University of New Mexico. p. 236-237.

_____. 2005f. "Elegant Trogon (*Trogon elegans*)." In *Arizona Breeding Bird Atlas*, edited by Troy E. Corman and Cathryn Wise-Gervais. Albuquerque, New Mexico: University of New Mexico. p. 264-265.

_____. 2005g. "Ferruginous Pygmy-Owl (*Glaucidium brasilanum*)." In *Arizona Breeding Bird Atlas*, edited by Troy E. Corman and Cathryn Wise-Gervais. Albuquerque, New Mexico: University of New Mexico Press. p. 218-219.

_____. 2005h. "Grasshopper Sparrow (*Ammodramus savannarum*)." In *Arizona Breeding Bird Atlas*, edited by Troy E. Corman and Cathryn Wise-Gervais. Albuquerque, New Mexico: University of New Mexico. p. 528-529.

_____. 2005i. "Gray Vireo (*Vireo vicinior*)." In *Arizona Breeding Bird Atlas*, edited by Troy E. Corman and Cathryn Wise-Gervais. Albuquerque, New Mexico: University of New Mexico. p. 340-341.

_____. 2005j. "Lucifer Hummingbird (*Calothorax lucifer*)." In *Arizona Breeding Bird Atlas*, edited by Troy E. Corman and Cathryn Wise-Gervais. Albuquerque, New Mexico: University of New Mexico Press. p. 254-255.

_____. 2005k. "Northern Beardless-Tyrannulet (*Camptostoma imberbe*)." In *Arizona Breeding Bird Atlas*, edited by Troy E. Corman and Cathryn Wise-Gervais. Albuquerque, New Mexico: University of New Mexico. p. 294-295.

_____. 2005l. "Rose-Throated Becard (*Pachyramphus aglaiae*)." In *Arizona Breeding Bird Atlas*, edited by Troy E. Corman and Cathryn Wise-Gervais. Albuquerque, New Mexico: University of New Mexico. p. 334-335.

_____. 2005m. "Sulphur-Bellied Flycatcher (*Myiodynastes luteiventris*)." In *Arizona Breeding Bird Atlas*, edited by Troy E. Corman and Cathryn Wise-Gervais. Albuquerque, New Mexico: University of New Mexico. p. 324-325.

_____. 2005n. "Supplemental Species Accounts." In *Arizona Breeding Bird Atlas*, edited by Troy E. Corman and Cathryn Wise-Gervais. Albuquerque, New Mexico: University of New Mexico. p. 590-603.

_____. 2005o. "Thick-Billed Kingbird (*Tyrannus crassirostris*)." In *Arizona Breeding Bird Atlas*, edited by Troy E. Corman and Cathryn Wise-Gervais. Albuquerque, New Mexico: University of New Mexico. p. 330-331.

_____. 2005p. "Varied Bunting (*Passerina versicolor*)." In *Arizona Breeding Bird Atlas*, edited by Troy E. Corman and Cathryn Wise-Gervais. Albuquerque, New Mexico: University of New Mexico. p. 550-551.

_____. 2005q. "Violet-Crowned Hummingbird (*Amazilia violiceps*)." In *Arizona Breeding Bird Atlas*, edited by Troy E. Corman and Cathryn Wise-Gervais. Albuquerque, New Mexico: University of New Mexico Press. p. 248-249.

_____. 2005r. "White-Eared Hummingbird (*Hylocharis leucotis*)." In *Arizona Breeding Bird Atlas*, edited by Troy E. Corman and Cathryn Wise-Gervais. Albuquerque, New Mexico: University of New Mexico Press. p. 244-245.

_____. 2005s. "Yellow-Eyed Junco (*Junco phaeonotus*)." In *Arizona Breeding Bird Atlas*, edited by Troy E. Corman and Cathryn Wise-Gervais. Albuquerque, New Mexico: University of New Mexico. p. 536-537.

Cuarón, A. D., J. F. González-Maya, K. Helgen, F. Reid, J. Schipper, and J. W. Dragoo. 2016. *Mephitis macroura*. *The IUCN Red List of Threatened Species 2016*. e.T41634A45211135.

Decker, Karin. 2006. *Asclepias uncialis* Greene (Wheel Milkweed): A Technical Conservation Assessment. Rocky Mountain Region: USDA Forest Service. April 24, 2006. 52 pp.

Desert Fishes Team. 2004. Status of Unlisted Native Fishes of the Gila River Basin, with Recommendations for Management. *Report Number 2*. Tempe, Arizona: Marsh & Associates, LLC. August 31, 2004.

Dorr, Laurence J. 2015. "*Ayenia jaliscana*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. New York and Oxford: Oxford University Press. 20+. 6 Volume 6, p. 203.

eBird. 2019. eBird: An Online Database of Bird Distribution and Abundance. *eBird Website*. Ithaca, New York: Cornell Lab of Ornithology.

Edwards, Taylor, and Don Swann. 2003. "Mountain Skink (*Plestiodon callicephalus*)." *Sonoran Herpetologist* 16 (6).

Egger, J. Mark, Peter F. Zika, Barabara L. Wilson, Richard E. Brainerd, and Nick Otting. 2019. "*Castilleja nervata*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. New York and Oxford. 20+ vols. Vol. 17 Volume 17, p. 634.

Elvander, Patrick. 1992. "Vascular Plants of Arizona: Saxifragaceae." *Journal of the Arizona-Nevada Academy of Science* 26 (1):36-41.

Ertter, Barbara. 2007. "Generic Realignments in Tribe Potentilleae and Revision of Drymocallis (Rosoideae: Rosaceae) in North America." *Journal of the Botanical Research Institute of Texas* 1:31-46.

_____. 2014a. "*Potentilla albiflora*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. New York and Oxford. 20+ vols. Vol. 9 Volume 9, p. 186.

_____. 2014b. "*Potentilla rhyolitica* var. *chiricahuensis*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. New York and Oxford. 20+ vols. Vol. 9 Volume 9, p. 186.

_____. 2014c. "*Potentilla rhyolitica* var. *rhylolitica*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. New York and Oxford. 20+ vols. Vol. 9 Volume 9, p. 186.

Ferguson, David J. 2002. *Phemeranthus humilis* (Pinos Altos fame flower). *New Mexico Rare Plants*. Albuquerque, New Mexico: New Mexico Rare Plant Technical Council.

Forston Wells, Elizabeth, and Barbara Greene Shipes. 2009. "*Heuchera glomerulata*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. New York and Oxford. 20+ vols. Vol. 8 Volume 8, p. 103.

Freeman, Craig C. 2019. "*Penstemon discolor*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. New York and Oxford. 20+ vols. Vol. 17 Volume 17, p. 103.

Fryxell, Paul A., and Steven R. Hill. 2016. "*Abutilon parishii*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. New York and Oxford. 20+ vols. Vol. 6 Volume 6, p. 225.

Fuentes-Soriano, Sara, and Ihsan A. Al-Shehbaz. 2010. "*Pennellia tricornuta*." In *Flora of North America Editorial Committee, eds. 1993+ Flora of North America North of Mexico*. New York and Oxford. 20+ vols. Vol. 7 Volume 7, p. 561.

Gehlbach, F. R., N. Y. Gehlbach, P. Pyle, and M. A. Patten. 2017. "Whiskered Screech-Owl (*Megascops trichopsis*), version 3.0." In *The Birds of North America [online]*, edited by P.G. Rodewald. Ithaca, New York: Cornell Lab of Ornithology.

Glassberg, Jeffrey. 2001. *Butterflies Through Binoculars: The West: A Field Guide to the Butterflies of Western North America*. New York, New York: Oxford University Press.

Goldman, D. H., Ronald A. Coleman, L. K. Magrath, and P.M. Catling. 2003. "Orchidaceae." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. New York and Oxford: Oxford University Press. 20+. 26 603-605.

Goldman, Douglas H., and John M. MacDougal. 2016. "*Passiflora arizonica*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. New York and Oxford. 20+ vols. Vol. 6 Volume 6, p. 177.

Green, M. T., P. E. Lowther, S. L. Jones, S. K. Davis, and B. C. Dale. 2020. "Baird's Sparrow (*Centronyx bairdii*), version 1.0." In *Birds of the World*, edited by A. F. Poole and F. B. Gill. Ithaca, New York: Cornell Lab of Ornithology.

Greenlaw, J. S. 2014. "Rose-Throated Becard (*Pachyramphus aglaiae*), version 1.0." In *Neotropical Birds Online*, edited by T. S. Schulenberg. Ithaca, New York: Cornell Lab of Ornithology.

Groschupf, K. D., and C. W. Thompson. 2020. "Varied Bunting (*Passerina versicolor*), version 1.0." In *Birds of the World*, edited by A. F. Poole and F. B. Gill. Ithaca, New York: The Cornell Lab of Ornithology.

Gulson, E. R. 2012. "Eared Quetzal (E*uptilotis neoxenus)*, version 1.0." In *Neotropical Birds Online*, edited by T. S. Schulenberg. Ithaca, New York: Cornell Lab of Ornithology.

Gutierrez, Raul Jr. 2007. "Vascular Plants of Arizona: Psilotaceae." *Canotia* 3 (2):32-34.

Hammerson, G. 2005. Brown Vinesnake (*Oxybelis aeneus*). *NatureServe Explorer*. December 12, 2005.

Hammerson, G. A. 2019. *Aspidoscelis stictogramma*. *The IUCN Red List of Threatened Species 2019*. e.T89970161A89970185.

Hammerson, G. A., D. R. Frost, and H. Gadsden. 2007. *Gyalopion quadrangulare*. *The IUCN Red List of Threatened Species 2007*. e.T63818A1271838.

Hammerson, G. A., D. R. Frost, P. Ponce-Campos, and H. Gadsden. 2007. *Plestiodon callicephalus*. *The IUCN Red List of Threatened Species 2007*. e.T64222A12754928.

Hammerson, G. A., F. Mendoza-Quijano, J. Lee, J. Vazquez Díaz, and G. E. Quintero Díaz. 2015. *Senticolis triaspis*. *The IUCN Red List of Threatened Species 2015*. e.T190631A79915739.

Hammerson, G. A., J. Vazquez Díaz, and G. E. Quintero Díaz. 2007a. *Crotalus pricei*. *The IUCN Red List of Threatened Species 2007*. e.T64328A12770149.

_____. 2007b. *Crotalus willardi*. *The IUCN Red List of Threatened Species 2007*. e.T62253A12584209.

_____. 2007c. *Sceloporus slevini*. *The IUCN Red List of Threatened Species 2007*. e.T64145A12748974.

Hammerson, G.A. 2017. *Dryophytes wrightorum* (amended version of 2004 assessment). *The IUCN Red List of Threatened Species 2017*. e.T55696A112710808.

Hayden, W. John. 2016. "*Manihot davisiae*." In *Flora of North America Editorial Committee, eds. 1993+ Flora of North America North of Mexico*. New York and Oxford. 20+ vols. Vol. 12 194.

Herrera Arrieta, Yolanda, and Paul M. Peterson. 2018. "Grasses of Chihuahua, Mexico." *Smithsonian Contributions to Botany* 107:1-380.

Hoffmeister, Donald F. 1986. *Mammals of Arizona*: The University of Arizona Press and The Arizona Game and Fish Department.

Holderman, Jill. 2016. Travel Management Tonto National Forest, Sensitive Wildlife Species, Management Indicator Species, and Migratory Bird Report. U.S. Forest Service. February 17, 2016.

Hwang, Y.T., and S. Larivière. 2001. "Mephitis macroura." *Mammalian Species* 686:1-3.

Integrated Taxonomic Information System. 2019. "Integrated Taxonomic Information System online database." http://www.itis.gov.

Johnson-Fulton, Susannah B., and Linda E. Watson. 2016. "*Amoreuxia gonzalezii*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. New York and Oxford. 20+ vols. Vol. 6 Volume 6, p. 379.

Johnson, Kristen. 2013. Huachuca milkvetch (*Astragalus hypoxylus*). *NatureServe Explorer*.

Johnson, R. R., L. T. Haight, J. D. Ligon, P. Pyle, and M. A. Patten. 2018. "Arizona Woodpecker (*Picoides arizonae*), version 2.1." In *The Birds of North America [online]*, edited by P. G. Rodewald. Ithaca, New York: Cornell Lab of Ornithology.

Kearney, Thomas H., and Robert H. Peebles. 1960. *Arizona Flora Second Edition*. Berkeley, California: University of California Press.

Kennedy, A. H., D. L. Taylor, and L. E. Watson. 2011. "Mycorrhizal Specificity in the Fully Mycoheterotrophic *Hexalectris* Raf. (Orchidaceae: Epidendroideae)." *Molecular Ecololgy* 20 (6):1303-16.

Kennedy, Aaron H. , and Linda Watson. 2010. "Species Delimitations and Phylogenetic Relationships with the Fully Myco-Heterotrophic Hexalectris (Orchidaceae)." *Systematic Botany* 35 (1):64-76.

Kiger, Robert W. 2003. "*Phemeranthus humilis*." In *Flora of North America Editorial Commettee, eds. 1993+ Flora of North America North of Mexico*. New York and Oxford. 20+ vols. Vol. 4 Volume 4, p. 492.

Kunzmann, M. R., L. S. Hall, and R. R. Johnson. 1998. "Elegant Trogon (*Trogon elegans*), version 2.0." In *The Birds of North America [online]*, edited by A. F. Poole and F. B. Gill. Ithaca, New York: Cornell Lab of Ornithology.

Ladyman, Juanita A. 1999. Chiricahua Mudwort (*Limosella pubiflora*). *NatureServe Explorer*. October 28, 1999.

Lang, Brian K., and Lance H. Gilbertson. 2010. "A New Species of *Sonorella* (Gastropoda: Pulmonata: Helminthoglyptidae) From Southwestern New Mexico, With a Revision of the Subspecies of *Sonorella hachitana* (Dall)." *Proceedings of the Biological Society of Washington* 123 (1):62-71.

Leavitt, D.H., R.L. Bezy, K.A. Crandall, and Jr. Sites, J.W. 2007. "Multi-Locus DNA Sequence Data Reveal a History of Deep Cryptic Vicariance and Habitat-Driven Convergence in the Desert Night Lizard *Xantusia vigilis* Species Complex (Squamata: Xantusiidae)." *Molecular Ecology* 16:4455-4481.

Lichvar, R. W., D. L. Banks, W. N. Kirchner, and N. C. Melvin. 2016. 2016 National Wetland Plant List. *Phytoneuron*: U.S. Army Corps of Engineers. 166 pp.

Light, Jessica E., Marcy O. Ostroff, and David J. Hafner. 2016. "Phylogeographic Assessment of the Northern Pygmy Mouse, *Baiomys taylori*." *Journal of Mammalogy* 97 (4):1081-1094.

Little, R. John, and Landon E McKinney. 2016. "*Violoa umbraticola* var. *glaberrima*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. New York and Oxford. 20+ vols. Vol. 6 Volume 6, p. 161.

Lower Colorado River Multi-Species Conservation Program. 2016. Species Accounts for the Lower Colorado River Multi-Species Conservation Program. Boulder City, Nevada: Bureau of Reclamation. June 2016.

Lowther, P. E., P. Pyle, and M. A. Patten. 2020. "Thick-Billed Kingbird (*Tyrannus crassirostris*), version 1.0." In *Birds of the World*, edited by P.G. Rodewlad. Ithaca, New York: Cornell Lab of Ornithology.

Lowther, Peter E., and Douglas F. Stotz. 1999. "Sulphur-bellied Flycatcher (*Myiodynastes luteiventris*), version 2.0." In *The Birds of North America [online]*. Ithaca, New York: Cornell Lab of Ornithology.

Luensmann, Peggy. 2010. "*Falco peregrinus.* In: Fire Effects Information System, [Online]." U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory. https://www.fs.fed.us/database/feis/animals/bird/fape/all.html.

Lutch, Debbie. 2000. Tonto National Forest Threatened, Endangered and Sensitive (TES) Species 2000 Draft Abstracts. U.S. Forest Service. July 5, 2000.

Mason, Charles T., Jr. 1998. "Gentianaceae Gentian Family." *Journal of the Arizona-Nevada Academy of Science* 30 (2):84-95.

McCraine, James T. 1980. "*Crotalus pricei* Van Denburgh Twin-Spotted Rattlesnake." *Catalogue of American Amphibians and Reptiles (CAAR)*:266.1-266.2.

McLaughlin, Steven P. 1993. "Apocynaceae A. L. Juss. Dogbane Family." *Journal fo the Arizona-Nevada Academy of Science* 27 (2):164-168.

McNeal, Dale W., and T. D. Jacobsen. 2002. "*Allium gooddingii* Ownbey." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. 20+. 26 Volume 26, p. 245.

McRoberts, J. T., M. C. Wallace, and S. W. Eaton. 2014. "Wild Turkey (M*eleagris gallopavo)*, version 2.0." In *The Birds of North America [online]*, edited by A. F. Poole. Ithaca, New York: Cornell Lab of Ornithology.

Medellín, R. 2016. "*Leptonycteris yerbabuenae* (Lesser Long-nosed Bat)." *The IUCN Red List of Threatened Species*:e.T136659A21988965.

Mims, Meryl C., Lorenz Hauser, Caren S. Goldberg, and Julian D. Olden. 2016. "Genetic Differentiation, Isolation-by-Distance, and Metapopulation Dynamics of the Arizona Treefrog (*Hyla wrightorum*) in an Isolated Portion of Its Range." *PLOS ONE* 11 (8):1-23.

Minckley, W. L., and P.C. Marsh. 2009. *Inland Fishes of the Greater Southwest - Chronicle of a Vanishing Biota*. Tucson, Arizona: University of Arizona Press.

Moors, Amanda. 2005. "Wild Turkey (*Meleagris gallopavo*)." In *Arizona Breeding Bird Atlas*, edited by Troy E. Corman and Cathryn Wise-Gervais. Albuquerque, New Mexico: University of New Mexico. p. 80-81.

Morgan, David R. 2006. "*Psilactis gentryi*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. 20+. 20 Volume 20, p. 463.

Morton, John K. 2005. "*Stellaria porsildii*." In *Flora of North America Editorial Committee, eds. 1993+ Flora of North America North of Mexico*. New York and Oxford. 20+ vols. Vol. 5 Volume 5, p. 112.

Mosyakin, Sergei L. 2005. "*Rumex orthoneurus*." In *Flora of North America Editorial Committee, eds. 1993+ Flora of North America North of Mexico*. New York and Oxford. 20+ vols. Vol. 5 Volume 5, p. 516.

Muchmore, William B. 1997. "*Tuberochernes* (Pseudoscorpionida, Chernetidae), a New Genus with Species in Caves in California and Arizona." *The Journal of Arachnology* 25:206-212.

Mygatt. 2000. *Hymenoxys ambigens* var*. neomexicana* (New Mexico Bitterweed). *New Mexico Rare Plants*. Albuquerque, New Mexico: New Mexico Rare Plants Technical Council.

Natural Resources Conservation Service. 2019. "The PLANTS Database." U.S. Department of Agriculture. http://plants.usda.gov. Greensboro, N.C.

NatureServe. 2020. "NatureServe Explorer [web application] *Leptonycteris yerbabuenae* Lesser Long-nosed Bat." https://explorer.natureserve.org/. Arlington, Virginia.

NatureServe, and T. J. Lyons. 2019a. "*Catostomus insignis* (Sonora Sucker)." *The IUCN Red List of Threatened Species 2019*:e.T191236A129657033.

_____. 2019b. "*Pantosteus clarkii* (Desert Sucker)." *The IUCN Red List of Threatened Species 2019*:e.T62193A129656831.

Nesom, Guy L. 2006a. "*Erigeron arisolius*." In *Flora of North America Editorial Committee, eds. 1993+ Flora of North America North of Mexico*. New York and Oxford. 20+ vols. Vol. 20 Vol. 20, p. 337.

_____. 2006b. "*Erigeron heliographis*." In *Flora of North America Editorial Committee, eds. 1993+ Flora of North America North of Mexico*. New York and Oxford. 20+ vols. Vol. 20 Vol. 20, p. 309.

_____. 2006c. "*Erigeron kuschei*." In *Flora of North America Editorial Committee, eds. 1993+ Flora of North America North of Mexico*. New York and Oxford. 20+ vols. Vol. 20 Vol. 20, p. 334.

_____. 2006d. "*Stevia lemmonii*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. New York and Oxford: Oxford University Press. 20+. 21 Volume 20, p. 484.

_____. 2015. "*Tumamoca macdougalii*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. New York and Oxford: Oxford University Press. 20+. 6 Volume 6, p. 30.

Nimmo, Andrew P. 1991. "Seven New Species of *Limnephilus* from Western North America with Description of Female of *L. pallens* (Banks) (Trichoptera: Limnephilidae, Limnephilinae, Limnephilini)." *Proceedings of the Entomological Society of Washington* 93 (2):499-508.

Noel, Debra, and Paul Cryan. 2005. "Mexican Long-Tongued Bat (*Choeronycteris mexicana*)." Western Bat Working Group. http://wbwg.org/western-bat-species/.

Nordman, C. 2018a. Chihuahuan Sedge (*Carex chihuahuensis*). *NatureServe Explorer*. December 9, 2018.

_____. 2018b. Ponderosa Violet (*Viola umbraticola*). *NatureServe Explorer*. December 10, 2018.

_____. 2018c. Smooth Baby-Bonnets (*Coursetia glabella*). *NatureServe Explorer*. November 26, 2018.

_____. 2018d. Sonoran Trefoil (*Lotus alamosanus*). *NatureServe Explorer*. December 7, 2018.

_____. 2018e. Virlet's Paspalum (*Paspalum virletii*). *NatureServe Explorer*. November 27, 2018.

O'Farrell, Michael J., Patricia Brown, and Lyle Lewis. 2005. "*Idionycteris phyllotis*." Western Bat Working Group. http://wbwg.org/western-bat-species.

Oliver, L. 2015. Bush-violet (*Browallia eludens*). *NatureServe Explorer*. October 8, 2015.

Pasch, Bret, and John L. Koprowski. 2011. "Impacts of Fire Suppression on Space Use by Mexican Fox Squirrels." *Journal of Mammalogy* 92 (1):227-234.

Peterson, Paul M. 2003a. "*Muhlenbergia elongata*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. New York and Oxford. 20+ vols. Vol. 25 Volume 25, p. 190.

_____. 2003b. "*Muhlenbergia palmeri*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. New York and Oxford. 20+ vols. Vol. 25 Volume 25, p. 192.

Piaggio, Antoinette, Kirk W. Navo, and Craig W. Stihler. 2009. "Intraspecific Comparison of Population Structure, Genetic Diversity, and Dispersal Among Three Subspecies of Townsend's Big-Eared Bats, *Corynorhinus townsendii townsendii*, *C. t. pallescens*, and the Endangered *C. t. virginianus*." *Conservation Genetics* 10:143-159.

Poole, Jackie M. 2011. Hinckley's Jacob's-ladder (*Polemonium pauciflorum* ssp. *hinckleyi*). *NatureServe Explorer*.

Powers, D. R., and S. M. Wethington. 1999. "Broad-billed Hummingbird (*Cynanthus latirostris*), version 2.0." In *The Birds of North America [online]*, edited by A. F. Poole and F. B. Gill. Ithaca, New York: Cornell Lab of Ornithology.

Price, R. M. 1991. "*Senticolis* Dowling and Fries." *Catalogue of American Amphibians and Reptiles (CAAR)*:525.1-525.4.

Proudfoot, G. A., and R. R. Johnson. 2000. "Ferruginous Pygmy-Owl (*Glaucidium brasilianum*), wersion 2.0." In *The Birds of North America [online]*, edited by A. F. Poole and F. B. Gill. Ithaca, New York: The Cornell Lab of Ornithology.

Reveal, James L., and Wendy C. Hodgson. 2002a. "*Agave parviflora* subsp. *parviflora*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. 20+. 26 Volume 26 p. 446.

_____. 2002b. "*Agave schottii* var. *treleasei*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. 20+. 26 Volume 26, p. 448.

Rorabaugh, Jim. 2008a. "Barking Frog *Craugastor augusti*." Online Field Guide to the Reptiles and Amphibians of Arizona. T.C. Brennan. http://www.reptilesofaz.org/Turtle-Amphibs-Subpages/h-c-augusti.html.

_____. 2008b. "Tarahumara Frog *Lithobates tarahumarae*." Online Field Guide to the Reptiles and Amphibians of Arizona. T.C. Brennan. http://www.reptilesofaz.org/Turtle-Amphibs-Subpages/h-l-tarahumarae.html.

_____. 2013a. "Chihuahuan Black-Headed Snake (*Tantilla wilcoxi*)." *Sonoran Herpetologist* 26 (4):77-79.

_____. 2013b. "Tarahumara Frog *Lithobates tarahumarae*." *Sonoran Herpetologist* 26 (4):80-85.

_____. 2013c. "Yaqui Black-Headed Snake (*Tantilla yaquia*)." *Sonoran Herpetologist* 26 (3):61-67.

_____. 2019a. "Giant Spotted Whiptail (*Aspidoscelis stictogramma*)." Tucson Herpetological Society. https://tucsonherpsociety.org/amphibians-reptiles/lizards/giant-spotted-whiptail/.

_____. 2019b. "Green Ratsnake (*Senticolis triaspis*)." Tucson Herpetological Society. https://tucsonherpsociety.org/amphibians-reptiles/snakes/green-ratsnake/.

_____. 2019c. "Red-Backed Whiptail (*Aspidoscelis xanthonota*)." Tucson Herpetological Society. https://tucsonherpsociety.org/amphibians-reptiles/lizards/red-backed-whiptail/.

_____. 2019d. "Thornscrub Hook-Nosed Snake (*Gyalopion quadrangulare*)." Tucson Herpetological Society. https://tucsonherpsociety.org/amphibians-reptiles/snakes/thornscrub-hook-nosed-snake-2/.

_____. 2019e. "Twin-Spotted Rattlesnake (*Crotalus pricei*)." Tucson Herpetological Society. https://tucsonherpsociety.org/amphibians-reptiles/snakes/twin-spotted-rattlesnake/.

Roth, Daniela. 2008. Species Account for *Allium gooddingii*. Window Rock, Arizona: Navajo Natural Heritage Program. May 15, 2008. 29-30.

Ruiter, David E. 2007. "Description of the *Limnephilus granti* (Nimmo) Female with a Redescription of the Male (Trichoptera: Limnephilidae)." *Proceedings of the Entomological Society of Washington* 109 (1):86-89.

Schemnitz, Sanford D., and William D. Zeedyk. 1992. "Gould's Turkey." In *The Wild Turkey: Biology and Management*, edited by James G. Dickson. Mechanicsburg, Pennsylvania: Stackpole Books. 350-360.

Schuetze, S. 2011. Gentry's Indigobush (*Dalea tentaculoides*). *NatureServe Explorer*. July 28, 2011.

_____. 2013. Palmer's Muhly (*Muhlenbergia palmeri*). *NatureServe Explorer*.

Scott, P. E. 1994. "Lucifer Hummingbird (*Calothorax lucifer*), version 2.0." In *The Birds of North America [online]*, edited by A. F. Poole and F. B. Gill. Ithaca, New York: Cornell Lab of Ornithology.

SEINet Portal Network. 2018. http://swbiodiversity.org/seinet/index.php. SEINet Portal Network.

_____. 2019. http://swbiodiversity.org/seinet/index.php. SEINet Portal Network.

Semple, John C. 2006. "*Heterotheca rutteri*." In *Flora of North America Editorial Committee, eds. 1993+ Flora of North America North of Mexico*. New York and Oxford. 20+ vols. Vol. 20 Volume 20, p. 242.

Sherwin, Rick, and Antoinette Piaggio. 2005. "Townsend's Big-Eared Bat (*Corynorhinus townsendii*)." Western Bat Working Group. http://wbwg.org/western-bat-species/.

Skinner, Mark W. 2002. "*Lilium parryi*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. New York and Oxford. 20+ vols. Vol. 26 Volume 26, p. 191.

Smith, Alan R. 1993. "*Thelypteris puberula* var. *sonorensis*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. New York and Oxford. 20+ vols. Vol. 2.

Spellenberg, Richard. 1999. Chihuahua scurf pea (*Pediomelum pentaphyllum*). *New Mexico Rare Plants*. Albuquerque, New Mexico: New Mexico Rare Plants Technical Council.

Squires, John R., and Richard T. Reynolds. 1997. "Northern Goshawk (*Accipiter gentilis*), version 2.0." In *The Birds of North America Online*, edited by A. F. Poole and F. B. Gill. Ithaca, New York: Cornell Lab of Ornithology.

Standley, Lisa A. 2002a. "*Carex chihuahuensis*." In *Flora of North America Editorial Committee, eds. 1993+ Flora of North America North of Mexico*. New York and Oxford. 20+ vols. Vol. 23 423.

_____. 2002b. "*Carex spissa*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. New York and Oxford. 20+ vols. Vol. 23 Vol. 23, p. 423.

Streicher, Jeffrey W., Thomas J. Devitt, Caren S. Goldberg, John H. Malone, Heath Blackmon, and Matthew K. Fujita. 2014. "Diversification and Asymmetrical Gene Flow Across Time and Space: Lineage Sorting and Hybridization in Polytypic Barking Frogs." *Molecular Ecology* 23 (13):3273-3291.

Strother, John L. 2006. "*Hieracium abscissum*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. 20+. 19 Volume 19, p. 293.

Sullivan, K. A. 2018. "Yellow-eyed Junco (*Junco phaeonotus*), version 1.1." In *The Birds of North America [online]*, edited by P. G. Rodewald. Ithaca, New York: Cornell Lab of Ornithology.

Sundell, Eric. 1993. "Asclepiadaceae Milkweed Family." *Journal fo the Arizona-Nevada Academy of Science* 27 (2):169-187.

Tenney, Chris R. 2000. "Northern Beardless-Tyrannulet (*Camptostoma imberbe*), version 2.0." In *The Birds of North America [online]*, edited by A.F. Poole and F. B. Gill. Ithaca, New York: Cornell Lab of Ornithology.

Thieret, John W. 1993. "*Psilotum nudum*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. New York and Oxford. 20+ vols. Vol. 2 Volume 2, p.

Timm, R., S.T. Álvarez-Castañeda, I. Castro-Arellano, and T. Lacher. 2016. *Baiomys taylori* (errata version published in 2017). *The IUCN Red List of Threatened Species 2016*. e.T2466A115062269.

Tomaino, A. 2018a. Pinaleno Cinquefoil (*Potentilla albiflora*). *NatureServe Explorer*. November 16, 2018.

_____. 2018b. Soft Mexican Orange (*Choisya dumosa* var. *mollis*). *NatureServe Explorer*. August 18, 2018.

Trock, Debra K. 2006. "*Packera neomexicana* var. *toumeyi*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. 20+. 20 Volume 20, p. 594.

Tweit, R. C., and D. M. Finch. 1994. "Abert's Towhee (*Melozone aberti*), version 2.0." In *The Birds of North America [online]*, edited by A. F. Poole and F. B. Gill. Ithaca, New York: Cornell Lab of Ornithology.

U.S. Fish and Wildlife Service. 2009. Endangered and Threatened Wildlife and Plants; Partial 90-Day Finding on a Petition to List 475 Species in the Southwestern United States as Threatened or Endangered with Critical Habitat. U.S. Fish and Wildlife Service. December 16, 2009. *Federal Register*, 74:66866-66905.

_____. 2011a. Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to List Amoreuxia gonzalezii, Astragalus hypoxylus, and Erigeron piscatcus as Endangered or Threatened. U.S. Department of the Interior. October 11, 2011. *Federal Register*, 76:62722-62740.

_____. 2011b. Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition To List the Cactus Ferruginous Pygmy-Owl as Threatened or Endangered With Critical Habitat; Proposed Rule. U.S. Department of the Interior. October 5, 2011. *Federal Register*, 76:61856-61894.

_____. 2012. Endangered and Threatened Wildlife and Plants; 90-Day Finding on a Petition To List the Sonoran Talussnail as Endangered or Threatened. Department of the Interior. *Federal Register*, 77:43218-43222.

_____. 2013. Endangered and Threatened Wildlife and Plants; 12-Month Finding on a Petition to List Coleman's Coralroot as an Endangered or Threatened Species. U.S. Fish and Wildlife Service. December 19, 2013. *Federal Register*, 75:76795-76807.

_____. 2016a. Endangered and Threatened Wildlife and Plants; 12-Month Findings on Petitions to List 10 Species as Endandered or Threatened Species. Thursday, October 6, 2016,. *Federal Register*, 81:69425-69442.

_____. 2016b. Species Assessment and Listing Priority Assignment Form: *Hyla wrightorum* (Arizona Treefrog Huachuca-Canelo Population). U.S. Fish and Wildlife Service,. August 8, 2016. 27 pp.

_____. 2016c. Species Status Assessment Report for Stephan's Riffle Beetle. *Version 1.0*. Albuquerque, New Mexico: U.S. Fish and Wildlife Service. August, 2016. 39 pp.

_____. 2018a. Endangered and Threatened Wildlife and Plants; Removal of the Lesser Long-nosed Bat from the Federal List of Endangered and Threatened Wildlife; Final Rule. U.S. Fish and Wildlife Service. April 18, 2018. *Federal Register*, 83:17093 - 17110.

_____. 2018b. Species Status Assessment for the Lesser Long-Nosed Bat (*Leptonycteris yerbabuenae*). Phoenix, Arizona: Arizona Ecological Services Office. April 2018.

_____. 2018c. Species Status Assessment Report for *Pediomelum pentaphyllum* (Chihuahua scurfpea). *Version 1.0*, New Mexico Ecological Services Field Office. Albuquerque, New Mexico. April 2018. 94 pp.

Urtecho, Roberto J. 2016. "*Tragia laciniata*." In *Flora of North America North of Mexico*, edited by Flora of North America Editorial Committee. New York and Oxford. 20+ vols. Vol. 12 Volume 12, p. 188.

Van Devender, Thomas R., Charles H. Lowe, and Howard E. Lawler. 1994. "Factors Influencing the Distribution of the Neotropical Vine Snake *Oxybelis aeneus* in Arizona and Sonora, Mexico." *Herpetological Natural History* 2 (1):25-42.

Vickery, Peter D. 1996. "Grasshopper Sparrow (*Ammodramus savannarum*), version 2.0." In *The Birds of North America [online]*, edited by A. F. Poole and F. B. Gill. Ithaca, New York: Cornell Lab of Ornithology.

Villa, Robert. 2019. "Ridge-Nosed Rattlesnake (*Crotalus willardi*)." Tucson Herpetological Society. https://tucsonherpsociety.org/amphibians-reptiles/snakes/ridge-nosed-rattlesnake/.

Watkins-Colwell, Gregory J, Hobart M Smith, and David Chiszar. 2003. "*Sceloporus slevini*." *Catalogue of American Amphibians and Reptiles (CAAR)*:771.1-771.6.

Weaver, K. F., P. F. Weaver, and R. Guralnick. 2010. "Origin, Diversification and Conservation Status of the Talus Snail in the Pinaleno Mountains: A Conservation Biogeographic Study." *Animal Conservation* 13 (3):306-314.

WestLand Resources, Inc. 2012. Survey for *Hexalectris colemanii* and *Hexalectris arizonica* in Southeastern Arizona - 2012. *Prepared for Rosemont Copper Company*. Tucson, Arizona: WestLand Resources, Inc. September 2012.

Wethington, S. M. 2002. "Violet-crowned Hummingbird (*Amazilia violiceps*), version 2.0." In *The Birds of North America [online]*, edited by A. F. Poole and F. B. Gill. Ithaca, New York: Cornell Lab of Ornithology.

White, Clayton M., Nancy J. Clum, Tom J. Cade, and W. Grainger Hunt. 2002. "Peregrine Falcon (*Falco peregrinus*), version 2.0." In *The Birds of North America [online]*, edited by A. F. Poole and F. B. Gill. Ithaca, New York: Cornell Lab of Ornithology.

Wilken, Dieter H., and J. Mark Porter. 2005. "Polemoniaceae Phlox Family." *Canotia* 1 (1):1-37.

Williams, N. R. 2011. "Elegant Trogon (*Trogon elegans*), version 1.0." In *Neotropical Birds Online*, edited by T. S. Schulenberg. Ithaca, New York: Cornell Lab of Ornithology.

Wise-Gervais, Cathryn. 2005a. "Northern Goshawk (*Accipiter gentilis*)." In *Arizona Breeding Bird Atlas*, edited by Troy E. Corman and Cathryn Wise-Gervais. Albuquerque, New Mexico: University of New Mexico. p. 134-135.

_____. 2005b. "Whiskered Screech-Owl (*Megascops trichopsis*)." In *Arizona Breeding Bird Atlas*, edited by Troy E. Corman and Cathryn Wise-Gervais. Albuquerque, New Mexico: University of New Mexico. p. 212-213.

Woodman, N., J. Matson, and I. Castro-Arellano. 2016. *Sorex arizonae* (errata version published in 2017). *The IUCN Red List of Threatened Species 2016*. e.T20396A115158374.

Yarborough, Sharon C., and A. Michael Powell. 2006. "*Perityle cochisensis*." In *Flora of North America Editorial Committee, eds. 1993+ Flora of North America North of Mexico*. New York and Oxford. 20+ vols. Vol. 21 Volume 21, p. 334.

Yatskievych, George, and Michael D. Windham. 2009. "Vascular Plants of Arizona: Thelypteridaceae." *Canotia* 5 (1):49-52.

Zimmerman, Allan D., and Bruce D. Parfitt. 2003. "*Coryphantha recurvata*." In *Flora of North America Editorial Committee, eds. 1993+ Flora of North America North of Mexico*. New York and Oxford. 20+ vols. Vol. 4.

APPENDIX E
USFS CNF Sensitive Species (Common Name) with Potential to Occur in ERU Habitat Types within the Study Area

USFS CNF Sensitive Species (Common Name) with Potential to Occur in Ecosystem Response Unit (ERU) Habitat Types within the Analysis Area

Madrean Encinal Woodland	Fremont Cottonwood / Shrub	Semi-Desert Grassland	Juniper Grass
Western barking frog	Violet-crowned hummingbird	Arizona grasshopper sparrow	Buff-collared nightjar
Arizona treefrog	Northern beardless tyrannulet	Buff-collared nightjar	Varied bunting
Northern goshawk	Broad-billed hummingbird	Lucifer hummingbird	Northern pygmy mouse
Broad-billed hummingbird	American peregrine falcon	Varied bunting	Lesser long-nosed bat
American peregrine falcon	Gould's wild turkey	Sunrise skipper	Pima/Parish's Indian mallow
Yellow-eyed junco	Abert's towhee	Northern pygmy mouse	Santa Cruz striped agave
Whiskered screech owl	Thick-billed kingbird	Lesser long-nosed bat	Saiya
Gould's wild turkey	Sunrise skipper	Pima/Parish's Indian mallow	Greene milkweed
Sulphur-bellied flycatcher	Western red bat	Santa Cruz striped agave	Ayenia
Arizona Woodpecker	Western yellow bat	Saiya	Santa Cruz beehive cactus
Elegant trogon	Hooded skunk	Greene milkweed	Metcalfe's tick-trefoil
Gray vireo	Chihuahuan sedge	Ayenia	Arid throne fleabane
Mexican long-tongued bat	Sycamore canyon muhly	Santa Cruz beehive cactus	Rutter's false goldenaster, Huachuca golden aster
Pale Townsend's big-eared bat	Southwestern muhly	Metcalfe's tick-trefoil	Lemmon's lupine
Lesser long-nosed bat		Arid throne fleabane	Supine bean
Hooded skunk		Rutter's false goldenaster, Huachuca golden aster	Arizona manihot
Arizona shrew		Lemmon's lupine	Southwestern muhly
Santa Cruz striped agave		Supine bean	Arizona passionflower
Saiya		Arizona Manihot	Piños altos flame flower
Large-flowered blue star		Sycamore canyon muhly	Tepic flame flower
Lemmon milkweed		Southwestern muhly	Giant spotted whiptail
Greene milkweed		Arizona passionflower	Thornscrub hook-nosed snake
Huachuca milkvetch		Piños altos flame flower	Brown vinesnake
Bush-violet		Tepic flame flower	Mountain skink
Chihuahuan sedge		Giant spotted whiptail	Slevin's bunchgrass lizard
Trans-pecos Indian paintbrush		Thornscrub hook-nosed snake	Green ratsnake
Santa Cruz star leaf		Brown vinesnake	Yaqui black-headed snake
Santa Cruz beehive cactus		Mountain skink	Huachuca springsnail
Smooth baby-bonnets		Slevin's bunchgrass lizard	
Gentry indigo bush		Green ratsnake	
Metcalfe's tick-trefoil		Yaqui black-headed snake	
Arid throne fleabane		Huachuca springsnail	
Rutter's false goldenaster, Huachuca golden aster			
Arizona coralroot			

USFS CNF Sensitive Species (Common Name) with Potential to Occur in Ecosystem Response Unit (ERU) Habitat Types within the Analysis Area

Madrean Encinal Woodland	Fremont Cottonwood / Shrub	Semi-Desert Grassland	Juniper Grass
Coleman's crested coralroot			
Texas purple-spike, Purple-spike Coralroot			
Alamos deer vetch			
Lemon lily			
Huachuca mountain lupine			
Lemmon's lupine			
Supine bean			
Arizona manihot			
Wiggin's milkweed vine			
Sycamore canyon muhly			
Southwestern muhly			
Arizona passionflower			
Piños altos flame flower			
Tepic flame flower			
Mexican tansy aster			
Chiricahua mountain brookweed			
Nodding blue-eyed grass			
Lemmon's stevia			
Sonoran noseburn			
Giant spotted whiptail			
Arizona ridgenose rattlesnake			
Thornscrub hook-nosed snake			
Brown vinesnake			
Mountain skink			
Slevin's bunchgrass lizard			
Green ratsnake			
Chihuahuan black-headed snake			
Yaqui black-headed snake			
Huachuca springsnail			

APPENDIX F
Other Special-Status Species and Species of Interest with Records within 3 Miles of the Project

Other Special-Status Species and Species of Interest with Records within 3 Miles of the Project

E: Endangered, ESA
T: Threatened, ESA
SGCN: Species of Greatest Conservation Need, AGFD (no official status)
1A, 1B: SGCN Tier
SC Species of Concern. The terms "Species of Concern" or "Species at Risk" should be considered as terms-of-art that describe the entire realm of taxa whose conservation status may be of concern to the US Fish and Wildlife Service, but neither term has official status (currently includes all former C2 and delisted species).

USFS S Sensitive: those taxa occurring on National Forests in Arizona which are considered sensitive by the Regional Forester.
BLM S Sensitive: those taxa occurring on BLM Field Office Lands in Arizona which are considered sensitive by the Arizona State Office.

Plants
HS Highly Safeguarded: no collection allowed.
SR Salvage Restricted: collection only with permit.
ER Export Restricted: transport out of State prohibited.
SA Salvage Assessed: permits required to remove live trees.
HR Harvest Restricted: permits required to remove plant by-products.

Common Name Scientific Name	Habitat and Notes	Status	Project Effects
Bat Colony Species not identified	Bat colonies can be in a variety of locations with minimal disturbance and shelter from extreme temperatures, including caves, mines, rock crevices, old buildings, and vegetation. Potential: **Possible**	None	**May impact individuals, but unlikely to result in a loss of viability or result in a trend toward federal listing.** The Project may result in some temporary disturbance to shelter habitat (i.e., abandoned mine features in the site) that may support bat colonies however due to the short temporal duration and small spatial footprint of the Project and the bat EPMs, the Project is unlikely to result in a loss of viability or result in a trend toward federal listing.
Gila Longfin Dace *Agosia chrysogaster chrysogaster*	Habitat: They tend to occupy relatively small or medium size streams, with sandy or gravely bottoms; eddies, pools near overhanging banks or other cover. Usually in water less than 0.6 ft deep with moderate velocities of approximately 1.1 f/s. They are rarely abundant in large streams or above 5,000 ft. Potential: **Known**	SC, BLM S, SGCN 1B	**No impact.** This species is known to occur in reaches of Harshaw Creek, which crosses the eastern extent of the Study Area. It may also occur in reaches of Potrero Creek and the Santa Cruz River at the western extent of the Study Area. The project will not directly affect these aquatic habitats and best management practices implemented during construction will avoid indirect impacts.
Five-striped Sparrow *Amphispiza quinquestriata*	Habitat: Dense bushy vegetation and grasses on steep hillsides, especially with acacia, mesquite or riparian vegetation. Semi desert slopes, canyon slopes. Density of brush apparently more important than species of vegetation or topography. Elevation 3,500 – 4,000 ft. Potential: **Possible**	SGCN 1B	**May impact individuals, but unlikely to result in a loss of viability or result in a trend toward federal listing.** The short temporal duration and small spatial footprint of the Project may result in some temporary displacement or disturbance of foraging individuals but with the migratory bird nest avoidance and riparian habitat protection EPM's, the Project is unlikely to result in a loss of viability or result in a trend toward federal listing.

Other Special-Status Species and Species of Interest with Records within 3 Miles of the Project

Common Name Scientific Name	Habitat and Notes	Status	Project Effects
Gray Hawk *Buteo plagiatus*	Habitat: Riparian woodlands with large trees (cottonwoods), usually near mesquite forests. Potential: **Known**	SC	**May impact individuals, but unlikely to result in a loss of viability or result in a trend toward federal listing.** The short temporal duration and small spatial footprint of the Project may result in some temporary displacement or disturbance of foraging individuals but with the migratory bird nest avoidance and riparian habitat protection EPM's, the Project is unlikely to result in a loss of viability or result in a trend toward federal listing.
Santa Rita Hedgehog Cactus *Echinocereus santaritensis*	Habitat: Found in rocky terrain in southeast Arizona. Potential: **Possible**	SR	**May impact individuals, but unlikely to result in a loss of viability or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species or potential habitat.
Sinaloan Narrow-mouthed Toad *Gastrophyrne mazatlanensis*	Habitat: In Arizona, from mesquite semi-desert grassland to oak woodland, in the vicinity of streams, springs and rain pools. They are more terrestrial than aquatic in habits. Elevations range from 1,400 – 4,700 ft. Potential: **Unlikely**	BLM S, SGCN 1C	**No impact.** The short temporal duration and small spatial footprint of the Project and EPMs to avoid impact to aquatic areas, the Project will result in no impact to this species.
Sonoran Desert Tortoise *Gopherus morafkai*	Habitat: Rocky slopes, boulder fields, and washes throughout the Sonoran Desert up to 5,300 feet. Potential: **Unlikely**	CCA, USFS S, BLM S, SGCN 1A	**No impact.** Although there are HDMS occurrence records for this species within 3 miles of the Study Area (**Appendix C**), the Study Area is just outside the southeastern extent of this species' range (USFWS 2015) and there is no Sonoran desertscrub habitat within the Study Area. This species is not anticipated to occur.
Hooded Nightsnake *Hypsiglena sp. nov.*	Habitat: Sonoran Desertscrub, through the grasslands, and woodlands, and into cool Petran Montane Conifer Forest. A variety of terrain types ranging from flat, open, desert to steep, rocky, wooded slopes. Potential: **Possible**	SGCN 1B	**May impact individuals, but unlikely to result in a loss of viability or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.
Desert Mud Turtle *Kinosternon sonoriense sonoriensere*	Habitat: Springs, creeks, ponds and waterholes of intermittent streams. Elevation ranges from **s**ea level to approximately 6,700 ft. Potential: **Unlikely**	BLM S, SGCN 1B	**No impact.** There is a lack of suitable habitat in the Study Area and the Project has a small footprint, short duration and EPMs to avoid impact to aquatic areas in the eastern and western extents of the Study Area, therefore is anticipated to have no impact on this species.
Mexican Black Kingsnake *Lampropeltis nigrita*	Habitat: This species is often found in rock outcrops, rodent burrows, under vegetative cover or under surface cover in low elevation desert areas. Potential: **Possible**	SCGN 1B	**May impact individuals, but unlikely to result in a loss of viability or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.

Other Special-Status Species and Species of Interest with Records within 3 Miles of the Project

Common Name Scientific Name	Habitat and Notes	Status	Project Effects
Fringed Myotis *Myotis thysanodes*	Habitat: Fringed *Myotis* occur primarily in middle elevation habitats ranging from deserts, grasslands, and woodlands. They also have been captured in high-elevation habitats and at sea level in coastal areas. Roost sites found in caves, mine tunnels, in large snags, under exfoliating bark, and in buildings. Elevation: 4,000 – 8,437 feet Potential: **Possible**	SC	**May impact individuals, but unlikely to result in a loss of viability or result in a trend toward federal listing.** The Project may result in some temporary disturbance to shelter habitat (i.e., abandoned mine features in the site) that may support this species however due to the short temporal duration and small spatial footprint of the Project and the bat EPMs, the Project is unlikely to result in a loss of viability or result in a trend toward federal listing.
Black-capped Gnatcatcher *Polioptila nigriceps*	Habitat: Riparian woodland and associated brushy areas. Elevation: 2,625 – 4,595 ft. Potential: **Possible**	SCGN 1B	**May impact individuals, but unlikely to result in a loss of viability or result in a trend toward federal listing.** The Project has a small footprint short duration, and EPMs to avoid impact to riparian and aquatic areas, therefore the Project is not likely to adversely affect the species.
Speckled Dace *Rhinichthys osculus*	Habitat: A bottom dweller, found in rocky riffles, runs, and pools of headwaters, creeks, and small to medium rivers: rarely in lakes. In Arizona, elevation ranges from 1,550 – 8,920 ft. Potential: **Possible**	SC, BLM S, SGCN 1B	**No effect.** This species is not expected to occur within the Study Area.
Arizona Gray Squirrel *Sciurus arizonensis*	Habitat: Dense, mixed broad-leaf forested canyon bottoms and drainage ways within large stature conifer or evergreen forests. Elevation: 3,500 – 7,500 ft. Potential: **Possible**	SGCN 1B	**May impact individuals, but unlikely to result in a loss of viability or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.
Yellow-nosed Cotton Rat *Sigmodon ochrognathus*	Habitat: Grassy, dry, rocky slopes in or near the oak woodland belt, as well as montane meadows within ponderosa pine and Douglas fir forests. In Arizona, elevation ranges from 1,998 – 8,800 feet . Potential: **Possible**	SC, SGCN 1C	**May impact individuals, but unlikely to result in a loss of viability or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.
Brazilian Free-tailed Bat *Tadaria brasiliensis*	Habitat: Roosts in caves, tunnels, and buildings. Forages widely, often over farmland. Potential: **Possible**	SGCN 1B	**May impact individuals, but unlikely to result in a loss of viability or result in a trend toward federal listing.** The Project may result in some temporary disturbance to shelter habitat (i.e., abandoned mine features in the site) that may support bat colonies however due to the short temporal duration and small spatial footprint of the Project and the bat EPMs, the Project is unlikely to result in a loss of viability or result in a trend toward federal listing.
Desert Box Turtle *Terrapene ornate luteola*	Habitat: In Arizona, grassland of southeast corner of state. Occasionally in desertscrub. Found at elevations ranging from 2,000 – 7,100 ft. Potential: **Unlikely**	BLM S, SGCN 1A	**May impact individuals, but unlikely to result in a loss of viability or result in a trend toward federal listing.** The Project has a small footprint and short duration, which is not likely to adversely affect the species.

This page intentionally left blank

EXHIBIT D

This page intentionally left blank

EXHIBIT D: **BIOLOGICAL RESOURCES**

As stated in Arizona Administrative Code R14-3-219 of the Rules of Practice and Procedure Before Power Plant and Transmission Line Siting Committee, Exhibits to Application, Exhibit D:

"List the fish, wildlife, plant life and associated forms of life in the vicinity of the proposed site or route and describe the effects, if any, the proposed facilities will have thereon."

D.1 Introduction D-1
D.2 Existing Conditions D-1
D.3 Effects of the Proposed Project D-4
D.4 Conclusion D-4
D.5 References D-4

D.1 **Introduction**

The Project will consist of building a new 138 kV transmission line approximately 20 miles in length, depending on the alternative approved, to connect the planned Rio Rico Switchyard to the planned Harshaw Substation. The Project will interconnect the existing 138 kV transmission line to the planned Substation. The Project will cross private and USFS owned land, as well as Santa Cruz County Road and ADOT ROW. One preferred route alternative has been identified, resulting from line siting studies, analyses, and a public participation process that began in 2020, with three 1.5- to 2.5-mile alternative routing options in areas of elevated community sensitivity. The proposed alternative routes are identified as Preferred Route 1, and Alternative Routes 1A, 1B, and 1C, and are described in Section B.1-4 of the application. The new line will be built of self-weathering steel monopoles ranging from 60 to 120 feet above ground, with the taller structures required for site specific clearance issues.

This exhibit includes a description of biological resources within the Biological Study Area, which is one mile on either side of the route centerlines analyzed for the Project.

D.2 **Existing Conditions**

The Project will be constructed in a largely rural area within Santa Cruz County. Approximate elevations within the Study Area range from 3,900 to 7,000 feet above mean sea level, sloping from the Patagonia Mountains in the east down to the Santa Cruz River in the west. The eastern portion of the Study Area is within the Sonoita Creek Subwatershed (HUC 1505030102), and the western portion is within the Potrero Creek-Santa Cruz River Subwatershed (HUC 1505030103) of the Upper Santa Cruz River watershed (HUC 15050301). The Biological Study Area consists mostly of natural and undisturbed areas, with areas of development along existing road corridors and utility lines.

Annual precipitation recorded in Patagonia, Arizona is 17.65 inches. High summer temperatures average just over 95 degrees Fahrenheit (°F), with winter low averages approximately 27 °F.

There are numerous steep drainage features in the Patagonia Mountains, through volcanic and sedimentary rock, moderating to mildly sloping hills in the middle of the Study Area, and smaller hills in the east along the Santa Cruz River floodplain. Bedrock in the Study Area is primarily limestone and biotite rhyolite tuff.

Soils in the Biological Study Area are widely varied, including Holocene alluvium near the Santa Cruz River, and bedrock in the Patagonia Mountains. A full list of the soils is in the BE, Appendix C (Exhibit C-2). The predominant soil types are the White House-Caralampi Complex, Comoro soils, and Lampshire-Chiricahua association. The typical profiles are gravelly loam, sandy loam, and associated bedrock; runoff capacity is medium.

The Study Area contains a portion of the CNF and private lands as shown in Exhibit C-1. Within the portion of the CNF overlapping with the Study Area, there is one land use designation identified: Roaded Backcountry. The Roaded Backcountry designated areas are managed for dispersed motorized, nonmotorized, and quiet recreational uses. The CNF allows for construction of new utility structures and power lines, but recommends that they should be located within existing communications sites and utility corridors, except for as needed statutory requirements, such as mining law or laws to protect public health and safety (USFS 2018).

The unincorporated town of Rio Rico is along the western edge of the Study Area with rural development, including residential communities, shopping plazas, gas stations, and existing utility corridors/infrastructure that surround portions of the Study Area. Numerous roads cross the Study Area including SR 82. There are several ranches within and adjacent to the Study Area, and portions of the Study Area are used for livestock grazing. Land use also includes recreation and mining. Areas of biological wealth within the Study Area are discussed in Exhibit C.

A brief discussion of vegetation and wildlife resources potentially occurring within the Study Area and the potential impacts to them from the Project are outlined below and described in more detail in the BE, Exhibit C-2.

<u>Vegetation</u>

The Study Area is mapped within three biotic communities: Semidesert Grassland; Madrean Evergreen Forest and Woodland; and Plains Grassland, Shortgrass Communities (The Nature Conservancy 2012). Within these communities are four Ecological Response Unit (ERU) vegetation types: Semi-Desert Grassland, Juniper Grass, Madrean Encinal Woodland, and Fremont Cottonwood/Shrub (as outlined by Wahlberg et al. 2014). The majority of the Study Area is mapped as Semi-Desert Grassland which encompasses the western foothills of the Patagonia Mountains west across the valley, towards Rio Rico. Evergreen woodland is present in the higher elevation reaches of the eastern portion in the Patagonia Mountains along Flux Canyon.

Dominant grassland species are black grama (*Bouteloua eriopoda*), blue grama (*Bouteloua gracilis*), curly mesquite (*Hilaria belangeri*), tobosa (*Pleuraphis mutica*), giant sacaton (*Sporobolus wrightii*), and mixed native and non-native perennial grasses and shrubs.

In October 2021, WestLand conducted a field visit of a portion of the Study Area. Plant and wildlife species observed during this survey are provided in Table 7 and Table 8. Details on species that typically occur in the biotic communities present in the Study Area are outlined in the BE, Section 3.6.3, Tables 1, 2 and 3 (Exhibit C-2).

Table 7. Plants Observed During Field Visit October 2021*

Species Name	Common Name
Arctostaphylos pungens	Pointleaf manzanita
Dodonaea viscosa	Hop bush
Fouquieria splendens	Ocotillo
Juniperus sp.	Juniper
Mimosa aculeaticarpa var. biuncifera	Cat-claw mimosa
M. dysocarpa	Velvet-pod mimosa
Mentzelia sp.	Blazingstar
Prosopis velutina	Velvet mesquite
Quercus arizonica	Arizona white oak
Q. emoryi	Emory oak
Q. toumeyi	Toumey oak

* This does not represent a comprehensive listing of the species that are either otherwise known to occur or have the potential to occur in the area, the field visit only covered a portion of the Study Area and was not a comprehensive plant or wildlife inventory.

Wildlife

Special status species, to include those listed federally, by the State, or the CNF, are discussed in the BE (Exhibit C-2). Wildlife species observed in the Study Area during a field visit in October 2021 by Westland are shown in Table 8.

Table 8. Wildlife Observed During Field Visit October 2021*

Species Name	Common Name	Comment
Canis latrans	Coyote	tracks
Cyrtonyx montezumae	Montezuma quail	observed
Falco sparverius	American kestrel	observed

Species Name	Common Name	Comment
Odocoileus virginianus	White-tailed deer	observed
Pecari tajacu	Collared peccary (javelina)	observed
Zenaida macroura	Mourning dove	observed

* This does not represent a comprehensive listing of the species that are either otherwise known to occur or have the potential to occur in the area, the field visit only covered a portion of the Study Area and was not a comprehensive plant or wildlife inventory.

D.3 **Effects of the Proposed Project**

Removal of vegetation associated with clearing and grading has the potential to impact nesting birds protected under the MBTA. In the event construction is scheduled during nesting/breeding seasons, UNSE will conduct pre-construction bird surveys and avoid nesting birds until fledging is complete. Vegetation will be checked prior to construction to ensure there would be no impacts to protected species.

Native plants in the Study Area are protected by Arizona Native Plant Law (ANPL) and subject to standards included in ARS § 3-904 per Santa Cruz County Zoning and Development Code to avoid destruction of protected plants, which UNSE will follow. Some native vegetation and riparian habitat would be trimmed or removed to allow for equipment access during construction. Construction of the transmission line in the wildlife corridors is not anticipated to create barriers to wildlife movement or likely have any long-term impacts on urban wildlife movement.

D.4 **Conclusion**

Impacts to general wildlife and vegetation along the alternative routes are anticipated to be minor, and are similar between all alternatives. Minimal, temporary, disturbance is anticipated to native vegetation due to plant trimming and removal to allow for equipment access during construction. Potential impacts to plants and animals will be addressed through pre-construction surveys, timing of work, and compliance with all applicable statutes, ordinances, and regulations of any local, state, or federal agency having jurisdiction.

D.5 **References**

AZIBA. (2021). Important Bird Areas: Mini Conservation Plan Patagonia Mountains. Tucson: Arizona Important Bird Areas Program.

AZIBA. (2023, Jan). About the Arizona IBA Program. Retrieved from Arizona Important Bird Areas Program: https://aziba.org

WestLand. (2023). Biological Evaluation - Rio Rico to Harshaw 138-kV Transmission Line. Tucson: WestLand Engineering & Environmental Services.

WRCC. (2018, August). Arizona Climate Summaries: Tucson Univ of Arizona, Arizona: NCDC 1981-2010 Monthly Normals. Retrieved from Western Region Climate Center: http://wrcc.dri.edu/summary/climsmaz.html

EXHIBIT E

This page intentionally left blank

EXHIBIT E: SCENIC AREAS, HISTORIC SITES AND STRUCTURES, AND ARCHAEOLOGICAL SITES

As stated in Arizona Administrative Code R14-3-219 of the Rules of Practice and Procedure Before Power Plant and Transmission Line Siting Committee, Exhibits to Application, Exhibit E:

Describe any existing scenic areas, historic sites and structures or archaeological sites in the vicinity of the proposed facilities and state the effects, if any, the proposed facilities will have thereon.

E.1 Introduction E-1
E.2 Scenic Areas and Visual Resources E-2
E.2.1 Overview E-2
E.2.2 Visual Impact Assessment Protocol E-2
E.2.3 Landscape Setting E-3
E.2.4 Visual Impact Assessment Results E-4
E.3 Historic Sites and Structures, and Archaeological Sites E-8
E.3.1 Inventory Methods E-9
E.3.2 Inventory Results E-9
E.3.2.1 Mineral Survey Plats E-10
E.3.2.2 General Land Office Plats E-10
E.3.2.3 U.S. Geological Survey Quadrangles E-11
E.3.3 Assessment of Effects E-11
E.3.4 Conclusion E-12
E.3.5 References E-12

E.1 Introduction

The Project will consist of building a new 138 kV transmission line approximately 20 miles in length, depending on the alternative approved, to connect the planned Rio Rico Switchyard to the planned Harshaw Substation. The Project will interconnect the existing 138 kV transmission line to the planned Substation. The Project will cross private and USFS owned land, as well as Santa Cruz County Road and ADOT ROW. One preferred route alternative has been identified, resulting from line siting studies, analysis, and a public participation process that began in 2020, with three 1.5- to 2.5-mile alternative

routing options in areas of elevated community sensitivity. The proposed alternative routes are identified as Preferred Route 1, and Alternative Routes 1A, 1B, and 1C, and are described in Section B.1-4 of the application. The new line will be built of self-weathering steel monopoles ranging from 60 to 120 feet above ground, with the taller structures required for site specific clearance issues.

Exhibit E includes summaries of studies conducted for existing visual (scenic) resources, historic sites and structures, cultural resources, and archaeological resources, and evaluates the potential impacts the proposed Project may have on each resource.

E.2 **Scenic Areas and Visual Resources**

E.2.1 Overview

This section of Exhibit E addresses scenic areas and visual resources in the Project area. While the Project Study Area does not contain designated national, state, and local scenic areas, it is bisected by Arizona State Route 82, which was formerly designated as a state scenic road, known as the Patagonia-Sonoita Scenic Road. Additionally, there are two units of the Tumacácori National Historic Park nearby: Mission San Cayetano de Calabazas, located approximately 700 feet north of Route 1, and Mission Los Santos Angeles de Guevavi, located approximately 1.25 miles south of Route 1. Both of these sites are outlying units of the Tumacácori National Historic Park and their respective visual resources are managed by the 2012 General Management Plan which seeks to identify and preserve key viewsheds by working with partners to mitigate potential threats.

A Visual Impact Assessment was conducted by Jeremy Palmer, Sole Proprietor (Palmer) for the entire Project, including Alternative Routes: 1, 1A, 1B, 1C, 2A, 2B, 2C (Table 9). The visual impact assessment combines objective and subjective evaluations of the existing landscape characteristics and potential changes to the landscape because of the Project and assesses the level of viewer sensitivity to different segments of the preferred and alternative routes.

E.2.2 Visual Impact Assessment Protocol

The visual impact assessment conducted by Palmer for the Project determined the potential impacts of each alternative on viewsheds. Viewsheds associated with the Project's Alternative Routes: 1, 1A, 1B, 1C, 2A, 2B, 2C were measured by the frequency of casual observers and the classification of the viewer's experience (i.e., traveler, recreationist, resident). Each alternative route was scored based on the relative level of impact to existing versus future landscape, types of viewers, and degree of impact to visual resources.

Identification of potential visual impacts involved a review of the preliminary transmission line designs and review of local planning documents, aerial photos, geographic information system (GIS) data maps, site visits, 3d modeling, photos taken in the Project Study Area, and use of Google Earth Pro.

The components of the visual impact assessment included (1) identification of the types of viewers and their sensitivity to the Project in each segment of the route, and (2) characterization of impacts that were quantified as low, medium, or high. The visual impact assessment considered the effects of new structures introduced into the existing setting on associated sensitive viewers, which considered the influence of existing facilities (i.e., existing transmission lines, streetlight structures).

E.2.3 Landscape Setting

The landscape setting for the Project Study Area is comprised of a mix of rural developed land, and natural open space within Santa Cruz County and the Coronado National Forest. The Project Study Area delineated by UNSE, that encompasses the evaluated preferred and alternative routes, is comprised of rural settings, including: residential, commercial, industrial, ranches, park/recreation and open space.

For each type of land use within the Project Study Area, the expectations of a casual observer for the character of the landscape changes. Residential observers located within a home or private yard, ranchers, and recreational observers typically take in a viewshed with long and frequent views of the surrounding landscape; therefore, their respective sensitivity is typically higher. Similarly, observers associated with tourism are expected to have a high sensitivity to their surroundings. Commercial observers are anticipated to have a medium sensitivity, due to shorter exposure to a viewshed and less familiarity. Commuters typically experience low sensitivity as they are in transit to and focused on work-related activities, and may not be as sensitive to changes in the landscape.

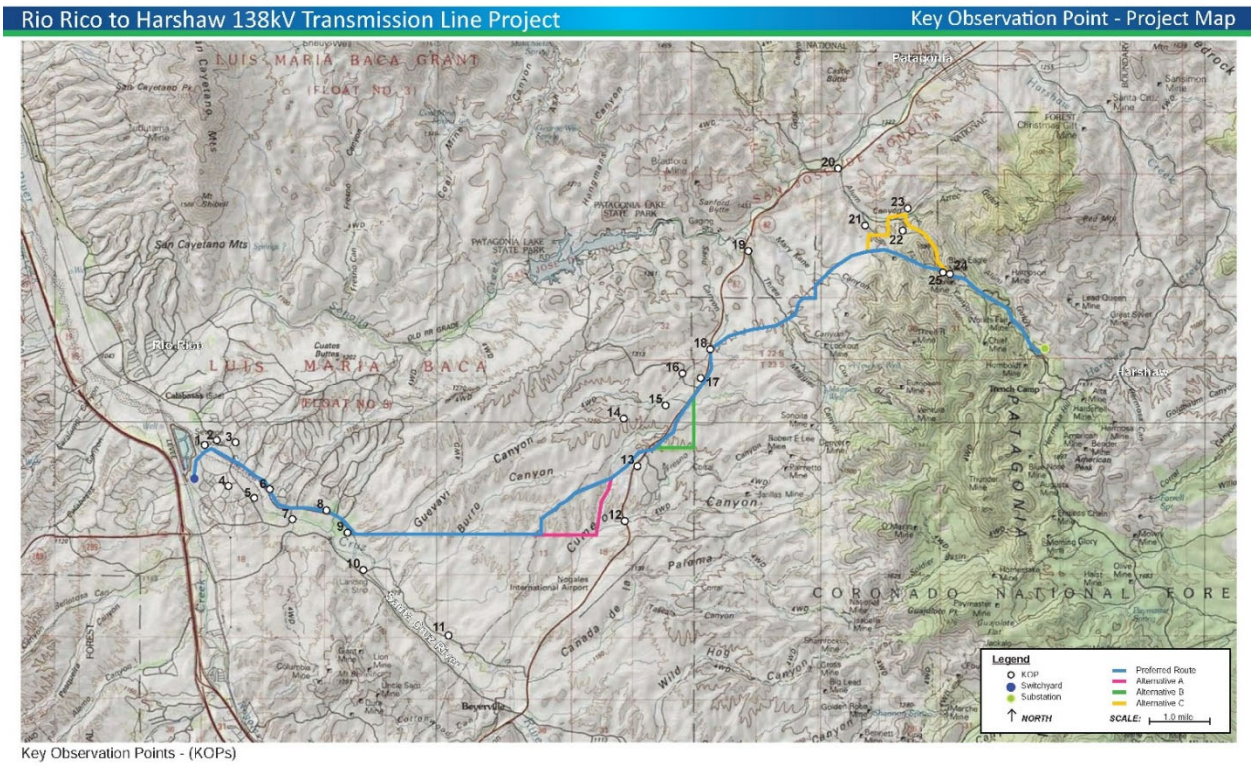


Figure 2. Key Observation Points for the Visual Simulation

The casual observer's sensitivity to changes in the landscape that is a direct result of proposed structures is also contingent on the character of the existing landscape. If the proposed structures are similar in character, e.g., form, line, scale, color, when compared to the existing landscape, then a viewer sensitivity to the resulting changes will be lower than when compared to an existing landscape in which there are no similar features.

E.2.4 Visual Impact Assessment Results

Visual contrasts are defined as the change to the visual environment resulting from modifications to the landscape. The degree of visual change resulting from a modification is directly related to the amount of contrast between the proposed structures and existing environment.

Visual contrasts were first rated by the degree to which transmission routes and structures would conflict with existing environment. Visual impacts were rated as follows:

- Low Contrast: the Project is adjacent or parallel to similar features and/or is within a more industrial setting, and a casual observer's sensitivity to changes to the landscape resulting from the Project is low.
- Moderate Contrast: the Project is adjacent or parallel to similar features and casual observer's sensitivity to changes to the landscape resulting from the Project is moderate or high.
- High Contrast: the Project introduces new visual forms that contrast with the existing landscape, the setting is residential or recreational, and casual observer's sensitivity is high.

Impacts are anticipated to be low for the proposed Project when it is adjacent to or parallel with similar developed settings or features, such as industrial and commercial settings, because visual contrast is minimal. Park/recreation settings, which are typically characterized by open space and developed recreational facilities, typically result in greater impacts when adjacent to the Project, because it differs in form and line. Residential and ranch settings are characterized by moderate sized structures and/or open space; here, impacts are anticipated to be moderate because form and line are similar to the proposed Project, but sensitivity is higher.

Visual contrasts resulting from the Project would typically be reduced where: (1) the proposed route occurs within an industrial setting that is similar in form and line, (2) the route is within a corridor that has existing overhead electric lines, or (3) the route is some distance from the casual observer and is obscured or blends into the landscape.

Once the differing route segments were rated from Low contrast to High contrast, each alternative route is analyzed from a Key Observation Point (KOP) (Figure 2), to understand the potential Visual Impacts to a casual observer from the respective KOP. The Impacts are weighted from 1 to 3 to weight and score the results in the following *Visual Impact Assessment Matrix* (Table 9). In order to rank the alignment alternatives with respect to visual impacts, a value was assigned to each segment as follows:

- High Visual Impact (Rank= 3): A value assigned to segments in which the installation of proposed UNSE structures would negatively affect the casual observer's viewshed.
- Moderate Visual Impact (Rank= 2): A value assigned to segments in which the installation of proposed UNSE structures would moderately affect the casual observer's viewshed.
- Low Visual Impact (Rank=1): A value assigned to segments in which the installation of proposed UNSE structures would have minimal effect on the casual observer's viewshed.

Finally, each Alternative Route's score is averaged across the matrix to develop a final ranking for the purpose of comparing alternative sections and preparing a recommendation. The recommendations are

based solely on impacts to visual resources and do not take into account other important factors, e.g. engineering, costs, etc. (Table 10).

Table 9. Visual Impact Assessment Matrix

KOP	Route	Contrast Rating	Visual Impact	Notes
1	1	Low	Mod	National Historic Park; existing fence posts and protective structures are similar in form, line. Recreational viewer may be less sensitive due to surrounding industrial development areas. Alignment is routed down in elevation and southeast- away from site to mitigate impact to managed viewshed.
2	1	Low	Mod.	Proposed structures protrude above horizon line drawing attention to them.
3	1	Low	Low	Numerous similar lines, forms, colors from existing structure and development.
4	1	Low	Low	Numerous similar lines, forms, colors from existing structure and development.
5	1	Low	Mod	Similar lines, forms from existing development, however view is more scenic in nature.
6	1	Low	Mod	Proposed structures protrude above horizon line drawing attention to them.
7	1	Low	Low	Similar lines, forms, colors from existing structure and development.
8	1	Low	Low	Similar lines, forms, colors from existing structure and development.
9	1	Low	Low	Similar lines, forms from existing development. While viewer is recreational, the structures are obscured by vegetation.
10	1	Mod	Low	Proposed structures are new development in natural open space, however the distance from the viewer minimizes impacts
11	1	Mod	Low	National Historic Site. Proposed structures are new development in natural open space and a managed viewshed. The structures are approximately 1.5 miles from sensitive viewers and weathered to blend into the landscape which mitigates impacts.
12	1A	Low	Mod	Similar lines, forms, colors from existing structure and development.
	2A	Low	Low	Similar lines, forms, colors from existing structure and development, however Alternative A is aligned in basin and less structure is visible compared to Preferred Route.
13	1A	Mod	Mod	Proposed structure is close to viewer and impactful
14	1B	Low	Mod	Similar lines, forms, colors from existing structure and development.
	2B	Low	Mod	Similar lines, forms, colors from existing structure and development.

KOP	Route	Contrast Rating	Visual Impact	Notes
15	1B	Low	Mod	Similar character to existing structure and development, however residential viewers
	2B	Low	Mod	Similar character to existing structure and development, however residential viewers
16	1B	Low	Mod	Similar character to existing structure and development, however residential viewers
	2B	Low	Low	Proposed structures are obscured from view by vegetation and terrain.
17	1B	Mod	Mod	Proposed structures introduced on relatively natural landscape.
	2B	Mod	Low	Proposed structures introduced on relatively natural landscape, relatively fewer structures are visible compared to Preferred Route
18	1	Mod	Mod	Proposed structures introduced on relatively natural landscape.
19	1	Mod	Low	Proposed structures introduce development on open space, however distance from casual observer to structures reduces impact
20	1C	Mod	Mod	Proposed structures introduce development on open space. The distance from casual observer to structures reduces impact, but there is a pole being silhouetted on the ridge line/horizon
	2C	Mod	Low	Proposed structures introduce development on natural open space, however the structures are obscured from view by terrain
21	1C	Mod	Mod	Proposed structures introduce development on open space. The distance from casual observer to structures reduces impact, but there is a pole being silhouetted on the ridge line/horizon
	2C	High	High	Proposed structures introduce development on natural open space. Casual observer is residential. Structures are close to properties.
22	1C	Mod	Mod	Residential development is sparse but similar character to structures reducing impacts. Distance to viewer reduces impacts.
	2C	Mod	High	Residential development is sparse, but similar character to structures reducing contrast and impact, however structures are numerous and near to residential viewers.
23	1C	Mod	Mod	Proposed structures similar in character to development. Distance from viewer reduces impact, but there are many poles being silhouetted on the ridge line/horizon.
	2C	Mod	Mod	Proposed structures similar in character to development. Distance from viewer to structures reduces impact, but there are many poles being silhouetted on the ridge line/horizon.

KOP	Route	Contrast Rating	Visual Impact	Notes
24	1C	High	Low	Proposed structures introduce development on natural open space. Viewers are limited at this location and likely industrial with low sensitivity.
25	1	Mod	Low	Similar development exists however new structures silhouetted. Limited viewers are likely industrial/commercial.

Table 10. Visual Impact Assessment Scoring and Alternative Recommendation

Alternative Route	Average Score	Ranking	Section A Recommendation	Section B Recommendation	Section C Recommendation
1	1.36	1			
1A	2	4			
2A	1.5	2	X		
1B	2	4			
2B	1.5	2		X	
1C	1.8	3			X
2C	2.25	5			

The following narrative provides an assessment for segments of the proposed 138-kV alignments consisting of: Preferred Route 1; Preferred Route 1A; Preferred Route 1B; Preferred Route 1C; Alternative Route 2A; Alternative Route 2B; and Alternative Route 2C.

Starting on the western end of the Project in the community of Rio Rico, KOPs 1 to 9, the project setting is a mix of industrial/commercial and rural residential land use. The landscape is moderately developed with buildings, roads, and utilities. This development is similar in character and provides low contrast to the proposed transmission structures. Due to the proximity of the structures to residential and recreational viewers in this area, there is the potential for moderate visual impacts.

As the Project moves towards the east into unincorporated areas of Santa Cruz County, development becomes more sparse. The proposed transmission structures will be introduced development in areas where little development exists, creating moderate contrast with natural open space. As seen in KOPs 10 and 11, the casual observer is quite a distance from the development, which reduces the visual impacts of the proposed structures.

The central to eastern side of the Study Area is bisected by SR 82. KOPs 12 and 13 demonstrate that because of existing development in this area there are low contrasts and low impacts from the proposed structures. From KOP 12, one can see that Alternative Route 2A mitigates the already low impacts by aligning the route in the bottom of a basin.

The Project continues north and east (KOPs 14 to 16) into the Lake Patagonia Ranch rural development area where there are dispersed residential and ranch developments. The Project has generally low contrasts with the existing development, which includes buildings, roads, and utilities. However, due to the proximity of residential viewers and the casual recreational observer, there is the potential for moderate impacts by viewers with higher levels of sensitivity.

Lastly, KOPs 17 and 18 show impacts of the Project as it aligns with SR 82 heading north and east towards USFS land. In this location, near Lake Patagonia Road and SR 82, there is little development on the east side of the Highway which creates moderate contrast ratings for the proposed structures. This location is also proximal to residential and recreational viewers, thus increasing impacts. Alternative Route 2B does mitigate impacts as the alignment veers south away from the Highway and residences, creating some distance between the casual observer and structures.

The Project continues to the east through the natural open spaces of the CNF. For much of the alignment on USFS, the casual observer would likely be commuters traveling along SR 82, which have low sensitivity to the proposed structures. Further, potential visual impacts are reduced by the distance from the structures to the viewers. KOPs 19 and 20 illustrate that this distance of over 1 mile allows the alignment to be obscured by vegetation and terrain when viewed from SR 82.

KOPs 21 to 23 are located in and around the small community of residences called “The Valley of Thousand Oaks” in Flux Canyon. UNSE proposed two alternatives: Route 1C and Alternative Route 2C. Route 1C diverges away from residential area to the south onto USFS land. Route 1C proposes new structures on natural open space where no development exists, creating moderate to high contrasts, but the alignment is located down in a canyon where it is obscured by terrain and it is some distance from the residential viewers nearby, thus reducing potential visual impacts. Alternative Route 2C brings the alignment into the residential area where there is existing development of similar character to the proposed structures resulting in contrast ratings of low to moderate, however the Impacts are moderate to high due to the residential-type viewer and the close proximity of the structures to the viewers.

Finally, the Routes 1C and 2C converge near Flux Canyon Road back onto USFS land. This last leg of the alignment continues south to its terminus. KOPs 24 and 25 show the impacts of the proposed structures in this area. For much of the alignment there are existing utilities, roadways, and remnant disturbances to the landscape resulting in low to moderate contrasts. The area is also anecdotally determined to be lightly used by viewers, generally for recreational purposes such as hunting, hiking, and camping.

E.3 **Historic Sites and Structures, and Archaeological Sites**

As required by the Arizona Administrative Code R14-3-219, Ex. 1(E), the potential effects of the Project on historic sites and structures and archaeological sites were assessed. The assessment also was prepared to support ACC compliance with the State Historic Preservation Act (A.R.S. §§ 41-861 – 41-864), which requires state agencies to consider the impacts of their programs on historic properties listed in or eligible for listing in the Arizona Register of Historic Places (ARHP), or the National Register of Historic Places (NRHP), and to provide the State Historic Preservation Office (SHPO) an opportunity to review and comment on the actions that affect such historic properties.

E.3.1 Inventory Methods

WestLand Engineering & Environmental Services (WestLand) examined information for historic sites, structures, and archaeological sites within the original Project Study Area. (The original Study Area covered all potential preliminary links for the proposed transmission line. The Study Area was narrowed to encompass a 1-mile buffer of the Preferred Route and Alternative Routes for the application to the ACC. The studies conducted over the original Study Area are attached as Exhibits E-1 and E-2 (WestLand, 2022), (WestLand, 2021)). The following sources were consulted:

- AZSITE database
- Archaeological Records Office of the Arizona State Museum
- Coronado National Forest site and project files
- Historic General Land Office (GLO) Plats
- Historic U.S. Geological Survey topographic quadrangle maps
- National Register of Historic Places
- ARHP

WestLand gathered information from these sources to evaluate whether portions of the Study Area had been previously surveyed for cultural resources, to determine whether historic properties eligible for inclusion or already listed in the ARHP or NRHP are present, and to provide recommendations concerning the potential for impacts to cultural resources. The results of the Class I records review were used by UNSE to identify possible routes that would avoid impacts to known historic properties or cultural resources. The full Class I methods and results are presented in Exhibits E-1 and E-2. The discussion here is limited to the cultural resources that have the potential to be impacted by the Preferred or Alternative Routes, within the narrowed Study Area.

E.3.2 Inventory Results

According to the records reviewed, 185 cultural resources inventories have been conducted within the Study Area, and 260 archaeological sites have been recorded within the Study Area (Exhibits E-1 and E-2).

A file search was also conducted in the NRHP and the ARHP databases (National Park Service 2022; Arizona State Parks 2022). There are two listed properties in the NRHP within the Study Area, San Cayetano de Calabasas and Mission Los Santos Angeles de Guevavi. However, neither listed property is intersected by any of the route alternatives. One property within the Study Area is listed on the ARHP, Johnny Ward Ranch. This property is also not intersected by any of the route alternatives.

Starting from the eastern end, the first approximately 4.5 miles of the Preferred Route has been surveyed for cultural resources (Surveys WR 1757.27 and WR 1757.11). Both surveys meet modern standards. Approximately 1.6 miles of the Alternative Route C has also been surveyed by the same two projects. The remainder of the Preferred Route and Alternatives A and B have largely not been surveyed.

Only one previously recorded archaeological site is intersected by any of the alignments, AR-03-05-03-281. The site is on USFS land and is known as the World's Fair Mine, and it has been determined eligible for listing on the NRHP. Since all routes are common in this location, this historic property has the potential to be impacted equally by either the Preferred Route or any of the Alternative Routes.

WestLand examined maps dating from the 1870s to the late 1950s to identify historical cultural resources that might be located in the Study Area. These included Mineral Survey plats, General Land Office (GLO) plats, U.S. Geological Survey (USGS) quadrangles, and Plate 1 in USGS Bulletin 582. The available historical USGS quadrangle maps at the Historical Topographic Map Collection and the available historical GLO plats at the Official Federal Land Records Site were examined during this research. The historic map review for the full Study Area is included in Exhibits E-1 and E-2.

The following historical maps depicted several named and unnamed roads and trails as well as mining claims and associated features which may still exist within or adjacent to the proposed routes:

E.3.2.1 Mineral Survey Plats

- **Mineral Survey 351** (California claim Lot No. 41), surveyed in 1882. The claimants are listed as E. P. Allis & James Mc. C. Elliot. The plat depicts five shafts and a tunnel/adit. The Alternative Route C passes through the claim in Township 22 South, Range 15 East, Section 25.
- **Mineral Survey 353** (Allis claim Lot No. 43), surveyed in 1882. The claimants are listed as E. P. Allis & J. Mc. C. Elliot. The plat depicts two shafts, a tunnel/adit, and an open cut. The Alternative Route C passes through the claim in Township 22 South, Range 15 East, Sections 24 and 25.
- **Mineral Survey 745** (January claim Lot No. 51), surveyed in 1885. The claimant is listed as Andrew B. McGill. The plat depicts three shafts and an open cut/tunnel. The Preferred Route originates within the claim in Township 22 South, Range 16 East, Section 32.

E.3.2.2 General Land Office Plats

- **Township 22 South, Range 16 East, Gila and Salt River Meridian, Arizona**, surveyed in 1912 (filed in 1915), depicts the northernmost extent of the Study Area and the northeastern portion of the Preferred Route. A small length of road follows the headwaters of "Alum Canyon" in Section 32 within the January (MS 745) claim.
- **Township 22 South, Range 15 East, Gila and Salt River Meridian, Arizona**, surveyed in 1921 (filed 1926), depicts the northwest extent of the Study Area and includes portions of the Preferred Alignment and Alternative Route C. The plat depicts a mill along the Alternative Route C as well as a section of unnamed road and a tramway (leading to the mill) in Sections 24 and 25. The Alternative Route C passes through the Allis (MS 353) and California (MS 351) claims.
- **Township 23 South, Range 15 East, Gila and Salt River Meridian, Arizona**, surveyed in 1913 (filed in 1914), depicts an earlier alignment of SR 82 labeled as Road Nogales to Patagonia near and intersecting the Preferred Route. A fence line (which encloses a pasture) is also depicted near the road as well as John R. Sorrel's house in Section 5.
- **Township 23 South, Range 14 East, Gila and Salt River Meridian, Arizona,** surveyed in 1871 and 1876 (filed in 1877). The plat depicts the Calabazas Private Land Claim and shows a Road to Tucson near the Preferred Route in Sections 7 and 8. A house is also depicted near where the Preferred Route enters Section 16.
- **Township 23 South, Range 14 East, Gila and Salt River Meridian, Arizona**, surveyed in 1871 and 1876 (filed in 1884). This plat depicts several unnamed roads in Section 12 near the western end of the Preferred Route.

E.3.2.3 U.S. Geological Survey Quadrangles

- **1905 1:125,000-scale (30' series) Nogales, Arizona.** This map depicts numerous mining related features and unnamed roads in the immediate vicinity of or intersecting the Preferred Route, including an earlier alignment of existing Flux Canyon Road.
- **1932, 1948, 1958 1:62,500 (15' series) Lochiel, Arizona.** These maps depict the area that encompasses the eastern end of the Preferred Route. It depicts the location of the World's Fair Mine (AR-03-05-03-281). Flux Canyon Road is also depicted but unnamed.
- **1933 1:62,500 (15' series) Calabasas, Arizona.** Several unnamed roads and a number of trails are depicted that cross the Preferred Route. SR 82 is indicated as "State Highway 82."
- **1948 and 1958 1:24,000 (7.5' series) Harshaw, Arizona.** This map depicts the area that encompasses the eastern end of the Preferred Route. It depicts the location of the World's Fair Mine (AR-03-05-03-281). Flux Canyon Road is also depicted but unnamed.
- **1956 and 1958 1:250,000-scale (60' series) Nogales, Arizona.** This map depicts the Humboldt Mine near the Preferred Route; however, the mine is known to exist further south and has been recorded as AR-03-05-03-349. SR 82 is also depicted, as is the alignment of Flux Canyon Road (unnamed).
- **1958 1:62,500 (15' series) Mount Wrightson, Arizona.** This map depicts the very northern portion of the Study Area and includes an unnamed road corresponding to Flux Canyon Road.
- **1958 1:62,500 (15' series) Nogales, Arizona.** This map depicts much of the Study Area. Flux Canyon Mine is depicted immediately adjacent to the Preferred Route; however, the recorded boundary of the site (AR-03-05-198) is not intersected by any of the Alternatives. SR 82 is depicted, and Flux Canyon Road is also depicted but not named. Several additional unnamed roads and trails are also depicted crossing the Preferred Route.

E.3.3 Assessment of Effects

The Preferred and Alternative Routes were each assessed for level of impact to eligible historic structures and archaeological sites. Potential avoidance measures such as shifts in the alignment, adjustments to span distances, and rerouting of access roads were considered when assessing potential impacts.

The only recorded historic property with the potential to be affected is AR-03-05-03-281, the World's Fair Mine on USFS land. If possible, the site should be avoided by designing structure locations to be outside the site boundary, and if necessary, routing any access roads around the site. If ground disturbance within the site boundary cannot be avoided, mitigation will be needed. Mitigation may range from archival research to full data recovery depending on the anticipated level of disturbance and the impacted features. Appropriate mitigation measures would be decided in consultation with the CNF and the SHPO.

One in-use historic structure, SR 82, is crossed by any of the Routes. Abandoned segments of earlier alignments of the road may also be present near or crossing the Routes. However, it is assumed the road will not be impacted as the proposed line would span the road.

Additional historical-aged resources were identified during the historical map review. Survey of previously unsurveyed areas would be necessary to determine if any of these features still exist and to evaluate them for listing on the A/NRHP before potential impacts could be assessed.

E.3.4 Conclusion

WestLand conducted a cultural resources assessment or Class I review of the Study Area to better inform the selection of the Preferred and Alternative Routes. This information was then used to evaluate impacts to known historic properties and cultural resources along the Routes.

Only one historic property on USFS land, AR-03-05-03-281, has the potential to be impacted by the proposed routes. Ground disturbance within the site boundary will be avoided as practicable. If avoidance is not possible, mitigation will be necessary and appropriate measures will be determined in consultation with the CNF and SHPO.

Approximately 4.5 miles of the Preferred Route and 1.6 miles of the Alternate C deviation have been covered by cultural resources surveys meeting modern standards. Therefore, additional Class III pedestrian survey may be required by various land managing agencies and/or SHPO for previously unsurveyed portions of the approved route prior to construction. The SHPO and appropriate land managing agencies would be consulted on the adequacy of survey and on any necessary mitigation measures should additional eligible or listed historic properties be recorded.

E.3.5 References

Arizona State Parks
2022 State Register of Historic Places. Online database https://d2umhuunwbec1r.cloudfront.net/gallery/0004/0051/6C59BF0C13FB42FA9804DCA7A9F174D2/ARHP%20List.pdf, accessed 25 January 2023.

National Park Service
2022 National Register Database and Research. Online database https://www.nps.gov/subjects/nationalregister/database-research.htm, accessed 25 January 2023.

WestLand. (2021). *A Cultural Resources Assessment of Approximatetly 43,775 acres of Coronado National Forest Land in Support of the Rio Rico-Harshaw 138kV Transmission Line Project, Santa Cruz County, Arizona Rpt 2021-24.* Tucson AZ: WestLand Engineering & Environmental Services, Inc.

WestLand. (2022). *A Cultural Resources Assessment of Approximately 44,657 acres of Private and State Trust Land in Support of the Rio Rico-Harshaw 138kV Transmission Line Project, Santa Cruz County, Arizona Rpt No 2022-002.* Tucson, AZ: WestLand Engineering & Environmental Services, Inc.

Application for a Certificate of Environmental Compatibility

Rio Rico to Harshaw

138 Kilovolt Transmission Line Project

Exhibit E-1

This page intentionally left blank

A Cultural Resources Assessment of Approximately 44,657 Acres of Private and State Trust Land in Support of the Rio Rico-to-Harshaw 138kV Transmission Line Project, Santa Cruz County, Arizona

UNS Energy/Tucson Electric Power

Prepared by:
Paul M. Miller, Ph.D. and Sherri M. Middleton, M.S.

Reviewed and Submitted by:
Jocelyn A. Bernatchez, Ph.D.

WestLand Engineering & Environmental Services, Inc.
4001 E. Paradise Falls Drive – Tucson, Arizona 85712
+1 520-206-9585

Cultural Resources Report No. 2022-002
WestLand Project No. 1610.283

January 7, 2022

WestLand
100% EMPLOYEE OWNED
Engineering & Environmental Services, Inc.

STATEMENT OF CONFIDENTIALITY

Disclosure of the locations of historic properties to the public may be in violation of both federal and state laws. Applicable United States laws include, but may not be limited to, Section 304 (54 U.S.C. §307103) of the National Historic Preservation Act and the Archaeological Resources Protection Act (16 U.S.C. §470hh). In Arizona, applicable state laws include, but may not be limited to, Arizona Revised Statute Title 39, Section 125.

TABLE OF CONTENTS

STATEMENT OF CONFIDENTIALITY i

STATE HISTORIC PRESERVATION OFFICE REPORT ABSTRACT iii

INTRODUCTION AND PROJECT BACKGROUND 1

ARCHAEOLOGICAL RESEARCH AND RECORDS SEARCH 5
- Previous Survey Coverage Within the Study Area 6
- Sites Within the Study Area 6
- Historical Map Review 7
- Mineral Survey Plats 7
- General Land Office Plats 11
  - U.S. Geological Survey Quadrangles 14
  - U.S. Geological Survey Bulletin 582 17

MANAGEMENT SUMMARY 18

REFERENCES 19

Figures

Figure 1. Vicinity map 3
Figure 2. Survey location showing surface management 4a–e

Appendices

Appendix A. Archaeological Records Search and Historical Maps of the Study Area
- Table A.1. Previous archaeological projects intersecting the Study Area
- Table A.2. Known archaeological sites intersecting the Study Area
- Figure A.1.a–e. Previous archaeological projects that intersect the Study Area
- Figure A.2.a–e. Previously recorded sites that intersect the Study Area
- Class I References
- Figure A.3. Overlay of Study Area on General Land Office Plat of Township 22 South, Range 15 East, officially filed 1905
- Figure A.4. Overlay of Study Area on General Land Office Plat of Township 23 South, Range 14 East, officially filed 1877
- Figure A.5. Overlay of Study Area on the 1905 1:125,000-scale (30′ series) Nogales, Arizona USGS quadrangle
- Figure A.6. Overlay of Study Area on the 1933 1:62,500-scale (15′ series) Calabasas, Arizona USGS quadrangle

STATE HISTORIC PRESERVATION OFFICE REPORT ABSTRACT

Report Title: A Cultural Resources Assessment of Approximately 44,657 Acres of Private and State Trust Land in Support of the Rio Rico-to-Harshaw 138kV Transmission Line Project, Santa Cruz County, Arizona

Report Date: January 7, 2022

Project Name: UNS/TEP 138kV Transmission Line Resource Studies

Project Number: 1610.283

Project Sponsor: UniSource Energy/Tucson Electric Power

Lead Agency: U.S. Forest Service

Description of the Project/Undertaking: UniSource Energy/Tucson Electric Power (UNS/TEP) is proposing to construct an overhead 138kV transmission line between Rio Rico and Harshaw, Arizona (the Project). The area under consideration for the Project encompasses approximately 88,000 acres of land in southern Arizona (the Study Area). Within the Study Area, the proposed 138 kV overhead transmission line would run approximately 20 to 30 miles across private and Coronado National Forest (CNF) land and connect the planned Rio Rico switchyard to the planned Harshaw Substation, which is located on an inholding parcel surrounded CNF land. In support of the undertaking, UNS/TEP contracted WestLand Engineering & Environmental Services, Inc. (WestLand), to conduct a cultural resources assessment (Class I) within the preliminary Study Area designed to determine the extent of previous cultural resources surveys, as well as any cultural resources discovered therein. This assessment will be used to assist in identifying the areas that may provide the best opportunities or constraints during the alternative route development for the Project. This document presents the Class I records search results for the 44,657-acre portion of the Study Area that is privately owned or managed by the Arizona State Land Department (ASLD), including much of the western foothills of the Patagonia Mountains between Sonoita Creek and the Santa Cruz River. The portion of the Study Area on CNF-managed land is presented in a separate report (Miller 2021).

Legal Description: The 44,657-acre portion of the Study Area that is privately owned or managed by the ASLD falls within the following Public Land Survey System plats (all Gila and Salt River Baseline and Meridian, Santa Cruz County, Arizona):

- Township 22 South, Range 14 East, Section 36 and portions of Sections 25, 26, and 33–35;
- Township 22 South, Range 15 East, Sections 22, 23, 27–29, 31–32, and portions of Sections 13–15, 19–21, 24, 25, 30, 33, and 36;
- Township 22 South, Range 16 East, portions of Sections 19 and 30–32;
- Township 23 South, Range 13 East, portions of Sections 1, 12, and 13;
- Township 23 South, Range 14 East, Sections 1–3, 7–17, 20–29, 33, -36 and portions of Sections 4–6, 18, 19, and 30–32;
- Township 23 South, Range 15 East, Sections 5–8, 17–20, and 29–32, as well as portions of Sections 1–3, 10–11, and 35;
- Township 23 South, Range 16 East, portions of Sections 3–6, 8, 13–15, 19–20, 22–24, 30, and 34–35;
- Township 24 South, Range 14 East, portions of Sections 1 and 2;
- Township 24 South, Range 15 East, portions of Sections 3–6 and 8–10, and;
- Township 24 South, Range 16 East, portions of Sections of 3 and 4.

USGS 7.5′ Quadrangle(s): Patagonia, Rio Rico, Cumero Canyon, Harshaw, Kino Springs, and Duquesne, Arizona

Land Jurisdiction: Private and ASLD

Recommendations: WestLand performed a cultural resources assessment for the UNS/TEP 138kV Transmission Line preliminary Study Area located on private and ASLD land. WestLand reviewed existing archaeological survey and site information available at the CNF, the Archaeological Records Office (ARO) of the Arizona State Museum, and on AZSITE and examined historical maps of the Study Area in order to understand previous survey coverage, known archaeological site density, and the potential for additional prehistoric and historical sites in the Study Area.

ARO and AZSITE records show 42 previous cultural resources projects intersecting the portion of the Study Area that is privately owned or managed by the ASLD, and CNF records indicate that 20 additional surveys intersect. Most of the 44,657 acres on the private/ASLD portion of the Study Area have not been examined for cultural resources according to ARO records and the AZSITE and CNF databases. Furthermore, of the 62 total projects, only nine could be considered recent (conducted in the last 10 years), and as few as 26 have been conducted since 2000. As such, Class III survey is likely to be necessary for portions of the preferred alternative alignment of the transmission line when it is identified.

Previous site records show that 118 known sites are located partly or wholly in the private/ASLD portion of the Study Area. Assessment of Arizona and/or National Register of Historic Places (A/NRHP)–eligibility revealed that 31 sites within the private/ASLD portion of the Study Area have been determined or recommended eligible for inclusion in the A/NRHP. Another five sites were determined or recommended not eligible for A/NRHP listing. For the remaining 82 sites, information on eligibility was not available or the recorders recommended the site be considered unevaluated for the NRHP.

Assessment of historical maps of the private/ASLD portion of the Study Area showed Euroamerican settlement, as well as resource-extraction, transportation, and utility infrastructure development, particularly in the late nineteenth century and first-half of the twentieth century. Towns of various sizes, including Patagonia and Harshaw, as well as the infrastructure to support them, appear on the maps, as do the occasional smaller homesteads. Much of the focus of settlement appears to be related to extensive resource extraction throughout the Patagonia Mountains, particularly in relation to the mining districts in areas such as Duquesne, Washington Camp, and Harshaw, as well as to ranching along the Sonoita Creek and Santa Cruz valleys.

INTRODUCTION AND PROJECT BACKGROUND

UniSource Energy Services/Tucson Electric Power (UNS/TEP) is proposing to construct an overhead 138kV transmission line between Rio Rico and Harshaw, Arizona (the Project). The area under consideration for the Project encompasses approximately 88,000 acres of land in southern Arizona (the Study Area) (**Figures 1 and 2**). Within the Study Area, the proposed 138 kV overhead transmission line would run approximately 20 to 30 miles across private and Coronado National Forest (CNF) land and connect the planned Rio Rico switchyard to the planned Harshaw Substation, which is located on an inholding parcel surrounded by CNF land. In support of the undertaking, UNS/TEP contracted WestLand Engineering & Environmental Services, Inc. (WestLand), to conduct a cultural resources assessment (Class I) within the preliminary Study Area designed to determine the extent of previous cultural resources surveys, as well as any cultural resources discovered therein. This assessment will be used to assist in identifying the areas that may provide the best opportunities or constraints during the alternative route development for the Project.

This document presents the Class I records search results for the 44,657-acre portion of the Study Area on private land or on land managed by the Arizona State Land Department (ASLD). The portion of the Study Area on CNF-managed lands is presented in a separate report. The private and state-held lands of the Study Area fall within the following Public Land Survey System plats (all Gila and Salt River Baseline and Meridian, Santa Cruz County, Arizona):

- Township 22 South, Range 14 East, Section 36 and portions of Sections 25, 26, and 33–35;
- Township 22 South, Range 15 East, Sections 22, 23, 27–29, 31–32, and portions of Sections 13–15, 19–21, 24, 25, 30, 33, and 36;
- Township 22 South, Range 16 East, portions of Sections 19 and 30–32;
- Township 23 South, Range 13 East, portions of Sections 1, 12, and 13;
- Township 23 South, Range 14 East, Sections 1–3, 7–17, 20–29, and 33-36, and portions of Sections 4-6, 18, 19, and 30-32;
- Township 23 South, Range 15 East, Sections 5–8, 17–20, and 29–32, and portions of Sections 1–3, 10–11, and 35;
- Township 23 South, Range 16 East, portions of Sections 3–6, 8, 13–15, 19–20, 22–24, 30, and 34–35;
- Township 24 South, Range 14 East, portions of Sections 1 and 2;
- Township 24 South, Range 15 East, portions of Sections 3–6 and 8–10, and;
- Township 24 South, Range 16 East, portions of Sections of 3 and 4.

The purpose of the Class I cultural resources assessment is to provide UNS/TEP with baseline information on known cultural resources on the privately held and state-managed lands within the Study Area. Specifically, the aim of the Class I records search is to determine previous cultural survey coverage within the Study Area conducted to date, as well as to ascertain the number of previously recorded cultural resources sites present within the Study Area, their site-types, and, if possible, their Arizona and/or National Register of Historic Places (A/NRHP) status. Historical maps depicting the Study Area were also reviewed to determine whether potential Historic period resources are present in the Study Area.

The report begins with the research methods employed for the project, followed by sections describing previous survey coverage, the known sites, and potential historical resources in the private and state-managed lands of the Study Area. The report concludes with a summary of the records check and a recommendation for future survey work in support of the proposed transmission line. Maps showing known resources are provided in **Appendix A**, which can be easily redacted from the report for confidentiality.

Path: M:\Jobs\1600's\1610.283\ARC\MXD\RevisedClass1_StudyFigures\01_Vicinity.mxd Date: 12/13/2021 User: rwitzke

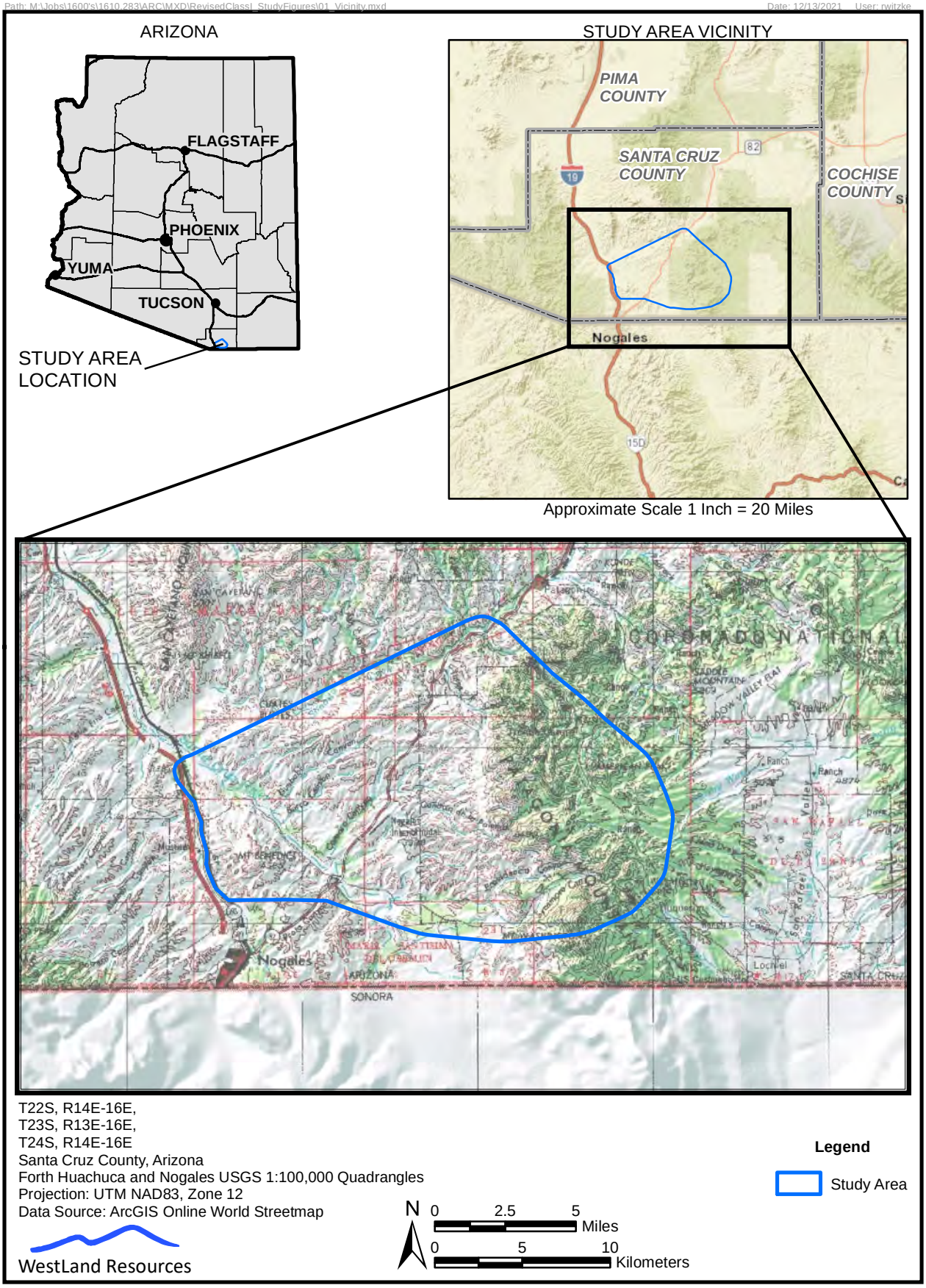
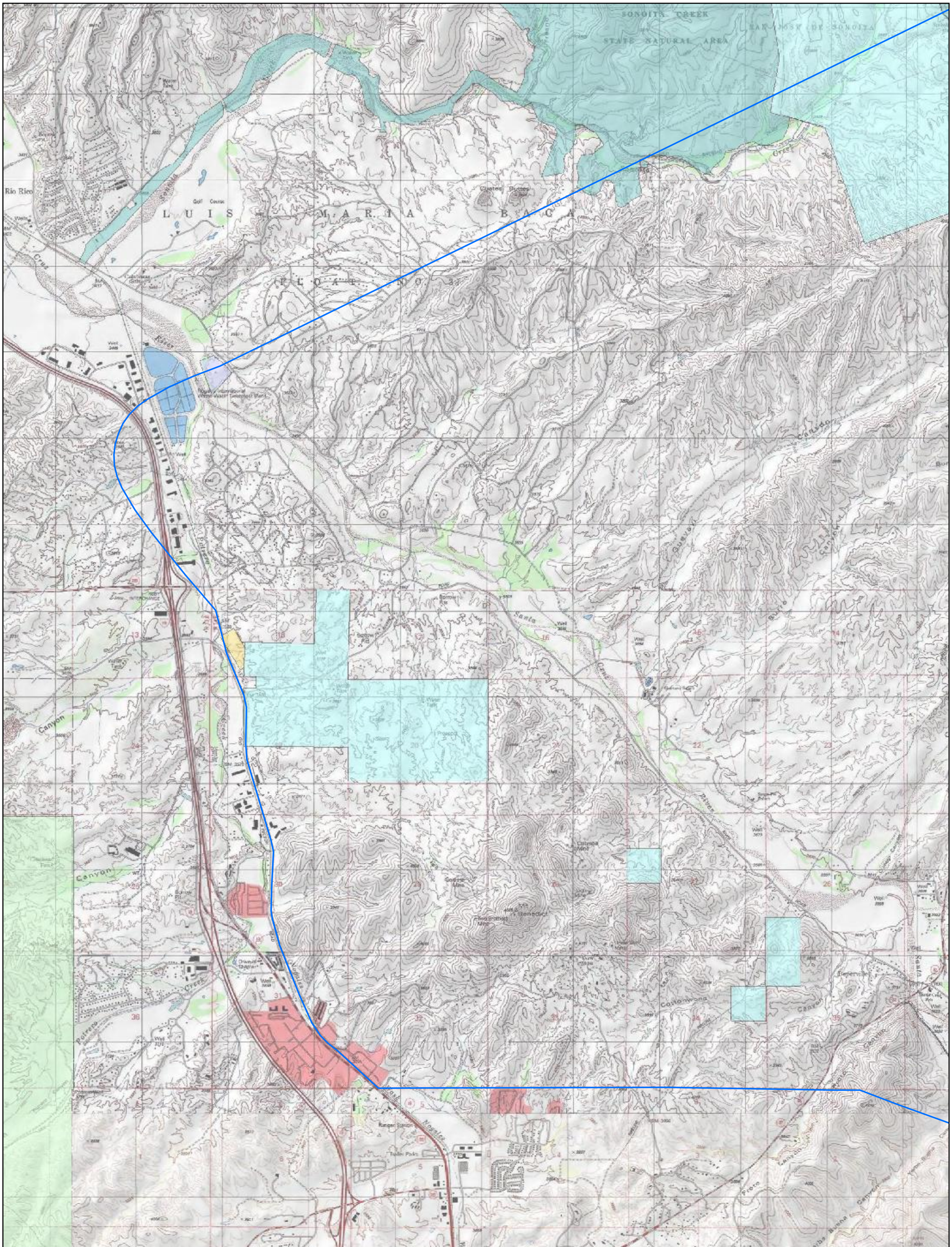


Figure 1. Vicinity map

Page 4 intentionally left blank



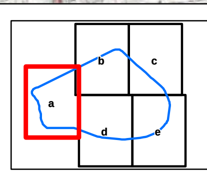
T22S, R14E,
T23S, R13E-14E,
T24S, R14E
Santa Cruz County, Arizona
Cumero Canyon, Kino Springs and Rio Rico USGS 7.5' Quadrangles
Projection: UTM NAD83, Zone 12
Data Source: BLM Surface Management (BLM 2019, WRI Modified 2019)

WestLand Resources

N

0 1,000 2,000 Feet

0 500 1,000 Meters



Legend

Study Area

Surface Management

Bureau of Land Management (BLM)

Local or State Parks

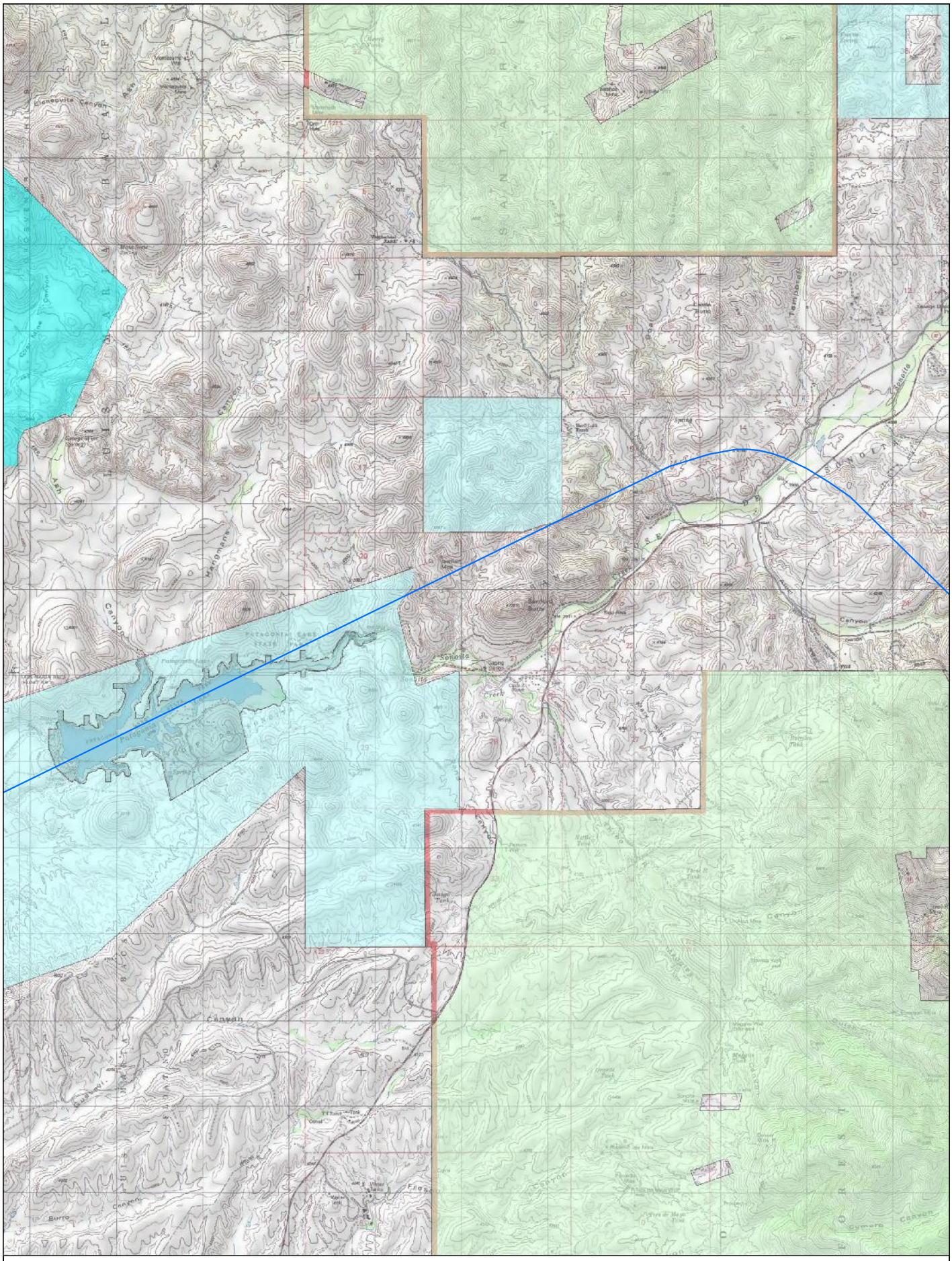
National Park Service (NPS)

Private Land (No Color)

State Trust Land

US Forest Service (USFS)

Figure 2.1. Study area location showing surface management

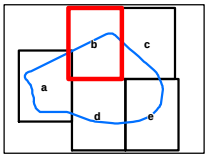


T22S, R14E-15E,
T23S, R14E-15E
Santa Cruz County, Arizona
Cumero Canyon, Patagonia, and Rio Rico USGS 7.5' Quadrangles
Projection: UTM NAD83, Zone 12
Data Source: BLM Surface Management (BLM 2019, WRI Modified 2019)

N

0 1,000 2,000 Feet

0 500 1,000 Meters



Legend

Study Area

Surface Management

Local or State Parks

Private Land (No Color)

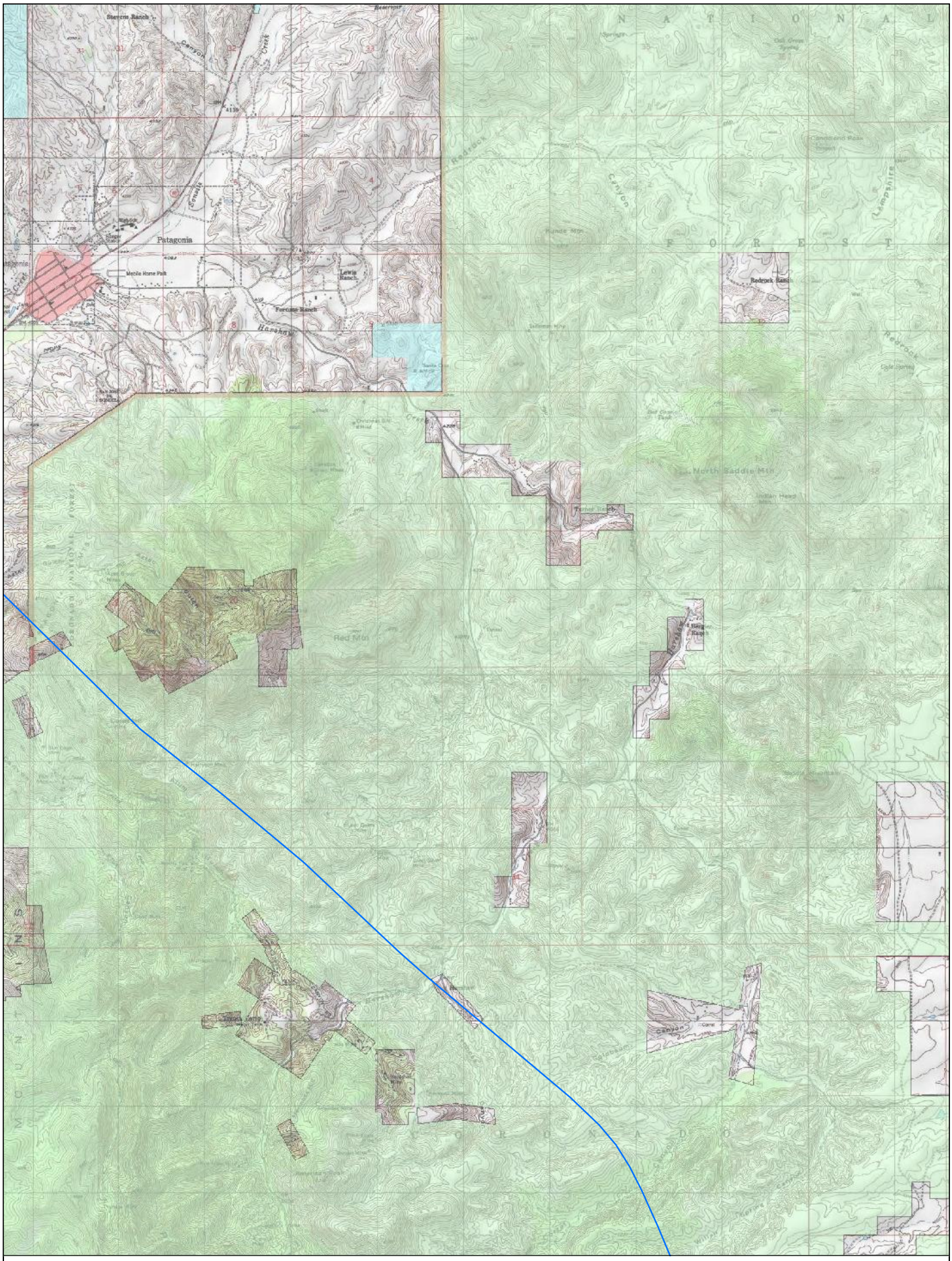
State Trust Land

State Wildlife Area

US Forest Service (USFS)

WestLand Resources

Figure 2.2. Study area location showing surface management



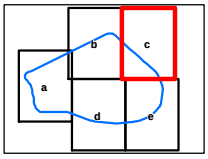
T22S, R15E-16E,
T23S, R15E-16E
Santa Cruz County, Arizona
Cumero Canyon, Harshaw, and Patagonia USGS 7.5' Quadrangles
Projection: UTM NAD83, Zone 12
Data Source: BLM Surface Management (BLM 2019, WRI Modified 2019)

WestLand Resources

N

0 1,000 2,000 Feet

0 500 1,000 Meters



Legend

Study Area

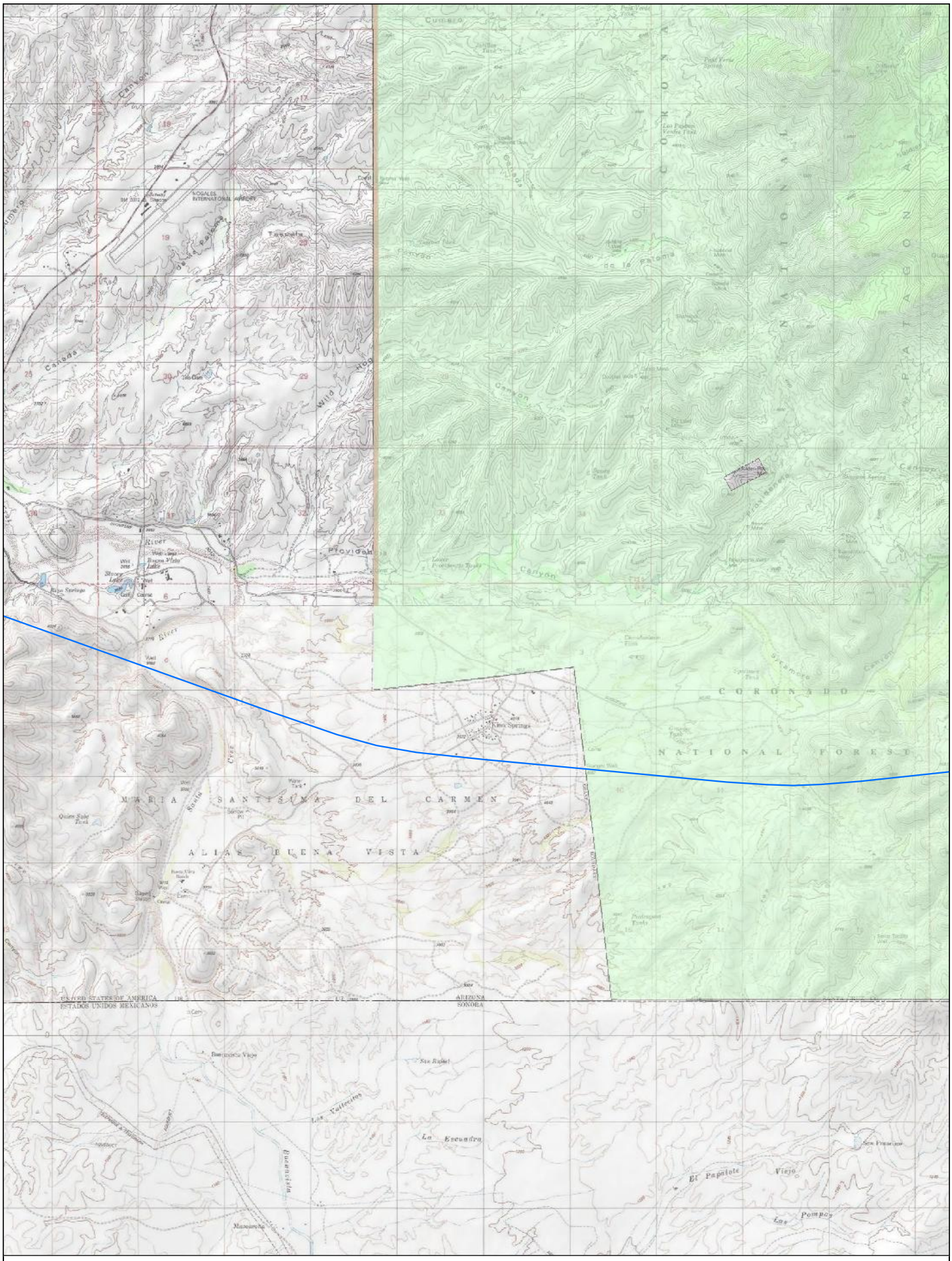
Surface Management

Private Land (No Color)

State Trust Land

US Forest Service (USFS)

Figure 2.3. Study area location showing surface management

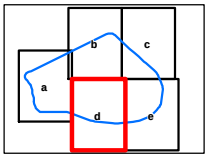


T23S, R14E-16E,
T24S, R14E-16E
Santa Cruz County, Arizona
Cumero Canyon and Kino Springs USGS 7.5' Quadrangles
Projection: UTM NAD83, Zone 12
Data Source: BLM Surface Management (BLM 2019, WRI Modified 2019)

N

0 1,000 2,000 Feet

0 500 1,000 Meters



Legend

Study Area

Surface Management

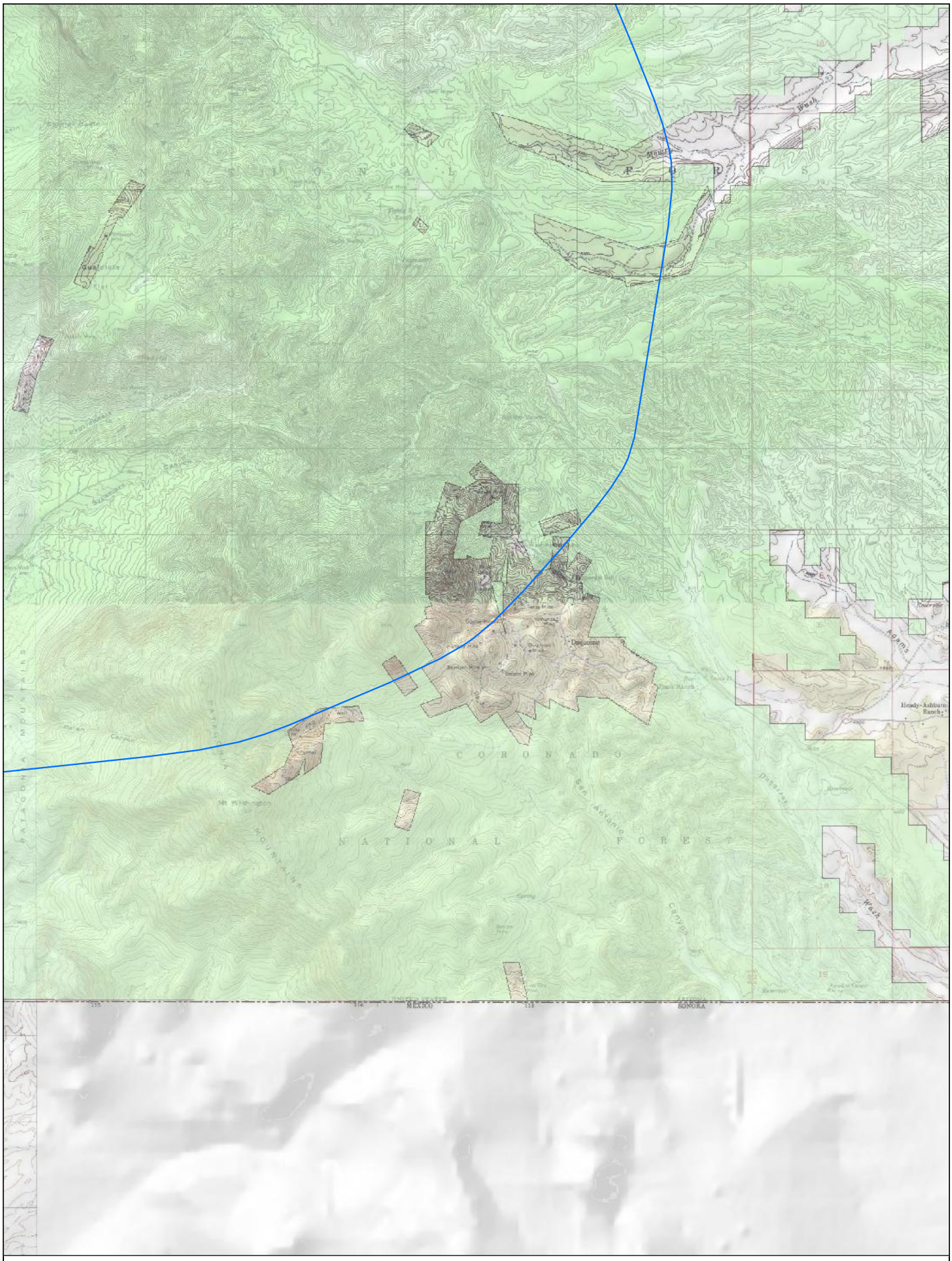
Private Land (No Color)

State Trust Land

US Forest Service (USFS)

WestLand Resources

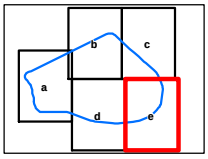
Figure 2.4. Study area location showing surface management



T23S, R16E,
T24S, R16E
Santa Cruz County, Arizona
Cumero Canyon, Duquesne, Harshaw, and Kino Springs USGS 7.5' Quadrangles
Projection: UTM NAD83, Zone 12
Data Source: BLM Surface Management (BLM 2019, WRI Modified 2019)

WestLand Resources

N
0 1,000 2,000 Feet
0 500 1,000 Meters



Legend
Study Area

Surface Management
US Forest Service (USFS)
Private Land (No Color)

Figure 2.5. Study area location showing surface management

ARCHAEOLOGICAL RESEARCH AND RECORDS SEARCH

As part of the cultural resources analysis, an archaeological overview of the Study Area was conducted. Specifically, archaeologists reviewed existing archaeological information in the site files available at the Archaeological Records Office (ARO) of the Arizona State Museum (ASM) and online using Arizona's AZSITE archaeological database. In addition, WestLand archaeologists reviewed the extensive data on existing cultural resources projects and sites maintained by the CNF office.

For each previous project, WestLand noted the agency project number, project title, and reference, as well as the spatial extent of each project as it intersected the private/ASLD portions of the Study Area. Part of WestLand's analysis was to note the extent of previous archaeological survey coverage, particularly within the last 10 years. This 10-year timeframe was used to assess whether the previously conducted surveys in the private/ASLD portions of the Study Area could be considered adequate in light of current standards per State Historic Preservation Office (SHPO) guidelines ([Arizona] SHPO 2004). These guidelines make it clear that not all older surveys are adequate in terms of modern standards, either from the perspective of meeting state and federal standards or from a research standpoint. Many of these older surveys were conducted prior to the implementation of state and federal standards that help ensure the adequacy of these investigations, such as those that state what constitutes a 100 percent intensive survey and that provide the definition of an archaeological site.

Following these guidelines, WestLand would examine the results of older surveys in terms of the survey methods used and if they meet current standards and in terms of the professional qualifications of the survey personnel who conducted the investigation and if they meet current state or federal standards. During this examination of older surveys, WestLand would also determine whether or not the integrity of the previously recorded site has changed since its initial recording. If the adequacy of the survey project is found to be in question, ground-truthing, sample resurvey, or complete resurvey of the area in question may be necessary. Previous projects intersecting the Study Area are presented in **Appendix A, Table A.1** and **Figure A.1a–e**.

WestLand also documented the number of previously recorded sites in the private/ASLD portion of the Study Area; documentation includes each site's CNF or ASM site number, the site type, the site's age and cultural affiliation, and references associated with the site, if available. The A/NRHP-eligibility of each previously recorded site in the private/ASLD portion of the Study Area was documented, if known. This information is presented in **Table A.2** and **Figure A.2a–e** (Appendix A). The criteria for evaluating the eligibility of a site for inclusion in the A/NRHP are specified in the Code of Federal Regulations (36 CFR 60.4). 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, 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.

The site and A/NRHP information can help guide UNS/TEP future planning to design avoidance and mitigation measures prior to initiation of the transmission line project. To this end, locational information for each site and each site's placement in relation to the Study Area are provided in **Table A.2** (Appendix A) and shown spatially on **Figure A.2a–e** (Appendix A).

Previous Survey Coverage Within the Study Area

ARO, AZSITE, and CNF records show 62 previous cultural resources projects intersecting the Study Area (see **Table A.1** and **Figure A.1a–e** [Appendix A]). These projects were conducted during the past several decades for utilities installation, transportation improvements, national security, monitoring, and research. Most of the 44,657 acres on the private/ASLD portions of the Study Area have not been examined for cultural resources according to ARO records and the AZSITE and CNF databases. Furthermore, of the 62 projects, only nine could be considered recent (surveyed in the last 10 years), and as few as 26 have been conducted since 2000. As such, Class III survey may be necessary for at least portions of the preferred alternative route for the transmission line when it is identified.

Sites Within the Study Area

A total of 118 sites were found to intersect the private and state land portions of the Study Area. Of these 118 sites, 56 represent Native American occupation, 26 represent Historic period occupation, and 18 are multicomponent sites (comprising both prehistoric or protohistoric period and Historic period components). The occupation period represented by 18 sites is unknown. The prehistoric sites range from the Archaic to the Protohistoric period, with the majority dating to the Formative period. Only one Archaic site is represented. Most of the prehistoric sites in the Study Area appear to be characterized by scatters of flaked stone and/or ceramic sherds, and they reflect a wide variety of functions (**Table A.2, Figure A.2** [Appendix A]).

Historic period site types previously recorded in the private/ASLD portion of the Study Area relate to the influx of Euroamericans into the area during the Historic period. The historical sites were roughly evenly represented by mine workings and sites with mine-related functions, homesteads (both temporary and more permanent) and ranches, and transportation and utility infrastructure.

The A/NRHP eligibility of these sites was assessed, and a full documentation can be found in **Table A.2** (Appendix A). A quarter of the sites recorded in the private/ASLD portion of the Study Area (n = 31) have been recommended or determined eligible by the CNF. By comparison, five sites were recommended or determined not eligible. The remainder of the sites are either not evaluated (n = 60) or their eligibility status is unknown (i.e., no information is available; n = 22).

Historical Map Review

In addition to the archaeological project and site records review, WestLand examined maps of the survey area dating from the 1870s to the late 1950s to identify historical cultural resources that might be located in the private/ASLD portions of the Study Area. These included Mineral Survey plats, General Land Office (GLO) plats, U.S. Geological Survey (USGS) quadrangles, and Plate 1 in USGS Bulletin 582 (Schrader 1915). The available historical USGS quadrangle maps at the Historical Topographic Map Collection (USGS 2021) and the available historical GLO plats at the Official Federal Land Records Site (Bureau of Land Management 2021) were examined during this research. WestLand examined the following maps as part of this assessment:

Mineral Survey Plats

- **Mineral Survey 22** (Guajolote claim Lot No. 37), surveyed in 1873. The claimant is listed as H. D. Bacon. The plat depicts a single shaft.
- **Mineral Survey 23** (Belmont claim of the San Antonio Mining Co., Lot No. 38A), surveyed in 1873. The plat depicts two shafts and an adit.
- **Mineral Survey 28** (Trench claim Lot No. 37A), surveyed in 1873. The claimants are listed as A. P. K. Safford, Ino W. Hopkins, J. C. Handy, Thos. Gardner, and R. N. Leatherwood. The plat depicts two shafts and two adits.
- **Mineral Survey 84** (Alta claim Lot No. 38A), surveyed in 1877. The claimants are listed as D. J. Harshaw, John Long, and M. Fagan. The plat depicts two shafts.
- **Mineral Survey 140** (American claim of the Silver Cloud Mining Co., Lot No. 42A), surveyed in 1879. The plat depicts two shafts and an open cut.
- **Mineral Survey 243** (Plomoso claim Lot No. 37), surveyed in 1881. The claimant is listed as L. M. Jacobs & Co. The plat contains a feature labeled “tunnel, cut, and shaft.”

- **Mineral Survey 351** (California claim Lot No. 41), surveyed in 1882. The claimants are listed as E. P. Allis & James Mc. C. Elliot. The plat depicts five shafts and a tunnel/adit.

- **Mineral Survey 352** (Garfield claim Lot No. 42), surveyed in 1882. The claimants are listed as E. P. Allis & James Mc. C. Elliot. The plat depicts four shafts and an open cut.

- **Mineral Survey 353** (Allis claim Lot No. 43), surveyed in 1882. The claimants are listed as E. P. Allis & J. Mc. C. Elliot. The plat depicts two shafts, a tunnel/adit, and an open cut.

- **Mineral Survey 377** (Cosmopolitan claim Lot No. 44), surveyed in 1882. The claimants are listed as E. P. Allis & J. Mc. C. Elliot. The plat depicts a shaft.

- **Mineral Survey 378** (Commonworth claim Lot No. 45), surveyed in 1882. The claimants are listed as E. P. Allis & J. Mc. C. Elliot. The plat depicts a shaft.

- **Mineral Survey 385** (Salvation claim Lot No. 38), surveyed in 1882. The claimant is listed as Dana Harmon. The plat depicts a shaft.

- **Mineral Survey 498** (Salvador claim of the Harshaw Mining Company Lot No. 48), surveyed in 1883. The plat depicts a shaft, an open cut, and a linear featured labeled “ore road.”

- **Mineral Survey 499** (Hermosa claim of the Harshaw Mining Company, Lot No. 49), surveyed in 1883. The plat depicts four houses, seven shafts (one of which is an incline shaft), two tunnels/adits, five open cuts, a stope, an ore bin, a road that forks within the plat, and a trail.

- **Mineral Survey 500** (Bluff claim of the Harshaw Mining Company, Lot No. 50), surveyed in 1883. The plat depicts a shaft, a trail, and a road.

- **Mineral Survey 700** (Paymaster claim Lot No. 42A), surveyed in 1885. The claimant is listed as R. R. Richardson. The plat depicts four shafts and an open cut.

- **Mineral Survey 701** (Paymaster Millsite Lot No. 42A), surveyed in 1885. The claimant is listed as R. R. Richardson. The plat depicts a house, a spring, and a road labeled “from Harshaw…to La Noria.”

- **Mineral Survey 745** (January claim Lot No. 51), surveyed in 1885. The claimant is listed as Andrew B. McGill. The plat depicts three shafts and an open cut/tunnel.

- **Mineral Survey 892** (Indiana claim Lot No. 47A), surveyed in 1889. The claimant is listed as Charles A. Ashburner. The plat depicts three shafts, with one labeled “with levels, drifts, and hoisting works.”

- **Mineral Survey 895** (Pocahontas claim Lot No. 49), surveyed in 1889. The claimant is listed as Charles A. Ashburner. The plat depicts three shafts (two of which are labeled “old”), some “30 ft. of drifts,” and a road labeled “road Tucson to Washington Camp, road in gulch.”

- **Mineral Survey 896** (Evening Star claim Lot No. 50), surveyed in 1889. The claimant is listed as Charles A. Ashburner. The plat depicts four shafts, a drift, and a road labeled “road Washington Camp to La Noria.”

- **Mineral Survey 929** (Norton claim Lot No. 52), surveyed in 1890. The claimants are listed as A. B. and M. B. McGill. The plat depicts two shafts, two drifts, two open cuts, and a trail labeled “trail from the Flux to Harshaw.”

- **Mineral Survey 1399** (Posey Lode claim), surveyed in 1899. The claimants are listed as F. A. Odermatt and Howard Allen. The plat depicts two tunnels/adits.

- **Mineral Survey 1404** (Kansas and New York claims), surveyed in 1899. The claimant is listed as R. R. Richardson. The plat depicts three shafts, two tunnels/adits, a winze, and a road.

- **Mineral Survey 1405** (Maine claim), surveyed in 1899. The claimant is listed as R. R. Richardson. The plat depicts three shafts, three tunnels/adits, and two open cuts.

- **Mineral Survey 1406** (Georgia claim), surveyed in 1899. The claimant is listed as R. R. Richardson. The plat depicts two houses, three shafts, and two roads. A few wells also appear on the plat, located just beyond the claim lot, as does so-labeled “Washington Gulch,” which is depicted flowing east at the southern limit of the claim.

- **Mineral Survey 1407** (Seven Oaks, Slim Jim, and Ohio No. 2 claims), surveyed in 1899. The claimants are listed as David and Howard Allen. The plat depicts two shafts, two tunnels/adits, and two open cuts.

- **Mineral Survey 2032** (Lauretta, Comet, Mohawk, Indianapolis, and Little Emma claims of the Duquesne Mining and Reduction Company), surveyed in 1905. The plat depicts 21 shafts, four tunnels/adits, and four open cuts.

- **Mineral Survey 2036** (Dubley Standerd [sic] and Mary Jane claims of the Duquesne Mining and Reduction Company), surveyed in 1905. The plat depicts seven shafts, two tunnels/adits, four cuts, and four roads, one of which forks and crosses by bridge a wash named “Duquesne Gulch.”

- **Mineral Survey 2037** (Klondike, Contact, and Montezuma claims of the Duquesne Mining and Reduction Company), surveyed in 1905. The plat depicts 11 shafts, four tunnels/adits, and two open cuts.

- **Mineral Survey 2210** (the Alaska claim of the Mowry Mines Company), surveyed in 1906. The plat depicts three shafts and a tunnel/adit.

- **Mineral Survey 2211** (the Little Joker, Amsterdam, and Holland claims of the Duquesne Mining and Reduction Company), surveyed in 1906. The plat depicts four shafts (one of which is an incline shaft), a tunnel with an open cut, two further open cuts, and a circle road.

- **Mineral Survey 2216** (the Yosemite, New York, and Smuggler claims of the Duquesne Mining and Reduction Company), surveyed in 1906. The plat depicts six shafts, six tunnels/adits, nine open cuts, a drift, and two roads.

- **Mineral Survey 2217** (the Divide and Imperial claims of the Duquesne Mining and Reduction Company), surveyed in 1906. The plat depicts four shafts, three tunnels/adits, three open cuts, and a road.

- **Mineral Survey 2364** (Roadside claim), surveyed in 1906. The claimant is listed as Merriette Phelps. The plat depicts two houses, a barn, four shafts, an open cut, and a road that forks within the plat.

- **Mineral Survey 2402** (Joe Wheeler, Winnebago Chief, and Ivanhoe claims), surveyed in 1907. The claimant is listed as R. P. O'Connor. The plat depicts nine shafts and "22 ft. of drifts."

- **Mineral Survey 2406** (Golden Granite claim), surveyed in 1907. The claimant is listed as R. P. O'Connor. The plat depicts one shaft and two tunnels/adits, one of which has a crosscut.

- **Mineral Survey 2503** (the Pride of the West, Pride of the West No. 2, and David Allen Mine claims of The Pride of the West Mining & Milling Co.), surveyed in 1908. The plat depicts an engine/hoist building, an engine house, five shafts, three tunnels/adits, one open cut, a tramway, and a road.

- **Mineral Survey 2558** (Happy Thought claim), surveyed in 1908. The claimant is listed as H. W. Skerry. The plat depicts three tunnels/adits.

- **Mineral Survey 2566** (the Noonday Mine claim of the Duquesne Mining and Reduction Company), surveyed in 1909. The plat depicts a house, two tunnels/adits, an open cut, and a road that forks within the claim lot.

- **Mineral Survey 2589** (the Emerald claim of the National Consolidated Mining Company), surveyed in 1908. The plat depicts a shaft and an open cut.

- **Mineral Survey 2590** (the Silver Glance claim of the National Consolidated Mining Company), surveyed in 1908. The plat depicts an engine house, a blacksmith's shop, a shed, three shafts, and "240 ft. of drifts."

- **Mineral Survey 2952** (Bonnie Carrie claim), surveyed in 1912. The claimant is listed as Valentine Valenzuela, Jr. The plat depicts two tunnels/adits and an open cut.

- **Mineral Survey 3113** (the Santo Nino and Santo Nino Nos. 1 and 2 claims of the Havalena [sic] Mining Company), surveyed in 1915. The plat depicts four shafts, five tunnels/adits, three drifts, a stope, two winzes, and a road.

- **Mineral Survey 3689** (Comprising 21 lodes, including 3-R, Blue Rock, and Evening Star of the Patagonia Superior Copper Company), surveyed in 1920. The plat depicts a mill, three houses (one of which is labeled "Eng. House"), a power line, six shafts, eight tunnels/adits, 24 open cuts, two winzes, a drill hole, an incline, and 11 drifts. Additional extensive underground workings are described but are not otherwise depicted.

- **Mineral Survey 3769** (the Bender Group Claim No. 10 of the Hardshell Mining Company), surveyed in 1921. The plat depicts 10 shafts, a tunnel/adit, a drift, and three open cuts.

- **Mineral Survey 3916** (the Santo Nino No. 5 claim of the Southern Copper Mining Company), surveyed in 1923. The plat depicts a house, a shaft, two tunnels/adits, and a road.

- **Mineral Survey 4117** (Minnie Smith claim), surveyed in 1929. The claimant is listed as O. K. Franklin. The plat depicts two shafts, three tunnels/adits, and two open cuts.

- **Mineral Survey 4222** (Comprising 13 lode claims, including Hardshell No. 7, Josephine, and Trench Nos. 2–8 of the American Smelting and Refining Company), surveyed in 1939. The plat depicts a hoist house, a power house, an office, four houses, 11 shafts, two tunnels/adits, 17 open cuts, a road that forks, and "5299 ft. of drifts and crosscuts."

- **Mineral Survey 4232** (Roy and Roy Fraction claims), surveyed in 1940. The claimants are listed as Joseph C. and Thomas P. Bacon. The plat depicts three shafts, four tunnels/adits, and six open cuts.

- **Mineral Survey 4439** (Red Rose No. 1 claim), surveyed in 1958. The claimant is listed as A. E. de la Ossa. The plat depicts a house, two sheds, an adit, three open cuts, and a road labeled "County Road."

- **Mineral Survey 4460** (the Camden Mine, Camden No. 2, Hardshell No. 1, and Hardshell No. 15 claims of the American Smelting and Refining Company), surveyed in 1958. The plat depicts two houses, a hoist, a reservoir, a waterline, 18 shafts (one of which is a long incline shaft), nine adits, 31 open cuts, a trench, eight drill holes, and two roads. The primary road through the plat is described as "to Harshaw" at its northwest end and "to Bender Claim" at its south end.

- **Mineral Survey 4526A** (Arizona, Macedonia, and Athens claims), surveyed in 1960. The claimant is listed as Joseph W. Forsythe. The plat depicts a mill, 14 shafts (one of which is an incline shaft), eight adits, six open cuts, a well, and three roads.

- **Mineral Survey 4538** (Palmetto Nos. 1–2, Lucky Find, and Lucky Find No. 3 claims), surveyed in 1960. The claimant is listed as Peter M. Mosier, Jr. The plat depicts a house, seven shafts, an adit, 13 open cuts, a trench, and a road.

- **Mineral Survey 4546** (Old Timer and Old Timer Nos. 1–3 claims), surveyed in 1961. The claimant is listed as John L. Splane. The plat depicts 15 shafts, 14 open cuts, a drift, and several roads that primarily bisect the southmost claim, Old Timer. An earth dam is also depicted across the northmost part of the plat, in the Old Timer No. 3 claim lot.

- **Mineral Survey 4771** (Comprising 112 lode claims, including Aagh No. 1, South Red Mountain Nos. 1–8, and Wild Pig No. 16), patented in 1982 and again in 1987. The claimant is listed as the Kerr-McGee Corporation. The plat does not depict many features, despite the extensive number of claim lots present, but does include an adit and tunnel, as well as several roads and trails.

General Land Office Plats

- **Township 22 South, Range 14 East, Gila and Salt River Meridian, Arizona,** surveyed in 1876 (filed 1877), depicts the northwest extent of the Study Area. The 1877 plat depicts the extents of the "San Jose de Sonoita Private Land Claim," now mostly held by the ASLD, which includes most of Sections 25, 26, and 35, as well as part of Section 36. The valley of Sonoita Creek, as well as a small, south-flowing tributary arroyo in Section 35, is shown in Sections 25, 26, 34, and 35. A ditch is present in the southwest quarter of Section 35, as well as a group of three structures with "Hardins" written beside them. A line that may indicate a road is depicted parallel to the south side of Sonoita Creek, but it is not labeled and may represent some other type of linear feature. No features are indicated in Section 36 in the 1877 plat. No mineral claims are denoted.

- **Township 22 South, Range 14 East, Gila and Salt River Meridian, Arizona,** surveyed in 1903 (filed 1903), depicts the northwest extent of the Study Area. The 1903 plat depicts many of the same elements as the 1877 plat, including the private land claim and the valley of Sonoita Creek, the ditch, and the tributary arroyo. However, the 1903 plat includes additional tributary washes whose fingers extend throughout the depicted sections. In addition, the Arizona and New Mexico Railroad (AZ EE:4:43[ASM]) and its parallel fence lines are shown passing through Sections 25, 26, 34, 36, within the valley of Sonoita Creek. The structures on the 1877 plat are not depicted on the 1903 plat, but two other structures are: one in the southeast of Section 26 is labeled "Stevens," and the other in the south half of Section 34 is labeled "Forsyth's House." No mineral claims are denoted.

- **Township 22 South, Range 15 East, Gila and Salt River Meridian, Arizona,** surveyed in 1876 (filed 1877), depicts the north portion of the Study Area. The 1877 plat marks a number of features, with those within the San Jose de Sonoita Private Land Claim (and therefore most of the valley of Sonoita Creek) well detailed. Beyond the boundaries of the land claim, features (such as the "arroyo" in Section 27) are vague and broadly labeled. Otherwise, such sections are left blank. Several structures are depicted within the Study Area, including one labeled "House" in the northeast of Section 22, one labeled "Maloney's" in the northwest of Section 23, another labeled "Sanford's" in the northeast of Section 28, and another labeled "Day's" in the northeast of Section 30. A linear feature runs parallel to Sonoita Creek and appears to be a road, based upon its connection with the structures, particularly the one labeled "Maloney's." Immediately south of the "Sanford's" structure in Section 28 is a feature labeled "ditch." No mineral claims are denoted.

- **Township 22 South, Range 15 East, Gila and Salt River Meridian, Arizona,** surveyed in 1903 (filed 1905), depicts the north extent of the Study Area. Similar to the 1877 plat, the 1905 plat focuses on the San Jose de Sonoita land claim, with little outside of the claim detailed. Of the structures mentioned in the 1877 plat, only those in Sections 23 and 28 appear in the 1905 plat, in both cases with additional structures noted. A "house," alongside a "field" and "ditch," is present in the southeast of Section 14, and a structure named the "Sanford Section House" is in the southeast of Section 19, although it may be just outside the current Study Area. Perhaps most notable is the addition of several linear features, including the Arizona and New Mexico Railroad (AZ EE:4:43[ASM]) and its parallel fence line, which runs alongside west-flowing Sonoita Creek. A primary road, labeled in the northeast "Road to Patagonia" and in the south "Road to Nogales," follows the south bank of the creek until Section 21 where it forks with a road running southward through the east half of Section 28. Another road follows along the north bank of the creek from the east edge of the map to Section 14, where it diverts northwest. Within Section 15, this road is labeled "Road to Salero." A few other unnamed roads branch from these primary roads, including two that continue southeast through Section 23. Lastly, a number of prospect holes are noted, including in Section 22, as well as a spring in the southwest of Section 30. No mineral claims are denoted (**Figure A.3** [Appendix A]).

- **Township 22 South, Range 16 East, Gila and Salt River Meridian, Arizona,** surveyed in 1912 (filed in 1915), depicts the northeast extent of the Study Area. No buildings or structures are depicted in the Study Area. A small length of road follows the headwaters of "Alum Canyon" in Section 32, within the January (MS 745) and part of the Norton (MS 929) claims. Several mineral claims are denoted, including MS 351, MS 745, and MS 929.

- **Township 23 South, Range 13 East, Gila and Salt River Meridian, Arizona,** surveyed in 1871 and 1876 (filed in 1884), depicts the westernmost extent of the Study Area. Several structures are present, including a group of four in the southeast of Section 1 labeled "Old Fort" and a further group of four on the east boundary of Section 12 labeled "Calabasas." A few linear features are also depicted; one seemingly follows the north bank of the Santa Cruz River in Section 1 (which appears to correlate to

the modern Pendleton Drive) and another follows the south bank in Sections 1 and 12, appearing to lead to the Calabasas structures. Immediately south of the Old Fort structures, the north bank feature forks southward, crossing the Santa Cruz just downstream of the confluence with north-flowing Potrero Creek and leading to the Calabasas structures. Another linear feature follows along the west bank of Potrero Creek throughout Section 12 and into Section 13, corresponding with the corridor of modern Interstate 19 (I-19) and Southern Pacific Railroad. No mineral claims are denoted.

- **Township 23 South, Range 14 East, Gila and Salt River Meridian, Arizona,** surveyed in 1871 and 1876 (filed in 1877), depicts most of the west half of the Study Area, particularly those sections within the so-noted "Calabazas Private Land Claim" in the Santa Cruz Valley. Several structures are present, including a group of four on the west boundary of Section 6 labeled "Old Fort" and a further group of four on the west boundary of Section 7 labeled "Calabasas." Two additional structures are depicted in Section 16; one in the southeast is labeled "Benedict's." A road labeled "from Tucson…to Sonora" follows the north bank of the Santa Cruz, which itself crosses Sections 7–8, 16–17, 21–22, 25–27, and 36. In modern times, this road appears to be a combination of Pendleton Drive, North River Road, and a short portion of Duquesne Road/Forest Road (FR) 61. Another road labeled "from Tucson to Sonora" partially follows the "Potrero Creek" and crosses Sections 18, 19, 30, and 31. Currently, this road can be seen on modern aerials as "Old Tucson Road." In Section 33, there is an "old mine cut" depicted. However, there are no mining claims noted for this feature. An unnamed linear feature that does not appear to have a modern correlation follows the south bank of the Santa Cruz in Section 36. Beyond the Santa Cruz Valley, features are vaguely depicted or non-existent. **(Figure A.4** [Appendix A]**)**.

- **Township 23 South, Range 14 East, portion of Section 18, Gila and Salt River Meridian, Arizona,** surveyed and filled in 1920, depicts 20.66 acres of an unsurveyed mine claim labeled "Hector 16." The area shows a shaft, old mill, tin house, and a barn. The 1920 GLO map further depicts an unnamed railroad running adjacent to the Class I study area and a station. Modern-day aerials show the present-day railroad.

- **Township 23 South, Range 15 East, Gila and Salt River Meridian, Arizona,** surveyed in 1876, 1908, and 1909 (filed in 1910), depicts three sections in the southwest portion of the Study Area. Three structures, all labeled "Adobe houses," are depicted. Two are immediately north of a westward bend in the Santa Cruz in the southeast of Section 31, and another is north of a tributary of the Santa Cruz in the southeast of Section 32. An unnamed linear feature follows the north bank of a west-flowing tributary of the Santa Cruz through Section 32 and may correspond with modern-day Duquesne Road/FR 61. Another few unnamed linear features are present in the southern half of Section 31, one of which may correspond with the modern Buena Vista Ranch Road. Lastly, an "Artificial Lake" is noted in the southeast of Section 31. The remainder of Township 23 South, Range 15 East is depicted as unsurveyed. No mineral claims are denoted.

- **Township 23 South, Range 15 East, Gila and Salt River Meridian, Arizona,** surveyed in 1913 (filed in 1914), depicts the central portion of the Study Area. A single structure, labeled "House/John R. Sorrel," is depicted in the south half of Section 5 along the south side of a northeast-southwest-trending road here-named "Road Nogales to Patagonia." This road now broadly corresponds with State Route (SR) 82. Throughout the southwest of Section 5, southeast of Section 6, and northeast of Section 7, a fenced-in "Pasture" is shown. Another linear feature branches off of the primary road between Nogales and Patagonia in Section 18 and continues eastward through Sections 17 and 18. This road appears to correspond with a disused portion of modern FR 4658. Similarly, the west terminus to an east-west-trending road extends into Section 29 and may be a now-disused portion of modern FR 125. No mineral claims are denoted.

- **Township 24 South, Range 14 East, Gila and Salt River Meridian, Arizona,** surveyed in 1899 and 1900 (filed in 1901), depicts the southwest extent of the Study Area. One building labeled "House," as well as three short, concomitant fence lines appear at the north boundary of Section 1. Most of the features depicted in Sections 1 and 2 are vague, with some linear features only hinted at extending across the boundary. No mineral claims are denoted.

- **Township 24 South, Range 15 East, Gila and Salt River Meridian, Arizona,** surveyed in 1899, 1901, and 1908 (filed in 1911), depicts the southwestern extent of the Study Area. Three structures labeled "J. H. Harrison" appear on a bluff overlooking the west bank of the Santa Cruz in Section 6. An east-west-trending arterial road labeled "Road, Nogales to Washington Camp" bisects the north halves of Sections 5 and 6, with the portion in Section 5 in similar alignment to the modern Duquesne Road/FR 61. A broadly east-west-trending telephone line also bisects Sections 5 and 6. Several other unnamed linear features are shown extending from the main arterial road. None of these other linear features appear to have modern counterparts, save the northwesternmost, which may correspond with Buena Vista Ranch Road. Interestingly, a seemingly primary north-south-trending road is depicted bisecting Section 6 west of the Santa Cruz and appears to represent an earlier alignment of Kino Springs Drive that is now an unmaintained dirt road.

U.S. Geological Survey Quadrangles

- **1905 1:125,000-scale (30′ series) Nogales, Arizona***.* This map represents an area inclusive of the current Study Area. It depicts several mines now on private holdings within the Study Area, one of which is the "Holland Mine" (a component of AR-03-05-03-386/AZ Z:5:81[ASM] and associated with MS 2211). Several unnamed mines are marked, including those seemingly associated with known sites such as the Maine mine (associated with MS 1405), the New York mine (associated with MS 1404), and the Pride-of-the-West mine (associated with MS 2503). In addition to the mines, a few towns are named, including "Hardshell" (AR-03-05-03-499/ AZ EE:10:195[ASM]), "Harshaw" (AR-03-05-03-133/AZ EE:10:40[ASM]), "Washington," and "Duquesne" (AR-03-05-03-386/AZ Z:5:81]ASM]). Further west, several ranches are named, including "Fuller's Ranch" and "Forsythe's Ranch" in the valley of Sonoita Creek, "Estrada's Ranch" within the north fork of Comoro Canyon, and "Harrison's Ranch" on the Santa Cruz near the mouth of Providencia Canyon. A number of roads and trails are also depicted; several appear to correspond with modern SR 82 (AZ EE:9:168[ASM]), Harshaw Road (AR-03-05-03-622, FR 49), South River Road, East Camino Vista Del Cielo, and Duquesne Road (FR 64). Several of the trails are currently in-use dirt roads, including FR 215 and FR 4653 in the north, FR 4662 in the south, and FR 4695 and FR 4697 in the east. A railroad labeled "Southern Pacific R" is also depicted in the valleys of Sonoita Creek in the north and the Santa Cruz in the west; the western portion of the railroad corresponds with the modern line. The land claim San Jose de Sonoita is also depicted in the northwest along Sonoita Creek (**Figure A.5** [Appendix A]).

- **1905 1:125,000-scale (30′ series) Patagonia, Arizona***.* This map represents an area corresponding to a small portion of the far north of the Study Area. A railroad labeled "Southern Pacific R" is depicted in the valley of Sonoita Creek alongside an unnamed road that corresponds with modern SR 82 (AZ EE:9:168(ASM)). The land claim San Jose de Sonoita is also depicted.

- **1922 1:62,500 (15′ series) Agua Caliente, Arizona***.* This map represents an area corresponding to a small portion of the far north of the Study Area. A railroad labeled "Southern Pacific R (Nogales Br)" is depicted within the valley of Sonoita Creek, alongside an unnamed road that corresponds to modern SR 82 (AZ EE:9:168[ASM]). A trail is shown branching from this unnamed road and heading

southward into “Alum Canyon.” This trail corresponds to the modern Flux Canyon Road (FR 812). The land claim San Jose de Sonoita is depicted along Sonoita Creek. Several other place names are shown, including “Forallo,” “Flux,” and “Bloxton,” although it is unclear if these depict geological features, town names, or properties. The 3-R Mine (AR-03-05-03-109) is both named and depicted within Alum Canyon, although this does not correspond to its typically plotted location approximately 3.5 km further south.

- **1932 1:62,500 (15′ series) Lochiel, Arizona**. This map depicts an area that broadly corresponds to the eastern half of the current Study Area. It names several mines now on private holdings within the Study Area, including the “Trench Mine” (associated with MS 28 and MS 4222) and the “Holland Mine” (a component of AR-03-05-03-386/AZ Z:5:81[ASM] and associated with MS 2211). Several unnamed mines are marked, including those seemingly associated with known sites, such as the Maine mine (associated with MS 1405), the New York mine (associated with MS 1404), and the Pride-of-the-West mine (associated with MS 2503). In addition to the mines, a few towns are named, including “Hardshell” (AR-03-05-03-499/AZ EE:10:195[ASM]), “Harshaw” (AR-03-05-03-133/AZ EE:10:40[ASM]), “Washington,” and “Duquesne” (AR-03-05-03-386/ AZ Z:5:81[ASM]). Two roads are depicted that correspond to modern Harshaw Road (AR-03-05-03-622, FR 49) and Duquesne Road (FR 64). Several of the trails are currently in-use dirt roads, including FR 4695 and FR 4697.

- **1933 1:62,500 (15′ series) Calabasas, Arizona**. This map depicts an area that broadly corresponds to the western half of the current Study Area. Several ranches are named, including “Fuller’s Ranch” and “Forsythe’s Ranch” in the valley of Sonoita Creek, “Sorrels Ranch” within both the north fork of Comoro Canyon and the valley of the Santa Cruz, “San Antonio Ranch” overlooking the north bank of the Santa Cruz, “Griffith Ranch” at the east foot of Mount Benedict, and “Harrison’s Ranch” and “Mayfield Ranch” on the Santa Cruz near the mouth of Providencia Canyon. Several other features are named, including the supposed properties of “J. Wise” and “Hathaway,” as well as possibly “Plomo,” all in the Santa Cruz Valley. Near the railroad in the western portion of the study area is “Saxton.” The Nogales Water Pumping Station (AZ EE:9:150[ASM]), labeled “Nogales Pumping Sta.,” is also depicted. A number of roads and trails are also depicted, two of which are named: “United States Highway No 89,” broadly corresponding with the modern route of I-19 (the few modern intact stretches of this road are now known as “Old Tucson Highway”), and “United States Highway No 82,” depicting an earlier alignment of modern SR 82. Other unnamed roads and trails appear to correspond with modern Pendleton Drive, South River Road, and Duquesne Road (FR 64). Of interest, a trail labeled “proposed rd.” appears to follow the modern alignment of South River Road. A railroad labeled “Southern Pacific Nogales Branch” is also depicted within the valleys of Sonoita Creek in the north and the Santa Cruz in the west. The western portion of the railroad corresponds with the modern line. One feature, a “water tank” is noted in the southwest part of the study area. The San Jose de Sonoita land claim is also depicted in the north along Sonoita Creek (**Figure A.6** [Appendix A]).

- **1948 1:24,000 (7.5′ series) Duquesne, Arizona**. This map corresponds with the particularly rugged southeastern extent of the Study Area. No buildings, structures, or roads are indicated in the area of the current project.

- **1948 1:24,000 (7.5′ series) Harshaw, Arizona**. This map depicts an area that broadly corresponds to the eastern half of the current Study Area. It names the “A S and R Mines” and the “Hardshell Mine” (both associated with MS 4460). Several unnamed mines are marked, including those seemingly associated with known sites, such as the Kansas Mine (AZ EE:10:198[ASM], associated with MS 1404). In addition to the mines, the map names “Washington Camp,” “Trench Camp,”

"Harshaw" (AR-03-05-03-133/AZ EE:10:40[ASM]), and "Duquesne" (AR-03-05-03-386/ AZ Z:5:81[ASM]). Three unnamed roads are also depicted, corresponding with modern Flux Canyon Road (FR 812), Harshaw Road (AR-03-05-03-622, FR 49), and Duquesne Road (FR 64).

- **1948 1:62,500 (15′ series) Lochiel, Arizona***.* This map depicts an area that broadly corresponds to the eastern half of the current Study Area. It names the "Hardshell Mine" (associated with MS 4460) in addition to several unnamed mines, including those seemingly associated with known sites, such as the Kansas mine (AZ EE:10:198[ASM], associated with MS 1404). In addition to the mines, the map names "Washington Camp," "Trench Camp," "Harshaw" (AR-03-05-03-133/ AZ EE:10:40[ASM]), and "Duquesne" (AR-03-05-03-386/AZ Z:5:81[ASM]). Three unnamed roads are also depicted, corresponding with modern Flux Canyon Road (FR 812), Harshaw Road (AR-03-05-03-622, FR 49), and Duquesne Road (FR 64).

- **1956 1:250,000-scale (60′ series) Nogales, Arizona***.* This map represents an area inclusive of the current Study Area. Several unnamed mines are marked, including those seemingly associated with known sites on private land, such as the 3-R mine (AR-03-05-03-109) and the Hardshell mine (associated with MS 4460). In addition to the mines, the map names "Washington Camp" and "Trench Camp," with "Harshaw" (AR-03-05-03-133/AZ EE:10:40[ASM]) and "Duquesne" (AR-03-05-03-386/ AZ Z:5:81[ASM]) also named but falling just beyond the Study Area. The map names both U. S. Route 89 (US 89), broadly corresponding with modern I-19, and SR 82 (AZ EE:9:168[ASM]), as well as those corresponding with modern Harshaw Road (AR-03-05-03-622, FR 49) and Duquesne Road (FR 64). The current railroad alignment (now operated by Union Pacific) is shown passing through the western part of the Study Area along US 89 and labeled "Southern Pacific." Nogales International Airport is shown in its current location on the east side of SR 82. The San Jose de Sonoita land claim is also depicted in the north along Sonoita Creek, as is the northeast corner of the Maria Santisima del Carmen land claim in the south along the Santa Cruz.

- **1958 1:24,000 (7.5′ series) Duquesne, Arizona***.* This map corresponds with the particularly rugged southeastern extent of the Study Area. No buildings, structures, or roads are indicated in the area of the current project.

- **1958 1:24,000 (7.5′ series) Harshaw, Arizona***.* This map depicts an area that broadly corresponds to the eastern half of the current Study Area. It names several mines on privately held land within the Study Area, including the "Alta Mine" (associated with MS 84); the "Hardshell Mine" (associated with MS 4460); the "Paymaster Mine" (associated with MS 700 and 701); the "Kansas Mine" (AZ EE:10:198[ASM], associated with MS 1404); the "Maine Mine" (associated with MS 1405); the "New York Mine" (associated with MS 1404); and the "Pride Mine" (associated with MS 2503). In addition to the mines, the map names "Washington Camp" and "Trench Camp," with "Harshaw" (AR-03-05-03-133/ AZ EE:10:40[ASM]) also named but falling just beyond the Study Area. Three roads are depicted, with Flux Canyon Road (FR 812) named, and two others unnamed but corresponding with modern Harshaw Road (AR-03-05-03-622, FR 49) and Duquesne Road (FR 64).

- **1958 1:62,500 (15′ series) Lochiel, Arizona***.* This map depicts an area that broadly corresponds to the eastern half of the current Study Area. It names several mines on privately held land within the Study Area, including the "Alta Mine" (associated with MS 84); the "Hardshell Mine" (associated with MS 4460); the "Paymaster Mine" (associated with MS 700 and 701); the "Kansas Mine" (AZ EE:10:198(ASM), associated with MS 1404); the "Maine Mine" (associated with MS 1405); the "New York Mine" (associated with MS 1404); and the "Pride Mine" (associated with MS 2503). In addition to the mines, the map names "Washington Camp" and "Trench Camp," with "Harshaw" (AR-03-05-03-133/AZ EE:10:40[ASM]) also named but falling just beyond the Study Area. Three

roads are depicted, with Flux Canyon Road (FR 812) named and two others unnamed but corresponding with modern Harshaw Road (AR-03-05-03-622, FR 49) and Duquesne Road (FR 64).

- **1958 1:62,500 (15′ series) Mount Wrightson, Arizona***.* This map represents an area corresponding to the northernmost portion of the Study Area. The map portrays one named road, SR 82 (following its modern alignment), and two unnamed roads that correspond with modern Blue Heaven Road and Flux Canyon Road (FR 812). The map also depicts the alignment of the abandoned Arizona and New Mexico Railroad (AZ EE:4:43[ASM]), labeling it "old railroad grade." The San Jose de Sonoita land claim is also shown along Sonoita Creek.

- **1958 1:62,500 (15′ series) Nogales, Arizona***.* This map depicts an area that broadly corresponds to the western half of the current Study Area. It shows the "Three R Mine" (AR-03-05-03-109, associated with MS 3689) and the "Columbia Mine," located on the north slope of Mount Benedict and "VABM 4565," the "Uncle Sam Mine," and the "Dura Mine" located on the south and southeast slopes. In addition, there are several unnamed mines. Only one ranch is named, the "Yerba Buena Ranch," on the south bank of the Santa Cruz near the modern intersection of Buena Vista Ranch Road and Duquesne Road (FR 64). The map names both US 89 (broadly corresponding with modern I-19) and SR 82 (AZ EE:9:168(ASM)), as well as roads corresponding with modern South River Road, Flux Canyon Road (FR 812), and Duquesne Road. Several unnamed trails are also depicted, including one that corresponds to modern North River Road. The current railroad alignment (now operated by Union Pacific) is shown crossing the western part of the Study Area along US 89 and labeled "Southern Pacific." The disused Arizona and New Mexico Railroad (AZ EE:4:43[ASM]) through the Sonoita Creek valley is labeled "old railroad grade." The other named structures include Nogales International Airport (at its present-day location) and the "Santa Cruz Sch" at the intersection of SR 82 and Duquesne Road. The San Jose de Sonoita land claim is also depicted in the north along Sonoita Creek, as is the northeast corner of the Maria Santisima del Carmen land claim in the south along the Santa Cruz.

- **1958 1:250,000-scale (60′ series) Nogales, Arizona***.* This map represents an area inclusive of the current Study Area. The only named mine in the Study Area is the "Mary Lou Mine (aband)" (probably representing the 3-R mine/AR-03-05-03-109). A mining camp, probably Trench Camp, is marked. The map also names "Washington" as a town, with "Harshaw" (AR-03-05-03-133/ AZ EE:10:40[ASM]) and "Duquesne" (AR-03-05-03-386/AZ Z:5:81[ASM]) also named but falling just beyond the Study Area. The map names both US 89 and SR 82 (AZ EE:9:168[ASM]), with Flux Canyon Road (FR 812), Harshaw Road (AR-03-05-03-622, FR 49) and Duquesne Road (FR 64) also depicted. The current railroad alignment (now operated by Union Pacific) is shown crossing the western part of the Study Area along US 89 and labeled "Southern Pacific." The northeast-southwest alignment of an "Underground pipeline" is also noted, primarily west of SR 82.

U.S. Geological Survey Bulletin 582

- **1914 Topographic Map of the Santa Rita and Patagonia Mountains, Arizona** (Schrader 1915:Plate 1). This map, a composite of the Nogales and Patagonia 30′ quadrangles, shows the primary mining districts, camps, producing mines, and prospects within the Patagonia Mountains. It shows most of the historical mining-related sites in the Study Area and is a useful depiction of the area during the early twentieth century.

MANAGEMENT SUMMARY

WestLand performed a cultural resources assessment in support of the proposed 138kV transmission line project between Rio Rico and Harshaw, Arizona. WestLand reviewed existing archaeological survey and site information available at the ARO of the ASM, in Arizona's AZSITE archaeological database, and in the CNF cultural resources database and examined historical maps of the private/ASLD portions of the Study Area in order to understand previous survey coverage, known archaeological site density, and the potential for additional prehistoric and historical sites.

Most of the 44,657-acres on the private/ASLD portions of the Study Area have not been examined for cultural resources, according to ARO records and the AZSITE and CNF databases. Furthermore, of the total projects, only nine could be considered recent (surveyed in the last 10 years), and as few as 26 have been conducted since 2000. As such, Class III survey is likely to be necessary for portions of the preferred alternative alignment of the transmission line when it is identified.

A total of 118 archaeological sites are located partly or wholly within the private/ASLD portions of the Study Area. Sites attributed to the prehistoric cultures affiliated with the Formative period (A.D. 1–1450) were most prominent, with almost three-quarters of the prehistoric sites exhibiting Formative period cultural affiliations. The prehistoric sites reflect a wide variety of primarily transient functions and potential cultural affiliations. Sites affiliated with the Historic period were evenly represented by mining and mine-related activities, homesteads and ranches, and transportation and utility infrastructure site types. Avoidance of all A/NRHP-eligible sites is preferred. However, if that is not possible, a Historic Properties Treatment Plan should be developed and implemented for any impacted Historic Properties.

In summary, it is expected that further survey work in support of the Rio Rico-to-Harshaw 138kV transmission line project will be needed to ensure completed Class III survey coverage of the preferred alternative alignment of the transmission line when it is identified, to reassess the previously documented sites, and to identify any previously unknown historic properties in the private/ASLD portions of the Study Area.

REFERENCES

Arizona State Historic Preservation Office (SHPO)

2004 *SHPO Position on Relying on Old Archaeological Survey Data*. SHPO Guidance Point No. 5. Arizona State Parks, Phoenix.

Bureau of Land Management

2021 General Land Office Records. Available at: https://glorecords.blm.gov/default.aspx. Accessed December 1, 2021.

Miller, Paul M.

2021 *A Cultural Resources Assessment of Approximately 43,775 Acres of Coronado National Forest Land in Support of the Rio Rico-to-Harshaw 138kV Transmission Line Project, Santa Cruz County, Arizona*. Cultural Resources Report No. pending. WestLand Resources, Inc., Tucson.

Schrader, Frank C.

1915 *Mineral Deposits of the Santa Rita and Patagonia Mountains, Arizona*. Bulletin 582. U.S. Department of the Interior, U.S. Geological Survey, Washington D.C.

U.S. Geological Survey (USGS)

2021 TopoView. Available at: https://ngmdb.usgs.gov/topoview. Accessed December 1, 2021.

APPENDIX A
Archaeological Records Search and Historical Maps of the Study Area

Figure A.2 depicts information that is considered sensitive and may be protected under federal, state, and local laws. As such, it has been redacted from the report.

Table A.1. Previous archaeological surveys intersecting the Study Area*

Agency Project No.	Project Name	Reference
1964-8.ASM [1]	I-19, Tucson to Nogales	Not available
1967-2.BLM [2]	No information available	Not available
1976-10.CNF [3]	San Rafael Brush Crush	Wood (1976)
1978-31.CNF [4]	Sierra Vista Ranger District Forest Road Flood Damage Repair Project	Wood and Salyer (1978)
1980-77.ASM [5]	Patagonia Lake Barrow [sic] Pit	Not available
1981-73.CNF [6]	Hale Well	Piper (1981)
1984-14.CNF [7]	Mowry Division Fence	Van Keuren (1984)
1984-77.ASM [9]	Materials Pit 7482 Haul Road	Not available
1985-14.CNF [10]	Ridge Lateral Pipeline	Van Keuren (1985c)
1985-27.CNF [11]	Big Canyon Pipeline	Van Keuren (1985b)
1985-68.CNF [12]	Banta, Morning Glory North, and Blue Nose Mines	Van Keuren (1985a)
1986-179.ASM [13]	Patagonia State Park Access Road	Not available
1986-163.ASM [14]	Nogales Wash-Potrero Creek	Not available
1986-240.ASM [15]	Patagonia State Park Access Road	Not available
1988-172.CNF [16]	Dekon Mining Projects	Farrell (1988)
1988-180.CNF [17]	Dekon Road Repair and Construction Providencia	Bennett (1988)
1989-58.CNF [18]	Flux Canyon Road Maintenance	Bennett (1989)
1989-176.CNF [19]	Tres de Mayo FR 235 Road Rehabilitation Project	Not available
1992-32.ASM [20]	Nogales Airport Expansion	Not available
1992-47.CNF [21]	Gila Monster Mine Survey	Not available
1992-122.CNF [22]	U.S. West Right-of-way along Pipeline, 3-R Canyon	A. Roth (1992)
1992-165.ASM [23]	ROW Survey Along SR 189, Arizona	B. Roth (1992)
1993-71.CNF [24]	El Paso Natural Gas Co. Meter Station Survey	Troncone (1993)
1994-76.ASM [25]	Frank Reed Road	Eighmey (1994)
1994-90.CNF [26]	Soldier Basin Pipeline/Spring Development	Not available
1995-72.ASM [27]	Tucson–Nogales Fiber Optics ROW	Adams and Hoffman (1995)
1995-174.ASM [28]	Hacienda De Las Flores Survey	Slawson (1995)
1996-180.ASM [29]	Cultural Resources Inventory of Approximately 7.6 Miles of Trails on State Land Surrounding Patagonia	Not available
1996-389.ASM [30]	ADOT/Business 19/Nogales	Stone (1997)

Table A.1. Previous archaeological surveys intersecting the Study Area*

Agency Project No.	Project Name	Reference
1996-408.ASM [31]	Interstate-19 Between Nogales and Amado	Lite et al. (1996)
1996-459.ASM [32]	SR 82, Nogales–Sonoita–SR 90	Not available
1998-22.CNF [33]	Cultural Resources Survey of Two Highway Segments along SR 82 between Nogales and SR 90	Hathaway (1997)
1998-60.CNF [34]	Hardy Electric Line Installation, Modified Alignment	Bennett and Gillespie (1998)
1999-104.ASM [35]	I-19, Ruby Road to Rio Rico Survey	Swartz (1999b)
1999-541.ASM [36]	Harshaw Creek Survey	Not available
2000-160.ASM [37]	South River Road Revisited Survey	Not available
2000-349.ASM [38]	Patagonia Lake State Park Project	Not available
2001-5.CNF/ 2000-315.ASM [39]	Flux Canyon Powerline Replacement Survey	Hesse (2000)
2003-40.CNF [40]	Metz Small Tracts Act Case & Road Realignment	Not available
2003-53.CNF [41]	Granillo Small Tracts Act Case	Bennett (2003)
2003-413.ASM [42]	Rio Rico Santa Cruz School District Survey	Breternitz (2003)
2003-937.ASM [43]	Trail Survey Patagonia Lake State and Sonoita Creek Natural Area	Johnson (2003)
2003-1111.ASM [44]	FEMA Nogales Flood Control Basins	Morton and Rogge (2003)
2003-1407.ASM [45]	A Cultural Resource Survey of two TCE's on State Route 82, South of Patagonia	LaFond and Folb (2001)
2005-7.CNF [46]	Searles Road Homeowners' Association Easement	Bennett (2005)
2005-152.ASM [47]	Santa Cruz River Bridge	Bruder and Garcia (2002a)
2006-144.ASM/ WestLand 1132.01 [48]	UPRR Survey	Mills (2005)
2007-711.ASM [49]	CR Survey of Proposed Tower Locations, Customs and Border Protection Tucson West	Harris Environmental Group (2009)
2008-695.ASM [50]	I-19 Sign Rehab	Walsh (2012)
2010-524.ASM [51]	Cumero Canyon Bridge	Walsh (2010)
2011-47.CNF [52]	Hilton Small Tracts Act Proposal	Bennett (2011)
2011-327.ASM [53]	CTIMR Phase 2 NEPA Clearance	Lundin (2011)
2011-430.ASM [54]	CR Survey for Proposed Remote Video Surveillance (RVSS) Towers Upgrade Program	Hart (2012)
2013-22.CNF/ 2013-2.ASM [55]	Hermosa Drilling Project Plan of Operation Survey	Chamorro (2014)
2014-480.ASM [56]	River Road and Pendleton Drive Safety Improvements	Jones and Gregory (2014)
2014-578.ASM [57]	Archaeological Survey for Proposed Erosion Control Project	Barr (2015)
2014-588.ASM [58]	Rio Rico Road Improvement	Seymour and Sugnet (2014)

Table A.1. Previous archaeological surveys intersecting the Study Area*

Agency Project No.	Project Name	Reference
2015-619.ASM [59]	CMAQ Grant for Rio Rico Chip Sealing	O'Mack (2016)
2018-328.ASM [60]	Santa Cruz County Ruby Road Project	Harte (2018)
2018-449.ASM [61]	No information available	Not available
2019-344.ASM [62]	Nogales International Airport Survey	Barr (2019)

* Only projects within or intersecting **the Study Area** are listed.

Table A.2. Known archaeological sites intersecting the Study Area*

Site Number	Site Type	Age and Cultural Affiliation	Reference	NRHP Eligibility
AR-03-05-03-109 1	Mine workings (3-R Mine)	Historic (late 1800s–early 1900s); Euroamerican	USDA Forest Service (1985); "updated notes on 3R" (post-2019)	No recommendation provided by recorder(s)
AR-03-05-03-133/ AZ EE:10:40(ASM) 2	Townsite/prehistoric artifact scatter (Harshaw Camp)	Multicomponent: Prehistoric, Historic (1879–1950s); Unknown Native American; Euroamerican	Chamorro (2014:42–49); Chamorro et al. (2019:45–52); Farrell (1988); Farrell and Schrager (1988); Farrell and Spoerl (1989); Lyon (2001:11–19)	Determined eligible (a), (d). James Finley House is listed on the NRHP (NRIS 5 #74000462).
AR-03-05-03-163 3	Mine workings	Historic (late 1800s–early 1900s); Euroamerican	Farrell (1991)	No recommendation provided by recorder(s)
AR-03-05-03-386/ AZ Z:5:81(ASM) 4	Historical mining area (Duquesne Mine)	Historic; Euroamerican	USDA Forest Service (2020)	Unevaluated
AR-03-05-03-404/ AZ EE:10:192(ASM) 5	Mine workings (Hermosa Mine)	Historic (1863–1912); Euroamerican	Chamorro et al. (2019); Mehalic and Gillespie (2006)	Determined eligible (d) by CNF
AR-03-05-03-499/ AZ EE:10:195(ASM) 6	Mining camp (Hardshell Camp)	Late Historic (ca. late 1800s–early 1900s); Euroamerican	Chamorro (2014:122–125); Chamorro et al. (2019)	Determined eligible (d) by CNF
AR-03-05-03-514/ AZ EE:10:184(ASM) 7	Mine workings (Salvador Mine)	Late Historic (ca. late 1800s–early 1900s); Euroamerican	Chamorro (2014:169–173); Chamorro et al. (2019)	Determined not eligible by CNF
AR-03-05-03-622 8	Harshaw Road	Late Historic (ca. 1883–1950); Euroamerican	Brown and Taylor 2021; Brown et al. 2021	Recommended eligible (a) and (d)
AZ EE:4:43(ASM) 9	New Mexico and Arizona Railroad	Historic (1881–mid-1900s); Euroamerican	Stone and Hooper 2017; Poseyesva 2020	Recommended eligible (a) and (d)
AZ EE:5:2(ASM) 10	Sherd scatter	Prehistoric (12,000 B.C.–A.D. 1500); Unknown Native American	ASM (1937)	No recommendation provided by recorder(s)
AZ EE:5:6(ASM) 11	Habitation	Multicomponent: Prehistoric, Historic (1800–1900s); Unknown Native American; Euroamerican	Hathaway (1997)	Determined eligible by SHPO
AZ EE:5:9(ASM) 12	Historical structure (shed)	Late Historic (late 19th–early 20th century); Euroamerican	Hammack (1967b)	No recommendation provided by recorder(s)
AZ EE:5:10(ASM) 13	Campsite or possible fieldhouse	Formative (A.D. 1–1450); Unknown Native American	Hammack (1967c)	No recommendation provided by recorder(s)
AZ EE:5:23(ASM) 14	Railroad	Historic (1800–1900); Euroamerican	AZSITE	Determined not eligible by SHPO
AZ EE:5:33(ASM) 15	Campsite	Formative (A.D. 1–1450); Unknown Native American	No information available	Recommended eligible
AZ EE:5:35(ASM) 16	Artifact scatter	Prehistoric (12,000 B.C.–A.D. 1500); Unknown Native American	Hathaway (1997)	Recommended eligible

Table A.2. Known archaeological sites intersecting the Study Area*

Site Number	Site Type	Age and Cultural Affiliation	Reference	NRHP Eligibility
AZ EE:5:36(ASM) [17]	Artifact scatter with features	Middle–Late Formative (A.D. 1000–1450); Hohokam, "Mogollon"	Hathaway (1997); Teague and Baldwin (1978)	Recommended eligible (d)
AZ EE:5:37(ASM) [18]	Artifact scatter	Formative (A.D. 1–1450); Hohokam	Hathaway (1997)	Recommended eligible
AZ EE:5:38(ASM) [19]	Artifact scatter	Formative (A.D. 1–1450); Hohokam	Hathaway (1997)	Recommended eligible
AZ EE:9:19(ASM) [20]	Sherd area	Formative (A.D. 1–1450); Unknown Native American	Danson (1941a)	Determined eligible by SHPO in 2000
AZ EE:9:21(ASM) [21]	Sherd area	Formative (A.D. 1–1450); Unknown Native American	Danson (1941b)	Unevaluated
AZ EE:9:22(ASM) [22]	Sherd area	Formative (A.D. 1–1450); Unknown Native American	Danson (1941c)	Unevaluated
AZ EE:9:23(ASM) [23]	Sherd and burnt rock area	Formative (A.D. 1–1450); Unknown Native American	Danson (1941d)	Unevaluated
AZ EE:9:25(ASM) [24]	Sherd area	Formative (A.D. 1–1450); Unknown Native American	Danson (1941e)	Unevaluated
AZ EE:9:27(ASM) [25]	Sherd area	Formative (A.D. 1–1450); Unknown Native American	Danson (1941f)	Unevaluated
AZ EE:9:28(ASM) [26]	Fortification/petroglyphs (Indian Hill)	Middle–Late Formative (A.D. 950–1450); Hohokam	Danson (1941g); Urban (1983a)	Unevaluated
AZ EE:9:29(ASM) [27]	Sherd area	Formative (A.D. 1–1450); Unknown Native American	Danson (1941h)	Unevaluated
AZ EE:9:30(ASM) [28]	Sherd area	Formative (A.D. 1–1450); Unknown Native American	Danson (1941i)	Unevaluated
AZ EE:9:31(ASM) [29]	Sherd area	Formative (A.D. 1–1450); Unknown Native American	Danson (1941j)	Unevaluated
AZ EE:9:32(ASM) [39]	Sherd area	Formative (A.D. 1–1450); Unknown Native American	Danson (1941k)	Unevaluated
AZ EE:9:33(ASM) [31]	Sherd area	Formative (A.D. 1–1450); Unknown Native American	Danson (1941l)	Unevaluated
AZ EE:9:34(ASM) [32]	Sherd area and trash mound	Formative (A.D. 1–1450); Unknown Native American	Danson (1941m)	Unevaluated
AZ EE:9:35(ASM) [33]	Sherd area	Formative (A.D. 1–1450); Unknown Native American	Danson (1941n)	Unevaluated
AZ EE:9:42(ASM) [34]	Historical structure	Late Historic (1900–1950); Mexican-American	Danson (1941o)	Unevaluated
AZ EE:9:50(ASM) [35]	Campsite	Formative (A.D. 1–1450); Unknown Native American	ASM (1943)	Unevaluated
AZ EE:9:51(ASM) [36]	Habitation	Formative (A.D. 1–1450); Hohokam or Trincheras	Breternitz (2003); Schroeder (2006)	Recommended eligible
AZ EE:9:57(ASM)** [37]	Railroad feature	Historic (A.D. 1500–1950); Euroamerican	Hammack (1967a)	Unevaluated
AZ EE:9:59(ASM) [38]	Farming camp	Formative (A.D. 1–1450); Unknown Native American	Hammack (1967d)	Unevaluated
AZ EE:9:60(ASM) [39]	Mescal pit	Prehistoric; Unknown Native American	Hammack (1967a, 1967e)	Unevaluated
AZ EE:9:64(ASM) [40]	Waste pile	Late Historic (1900–1950); Euroamerican	Fontana et al. (1967a)	Unevaluated
AZ EE:9:65(ASM) [41]	Historical structures (Fort Mason)	Late Historic (1900–1950); Euroamerican	Fontana et al. (1967b)	Unevaluated
AZ EE:9:66(ASM) [42]	Waste pile	Late Historic (1900–1950); Euroamerican, O'odham	Fontana et al. (1967c)	Unevaluated
AZ EE:9:69(ASM) [43]	Village	Formative (A.D. 1–1450); Unknown Native American	Cunningham and Goree (1972a)	Unevaluated

Table A.2. Known archaeological sites intersecting the Study Area*

Site Number	Site Type	Age and Cultural Affiliation	Reference	NRHP Eligibility
AZ EE:9:77(ASM) [44]	Village	Formative (A.D. 1–1450); Unknown Native American	Cunningham and Goree (1972b)	Unevaluated
AZ EE:9:78(ASM) [45]	Village	Late Formative (A.D. 1150–1450); Hohokam	Cunningham and Goree (1972c)	Unevaluated
AZ EE:9:79(ASM) [46]	Village	Formative (A.D. 1–1450); Unknown Native American	Cunningham and Goree (1972d)	Unevaluated
AZ EE:9:91(ASM) [47]	Lithic and sherd scatter	Late Formative (A.D. 1150–1450); Hohokam	Czaplicki (1981); Dongoske (1981a, 1981b)	Unevaluated
AZ EE:9:96(ASM) [48]	Village (Schoolhouse Site)	Middle–Late Formative (A.D. 950–1450); Hohokam	Urban (1983b)	Determined eligible by SHPO in 2003
AZ EE:9:97(ASM) [49]	Village and campsite (Ray Brown Site #2)	Formative (A.D. 1–1450); Unknown Native American, Hohokam	Urban (1983c)	Unevaluated
AZ EE:9:99(ASM) [50]	Village (Kino Springs Site/Samantha Star Site)	Middle–Late Formative (A.D. 950–1450); Hohokam	Urban (1983d)	Unevaluated
AZ EE:9:101(ASM) [51]	Lithic scatter (The Victoria Site)	Archaic (8500–1 B.C.); Unknown Native American	Urban (1984)	Unevaluated
AZ EE:9:106(ASM) [52]	Lithic scatter and rock feature	Prehistoric; Unknown Native American	Smithwick (1986a)	Unevaluated
AZ EE:9:111(ASM) [53]	Resource exploitation	Prehistoric; Unknown Native American	Smithwick (1986b)	Unevaluated
AZ EE:9:112(ASM) [54]	Habitation (Guevani Ranch Main Gate Site)	Multicomponent: Formative (A.D. 1–1450), Late Historic (ca. late 19th century); Unknown Native American, Euroamerican, O'odham	Seymour, Seymour, and Doak (1991a); Thiel (1995)	Recommended eligible
AZ EE:9:113(ASM) [55]	Habitation	Formative (A.D. 1–1450); Unknown Native American	Seymour, Litler, and Doak (1991a)	Unevaluated
AZ EE:9:114(ASM) [56]	Artifact scatter	Multicomponent: Prehistoric, Historic; Unknown Native American, Euroamerican	Seymour, Seymour, and Doak (1991b)	Unevaluated
AZ EE:9:115(ASM) [57]	Artifact scatter	Multicomponent: Prehistoric, Protohistoric (A.D. 1450–1700), Historic; Unknown Native American, possibly O'odham, Euroamerican	Seymour, Seymour, and Doak (1991c)	Unevaluated
AZ EE:9:116(ASM) [58]	Habitation	Multicomponent: Prehistoric, Historic; Unknown Native American, possibly Euroamerican	Seymour, Seymour, and Doak (1991d)	Unevaluated
AZ EE:9:117(ASM) [59]	Habitation	Multicomponent: Middle Formative (A.D. 750–950), Middle–Late Historic (1880–1950); Hohokam, Euroamerican	Seymour, Seymour, and Doak (1991e); Swartz (1996, 1999c); Swartz et al. (2000); Thiel (1995)	Recommended eligible
AZ EE:9:118(ASM) [60]	Resource exploitation	Formative (A.D. 1–1450); Unknown Native American	Seymour, Litler, and Doak (1991b)	Unevaluated

Table A.2. Known archaeological sites intersecting the Study Area*

Site Number	Site Type	Age and Cultural Affiliation	Reference	NRHP Eligibility
AZ EE:9:119(ASM) 61	Village	Multicomponent: Prehistoric, Protohistoric (A.D. 1450–1700), Historic; O'odham	Seymour, Seymour, and Doak (1991f)	Unevaluated
AZ EE:9:120(ASM) 62	Canal	Historic; Euroamerican	Seymour and Doak (1991a)	Unevaluated
AZ EE:9:121(ASM) 63	Limited use	Historic (late 19th century); Euroamerican, O'odham	Seymour and Doak (1991b)	Unevaluated
AZ EE:9:122(ASM) 64	Artifact scatter	Multicomponent: Formative (A.D. 1–1450), Late Historic (late 19th century); Unknown Native American, Euroamerican	Seymour, Litler, and Doak (1991c)	Unevaluated
AZ EE:9:123(ASM) 65	Artifact scatter	Formative–Protohistoric (A.D. 1–1700); Unknown Native American	Seymour, Seymour, and Doak (1991g)	Unevaluated
AZ EE:9:124(ASM) 66	Boulder clusters	Historic; Euroamerican	Seymour, Seymour, and Doak (1991h)	Unevaluated
AZ EE:9:125(ASM) 67	Canal	Historic; Euroamerican	Seymour and Doak (1991c)	Unevaluated
AZ EE:9:126(ASM) 68	Habitation	Multicomponent: Prehistoric, Historic; Unknown Native American, O'odham	Seymour, Seymour, and Doak (1991i)	Unevaluated
AZ EE:9:127(ASM) 69	Habitation	Multicomponent: Formative (A.D. 1–1450), Late Historic (late 19th century); Unknown Native American, Euroamerican, O'odham	Seymour, Litler, and Doak (1991d)	Unevaluated
AZ EE:9:128(ASM) 70	Artifact scatter	Formative (A.D. 1–1450); Unknown Native American	Seymour, Litler, and Doak (1991e)	Unevaluated
AZ EE:9:129(ASM) 71	Habitation	Formative (A.D. 1–1450); Trincheras	Seymour and Doak (1991d)	Unevaluated
AZ EE:9:130(ASM) 72	Habitation	Formative (A.D. 1–1450); Unknown Native American	Seymour, Seymour, and Doak (1991j)	Unevaluated
AZ EE:9:131(ASM) 73	Habitation and resource procurement	Formative (A.D. 1–1450); Unknown Native American	Seymour, Litler, and Doak (1991f)	Unevaluated
AZ EE:9:132(ASM) 74	Habitation (Beehive Site)	Multicomponent: Prehistoric, Historic; Unknown Native American, Sobaipuri	Seymour, Litler, and Doak (1991g)	Unevaluated
AZ EE:9:133(ASM) 75	Habitation	Multicomponent: Prehistoric, Historic; Unknown Native American, O'odham	Seymour and Doak (1991e)	Unevaluated
AZ EE:9:134(ASM) 76	Habitation	Late Historic (late 19th–early 20th century); Euroamerican	Seymour and Doak (1991f)	Unevaluated
AZ EE:9:135(ASM) 77	Artifact scatter	Formative (A.D. 1–1450); possibly Hohokam	Seymour and Doak (1991g)	Unevaluated
AZ EE:9:136(ASM) 78	Habitation	Late Historic (late 19th–early 20th century); Euroamerican	Seymour and Doak (1991h)	Unevaluated

Table A.2. Known archaeological sites intersecting the Study Area*

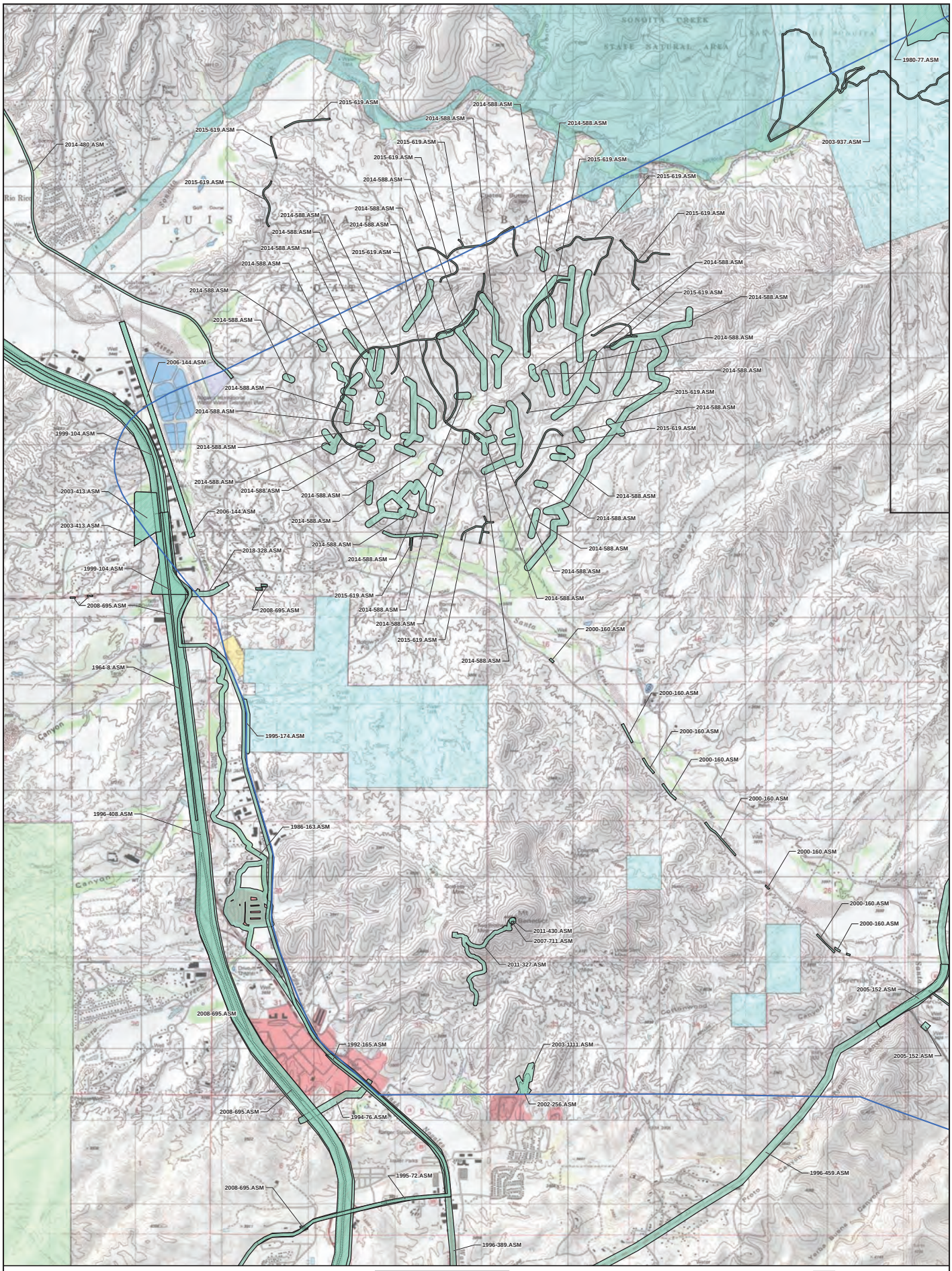
Site Number	Site Type	Age and Cultural Affiliation	Reference	NRHP Eligibility
AZ EE:9:137(ASM) 79	Habitation/village	Multicomponent: Formative (A.D. 1–1450), Late Historic (1900–1950); Trincheras, Euroamerican	Seymour and Doak (1991i)	Unevaluated
AZ EE:9:138(ASM) 80	Habitation	Multicomponent: Formative (A.D. 1–1450), Historic; Unknown Native American, O'odham	Seymour and Doak (1991j)	Determined eligible by SHPO in 2000
AZ EE:9:139(ASM) 81	Habitation	Formative (A.D. 1–1450); Unknown Native American	Jones and Gregory (2014); Seymour and Doak (1991k)	Unevaluated
AZ EE:9:150(ASM) 82	Historic industrial (Nogales Water Pumping Station)	Late Historic (1912–present)	Phillips (1992)	Determined eligible by SHPO in 2000
AZ EE:9:152(ASM) 83	Soil control structure	Unknown	Montero (1993)	Unevaluated
AZ EE:9:154(ASM) Old Tucson Road 84	Historic Road	Historic (pre-1877 to present)	Stone, B. (1994) Adams and Hoffman (1995) Jones and Gregory (2014)	Not eligible
AZ EE:9:155(ASM) 85	Artifact scatter	Unknown prehistoric Unknown Native American	Adams and Hoffman (1995)	Recommended eligible
AZ EE:9:162(ASM) 86	Artifact scatter/cemetery (South River Road Cemetery)	Multicomponent: Formative (A.D. 1–1450), Late Historic (late 19th–early 20th century); Unknown Native American, Mexican-American	Thiel (1995)	Recommended eligible
AZ EE:9:163(ASM) 87	Artifact scatter/ Historical structure	Multicomponent: Prehistoric, Late Historic (late 19th–early 20th century); Unknown Native American, Euroamerican	Thiel (1995)	Recommended eligible
AZ EE:9:164(ASM) 88	Artifact scatter	Formative (A.D. 1–1450); Unknown Native American	Thiel (1995)	Recommended eligible
AZ EE:9:166(ASM) 89	Artifact scatter	Formative (A.D. 1–1450); Unknown Native American	Hathaway (1997)	Recommended eligible
AZ EE:9:167(ASM) 90	Telephone line	Late Historic (A.D. 1900–1950); Euroamerican	Hathaway (1997)	Recommended not eligible
AZ EE:9:168(ASM) 91	Abandoned road segments (Nogales–Tombstone Highway)	Late Historic (post-1913–1960s); Euroamerican	Bruder and Garcia (2002a, 2002b); Hathaway (1997); Hathaway et al. (1996); Teague and Baldwin (1978)	Determined eligible (d) by SHPO in 2002
AZ EE:9:170(ASM) 92	Petroglyphs/artifact scatter	Formative (A.D. 1–1450); Unknown Native American	Sullivan (1996)	Recommended eligible
AZ EE:9:178(ASM) 93	Artifact scatter	Multicomponent: Prehistoric, Late Historic (1900–1950); Mogollon, Euroamerican	Hathaway (1997)	Recommended not eligible
AZ EE:9:180(ASM) 94	Artifact scatter	Formative (A.D. 1–1450); Hohokam	Swartz (1999a, 1999d)	Unevaluated
AZ EE:9:182(ASM) 95	Unknown	Unknown	Slawson (1999)	Unknown

Table A.2. Known archaeological sites intersecting the Study Area*

Site Number	Site Type	Age and Cultural Affiliation	Reference	NRHP Eligibility
AZ EE:9:186(ASM) 96	Unknown	Unknown	ARO Advanced Site	Unknown
AZ EE:9:191(ASM) 97	Unknown	Unknown	ARO Advanced Site	Unknown
AZ EE:9:197(ASM) 98	Unknown	Unknown	ARO Advanced Site	Unknown
AZ EE:9:198(ASM) 99	Unknown	Unknown	ARO Advanced Site	Unknown
AZ EE:9:217(ASM) 100	Unknown	Unknown	ARO Advanced Site	Unknown
AZ EE:9:218(ASM) 101	Unknown	Unknown	ARO Advanced Site	Unknown
AZ EE:9:219(ASM) 102	Unknown	Unknown	ARO Advanced Site	Unknown
AZ EE:9:220(ASM) 103	Unknown	Unknown	ARO Advanced Site	Unknown
AZ EE:9:221(ASM) 104	Unknown	Unknown	ARO Advanced Site	Unknown
AZ EE:9:222(ASM) 105	Unknown	Unknown	ARO Advanced Site	Unknown
AZ EE:9:230(ASM) 106	Campsite	Prehistoric; Unknown Native American	Johnson (2002a, 2003)	Determined eligible (d) by SHPO in 2002
AZ EE:9:231(ASM) 107	Campsite	Prehistoric; Unknown Native American	Johnson (2002b, 2003)	Recommended eligible (d)
AZ EE:9:232(ASM) 108	Campsite	Formative (A.D. 1–1450); Hohokam	Johnson (2002c, 2003)	Determined eligible (d) by SHPO in 2003
AZ EE:9:239(ASM) 109	Unknown	Unknown	ARO Advance Site	Unknown
AZ EE:9:246(ASM) 110	Unknown	Unknown	ARO Advanced Site	Unknown
AZ EE:9:247(ASM) 111	Unknown	Unknown	ARO Advanced Site	Unknown
AZ EE:9:250(ASM) 112	Unknown	Unknown	ARO Advance Site	Unknown
AZ EE:9:251(ASM) 113	Unknown	Unknown	Peters (2013)	Unknown
AZ EE:9:258(ASM) 114	Bedrock grinding station	Prehistoric; Unknown Native American	Armstrong et al. (2007)	Unevaluated
AZ EE:9:262(ASM) 115	Artifact scatter	Prehistoric; Hohokam, Trincheras	Hesse and Barr (2010)	Recommended eligible
AZ EE:9:263(ASM) 116	Artifact scatter	Prehistoric; Unknown Native American	Hesse and Barr (2010)	Recommended eligible
AZ EE:9:271(ASM) 117	Unknown	Unknown	Unknown	Unknown
AZ EE:10:198(ASM) 118	Hardrock Mine (Kansas Mine)	Historic (1905–1959); Euroamerican	Gruner (2018)	Recommended eligible (d)

* Only sites within or intersecting **the Study Area** are listed.

** No site boundary available on AZSITE.



T22S, R14E,
T23S, R13E-14E,
T24S, R14E
Santa Cruz County, Arizona
Cumero Canyon, Kino Springs and Rio Rico USGS 7.5' Quadrangles
Projection: UTM NAD83, Zone 12
Data Source: BLM Surface Management (BLM 2019, WRI Modified 2019)

WestLand Resources

N

0 1,000 2,000 Feet

0 500 1,000 Meters

a b c d e

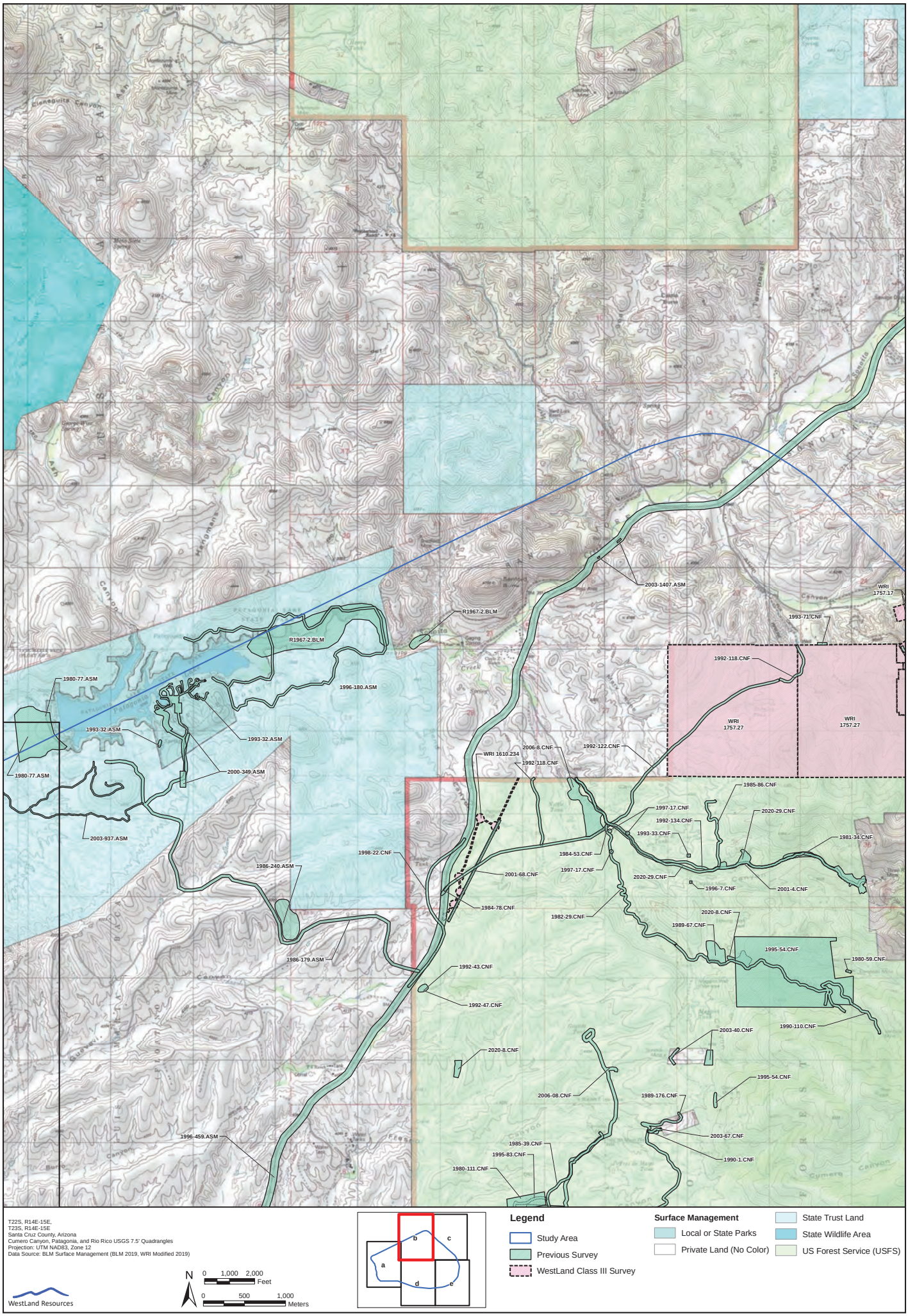
Legend

- Study Area
- Previous Survey

Surface Management

- Bureau of Land Management (BLM)
- Local or State Parks
- National Park Service (NPS)
- Private Land (No Color)
- State Trust Land
- US Forest Service (USFS)

Figure A.1.a. Previous archaeological projects that intersect the Study Area



T22S, R14E-15E,
T23S, R14E-15E
Santa Cruz County, Arizona
Cumero Canyon, Patagonia, and Rio Rico USGS 7.5' Quadrangles
Projection: UTM NAD83, Zone 12
Data Source: BLM Surface Management (BLM 2019, WRI Modified 2019)

WestLand Resources

N

0 1,000 2,000 Feet

0 500 1,000 Meters

a b c d e

Legend

- Study Area
- Previous Survey
- WestLand Class III Survey

Surface Management

- Local or State Parks
- Private Land (No Color)
- State Trust Land
- State Wildlife Area
- US Forest Service (USFS)

Figure A.1.b. Previous archaeological projects that intersect the Study Area

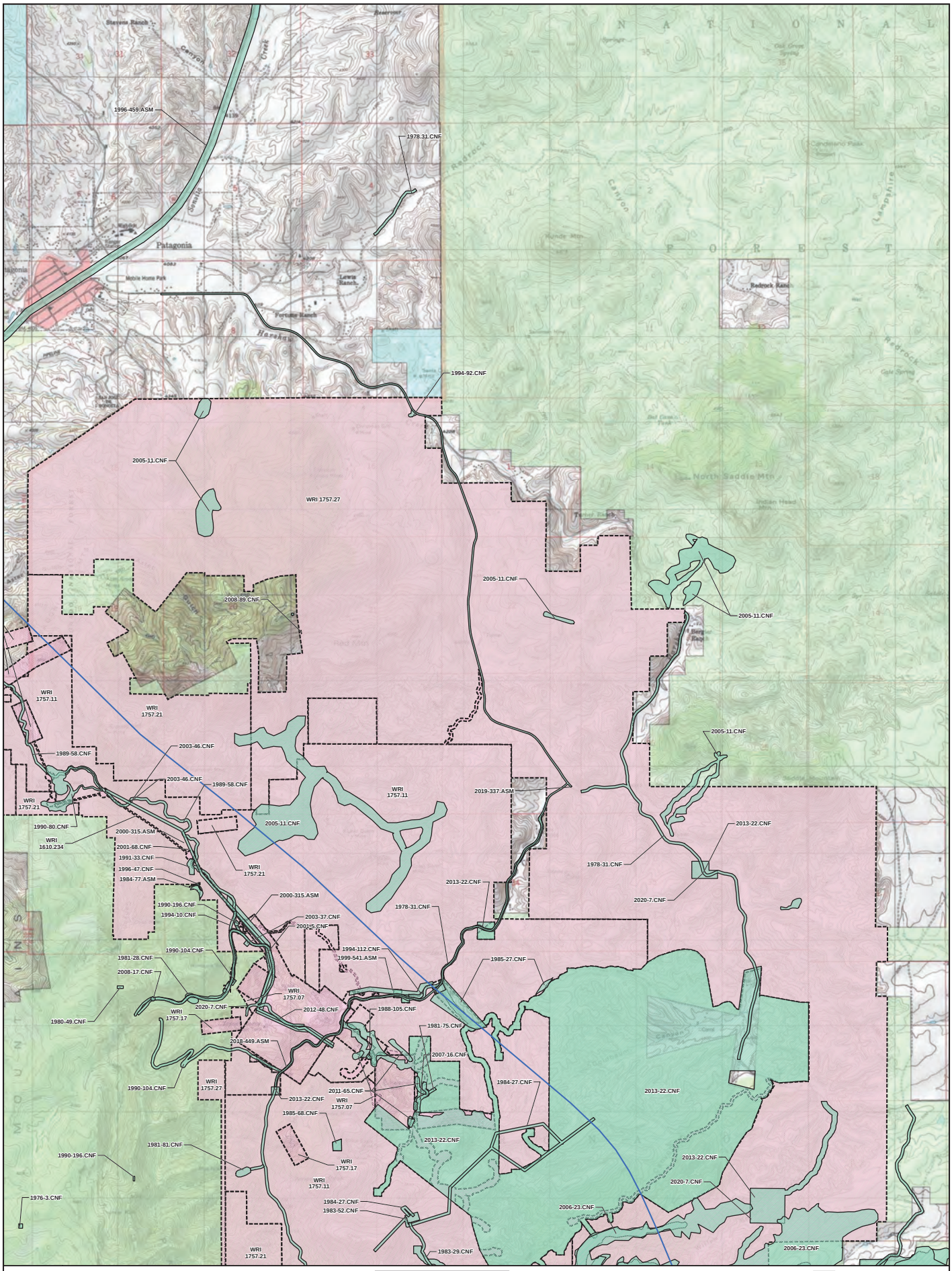
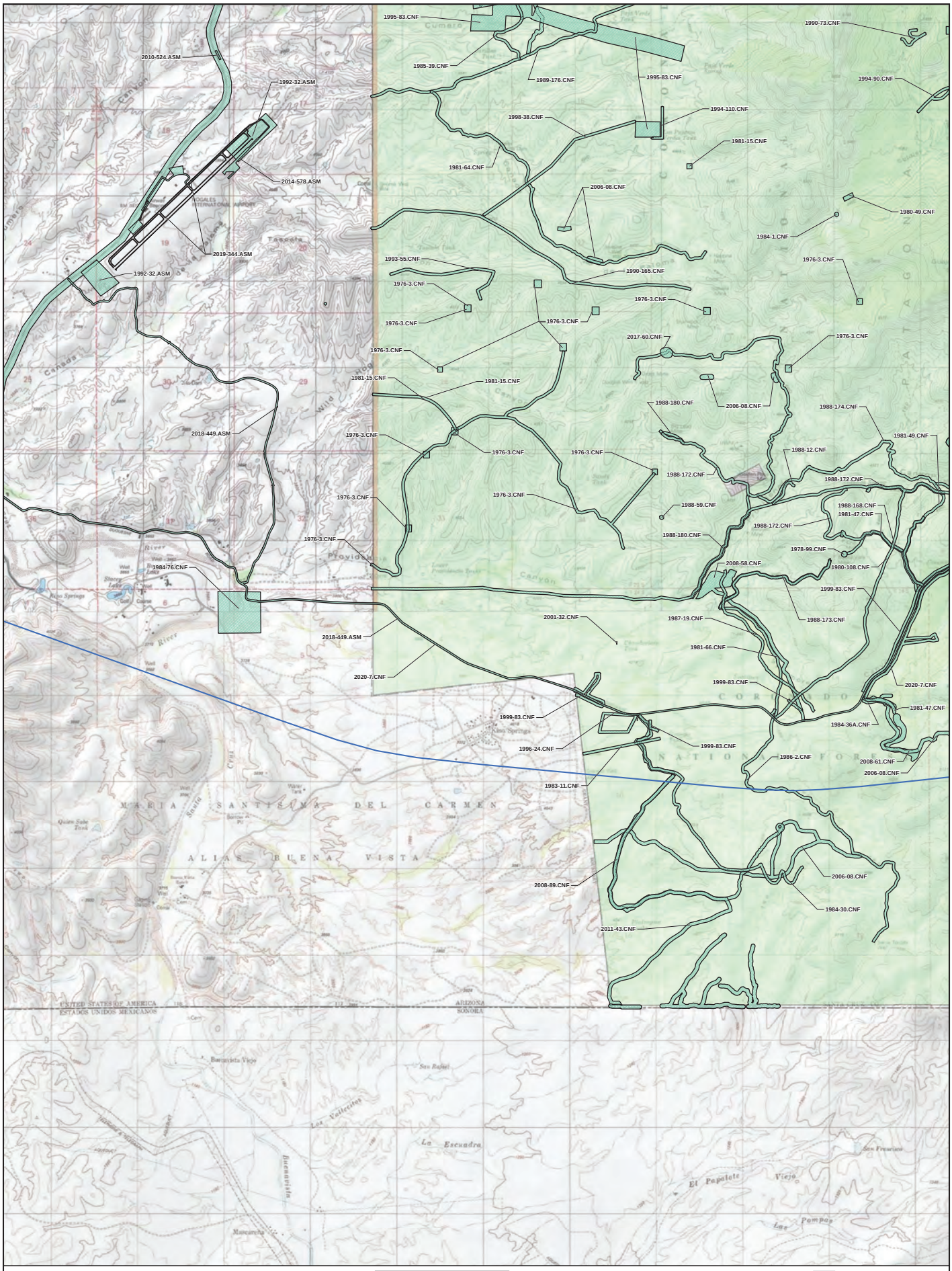


Figure A.1.c. Previous archaeological projects that intersect the Study Area



T23S, R14E-16E,
T24S, R14E-16E
Santa Cruz County, Arizona
Cumero Canyon and Kino Springs USGS 7.5' Quadrangles
Projection: UTM NAD83, Zone 12
Data Source: BLM Surface Management (BLM 2019, WRI Modified 2019)

WestLand Resources

N

0 1,000 2,000 Feet

0 500 1,000 Meters

a b c d e

Legend

Study Area

Previous Survey

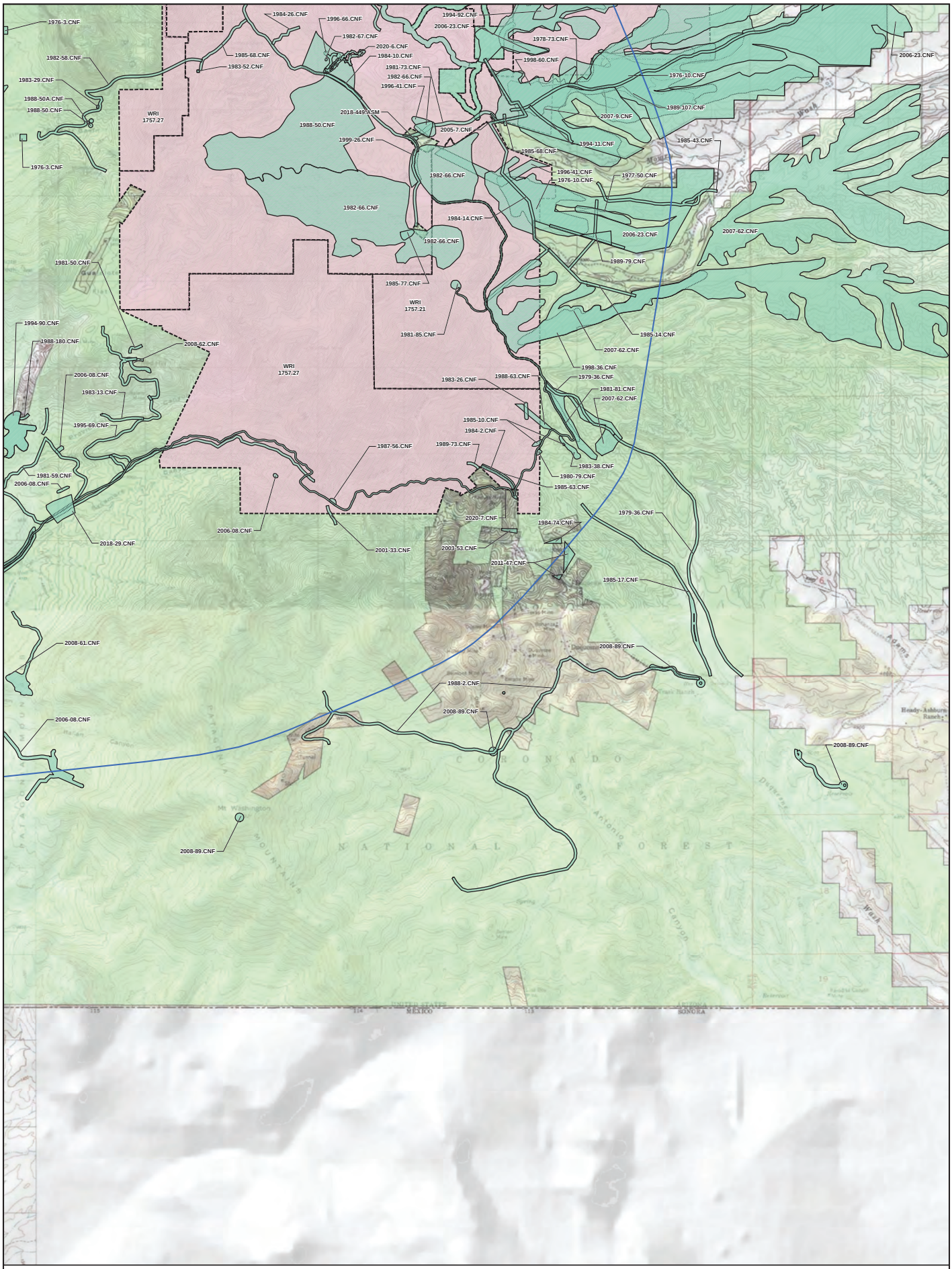
Surface Management

Private Land (No Color)

State Trust Land

US Forest Service (USFS)

Figure A.1.d. Previous archaeological projects that intersect the Study Area



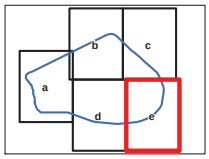
T23S, R16E,
T24S, R16E
Santa Cruz County, Arizona
Cumero Canyon, Duquesne, Harshaw, and Kino Springs USGS 7.5' Quadrangles
Projection: UTM NAD83, Zone 12
Data Source: BLM Surface Management (BLM 2019, WRI Modified 2019)

WestLand Resources

N

0 1,000 2,000 Feet

0 500 1,000 Meters



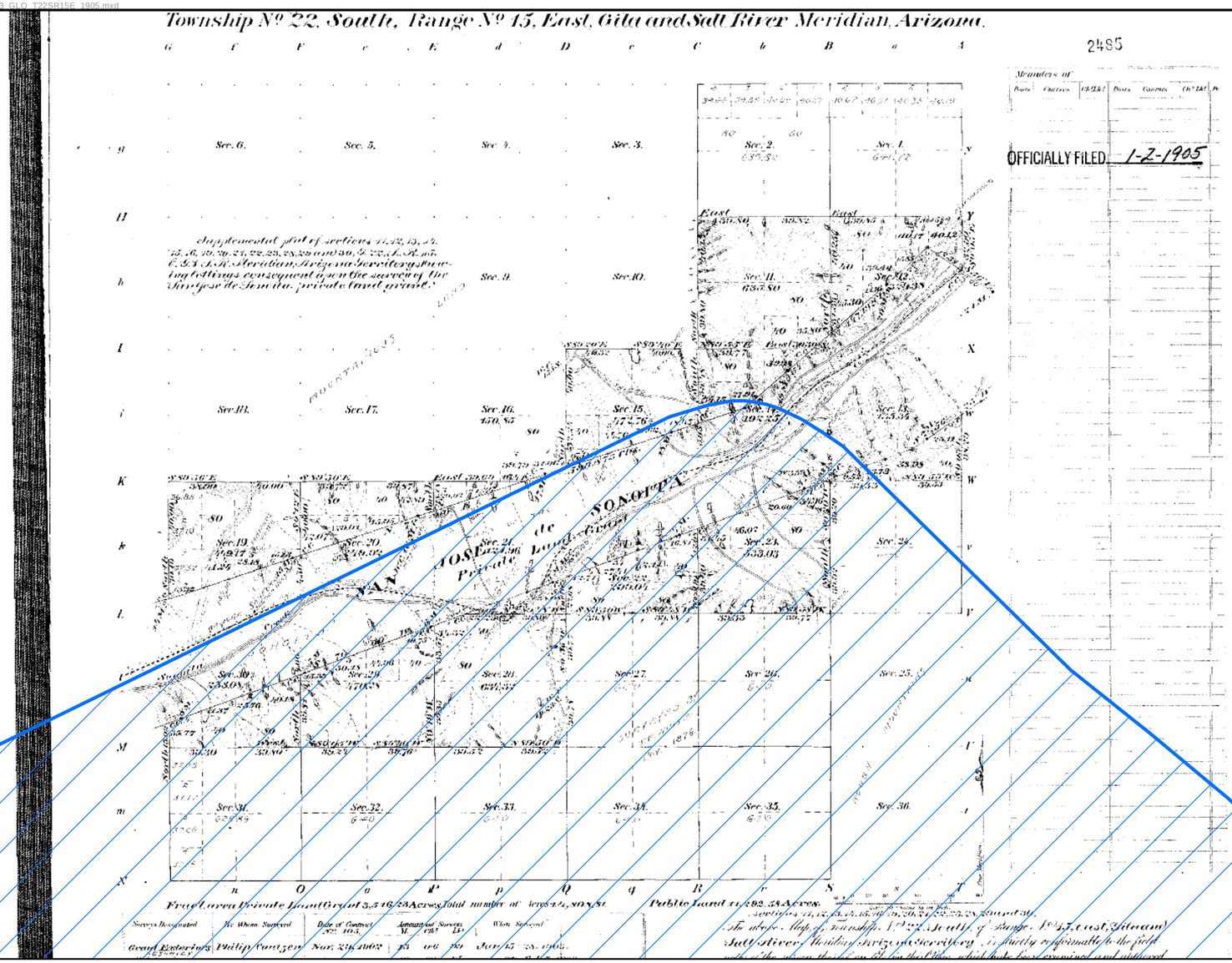
Legend

- Study Area
- Previous Survey
- WestLand Class III Survey

Surface Management

- Private Land (No Color)
- US Forest Service (USFS)

Figure A.1.e. Previous archaeological projects that intersect the Study Area



Santa Cruz County, Arizona
Projection: UTM NAD83, Zone 12
Data Source: General Land Office Plat

Legend

Study Area

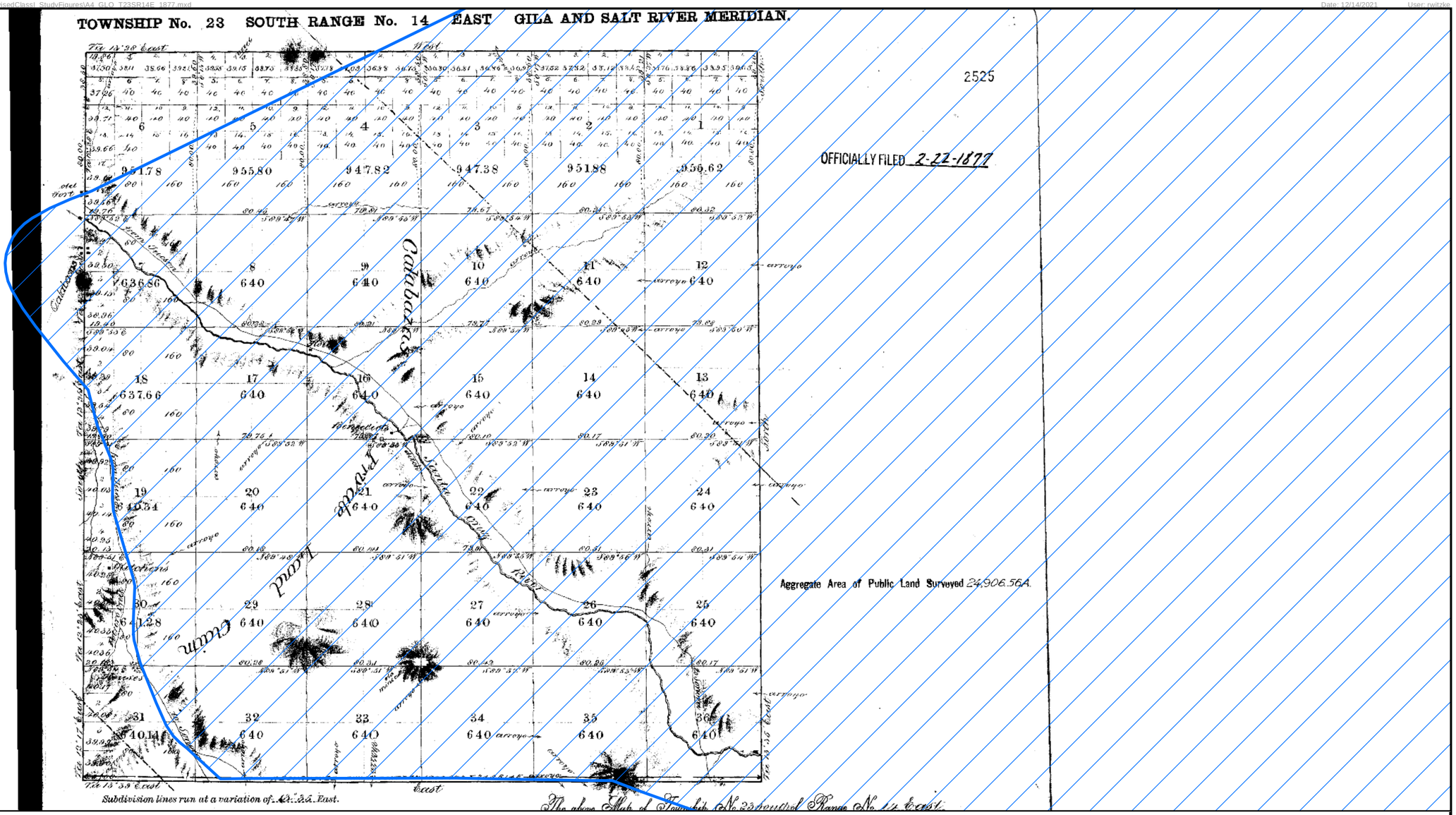
N

0 0.5 1 Miles

0 1 2 Kilometers

WestLand Resources

Figure A.3. Overlay of Study Area on General Land Office Plat of Township 22 South, Range 15 East, officially filed 1905



Santa Cruz County, Arizona
Projection: UTM NAD83, Zone 12
Data Source: General Land Office Plat

Legend

Study Area

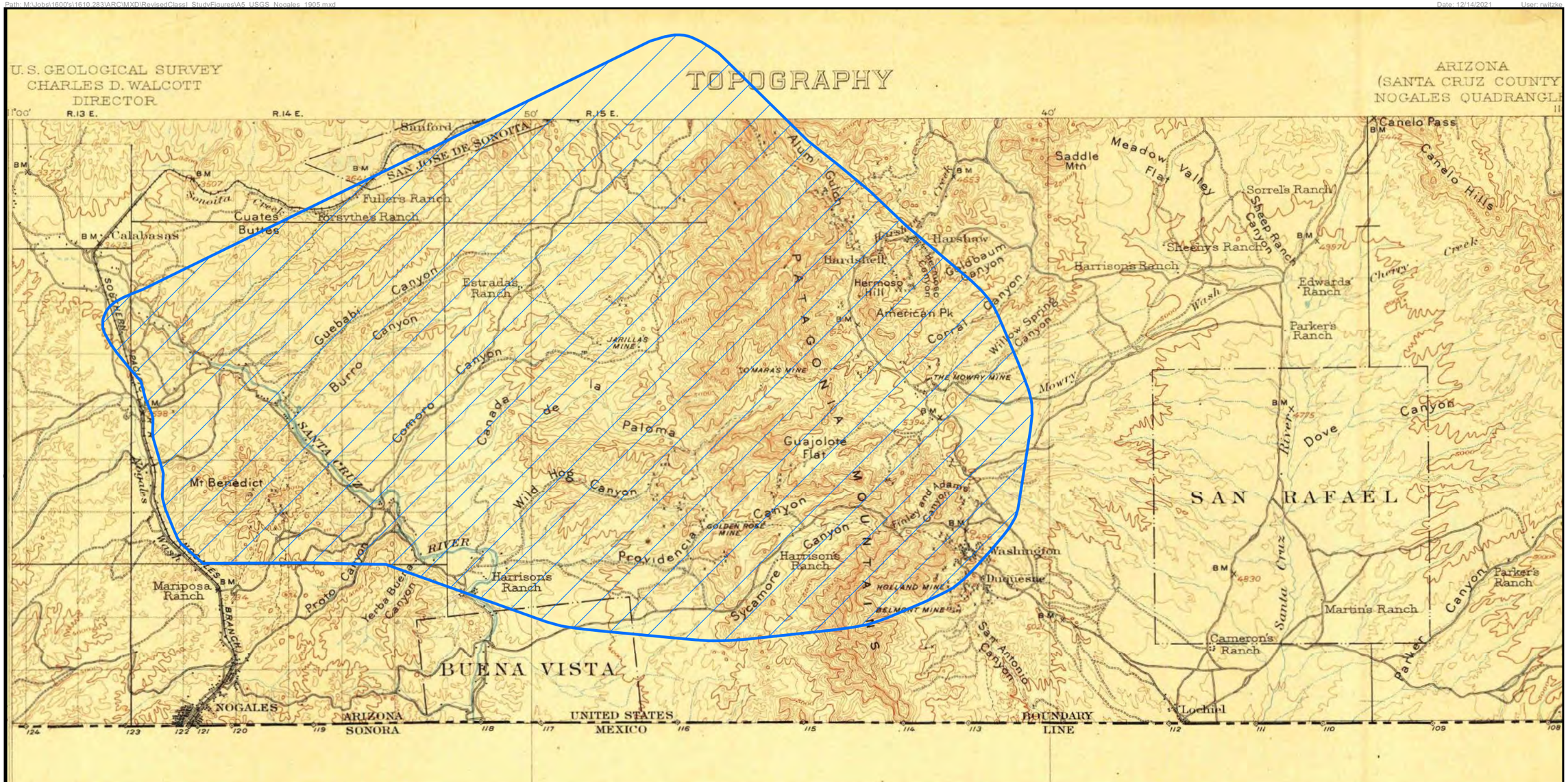
N

0 0.5 1 Miles

0 1 2 Kilometers

WestLand Resources

Figure A.4. Overlay of Study Area on General Land Office Plat of Township 23 South, Range 14 East, officially filed 1877



Santa Cruz County, Arizona
Projection: UTM NAD83, Zone 12

Legend

Study Area

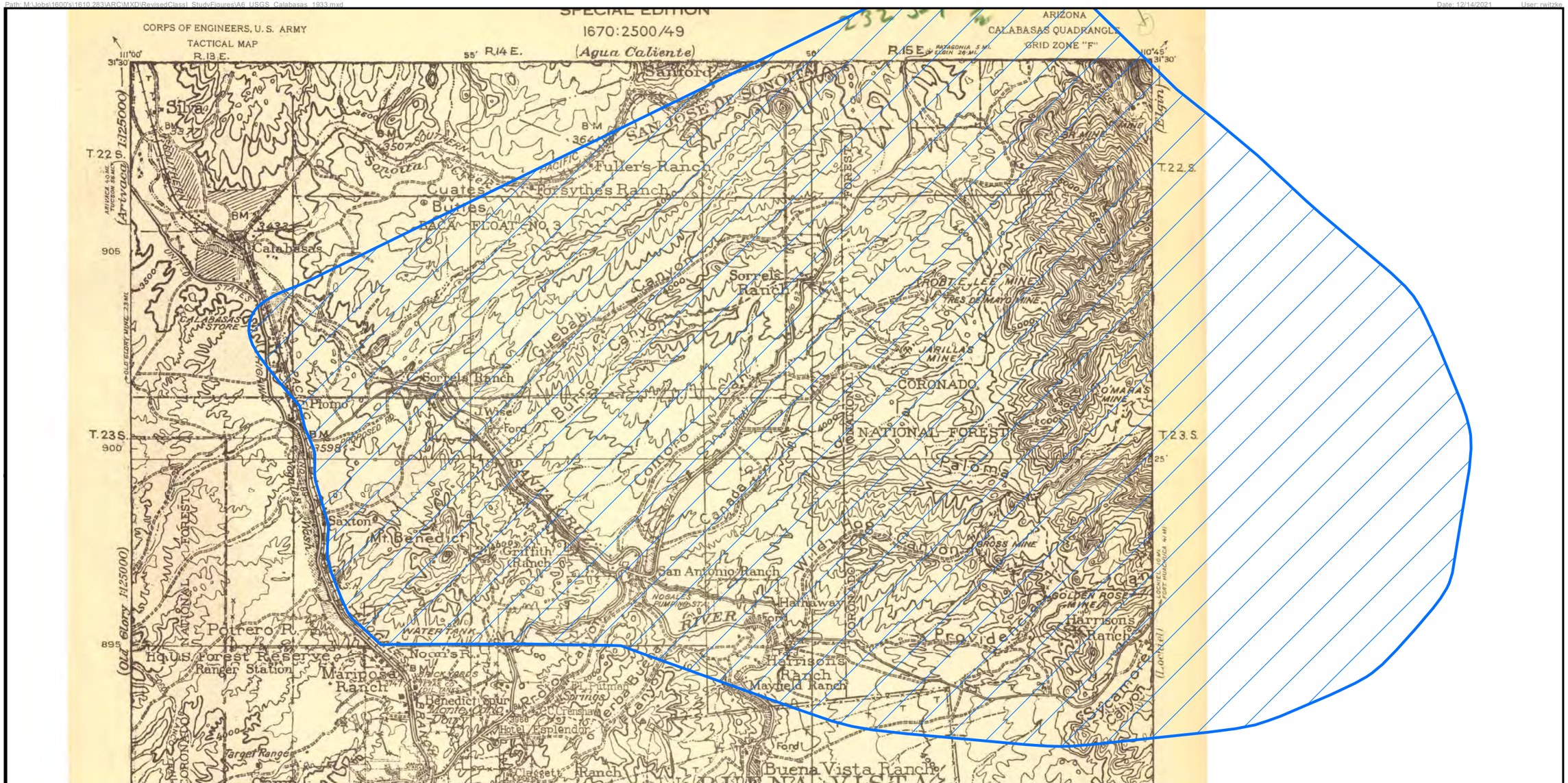
N

0 1 2 Miles

0 2 4 Kilometers

WestLand Resources

Figure A.5. Overlay of Study Area on the 1905 1:125,000-scale (30′ series) Nogales, Arizona USGS quadrangle



Santa Cruz County, Arizona
Projection: UTM NAD83, Zone 12

Legend

Study Area

N

0 1 2 Miles

0 2 4 Kilometers

WestLand Resources

Figure A.6. Overlay of Study Area on the 1933 1:62,500-scale (15′ series) Calabasas, Arizona USGS quadrangle

CLASS I REFERENCES

Adams, Kim, and Teresa L. Hoffman

1995 *Archaeological Assessment of a Proposed Fiber Optic Cable Right-of-way Between Tucson, Pima County, and Nogales, Santa Cruz County, Arizona*. ACS Project 95-7. Archaeological Consulting Services, Tempe.

Arizona State Museum (ASM)

1937 Site Card for AZ EE:2:2(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1943 Site Card for AZ EE:9:50(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

Armstrong, A., K. Morrow, and B. Adler

2007 Site Card for AZ EE:9:258(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

Barr, David M. R.

2015 *Archaeological Survey of 20.1 Acres for the Proposed Nogales International Airport Drainage–Erosion Control Improvements, Santa Cruz County, Arizona*. Report No. 14-683. SWCA Environmental Consultants, Inc., Tucson.

2019 *Archaeological Survey of 6.2 Acres for the Proposed Nogales International Airport Lighting Improvement Project, Santa Cruz County, Arizona*. Report No. 19-573. SWCA Environmental Consultants, Inc., Tucson.

Bennett, Duane A.

1988 *A Cultural Resources Investigation of the Proposed Road Repair and Construction Project, Sierra Vista Ranger District, Coronado National Forest*. CNF Cultural Clearance Report No. 1988-05-180. On file. Coronado National Forest Supervisor's Office, Tucson.

1989 *A Cultural Resources Investigation of the Proposed Flux Canyon Road Maintenance Project, Sierra Vista Ranger District, Coronado National Forest*. CNF Archaeological Clearance Report No. 1989-05-058. On file. Coronado National Forest Supervisor's Office, Tucson.

2003 *Granillo Small Tracts Act Case*. CNF Archaeological Survey Report No. 2003-05-053. On file. Coronado National Forest Supervisor's Office, Tucson.

2005 *Searles Road Homeowners' Association Easement*. CNF Archaeological Survey Report No. 2005-05-007. On file. Coronado National Forest Supervisor's Office, Tucson.

2011 *Hilton Small Tracts Act Proposal*. CNF Cultural Clearance Report No. 2011-05-047. On file. Coronado National Forest Supervisor's Office, Tucson.

Bennett, Duane, and William B. Gillespie

1998 *Hardy Electric Line Installation Modification*. CNF Cultural Clearance Report No. 1998-05-060. On file. Coronado National Forest Supervisor's Office, Tucson.

Breternitz, Cory D.

2003 *A Cultural Resources Survey of Approximately 25 Acres of Private Land for a Proposed School Site in the Santa Cruz Unified School District No. 35 in Rio Rico, Santa Cruz County, Arizona*. Technical Report No. 02-26. Soil Systems, Phoenix.

Brown, Stephanie A., and Christopher D. Taylor

2021 *A Cultural Resources Inventory of 2,352 Acres of Federal Land on the Coronado National Forest, Santa Cruz County, Arizona*. Cultural Resources Report 2020-100. WestLand Resources, Inc., Tucson.

Brown, Stephanie A., Sebastian Chamorro, Paul Miller, and Joseph Bryce

2021 *A Cultural Resources Inventory of 12,277 Acres of Federal Land Within the Coronado National Forest, Santa Cruz County, Arizona.* Cultural Resources Report 2021-40. WestLand Resources, Inc., Tucson.

Bruder, J. Simon, and Daniel Garcia

2002a *A Cultural Resource Survey at the Santa Cruz River Bridge on State Route 82, Santa Cruz County, Arizona*. Cultural Resources Report No. 00-469: 118. EcoPlan Associates, Mesa.

2002b Site Card for AZ EE:9:168(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

Chamorro, Sebastian

2014 *A Cultural Resources Inventory of 2,634 Acres of Private and Federal Lands in Support of the Hermosa Drilling Project Plan of Operations Within the Coronado National Forest, Arizona*. Cultural Resources Report 2013-19. WestLand Resources, Inc., Tucson.

Chamorro, Sebastian, Bradford W. Stone, Erina Gruner, Anna M. King, George Tinseth, Rebecca Caroli, Stephanie Brown, Cannon S. Daughtrey, and Jocelyn A. Bernatchez

2019 *A Cultural Resources Inventory of 10,342.41 Acres of Federal Land Within the Coronado National Forest, Santa Cruz County, Arizona*. Cultural Resources Report 2019-3. WestLand Resources, Inc., Tucson.

Cunningham, Robert D., and Patricia A. Goree

1972a Site Card for AZ EE:9:69(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1972b Site Card for AZ EE:9:77(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1972c Site Card for AZ EE:9:78(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1972d Site Card for AZ EE:9:79(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

Czaplicki, Jon S.

1981 *Additional Archaeological Testing at Site AZ EE:9:91, Patagonia Lake State Park, South-Central Arizona*. Cultural Resource Management Section, Arizona State Museum, Tucson.

Danson, E. B.

1941a Site Card for AZ EE:9:19(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1941b Site Card for AZ EE:9:21(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1941c Site Card for AZ EE:9:22(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1941d Site Card for AZ EE:9:23(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1941e Site Card for AZ EE:9:25(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1941f Site Card for AZ EE:9:27(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1941g Site Card for AZ EE:9:28(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1941h Site Card for AZ EE:9:29(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1941i Site Card for AZ EE:9:30(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1941j Site Card for AZ EE:9:31(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1941k Site Card for AZ EE:9:32(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1941l Site Card for AZ EE:9:33(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1941m Site Card for AZ EE:9:34(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1941n Site Card for AZ EE:9:35(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1941o Site Card for AZ EE:9:42(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

Dongoske, Kurt E.

1981a *Archaeological Testing of Site AZ EE:9:91, Patagonia Lake State Park, South Central Arizona*. Cultural Resource Management Section, Arizona State Museum, Tucson.

1981b Site Card for AZ EE:9:91(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

Eighmey, James D.

1994 *Cultural Resources Survey of a ca. One-half Mile Long Segment of Frank Reed Road Right-of-way from Interstate-19 to State Route 89 in Nogales, Santa Cruz County, Arizona*. Report 94-08. Archaeological Research Services, Tempe.

Farrell, Mary M.

1988 *A Cultural Resources Investigation of Proposed Dekon Mining Projects, Sierra Vista Ranger District, Coronado National Forest*. CNF Archaeological Survey Report No. 1988-05-172. On file. Coronado National Forest Supervisor's Office, Tucson.

1991 Archaeological and Historical Site Inventory Form for AR-03-05-03-163. On file. Coronado National Forest Supervisor's Office, Tucson.

Farrell, Mary M., and Christopher Schrager

1988 Field Map of AR-03-05-03-133, Harshaw, Arizona. Document on file. Coronado National Forest Supervisor's Office, Tucson.

Farrell, Mary M., and Patricia M. Spoerl

1989 *A Cultural Resources Investigation of the Proposed Hale Small Tract Act Project, Sierra Vista Ranger District, Coronado National Forest*. CNF Archaeological Clearance Report No. 1988-05-122. On file. Coronado National Forest Supervisor's Office, Tucson.

Fontana, Bernard L., J. Cameron Greenleaf, and James E. Ayers

1967a Site Card for AZ EE:9:64(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1967b Site Card for AZ EE:9:65(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1967c Site Card for AZ EE:9:66(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

Gruner, Erina

2018 *A Cultural Resources Inventory of 20.93 Miles of Santa Cruz County Road Right-of-way in the Patagonia Mountains, Santa Cruz County, Arizona*. Cultural Resources Report 2018-61. WestLand Resources, Inc., Tucson.

Hammack, Laurens C.

1967a *The Archaeological Survey of the Patagonia Dam*. Arizona State Museum, University of Arizona, Tucson.

1967b Site Card for AZ EE:5:9(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1967c Site Card for AZ EE:5:10(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1967d Site Card for AZ EE:9:59(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1967e Site Card for AZ EE:9:60(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

Harris Environmental Group

2009 *A Class III Cultural Resources Survey of 34 Proposed Customs and Border Protection Tower Locations in Tucson East, Cochise County, Arizona.* Harris Environmental Group, Inc., Tucson.

Hart, David R.

2012 *Class I Overview and Class III Cultural Resources Survey in Support of Proposed Upgrades, Repairs, and Maintenance of Existing Remote Video Surveillance Systems and Replay Stations for U.S. Customs and Border Protection, Facilities Management, and Engineering, U.S. Border Patrol, Tucson and Yuma Sectors, Arizona*. Report 1 of 4. Gulf South Research Corporation, Tucson.

Harte, Marybeth T.

2018 *Cultural Resources Survey of 7.5 Acres Along Ruby Road near Rio Rico, Santa Cruz County, Arizona*. Cultural Resources Survey Report No. 17-633. EcoPlan Associates, Mesa.

Hathaway, Jeffrey B.

1997 *Cultural Resource Survey of Two Highway Segments Along State Route 82 Between Nogales and the Junction of State Route 90 (from Mileposts 1.2 to 28.0 and Mileposts 45.3 to 51.2) in Santa Cruz and Southwestern Cochise Counties, Arizona*. Project Report 96:71. Archaeological Research Services, Tempe.

Hathaway, Jeffrey B., David J. Dreher, Jennifer K. Tweedy, and Sharon J. Kramer

1996 Site Card for AZ EE:9:168(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

Hesse, Jerome

2000 *Results from a Class III Cultural Resource Survey for the Proposed Upgrade to the Citizens Utilities Electric Power Distribution Line in Flux Canyon, Coronado National Forest, Santa Cruz County, Arizona*. Letter Report for Project No. 3331-2352. SWCA Environmental Consultants, Inc., Tucson.

Hesse, S. Jerome, and David M. R. Barr

2010 *Archaeological Survey for the EPNG Line No. 2010 Abandonment and Replacement Project (Mileposts 36+343 to 48+3811), Santa Cruz County, Arizona*. Report No. 10-154. SWCA Environmental Consultants, Inc., Tucson.

Johnson, Catherine B.

2002a Site Card for AZ EE:9:230(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

2002b Site Card for AZ EE:9:231(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

2002c Site Card for AZ EE:9:232(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

2003 *Trail Survey of Specific Areas of Patagonia Lake State Park, Sonoita Creek State Natural Area, Santa Cruz County, Arizona*. Arizona State Parks, Phoenix.

Jones, Thomas E., and Andrea R. Gregory

2014 *A Class III Cultural Resources Survey Along Portions of Pendleton Drive in the Community of Rio Rico, Santa Cruz County, Arizona*. Archaeological Consulting Services, Tempe.

LaFond, Andre, and Lisa Folb

2001 *A Cultural Resource Survey of Two Temporary Construction Easements on State Route 82, South of Patagonia, Santa Cruz County, Arizona*. Cultural Resources Report 97-227:153. EcoPlan Associates, Mesa.

Lite, Jeremy A., Jennifer K. Tweedy, and Teresa L. Cadiente

1996 *A Cultural Resources Survey of 30 Miles of Interstate-19 Right-of-way Along the Santa Cruz River Valley Between Nogales and Amado (Kilometers 0.0 to 48.3; Mileposts 0 to 30), Santa Cruz County, Arizona*. Project Report No. 96:83. Archaeological Research Services, Tempe.

Lundin, Deil R.

2011 *A Class III Cultural Resources Survey of Access Roads in Four Locations near Bisbee in Cochise County; Nogales in Santa Cruz County, and Sasabe in Pima County, Arizona U.S. Border Patrol, Tucson Sector*. Report No. 11-14. HDR Engineering, Inc., Phoenix.

Lyon, Jerry D.

2001 *Results from a Class III Cultural Resource Survey for the Proposed Upgrade to the Harshaw Segment of the Citizens Utilities Electric Power Distribution Line, Coronado National Forest, Santa Cruz County, Arizona*. SWCA Environmental Consultants, Inc., Tucson.

Mehalic, David S., and William B. Gillespie

2006 *Results for Phase II of the San Rafael Manzanita Heritage Resources Inventory, Sierra Vista Ranger District, Coronado National Forest*. CNF Cultural Resource Survey Report No. 2006-05-023. On file. Coronado National Forest Supervisor's Office, Tucson.

Mills, Alexis

2005 *A Class III Cultural Resources Survey of a Segment of the Union Pacific Railroad near Rio Rico, Santa Cruz County, Arizona*. Cultural Resources Report No. 2005-28. WestLand Resources, Inc., Tucson.

Montero, Laurene G.

1993 *Archaeological Survey at Patagonia Lake State Park*. Arizona State Parks, Phoenix.

Morton, Ethan, and A. E. Rogge

2003 *A Supplemental Cultural Resource Survey for the Proposed Monte Carlo, Challenger, and Chihuahua Flood Control Basins, Nogales, Arizona*. Cultural Resource Report 2003-20 (AZ). URS Corporation, Phoenix.

O'Mack, Scott

2016 *Cultural Resource Survey CMAQ Grant for Rio Rico Chip Sealing, Santa Cruz County, Arizona*. Report No. 15-551. EcoPlan Associates, Tucson.

Peters, Matthew D.

2013 *Class III Cultural Resources Survey Report: Vail to Valencia 115kV to 138kV Transmission Line Upgrade Project, Private Lands and Previously Authorized Right-of-way South of Kantor Substation, Santa Cruz County, Arizona*. Transcon Environmental, Mesa.

Phillips, Dave A.

1992 Site Card for AZ EE:9:150(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

Piper, William T.

1981 *A Cultural Resource Survey of the Proposed Hale Well*. CNF Cultural Resources Clearance Report No. 1981-05-073. On file. Coronado National Forest Supervisor's Office, Tucson.

Poseyesva, Lanell T.

2020 *A Class III Cultural Resources Inventory of 190.1 Acres of Private Lands and 6.2 Acres of ADOT Right-of-way for Arizona Minerals, Inc., near Patagonia, Santa Cruz County, Arizona*. Cultural Resources Report 2020-2. WestLand Resources, Inc., Tucson.

Roth, A.

1992 *US West Right-of-way Along Pipeline, 3-R Canyon*. CNF Cultural Resource Survey Report No. 1992-05-122 Summary Form. On file. Coronado National Forest Supervisor's Office, Tucson.

Roth, Barbara J.

1992 *An Archaeological Survey of a U.S. West Right of Way Along State Route 189 in Nogales, Santa Cruz County, Arizona*. Tierra Right of Way Services, Ltd., Tucson.

Schroeder, K. J.

2006 *Archaeological Test Excavations at Escuela Calabasas--site AZ EE:9:51(ASM), for the Expanded Turn Lane at Calabasas Elementary and Middle School, Rio Rico, Santa Cruz County, Arizona*. Project Report No. 2005-030c. Archaeological Research Services, Tempe.

Seymour, Deni J., and David P. Doak

1991a Site Card for AZ EE:9:120(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1991b Site Card for AZ EE:9:121(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1991c Site Card for AZ EE:9:125(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1991d Site Card for AZ EE:9:129(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1991e Site Card for AZ EE:9:133(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1991f Site Card for AZ EE:9:134(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1991g Site Card for AZ EE:9:135(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1991h Site Card for AZ EE:9:136(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1991i Site Card for AZ EE:9:137(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1991j Site Card for AZ EE:9:138(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1991k Site Card for AZ EE:9:139(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

Seymour, Deni J., S. Litler, and David P. Doak

1991a Site Card for AZ EE:9:113(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1991b Site Card for AZ EE:9:118(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1991c Site Card for AZ EE:9:122(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1991d Site Card for AZ EE:9:127(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1991e Site Card for AZ EE:9:128(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1991f Site Card for AZ EE:9:131(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1991g Site Card for AZ EE:9:132(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

Seymour, Deni J., Gregory R. Seymour, and David P. Doak

1991a Site Card for AZ EE:9:112(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1991b Site Card for AZ EE:9:114(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1991c Site Card for AZ EE:9:115(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1991d Site Card for AZ EE:9:116(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1991e Site Card for AZ EE:9:117(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1991f Site Card for AZ EE:9:119(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1991g Site Card for AZ EE:9:123(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1991h Site Card for AZ EE:9:124(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1991i Site Card for AZ EE:9:126(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1991j Site Card for AZ EE:9:130(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

Seymour, Deni J., and Chris Sugnet

2014 *Cultural Resource Inventory for Rio Rico Road Improvement, Santa Cruz County, Arizona*. Lone Mountain Archaeological Services, Tucson.

Slawson, Laurie V.

1995 *A Cultural Resources Inventory of the Hacienda de las Flores Subdivision Right-of-way North of Nogales, Arizona*. Aztlan Archaeology, Inc., Tucson.

1999 *A Class III Archaeological Survey of Proposed Activity Areas, Roads, Trails, and Fencelines Within the Sonoita Creek State Natural Area, Santa Cruz County, Arizona*. Technical Report 99-11. Aztlan Archaeology, Tucson.

Smithwick, James M.

1986a Site Card for AZ EE:9:106(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1986b Site Card for AZ EE:9:111(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

Stone, Bradford W.

1994 *Cultural Resources Survey of a 2.3 Mile Long Segment of the Old Tucson Road North of Nogales, South-Central Santa Cruz County, Arizona*. Project Report 94-07. Archaeological Research Services, Tempe.

Stone, Bradford W., and John M. D. Hooper

2017 *A Cultural Resources Inventory of Approximately 534.5 Acres of the Sonoita Creek Ranch Property Along State Route 82, Northeast of Patagonia, Santa Cruz County, Arizona*. Cultural Resources Report 2017-60. WestLand Resources, Inc., Tucson.

Stone, Lyle M.

1997 *A Cultural Resources Survey of 5.2 Miles of Business-19 Right-of-way (Mileposts 0.0 to 5.2) in Nogales, Santa Cruz County, Arizona*. Project Report No. 96:84. Archaeological Research Services, Inc., Tempe.

Sullivan, Mark

1996 Site Card for AZ EE:9:170(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

Swartz, Deborah L.

1995a *An Archaeological Survey for Mining Activity South of Patagonia, Arizona*. Letter Report No. 95-106. Desert Archaeology, Tucson.

1995b Site Card for AZ EE:9:160(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1996 *Testing Results and Data Recovery Plan for Sites Along the Santa Cruz River North of Nogales, Arizona*. Technical Report No. 96-4. Center for Desert Archaeology, Tucson.

1999a *Archaeological Survey of a Proposed Water Pipeline and Forebay Along S. River Road in Santa Cruz County, North of Nogales, AZ*. Letter Report No. 98-208. Desert Archaeology, Tucson.

1999b *Archaeological Survey of 3.1 Miles Along Interstate 19 Between Ruby Road and Rio Rico Drive in Santa Cruz County, North of Nogales, Arizona*. Project Report No. 99-123. Desert Archaeology, Tucson.

1999c *Data Recovery at AZ EE:9:117, a Small Site Along the Santa Cruz River North of Nogales, Arizona*. Technical Report No. 99-1. Desert Archaeology, Tucson.

1999d Site Card for AZ EE:9:180(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

Swartz, Deborah L., Jenny L. Adams, Linda Scott Cummings, William L. Deaver, Michael W. Diehl, James M Heidke, Penny Dufoe Minturn, Thomas E. Moutoux, Barbara A. Murphy, R. Jane Sliva, J. Homer Thiel, and Jennifer A. Waters

2000 *Data Recovery at AZ EE:9:117, a Small Site Along the Santa Cruz River North of Nogales, Arizona*. Technical Report 99-1. Desert Archaeology, Tucson.

Teague, Lynn S., and Anne R. Baldwin

1978 *Painted Rock Reservoir Project, Phase I: Preliminary Survey and Recommendations*. Archaeological Series 126. Arizona State Museum, University of Arizona, Tucson.

Thiel, J. Homer

1995 *A Survey of 4.1 Miles of South River Road, Santa Cruz County, Arizona*. Letter Report No. 95-121. Desert Archaeology, Tucson.

Troncone, Steven M.

1993 *Cultural Resource Survey of the El Paso Natural Gas Company North Phoenix Meter Station at the Carefree Highway and Lake Pleasent* [sic] *Road Maricopa County, Arizona*. Archaeological Consulting Services, Tempe.

U.S. Department of Agriculture Forest Service (USDA Forest Service)

1985 Archaeological and Historical Site Inventory Form for AR-03-05-03-109. On file. Coronado National Forest Supervisor's Office, Tucson.

2020 Heritage Site Summary Form for AR-03-05-03-386. On file. Coronado National Forest Supervisor's Office, Tucson.

Urban, Sharon F.

1983a Site Card for AZ EE:9:28(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1983b Site Card for AZ EE:9:96(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1983c Site Card for AZ EE:9:97(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1983d Site Card for AZ EE:9:99(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

1984 Site Card for AZ EE:9:101(ASM). On file. Arizona State Museum, University of Arizona, Tucson.

Van Keuren, Denise D.

1984 *A Cultural Resource Survey of the Mowry Division Fence, Sierra Vista Ranger District, Coronado National Forest*. CNF Archaeological Clearance Report No. 1984-05-014. On file. Coronado National Forest Supervisor's Office, Tucson.

1985a *A Cultural Resource Survey of Assessment Work at the Banta, Morning Glory North and Blue Nose Mines*. CNF Archaeological Clearance Report No. 1985-05-068. On file. Coronado National Forest Supervisor's Office, Tucson.

1985b *A Cultural Resource Survey of the Proposed Big Canyon Pipeline, Sierra Vista Ranger District, Coronado National Forest, Arizona*. CNF Archaeological Clearance Report No. 1985-05-027. On file. Coronado National Forest Supervisor's Office, Tucson.

1985c *A Cultural Resource Survey of the Proposed Ridge Lateral Pipeline, Sierra Vista Ranger District, Coronado National Forest, Arizona*. CNF Archaeological Clearance Report No. 1985-05-014. On file. Coronado National Forest Supervisor's Office, Tucson.

Walsh, Mary-Ellen

2010 *A Cultural Resource Survey of a Temporary Construction Easement at the Comoro Canyon Bridge (Structure 412), State Route 82, Milepost 9.6, North of Nogales, Santa Cruz County, Arizona*. Technical Report No. 105439. Logan Simpson Design, Tempe.

2012 *A Cultural Resources Survey of 51 Temporary Construction Easements (11.8 Acres) Located on I-19 Crossroads Between Nogales and Tucson (Mileposts 0.00–63.09), Santa Cruz and Pima Counties, Arizona*. Technical Report No. 085115. Logan Simpson Design, Tempe.

Wood, Donald G.

1976 *An Archaeological Survey of the Proposed San Rafael Brush Crush, Coronado National Forest, Arizona*. CNF Archaeological Clearance Report No. 1976-05-010. On file. Coronado National Forest Supervisor's Office, Tucson.

Wood, Donald G., and James D. Salyer

1978 *An Archaeological Survey of the Sierra Vista Ranger District Forest Road Flood Damage Repair Project*. Heritage Resource Report No. 1978–05-031. On file. Coronado National Forest Supervisor's Office, Tucson.

Application for a Certificate of Environmental Compatibility

Rio Rico to Harshaw

138 Kilovolt Transmission Line Project

Exhibit E-2

This page intentionally left blank

A CULTURAL RESOURCES ASSESSMENT OF APPROXIMATELY 43,775 ACRES OF CORONADO NATIONAL FOREST LAND IN SUPPORT OF THE RIO RICO-TO-HARSHAW 138KV TRANSMISSION LINE PROJECT, SANTA CRUZ COUNTY, ARIZONA

UNS Energy/Tucson Electric Power

Prepared by:
Paul M. Miller, Ph.D.

Reviewed and submitted by:
Jocelyn A. Bernatchez, Ph.D.

Cultural Resources Report 2021-24

February 25, 2021
Project Number: 1610.271

WestLand Resources

WestLand Resources, Inc. • 4001 E. Paradise Falls Drive • Tucson, Arizona 85712 • 520•206•9585

STATEMENT OF CONFIDENTIALITY

Disclosure of the locations of historic properties to the public may be in violation of both federal and state laws. Applicable United States laws include, but may not be limited to, Section 304 (54 U.S.C. §307103) of the National Historic Preservation Act and the Archaeological Resources Protection Act (16 U.S.C. §470hh). In Arizona, applicable state laws include, but may not be limited to, Arizona Revised Statute Title 39, Section 125.

TABLE OF CONTENTS

STATEMENT OF CONFIDENTIALITY i
STATE HISTORIC PRESERVATION OFFICE REPORT ABSTRACT iii
INTRODUCTION AND PROJECT BACKGROUND 1
ARCHAEOLOGICAL RESEARCH AND RECORDS SEARCH 3
Previous Survey Coverage Within the Study Area 4
Sites Within the Study Area 4
Historical Map Review 5
Mineral Survey Plats 5
General Land Office Plats 11
U.S. Geological Survey Quadrangles 12
U.S. Geological Survey Bulletin 582 17
MANAGEMENT SUMMARY 18
REFERENCES 19

FIGURES

Figure 1. Vicinity Map 2
Figure 2.a–e. Study Area location showing surface management 2a–e

APPENDICES

Appendix A. Archaeological Records Search and Historical Maps of the Study Area

STATE HISTORIC PRESERVATION OFFICE REPORT ABSTRACT

REPORT TITLE: A Cultural Resources Assessment of Approximately 43,775 Acres of Coronado National Forest Land in Support of the Rio Rico-to-Harshaw 138kV Transmission Line Project, Santa Cruz County, Arizona

REPORT DATE: February 25, 2021

PROJECT NAME: UNS/TEP 138kV Transmission Line Resource Studies

PROJECT NUMBER: 1610.271

PROJECT SPONSOR: UNS Energy/Tucson Electric Power

LEAD AGENCY: U.S. Forest Service

DESCRIPTION OF THE PROJECT/UNDERTAKING: UNS Energy/Tucson Electric Power (UNS/TEP) is proposing to construct an overhead 138kV transmission line between Rio Rico and Harshaw, Arizona (the Project). The area under consideration for the Project encompasses approximately 84,000 acres of land in southern Arizona (the Study Area). Within the Study Area, the proposed 138 kV overhead transmission line would run approximately 20 to 30 miles across private and Coronado National Forest (CNF) land and connect the planned Rio Rico switchyard to the planned Harshaw Substation, which is located on an inholding parcel surrounded by CNF land. In support of the undertaking, UNS/TEP contracted WestLand Resources, Inc. (WestLand), to conduct a cultural resources assessment (Class I) within the preliminary Study Area designed to determine the extent of previous cultural resources surveys, as well as any cultural resources discovered therein. This assessment will be used to assist in identifying the areas that may provide the best opportunities or constraints during the alternative route development for the Project.

This document presents the Class I records search results for the 43,775-acre portion of the Study Area managed by the CNF, including much of the Patagonia Mountains in the Sierra Vista Ranger District. The portions of the Study Area on private and state lands are presented in a separate report (Miller 2021).

LEGAL DESCRIPTION: The Study Area falls within the following Public Land Survey System plats (all Gila and Salt River Baseline and Meridian, Santa Cruz County, Arizona):

- Township 22 South, Range 15 East, Sections 25, 26, 34–36, and portions of Section 33;
- Township 22 South, Range 16 East, Section 31 and portions of 19, 29, 30, 32, and 33;
- Township 23 South, Range 15 East, Sections 1–3, 9–16, 21–28, 33–36, and portions of Section 4;
- Township 23 South, Range 16 East, Sections 5–10, 15–22, 27–33, and portions of Sections 2–4, 11, 14, 23, 26, 34, and 35;
- Township 24 South, Range 15 East, Sections 1 and 2, and portions of Sections 3, 4, and 10–12;
- Township 24 South, Range 16 East, Sections 5 and 6, and portions of Sections of 3, 4, and 7–9.

USGS 7.5′ QUADRANGLE(S): Patagonia, Cumero Canyon, Harshaw, Kino Springs, and Duquesne, Arizona

LAND JURISDICTION: CNF

RECOMMENDATIONS: WestLand performed a cultural resources assessment for the UNS/TEP 138kV Transmission Line preliminary Study Area located on CNF land. WestLand reviewed existing archaeological survey and site information available in the database of cultural resources on file at the CNF and available on AZSITE and examined historical maps of the Study Area in order to understand previous survey coverage, known archaeological site density, and the potential for additional prehistoric and historical sites in the Study Area.

CNF records show 144 previous cultural resources projects intersecting the Study Area. Two additional projects were conducted by WestLand in 2020 which are not yet in the CNF database. Most of the 43,775-acre Study Area has not been examined for cultural resources, according to the CNF database, although the recent Class III pedestrian survey projects conducted in late 2020 by WestLand have considerably reduced the unsurveyed portion. Furthermore, of these 146 projects, only 10 could be considered recent (conducted in the last 10 years), and as few as 32 have been conducted since 2000. As such, Class III survey is likely to be required for portions of the preferred alternative alignment of the transmission line when it is identified by the CNF.

Previous site records show that 151 known sites are located partly or wholly in the Study Area. Assessment of National Register of Historic Places (NRHP)–eligibility revealed that 64 sites within the Study Area have been determined or recommended eligible for inclusion in the NRHP. Another 44 sites have been determined or recommended not eligible for NRHP listing. For the remaining 43 sites, information on eligibility was not available or the recorders recommended the site be considered unevaluated for the NRHP.

Assessment of historical maps of the Study Area showed Euroamerican settlement, as well as resource-extraction, transportation, and utility infrastructure development, particularly in the late nineteenth century and first half of the twentieth century. Villages and towns of various sizes, including Patagonia and Harshaw, as well as the infrastructure to support them, appear on the maps, as do occasional smaller homesteads. Much of the focus of settlement appears to be related to extensive resource extraction throughout the Patagonia Mountains, particularly in relation to the mining districts in areas such as Duquesne, Washington Camp, and Harshaw.

INTRODUCTION AND PROJECT BACKGROUND

UNS Energy/Tucson Electric Power (UNS/TEP) is proposing to construct an overhead 138kV transmission line between Rio Rico and Harshaw, Arizona (the Project). The area under consideration for the Project encompasses approximately 84,000 acres of land in southern Arizona (the Study Area) **(Figures 1 and 2)**. Within the Study Area, the proposed 138 kV overhead transmission line would run approximately 20 to 30 miles across private and Coronado National Forest (CNF) land and connect the planned Rio Rico switchyard to the planned Harshaw Substation, which is located on an inholding parcel surrounded by CNF land. In support of the undertaking, UNS/TEP contracted WestLand Resources, Inc. (WestLand), to conduct a cultural resources assessment (Class I) within the preliminary Study Area, designed to determine the extent of previous cultural resources surveys, as well as any cultural resources discovered therein. This assessment will be used to assist in identifying the areas that may provide the best opportunities or constraints during the alternative route development for the Project.

This document presents the Class I records search results for the 43,775-acre portion of the Study Area managed by the CNF, including much of the Patagonia Mountains in the Sierra Vista Ranger District. The portions of the Study Area on private and state lands are presented in a separate report. The Study Area falls within the following Public Land Survey System plats (all Gila and Salt River Baseline and Meridian, Santa Cruz County, Arizona):

- Township 22 South, Range 15 East, Sections 25, 26, 34–36, and portions of Section 33;
- Township 22 South, Range 16 East, Section 31 and portions of 19, 29, 30, 32, and 33;
- Township 23 South, Range 15 East, Sections 1–3, 9–16, 21–28, 33–36, and portions of Section 4;
- Township 23 South, Range 16 East, Sections 5–10, 15–22, 27–33, and portions of Sections 2–4, 11, 14, 23, 26, 34, and 35;
- Township 24 South, Range 15 East, Sections 1 and 2, and portions of Sections 3, 4, and 10–12;
- Township 24 South, Range 16 East, Sections 5 and 6, and portions of Sections of 3, 4, and 7–9.

The purpose of the Class I cultural resources assessment is to provide UNS/TEP with baseline information on known cultural resources on the CNF-managed lands within the Study Area. Specifically, the aim of the Class I records search is to determine previous cultural survey coverage within the Study Area conducted to date, as well as to ascertain the number of previously recorded cultural resources sites present within the Study Area, their site-types, and, if possible, their National Register of Historic Places (NRHP) status. Historical maps depicting the Study Area were also reviewed to determine whether potential Historic period resources are present in the Study Area.

This report begins with the research methods employed for the project, followed by sections describing previous survey coverage in the Study Area, the known sites in the Study Area, and potential historical resources in the Study Area. The report concludes with a summary of the records check and a recommendation for future survey work in support of the proposed transmission line. Maps showing known resources are provided in **Appendix A**, which can be easily redacted from the report for confidentiality.

Path: M:\Jobs\1600's\1610.271\ARC\MXD\01_Vicinity.mxd Date: 2/5/2021 User: naydin

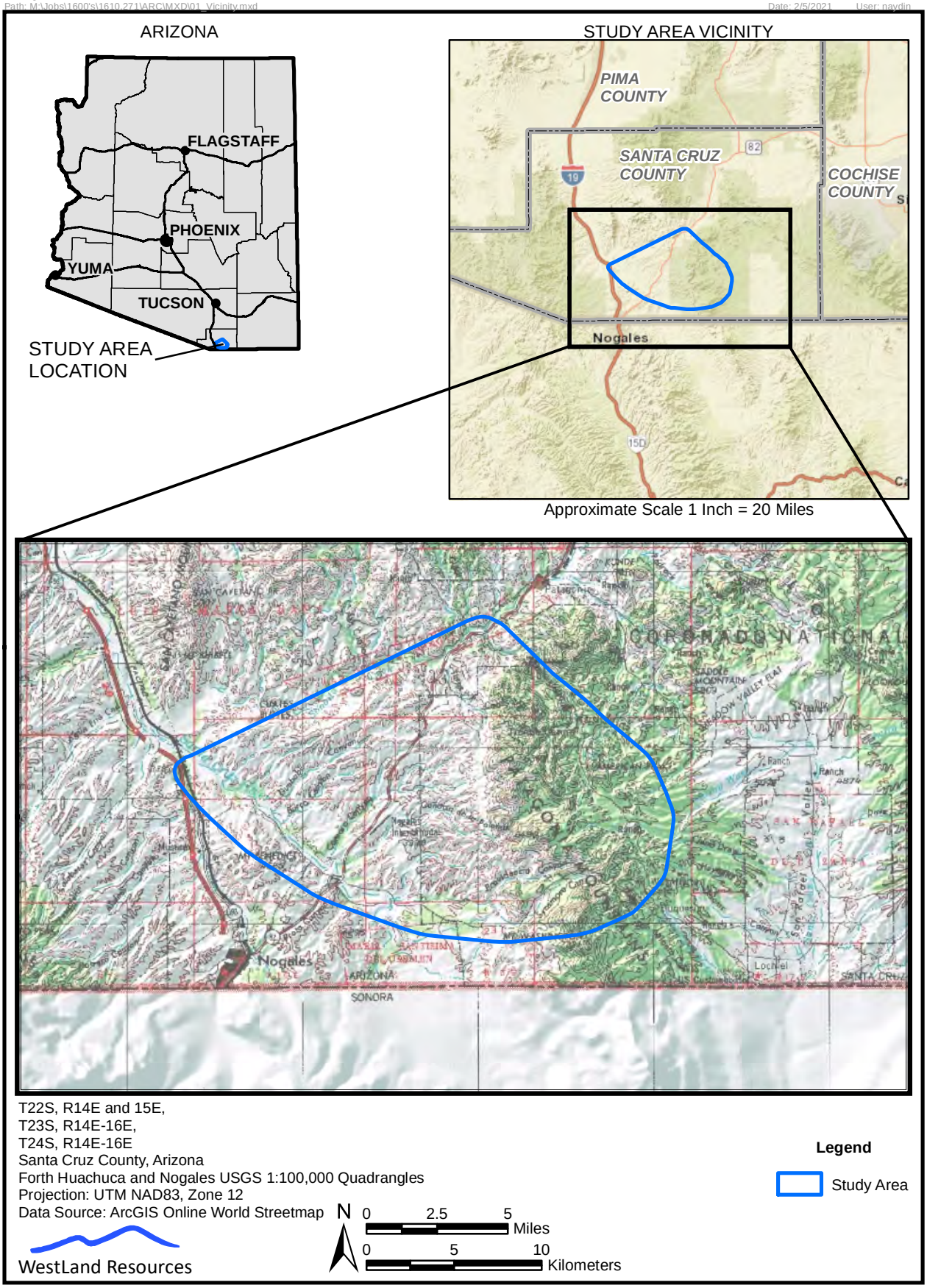
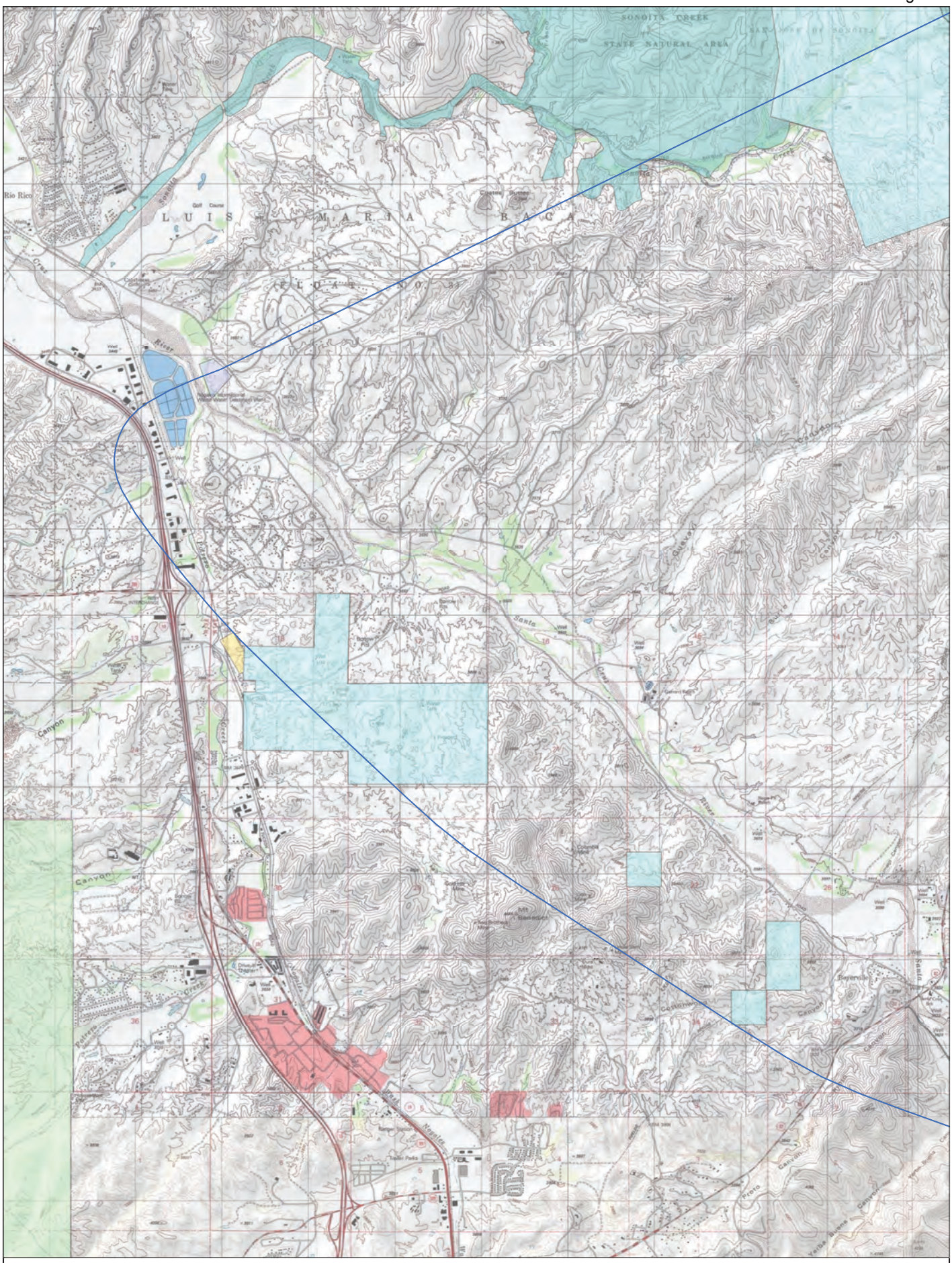


Figure 1. Vicinity map



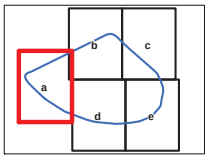
T22S, R14E,
T23S, R13E-14E,
T24S, R14E
Santa Cruz County, Arizona
Cumero Canyon and Rio Rico USGS 7.5' Quadrangles
Projection: UTM NAD83, Zone 12
Data Source: BLM Surface Management (BLM 2019, WRI Modified 2019)

WestLand Resources

N

0 1,000 2,000 Feet

0 500 1,000 Meters



Legend

Study Area

Surface Management

- Bureau of Land Management (BLM)
- Local or State Parks
- National Park Service (NPS)
- Private Land (No Color)
- State Trust Land
- US Forest Service (USFS)

Figure 2.a. Study area location showing surface management

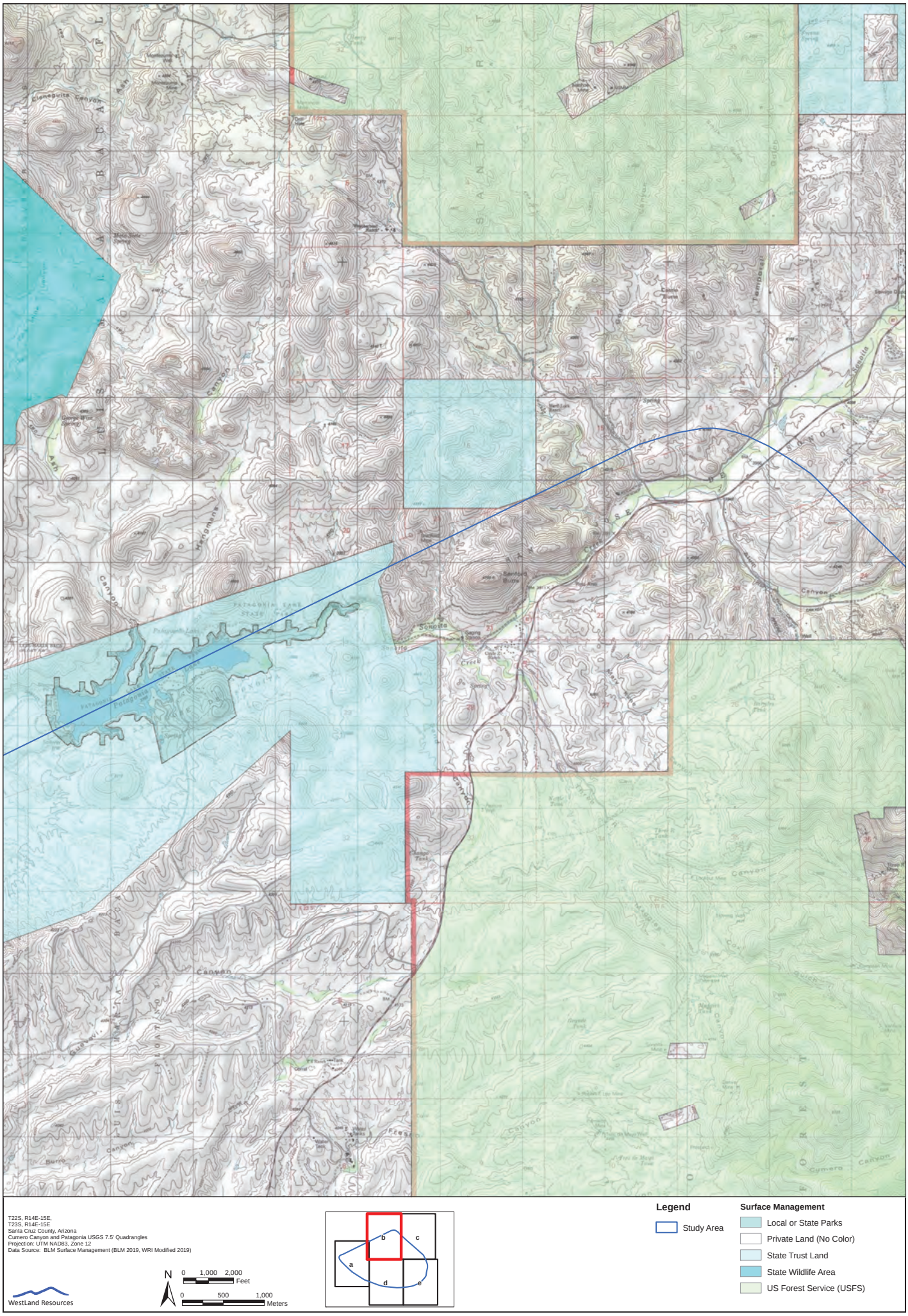
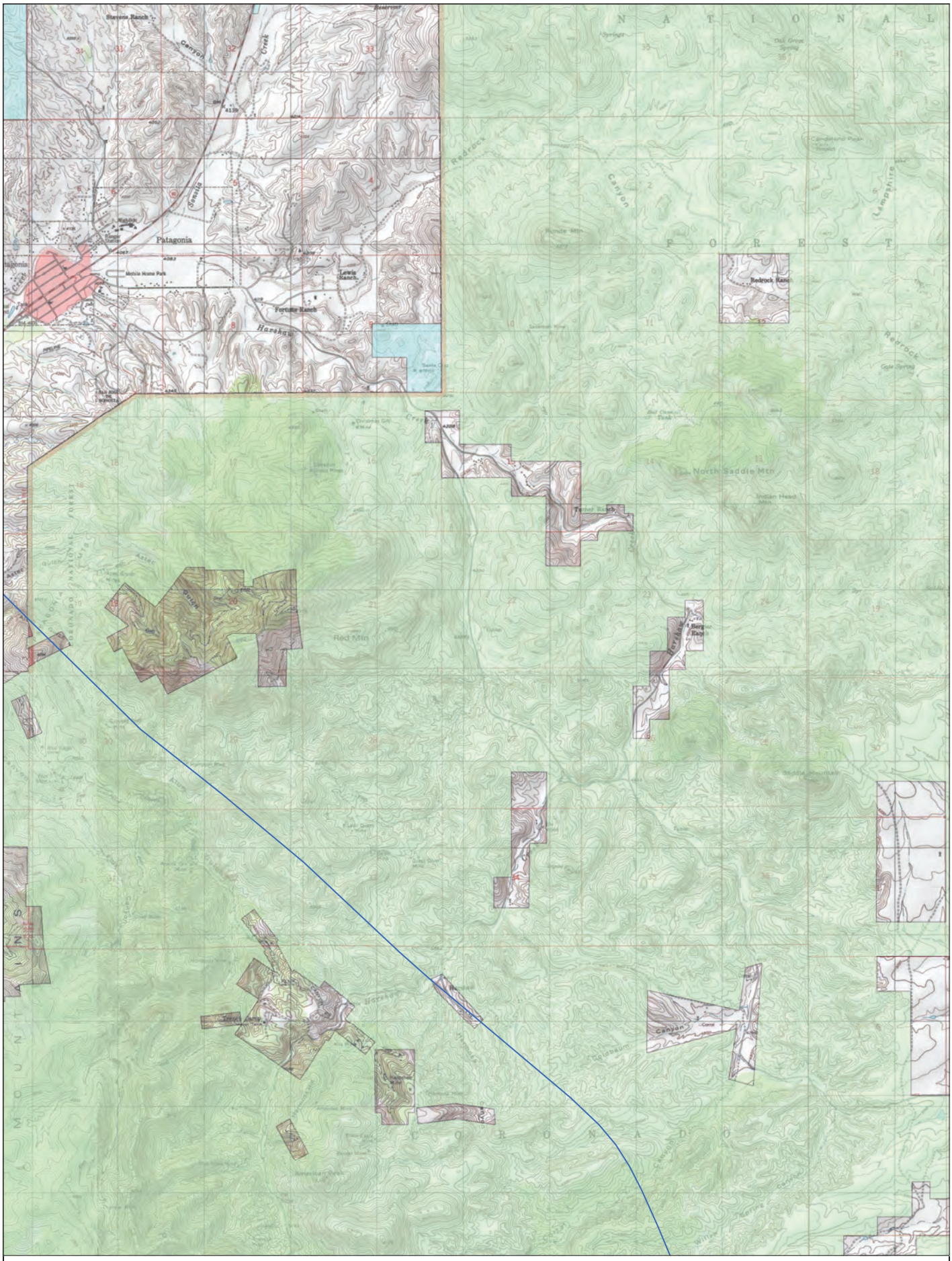


Figure 2.b. Study area location showing surface management



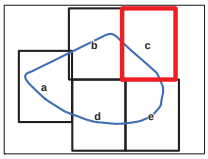
T22S, R14E-15E,
T23S, R14E-15E
Santa Cruz County, Arizona
Cumero Canyon, Harshaw, and Patagonia USGS 7.5' Quadrangles
Projection: UTM NAD83, Zone 12
Data Source: BLM Surface Management (BLM 2019, WRI Modified 2019)

WestLand Resources

N

0 1,000 2,000 Feet

0 500 1,000 Meters



Legend

Study Area

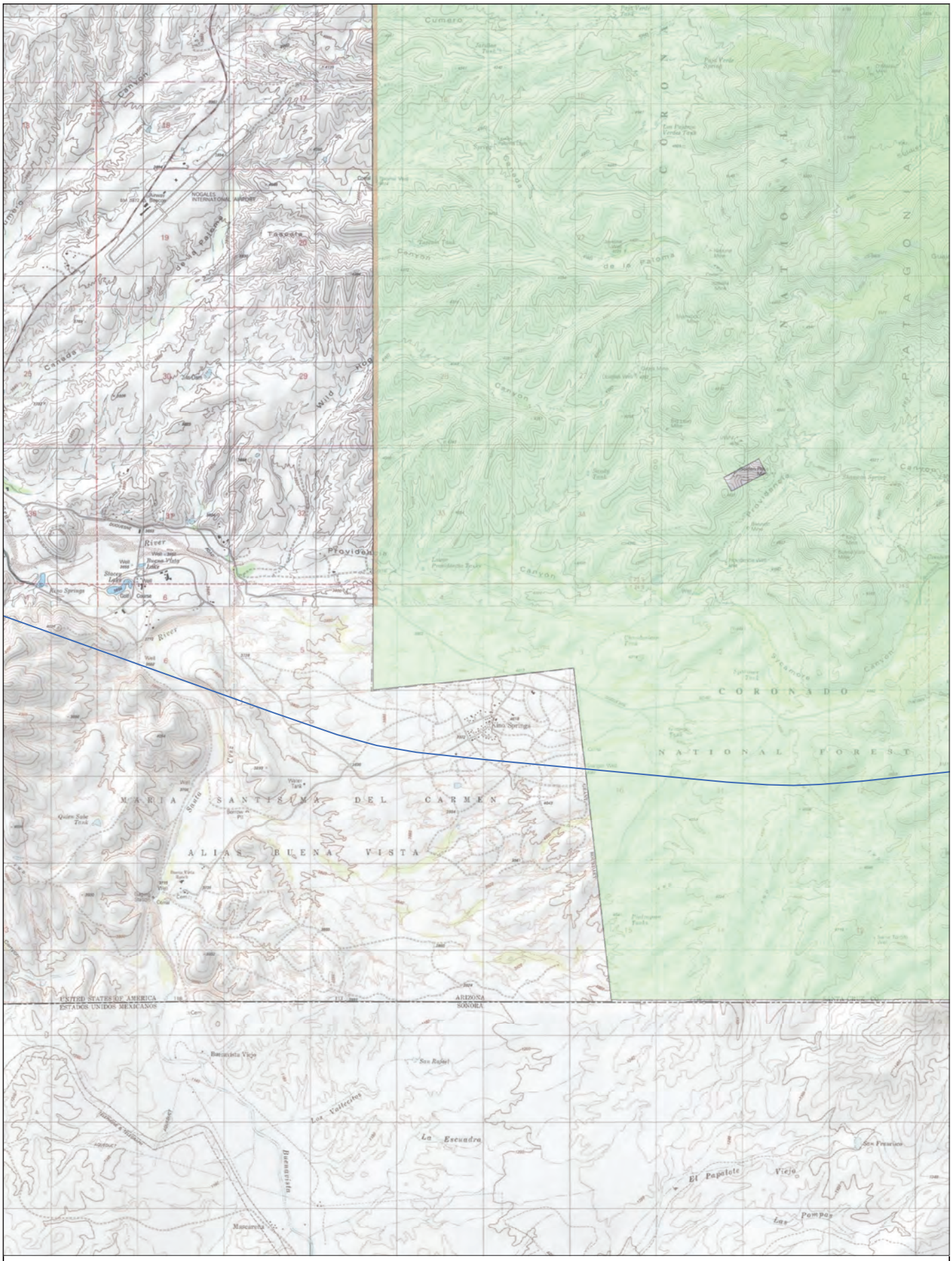
Surface Management

Private Land (No Color)

State Trust Land

US Forest Service (USFS)

Figure 2.c. Study area location showing surface management



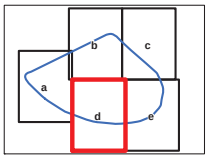
T23S, R14E-15E,
T24S, R14E-15E
Santa Cruz County, Arizona
Cumero Canyon and Kino Springs USGS 7.5' Quadrangles
Projection: UTM NAD83, Zone 12
Data Source: BLM Surface Management (BLM 2019, WRI Modified 2019)

WestLand Resources

N

0 1,000 2,000 Feet

0 500 1,000 Meters



Legend

Study Area

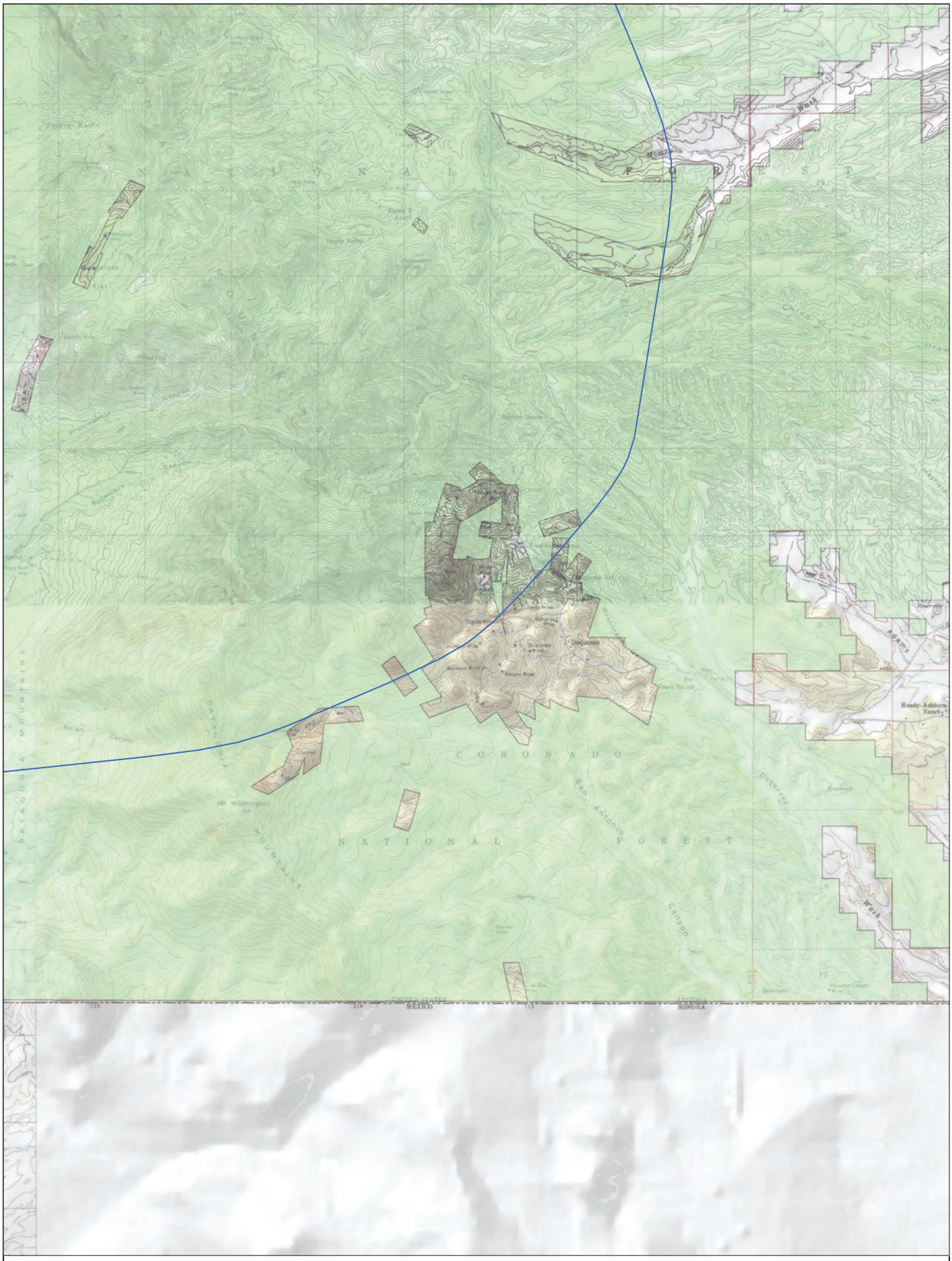
Surface Management

Private Land (No Color)

State Trust Land

US Forest Service (USFS)

Figure 2.d. Study area location showing surface management



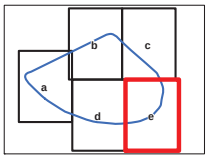
T23S, R15E-16E,
T24S, R15E-16E
Santa Cruz County, Arizona
Cumero Canyon, Duquesne, Harshaw, and Kino Springs USGS 7.5' Quadrangles
Projection: UTM NAD83, Zone 12
Data Source: BLM Surface Management (BLM 2019, WRI Modified 2019)

WestLand Resources

N

0 1,000 2,000 Feet

0 500 1,000 Meters



Legend

Study Area

Surface Management

Private Land (No Color)

US Forest Service (USFS)

Figure 2.e. Study area location showing surface management

ARCHAEOLOGICAL RESEARCH AND RECORDS SEARCH

As part of the cultural resources analysis, an archaeological overview of the Study Area was conducted. Specifically, archaeologists reviewed existing archaeological information in the site files available online using the Arizona State Museum's (ASM's) AZSITE archaeological database. In addition, WestLand archaeologists reviewed the extensive data on existing cultural resources projects and sites maintained by the CNF office.

For each previous project, WestLand noted the agency project number, project title, and reference, as well as the spatial extent of each project as it intersected the Study Area. Part of WestLand's analysis was to note the extent of previous archaeological survey coverage in the Study Area, particularly within the last 10 years. This 10-year timeframe was used to assess whether the previously conducted surveys in the Study Area could be considered adequate in light of current standards per State Historic Preservation Office (SHPO) guidelines ([Arizona] SHPO 2004). These guidelines make it clear that not all older surveys are adequate in terms of modern standards, either from the perspective of meeting state and federal standards or from a research standpoint. Many of these older surveys were conducted prior to the implementation of state and federal standards that help ensure the adequacy of these investigations, such as those that state what constitutes a 100 percent intensive survey and that provide the definition of an archaeological site.

Following these guidelines, WestLand would examine the results of older surveys in terms of the survey methods used and if they meet current standards and in terms of the professional qualifications of the survey personnel who conducted the investigation and if they meet current state or federal standards. During this examination of older surveys, WestLand would also determine whether or not the integrity of the previously recorded site has changed since its initial recording. If the adequacy of the survey project is found to be in question, ground-truthing, sample resurvey, or complete resurvey of the area in question may be necessary. Previous projects intersecting the Study Area are presented in **Appendix A, Table A.1 and Figure A.1**.

WestLand also documented the number of previously recorded sites in the Study Area, including each site's CNF and/or ASM site number, the site type, the site's age and cultural affiliation, and references associated with the site, if available. The NRHP-eligibility of all previously recorded sites in the Study Area was documented, if known. This information is presented in **Table A.2 and Figure A.2** (Appendix A). The criteria for evaluating the eligibility of a site for inclusion in the NRHP are specified in the Code of Federal Regulations (36 CFR 60.4).

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, 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.

The site and NRHP information can help guide UNS/TEP future planning to design avoidance and mitigation measures prior to initiation of the transmission line project. To this end, locational information for each site, as well as each site's placement in relation to the Study Area, are provided in **Table A.2** [Appendix A] and shown spatially on **Figure A.2** [Appendix A].

Previous Survey Coverage Within the Study Area

CNF records show 144 previous cultural resources projects intersecting the Study Area **(**see **Table A.1** and **Figure A.1** [Appendix A]**)**. Two additional projects were conducted by WestLand in 2020 which are not yet in the CNF database. These 146 previous projects were conducted during the past several decades for utilities installation, transportation improvements, monitoring, and research. Most of the 43,775-acre Study Area has not been examined for cultural resources according to the CNF database, although the recent Class III pedestrian survey projects conducted in late 2020 by WestLand have considerably reduced the unsurveyed portion. Furthermore, of the 146 projects, only 10 could be considered recent (surveyed in the last 10 years), and as few as 32 have been conducted since 2000. As such, it should be expected that the CNF and SHPO will require resurvey of at least portions of the preferred alternative route for the transmission line when it has been identified by the CNF.

Sites Within the Study Area

A total of 151 archaeological sites are located partly or wholly within the Study Area. Of these 151 sites, 116 represent historic period occupation, 30 represent Native American occupation, 4 are multicomponent sites, and 1 represents a protohistoric or historic occupation. **(Table A.2, Figure A.2** [Appendix A]**)**. The prehistoric sites range from the Archaic to Protohistoric period and most of these prehistoric sites in the Study Area appear to be characterized by scatters of flaked stone and, in the case of the Formative period sites, ceramic sherds, and they reflect a wide variety of functions.

The most common site type previously recorded in the Study Area relates to the influx of Euroamericans into the area during the Historic period. In particular, mine workings and sites with mine-related functions, such as charcoal mounds, were the most commonly recorded types of historical sites, with 85 such sites present. Other relatively common historical site types include homesteads (both temporary and more permanent) and ranching sites, with occasional transportation and utility infrastructure sites also present throughout the Study Area.

The NRHP-eligibility of these sites was assessed, and a full documentation can be found in **Table A.2** [Appendix A]. Slightly fewer than half of the sites recorded in the Study Area (n = 64) have been recommended or determined eligible by the CNF. By comparison, 44 sites were recommended or determined not eligible. The remainder of the sites are either not evaluated (n = 33) or their eligibility status is unknown (i.e., no information is available; n = 10).

Historical Map Review

In addition to the archaeological project and site records review, WestLand examined maps of the survey area dating from the 1870s to the late 1950s to identify historical cultural resources that might be located in the survey area. These included Mineral Survey plats, General Land Office (GLO) plats, U.S. Geological Survey (USGS) quadrangles, and Plate 1 in USGS Bulletin 582 (Schrader 1915). The available historical USGS quadrangle maps at the Historical Topographic Map Collection (https://ngmdb.usgs.gov/topoview/) and the available historical GLO plats at the Official Federal Land Records site (https://glorecords.blm.gov/default.aspx) were examined during this research. WestLand examined the following maps as part of this assessment:

Mineral Survey Plats

- **Mineral Survey 22** (Guajolote claim Lot No. 37), surveyed in 1873. The claimant is listed as H. D. Bacon. The plat depicts a single shaft.
- **Mineral Survey 23** (Belmont claim of the San Antonio Mining Co., Lot No. 38A), surveyed in 1873. The plat depicts two shafts and an adit.
- **Mineral Survey 28** (Trench claim Lot No. 37A), surveyed in 1873. The claimants are listed as A. P. K. Safford, Ino W. Hopkins, J. C. Handy, Thos. Gardner, and R. N. Leatherwood. The plat depicts two shafts and two adits.
- **Mineral Survey 71** (Enterprise claim Lot No. 37), surveyed in 1876 and again in 1880. The claimants are listed as E. N. Fish, S. Silverberg, and D. A. Bennett. The plat depicts a shaft and a road.
- **Mineral Survey 84** (Alta claim Lot No. 38A), surveyed in 1877. The claimants are listed as D. J. Harshaw, John Long, and M. Fagan. The plat depicts two shafts.
- **Mineral Survey 122** (Western Expansion of the Enterprise Mine claim), surveyed in 1879. The claimants are listed as "E. N. Fish and others." The plat depicts three houses, a smelter indicated as "Mowry Old Smelters," and two roads.
- **Mineral Survey 140** (American claim of the Silver Cloud Mining Co., Lot No. 42A), surveyed in 1879. The plat depicts two shafts and an open cut.

- **Mineral Survey 141** (American claim of the Silver Cloud Mining Co., Lot No. 42B), surveyed in 1879. The plat depicts a well and a trail.
- **Mineral Survey 142** (Blue Nose claim Lot No. 39), surveyed in 1879. The claimant is listed as E. A. Corbin. The plat depicts an incline shaft, a tunnel/adit, and two open cuts.
- **Mineral Survey 243** (Plomoso claim Lot No. 37), surveyed in 1881. The claimant is listed as L. M. Jacobs & Co. The plat contains a feature indicated as a "tunnel, cut, and shaft."
- **Mineral Survey 318** (Goshen claim Lot No. 37), surveyed in 1882. The claimant is listed as Hugh White. The plat depicts a shaft, two tunnels/adits, a drift, and an open cut.
- **Mineral Survey 351** (California claim Lot No. 41), surveyed in 1882. The claimants are listed as E. P. Allis & James Mc. C. Elliot. The plat depicts five shafts and a tunnel/adit.
- **Mineral Survey 352** (Garfield claim Lot No. 42), surveyed in 1882. The claimants are listed as E. P. Allis & James Mc. C. Elliot. The plat depicts four shafts and an open cut.
- **Mineral Survey 353** (Allis claim Lot No. 43), surveyed in 1882. The claimants are listed as E. P. Allis & J. Mc. C. Elliot. The plat depicts two shafts, a tunnel/adit, and an open cut.
- **Mineral Survey 377** (Cosmopolitan claim Lot No. 44), surveyed in 1882. The claimants are listed as E. P. Allis & J. Mc. C. Elliot. The plat depicts a shaft.
- **Mineral Survey 378** (Commonworth claim Lot No. 45), surveyed in 1882. The claimants are listed as E. P. Allis & J. Mc. C. Elliot. The plat depicts a shaft.
- **Mineral Survey 379** (Conundrum claim Lot No. 46), surveyed in 1882. The claimants are listed as E. P. Allis & J. Mc. C. Elliot. The plat depicts a shaft.
- **Mineral Survey 385** (Salvation claim Lot No. 38), surveyed in 1882. The claimant is listed as Dana Harmon. The plat depicts a shaft.
- **Mineral Survey 498** (Salvador claim of the Harshaw Mining Company Lot No. 48), surveyed in 1883. The plat depicts a shaft, an open cut, and a linear featured labeled as an "ore road."
- **Mineral Survey 499** (Hermosa claim of the Harshaw Mining Company, Lot No. 49), surveyed in 1883. The plat depicts four houses, seven shafts (one of which is an incline shaft), two tunnels/adits, five open cuts, a stope, an ore bin, a road that forks within the plat, and a trail.
- **Mineral Survey 500** (Bluff claim of the Harshaw Mining Company, Lot No. 50), surveyed in 1883. The plat depicts a shaft, a trail, and a road.
- **Mineral Survey 700** (Paymaster claim Lot No. 42A), surveyed in 1885. The claimant is listed as R. R. Richardson. The plat depicts four shafts and an open cut.

- **Mineral Survey 701** (Paymaster Millsite Lot No. 42A), surveyed in 1885. The claimant is listed as R. R. Richardson. The plat depicts a house, a spring, and a road labeled "from Harshaw…to La Noria."

- **Mineral Survey 745** (January claim Lot No. 51), surveyed in 1885. The claimant is listed as Andrew B. McGill. The plat depicts three shafts and an open cut/tunnel.

- **Mineral Survey 769** (First Extension West of the Enterprise claim Lot No. 43), surveyed in 1886. The claimants are listed as S. Silverberg and E. N. Fish. The plat depicts three shafts and two open cuts.

- **Mineral Survey 770** (Eastern Extension of the Enterprise claim Lot No. 44), surveyed in 1886. The claimants are listed as S. Silverberg and E. N. Fish. The plat depicts three shafts.

- **Mineral Survey 892** (Indiana claim Lot No. 47A), surveyed in 1889. The claimant is listed as Charles A. Ashburner. The plat depicts three shafts, with one labeled "with levels, drifts, and hoisting works."

- **Mineral Survey 895** (Pocahontas claim Lot No. 49), surveyed in 1889. The claimant is listed as Charles A. Ashburner. The plat depicts three shafts (two of which are labeled "old"), some "30 ft. of drifts," and a road labeled "road Tucson to Washington Camp, road in gulch."

- **Mineral Survey 896** (Evening Star claim Lot No. 50), surveyed in 1889. The claimant is listed as Charles A. Ashburner. The plat depicts four shafts, a drift, and a road labeled "road Washington Camp to La Noria."

- **Mineral Survey 929** (Norton claim Lot No. 52), surveyed in 1890. The claimants are listed as A. B. and M. B. McGill. The plat depicts two shafts, two drifts, two open cuts, and a trail labeled "trail from the Flux to Harshaw."

- **Mineral Survey 1399** (Posey Lode claim), surveyed in 1899. The claimants are listed as F. A. Odermatt and Howard Allen. The plat depicts two tunnels/adits.

- **Mineral Survey 1404** (Kansas and New York claims), surveyed in 1899. The claimant is listed as R. R. Richardson. The plat depicts three shafts, two tunnels/adits, a winze, and a road.

- **Mineral Survey 1405** (Maine claim), surveyed in 1899. The claimant is listed as R. R. Richardson. The plat depicts three shafts, three tunnels/adits, and two open cuts.

- **Mineral Survey 1406** (Georgia claim), surveyed in 1899. The claimant is listed as R. R. Richardson. The plat depicts two houses, three shafts, and two roads. A few wells also appear on the plat, located just beyond the claim lot, as does so-labeled "Washington Gulch," which is depicted flowing east at the southern limit of the claim.

- **Mineral Survey 1407** (Seven Oaks, Slim Jim, and Ohio No. 2 claims), surveyed in 1899. The claimants are listed as David and Howard Allen. The plat depicts two shafts, two tunnels/adits, and two open cuts.

- **Mineral Survey 2027** (Golden Gate claim), surveyed in 1905. The claimants are listed as S. M. Franklin et al. The plat depicts eight shafts and one open cut.

- **Mineral Survey 2032** (Lauretta, Comet, Mohawk, Indianapolis, and Little Emma claims of the Duquesne Mining and Reduction Company), surveyed in 1905. The plat depicts 21 shafts, four tunnels/adits, and four open cuts.

- **Mineral Survey 2036** (Dubley Standerd [sic] and Mary Jane claims of the Duquesne Mining and Reduction Company), surveyed in 1905. The plat depicts seven shafts, two tunnels/adits, four cuts, and four roads, one of which forks and crosses by bridge a wash named "Duquesne Gulch."

- **Mineral Survey 2037** (Klondike, Contact, and Montezuma claims of the Duquesne Mining and Reduction Company), surveyed in 1905. The plat depicts 11 shafts, four tunnels/adits, and two open cuts.

- **Mineral Survey 2190** (Comprising 12 lode claims, including Mowry Nos. 1–5, Park, and El Pueblo of the Mowry Mines Company), surveyed in 1906. The plat depicts 45 shafts, two tunnels/adits, eight open cuts, and a road.

- **Mineral Survey 2193** (the Cedar and Ash claims of the Mowry Mines Company), surveyed in 1906. This plat depicts five shafts and an adit. Many of these features fall within the recorded portions of AR-03-05-03-313, the Mowry Hacienda site. Some features appear to have been reclaimed.

- **Mineral Survey 2210** (the Alaska claim of the Mowry Mines Company), surveyed in 1906. The plat depicts three shafts and a tunnel/adit.

- **Mineral Survey 2211** (the Little Joker, Amsterdam, and Holland claims of the Duquesne Mining and Reduction Company), surveyed in 1906. The plat depicts four shafts (one of which is an incline shaft), a tunnel with an open cut, two further open cuts, and a circle road.

- **Mineral Survey 2216** (the Yosemite, New York, and Smuggler claims of the Duquesne Mining and Reduction Company), surveyed in 1906. The plat depicts six shafts, six tunnels/adits, nine open cuts, a drift, and two roads.

- **Mineral Survey 2217** (the Divide and Imperial claims of the Duquesne Mining and Reduction Company), surveyed in 1906. The plat depicts four shafts, three tunnels/adits, three open cuts, and a road.

- **Mineral Survey 2226** (the Refugio claim of the Mowry Mines Company), surveyed in 1906. The plat depicts a shaft, a tunnel/adit, an open cut, and a road that forks within the plat. To the northwest of the lode claims is a feature labeled "Adobe House."

- **Mineral Survey 2227** (the Mowry No. 6 claim of the Mowry Mines Company), surveyed in 1906. The plat depicts a shaft and a road.

- **Mineral Survey 2364** (Roadside claim), surveyed in 1906. The claimant is listed as Merriette Phelps. The plat depicts two houses, a barn, four shafts, an open cut, and a road that forks within the plat.

- **Mineral Survey 2402** (Joe Wheeler, Winnebago Chief, and Ivanhoe claims), surveyed in 1907. The claimant is listed as R. P. O'Connor. The plat depicts nine shafts and "22 ft. of drifts."

- **Mineral Survey 2406** (Golden Granite claim), surveyed in 1907. The claimant is listed as R. P. O'Connor. The plat depicts one shaft and two tunnels/adits, one of which has a crosscut.

- **Mineral Survey 2503** (the Pride of the West, Pride of the West No. 2, and David Allen Mine claims of The Pride of the West Mining & Milling Co.), surveyed in 1908. The plat depicts an engine/hoist building, an engine house, five shafts, three tunnels/adits, one open cut, a tramway, and a road.

- **Mineral Survey 2558** (Happy Thought claim), surveyed in 1908. The claimant is listed as H. W. Skerry. The plat depicts three tunnels/adits.

- **Mineral Survey 2566** (the Noonday Mine claim of the Duquesne Mining and Reduction Company), surveyed in 1909. The plat depicts a house, two tunnels/adits, an open cut, and a road that forks within the claim lot.

- **Mineral Survey 2589** (the Emerald claim of the National Consolidated Mining Company), surveyed in 1908. The plat depicts a shaft and an open cut.

- **Mineral Survey 2590** (the Silver Glance claim of the National Consolidated Mining Company), surveyed in 1908. The plat depicts an engine house, a blacksmith's shop, a shed, three shafts, and "240 ft. of drifts."

- **Mineral Survey 2952** (Bonnie Carrie claim), surveyed in 1912. The claimant is listed as Valentine Valenzuela, Jr. The plat depicts two tunnels/adits and an open cut.

- **Mineral Survey 3109** (Rocky Road and Cross Ledge claims), surveyed in 1914. The claimant is listed as R. P. O'Connor. The plat depicts two shafts and three open cuts/tunnels.

- **Mineral Survey 3113** (the Santo Nino and Santo Nino Nos. 1 and 2 claims of the Havalena [sic] Mining Company), surveyed in 1915. The plat depicts four shafts, five tunnels/adits, three drifts, a stope, two winzes, and a road.

- **Mineral Survey 3603** (Comprising 14 lodes, including Olive and El Paso of the Consolidated Arizona Copper Mines Company), surveyed in 1919. This plat depicts a house, two barns, an engine house, a shop, 12 shafts, 10 open cuts, two trenches, and a road now known as Harshaw Road (AR-03-05-03-622) that is still extant as an in-use dirt road.

- **Mineral Survey 3689** (Comprising 21 lodes, including 3-R, Blue Rock, and Evening Star of the Patagonia Superior Copper Company), surveyed in 1920. The plat depicts a mill, three houses (one of which is labeled "Eng. House"), a power line, six shafts, eight tunnels/adits, 24 open cuts, two winzes, a drill hole, an incline, 11 drifts; additional extensive underground workings are described but are not otherwise depicted.

- **Mineral Survey 3690** (the Senator Lodge Nos. 1 and 2 claims of the Patagonia Superior Copper Company), surveyed in 1920. The plat depicts three houses, a store house, a shaft, three tunnels/adits, a drift, and a road that forks within the claim lots.

- **Mineral Survey 3769** (the Bender Group Claim No. 10 of the Hardshell Mining Company), surveyed in 1921. The plat depicts 10 shafts, a tunnel/adit, a drift, and three open cuts.

- **Mineral Survey 3916** (the Santo Nino No. 5 claim of the Southern Copper Mining Company), surveyed in 1923. The plat depicts a house, a shaft, two tunnels/adits, and a road.

- **Mineral Survey 4117** (Minnie Smith claim), surveyed in 1929. The claimant is listed as O. K. Franklin. The plat depicts two shafts, three tunnels/adits, and two open cuts.

- **Mineral Survey 4222** (Comprising 13 lode claims, including Hardshell No. 7, Josephine, and Trench Nos. 2–8 of the American Smelting and Refining Company), surveyed in 1939. The plat depicts a hoist house, a power house, an office, four houses, 11 shafts, two tunnels/adits, 17 open cuts, a road that forks, and "5299 ft. of drifts and crosscuts."

- **Mineral Survey 4232** (Roy and Roy Fraction claims), surveyed in 1940. The claimants are listed as Joseph C. and Thomas P. Bacon. The plat depicts three shafts, four tunnels/adits, and six open cuts.

- **Mineral Survey 4434** (El Paso and El Paso Nos. 1–3 claims), surveyed in 1958. The claimants are listed as C. Zay and Dorothy Clopton. The plat depicts a house, a bunkhouse, a well, a barn, 17 shafts (one of which is labeled "El Paso"), five open cuts, two trenches, and a forked road. Each fork of the road is labeled, with the northwest end labeled "to Patagonia," the south end labeled "to Guajalate [sic] Flat," and the southeast end labeled "to Lochiel."

- **Mineral Survey 4439** (Red Rose No. 1 claim), surveyed in 1958. The claimant is listed as A. E. de la Ossa. The plat depicts a house, two sheds, an adit, three open cuts, and a road labeled "County Road."

- **Mineral Survey 4460** (the Camden Mine, Camden No. 2, Hardshell No. 1, and Hardshell No. 15 claims of the American Smelting and Refining Company), surveyed in 1958. The plat depicts two houses, a hoist, a reservoir, a waterline, 18 shafts (one of which is a long incline shaft), nine adits, 31 open cuts, a trench, eight drill holes, and two roads. The primary road through the plat is described as "to Harshaw" at its northwest end and "to Bender Claim" at its south end.

- **Mineral Survey 4526A & 4526B** (Arizona, Macedonia, and Athens claims), surveyed in 1960. The claimant is listed as Joseph W. Forsythe. The plat depicts a mill, 14 shafts (one of which is an incline shaft), eight adits, six open cuts, a well, and three roads.

- **Mineral Survey 4538** (Palmetto Nos. 1–2, Lucky Find, and Lucky Find No. 3 claims), surveyed in 1960. The claimant is listed as Peter M. Mosier, Jr. The plat depicts a house, seven shafts, an adit, 13 open cuts, a trench, and a road.

- **Mineral Survey 4546** (Old Timer and Old Timer Nos. 1–3 claims), surveyed in 1961. The claimant is listed as John L. Splane. The plat depicts 15 shafts, 14 open cuts, a drift, and several roads that primarily bisect the southmost claim, Old Timer. An earth dam is also depicted across the northmost part of the plat, in the Old Timer No. 3 claim lot.

- **Mineral Survey 4550** (Los Jarillas Nos. 1, 2, and 4 claims), surveyed in 1961. The claimant is listed as John L. Splane. The plat depicts 14 shafts, three open cuts, and a road.

- **Mineral Survey 4771** (Comprising 112 lode claims, including Aagh No. 1, South Red Mountain Nos. 1–8, and Wild Pig No. 16), patented in 1982 and again in 1987. The claimant is listed as the Kerr-McGee Corporation. The plat does not depict many features, despite the extensive number of claim lots present, but does include an adit and tunnel, as well as several roads and trails.

General Land Office Plats

- **Township 22 South, Range 15 East, Gila and Salt River Meridian, Arizona,** surveyed in 1876 (filed 1877), depicts the northwest extent of the survey area. The 1877 plat simply marks the sections in the survey area as either "Rolling Hills" or "Rough Mountains" with no features indicated.

- **Township 22 South, Range 15 East, Gila and Salt River Meridian, Arizona,** surveyed in 1903 (filed 1905), depicts the northwest extent of the survey area. Similar to the 1877 plat, the 1905 plat simply marks the sections in the survey area as "Rough Mountains" with no buildings, structures, or roads indicated.

- **Township 22 South, Range 15 East, Gila and Salt River Meridian, Arizona**, surveyed in 1921 (filed 1926), depicts the northwest extent of the survey area. The 1926 plat more closely details the features of Sections 25 and 36, depicting a tank, pump, and barn in the southeast quarter of Section 35 and a mill in the south half of Section 36. A tramway running northwest-southeast is shown entering Section 25 at the northeast quarter. Several mineral claims are also denoted, including MS 351, MS 353, MS 3689, and MS 3777 **(Figure A.3** [Appendix A]**)**.
- **Township 22 South, Range 16 East, Gila and Salt River Meridian, Arizona,** surveyed in 1912 (filed in 1915), depicts the northernmost extent of the survey area. No buildings or structures are depicted in the survey area. A small length of road follows the headwaters of "alum canyon" in Section 32 within the January (MS 745) and part of the Norton (MS 929) claims. Several mineral claims are denoted, including MS 351, MS 352, MS353, MS 745, and MS 929 **(Figure A.4** [Appendix A]**)**.
- **Township 23 South, Range 15 East, Gila and Salt River Meridian, Arizona,** surveyed in 1913 (filed in 1914), depicts a significant portion of the western part of the survey area. The plat depicts the eastern terminus of an east-west-trending road in Section 9. Near the road is a feature labeled "shaft." Two more east-west-trending roads are in the centers of Sections 27 and 28 and in the south halves of Sections 33 and 34. No mineral claims are denoted. Of note, the two easternmost sections of the range (i.e., Sections 1–2, 11–14, 23–26, and 35–35), appear as "unsurveyed," and remain so in each subsequent GLO plat **(Figure A.5** [Appendix A]**)**.
- **Township 24 South, Range 15 East, Gila and Salt River Meridian, Arizona,** surveyed in 1899, 1901, and 1908 (filed in 1911), depicts the southwestern extent of the survey area. No buildings or structures are depicted in the survey area. The primary east-west arterial road between Nogales and Washington Camp, now known as Duquesne Road (Forest Road 61), is depicted bisecting the survey area in Sections 1–3. A telephone line broadly parallels this road to its south, with some deviation further south into Sections 10–11, thereby avoiding Section 3. Several secondary roads lead away from the arterial road, with a still-in-use dirt road, now known as Forest Road 4669C, branching north in Section 2 toward Providencia Canyon. No mineral claims are denoted **(Figure A.6** [Appendix A]**)**.

U.S. Geological Survey Quadrangles

- **1905 1:125,000-scale (30' series) Nogales, Arizona**. This map represents an area inclusive of the current Study Area. It names several mines now within the Study Area, including "Jarilla's Mine" (associated with MS 4550), "O'Mara's Mine" (no associated mineral claim), "The Mowry Mine" (AR-03-05-03-00164, associated with MS 2190, among others), the "Golden Rose Mine" (associated with MS 243), and the "Holland Mine" (a component of AR-03-05-03-00386/AZ Z:5:81(ASM) and associated with MS 2211). Several unnamed mines are marked, including those seemingly associated with known sites, such as the Endless Chain Mine (AR-03-05-03–00568) and the Morning Glory Mine (AR-03-05-03–

00569). In addition to the mines, a few towns are named, including "Hardshell" (AR-03-05-03-00499/AZ EE:10:195[ASM]), "Harshaw" (AR-03-05-03-00133/AZ EE:10:40[ASM]), "Washington," and "Duquesne" (AR-03-05-03-00386/AZ Z:5:81[ASM]). A ranch, "Harrison's Ranch," is also named within Sycamore Canyon in the south part of the Study Area. A number of roads and trails are also depicted, with State Route (SR) 82 (AZ EE:9:168[ASM]), Harshaw Road (AR-03-05-03-00622, Forest Road 49), and Duquesne Road (Forest Road 64) unnamed but present. Several of the trails are currently in-use dirt roads, including Forest Road (FR) 215 and FR 4653 in the northwest, FR 4662 in the south, and FR 4695 and FR 4697 in the east.

- **1905 1:125,000-scale (30' series) Patagonia, Arizona**. This map represents an area corresponding with a small portion of the far north of the Study Area. No buildings, structures, or roads are indicated in the area of the current project.
- **1922 1:62,500 (15' series) Agua Caliente, Arizona**. This map represents an area corresponding with a small portion of the far north of the Study Area. No buildings, structures, or roads are indicated in the area of the current project.
- **1932 1:62,500 (15' series) Lochiel, Arizona**. This map depicts an area that broadly corresponds with the east half of the current Study Area. It names several mines within the Study Area, including the "World's Fair Mine" (AR-03-05-03-00281), the "Humboldt Mine" (AR-03-05-03-00349), "The Mowry Mine" (AR-03-05-03-00164, associated with MS 2190, among others), and the "Holland Mine" (a component of AR-03-05-03-00386/AZ Z:5:81(ASM) and associated with MS 2211). Several unnamed mines are marked, including those seemingly associated with known sites, such as the Endless Chain Mine (AR-03-05-03–00568) and the Morning Glory Mine (AR-03-05-03–00569). In addition to the mines, a few towns are named, including "Hardshell" (AR-03-05-03-00499/AZ EE:10:195[ASM]), "Harshaw" (AR-03-05-03-00133/AZ EE:10:40[ASM]), "Washington," and "Duquesne" (AR-03-05-03-00386/AZ Z:5:81[ASM]). Two roads and several trails are also depicted, with Harshaw Road (AR-03-05-03-00622, FR 49), and Duquesne Road (FR 64) unnamed but present. Several of the trails are currently in-use dirt roads, including FR 4695 and FR 4697.
- **1933 1:62,500 (15' series) Calabasas, Arizona**. This map depicts an area that broadly corresponds with the west half of the current Study Area. It names several mines within the Study Area, including the "3R Mine" (AR-03-05-03-00109), the "Robt. E. Lee Mine" (no associated mineral claim), the "Tres de Mayo Mine" (possibly related to AR-03-05-03-00107 or AR-03-05-03-00372, no associated mineral claim), the "Jarillas Mine" (associated with MS 4550), "O'Mara's Mine" (no associated mineral claim), the "gross mine" (AR-03-05-03-00138), and the "golden rose mine" (associated with MS 243). Several unnamed mines are marked, including those seemingly associated with known sites, such as the Buena Vista Mine (AR-03-05-03–00135) and the Minnesota Mine (AR-03-05-03–00182). A ranch, "Harrison's Ranch," is also named within Sycamore Canyon in the south part of the Study

Area. Two roads and a number of trails are also depicted, with SR 82 (AZ EE:9:168[ASM]) and Duquesne Road (FR 64) present. Duquesne Road remains unnamed, but SR 82 is indicated as "State Highway 82." Several of the trails are currently in-use dirt roads, including FR 125, FR 4653, and FR 4669.

- **1948 1:24,000 (7.5' series) Duquesne, Arizona**. This map corresponds with the particularly rugged southeastern extent of the Study Area. No buildings, structures, or roads are indicated in the area of the current project.
- **1948 1:24,000 (7.5' series) Harshaw, Arizona**. This map depicts an area that broadly corresponds with the eastern half of the current Study Area. It names several mines within the Study Area, including the "Worlds Fair Mine" (AR-03-05-03-00281), the "Humboldt Mine" (AR-03-05-03-00349), the "Hardshell Mine" (associated with MS 4460), the "Hardshell Shaft" (associated with MS 4460), the "Morning Glory Mine" (AR-03-05-03-00569), the "Paymaster Mine" (associated with MS 700 and 701), and the "Haist Mine" (AR-03-05-03-00596). Several unnamed mines are marked, including those seemingly associated with known sites, such as the Chief Mine (AR-03-05-03-00550) and the Kansas Mine (AZ EE:10:198[ASM], associated with MS 1404). In addition to the mines, the map names "Washington Camp," with "Trench Camp," "Harshaw" (AR-03-05-03-00133/ AZ EE:10:40[ASM]), and "Duquesne" (AR-03-05-03-00386/AZ Z:5:81[ASM]) also named but falling just beyond the Study Area. Several ranches are named, including the "Flying R Ranch" (AR-03-05-03-00566), the "Bagby Ranch" (AR-03-05-03-00551), and the "Shaffer Ranch." Three roads and several trails are also depicted, with Flux Canyon Road (FR 812), Harshaw Road (AR-03-05-03-00622, FR 49), and Duquesne Road (FR 64) unnamed but present. Several of the trails are currently in-use dirt roads, including FR 4687 and FR 4695.
- **1948 1:62,500 (15' series) Lochiel, Arizona**. This map depicts an area that broadly corresponds with the eastern half of the current Study Area. It names several mines within the Study Area, including the "Worlds Fair Mine" (AR-03-05-03-00281), the "Humboldt Mine" (AR-03-05-03-00349), the "Hardshell Mine" (associated with MS 4460), the "Hardshell Shaft" (associated with MS 4460), the "Morning Glory Mine" (AR-03-05-03-00569), the "Paymaster Mine" (associated with MS 700 and 701), and the "Haist Mine" (AR-03-05-03-00596). Several unnamed mines are marked, including those seemingly associated with known sites, such as the Chief Mine (AR-03-05-03-00550) and the Kansas Mine (AZ EE:10:198[ASM], associated with MS 1404). In addition to the mines, the map names "Washington Camp," with "Trench Camp," "Harshaw" (AR-03-05-03-00133/AZ EE:10:40[ASM]), and "Duquesne" (AR-03-05-03-00386/ AZ Z:5:81[ASM]) also named but falling just beyond the Study Area. Several ranches are named, including the "Flying R Ranch" (AR-03-05-03-00566), the "Bagby Ranch" (AR-03-05-03-00551), and the "Shaffer Ranch." Three roads and several trails are also depicted, with Flux Canyon Road (FR 812), Harshaw Road (AR-03-05-03-00622, FR 49), and Duquesne Road (FR 64) unnamed but present. Several of the trails are currently in-use dirt roads, including FR 4687 and FR 4695.

- **1956 1:250,000-scale (60' series) Nogales, Arizona**. This map represents an area inclusive of the current Study Area. It names one mine within the Study Area, the "Humboldt Mine" (AR-03-05-03-00349). Several unnamed mines are marked, including those seemingly associated with known sites, such as the 3-R Mine (AR-03-05-03-00109), Hardshell Mine (associated with MS 4460), and the Haist Mine (AR-03-05-03-00596). In addition to the mines, the map names "Washington Camp" and "Trench Camp," with "Harshaw" (AR-03-05-03-00133/AZ EE:10:40[ASM]) and "Duquesne" (AR-03-05-03-00386/ AZ Z:5:81[ASM]) also named but falling just beyond the Study Area. "Bagby Ranch" (AR-03-05-03-00551) is also named. The map names only SR 82 (AZ EE:9:168[ASM]), although Harshaw Road (AR-03-05-03-00622, FR 49) and Duquesne Road (FR 64) are also depicted.

- **1958 1:24,000 (7.5' series) Duquesne, Arizona**. This map corresponds with the particularly rugged southeastern extent of the Study Area. No buildings, structures, or roads are indicated in the area of the current project.

- **1958 1:24,000 (7.5' series) Harshaw, Arizona**. This map depicts an area that broadly corresponds with the eastern half of the current Study Area. It names several mines within the Study Area, including The "Exposed Reef Mine" (no associated mineral claim), the "Worlds Fair Mine" (AR-03-05-03-00281), the "Chief Mine" (AR-03-05-03-00550), the "Humboldt Mine" (AR-03-05-03-00349), the "Hardshell Mine" (associated with MS 4460), the "American Mine" (associated with MS 140 and MS 141), the "Hermosa Mine" (AR-03-05-03-00404/AZ EE:10:192[ASM], associated with MS 499), the "Black Eagle Mine" (AR-03-05-03-00559, associated with MS 3769), the "Bender Mine" (AR-03-05-03-00559, associated with MS 3769); the "Blue Nose Mine" (AR-03-05-03-00553, associated with MS 142), the "Thunder Mine" (no associated mineral claim), the "Augusta Mine" (AR-03-05-03-00624), the "Endless Chain Mine" (AR-03-05-03–00568), the "Morning Glory Mine" (AR-03-05-03-00569), the "Mowry Mine" (AR-03-05-03-00164, associated with MS 2190, among others), the "Homestake Mine" (no associated mineral claims), the "Paymaster Mine" (associated with MS 700 and 701), the "Haist Mine" (AR-03-05-03-00596), the "Olive Mine" (AR-03-05-03-00585, associated with MS 3603), the "Winifred Mine" (no associated mineral claims), the "Jackalo Mine" (associated with MS 4232), the "Four Metals Mine" (AR-03-05-03-00555), the "Kansas Mine" (AZ EE:10:198(ASM), associated with MS 1404), the "Maine Mine" (associated with MS 1405), the "New York Mine" (associated with MS 1404), and the "Pride Mine" (associated with MS 2503). Notably, the locations given for several mines, such as the World's Fair Mine and the Hardshell Mine, differ from the 1948 USGS Harshaw 1:24,000 (7.5-minute) quadrangle map. A few unnamed mines are marked, including AR-03-05-03-00552. In addition to the mines, the map names "Washington Camp," with "Trench Camp" and "Harshaw" (AR-03-05-03-00133/AZ EE:10:40[ASM]) also named but falling just beyond the Study Area. Several ranches are named, including the "Flying R Ranch" (AR-03-05-03-00566), the "Bagby Ranch" (AR-03-05-03-00551), and the "Shaffer

Ranch." Three roads and several trails are also depicted, with Flux Canyon Road (FR 812) named, and Harshaw Road (AR-03-05-03-00622, FR 49) and Duquesne Road (FR 64) unnamed but present. Several of the trails are currently in-use dirt roads, including FR 4687 and FR 4695.

- **1958 1:62,500 (15' series) Lochiel, Arizona**. This map depicts an area that broadly corresponds with the eastern half of the current Study Area. It names several mines within the Study Area, including The "Exposed Reef Mine" (no associated mineral claim), the "Worlds Fair Mine" (AR-03-05-03-00281), the "Chief Mine" (AR-03-05-03-00550), the "Humboldt Mine" (AR-03-05-03-00349), the "Hardshell Mine" (associated with MS 4460), the "American Mine" (associated with MS 140 and MS 141), the "Hermosa Mine" (AR-03-05-03-00404/AZ EE:10:192[ASM], associated with MS 499), the "Black Eagle Mine" (AR-03-05-03-00559, associated with MS 3769), the "Bender Mine" (AR-03-05-03-00559, associated with MS 3769), the "Blue Nose Mine" (AR-03-05-03-00553, associated with MS 142), the "Thunder Mine" (no associated mineral claim), the "Augusta Mine" (AR-03-05-03-00624), the "Endless Chain Mine" (AR-03-05-03–00568), the "Morning Glory Mine" (AR-03-05-03-00569), the "Mowry Mine" (AR-03-05-03-00164, associated with MS 2190, among others), the "Homestake Mine" (no associated mineral claims), the "Paymaster Mine" (associated with MS 700 and 701), the "Haist Mine" (AR-03-05-03-00596); the "Olive Mine" (AR-03-05-03-00585, associated with MS 3603), the "Winifred Mine" (no associated mineral claims), the "Jackalo Mine" (associated with MS 4232), the "Four Metals Mine" (AR-03-05-03-00555), the "Kansas Mine" (AZ EE:10:198(ASM), associated with MS 1404), the "Maine Mine" (associated with MS 1405), the "New York Mine" (associated with MS 1404), and the "Pride Mine" (associated with MS 2503). Notably, the locations given for several mines, such as the World's Fair Mine and the Hardshell Mine, differ from the 1948 USGS Lochiel 1:62,500 (15-minute) quadrangle map. A few unnamed mines are marked, including AR-03-05-03-00552. In addition to the mines, the map names "Washington Camp," with "Trench Camp" and "Harshaw" (AR-03-05-03-00133/AZ EE:10:40[ASM]) also named but falling just beyond the Study Area. Several ranches are named, including the "Flying R Ranch" (AR-03-05-03-00566), the "Bagby Ranch" (AR-03-05-03-00551), and the "Shaffer Ranch." Three roads and several trails are also depicted, with Flux Canyon Road (FR 812) named, and Harshaw Road (AR-03-05-03-00622, FR 49) and Duquesne Road (FR 64) unnamed but present. Several of the trails are currently in-use dirt roads, including FR 4687 and FR 4695.

- **1958 1:62,500 (15' series) Mount Wrightson, Arizona**. This map represents an area corresponding with a small portion of the far north of the Study Area. No buildings, structures, or roads are indicated in the area of the current project.

- **1958 1:62,500 (15' series) Nogales, Arizona**. This map depicts an area that broadly corresponds with the western half of the current Study Area. It names several mines within

the Study Area, including the "Blue Eagle Mine" (possibly associated with MS 351), the "Flux Mine" (AR-03-05-03-00198), the "Three R Mine" (AR-03-05-03-00109, associated with MS 3689), the "Lookout Mine" (possibly associated with Gray Camp/AR-03-05-03-00618 and MS 3690), the "Domino Mine" (no associated mineral claim), the "European Mine" (no associated mineral claim), the "Sonoita Mine" (associated with MS 4546), the "Ventura Mine" (no associated mineral claim), the "Denver Mine" (possibly associated with AR-03-05-03-00162 and MS 4538), the "Robert E. Lee Mine" (no associated mineral claim), the "Tres de Mayo Group" (possibly related to AR-03-05-03-00107 or AR-03-05-03-00372, no associated mineral claim), the "Jarillas Mine" (associated with MS 4550), "O'Maras Mine" (no associated mineral claim), the "National Mine" (associated with AR-03-05-03-00454), the "Serenata Mine" (no associated mineral claim), the "Shamrock Mine" (no associated mineral claim), the "Gross Mine" (AR-03-05-03-00138), the "Big Lead Mine" (possibly associated with AR-03-05-03-00134), the "Golden Rose Mine" (associated with MS 243), the "Minnesota Mine" (AR-03-05-03-00182), the "Bennett Mine" (no associated mineral claim), the "King Mine" (no associated mineral claim), and the "Buena Vista Mine" (AR-03-05-03–00135). Several unnamed mines are marked, with a few, such as AR-03-05-03-00163 (associated with MS 4538), known through archaeological reconnaissance. Three roads and several trails are also depicted, with SR 82 named and Flux Canyon Road (FR 812) and Duquesne Road (FR 64) unnamed but present. Several of the trails are currently in-use dirt roads, including FR 125, FR 4653, and FR 4669.

- **1958 1:250,000-scale (60' series) Nogales, Arizona**. This map represents an area inclusive of the current Study Area. It names five mines within the Study Area, including the "Mary Lou Mine (aband)" (probably the 3-R Mine/AR-03-05-03-00109), the "Humboldt Mine" (AR-03-05-03-00349), the "Hardshell Mine" (associated with MS 4460), the "Paymaster Mine (aband)" (associated with MS 700 and 701), and the "Haist Mine (aband)" (AR-03-05-03-00596). One unnamed abandoned mine (possibly associated with AR-03-05-03-00371 or MS 4526) and two mining camps are marked. In addition to the mines, the map names "Washington" as a town, with "Harshaw" (AR-03-05-03-00133/AZ EE:10:40[ASM]) and "Duquesne" (AR-03-05-03-00386/AZ Z:5:81[ASM]) also named but falling just beyond the Study Area. "Bagby Ranch" (AR-03-05-03-00551) also appears. The map names only SR 82 (AZ EE:9:168[ASM]), although Flux Canyon Road (FR 812), Harshaw Road (AR-03-05-03-00622, FR 49) and Duquesne Road (FR 64) are also depicted.

U.S. Geological Survey Bulletin 582

- **1914 Topographic Map of the Santa Rita and Patagonia Mountains, Arizona** (Schrader 1915:Plate 1). This map, a composite of the Nogales and Patagonia 30' quadrangles, shows the primary mining districts, camps, producing mines, and prospects within the Patagonia Mountains. It shows most of the historical mining-related sites in the survey area and is a useful depiction of the area during the early twentieth century.

MANAGEMENT SUMMARY

WestLand performed a cultural resources assessment in support of the proposed 138kV transmission line project between Rio Rico and Harshaw, Arizona. WestLand reviewed existing archaeological survey and site information available in the AZSITE archaeological database and the CNF cultural resources database and examined historical maps of the Study Area in order to understand previous survey coverage, known archaeological site density, and the potential for additional prehistoric and historical sites in the Study Area.

Most of the 43,775-acre Study Area has not been examined for cultural resources, according to the CNF database, although recent Class III pedestrian survey projects conducted in late 2020 by WestLand have considerably reduced the unsurveyed portion. Furthermore, of the total projects, only ten could be considered recent (surveyed in the last 10 years), and as few as 32 have been conducted since 2000. As such, Class III survey is likely to be required for any previously unsurveyed portions of the preferred alternative alignment of the transmission line when it is identified by the CNF.

A total of 151 archaeological sites are located partly or wholly within the Study Area. Sites attributed to the Historic period Euroamerican cultures were most prominent. Mining and mine-related activities are far-and-away most represented. Some other common historical site types included homesteads and ranches, with occasional transportation and utility infrastructure sites also present. Approximately 23 percent of the total sites in the Study Area represent prehistoric occupation. These prehistoric sites reflect a wide variety of primarily transient functions and potential cultural affiliations, with slightly more than a third exhibiting Formative period cultural affiliations. Avoidance of all NRHP-eligible or unevaluated sites is preferred. However, if that is not possible, a Historic Properties Treatment Plan should be developed and implemented for any impacted Historic Properties.

In summary, it is expected that further survey work in support of the Rio Rico-to-Harshaw 138kV transmission line project will be needed, to ensure completed Class III survey coverage of the preferred alternative alignment of the transmission line when it is identified by the CNF, to reassess the previously documented sites, and to identify any previously unknown Historic Properties in the Study Area.

REFERENCES

Arizona State Historic Preservation Office (SHPO)

2004 *SHPO Position on Relying on Old Archaeological Survey Data*. SHPO Guidance Point No. 5. Arizona State Parks, Phoenix.

Miller, Paul M.

2021 *A Cultural Resources Assessment of Approximately 40,420 Acres of Private and State Trust Land in Support of the Rio Rico-to-Harshaw 138kV Transmission Line Project, Santa Cruz County, Arizona*. Cultural Resources Report No. pending. WestLand Resources, Inc., Tucson.

Schrader, Frank C.

1915 *Mineral Deposits of the Santa Rita and Patagonia Mountains, Arizona*. Bulletin 582. U.S. Department of the Interior, U.S. Geological Survey, Washington, D.C.

APPENDIX A

ARCHAEOLOGICAL RECORDS SEARCH AND HISTORICAL MAPS OF THE STUDY AREA

Table A.1. Previous archaeological projects that intersect the Study Area

Table A.2. Previously recorded sites that intersect the Study Area

Figure A.1.a–e. Previous archaeological projects that intersect the Study Area

Figure A.2.a–e. Previously recorded sites that intersect the Study Area

Class I References

Figure A.3. Overlay of Study Area on General Land Office plat of Township 22 South, Range 15 East, officially filed 1926

Figure A.4. Overlay of Study Area on General Land Office plat of Township 22 South, Range 16 East, officially filed 1915

Figure A.5. Overlay of Study Area on General Land Office plat of Township 23 South, Range 15 East, officially filed 1914

Figure A.6. Overlay of Study Area on General Land Office plat of Township 24 South, Range 15 East, officially filed 1911

Figure A.2 depicts information that is considered sensitive and may be protected under federal, state, and local laws. As such, it has been redacted from the report.

Table A.1. Previous archaeological projects that intersect the Study Area

Agency Project No.	Project Name	Reference
1976-3.CNF [1]	Santa Cruz Water Developments	Wood (1976c)
1976-10.CNF [2]	San Rafael Brush Crush	Wood (1976b)
1977-50.CNF [3]	San Rafael Brush Crush Amendment #2	Mauti (1977)
1978-31.CNF [4]	Sierra Vista Ranger District Forest Road Flood Damage Repair Project	Wood and Salyer (1978)
1978-73.CNF [5]	Survey of Forest Service Road 214 for Mountain Bell	Baldwin (1978)
1978-99.CNF [6]	Stock Tank Fence	Mauti (1978)
1979-36.CNF [7]	Duquesne--Hayfield Allotment Boundary Fence	Mauti (1979)
1980-49.CNF [8]	Whitetail Waters Project	Piper (1980b)
1980-59.CNF [9]	ASARCO European Canyon Drillsite	Not available
1980-79.CNF [10]	Finley and Adams Canyon Group Campsite	Vito (1980)
1980-108.CNF [11]	Santa Cruz–Sierra Tordillo Reconstruction	Piper (1980a)
1980-111.CNF [12]	One Holer #1 Road	Not available
1981-15.CNF [13]	Santa Cruz Range Improvements	Not available
1981-28.CNF [14]	Silver Leaf #1 Drillsite	Vito (1981e)
1981-34.CNF [15]	Lookout Mine Channel Cut Project	Not available
1981-47.CNF [16]	Buena Vista Drillsite #1 and Access Road	Vito (1981a)
1981-49.CNF [17]	Cumo Road and Drill Site	Brandolino (1981b)
1981-50.CNF [18]	Four Metal Mine Road Extension	Brandolino (1981a)
1981-59.CNF [19]	Providencia Canyon Drillsites and Access Roads	Vito (1981d)
1981-64.CNF [20]	National 1–4 Mine Road Upgrading	Not available
1981-66.CNF [21]	Buena Vista Mine Road	Wood (1981)
1981-73.CNF [22]	Hale Well	Piper (1981)
1981-75.CNF [23]	Hermosa Mine Drillsite and Access Road	Vito (1981b)
1981-81.CNF [24]	Washington Camp Borrow Sites A & B	Vito (1981f)
1981-85.CNF [25]	Paymaster Millsite Access Road	Vito (1981c)
1982-29.CNF [26]	Maggie's Placer Claims 1–8	Not available
1982-58.CNF [27]	Paloma Mountains Road, Soldier Basin	Stensby (1982)
1982-66.CNF [28]	Mowry Fuel Wood Sale	Newman (1984b)

Table A.1. Previous archaeological projects that intersect the Study Area

Agency Project No.	Project Name	Reference
1982-67.CNF [29]	Guajolote Fuelwood Area	Newman (1984a)
1983-11.CNF [30]	Sierra Tordillo Pipeline	Piper (1983c)
1983-13.CNF [31]	Providencia Canyon Road	Stensby (1983)
1983-26.CNF [32]	Shaffer Storage Tank and Pipeline	Piper (1983b)
1983-29.CNF [33]	Farrell Trick Tank	Piper (1982)
1983-38.CNF [34]	Finley and Adams Water Storage Tank	Wheat (1983)
1983-52.CNF [35]	American Peak Trick Tank, Storage, and Drinker	Piper (1983a)
1984-1.CNF [36]	West Soldier Basin Assessment Work / Murray	Not available
1984-2.CNF [37]	Washington Camp Fence	Piper (1984)
1984-10.CNF [38]	Exxon Test Drilling Pad	Wheat (1984d)
1984-14.CNF [39]	Mowry Division Fence	Van Keuren (1984)
1984-26.CNF [40]	Exxon Mining Road	Spoerl (1984c)
1984-27.CNF [41]	American Peak Fence	Spoerl (1984a)
1984-30.CNF [42]	Sierra Tordilla Borrow Site and Access Road	Wheat (1984b)
1984-36A.CNF [43]	Expansion—Boyer Mining Claims	Spoerl (1984b)
1984-53.CNF [44]	Billue/Quinn Mining Claims	Not available
1984-74.CNF [45]	Goldsil Paymaster Coal Systems Mining Claims	Spoerl (1984d)
1984-76.CNF [46]	Italian Canyon Rock Removal	Wheat (1984c)
1984-78.CNF [47]	The Opal Camping Area	Not available
1985-10.CNF [48]	Santa Cruz County Roadcut Borrow Sites	Wheat (1985b)
1985-14.CNF [49]	Ridge Lateral Pipeline	Van Keuren (1985e)
1985-17.CNF [50]	Callahan Pipeline	Van Keuren (1985c)
1985-27.CNF [51]	Big Canyon Pipeline	Van Keuren (1985b)
1985-39.CNF [52]	Tres de Mayo Mining	Not available
1985-43.CNF [53]	AZ Brethren Church Camp Buried Utility Lines	Wheat (1985a)
1985-63.CNF [54]	Washington Camp Fence	Van Keuren (1985d)
1985-68.CNF [55]	Banta, Morning Glory North, and Blue Nose Mines	Van Keuren (1985a)
1985-77.CNF [56]	Ridge Pipeline Alternate Route	Van Keuren (1985f)

Table A.1. Previous archaeological projects that intersect the Study Area

Agency Project No.	Project Name	Reference
1985-86.CNF [57]	Conley Three-R Claims Assessment Work	Not available
1986-2.CNF [58]	Sierra Tordilla Well and Road Improvement	Wade (1986)
1987-19.CNF [59]	Alisos Pipeline Extension	Wade (1987)
1987-56.CNF [60]	Bog Hole Dam and Lake Maintenance	Spoerl (1987)
1988-2.CNF [61]	Santo Nino Road Maintenance	Not available
1988-12.CNF [62]	Providencia Canyon Placer Mine	Not available
1988-50.CNF [63]	Solaris Soldier Basin Drilling	Bennett and Farrell (1988)
1988-50A.CNF [64]	Soldier Basin Mining Claims Addendum	Spoerl (1988)
1988-59.CNF [65]	Ophir Queen Mining Project	Not available
1988-63.CNF [66]	Paymaster Borrow Site and Road	Bennett (1988b)
1988-105.CNF [67]	Alum Gulch Test Drilling	Bennett (1988a)
1988-168.CNF [68]	First Dekon–Providencia Test Drilling Project	Bennett (1988d)
1988-172.CNF [69]	Dekon Mining Projects	Farrell (1988)
1988-173.CNF [70]	Dekon-Buena Vista Road Repair Project	Bennett (1988c)
1988-174.CNF [71]	Minnesota–Rose Road Repair Project	Bennett (1988e)
1988-180.CNF [72]	Dekon Road Repair and Construction Providencia	Bennett (1988f)
1989-58.CNF [73]	Flux Canyon Road Maintenance	Bennett (1989)
1989-67.CNF [74]	3-R Sierrita Drilling Project	Not available
1989-73.CNF [75]	Bell-Werstler Washington Camp Road Project	Not available
1989-79.CNF [76]	Satellite Communications – Holloman Air Force	Ackerman (1989)
1989-107.CNF [77]	Road 49 Improvement	Schrager (1989)
1989-176.CNF [78]	Tres de Mayo FR 235 Road Rehabilitation Project	Not available
1990-1.CNF [79]	Kemper Road Rehabilitation Project	Not available
1990-73.CNF [80]	Rio Algom Road	Not available
1990-80.CNF [81]	El Paso Natural Gas Pipeline Maintenance	Bennett (1990b)
1990-104.CNF [82]	ASARCO Trench Camp Assessment Drilling Project	Bennett (1990a)
1990-110.CNF [83]	ASARCO Venture Mine Assessment Drilling Project	Not available
1990-165.CNF [84]	Paloma Ridge Fence	Not available

Table A.1. Previous archaeological projects that intersect the Study Area

Agency Project No.	Project Name	Reference
1990-196.CNF [85]	FR 812 Cutbank Backsloping	Bennett (1990c)
1991-33.CNF [86]	Red Bank Mining Project	Bennett (1991)
1992-43.CNF [87]	US Rights-of-Way near Nogales and Patagonia	Not available
1992-118.CNF [88]	Two US West Rights-of-way near the 3-R Canyon	Roth (1992a)
1992-122.CNF [89]	U.S. West Right-of-way along Pipeline, 3-R Canyon	Roth (1992b)
1992-134.CNF [90]	3-R Canyon Road Maintenance	Not available
1993-33.CNF [91]	Flux Mine Dump Stabilization	Not available
1993-55.CNF [92]	Wild Hog Pipeline Extension	Not available
1993-71.CNF [93]	Flux Canyon Fence	Dupee (1993)
1994-10.CNF [94]	ASARCO Alum Gulch Borrow Project	Bennett (1993)
1994-11.CNF [95]	Mowry Wash Homeowners' Road Easement	Bennett (1994b)
1994-90.CNF [96]	Soldier Basin Pipeline/Spring Development	Not available
1994-92.CNF [97]	Sierra Vista Road Arizona Trail Trailheads	Not available
1994-110.CNF [98]	Los Pajaros Verdes Waterlot	Not available
1994-112.CNF [99]	Hardshell Road Backsloping Project	Bennett (1994a)
1995-54.CNF [100]	ASARCO Patagonia Mine	Swartz (1995a)
1995-69.CNF [101]	Red Hill Road Reconstruction and Spur Addition	Bennett (1995)
1995-83.CNF [102]	Jarillas Mine Group Exploration & Road Reconstruction	Not available
1996-7.CNF [103]	3-R Well Development	Not available
1996-24.CNF [104]	Pima Pineapple Cactus Exclosure Fence	Dupee (1996)
1996-41.CNF [105]	Hardy Electric Line	Bennett and Gillespie (1996a)
1996-47.CNF [106]	World's Fair Mine Clean-up	Bennett and Gillespie (1996c)
1996-66.CNF [107]	Unknown Mine Group Clean-up	Bennett and Gillespie (1996b)
1997-17.CNF [108]	Jaba (US) Drilling Project	Not available
1998-22.CNF [109]	Cultural Resources Survey of Two Highway Segments along SR 82 Between Nogales and SR 90	Hathaway (1997)
1998-36.CNF [110]	Mowry Manzanita Harvest	Gillespie and Bennett (1998)
1998-38.CNF [111]	Paloma Division Fence/Providencia Fence Realignment	Not available
1998-60.CNF [112]	Hardy Electric Line Installation, Modified Alignment	Bennett and Gillespie (1998)

Table A.1. Previous archaeological projects that intersect the Study Area

Agency Project No.	Project Name	Reference
1999-26.CNF [113]	Hardy Electric Overhead Line Installation	Bennett and Gillespie (1999)
1999-83.CNF [114]	Sycamore Canyon Off-highway Vehicle Project	Gillespie (1999b)
2000-33.CNF* [115]	Chester Road Easement	Bennett (2000)
2001-4.CNF [116]	3-R Road Maintenance	Not available
2001-5.CNF/ 2000-315.ASM [117]	Flux Canyon Powerline Replacement Survey	Hesse (2000)
2001-32.CNF [118]	Chamberlain Tank Fence	Gillespie (2001a)
2001-33.CNF [119]	Sycamore Pass Water Project	Gillespie (2001b)
2001-68.CNF [120]	Citizens Utilities SR 82 Line	Not available
2003-37.CNF [121]	No Name Adit Filling	Farrell (2003)
2003-40.CNF [122]	Metz Small Tracts Act Case & Road Realignment	Not available
2003-46.CNF [123]	7 Hazardous Adit and Shaft Filling on Sierra Vista Ranger District – 3 Locations	Farrell and Spoerl (2003)
2003-53.CNF [124]	Granillo Small Tracts Act Case	Bennett (2003)
2003-67.CNF [125]	Koeneman Road Right-of-Way Interchange	Not available
2005-7.CNF [126]	Searles Road Homeowners' Association Easement	Bennett (2005)
2005-11.CNF [127]	Farrell, Harshaw, Lewis, McFarland, and Weiland Allotment Management Plans	Taylor et al. (2005)
2006-8.CNF [128]	Alisos, Oak Bar, and Santa Cruz Allotment Analysis	Not available
2006-23.CNF [129]	Phase II of the San Rafael Manzanita Project	Mehalic and Gillespie (2006a)
2007-9.CNF [130]	Addendum to Phase II of San Rafael Manzanita Project	Mehalic and Gillespie (2007)
2007-62.CNF [131]	Phase III of the San Rafael Manzanita Heritage Resources Inventory	Mehalic (2007)
2008-17.CNF [132]	Humboldt Canyon Exploratory Drilling	LeBlanc (2007)
2008-58.CNF [133]	Mesquital Fence & Pipeline Survey	Not available
2008-61.CNF [134]	Italian Canyon Mineral Exploration	LeBlanc (2008)
2008-62.CNF [135]	Four Metals Mineral Exploration – Continuation	Not available
2008-89.CNF [136]	66 Proposed CBP Tower Locations in Tucson West	Not available
2011-43.CNF [137]	Jones Cistern Burial	Not available
2011-47.CNF [138]	Hilton Small Tracts Act Proposal	Bennett (2011)
2013-22.CNF/ 2013-2.ASM [139]	Hermosa Drilling Project Plan of Operation Survey	Chamorro (2014)
2017-60.CNF [140]	Forest Road 125 Cattle Guard Survey	Not available

Table A.1. Previous archaeological projects that intersect the Study Area

Agency Project No.	Project Name	Reference
2018-29.CNF [141]	CBP Scope Truck Site Near Sycamore Canyon	Dixon and Mehalic (2018)
2020-6.CNF [142]	2019 Forestwide Material Pits	Not available
2020-7.CNF [143]	South-32/AMI Access Road Environmental Support	Gruner (2018)
2020-29.CNF [144]	3-R Mine Remediation Project	Sezate and Forton (2019)
WRI 1757.21 [145]	AMI Soil Survey	Brown and Taylor (2020)
WRI 1757.27 [146]	AMI FY21 Survey	In prep

* Spatial data not available

Table A.2. Previously recorded sites that intersect the Study Area

Site Number	Site Type	Age and Cultural Affiliation	Reference	NRHP Eligibility
AR-03-05-03-899 1	Artifact scatter	Prehistoric; unknown Native American	No information available	No information available
AR-03-05-03-42 2	Cave shelter (Cox Canyon Cave)	Protohistoric/Historic (A.D. 1450–1976); unknown Native American, Euroamerican	Wood (1976a)	Recommended eligible (d)
AR-03-05-03-79/ AZ EE:9:98(ASM) 3	Village (Purple Flower Site)	Middle Formative (A.D. 700–900); Hohokam	Gillespie and Mehalic (2006a); Urban (1982)	Recommended eligible (d)
AR-03-05-03-80 4	Chipped stone scatter	Prehistoric; unknown Native American	Gillespie (2004b)	Unevaluated
AR-03-05-03-101 5	Mineral exploration	Historic; Euroamerican	Chamorro et al. (2019:264–266); Spoerl (1984d); USDA Forest Service (1984)	Determined not eligible
AR-03-05-03-102 6	Campsite	Unknown Native American	Chamorro (2014:38–41); Chamorro et al. (2019:40–44); Spoerl (1984a, 1984b)	Determined eligible (d)
AR-03-05-03-104 7	Campsite	Formative (A.D. 1–1450); unknown Native American	Wheat (1984a)	Unevaluated
AR-03-05-03-107 8	Mine workings	Historic; Euroamerican	No information available	No information available
AR-03-05-03-109 9	Mine workings (3-R Mine)	Historic (late 1800s–early 1900s); Euroamerican	USDA Forest Service (1985); "updated notes on 3R" (post-2019)	Unevaluated
AR-03-05-03-110 10	No information available	Historic (late 1800s–early 1900s); Euroamerican	USDA Forest Service (1980)	Unevaluated
AR-03-05-03-131 11	Historical structure	Historic; Euroamerican	No information available	No information available
AR-03-05-03-133/ AZ EE:10:40(ASM) 12	Townsite/prehistoric artifact scatter (Harshaw Camp)	Multicomponent: Prehistoric, Historic (A.D. 1879–1950s); unknown Native American Euroamerican,	Chamorro (2014:42–49); Chamorro et al. (2019:45–52); Farrell (1988); Farrell and Schrager (1988); Farrell and Spoerl (1989); Lyon (2001:11–19)	Determined eligible (a), (d). James Finley House is listed on the NRHP (NRIS 5 #74000462).
AR-03-05-03-134 13	Temporary mining camp with mine workings	Historic; Euroamerican	No information available	No information available
AR-03-05-03-135 14	Mine workings (Buena Vista Mine)	Historic (late 1800s–early 1900s); Euroamerican	Farrell (1988); Farrell and Bennett (1988a); USDA Forest Service (2006a)	Unevaluated
AR-03-05-03-136 15	Historic structure (Shannon Spring Cabin)	Historic (A.D. 1900–1950); Euroamerican	Farrell (1988); Farrell and Bennett (1988b)	No information available

Table A.2. Previously recorded sites that intersect the Study Area

Site Number	Site Type	Age and Cultural Affiliation	Reference	NRHP Eligibility
AR-03-05-03-137 [16]	Historic structure	Historic (A.D. 1900–1950); Euroamerican	Farrell (1988); Farrell and Bennett (1988c); USDA Forest Service (2006b)	Unevaluated
AR-03-05-03-138 [17]	Mine workings (Gross Mine/Gross Copper Prospect, and Douglas Well)	Historic (late 1800s–early 1900s); Euroamerican	Farrell (1988); USDA Forest Service (n.d.)	Unevaluated
AR-03-05-03-141 [18]	Historic structure (Chamberlain House)	Historic (late 1800s–early 1900s); Euroamerican	Mehalic (2008a); USDA Forest Service (1987)	Unevaluated
AR-03-05-03-144 [19]	Prehistoric artifact scatter; historical structures	Multicomponent: Formative (A.D. 1–1450), Historic (ca. 1935); unknown Native American, Euroamerican	Farrell and Bennett (1988d)	Unevaluated
AR-03-05-03-162 [20]	Mine workings	Historic (late 1800s–early 1900s); Euroamerican	Farrell (1991a)	Unevaluated
AR-03-05-03-163 [21]	Mine workings	Historic (late 1800s–early 1900s); Euroamerican	Farrell (1991b)	Unevaluated
AR-03-05-03-164 [22]	Mine workings (Mowry Mine)	Historic (A.D. 1850s–1960s); Euroamerican	Bennett and Gillespie (1996a); Boley et al. (2017); Brown and Taylor (2020); Chamorro et al. (2019:275–286); LeBlanc and Gillespie (2004:15–16)	Determined eligible (a), (b), and (d)
AR-03-05-03-172 [23]	Mine workings (3-R Millsite)	Historic (A.D. 1908–1956); Euroamerican	Schrager (1990)	Unevaluated
AR-03-05-03-182 [24]	Mine workings (Minnesota Mine)	Historic (late 1800s–early 1900s); Euroamerican	Bennett (1988c); Gillespie (1991)	Unevaluated
AR-03-05-03-198 [25]	Mine workings (Flux Mine)	Historic (A.D. 1850s–1960s); Euroamerican	Brown and Taylor (2020); Chamorro et al. (2019:287–293); Gillespie (1993)	Determined eligible (d)
AR-03-05-03-234/ AZ EE:9:160(ASM) [26]	Artifact scatter	Formative (A.D. 1–1450); unknown Native American	Mehalic and LeBlanc (2005a); Swartz (1995a, 1995b)	Recommended eligible (d)
AR-03-05-03-235/ AZ EE:9:161(ASM) [27]	Mining campsite/waste dump	Historic (late 1800s–early 1900s); Euroamerican	Swartz (1995a, 1995c); USDA Forest Service (1995)	Unevaluated
AR-03-05-03-262 [28]	Cemetery	Historic (early 1900s); Mexican American	Cowie (1998); Gillespie (2004b:13); USDA Forest Service (2006c)	Recommended not eligible
AR-03-05-03-266 [29]	Charcoal mound	Historic (mid-19th century); Euroamerican	Gillespie (2004b:14); Mehalic (2007:6)	Recommended eligible (a) and (d)

Table A.2. Previously recorded sites that intersect the Study Area

Site Number	Site Type	Age and Cultural Affiliation	Reference	NRHP Eligibility
AR-03-05-03-267 30	Charcoal mound	Historic (19th century); Euroamerican	Gillespie (2004b:14–15); Mehalic (2007:6)	Recommended not eligible
AR-03-05-03-268 31	Charcoal mound	Historic (19th century); Euroamerican	Gillespie (2004b:15); Mehalic (2007:7)	Recommended not eligible
AR-03-05-03-269 32	Charcoal mound	Historic (19th century); Euroamerican	Gillespie (2004b:15); Mehalic (2007:7)	Recommended eligible (a) and (d)
AR-03-05-03-270 33	Charcoal mound	Historic (19th century); Euroamerican	Gillespie (2004b:15–16); Mehalic (2007:7–8)	Recommended eligible (a)
AR-03-05-03-271 34	Coal oven with associated artifact scatter	Historic (1850s–1960s); Euroamerican	Gillespie (2004b); Gillespie and Bennett (1998); Mehalic (2007)	Recommended eligible (a) and (d)
AR-03-05-03-281 35	Mine workings and ore reduction (World's Fair Mine)	Historic; Euroamerican	Chamorro et al. (2019:294–302); Taylor et al. (2005)	Determined eligible (d)
AR-03-05-03-283/ AZ EE:10:49(ASM) 36	Historical habitation	Historic (after 1904–1958)	Gillespie (1999a, 1999b); Lyon (2001); Kovalchik et al. (2020)	Recommended not eligible
AR-03-05-03-293 37	Temporary residence/habitation	Historic (A.D. 1912–1941)	Gillespie (2001b); Gillespie and Mehalic (2006b); USDA Forest Service (2006d)	Unevaluated
AR-03-05-03-304/ AZ EE:9:166(ASM) 38	Artifact scatter	Formative (A.D. 1–1450); unknown Native American	Hathaway (1997); Teague and Baldwin (1978); USDA Forest Service (1998)	Recommended eligible (d)
AR-03-05-03-313 39	Mining camp and smelter (Mowry Hacienda)	Historic (ca. A.D. 1850s–1860s); Euroamerican	Brown and Taylor (2020); Chamorro et al. (2019:307–313); LeBlanc and Gillespie (2004:20–21)	Determined eligible (a), (b), and (d)
AR-03-05-03-314 40	Lime kiln	Historic (ca. A.D. 1880–1920); Euroamerican	Brown and Taylor (2020); Chamorro et al. (2019:314–317); LeBlanc and Gillespie (2004b:21–22)	Determined eligible (a), (b), (c), and (d)
AR-03-05-03-315/ AZ EE:10:37(ASM) 41	Lithic scatter	Prehistoric; unknown Native American	Brown and Taylor (2020); Gillespie (2004b:18); LeBlanc and Gillespie (2004:22)	Recommended eligible (d)
AR-03-05-03-316 42	Mine camp and workings (North Mowry Mine)	Historic (ca. early 1900s); Euroamerican	Chamorro (2014:52–59); Chamorro et al. (2019:55–62, 318–323); Gillespie (2004a, 2004b); LeBlanc and Gillespie (2004:22–23)	Determined eligible (d) by USFS in 2014

Table A.2. Previously recorded sites that intersect the Study Area

Site Number	Site Type	Age and Cultural Affiliation	Reference	NRHP Eligibility
AR-03-05-03-317 [43]	Charcoal production site	Historic (ca. early 1860s); Euroamerican	Chamorro (2014:60–64); Chamorro et al. (2019:63–67); Gillespie (2004b)	Determined eligible (d)
AR-03-05-03-318 [44]	Thermal feature	Historic (A.D. 1863–1912); Euroamerican	Gillespie (2004b:19–20); Mehalic and Gillespie (2006b); USDA Forest Service (2006e)	Unevaluated
AR-03-05-03-320 [45]	Charcoal ovens	Historic Euroamerican or Mexican American	Gillespie (2004b:20); Mehalic (2007:8); Mehalic and Gillespie (2007); Mehalic et al. (2007)	Recommended not eligible
AR-03-05-03-322/ AZ EE:10:41(ASM)/ AZ EE:10:11(Cochise College) [46]	Mining camp (West Mowry)	Historic (A.D. 1880–1950s); Euroamerican	Bennett and Gillespie (1996); Chamorro et al. (2019:324–328); Gillespie (2004b)	Determined eligible (d)
AR-03-05-03-349 [47]	Mine workings (Humboldt Mine)	Historic/modern (ca. A.D. 1887–1990s?); Euroamerican	Chamorro et al. (2019); Farrell and Gillespie (1997); Kovalchik et al. (2020:34–37); Tactikos (2012)	Recommended not eligible
AR-03-05-03-353 [48]	Artifact scatter	Formative (A.D. 1–1450); unknown Native American	Mehalic and LeBlanc (2005b)	Unevaluated
AR-03-05-03-354 [49]	Artifact scatter	Formative (A.D. 1–1450); unknown Native American	Mehalic and LeBlanc (2005c)	Recommended eligible (d)
AR-03-05-03-357 [50]	Temporary residence/habitation (Hammer City)	Early to Middle Formative (A.D. 200–900); Unknown Native American	Mehalic and Gillespie (2006c)	Recommended eligible (d)
AR-03-05-03-358 [51]	Historic structure	Historic (A.D. 1912–1946); Euroamerican	Mehalic and Gillespie (2006d)	Unevaluated
AR-03-05-03-359 [52]	Habitation	Formative (A.D. 1–1450); unknown Native American	Mehalic and Gillespie (2006e)	Recommended eligible (d)
AR-03-05-03-360 [53]	Multicomponent: prehistoric artifact scatter; Historic petroglyph, rock alignment, ore processing	Multicomponent: Prehistoric, Late Historic (late 1800s–early 1900s); unknown Native American, Euroamerican	Mehalic and Gillespie (2006f)	Unevaluated
AR-03-05-03-365 [54]	Lithic scatter	Unknown Native American	Mehalic and Gillespie (2006g); USDA Forest Service (2006f)	Unevaluated
AR-03-05-03-370 [55]	Water storage	Historic (A.D. 1912–1946); Euroamerican	USDA Forest Service (2006g)	Unevaluated

Table A.2. Previously recorded sites that intersect the Study Area

Site Number	Site Type	Age and Cultural Affiliation	Reference	NRHP Eligibility
AR-03-05-03-371 [56]	Structural foundations	Historic (late 1800s–early 1900s); Euroamerican	USDA Forest Service (2006h)	Unevaluated
AR-03-05-03-372 [57]	Historical structure	Historic (late 1800s–early 1900s); Euroamerican	USDA Forest Service (2006i)	Recommended eligible (d)
AR-03-05-03-373 [58]	Mine workings	Historic (A.D. 1912–1946); Euroamerican	USDA Forest Service (2006j)	Unevaluated
AR-03-05-03-386/ AZ Z:5:81(ASM) [59]	Historical mining area (Duquesne Mine)	Historic; Euroamerican	USDA Forest Service (2020)	Unevaluated
AR-03-05-03-387 [60]	Historical structure (Athens Mill)	Historic; Euroamerican	No information available	No information available
AR-03-05-03-388 [61]	Artifact scatter (Shannon Spring Lithic Site)	Prehistoric; unknown Native American	No information available	No information available
AR-03-05-03-389 [62]	Lithic scatter	Prehistoric; unknown Native American	Mehalic and Gillespie (2006h); USDA Forest Service (2006k)	Recommended eligible (d)
AR-03-05-03-391 [63]	Campsite	Prehistoric; unknown Native American	Chamorro (2014:65–67); Chamorro et al. (2019:68–70); Mehalic and Gillespie (2006i); USDA Forest Service (2006l)	Recommended eligible (d)
AR-03-05-03-393 [64]	Charcoal oven	Historic (A.D. 1863–1912); Euroamerican	Mehalic and Gillespie (2006j); USDA Forest Service (2006m)	Unevaluated
AR-03-05-03-394 [65]	Charcoal oven	Historic (A.D. 1863–1912); Euroamerican	Mehalic and Gillespie (2006k); USDA Forest Service (2006n)	Unevaluated
AR-03-05-03-395 [66]	Campsite	Historic/modern (A.D. 1946–present); Euroamerican	Mehalic and Gillespie (2006l); USDA Forest Service (2006o)	Unevaluated
AR-03-05-03-403 [67]	Charcoal ovens	Historic (A.D. 1863–1912); Euroamerican	Mehalic and Gillespie (2006m); USDA Forest Service (2006p)	Recommended eligible (a) and (d)
AR-03-05-03-404/ AZ EE:10:192(ASM) [68]	Mine workings (Hermosa Mine)	Historic (A.D. 1863–1912); Euroamerican	Chamorro et al. (2019)	Recommended eligible (d)
AR-03-05-03-405 [69]	Mine workings (North Hermosa Mine)	Historic (A.D. 1863–1912); Euroamerican	Chamorro et al. (2019)	Recommended eligible (d)
AR-03-05-03-443 [70]	Charcoal oven	Historic (A.D. 1863–1912); Euroamerican	Mehalic and Laluk (2007)	Unevaluated
AR-03-05-03-447 [71]	Mine workings (Four Metals Mine)	Historic; Euroamerican	No information available	No information available
AR-03-05-03-452 [72]	Historical structure (Italian Canyon Cabin)	Historic (late 1800s–early 1900s); Euroamerican	Mehalic (2008b)	Unevaluated

Table A.2. Previously recorded sites that intersect the Study Area

Site Number	Site Type	Age and Cultural Affiliation	Reference	NRHP Eligibility
AR-03-05-03-454 [73]	Mine workings (National Mine Powder Magazine)	Historic; Euroamerican	USDA Forest Service (2008)	Unevaluated
AR-03-05-03-466 [74]	Historical structure (1937 Stone House)	Historic (A.D. 1912–1946); Euroamerican	Mehalic and Urquidez (2009a)	Unevaluated
AR-03-05-03-467 [75]	Rock art (Soldier Basin Petroglyphs #1)	Prehistoric; unknown Native American	Mehalic (2009)	Recommended eligible (d)
AR-03-05-03-468 [76]	Resource site/rock art (Soldier Basin Petroglyphs #2)	Prehistoric; unknown Native American	Mehalic and Urquidez (2009b)	Recommended eligible (d)
AR-03-05-03-486 [77]	Homestead (D'Albini Ranch)	Historic (late 1800s–early 1900s); Euroamerican	Mehalic (2012)	Recommended eligible
AR-03-05-03-494 [78]	Campsite	Prehistoric; unknown Native American	Chamorro (2014:104–106); Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-495 [79]	Ranching (Farrell Spring)	Late Historic (ca. 1950s); Euroamerican	Chamorro (2014:107–109); Chamorro et al. (2019)	Determined not eligible
AR-03-05-03-497 [80]	Hardrock mining and mining camp	Late Historic (ca. A.D. 1880s–1920s); Euroamerican	Chamorro (2014:113–117); Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-498 [81]	Mine workings	Late Historic (ca. late 1800s–early 1900s); Euroamerican	Chamorro (2014:118–121); Chamorro et al. (2019)	Determined not eligible
AR-03-05-03-499/ AZ EE:10:195(ASM) [82]	Mining camp (Hardshell Camp)	Late Historic (ca. late 1800s–early 1900s); Euroamerican	Chamorro (2014:122–125); Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-503 [83]	Campsite	Prehistoric; unknown Native American	Chamorro (2014:135–137); Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-508 [84]	Campsite	Prehistoric; unknown Native American	Chamorro (2014:148–151); Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-511 [85]	Campsite	Prehistoric; unknown Native American	Chamorro (2014:160–162); Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-512 [86]	Resource site	Prehistoric; unknown Native American	Chamorro (2014:163–165); Chamorro et al. (2019)	Unevaluated
AR-03-05-03-514/ AZ EE:10:184(ASM) [87]	Mine workings (Salvador Mine)	Late Historic (ca. late 1800s–early 1900s); Euroamerican	Chamorro (2014:169–173); Chamorro et al. (2019)	Determined not eligible
AR-03-05-03-522 [88]	Mining camp	Late Historic (ca. early 1900s); Euroamerican	Chamorro (2014:204–207); Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-524 [89]	Resource site	Prehistoric; unknown Native American	Chamorro (2014:212–214); Chamorro et al. (2019)	Unevaluated

Table A.2. Previously recorded sites that intersect the Study Area

Site Number	Site Type	Age and Cultural Affiliation	Reference	NRHP Eligibility
AR-03-05-03-534 [90]	Multicomponent: prehistoric campsite; historical mining camp	Multicomponent: Formative (A.D. 1–1450), Late Historic (A.D. 1880s–1920s); unknown Native American, Euroamerican	Chamorro (2014:221–231); Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-542 [91]	Mineral exploration	Late Historic (ca. A.D. 1880s–1950s); Euroamerican	Chamorro et al. (2019)	Determined not eligible
AR-03-05-03-543 [92]	Mineral exploration/mine	Historic (ca. A.D. 1880–1950?); Euroamerican	Chamorro et al. (2019); Stone (2016)	Determined not eligible
AR-03-05-03-544 [93]	Temporary campsite	Historic (ca. A.D. 1880–1950s); Euroamerican	Chamorro et al. (2019); Kovalchik et al. (2020:38–42); Stone (2016)	Determined not eligible
AR-03-05-03-545 [94]	Electrical/phone line	Historic (A.D. 1930s–1960s); Euroamerican	Chamorro et al. (2019); Stone (2016)	Determined not eligible
AR-03-05-03-550 [95]	Mining camp and workings (Chief Mining Group)	Historic (ca. A.D. 1887–1956); Euroamerican	Chamorro et al. (2019); Kovalchik et al. (2020:43–49)	Determined eligible (d)
AR-03-05-03-551 [96]	Homesite (Bagby Ranch)	Historic (post-1917–pre-1948); Euroamerican	Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-552 [97]	Placer workings	Historic (ca. A.D. 1880s–1960s); Euroamerican	Chamorro et al. (2019)	Determined not eligible
AR-03-05-03-553 [98]	Mine workings and ore reduction (Blue Nose Mine)	Historic (A.D. 1884–1956); Euroamerican	Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-554 [99]	Mine workings	Historic (ca. A.D. 1900s–1960s); Euroamerican	Chamorro et al. (2019)	Determined not eligible
AR-03-05-03-555 [100]	Mining camp (Four Metals Camp)	Historic (A.D. 1880s–1920s); Euroamerican	Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-559 [101]	Mine workings (Black Eagle Mine)	Historic (ca. A.D. 1880s–1960s); Euroamerican	Chamorro et al. (2019)	Determined not eligible
AR-03-05-03-561 [102]	Resource site	Prehistoric; unknown Native American	Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-562 [103]	Placer workings	Historic (1950s); Euroamerican	Chamorro et al. (2019)	Determined not eligible
AR-03-05-03-563 [104]	Mine workings	Historic (1900s–1950s); Euroamerican	Chamorro et al. (2019)	Determined not eligible
AR-03-05-03-564 [105]	Homesite (Nations' Homesite)	Historic (A.D. 1920s–1959); Euroamerican	Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-565 [106]	Homesite/placer workings	Historic (A.D. 1940s–1950s); Euroamerican	Chamorro et al. (2019)	Determined eligible (d)

Table A.2. Previously recorded sites that intersect the Study Area

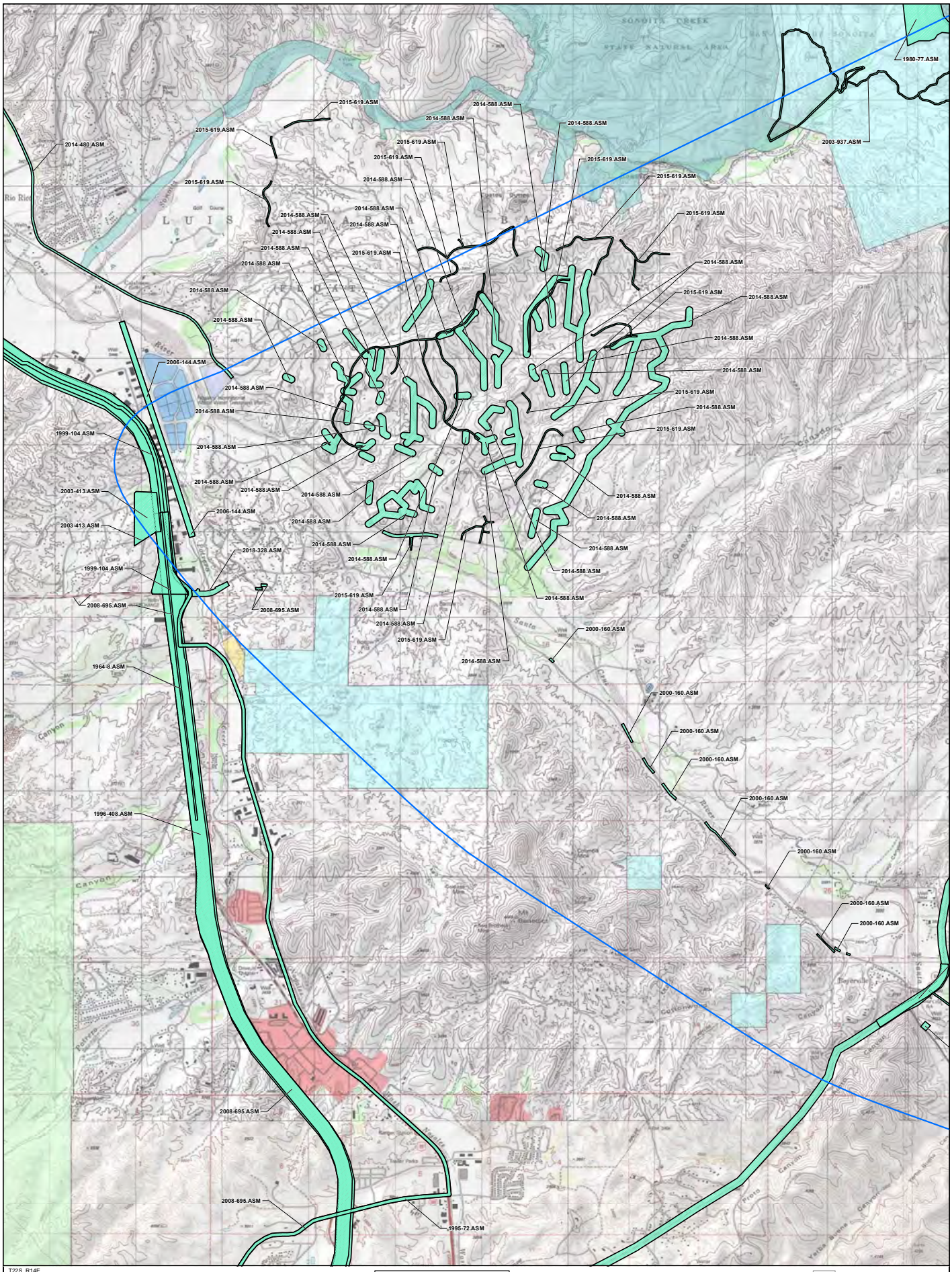
Site Number	Site Type	Age and Cultural Affiliation	Reference	NRHP Eligibility
AR-03-05-03-566 [107]	Ranch (Flying R Ranch)	Historic (pre-1919–1960s); Euroamerican	Chamorro et al. (2019)	Determined not eligible
AR-03-05-03-567 [108]	Homesite	Historic (1930s–1960s); Euroamerican	Chamorro et al. (2019)	Determined not eligible
AR-03-05-03-568 [109]	Mine workings (Endless Chain Mine)	Historic (ca. A.D. late 1800s–1967); Euroamerican	Chamorro et al. (2019)	Determined not eligible
AR-03-05-03-569 [110]	Mine workings (Morning Glory Mine)	Historic (ca. A.D. 1880s–1920s); Euroamerican	Chamorro et al. (2019)	Determined not eligible
AR-03-05-03-570 [111]	Mine workings	Historic (A.D. 1900–1960s); Euroamerican	Chamorro et al. (2019)	Determined not eligible
AR-03-05-03-571 [112]	Mine workings (Bender Mine)	Late Historic (A.D. 1880–1959); Euroamerican	Chamorro et al. (2019)	Determined not eligible
AR-03-05-03-572 [113]	Mine workings	Historic (A.D. 1880s–1920s); Euroamerican	Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-573 [114]	Mining camp and workings	Historic (late 1880s–early 1900s); Euroamerican	Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-574 [115]	Mining camp and workings	Historic (ca. A.D. early 1900s–1950s); Euroamerican	Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-575 [116]	Ranching	Historic (A.D. 1880s–1940s); Euroamerican	Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-576 [117]	Mine workings	Historic (ca. A.D. 1880s–1950s); Euroamerican	Chamorro et al. (2019)	Determined not eligible
AR-03-05-03-577 [118]	Waste piles	Historic (A.D. 1900–1940s); Euroamerican	Chamorro et al. (2019	Determined not eligible
AR-03-05-03-579 [119]	Resource site	Prehistoric; unknown Native American	Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-580 [120]	Campsite (rock shelter)	Formative (ca. A.D. 1–1450); Hohokam	Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-581 [121]	Campsite (rock shelter)	Prehistoric; unknown Native American	Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-582 [122]	Mineral exploration	Historic (ca. A.D. 1880s–1960s); Euroamerican	Chamorro et al. (2019)	Determined not eligible
AR-03-05-03-583 [123]	Mining camp	Historic (A.D. 1880–1918); Euroamerican	Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-584 [124]	Mine workings	Historic (ca. A.D. 1880s–1960s); Euroamerican	Chamorro et al. (2019)	Determined not eligible

Table A.2. Previously recorded sites that intersect the Study Area

Site Number	Site Type	Age and Cultural Affiliation	Reference	NRHP Eligibility
AR-03-05-03-585 [125]	Mining camp and workings (Olive Mine)	Historic (ca. A.D. 1900s–1950s); Euroamerican	Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-586 [126]	Campsite	Late Archaic (ca. 2000–800 B.C.); Native American	Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-587 [127]	Placer and mine workings	Historic (ca. A.D. late 1880s–early 1900s); Euroamerican	Chamorro et al. (2019)	Determined not eligible
AR-03-05-03-588 [128]	Resource site	Prehistoric; unknown Native American	Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-589 [129]	Mine workings (Blue Eagle Mine)	Historic (ca. A.D. 1897–1956); Euroamerican	Chamorro et al. (2019)	Determined not eligible
AR-03-05-03-592 [130]	Ranching	Historic (ca. A.D. 1940s); Euroamerican	Chamorro et al. (2019)	Determined not eligible
AR-03-05-03-594 [131]	Mining camp	Historic (A.D. 1880s–1920s); Euroamerican	Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-595 [132]	Mineral exploration	Historic (A.D. 1880s–1920s); Euroamerican	Chamorro et al. (2019)	Determined not eligible
AR-03-05-03-596 [133]	Mine working (Haist Mine)	Historic (A.D. early 1940s); Euroamerican	Chamorro et al. (2019)	Determined not eligible
AR-03-05-03-597 [134]	Mine workings	Historic (ca. A.D. 1900s–1960s); Euroamerican	Chamorro et al. (2019)	Determined not eligible
AR-03-05-03-599 [135]	Mine workings	Historic (A.D. 1880s –1950s); Euroamerican	Chamorro et al. (2019)	Determined not eligible
AR-03-05-03-600 [136]	Mine workings	Historic (ca. A.D. 1940–1960); Euroamerican	Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-601 [137]	Mining camp	Historic (ca. A.D. 1880s–1920s); Euroamerican	Chamorro et al. (2019)	Determined eligible (d)
AR-03-05-03-602 [138]	Mine workings	Historic (ca. A.D. 1880s–1960s); Euroamerican	Chamorro et al. (2019)	Determined not eligible
AR-03-05-03-604 [139]	Water control	Late Historic/modern (ca. mid 1900s); Euroamerican	Cowell (2019)	Recommended not eligible
AR-03-05-03-605 [140]	Ranching	Late Historic/recent (ca. 1930s to present)	Cowell (2019)	Recommended not eligible
AR-03-05-03-607 [141]	Historical trash scatter	Late Historic (ca. A.D. 1920s–1940s); Euroamerican	Kovalchik et al. (2020:49–52)	Recommended not eligible
AR-03-05-03-608 [142]	Corral	Late Historic (ca. A.D. 1900s–1930s); Euroamerican	Kovalchik et al. (2020:53–55)	Recommended not eligible

Table A.2. Previously recorded sites that intersect the Study Area

Site Number	Site Type	Age and Cultural Affiliation	Reference	NRHP Eligibility
AR-03-05-03-609 [143]	Temporary mining camp with mine workings	Late Historic (ca. A.D. 1910s–1920s); Euroamerican	Kovalchik et al. (2020:56–60)	Recommended not eligible
AR-03-05-03-610 [144]	Mine workings	Late Historic (ca. post 1920); Euroamerican	Kovalchik et al. (2020:61–68)	Recommended not eligible
AR-03-05-03-613 [145]	Mineral exploration	Historic; Euroamerican	No information available	No information available
AR-03-05-03-618 [146]	Mine Camp (Gray Camp)	Historic (early 20th century); Euroamerican	Sezate and Forton (2019)	Recommended eligible (d)
AR-03-05-03-619 [147]	Mine workings (Gray Camp)	Historic (early 1900s); Euroamerican	Sezate and Forton (2019)	Recommended not eligible
AR-03-05-03-622 [148]	Harshaw Road	Historic Euroamerican (ca. 1883–1950)	Stone (2020)	Recommended eligible (a), (c), (d)
AR-03-05-03-624 [149]	Mine workings (Augusta Mine)	Historic; Euroamerican	No information available	No information available
AZ EE:10:198(ASM) [150]	Hardrock Mine (Kansas Mine)	Historic (1905–1959); Euroamerican	Gruner (2018)	Recommended eligible (d)
AZ EE:9:168(ASM) [151]	Abandoned road segments (Nogales–Tombstone Highway)	Middle–Late Historic; Euroamerican	Hathaway (1997); Teague and Baldwin (1978)	Determined eligible (d) by SHPO in 2002



T22S, R14E,
T23S, R13E-14E,
T24S, R14E
Santa Cruz County, Arizona
Cumero Canyon and Rio Rico USGS 7.5' Quadrangles
Projection: UTM NAD83, Zone 12
Data Source: BLM Surface Management (BLM 2019, WRI Modified 2019)

WestLand Resources

N

0 1,000 2,000 Feet

0 500 1,000 Meters

a b c d e

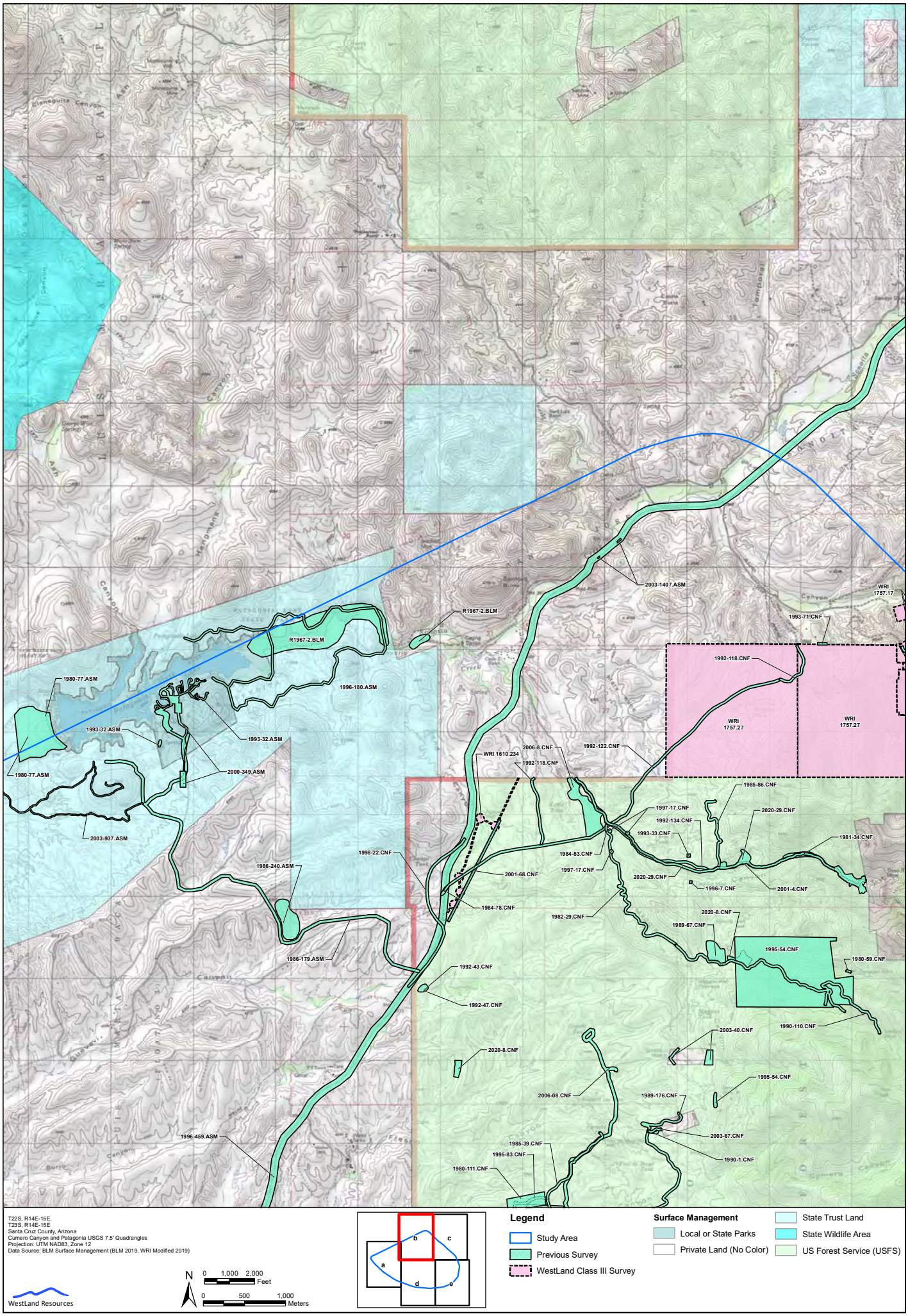
Legend

- Study Area
- Previous Survey

Surface Management

- Bureau of Land Management (BLM)
- Local or State Parks
- National Park Service (NPS)
- Private Land (No Color)
- State Trust Land
- US Forest Service (USFS)

Figure A.1.a. Previous archaeological projects that intersect the Study Area



T22S, R14E-15E,
T23S, R14E-15E
Santa Cruz County, Arizona
Cumero Canyon and Patagonia USGS 7.5' Quadrangles
Projection: UTM NAD83, Zone 12
Data Source: BLM Surface Management (BLM 2019, WRI Modified 2019)

WestLand Resources

N

0 1,000 2,000 Feet

0 500 1,000 Meters

a b c d e

Legend

- Study Area
- Previous Survey
- WestLand Class III Survey

Surface Management

- Local or State Parks
- Private Land (No Color)
- State Trust Land
- State Wildlife Area
- US Forest Service (USFS)

Figure A.1.b. Previous archaeological projects that intersect the Study Area

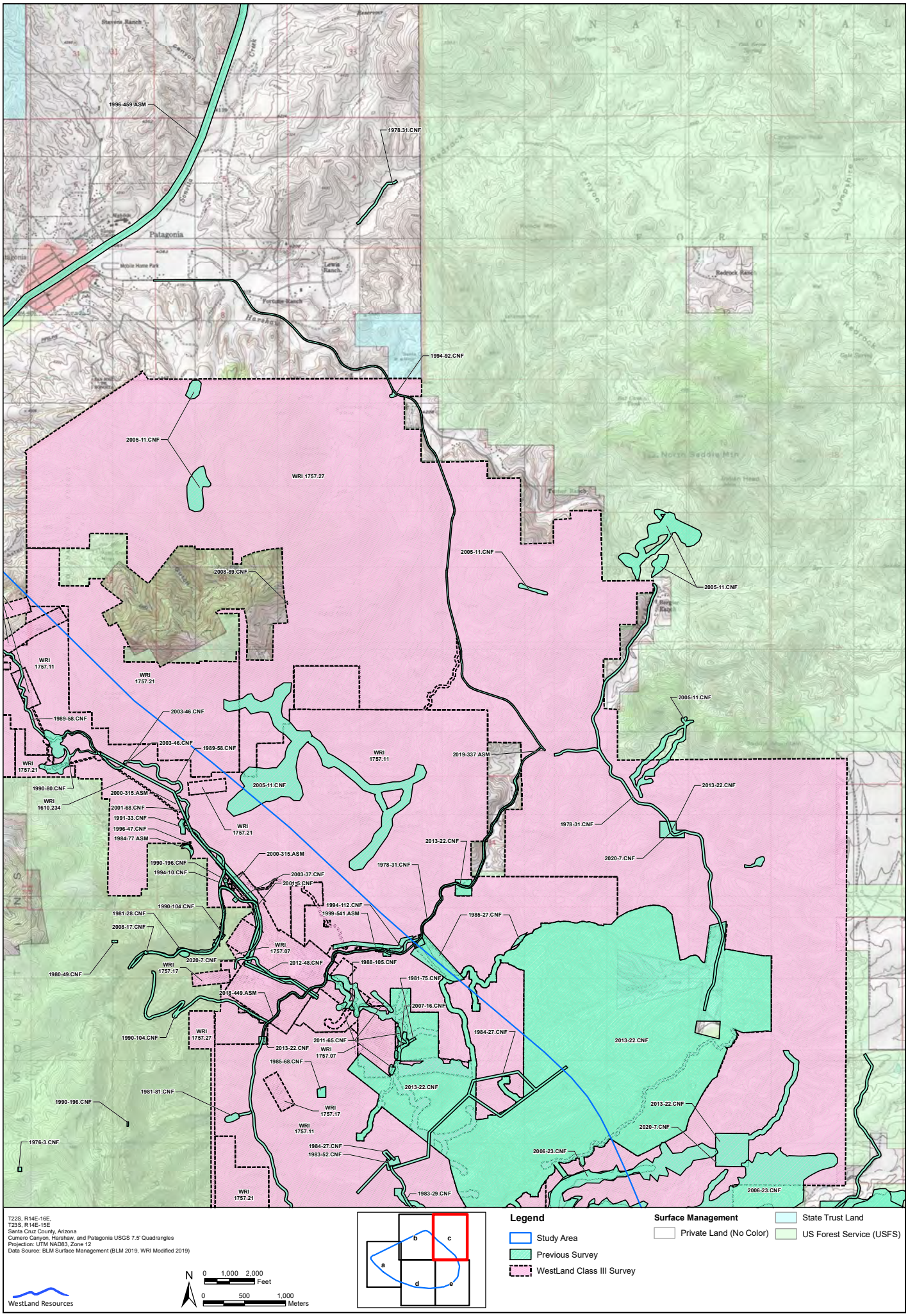


Figure A.1.c. Previous archaeological projects that intersect the Study Area

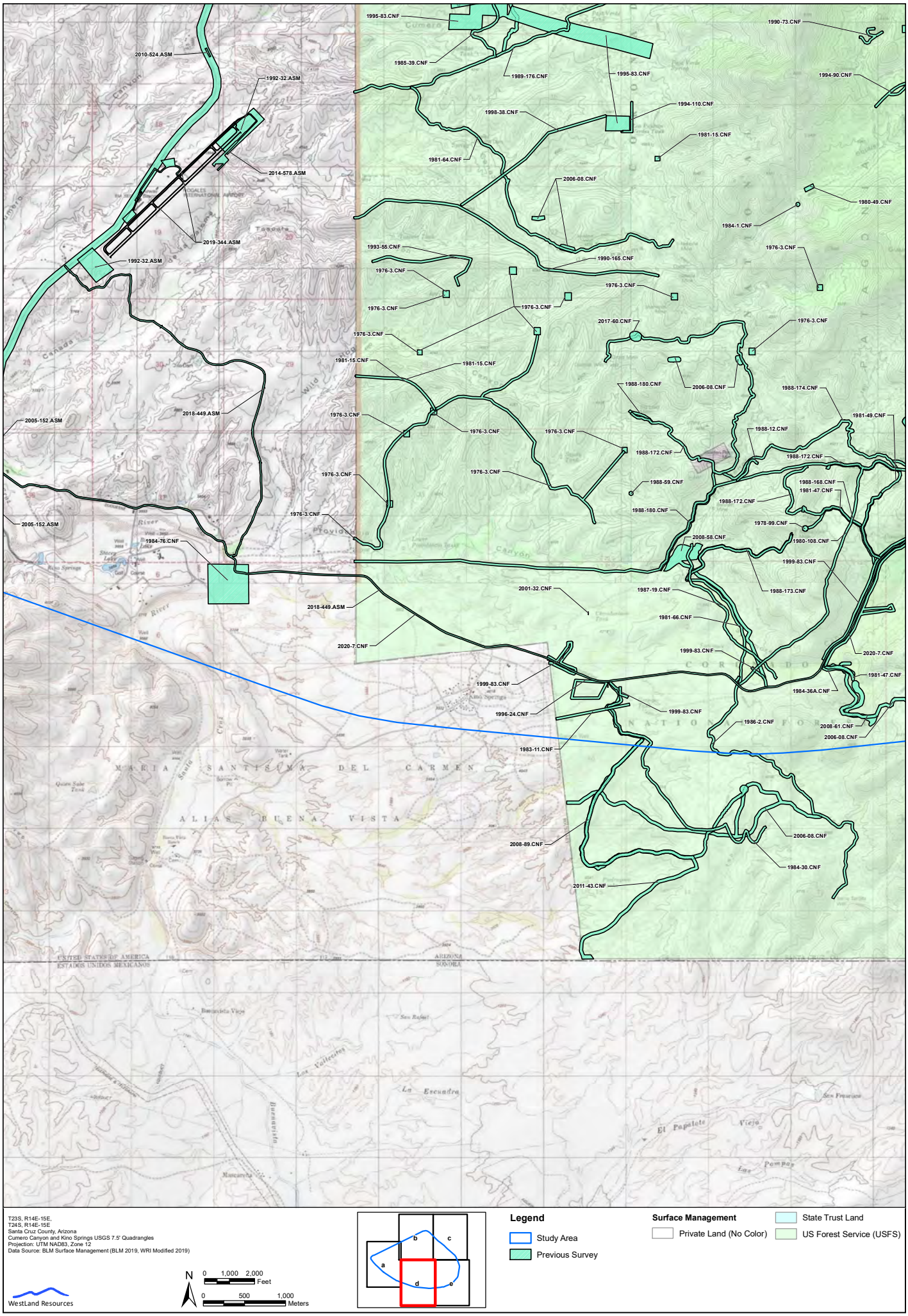
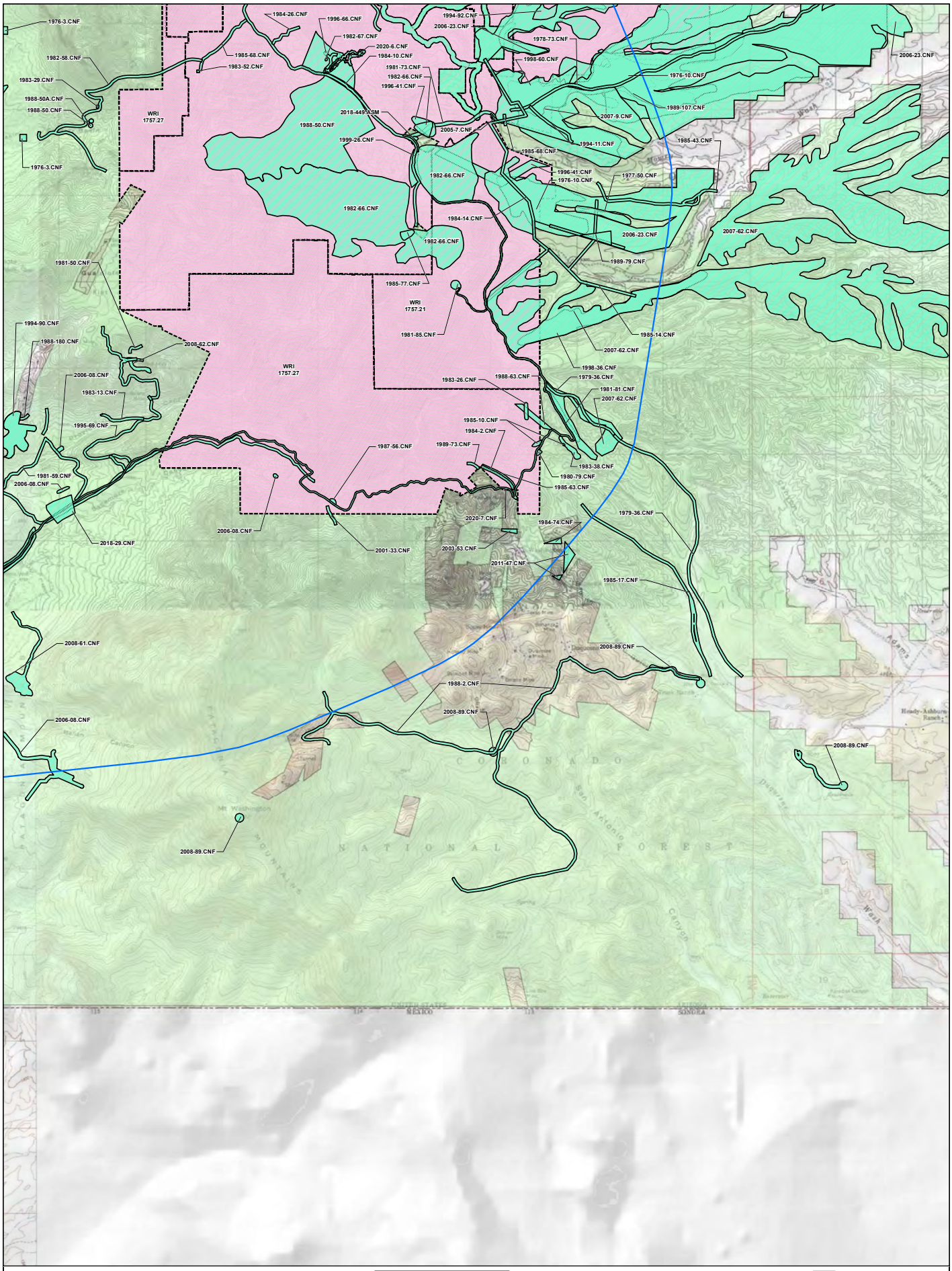


Figure A.1.d. Previous archaeological projects that intersect the Study Area



T23S, R15E-16E,
T24S, R15E-16E
Santa Cruz County, Arizona
Cumero Canyon, Duquesne, Harshaw, and Kino Springs USGS 7.5' Quadrangles
Projection: UTM NAD83, Zone 12
Data Source: BLM Surface Management (BLM 2019, WRI Modified 2019)

WestLand Resources

N

0 1,000 2,000 Feet

0 500 1,000 Meters

a b c d e

Legend

- Study Area
- Previous Survey
- WestLand Class III Survey

Surface Management

- Private Land (No Color)
- US Forest Service (USFS)

Figure A.1.e. Previous archaeological projects that intersect the Study Area

1990b *A Cultural Resources Investigation of the Proposed El Paso Natural Gas Pipeline Maintenance Project, Sierra Vista Ranger District, Coronado National Forest.* CNF Archaeological Clearance Report No. 1990-05-080. On file. Coronado National Forest Supervisor's Office, Tucson.

1990c *FR 812 Cutbank Backsloping.* CNF Cultural Resource Survey Report No. 1990-05-196. On file. Coronado National Forest Supervisor's Office, Tucson.

1991 *A Cultural Resources Investigation of the Proposed Red Bank Mining Project, Sierra Vista Ranger District, Coronado National Forest.* CNF Archaeological Clearance Report No. 1991-05-033. On file. Coronado National Forest Supervisor's Office, Tucson.

1993 *A Cultural Resources Investigation of the Proposed ASARCO Alum Gulch Borrow Project, Sierra Vista Ranger District, Coronado National Forest.* Heritage Resource Report No. 1994-05-010. On file. Coronado National Forest Supervisor's Office, Tucson.

1994a *A Cultural Resources Investigation of the Proposed Hardshell Mine Road Backsloping Project, Sierra Vista Ranger District, Coronado National Forest.* Heritage Resource Report No. 1994-05-112. On file. Coronado National Forest Supervisor's Office, Tucson.

1994b *A Cultural Resources Investigation of the Proposed Mowry Wash Homeowners Road Easement, Sierra Vista Ranger District, Coronado National Forest.* Heritage Resource Report No. 1994-05-011. On file. Coronado National Forest Supervisor's Office, Tucson.

1995 *Red Hill Road Reconstruction and Spur Addition.* CNF Cultural Resource Survey Report No. 1995-05-069. On file. Coronado National Forest Supervisor's Office, Tucson.

2000 *Chester Road Easement.* CNF Cultural Resource Report No. 2000-05-033. Coronado National Forest Supervisor's Office, Tucson.

2003 *Granillo Small Tracts Act Case.* CNF Archaeological Survey Report No. 2003-05-053. On file. Coronado National Forest Supervisor's Office, Tucson.

2005 *Searles Road Homeowners' Association Easement.* CNF Cultural Resource Survey Report No. 2005-05-007 Summary Form. On file. Coronado National Forest Supervisor's Office, Tucson.

2011 *Hilton Small Tracts Act Proposal.* CNF Cultural Clearance Report No. 2011-05-047. On file. Coronado National Forest Supervisor's Office, Tucson.

Bennett, Duane A., and Mary M. Farrell

1988 *A Cultural Resources Investigation of the Proposed Solaris–Soldier Basin Test Drilling Project, Sierra Vista Ranger District, Coronado National Forest.* CNF Archaeological Clearance Report No. 1988-05-050. On file. Coronado National Forest Supervisor's Office, Tucson.

Bennett, Duane A., and William B. Gillespie

1996a *Hardy Electric Line Project.* CNF Archaeological Survey Report No. 1996-05-041. On file. Coronado National Forest Supervisor's Office, Tucson.

1996b *Unknown Mine Group Closure Project.* CNF Archaeological Survey Report No. 1996-05-066. On file. Coronado National Forest Supervisor's Office, Tucson.

1996c *World's Fair Mine Clean-up.* CNF Archaeological Survey Report No. 1996-47 Summary Form. On file. Coronado National Forest Supervisor's Office, Tucson.

1998 *Hardy Electric Line Installation Modification.* CNF Archaeological Survey Report No. 1998-05-060. On file. Coronado National Forest Supervisor's Office, Tucson.

1999 *Hardy Electric Overhead Line Installation Project.* CNF Archaeological Survey Report No. 1999-05-026. On file. Coronado National Forest Supervisor's Office, Tucson.

Boley, Steven, Erina Gruner, Becky Caroli, Sebastian Chamorro, and Aaron Deaver

2017 Archaeological and Historical Site Inventory Form for AR-03-05-03-164. On file. Coronado National Forest Supervisor's Office, Tucson.

Brandolino, Dennis J.

1981a *A Cultural Resource Survey of the Four Metal Mine Road Extention* [sic]*, Coronado National Forest, Arizona.* CNF Archaeological Clearance Report No. 1981-05-050. On file. Coronado National Forest Supervisor's Office, Tucson.

1981b *A Cultural Resource Survey of the Proposed Cumo Road & Drill Site.* CNF Archaeological Clearance Report No. 1981-05-049. On file. Coronado National Forest Supervisor's Office, Tucson.

Brown, Stephanie A., and Christopher D. Taylor

2020 *A Cultural Resources Inventory of 2,2352 Acres of Federal Land Within the Coronado National Forest, Santa Cruz County, Arizona.* Cultural Resources Report 2020-100. WestLand Resources, Inc., Tucson.

Chamorro, Sebastian

2014 *A Cultural Resources Inventory of 2,634 Acres of Private and Federal Lands in Support of the Hermosa Drilling Project Plan of Operations Within the Coronado National Forest, Arizona.* Cultural Resources Report 2013-19. WestLand Resources, Inc., Tucson.

Chamorro, Sebastian, Bradford W. Stone, Erina Gruner, Anna M. King, George Tinseth, Rebecca Caroli, Stephanie Brown, Cannon S. Daughtrey, and Jocelyn A. Bernatchez

2019 *A Cultural Resources Inventory of 10,342.41 Acres of Federal Land Within the Coronado National Forest, Santa Cruz County, Arizona.* Cultural Resources Report 2019-3. WestLand Resources, Inc., Tucson.

Cowell, Shannon

2019 *A Cultural Resources Inventory of 38 Acres of Coronado National Forest Land for the Flux Canyon 13.2kV Distribution Line Upgrade Project in Santa Cruz County, Arizona*. Cultural Resources Report 2019-37. WestLand Resources, Inc., Tucson.

Cowie, S.

1998 Archaeological and Historical Site Inventory Form for AR-03-05-03-262. On file. Coronado National Forest Supervisor's Office, Tucson.

Dixon, Connor A., and David S. Mehalic

2018 Inventory Standards and Accounting Form for CBP Scope Truck Site near Sycamore Canyon. On file. Coronado National Forest Supervisor's Office, Tucson.

Dupee, Laura. W.

1993 *Flux Canyon Fence*. CNF Cultural Resource Survey Report No. 1993-05-071 Summary Form. On file. Coronado National Forest Supervisor's Office, Tucson.

1996 *Pima Pineapple Cactus Enclosure Fence*. CNF Cultural Resource Survey Report No. 1996-05-024 Summary Form. On file. Coronado National Forest Supervisor's Office, Tucson.

Farrell, Mary M.

1988 *A Cultural Resources Investigation of Proposed Dekon Mining Projects, Sierra Vista Ranger District, Coronado National Forest*. CNF Archaeological Survey Report No. 1988-05-172. On file. Coronado National Forest Supervisor's Office, Tucson.

1991a Archaeological and Historical Site Inventory Form for AR-03-05-03-162. On file. Coronado National Forest Supervisor's Office, Tucson.

1991b Archaeological and Historical Site Inventory Form for AR-03-05-03-163. On file. Coronado National Forest Supervisor's Office, Tucson.

2003 *No Name Adit Filling, Sierra Vista Ranger District, Coronado National Forest*. Heritage Resource Report No. 2003-05-037. On file. Coronado National Forest Supervisor's Office, Tucson.

Farrell, Mary M., and Duane A. Bennett

1988a Archaeological and Historical Site Inventory Form for AR-03-05-03-135. On file. Coronado National Forest Supervisor's Office, Tucson.

1988b Archaeological and Historical Site Inventory Form for AR-03-05-03-136. On file. Coronado National Forest Supervisor's Office, Tucson.

1988c Archaeological and Historical Site Inventory Form for AR-03-05-03-137. On file. Coronado National Forest Supervisor's Office, Tucson.

1988d Archaeological and Historical Site Inventory Form for AR-03-05-03-144. On file. Coronado National Forest Supervisor's Office, Tucson.

Farrell, Mary M., and Christopher Schrager
1988 Field Map of AR-03-05-03-133, Harshaw, Arizona. Document on file. Coronado National Forest Supervisor's Office, Tucson.

Farrell, Mary M., and Patricia M. Spoerl
1989 *A Cultural Resources Investigation of the Proposed Hale Small Tract Act Project, Sierra Vista Ranger District, Coronado National Forest.* CNF Archaeological Clearance Report No 1988-05-122. On file. Coronado National Forest Supervisor's Office, Tucson.

2003 *Hazardous Adit and Shaft Filling on Sierra Vista Ranger District – 3 Locations.* CNF Cultural Resource Survey Report No. 2003-05-046 Summary Form. On file. Coronado National Forest Supervisor's Office, Tucson.

Gillespie, William B.
1991 Archaeological and Historical Site Inventory Form for AR-03-05-03-182. On file. Coronado National Forest Supervisor's Office, Tucson.

1993 Archaeological and Historical Site Inventory Form for AR-03-05-03-193. On file. Coronado National Forest Supervisor's Office, Tucson.

1999a Archaeological and Historical Site Inventory Form for AR-03-05-03-283. On file. Coronado National Forest Supervisor's Office, Tucson.

1999b *An Archaeological Survey of the Proposed Sycamore Canyon Off-highway Vehicle Project, Sierra Vista Ranger District, Coronado National Forest.* CNF Cultural Resources Report No. 1999-05-083. On file. Coronado National Forest Supervisor's Office, Tucson.

2001a *Heritage Resource Survey of the Chamberlain Tank Fence Project, Sierra Vista Ranger District.* CNF Heritage Report No. 2001-32. On file. Coronado National Forest Supervisor's Office, Tucson.

2001b *Heritage Resource Survey of the Sycamore Pass Water Project, Sierra Vista Ranger District, Coronado National Forest*. CNF Heritage Report No. 2001-05-033. On file. Coronado National Forest Supervisor's Office, Tucson.

2004a Archaeological and Historical Site Inventory Form for AR-03-05-03-316. On file. Coronado National Forest Supervisor's Office, Tucson.

2004b *Heritage Resource Investigation of the Proposed Duquesne, Hayfield, and Lochiel Allotment Management Plans, Sierra Vista Ranger District, Coronado National Forest*. CNF Cultural Resource Report No. 2004-05-036. On file. Coronado National Forest Supervisor's Office, Tucson.

Gillespie, William B., and Duane A. Bennett

1998 *Mowry Manzanita Harvest.* CNF Cultural Resource Survey Report No. 1998-05-036. On file. Coronado National Forest Supervisor's Office, Tucson.

Gillespie, William B., and David S. Mehalic

2006a Archaeological and Historical Site Inventory Form for AR-03-05-03-79. On file. Coronado National Forest Supervisor's Office, Tucson.

2006b Heritage Site Summary Form for AR-03-05-03-293. On file. Coronado National Forest Supervisor's Office, Tucson.

Gruner, Erina

2018 *A Cultural Resources Inventory of 20.93 Miles of Santa Cruz County Road Right-of-way in the Patagonia Mountains, Santa Cruz County, Arizona.* CNF Cultural Resources Report 2018-61. WRI Project No. 1757.14. WestLand Resources, Inc., Tucson.

Hathaway, Jeffrey B.

1997 *Cultural Resource Survey of Two Highway Segments along State Route 82 between Nogales and the Junction of State Route 90 (from Mileposts 1.2 to 28.0 and Mileposts 45.3 to 51.2) in Santa Cruz and Southwestern Cochise Counties, Arizona.* Project Report 96:71. Archaeological Research Services, Tempe.

Hesse, Jerome

2000 *Results from a Class III Cultural Resource Survey for the Proposed Upgrade to the Citizens Utilities Electric Power Distribution Line in Flux Canyon, Coronado National Forest, Santa Cruz County, Arizona.* SWCA Environmental Consultants, Inc., Tucson.

Kovalchik, Jacob, Thomas Jones, Kelin Flanagan, and Creighton Gerber

2020 *Cultural Resource Survey of 198.5 Acres on the Coronado National Forest for the Sunnyside Mining Exploration Project, Santa Cruz County, Arizona*. ACS Project No. 17-164:CSUR. Archaeological Consulting Services, Ltd., Tempe.

LeBlanc, Christopher C.

2007 *Humboldt Canyon Exploratory Drilling, Heritage Resources Sierra Vista Ranger District, Coronado National Forest*. CNF Cultural Resource Survey Report No. 2008-05-017. On file. Coronado National Forest Supervisor's Office, Tucson.

2008 *Italian Canyon Mineral Exploration.* Report No. 2008-05-061. On file. Coronado National Forest Supervisor's Office, Tucson.

LeBlanc, Christopher, and William B. Gillespie

2004 *San Rafael Valley Manzanita Project: Background Research and Survey*. Heritage Report No. 2004-05-067. On file. Coronado National Forest Supervisor's Office, Tucson.

Lyon, Jerry D.

2001 *Results from a Class III Cultural Resource Survey for the Proposed Upgrade to the Harshaw Segment of the Citizens Utilities Electric Power Distribution Line, Coronado National Forest, Santa Cruz County, Arizona.* Letter Report. SWCA Environmental Consultants, Inc., Tucson.

Mauti, Sherri L.

1977 *An Archaeological Survey of the San Rafael Brush Crush Amendment #2*. CNF Archaeological Clearance Report No. 1977-05-050. On file. Coronado National Forest Supervisor's Office, Tucson.

1978 *An Archaeological Survey of the Proposed Stock Tank Fence Coronado National Forest, Arizona*. CNF Archaeological Clearance Report No. 1978-05-099. On file. Coronado National Forest Supervisor's Office, Tucson.

1979 *A Cultural Resource Survey of the Duquesne–Hayfield Allotment Boundary Fence, Coronado National Forest, Arizona.* CNF Archaeological Clearance Report No. 1979-05-036. On file. Coronado National Forest Supervisor's Office, Tucson.

Mehalic, David S.

2007 *Results for Phase III of the San Rafael Manzanita Heritage Resources Inventory, Sierra Vista Ranger District, Coronado National Forest.* CNF Cultural Resource Survey Report No. 2007-05-062. On file. Coronado National Forest Supervisor's Office, Tucson.

2008a Archaeological and Historical Site Inventory Form for AR-03-05-03-141. On file. Coronado National Forest Supervisor's Office, Tucson.

2008b Archaeological and Historical Site Inventory Form for AR-03-05-03-452. On file. Coronado National Forest Supervisor's Office, Tucson.

2009 Archaeological and Historical Site Inventory Form for AR-03-05-03-467. On file. Coronado National Forest Supervisor's Office, Tucson.

2012 Archaeological and Historical Site Inventory Form for AR-03-05-03-486. On file. Coronado National Forest Supervisor's Office, Tucson.

Mehalic, David S., and William B. Gillespie

2006a *Results for Phase II of the San Rafael Manzanita Heritage Resources Inventory, Sierra Vista Ranger District, Coronado National Forest.* CNF Cultural Resource Survey Report No. 2006-05-023. On file. Coronado National Forest Supervisor's Office, Tucson.

2006b Archaeological and Historical Site Inventory Form for AR-03-05-03-318. On file. Coronado National Forest Supervisor's Office, Tucson.

2006c Archaeological and Historical Site Inventory Form for AR-03-05-03-357. On file. Coronado National Forest Supervisor's Office, Tucson.

2006d Archaeological and Historical Site Inventory Form for AR-03-05-03-358. On file. Coronado National Forest Supervisor's Office, Tucson.

2006e Archaeological and Historical Site Inventory Form for AR-03-05-03-359. On file. Coronado National Forest Supervisor's Office, Tucson.

2006f Archaeological and Historical Site Inventory Form for AR-03-05-03-360. On file. Coronado National Forest Supervisor's Office, Tucson.

2006g Archaeological and Historical Site Inventory Form for AR-03-05-03-365. On file. Coronado National Forest Supervisor's Office, Tucson.

2006h Archaeological and Historical Site Inventory Form for AR-03-05-03-389. On file. Coronado National Forest Supervisor's Office, Tucson.

2006i Archaeological and Historical Site Inventory Form for AR-03-05-03-391. On file. Coronado National Forest Supervisor's Office, Tucson.

2006j Archaeological and Historical Site Inventory Form for AR-03-05-03-393. On file. Coronado National Forest Supervisor's Office, Tucson.

2006k Archaeological and Historical Site Inventory Form for AR-03-05-03-394. On file. Coronado National Forest Supervisor's Office, Tucson.

2006l Archaeological and Historical Site Inventory Form for AR-03-05-03-395. On file. Coronado National Forest Supervisor's Office, Tucson.

2006m Archaeological and Historical Site Inventory Form for AR-03-05-03-403. On file. Coronado National Forest Supervisor's Office, Tucson.

2007 *Results of an Addendum to Phase II of the San Rafael Manzanita Heritage Resources Inventory, Sierra Vista Ranger District, Coronado National Forest*. CNF Cultural Resource Survey Report No. 2007-05-009. On file. Coronado National Forest Supervisor's Office, Tucson.

Mehalic, David S., and Nick Laluk
2007 Archaeological and Historical Site Inventory Form for AR-03-05-03-433. On file. Coronado National Forest Supervisor's Office, Tucson.

Mehalic, David S., Nick Laluk, and William B. Gillespie
2007 Archaeological and Historical Site Inventory Form for AR-03-05-03-320. On file. Coronado National Forest Supervisor's Office, Tucson.

Mehalic, David S., and Christopher C. LeBlanc

2005a Archaeological and Historical Site Inventory Form for AR-03-05-03-234. On file. Coronado National Forest Supervisor's Office, Tucson.

2005b Archaeological and Historical Site Inventory Form for AR-03-05-03-353. On file. Coronado National Forest Supervisor's Office, Tucson.

2005c Archaeological and Historical Site Inventory Form for AR-03-05-03-354. On file. Coronado National Forest Supervisor's Office, Tucson.

Mehalic, David S., and G. Urquidez

2009a Archaeological and Historical Site Inventory Form for AR-03-05-03-466. On file. Coronado National Forest Supervisor's Office, Tucson.

2009b Archaeological and Historical Site Inventory Form for AR-03-05-03-468. On file. Coronado National Forest Supervisor's Office, Tucson.

Newman, Gary A.

1984a *A Cultural Resource Investigation of the Guajolote Fuelwood Sale Area*. CNF Archaeological Clearance Report No. 1982-05-067. On file. Coronado National Forest Supervisor's Office, Tucson.

1984b *A Cultural Resource Investigation of the Mowry Fuelwood Sale Area*. CNF Archaeological Clearance Report No. 1982-05-066. On file. Coronado National Forest Supervisor's Office, Tucson.

Piper, William T.

1980a *A Cultural Resource Survey of the Proposed Santa Cruz–Sierra Tordillo Reconstruction*. CNF Cultural Resources Clearance Report No. 1980-05-108. On file. Coronado National Forest Supervisor's Office, Tucson.

1980b *A Cultural Resource Survey of the Proposed Whitetail Waters Project*. CNF Cultural Resources Clearance Report No. 1980-05-049. On file. Coronado National Forest Supervisor's Office, Tucson.

1981 *A Cultural Resource Survey of the Proposed Hale Well*. CNF Cultural Resources Clearance Report No. 1981-05-073. On file. Coronado National Forest Supervisor's Office, Tucson.

1982 *A Cultural Resource Survey of the Proposed Farrell Trick Tank*. CNF Cultural Resources Clearance Report No. 1983-05-029. On file. Coronado National Forest Supervisor's Office, Tucson.

1983a *A Cultural Resource Survey of the Proposed American Peak Trick Tank, Storage, and Drinker, Coronado National Forest, Arizona.* CNF Cultural Resources Clearance Report No. 1983-05-052. On file. Coronado National Forest Supervisor's Office, Tucson.

1983b *A Cultural Resource Survey of the Proposed Shaffer Storage Tank and Pipeline.* CNF Cultural Resources Clearance Report No. 1983-05-026. On file. Coronado National Forest Supervisor's Office, Tucson.

1983c *A Cultural Resource Survey of the Proposed Sierra Tordillo Pipeline.* CNF Archaeological Clearance Investigation No. 1983-05-011. On file. Coronado National Forest Supervisor's Office, Tucson.

1984 *A Cultural Resource Survey of the Proposed Washington Camp Fence.* CNF Cultural Resources Clearance Report No. 1984-05-002. On file. Coronado National Forest Supervisor's Office, Tucson.

Roth, A.

1992a *Two US West Rights-of-way near the E R Canyon.* CNF Cultural Resource Survey Report No. 1992-05-118 Summary Form. On file. Coronado National Forest Supervisor's Office, Tucson.

1992b *US West Right-of-way along Pipeline, 3-R Canyon.* CNF Cultural Resource Survey Report No. 1992-05-122 Summary Form. On file. Coronado National Forest Supervisor's Office, Tucson.

Schrager, Chris

1989 *A Cultural Resources Investigation of the Proposed Road 49 Improvement Project, Sierra Vista Ranger District, Coronado National Forest.* CNF Archaeological Clearance Report No. 1989-05-107. On file. Coronado National Forest Supervisor's Office, Tucson.

1990 Archaeological and Historical Site Inventory Form for AR-03-05-03-172. On file. Coronado National Forest Supervisor's Office, Tucson.

Sezate, Adam, and Maxwell Forton

2019 *A Heritage Resource Investigation for the Three R Mine Remediation Project, Sierra Vista Ranger District, Coronado National Forest.* Heritage Resource Report No. 2020-05-029. On file. Coronado National Forest Supervisor's Office, Tucson.

Spoerl, Patricia M.

1984a Archaeological and Historical Site Inventory Form for AR-03-05-03-102. On file. Coronado National Forest Supervisor's Office, Tucson.

1984b *A Cultural Resources Investigation of the Proposed American Peak Fence, Sierra Vista Ranger District, Coronado National Forest, Arizona*. CNF Cultural Resource Survey Report No. 1984-05-027. On file. Coronado National Forest Supervisor's Office, Tucson.

1984c *A Cultural Resources Investigation of the Proposed Bonyer Mining Claims Expansion, Sierra Vista Mining District, Coronado National Forest, Arizona*. CNF Archaeological Survey Report No. 1984-05-036. On file. Coronado National Forest Supervisor's Office, Tucson.

1984d *A Cultural Resources Investigation of the Proposed Exxon Mining Road, Sierra Vista Ranger District, Coronado National Forest, Arizona*. CNF Cultural Resource Survey Report No. 1984-05-026. On file. Coronado National Forest Supervisor's Office, Tucson.

1987 *A Cultural Resources Investigation of the Proposed Bog Hole Watershed Maintenance Project, Sierra Vista Ranger District, Coronado National Forest*. CNF Archaeological Clearance Report No. 1987-05-056. On file. Coronado National Forest Supervisor's Office, Tucson.

1988 *Soldier Basin Mining Claims Addendum*. CNF Archaeological Clearance Report No. 1988-05-050A. On file. Coronado National Forest Supervisor's Office, Tucson.

Stensby, Ronald A.

1982 *A Cultural Resources Survey of the Proposed Paloma Mountains Road, Soldier Basin, Coronado National Forest, Arizona*. CNF Archaeological Clearance Report No. 1982-05-058. On file. Coronado National Forest Supervisor's Office, Tucson.

1983 *A Cultural Resources Survey of the Proposed Providencia Canyon Road, Coronado National Forest, Arizona*. CNF Archaeological Clearance Report No. 1983-05-013. On file. Coronado National Forest Supervisor's Office, Tucson.

Stone, Bradford W.

2016 *A Cultural Resources Inventory of Approximately 160 Acres of Coronado National Forest Land for Possible Mineral Exploration Activities in Santa Cruz County, Arizona*. Cultural Resources Report 2016-11. WestLand Resources, Inc., Tucson.

2020 *A Cultural Resources Inventory of Approximately 8.09 Miles of Santa Cruz County Right-of-Way for Harshaw Road East of Patagonia, Santa Cruz County, Arizona*. Cultural Resources Report No. 2019-91 (in prep). ASM Accession No. 2019-0337 WestLand Resources, Inc., Tucson.

Swartz, Deborah L.

1995a *An Archaeological Survey for Mining Activity South of Patagonia, Arizona*. Letter Report 95-106. Desert Archaeology, Tucson.

1995b Site Card for AZ EE:9:160(ASM). On file, Arizona State Museum, University of Arizona, Tucson.

1995c Site Card for AZ EE:9:161(ASM). On file, Arizona State Museum, University of Arizona, Tucson.

Tactikos, Joanne C.
2012 *Cultural Resource Survey of 4.6 Acres in the Coronado National Forest for the Sunnyside Mining Exploration Project, Santa Cruz County, Arizona.* USFS Heritage Resource Report No. 2012-05-048. Archaeological Consulting Services, Ltd., Tempe.

Taylor, Peter, William B. Gillespie, and David S. Mehalic
2005 *Heritage Resource Investigations of the Proposed Allotment Management Plans for the Farrell, Harshaw, Lewis, McFarland, and Weiland Allotments, Sierra Vista Ranger District, Coronado National Forest.* Heritage Resource Report No. 2005-05-011. On file. Coronado National Forest Supervisor's Office, Tucson.

Teague, Lynn S., and Anne R. Baldwin
1978 *Painted Rock Reservoir Project, Phase I: Preliminary Survey and Recommendations.* Archaeological Series 126. Arizona State Museum, University of Arizona, Tucson.

United States Department of Agriculture Forest Service (USDA Forest Service)
1980 Archaeological and Historical Site Inventory Form for AR-03-05-03-110. On file. Coronado National Forest Supervisor's Office, Tucson.

1984 Archaeological and Historical Site Inventory Form for AR-03-05-03-101. On file. Coronado National Forest Supervisor's Office, Tucson.

1985 Archaeological and Historical Site Inventory Form for AR-03-05-03-109. On file. Coronado National Forest Supervisor's Office, Tucson.

1987 Archaeological and Historical Site Inventory Form for AR-03-05-03-141. On file. Coronado National Forest Supervisor's Office, Tucson.

1995 Archaeological and Historical Site Inventory Form for AR-03-05-03-235. On file. Coronado National Forest Supervisor's Office, Tucson.

1998 Archaeological and Historical Site Inventory Form for AR-03-05-03-304. On file. Coronado National Forest Supervisor's Office, Tucson.

2006a Heritage Site Summary Form for AR-03-05-03-135. On file. Coronado National Forest, Tucson.

2006b Heritage Site Summary Form for AR-03-05-03-137. On file. Coronado National Forest, Tucson.

2006c Heritage Site Summary Form for AR-03-05-03-262. On file. Coronado National Forest, Tucson.

2006d Heritage Site Summary Form for AR-03-05-03-293. On file. Coronado National Forest, Tucson.

2006e Heritage Site Summary Form for AR-03-05-03-318. On file. Coronado National Forest, Tucson.

2006f Heritage Site Summary Report for AR-03-05-03-365. On file. Coronado National Forest Supervisor's Office, Tucson.

2006g Heritage Site Summary Report for AR-03-05-03-370. On file. Coronado National Forest Supervisor's Office, Tucson.

2006h Heritage Site Summary Report for AR-03-05-03-371. On file. Coronado National Forest Supervisor's Office, Tucson.

2006i Heritage Site Summary Report for AR-03-05-03-372. On file. Coronado National Forest Supervisor's Office, Tucson.

2006j Heritage Site Summary Report for AR-03-05-03-373. On file. Coronado National Forest Supervisor's Office, Tucson.

2006k Heritage Site Summary Report for AR-03-05-03-389. On file. Coronado National Forest Supervisor's Office, Tucson.

2006l Heritage Site Summary Report for AR-03-05-03-391. On file. Coronado National Forest Supervisor's Office, Tucson.

2006m Heritage Site Summary Report for AR-03-05-03-393. On file. Coronado National Forest Supervisor's Office, Tucson.

2006n Heritage Site Summary Report for AR-03-05-03-394. On file. Coronado National Forest Supervisor's Office, Tucson.

2006o Heritage Site Summary Report for AR-03-05-03-395. On file. Coronado National Forest Supervisor's Office, Tucson.

2006p Heritage Site Summary Report for AR-03-05-03-403. On file. Coronado National Forest Supervisor's Office, Tucson.

2008 Heritage Site Summary Report for AR-03-05-03-454. On file. Coronado National Forest Supervisor's Office, Tucson.

2020 Heritage Site Summary Form for AR-03-05-03-386. On file. Coronado National Forest Supervisor's Office, Tucson.

n.d. Heritage Site Summary Form for AR-03-05-03-138. On file. Coronado National Forest Supervisor's Office, Tucson.

Urban, Sharon F.
1982 Archaeological and Historical Site Inventory Form for AR-03-05-03-79. On file. Coronado National Forest Supervisor's Office, Tucson.

Van Keuren, Denise D.
1984 *A Cultural Resource Survey of the Mowry Division Fence, Sierra Vista Ranger District, Coronado National Forest*. CNF Archaeological Clearance Report No. 1984-05-014. On file. Coronado National Forest Supervisor's Office, Tucson.

1985a *A Cultural Resource Survey of Assessment Work at the Banta, Morning Glory North and Blue Nose Mines*. CNF Archaeological Clearance Report No. 1985-05-068. On file. Coronado National Forest Supervisor's Office, Tucson.

1985b *A Cultural Resource Survey of the Proposed Big Canyon Pipeline, Sierra Vista Ranger District, Coronado National Forest, Arizona*. CNF Archaeological Clearance Report No. 1985-05-027. On file. Coronado National Forest Supervisor's Office, Tucson.

1985c *A Cultural Resource Survey of the Proposed Callahan Pipeline, Sierra Vista Ranger District, Coronado National Forest, Arizona*. CNF Archaeological Clearance Report No. 1985-05-017. On file. Coronado National Forest Supervisor's Office, Tucson.

1985d *A Cultural Resource Survey of the Proposed Mesa Tank Repair*. CNF Archaeological Clearance Report No. 1985-05-062. On file. Coronado National Forest Supervisor's Office, Tucson.

1985e *A Cultural Resource Survey of the Proposed Ridge Lateral Pipeline, Sierra Vista Ranger District, Coronado National Forest, Arizona*. CNF Archaeological Clearance Report No. 1985-05-014. On file. Coronado National Forest Supervisor's Office, Tucson.

1985f *A Cultural Resource Survey of the Proposed Ridge Pipeline Alternate Route, Coronado National Forest*. CNF Archaeological Clearance Report No. 1985-05-077. On file. Coronado National Forest Supervisor's Office, Tucson.

Vito, Lisa A.
1980 *A Cultural Resource Survey of the Proposed Finley & Adams Canyon Group Campsite, Coronado National Forest, Arizona*. CNF Archaeological Clearance Report No. 1980-05-079. On file. Coronado National Forest Supervisor's Office, Tucson.

1981a *A Cultural Resources Survey of the Proposed Buena Vista Drillsite #1 and Access Road Coronado National Forest, Arizona.* CNF Archaeological Clearance Report No. 1981-05-047. On file. Coronado National Forest Supervisor's Office, Tucson.

1981b *A Cultural Resource Survey of the Proposed Hermosa Mine Drillsite and Access Road.* CNF Archaeological Clearance Report No. 1981-05-075. On file. Coronado National Forest Supervisor's Office, Tucson.

1981c *A Cultural Resource Survey of the Proposed Paymaster Millsite Access Road.* CNF Archaeological Clearance Report No. 1981-05-085. On file. Coronado National Forest Supervisor's Office, Tucson.

1981d *A Cultural Resource Survey of the Proposed Providencia Canyon Drillsites and Access Roads.* CNF Archaeological Clearance Report No. 1981-05-059. On file. Coronado National Forest Supervisor's Office, Tucson.

1981e *A Cultural Resource Survey of the Proposed Silver Leaf #1 Drillsite, Coronado National Forest, Arizona.* CNF Archaeological Clearance Report No. 1981-05-028. On file. Coronado National Forest Supervisor's Office, Tucson.

1981f *A Cultural Resource Survey of the Proposed Washington Camp Borrow Sites, Coronado National Forest, Arizona.* CNF Archaeological Clearance Report No. 1981-05-081. On file. Coronado National Forest Supervisor's Office, Tucson.

Wade, Jeanne M.

1986 *A Cultural Resource Investigation of the Proposed Sierra Tordilla Well and Road Improvement Coronado National Forest, Arizona.* Heritage Resource Report No. 1986-05-002. On file. Coronado National Forest Supervisor's Office, Tucson.

1987 *A Cultural Resource Investigation of the Proposed Alisos Pipeline Extension, Sierra Vista Ranger District, Coronado National Forest.* CNF Cultural Clearance Report No. 1987-05-019. On file. Coronado National Forest Supervisor's Office, Tucson.

Wheat, Mary A.

1983 *Finley and Adams Water Storage Tank, Cultural Resource Survey, Coronado National Forest*. CNF Cultural Resources Clearance Report No. 1983-05-038. On file. Coronado National Forest Supervisor's Office, Tucson.

1984a Archaeological and Historical Site Inventory Form for AR-03-05-03-104. On file. Coronado National Forest Supervisor's Office, Tucson.

1984b *A Cultural Resources Investigation of the Lichty World's Fair Mining Road Work, Sierra Vista Ranger District, Coronado National Forest, Arizona.* Heritage Resource Report No. 1984-05-077. On file. Coronado National Forest Supervisor's Office, Tucson.

1984c *A Cultural Resources Investigation of the Proposed Italian Canyon Rock Removal–Mesquite Construction Company*. Sierra Vista Ranger District, Coronado National Forest, Arizona. CNF Cultural Resources Clearance Survey No. 1984-05-076. On file. Coronado National Forest Supervisor's Office, Tucson.

1984d *Exxon Test Drilling Pad, Cultural Resource Survey, Coronado National Forest*. CNF Cultural Resources Clearance Report No. 1984-05-010. On file. Coronado National Forest Supervisor's Office, Tucson.

1985a *AZ Brethren Church Camp Buried Utilities Line, Cultural Resource Survey, Coronado National Forest*. CNF Archaeological Clearance Report No. 1985-05-043. On file. Coronado National Forest Supervisor's Office, Tucson.

1985b *A Cultural Resources Inventory of the Proposed Santa Cruz County Road Cut Borrow Sites, Coronado National Forest, Arizona*. CNF Report No. 1985-05-010. On file. Coronado National Forest Supervisor's Office, Tucson.

Wood, Donald G.

1976a *Archaeological and Historical Site Inventory for AR-03-05-03-00042*. On file. Coronado National Forest Supervisor's Office, Tucson.

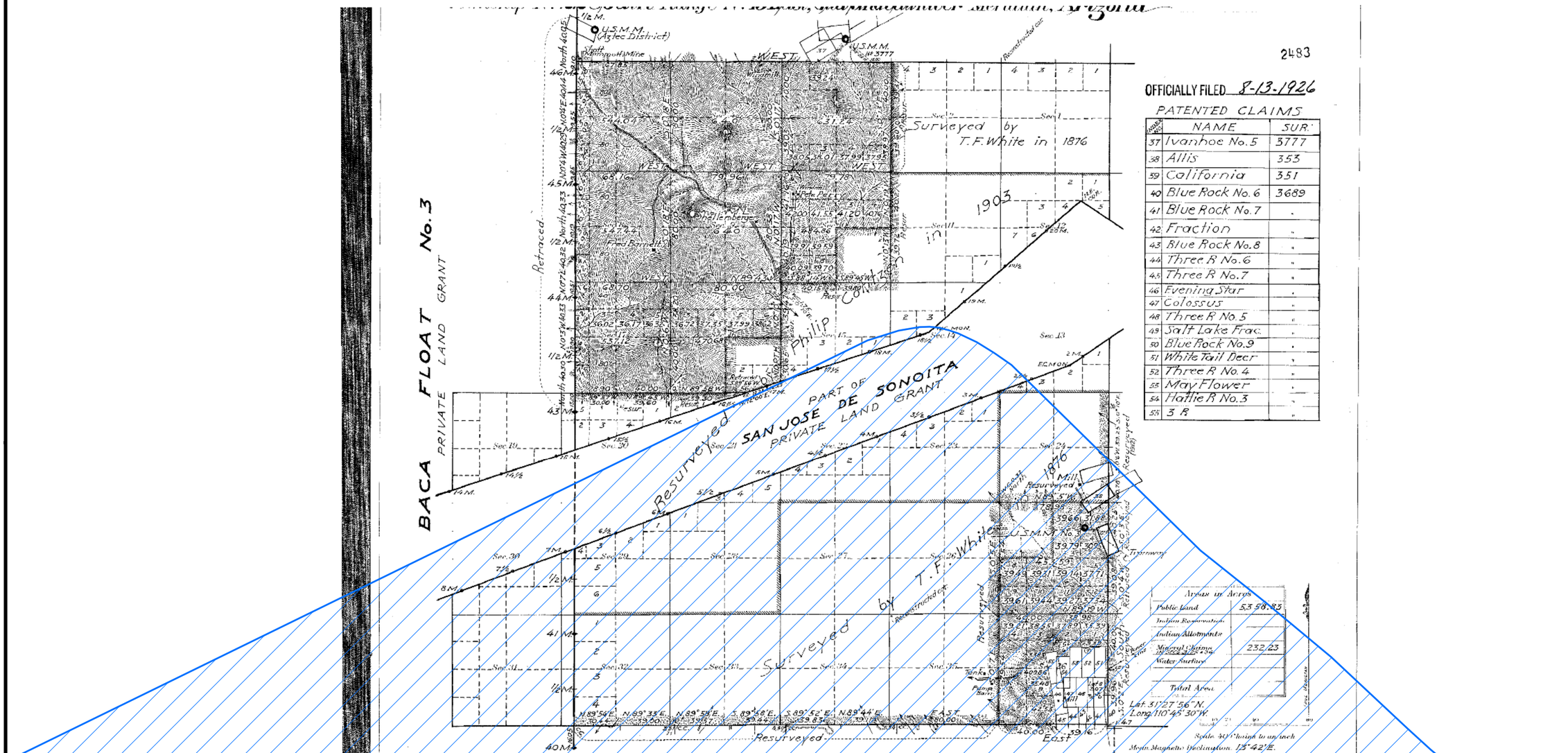
1976b *An Archaeological Survey of the Proposed San Rafael Brush Crush, Coronado National Forest, Arizona*. CNF Archaeological Clearance Report No. 1976-05-010. On file. Coronado National Forest Supervisor's Office, Tucson.

1976c *An Archaeological Survey of the Santa Cruz Water Developments, Coronado National Forest, Arizona*. CNF Archaeological Clearance Report No. 1976-05-003. On file. Coronado National Forest Supervisor's Office, Tucson.

1981 *A Cultural Resource Survey of the Proposed Buena Vista Mine Road Coronado National Forest, Arizona*. CNF Archaeological Clearance Investigation No. 1981-05-066. On file. Coronado National Forest Supervisor's Office, Tucson.

Wood, Donald G., and James D. Salyer

1978 *An Archaeological Survey of the Sierra Vista Ranger District Forest Road Flood Damage Repair Project*. Heritage Resource Report No. 1978–05-031. On file. Coronado National Forest Supervisor's Office, Tucson.



Santa Cruz County, Arizona
Projection: UTM NAD83, Zone 12
Data Source: General Land Office Plat of Township 22 South, Range 15 East, officially filed 1926

Legend

Study Area

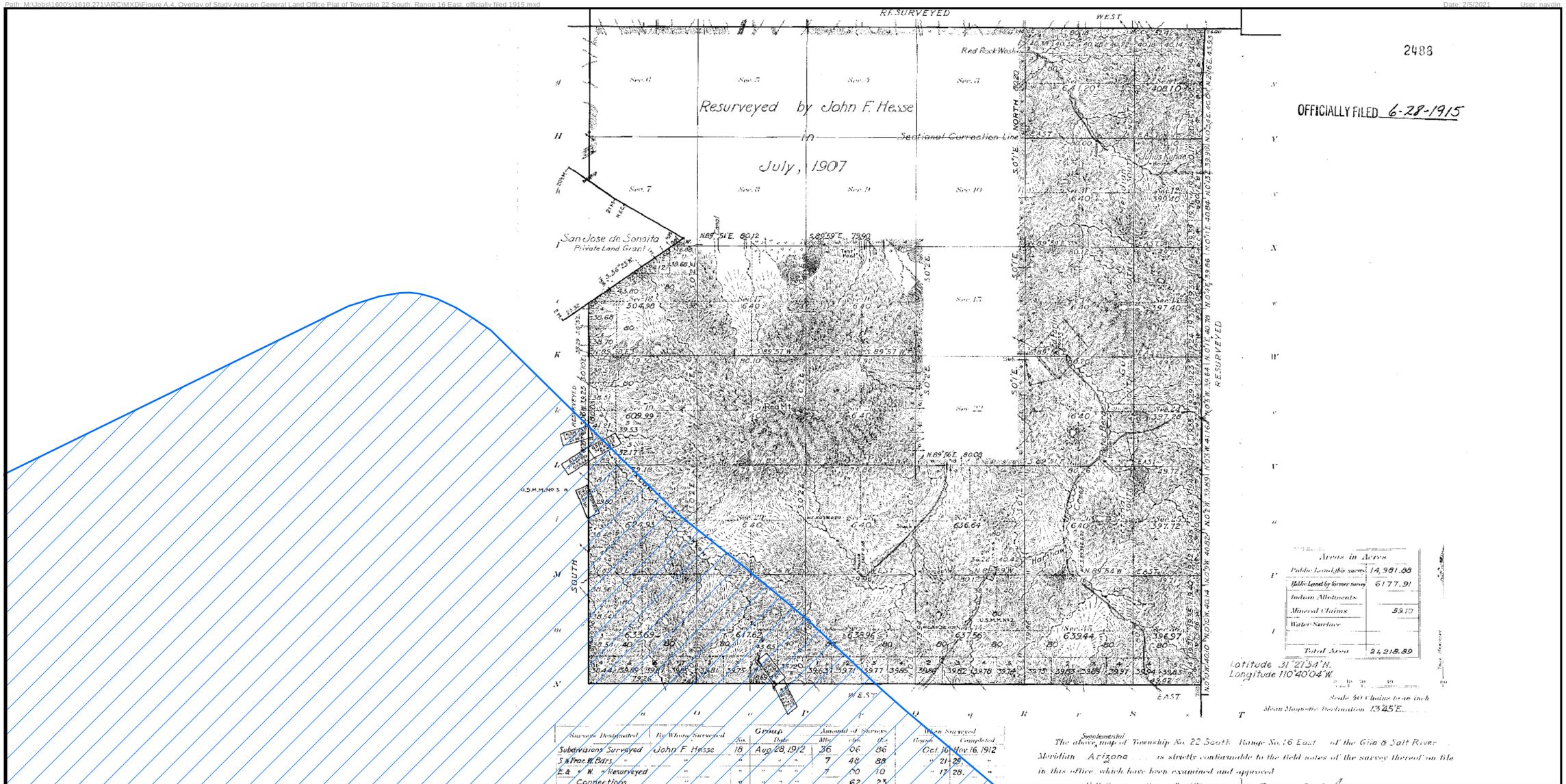
WestLand Resources

N

0 2,500 5,000 Feet

0 1,250 2,500 Meters

Figure A.3.. Overlay of Study Area on General Land Office Plat of Township 22 South, Range 15 East, officially filed 1926



Santa Cruz County, Arizona
Projection: UTM NAD83, Zone 12
Data Source: General Land Office Plat

Legend

Study Area

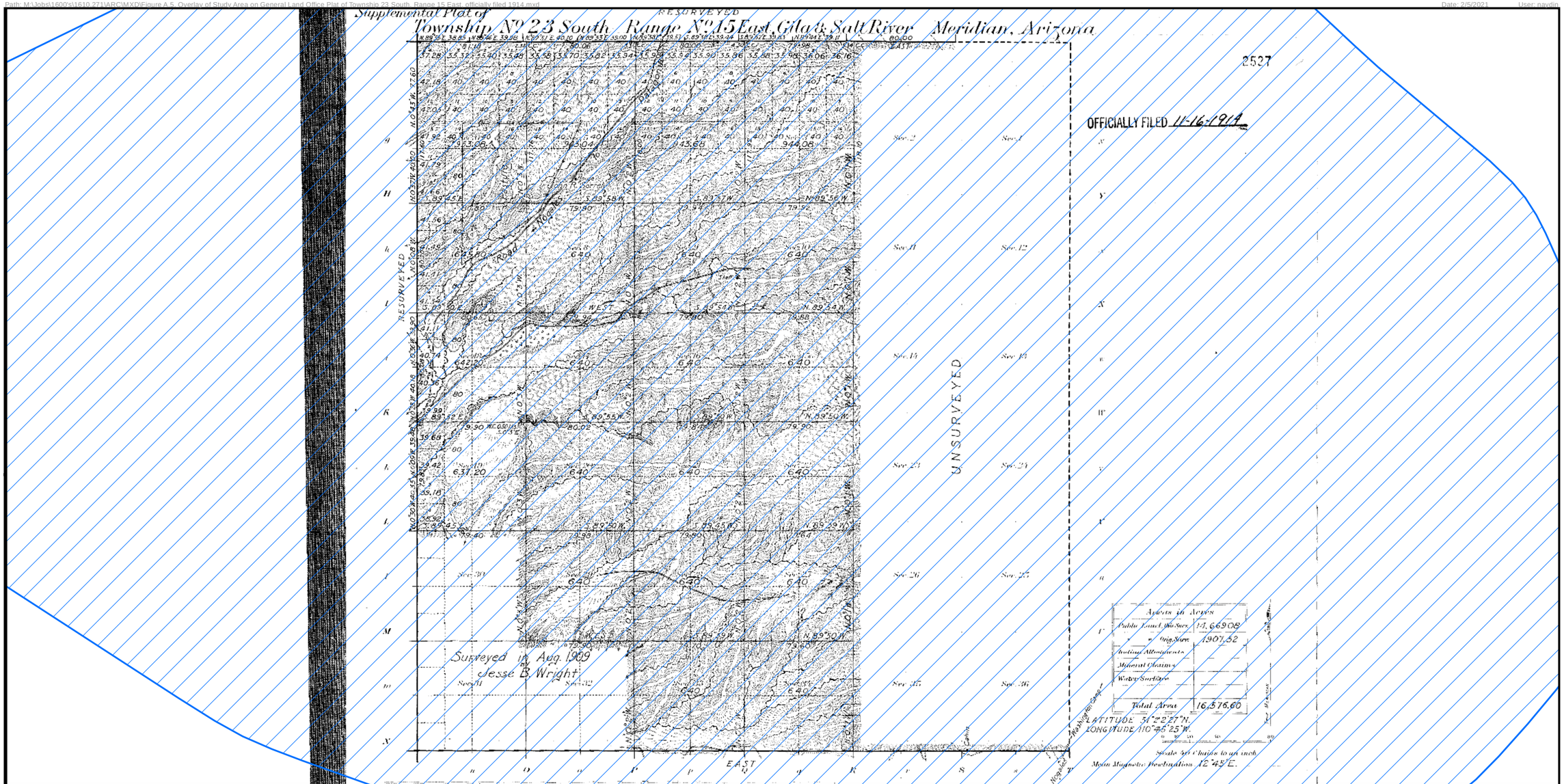
WestLand Resources

N

0 2,500 5,000 Feet

0 1,250 2,500 Meters

Figure A.4. Overlay of Study Area on General Land Office Plat of Township 22 South, Range 16 East, officially filed 1915



Santa Cruz County, Arizona
Projection: UTM NAD83, Zone 12
Data Source: General Land Office Plat

Legend

Study Area

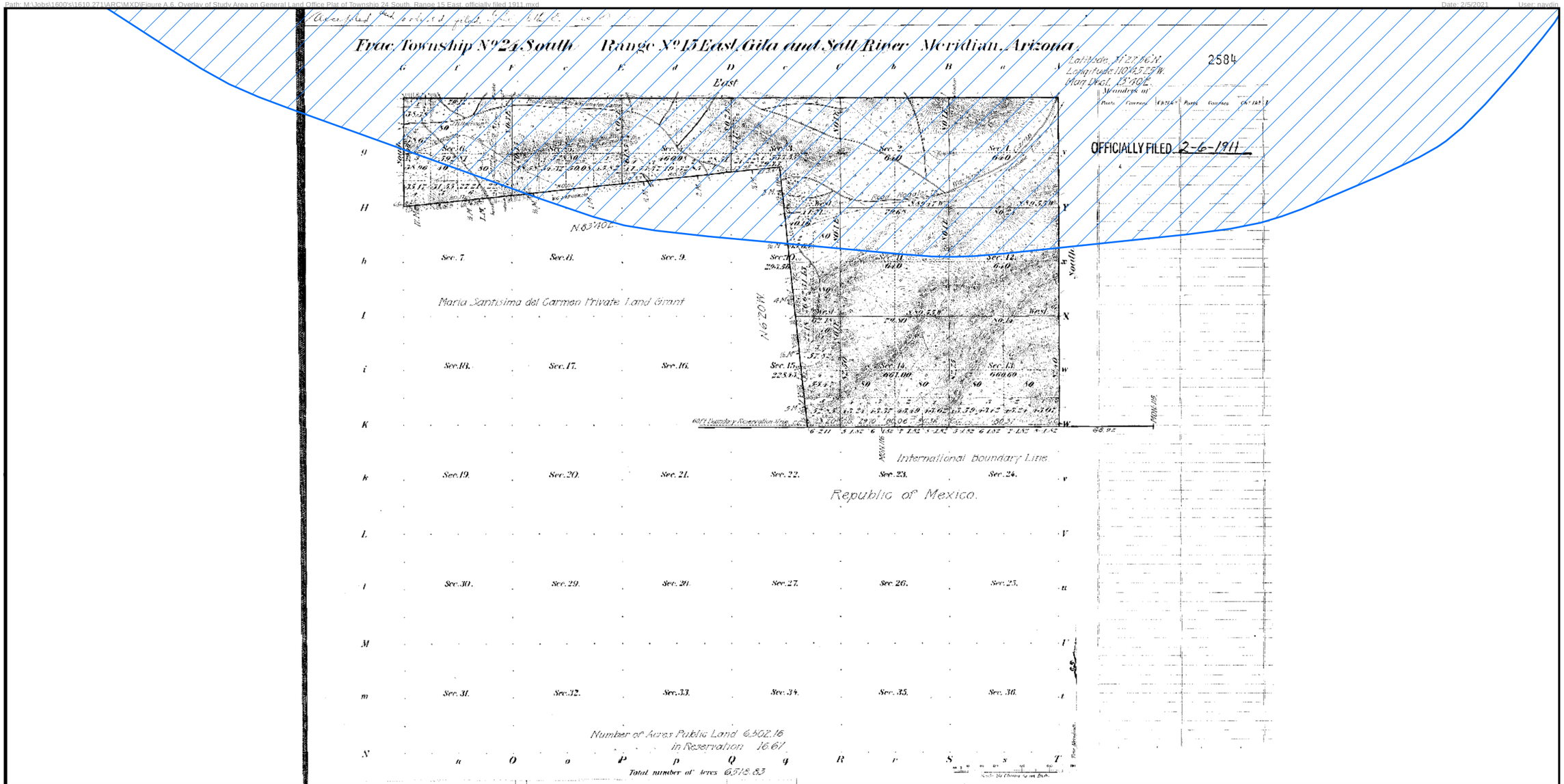
WestLand Resources

N

0 2,500 5,000 Feet

0 1,250 2,500 Meters

Figure A.5. Overlay of Study Area on General Land Office Plat of Township 23 South, Range 15 East, officially filed 1914



Santa Cruz County, Arizona
Projection: UTM NAD83, Zone 12
Data Source: General Land Office Plat

Legend

Study Area

WestLand Resources

N

0 2,500 5,000 Feet

0 1,250 2,500 Meters

Figure A.6. Overlay of Study Area on General Land Office plat of Township 24 South, Range 15 East, officially filed 1911

This page intentionally left blank

EXHIBIT F

This page intentionally left blank

EXHIBIT F: RECREATIONAL PURPOSES AND ASPECTS

As stated in Arizona Administrative Code R14-3-219 of the Rules of Practice and Procedure Before Power Plant and Transmission Line Siting Committee, Exhibits to Application, Exhibit F:

State the extent, if any, the proposed site or route will be available to the public for recreational purposes, consistent with safety considerations and regulations and attach any plans the applicant may have concerning the development of the recreational aspects of the proposed site or route.

F.1 Introduction F-1
F.2 Affected Environment F-1
F.3 Potential Effects F-3
F.4 Conclusion F-4

F.1 Introduction

The Project will consist of building a new 138 kV transmission line approximately 20 miles in length, depending on the alternative approved, to connect the planned Rio Rico Switchyard to the planned Harshaw Substation. The Project will interconnect the existing 138 kV transmission line to the planned Substation. The Project will cross private and USFS owned land, as well as Santa Cruz County Road and ADOT ROW. One preferred route alternative has been identified, resulting from line siting studies, analysis, and a public participation process that began in 2020, with three 1.5- to 2.5-mile alternative routing options in areas of elevated community sensitivity. The proposed alternative routes are identified as Preferred Route 1, and Alternative Routes 1A, 1B, and 1C, and are described in Section B.1-4 of the application. The new line will be built of self-weathering steel monopoles ranging from 60 to 120 feet above ground, with the taller structures required for site specific clearance issues.

The following analysis describes recreational settings and features, and potential impacts to them from the Project, within the Study Area, defined as 1 mile from the route alternatives. The entire Study Area is within Santa Cruz County.

F.2 Affected Environment

Recreational opportunities in the Recreation Study Area are primarily associated with trailheads and natural areas located within the Study Area or the vicinity. These facilities include two missions that are part of the Tumacacori National Historic Park, and local trails/paths (Table 11, Exhibit F-1). Recreational opportunities within the CNF are not associated with any formal facilities.

Although these facilities are located in proximity to the alternative routes, the Project is not anticipated to preclude recreational uses or public enjoyment because the location of the facilities would not result in closure of any recreational facilities.

Table 11. Recreation Facilities within the Study Area

Recreation Facility	Jurisdiction	Location	Adjacent to Alternative Route
Calabazas Mission	National Park Service	Between I-19 and Pendleton Dr; north of project	Route 1
Calabasas Park	Santa Cruz County	Between S River Rd and Pendleton Dr; west of project alignment	Route 1
Coronado National Forest	US Forest Service	Eastern portion of project	Route 1 Alt Route 1C
Pendleton Path	Santa Cruz County	Along Pendleton Dr and Avenida Coatimundi	Route 1

Calabazas Mission

Mission San Cayetano de Calabazas, also known as Calabasas, is a Spanish Mission in the Sonoran Desert, located near present-day Rio Rico, Arizona. The Mission was opened in 1756 and named for the Italian Saint Cajetan. Reservations are required to visit the mission, and a ranger provides an interpretive walking tour. The mission is located over 700 feet to the north of the Project alignment. With the exception of a distant view of the transmission line to the south, there are no impacts anticipated to the mission. See Section E.2 and Exhibit G-4 for more information on the visual analysis.

Calabasas Park

The 63-acre Calabasas Park, of which 25 acres are accessible, is in east Rio Rico, several miles east of I-19 and on the east bank of the Santa Cruz River, where the flow helps provide needed water for the trees that flourish there. There are two large playground structures for children, a basketball court and restrooms. The park is located on the west side of Pendleton Drive, where the Project alignment turns east. The Project will not enter the park, though may cross over the entrance driveway. Access to the park will not be reduced during construction or maintenance activities.

Coronado National Forest

The Coronado National Forest's 15 Sky Island mountain ranges offer vast scenery, diverse vegetation, from deserts to conifer forests, and a wide variety of amenities including bicycling, camping & cabins, fishing, hiking, birdwatching, OHV riding & camping, caving, target shooting, interpretive areas, visitors centers, picnicking, scenic driving, and water activities. The eastern portion of the Project is located within the CNF. UNSE is obtaining a Special Use Permit from the USFS for construction of the line within the CNF. Construction and Operation and Maintenance of the Project will not impact recreation activities or access to the relevant areas of the CNF.

Pendleton Path

The Pendleton Path is a paved walkway from Rio Rico Drive, along South Pendleton to Avenida Coatimundi, and a dirt path to Paseo Mexico. There is landscaping around the seat walls, places where people can sit, and trees planted in that area and along Pendleton Drive. Residents and families can enjoy a walk or ride bikes along the path. The Pendleton Path currently terminates within the Study Area approximately one mile north of where the transmission line would be located along Pendleton Drive. Construction and Operation and Maintenance of the Project will not impact use of this path.

F.3 Potential Effects

Construction

Construction activities could create minor impacts to recreational area users in locations where the transmission line intersects those areas. However, of these four recreation sites located within the Study Area, only the CNF will be intersected by the Project alignment as currently proposed.

Project construction would not permanently impact the use of any existing recreation opportunities or activities.

Short-term impacts to access to these resources could occur during the construction phases of the Project. Dispersed recreation activities such as walking, biking, and bird watching could be temporarily affected by construction noises, visual disturbances, and/or the presence of equipment and construction personnel in the area. Temporary, short-term closure of a lane of traffic and/or road shoulders or sidewalks may be required for safety during construction. Detours or alternate routes would be established as necessary to maintain access for public use and recreation.

Overall, impacts to recreation areas and users during construction would be negligible since the activities would be short-term in nature, removed from the recreation facilities, and access would be maintained.

Potential indirect impacts from construction to the natural, historic, cultural, or visual character of parks and recreation areas are discussed in Exhibits B, C, D, E, and G.

Much of the project will be located on private land and UNSE will obtain easements for the construction and operation of the transmission line. Currently, UNSE does not have any plans to make the ROW available to the public for recreational purposes. While UNSE would not be opposed to compatible recreational development within the ROW, this is not proposed as part of this project and agreements with landowners would need to be secured prior to pursing this type of a development.

Operation and Maintenance

Operation and maintenance activities are short-term and temporary in duration, and occur infrequently. Closures to areas required for maintenance would be short-term and temporary while the activity is conducted. Recreation opportunities and activities can continue as before construction, with only infrequent minor impacts during operation and maintenance tasks, such as noise or traffic detours.

F.4 Conclusion

The alternative routes for the Project are informed by UNSE's design principle to first use established infrastructure corridors that meet the Project objectives. This approach locates routes within public road ROW or within existing linear corridors to the greatest extent practicable and maintains public use consistent with existing use. This strategic approach minimizes impacts to recreational facilities and parks and maintains or improves public use and recreation along existing ROWs.

During and following construction, all existing recreation facilities will remain available. Where the Project crosses existing roads, permanent access to and along these features for recreation use will not be affected.

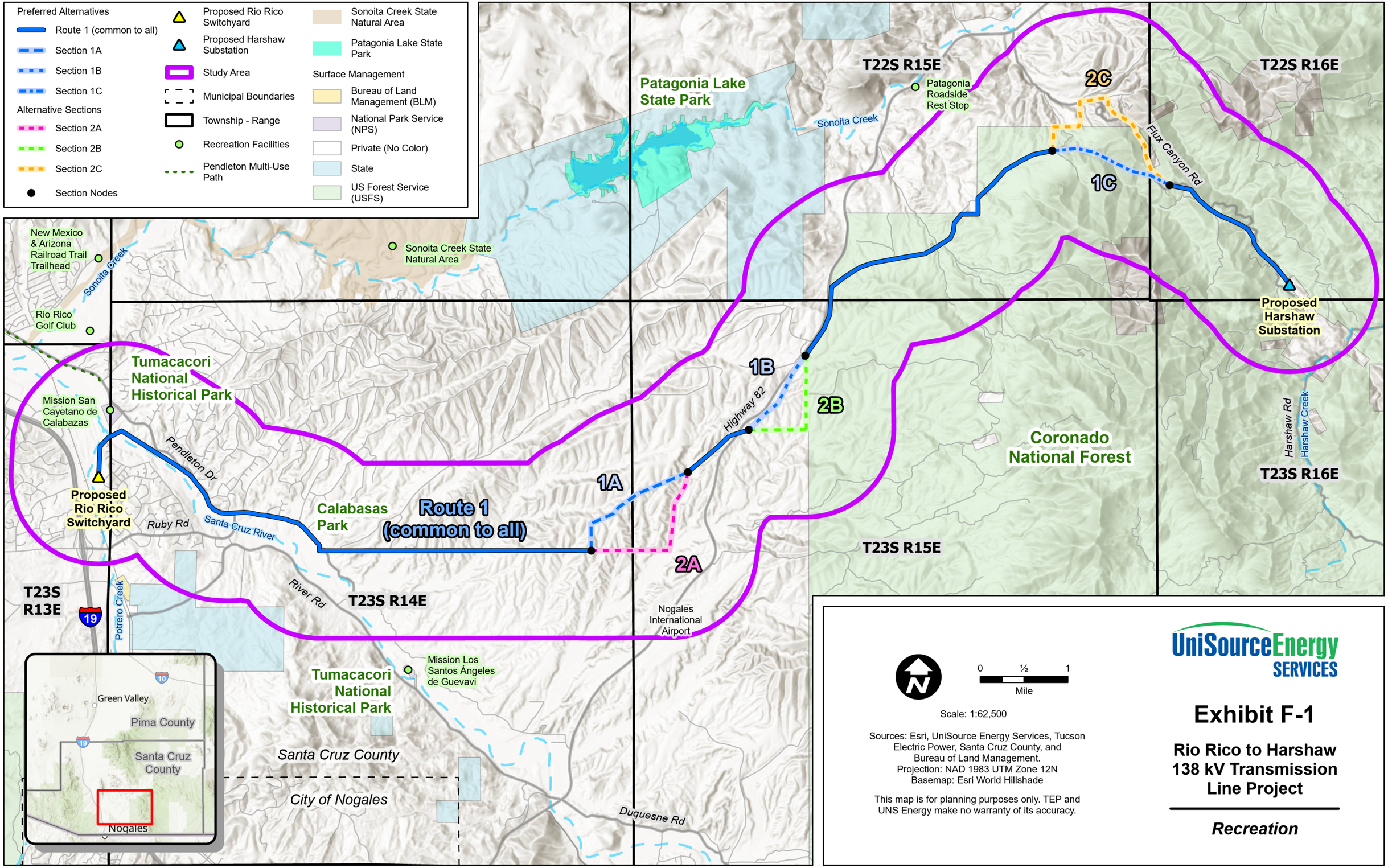
Application for a Certificate of Environmental Compatibility

Rio Rico to Harshaw

138 Kilovolt Transmission Line Project

Exhibit F-1

This page intentionally left blank


Preferred Alternatives
Route 1 (common to all)
Section 1A
Section 1B
Section 1C
Alternative Sections
Section 2A
Section 2B
Section 2C
Section Nodes
Proposed Rio Rico Switchyard
Proposed Harshaw Substation
Study Area
Municipal Boundaries
Township - Range
Recreation Facilities
Pendleton Multi-Use Path
Sonoita Creek State Natural Area
Patagonia Lake State Park
Surface Management
Bureau of Land Management (BLM)
National Park Service (NPS)
Private (No Color)
State
US Forest Service (USFS)
Patagonia Lake State Park
T22S R15E
Patagonia Roadside Rest Stop
Sonoita Creek
2C
T22S R16E
Flux Canyon Rd
1C
Proposed Harshaw Substation
New Mexico & Arizona Railroad Trail Trailhead
Sonoita Creek
Sonoita Creek State Natural Area
Rio Rico Golf Club
Tumacacori National Historical Park
Mission San Cayetano de Calabazas
1B
Highway 82
2B
Coronado National Forest
Harshaw Rd
Harshaw Creek
T23S R16E
Pendleton Dr
1A
Proposed Rio Rico Switchyard
Ruby Rd
Santa Cruz River
Calabasas Park
Route 1 (common to all)
T23S R15E
2A
T23S R13E
19
Potrero Creek
River Rd
T23S R14E
Nogales International Airport
Mission Los Santos Ángeles de Guevavi
Tumacacori National Historical Park
Green Valley
Pima County
Santa Cruz County
Nogales
Santa Cruz County
City of Nogales
Duquesne Rd
0
½
1
Mile
Scale: 1:62,500
Sources: Esri, UniSource Energy Services, Tucson Electric Power, Santa Cruz County, and Bureau of Land Management.
Projection: NAD 1983 UTM Zone 12N
Basemap: Esri World Hillshade
This map is for planning purposes only. TEP and UNS Energy make no warranty of its accuracy.
UniSourceEnergy SERVICES
Exhibit F-1
Rio Rico to Harshaw 138 kV Transmission Line Project
Recreation

2/10/2023

This page intentionally left blank

EXHIBIT G

This page intentionally left blank

EXHIBIT G: **CONCEPTS OF PROPOSED FACILITIES**

As stated in Arizona Administrative Code R14-3-219 of the Rules of Practice and Procedure Before Power Plant and Transmission Line Siting Committee, Exhibits to Application, Exhibit G:

Attach any artist's or architect's conception of the proposed plant or transmission line structures and switchyards, which applicant believes may be informative to the Committee.

EXHIBIT	CONTENTS
G-1	Single Circuit 138 kV Tangent Typical Configuration
G-2	Single Circuit 138 kV Turning Typical Configuration
G-3.1	Switchyard General Arrangement
G-3.2	Switchyard Site Arrangement
G-3.3	Switchyard Elevations
G-4	Visual Simulations

This page intentionally left blank

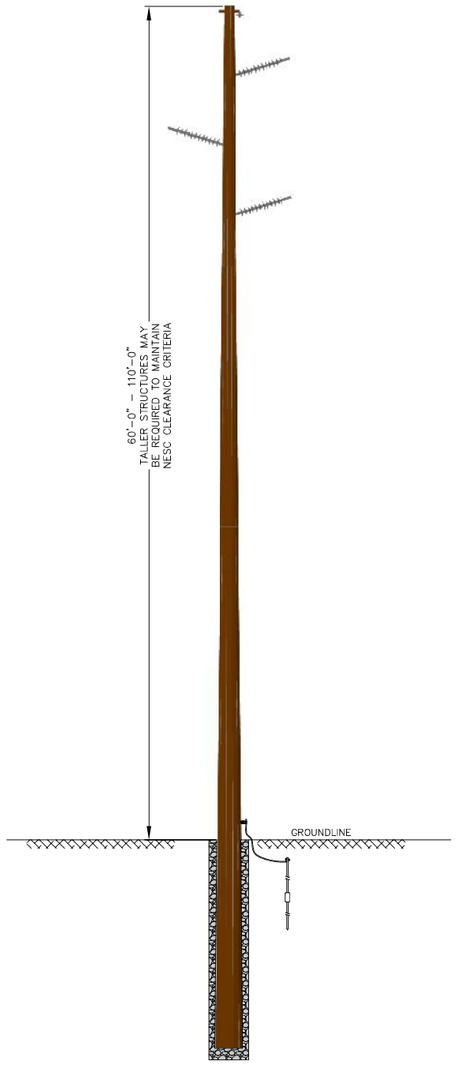
Application for a Certificate of Environmental Compatibility

Rio Rico to Harshaw

138 Kilovolt Transmission Line Project

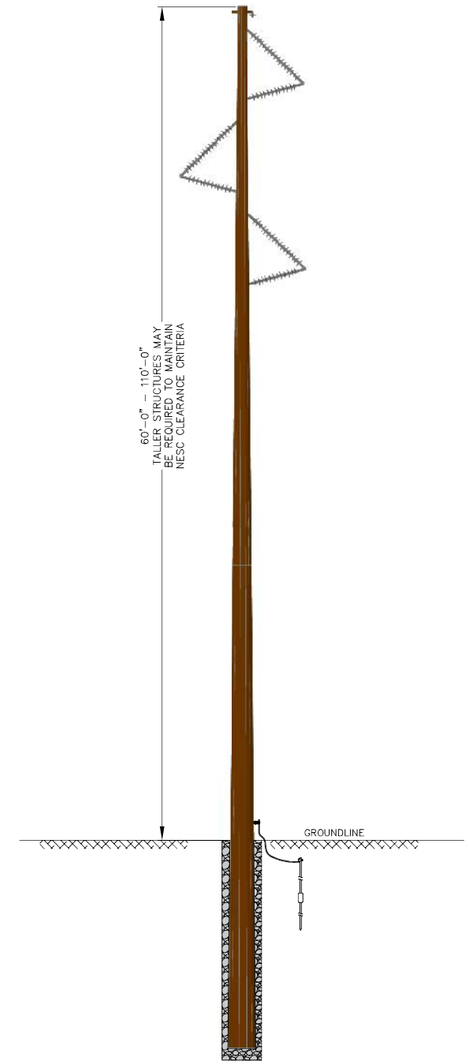
Exhibit G-1

This page intentionally left blank



0–3 DEG.
DELTA POST
TANGENT

0–3 DEG.
VERTICAL POST
TANGENT



0–3 DEG.
DELTA BRACED
POST TANGENT

EXHIBIT RR–1

SINGLE CIRCUIT 138 KV TANGENT CONFIGURATIONS

This page intentionally left blank

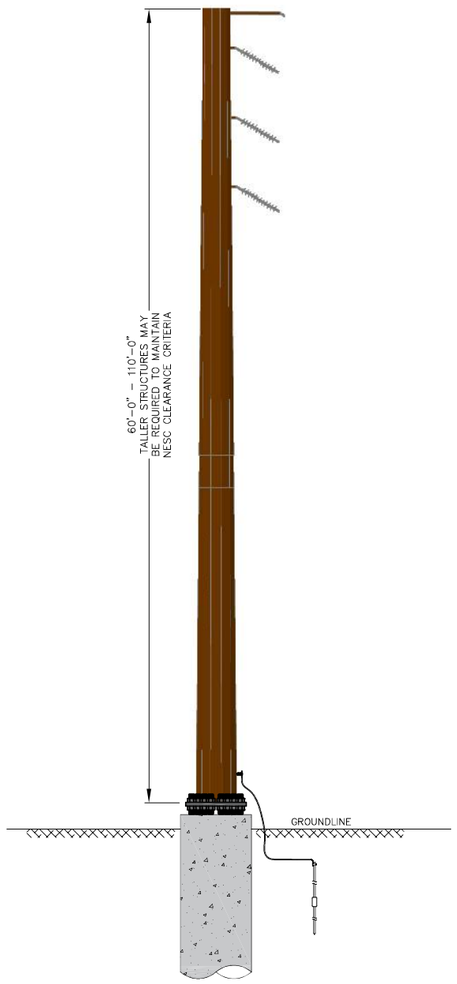
Application for a Certificate of Environmental Compatibility

Rio Rico to Harshaw

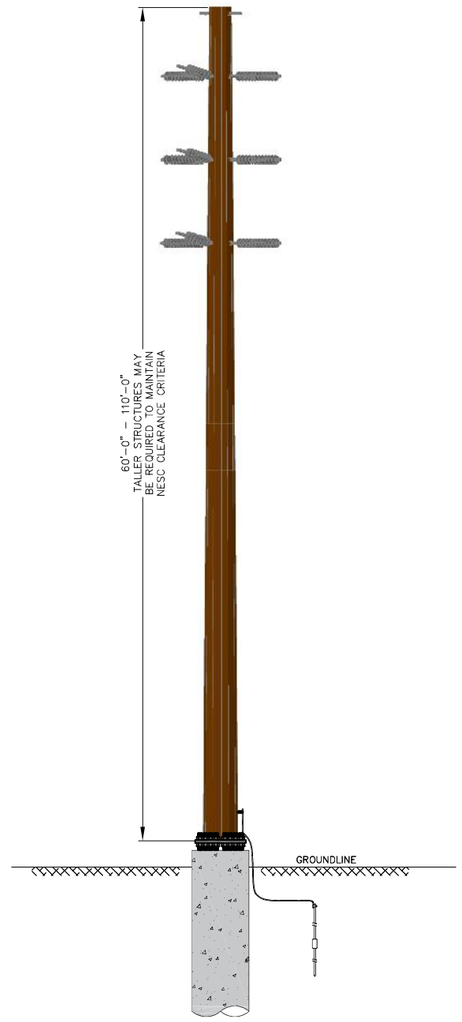
138 Kilovolt Transmission Line Project

Exhibit G-2

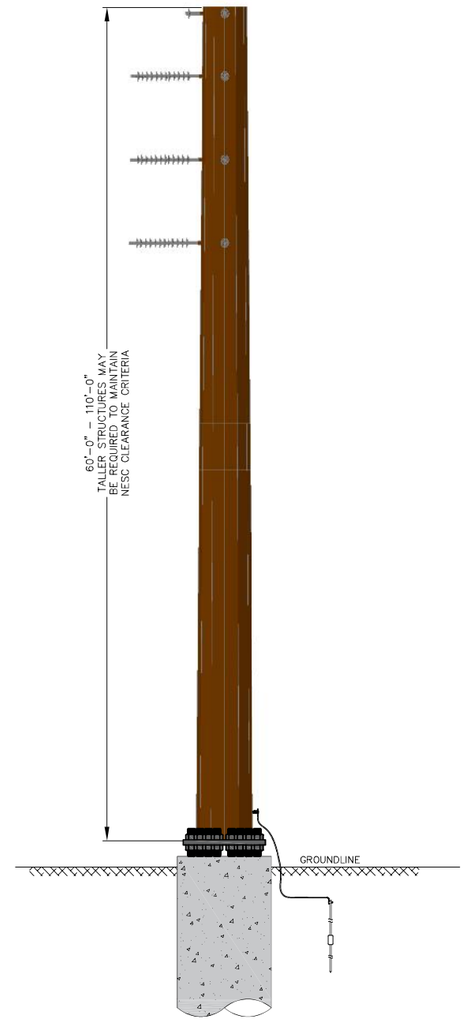
This page intentionally left blank



10–40 DEG.
RUNNING
ANGLE



0–60 DEG.
DEADEND



60–90 DEG.
DEADEND

EXHIBIT RR–2

SINGLE CIRCUIT 138 KV TURNING CONFIGURATIONS

This page intentionally left blank

Application for a Certificate of Environmental Compatibility

Rio Rico to Harshaw

138 Kilovolt Transmission Line Project

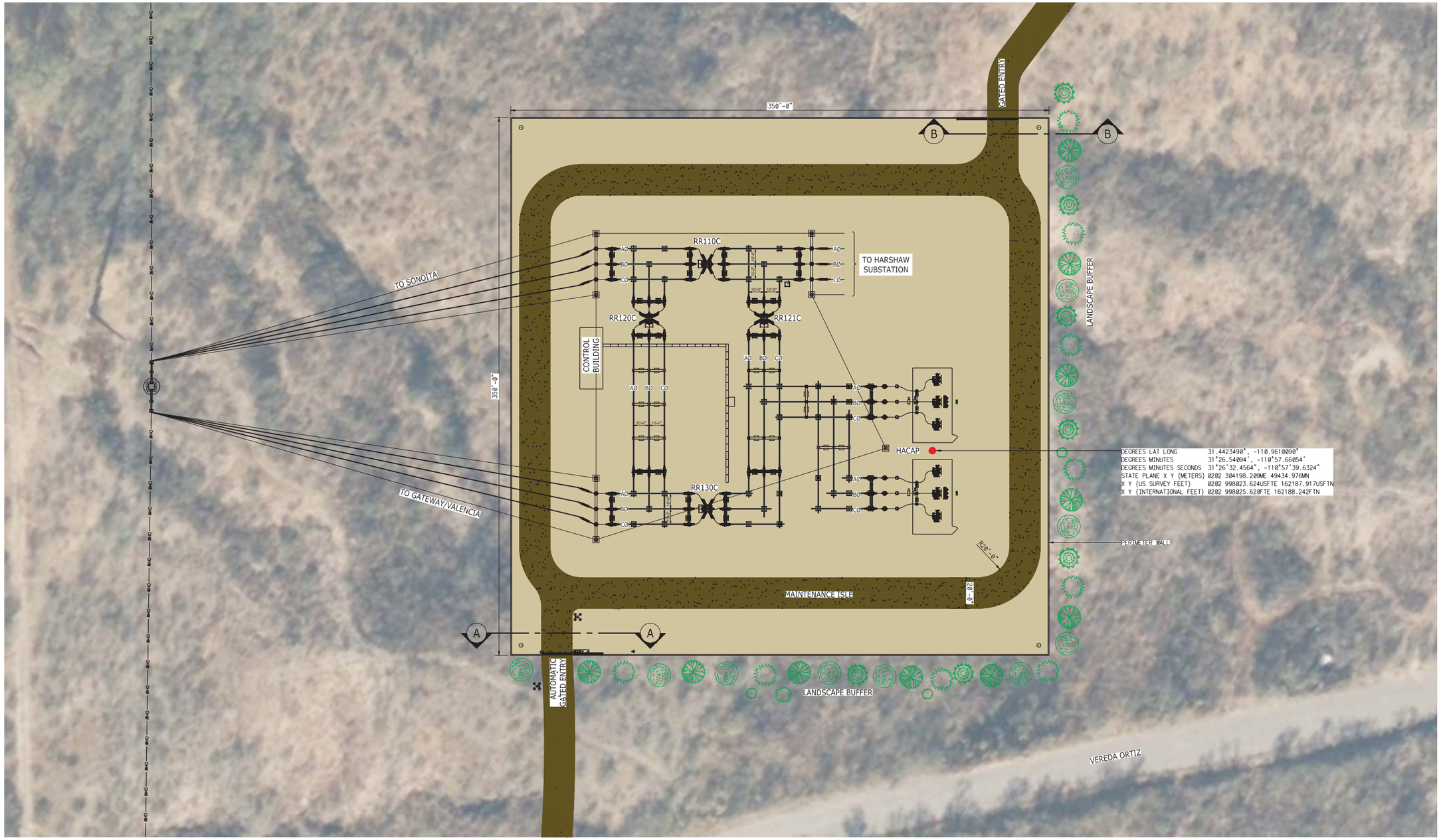
Exhibit G-3

This page intentionally left blank

REVISIONS

NORTH

SCALE: 1" = 30'-0"



AUTOCADD

UniSourceEnergy Services

UniSource Energy Services

TITLE: EQUIPMENT LAYOUT PLAN
GENERAL ARRANGEMENT - 138kV
RIO RICO 138KV SUBSTATION

NOT FOR CONSTRUCTION

Sargent & Lundy
55 EAST MONROE ST., CHICAGO, IL.

ANY MODIFICATION OR ADDITION TO THIS DRAWING BY ANY ORGANIZATION OTHER THAN SARGENT & LUNDY IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY

PROJ. No. 12974-XYZ

TRSQ

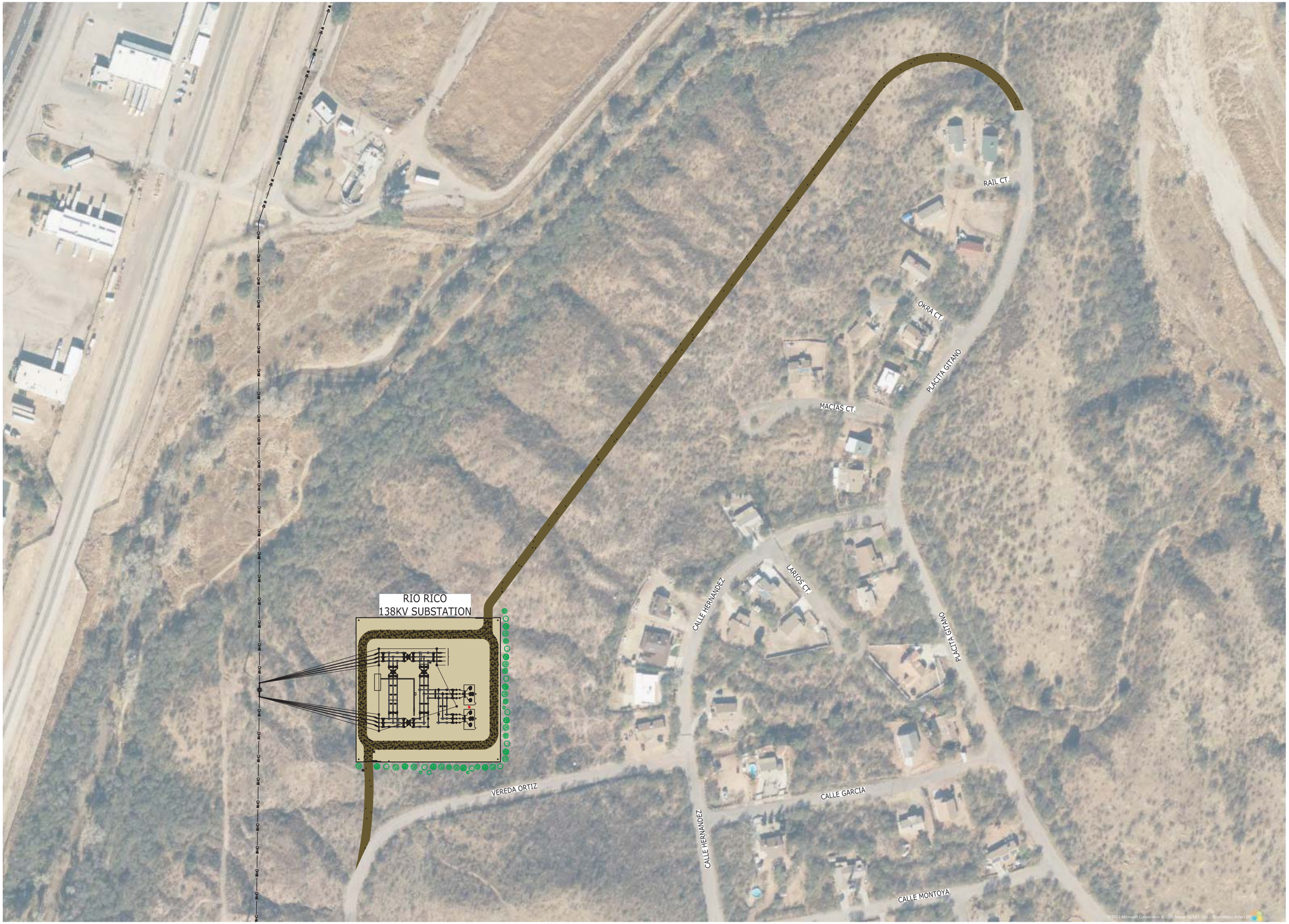
REF # N/A

DWG # 0XXX-138-01-0001

REV 00 SHEET CVR

2/1/2023 4:08:05 PM, 30% REVIEW

This page intentionally left blank



REVISIONS

AUTOCADD

ANY MODIFICATION OR ADDITION TO THIS DRAWING BY ANY ORGANIZATION OTHER THAN SARGENT & LUNDY IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY

PROJ. No. 12974-XYZ

Sargent & Lundy

55 EAST MONROE ST., CHICAGO, IL

UniSource Energy Services

UniSourceEnergy Services

TITLE: EQUIPMENT LAYOUT PLAN
SITE ARRANGEMENT - 138kV
RIO RICO 138KV SUBSTATION

NOT FOR CONSTRUCTION

TRSQ

REF # N/A

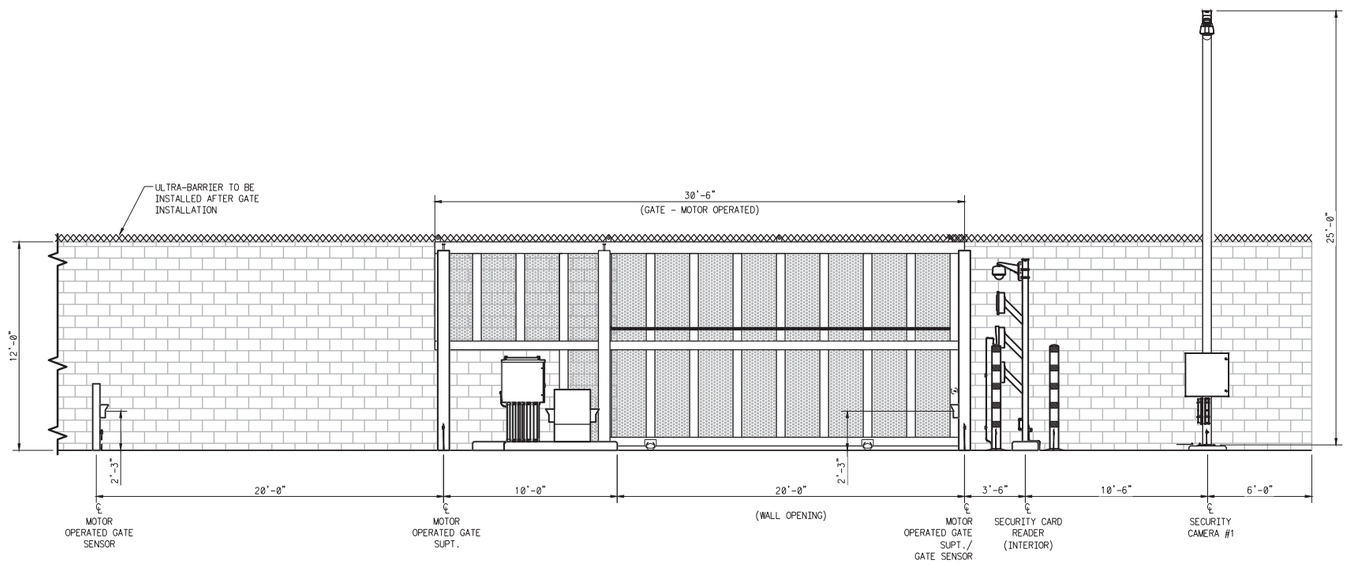
DWG # 0XXX-138-01-0002

REV 00

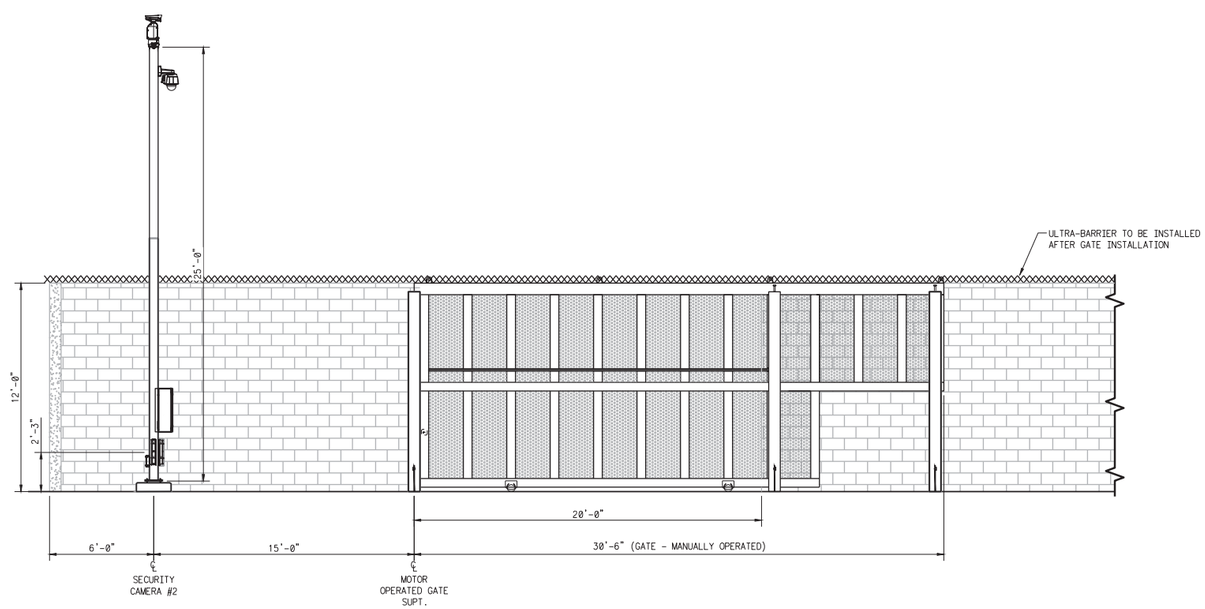
SHEET CVR

2/1/2023 4:08:11 PM, 30% REVIEW

This page intentionally left blank



A SECTION
SCALE: 1/4" = 1'-0"



B SECTION
SCALE: 1/4" = 1'-0"

NOT FOR CONSTRUCTION

Sargent & Lundy
55 EAST MONROE ST., CHICAGO, IL.

ANY MODIFICATION OR ADDITION TO THIS DRAWING BY ANY ORGANIZATION OTHER THAN SARGENT & LUNDY IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY

PROJ. No. 12974-XYZ

REVISIONS

AUTOCADD

UniSource Energy Services

TITLE: EQUIPMENT ELEVATIONS
SECTIONS A & B
RIO RICO 138KV SUBSTATION

TRSQ

REF # N/A

DWG # 0XXX-138-02-0001

REV. 00 SHEET CVR

This page intentionally left blank

Application for a Certificate of Environmental Compatibility

Rio Rico to Harshaw

138 Kilovolt Transmission Line Project

Exhibit G-4

This page intentionally left blank

Rio Rico to Harshaw 138kV Project
Visual Resource Exhibit

Visual Simulations

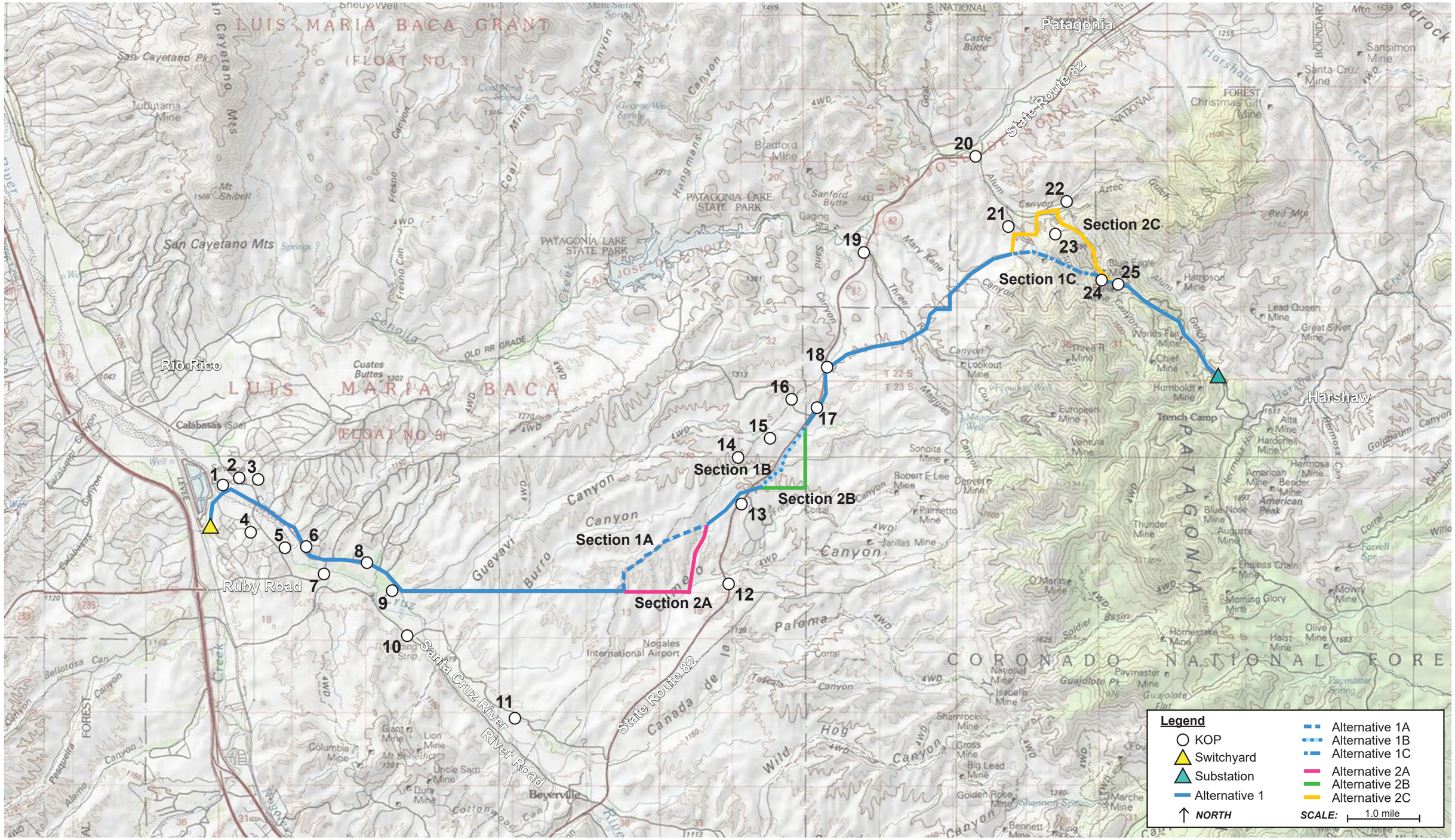
Prepared By:
Jeremy Palmer | Sole Proprietor

January 24th, 2023

This page intentionally left blank

Rio Rico to Harshaw 138kV Transmission Line Project

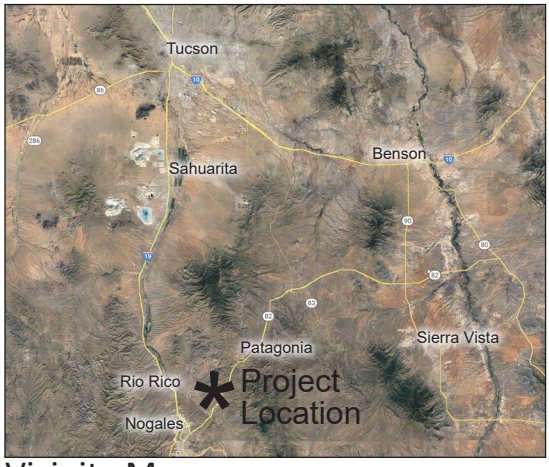
Key Observation Point - Project Map



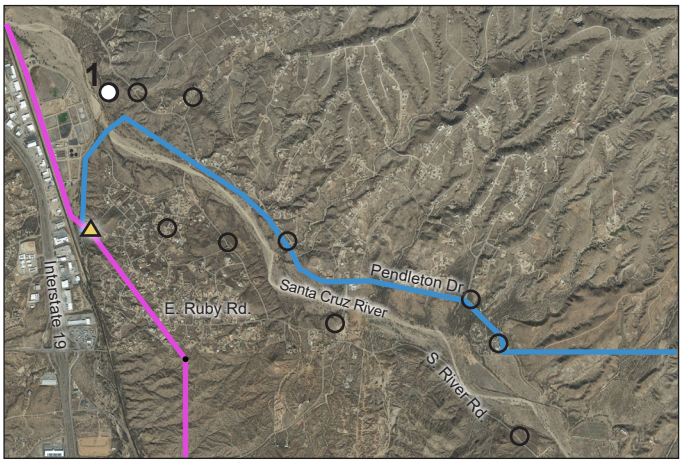
Key Observation Points - (KOPs)

This page intentionally left blank

Key Observation Point (KOP) # 1



Vicinity Map



Project Map Enlargement

Notes:

Camera Information

- Type: Canon EOS RP
- Sensor: CMOS (Full-Frame) 35.9mm x 24mm
- Lens: Canon RF 24-105mm f/4-7.1 IS STM
- Focal Length: 24mm | F-Stop: f/9 | ISO:100
- Dimensions in pixel: 6240 x 4160

KOP

- Representative View for: visitors to National Historic Site
- Location: Mission San Cayentano de Calabasas
- Latitude: 31.452623° N; Longitude: 110.959677° W
- View Point Elevation at Eye Level: 3,505 ft.
- Looking: south southeast
- Poles Visible: Steel Monopoles
- Image File Name: IMG_1841.JPG

Simulation Notes

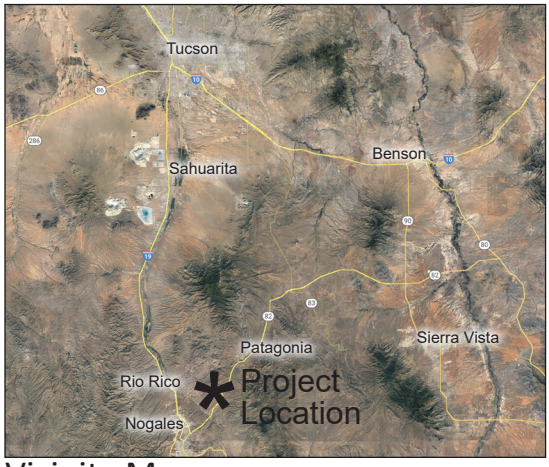
- Photo Taken: November 7, 2022 at 12:52 am
- The image is based on a single photo and represent approximately 73.7 degree horizontal field of view.
- This view is approximately 1,249 feet north northwest of the nearest pole represented in the simulation.
- The simulation is based on the best information available and is preliminary. Final alignment and structure locations are subject to change based on final engineering and other factors.

Key Observation Point (KOP) #1

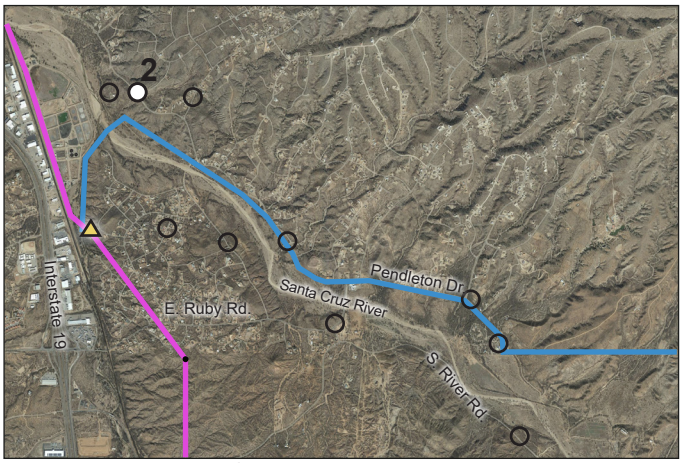
Existing Condition

Simulated Condition

Key Observation Point (KOP) # 2



Vicinity Map



Project Map Enlargement

Notes:

Camera Information

- Type: Canon EOS RP
- Sensor: CMOS (Full-Frame) 35.9mm x 24mm
- Lens: Canon RF 24-105mm f/4-7.1 IS STM
- Focal Length: 50mm | F-Stop: f/9 | ISO:100
- Dimensions in pixel: 6240 x 4160

KOP

- Representative View for: residents, recreational user
- Location: 1033 Pendleton Dr.
- Latitude: 31.451847° N; Longitude: 110.956278° W
- View Point Elevation at Eye Level: 3,533 ft.
- Looking: south southwest
- Poles Visible: Steel Monopoles, Transmission Line
- Image File Name: IMG_1280.JPG

Simulation Notes

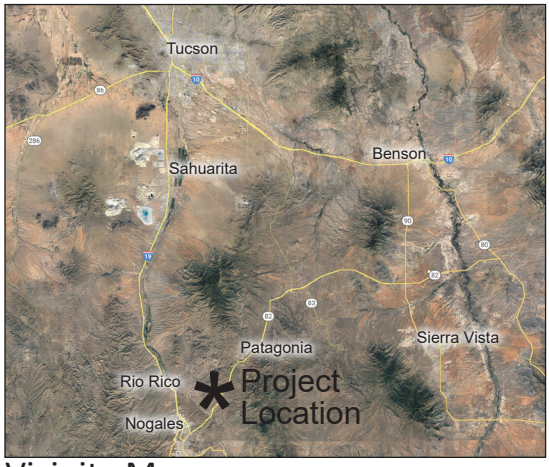
- Photo Taken: August 12th, 2022 at 11:26 am
- The image is based on a single photo and represent approximately 39.5 degree horizontal field of view.
- This view is approximately 781 feet north northeast of the nearest pole represented in the simulation.
- The simulation is based on the best information available and is preliminary. Final alignment and structure locations are subject to change based on final engineering and other factors.

Key Observation Point (KOP) #2

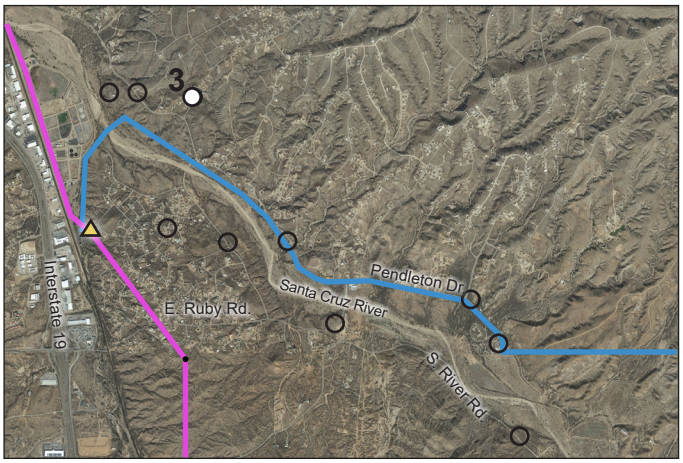
Existing Condition

Simulated Condition

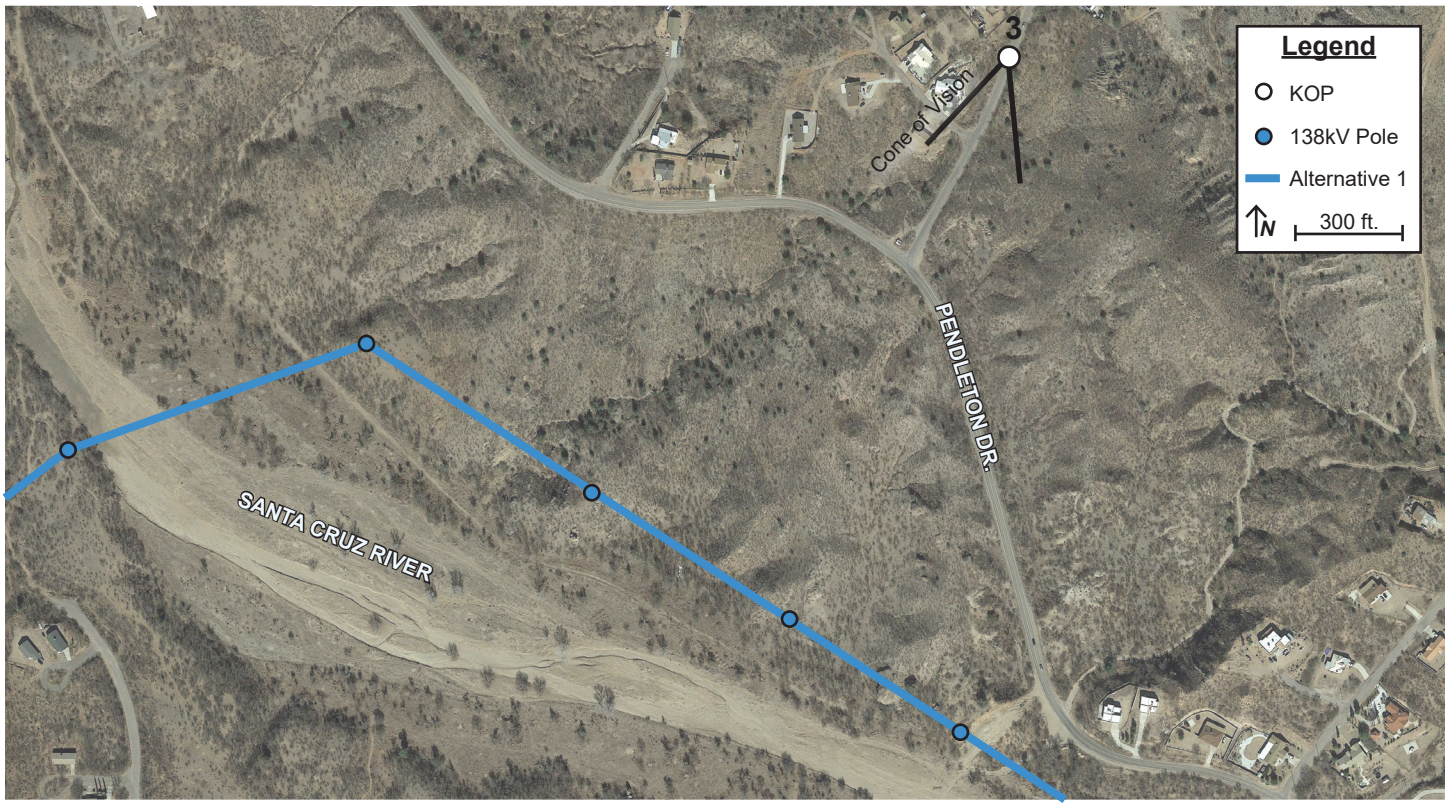
Key Observation Point (KOP) # 3



Vicinity Map



Project Map Enlargement



Notes:

Camera Information

- Type: Canon EOS RP
- Sensor: CMOS (Full-Frame) 35.9mm x 24mm
- Lens: Canon RF 24-105mm f/4-7.1 IS STM
- Focal Length: 50mm | F-Stop: f/10 | ISO:100
- Dimensions in pixel: 6240 x 4160

KOP

- Representative View for: residents
- Location: 130 Camino San Xavier
- Latitude: 31.453630° N; Longitude: 110.958166° W
- View Point Elevation at Eye Level: 3,573 ft.
- Looking: southwest
- Poles Visible: Structures
- Image File Name: IMG_1258.JPG

Simulation Notes

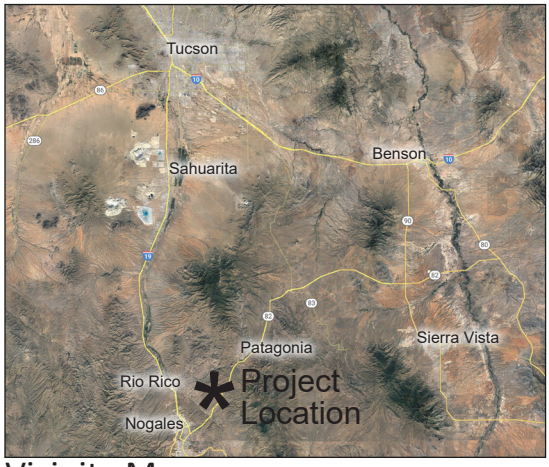
- Photo Taken: August 12, 2022, 11:18 AM
- The image is based on a single photo and represent approximately 39.5 degree horizontal field of view.
- This view is approximately 849 feet northeast of the nearest pole represented in the simulation.
- The simulation is based on the best information available and is preliminary. Final alignment and structure locations are subject to change based on final engineering and other factors.

Key Observation Point (KOP) #3

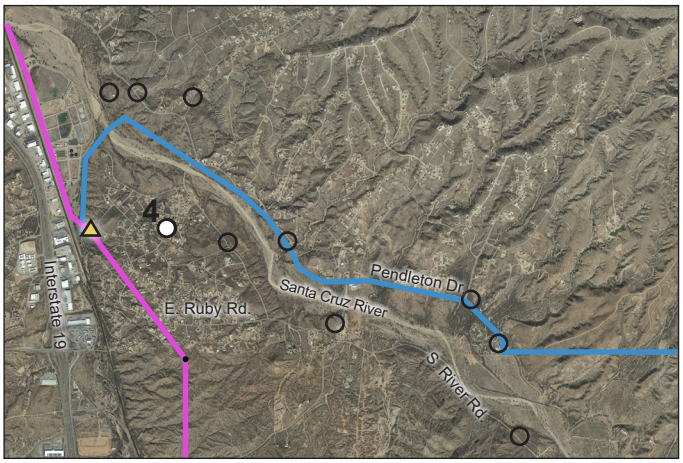
Existing Condition

Simulated Condition

Key Observation Point (KOP) # 4



Vicinity Map



Project Map Enlargement

Notes:

Camera Information

- Type: Canon EOS RP
- Sensor: CMOS (Full-Frame) 35.9mm x 24mm
- Lens: Canon RF 24-105mm f/4-7.1 IS STM
- Focal Length: 50mm | F-Stop: f/8 | ISO:250
- Dimensions in pixel: 6240 x 4160

KOP

- Representative View for: residents
- Location: 111 Calle Quitana
- Latitude: 31.440483° N; Longitude: 110.954115° W
- View Point Elevation at Eye Level: 3,558 ft.
- Looking: north northeast
- Poles Visible: Structures
- Image File Name: IMG_1047.JPG

Simulation Notes

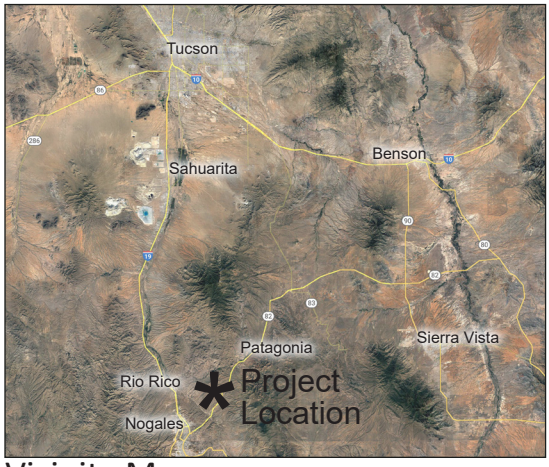
- Photo Taken: August 12, 2022, 9:50 AM
- The image is based on a single photo and represent approximately 39.5 degree horizontal field of view.
- This view is approximately 2,126 feet southwest of the nearest pole represented in the simulation.
- The simulation is based on the best information available and is preliminary. Final alignment and structure locations are subject to change based on final engineering and other factors.

Key Observation Point (KOP) #4

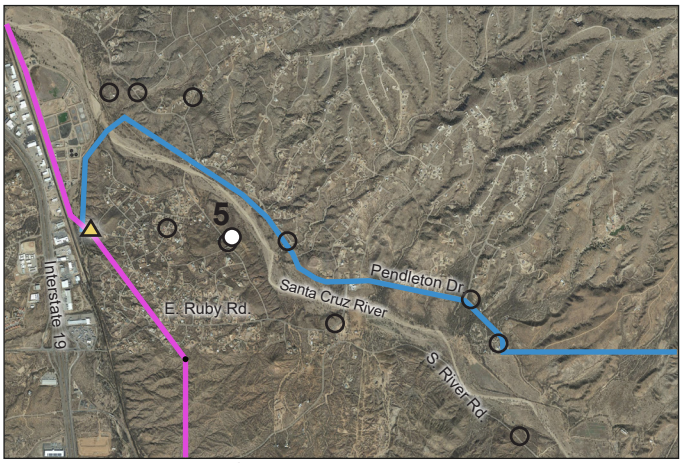
Existing Condition

Simulated Condition

Key Observation Point (KOP) # 5



Vicinity Map



Project Map Enlargement

Notes:

Camera Information

- Type: Canon EOS RP
- Sensor: CMOS (Full-Frame) 35.9mm x 24mm
- Lens: Canon RF 24-105mm f/4-7.1 IS STM
- Focal Length: 50mm | F-Stop: f/5 | ISO:160
- Dimensions in pixel: 6240 x 4160

KOP

- Representative View for: residents
- Location: 890 Cerrado Sanchez
- Latitude: 31.434978° N; Longitude: 110.944313° W
- View Point Elevation at Eye Level: 3,575 ft.
- Looking: west
- Poles Visible: Structures
- Image File Name: IMG_1115.JPG

Simulation Notes

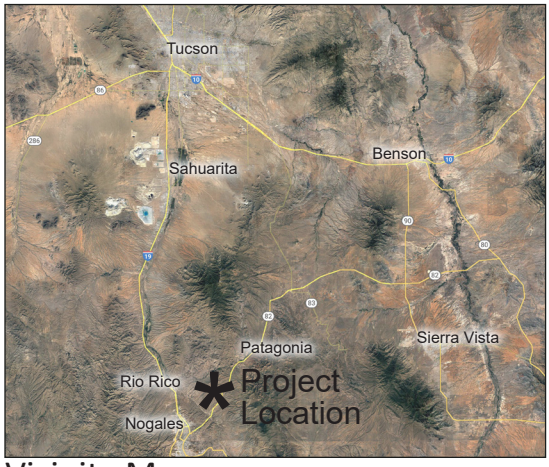
- Photo Taken: August 12, 2022, 10:18 AM
- The image is based on a single photo and represent approximately 39.5 degree horizontal field of view.
- This view is approximately 515 feet west of the nearest pole represented in the simulation.
- The simulation is based on the best information available and is preliminary. Final alignment and structure locations are subject to change based on final engineering and other factors.

Key Observation Point (KOP) #5

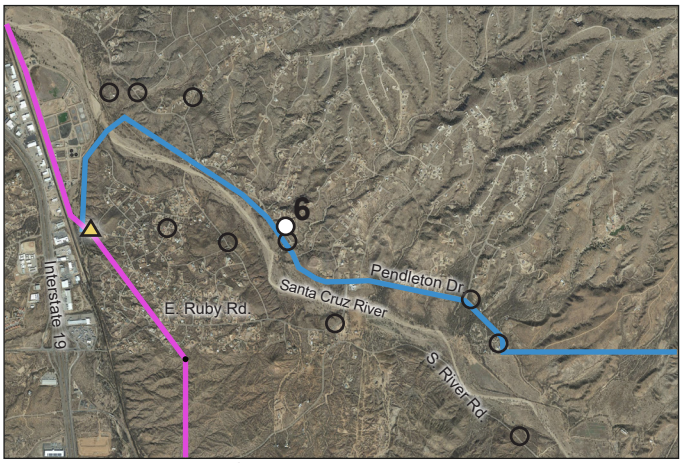
Existing Condition

Simulated Condition

Key Observation Point (KOP) # 6



Vicinity Map



Project Map Enlargement

Notes:

Camera Information

- Type: Canon EOS RP
- Sensor: CMOS (Full-Frame) 35.9mm x 24mm
- Lens: Canon RF 24-105mm f/4-7.1 IS STM
- Focal Length: 24mm | F-Stop: f/9 | ISO:100
- Dimensions in pixel: 6240 x 4160

KOP

- Representative View for: residents
- Location: 858 Pendleton Drive
- Latitude: 31.438664° N; Longitude: 110.940822° W
- View Point Elevation at Eye Level: 3,535 ft.
- Looking: south southeast
- Poles Visible: Structures
- Image File Name: IMG_1236.JPG

Simulation Notes

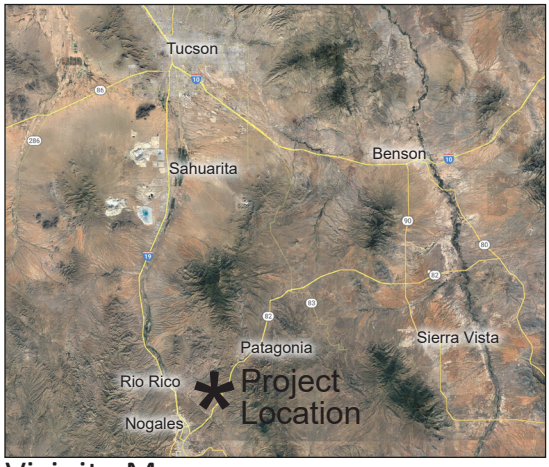
- Photo Taken: August 12, 2022, 11:10 AM
- The image is based on a single photo and represent approximately 73.7 degree horizontal field of view.
- This view is approximately 200 feet north of the nearest pole represented in the simulation.
- The simulation is based on the best information available and is preliminary. Final alignment and structure locations are subject to change based on final engineering and other factors.

Key Observation Point (KOP) #6

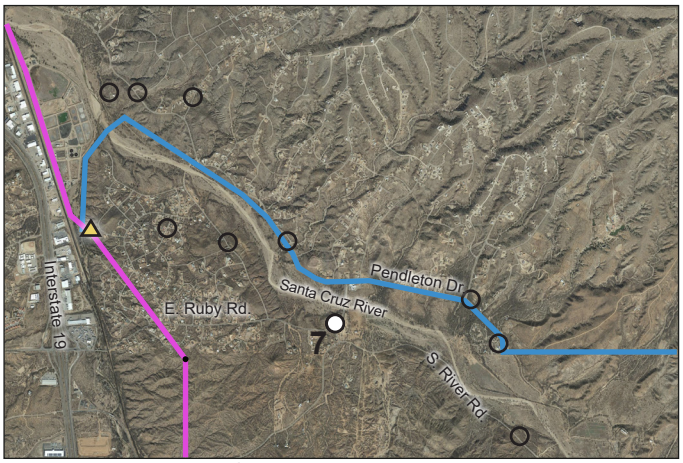
Existing Condition

Simulated Condition

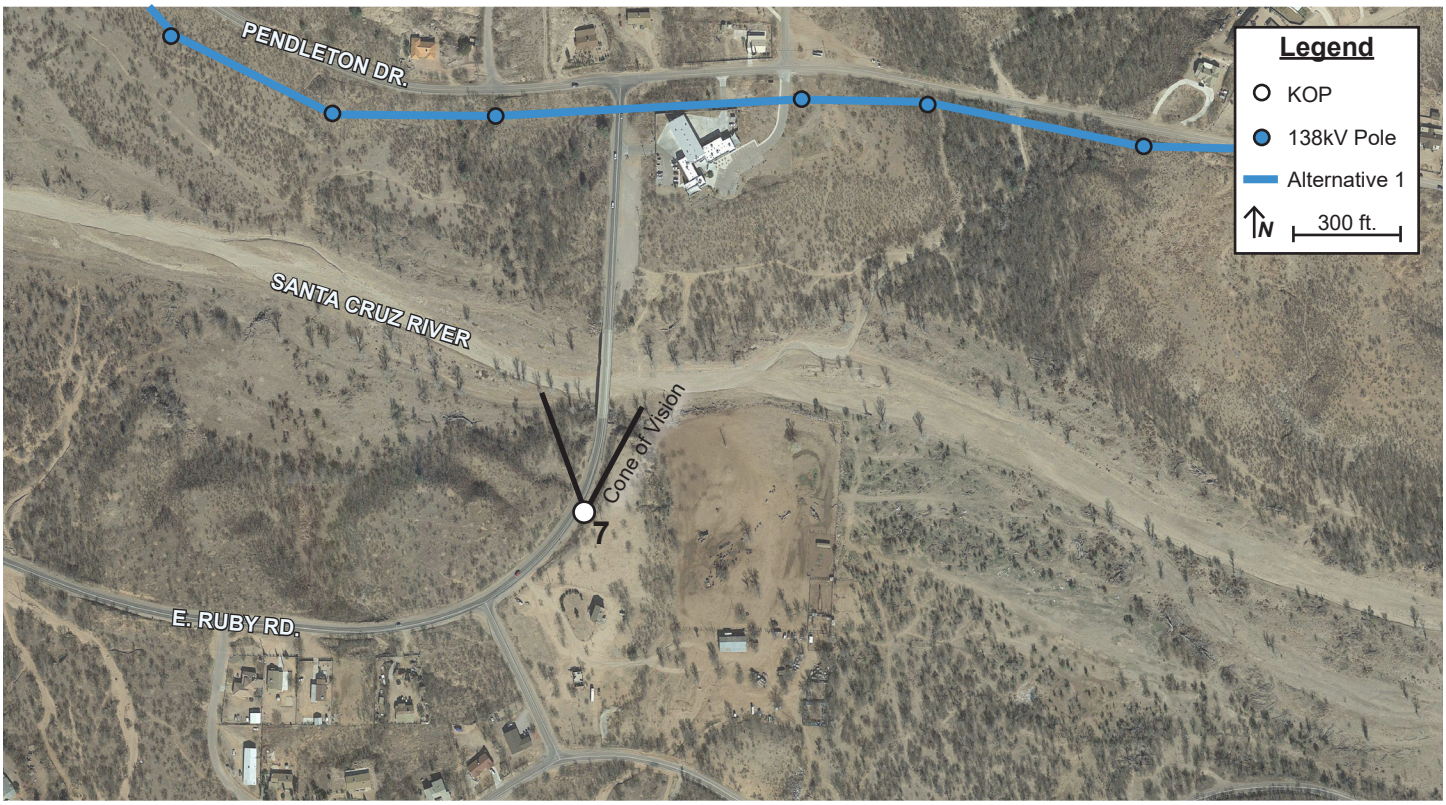
Key Observation Point (KOP) # 7



Vicinity Map



Project Map Enlargement



Notes:

Camera Information

- Type: Canon EOS RP
- Sensor: CMOS (Full-Frame) 35.9mm x 24mm
- Lens: Canon RF 24-105mm f/4-7.1 IS STM
- Focal Length: 35mm | F-Stop: f/6.3 | ISO:100
- Dimensions in pixel: 6240 x 4160

KOP

- Representative View for: residents
- Location: 500 East Ruby Road
- Latitude: 31.432876° N; Longitude: 110.935920° W
- View Point Elevation at Eye Level: 3,533 ft.
- Looking: north
- Poles Visible: Structures
- Image File Name: IMG_1137.JPG

Simulation Notes

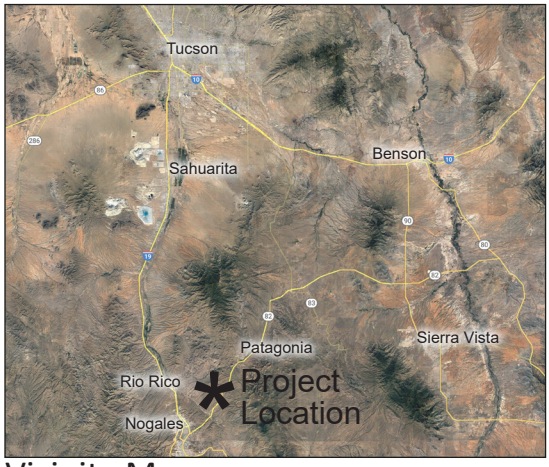
- Photo Taken: August 12, 2022, 10:28 AM
- The image is based on a single photo and represent approximately 54 degree horizontal field of view.
- This view is approximately 58 feet south of the nearest pole represented in the simulation.
- The simulation is based on the best information available and is preliminary. Final alignment and structure locations are subject to change based on final engineering and other factors.

Key Observation Point (KOP) #7

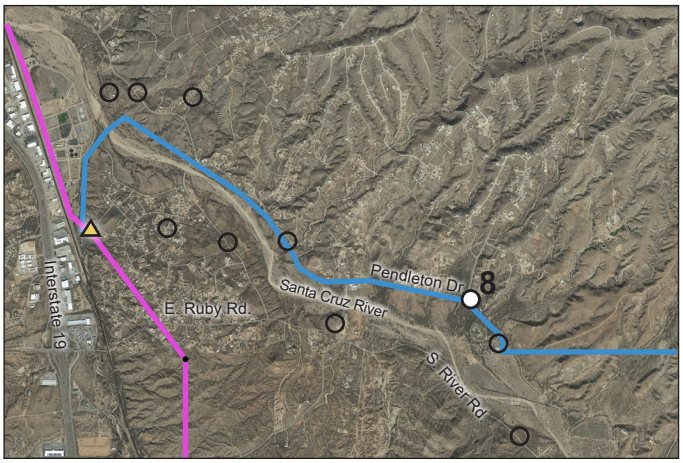
Existing Condition

Simulated Condition

Key Observation Point (KOP) # 8



Vicinity Map



Project Map Enlargement

Notes:

Camera Information

- Type: Canon EOS RP
- Sensor: CMOS (Full-Frame) 35.9mm x 24mm
- Lens: Canon RF 24-105mm f/4-7.1 IS STM
- Focal Length: 35mm | F-Stop: f/9 | ISO:100
- Dimensions in pixel: 6240 x 4160

KOP

- Representative View for: residents and recreational users
- Location: 576 Pendleton Drive
- Latitude:31.434022° N; Longitude:110.922496° W
- View Point Elevation at Eye Level: 3,543 ft.
- Looking: south southeast
- Poles Visible: Structures
- Image File Name: IMG_1288.JPG

Simulation Notes

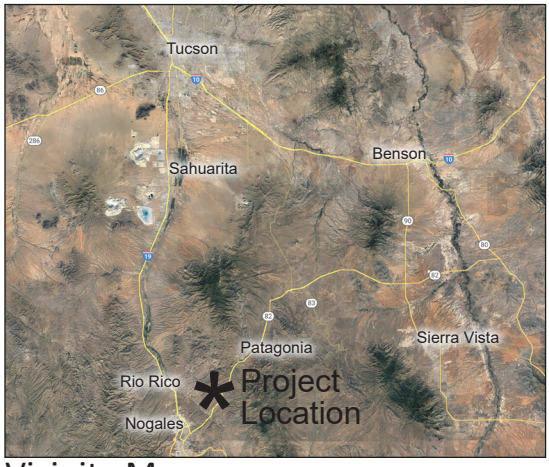
- Photo Taken: August 12, 2022, at 11:34 am
- The image is based on a single photo and represent approximately 39.5 degree horizontal field of view.
- This view is approximately 250 feet northwest of the nearest pole represented in the simulation.
- The simulation is based on the best information available and is preliminary. Final alignment and structure locations are subject to change based on final engineering and other factors.

Key Observation Point (KOP) #8

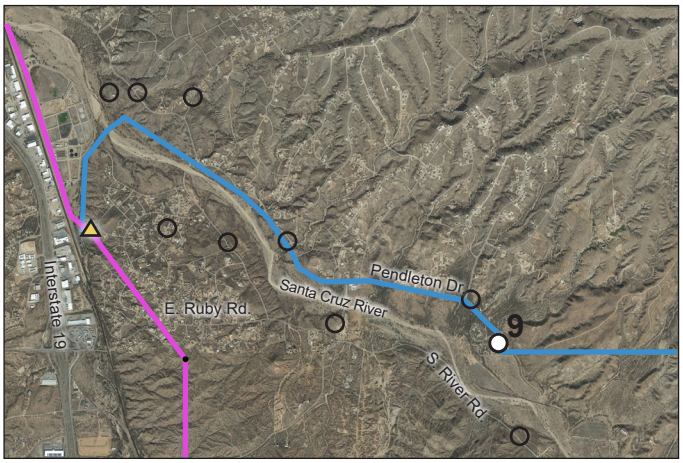
Existing Condition

Simulated Condition

Key Observation Point (KOP) # 9



Vicinity Map



Project Map Enlargement

Notes:

Camera Information

- Type: Canon EOS RP
- Sensor: CMOS (Full-Frame) 35.9mm x 24mm
- Lens: Canon RF 24-105mm f/4-7.1 IS STM
- Focal Length: 24mm | F-Stop: f/10 | ISO:100
- Dimensions in pixel: 6240 x 4160

KOP

- Representative View for: recreational users
- Location: Calabasas Park
- Latitude: 31.429911° N; Longitude: 110.919970° W
- View Point Elevation at Eye Level: 3,537 ft.
- Looking: east
- Poles Visible: Structures
- Image File Name: IMG_1292.JPG

Simulation Notes

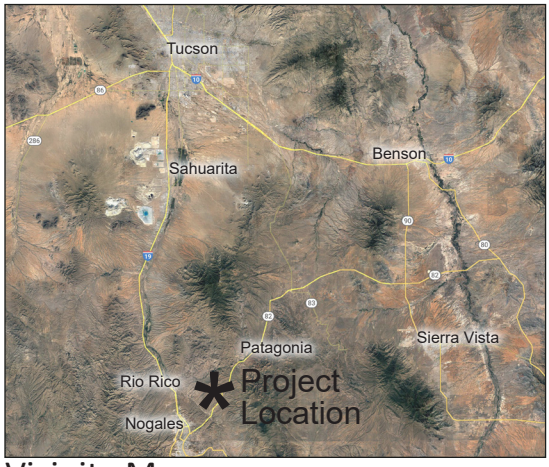
- Photo Taken: August 12, 2022, at 11:37 am
- The image is based on a single photo and represent approximately 73.7 degree horizontal field of view.
- This view is approximately 217 feet west of the nearest pole represented in the simulation.
- The simulation is based on the best information available and is preliminary. Final alignment and structure locations are subject to change based on final engineering and other factors.

Key Observation Point (KOP) #9

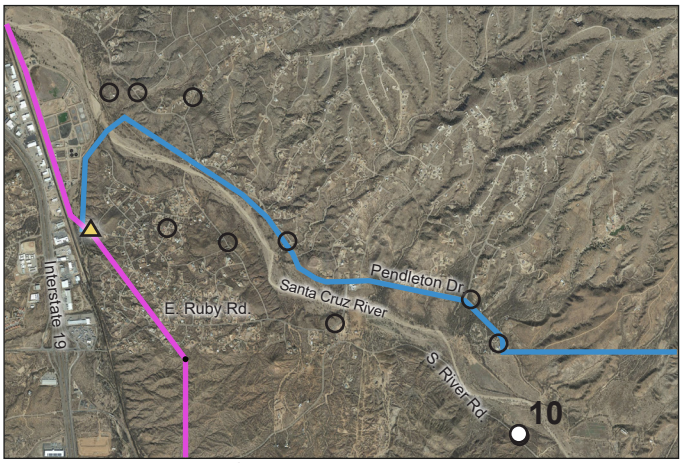
Existing Condition

Simulated Condition

Key Observation Point (KOP) # 10



Vicinity Map



Project Map Enlargement

Notes:

Camera Information

- Type: Canon EOS RP
- Sensor: CMOS (Full-Frame) 35.9mm x 24mm
- Lens: Canon RF 24-105mm f/4-7.1 IS STM
- Focal Length: 35mm | F-Stop: f/9 | ISO:100
- Dimensions in pixel: 6240 x 4160

KOP

- Representative View for: recreational, tourists, residents
- Location: 1574 South River Road
- Latitude: 31.421225° N; Longitude: 110.916266° W
- View Point Elevation at Eye Level: 3,568 ft.
- Looking: northeast
- Poles Visible: Structures
- Image File Name: IMG_1202.JPG

Simulation Notes

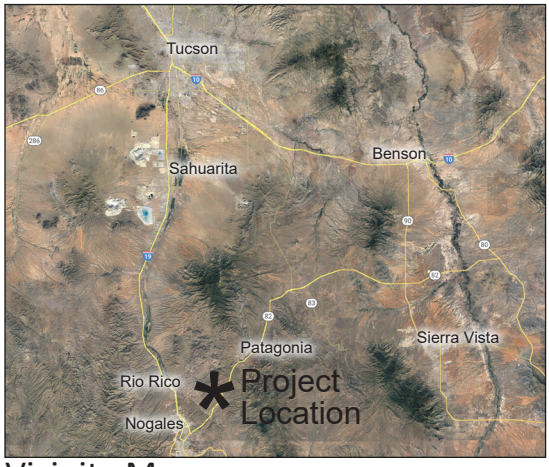
- Photo Taken: August 12, 2022, at 10:55 am
- The image is based on a single photo and represent approximately 54 degree horizontal field of view.
- This view is approximately 3,991 feet southwest of the nearest pole represented in the simulation.
- The simulation is based on the best information available and is preliminary. Final alignment and structure locations are subject to change based on final engineering and other factors.

Key Observation Point (KOP) #10

Existing Condition

Simulated Condition

Key Observation Point (KOP) # 11



Vicinity Map

Project Map Enlargement

Notes:

Camera Information

- Type: Canon EOS RP
- Sensor: CMOS (Full-Frame) 35.9mm x 24mm
- Lens: Canon RF 24-105mm f/4-7.1 IS STM
- Focal Length: 50mm | F-Stop: f/6.3 | ISO:100
- Dimensions in pixel: 6240 x 4160

KOP

- Representative View for: visitors of the National Historic Site
- Location: Mission Los Santos Angeles de Guevavi NHS
- Latitude: 31.410080° N; Longitude: 110.901834° W
- View Point Elevation at Eye Level: 3,595 ft.
- Looking: northeast
- Poles Visible: Steel Monopole Structures
- Image File Name: IMG_1821.JPG

Simulation Notes

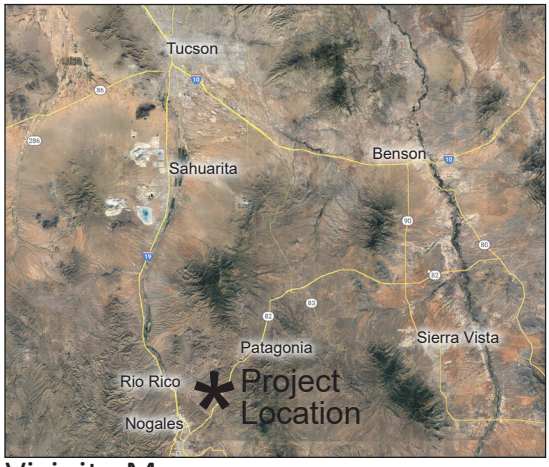
- Photo Taken: November 7, 2022 at 12:14 pm
- The image is based on a single photo and represent approximately 39.5 degree horizontal field of view.
- This view is approximately 7,831 feet southwest of the nearest pole represented in the simulation.
- The simulation is based on the best information available and is preliminary. Final alignment and structure locations are subject to change based on final engineering and other factors.

Key Observation Point (KOP) #11

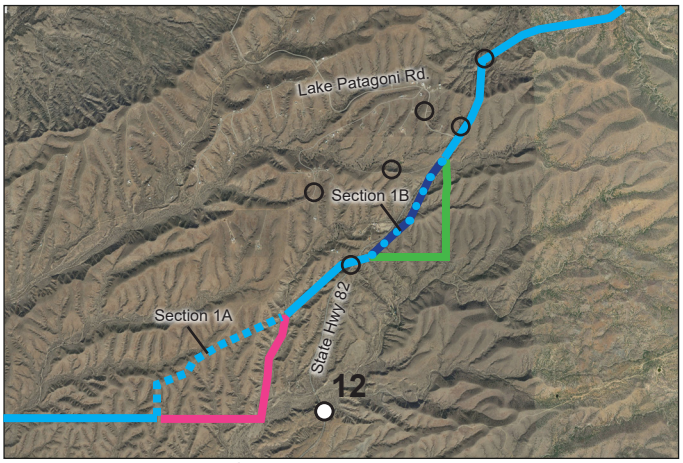
Existing Condition

Simulated Condition

Key Observation Point (KOP) # 12



Vicinity Map



Project Map Enlargement

Notes:

Camera Information

- Type: Canon EOS RP
- Sensor: CMOS (Full-Frame) 35.9mm x 24mm
- Lens: Canon RF 24-105mm f/4-7.1 IS STM
- Focal Length: 50mm | F-Stop: f/9 | ISO:100
- Dimensions in pixel: 6240 x 4160

KOP

- Representative View for: recreational, tourists, residents
- Location: East Patagonia Highway
- Latitude: 31.430765° N; Longitude: 110.842494° W
- View Point Elevation at Eye Level: 3,926 ft.
- Looking: northwest
- Poles Visible: Structures
- Image File Name: IMG_1363.JPG

Simulation Notes

- Photo Taken: August 12, 2022, at 2:07 pm
- The image is based on a single photo and represent approximately 39.5 degree horizontal field of view.
- This view is approximately 3,516 feet southeast of the nearest pole represented in the simulation.
- The simulation is based on the best information available and is preliminary. Final alignment and structure locations are subject to change based on final engineering and other factors.

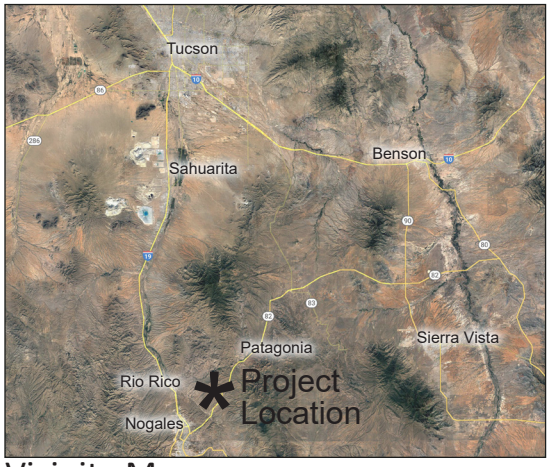
Key Observation Point (KOP) #12

Existing Condition

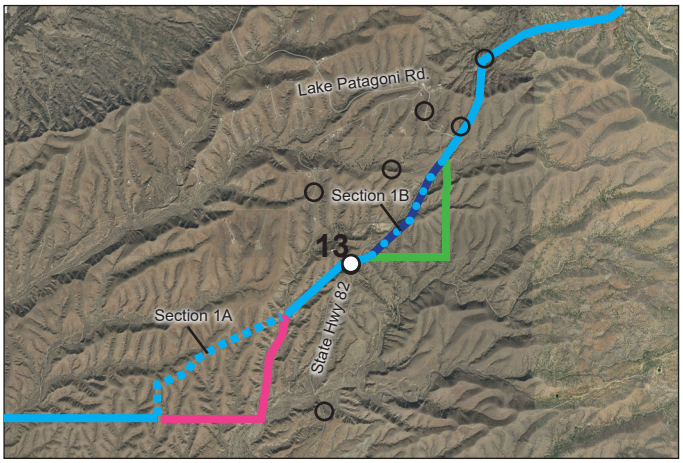
Simulated Condition - Alternative 1A

Simulated Condition - Alternative 2A

Key Observation Point (KOP) # 13



Vicinity Map



Project Map Enlargement

Notes:

Camera Information

- Type: Canon EOS RP
- Sensor: CMOS (Full-Frame) 35.9mm x 24mm
- Lens: Canon RF 24-105mm f/4-7.1 IS STM
- Focal Length: 37mm | F-Stop: f/10 | ISO:100
- Dimensions in pixel: 6240 x 4160

KOP

- Representative View for: residents, recreational users
- Location: State Highway 82
- Latitude: 31.448761° N; Longitude:110.838409° W
- View Point Elevation at Eye Level: 4,102 ft.
- Looking: northeast
- Poles Visible: Structures
- Image File Name: IMG_1371.JPG

Simulation Notes

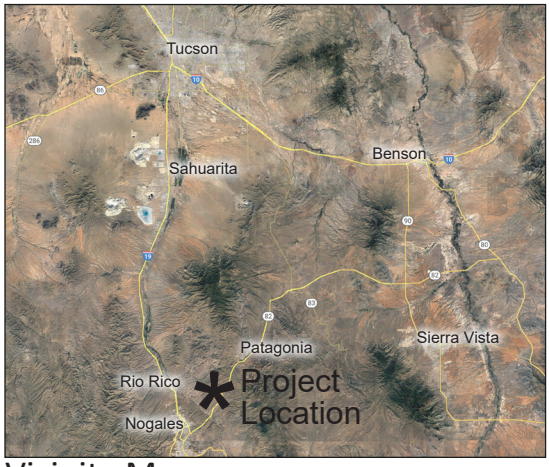
- Photo Taken: August 12, 2022, at 2:11 pm
- The image is based on a single photo and represent approximately 54 degree horizontal field of view.
- This view is approximately 839 feet southwest of the nearest pole represented in the simulation.
- The simulation is based on the best information available and is preliminary. Final alignment and structure locations are subject to change based on final engineering and other factors.

Key Observation Point (KOP) #13

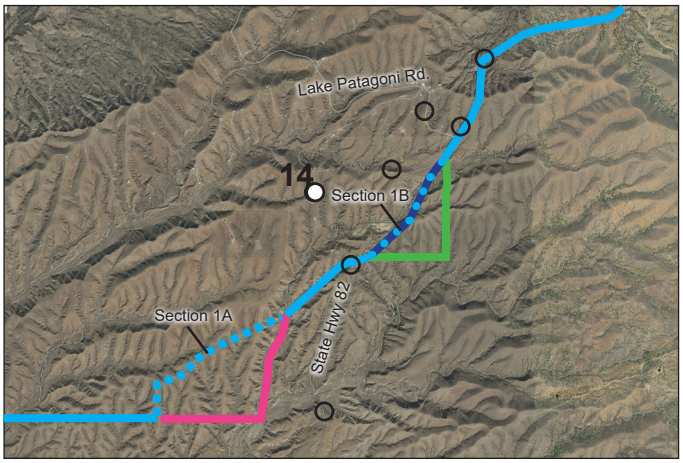
Existing Condition

Simulated Condition

Key Observation Point (KOP) # 14



Vicinity Map



Project Map Enlargement

Notes:

Camera Information

- Type: Iphone 12 Pro
- Sensor: Apple 12 MP 1/3.6-inch sensor
- Lens: Apple 26 mm-equivalent f/1.6 lens
- Focal Length: 4mm(26mm equivalent) | F-Stop: f/1.6 | ISO:32
- Dimensions in pixel: 4032 x 3024

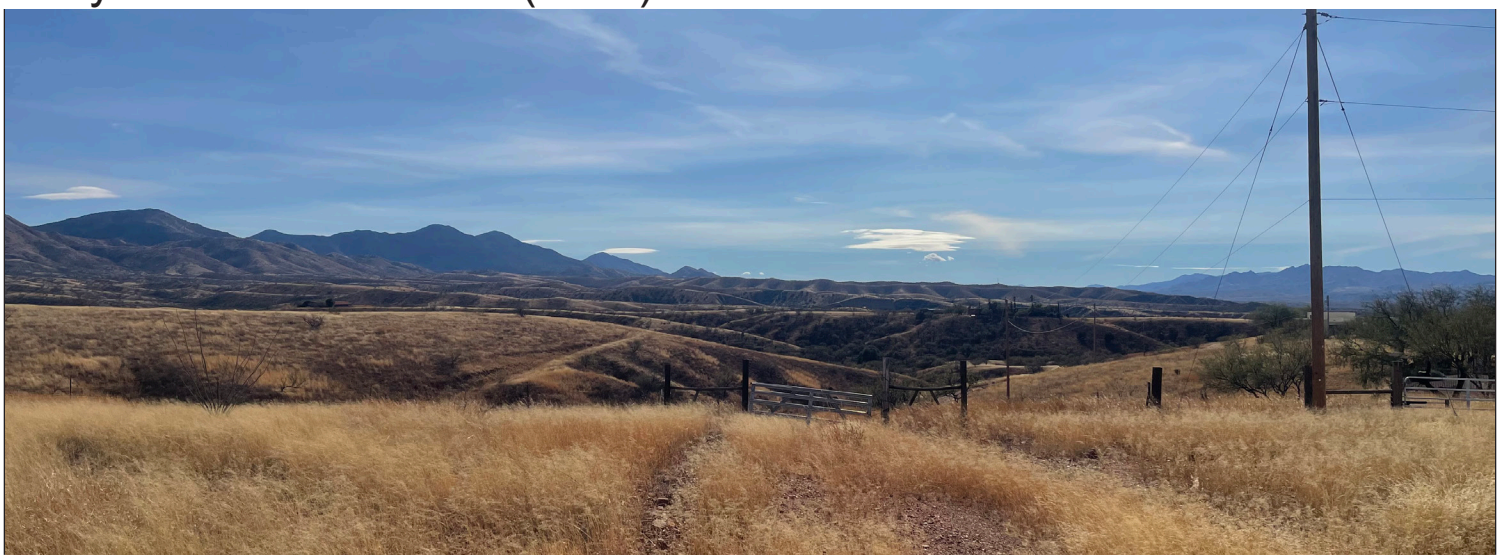
KOP

- Representative View for: residents
- Location: 161 Lado De Loma Dr.
- Latitude: 31.457460° N; Longitude:110.843947° W
- View Point Elevation at Eye Level: 4,151 ft.
- Looking: southeast
- Poles Visible: Structures
- Image File Name: IMG_4902.JPG

Simulation Notes

- Photo Taken: December 2, 2022, at 10:58 am
- The image is based on a single photo and represent approximately 71 degree horizontal field of view.
- This view is approximately 3,395 feet northwest of the nearest pole represented in the simulation.
- The simulation is based on the best information available and is preliminary. Final alignment and structure locations are subject to change based on final engineering and other factors.

Key Observation Point (KOP) #14

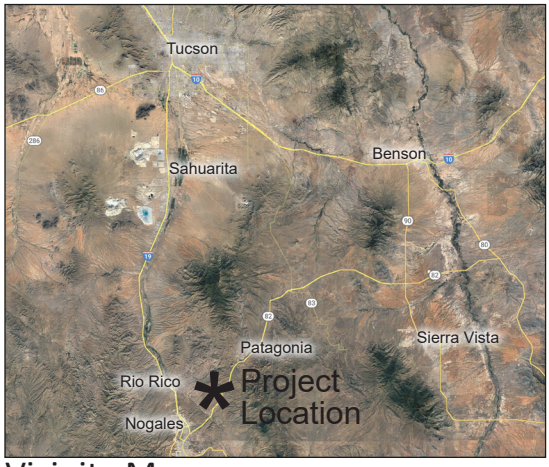


Existing Condition

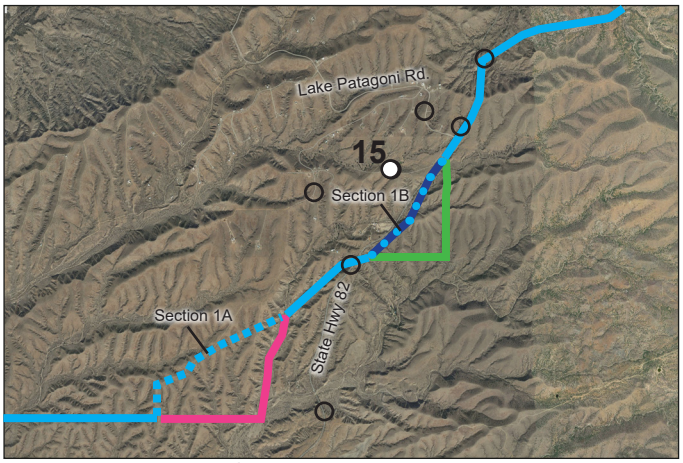
Simulated Condition - Alternative 1B

Simulated Condition - Alternative 2B

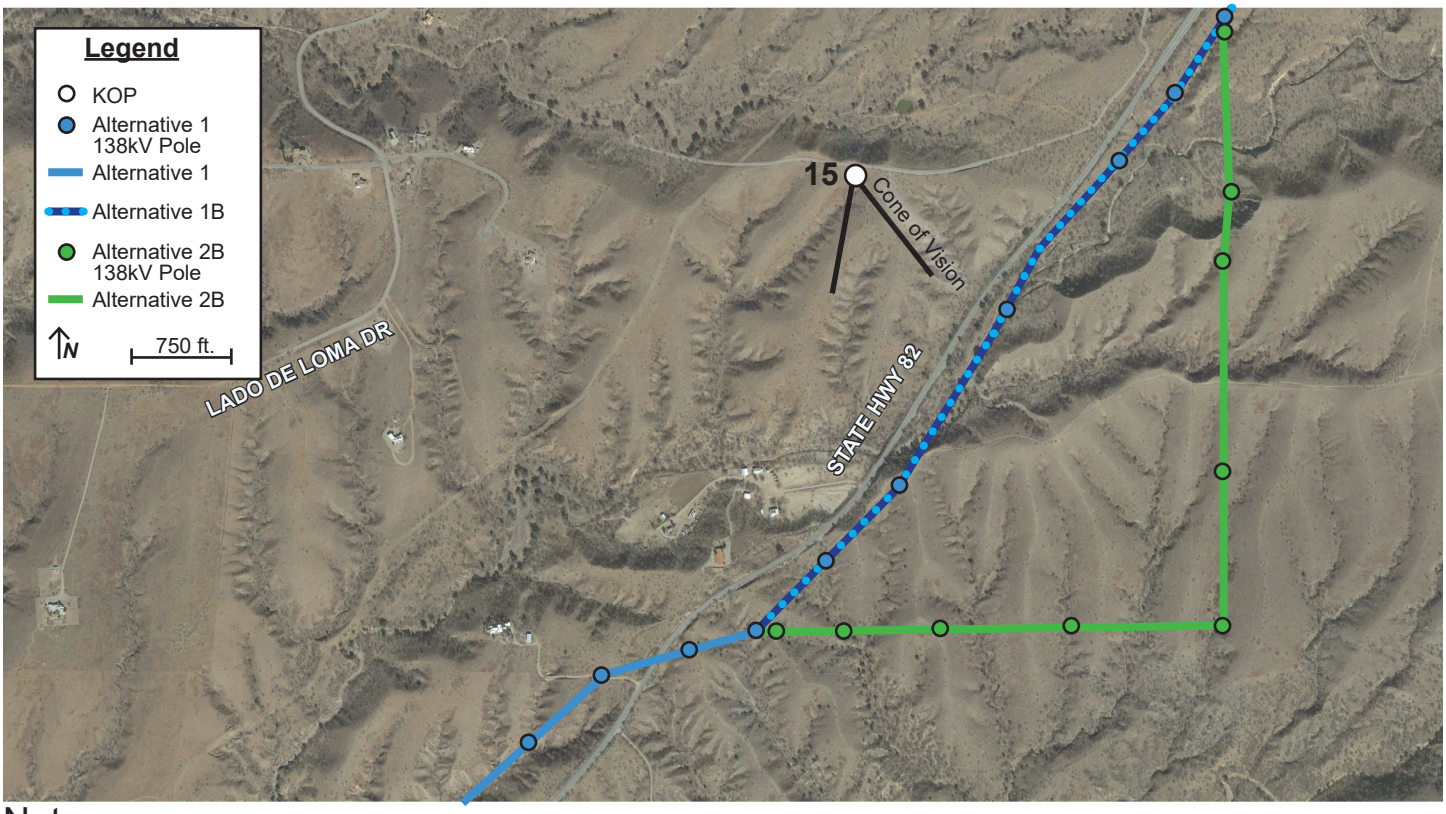
Key Observation Point (KOP) # 15



Vicinity Map



Project Map Enlargement



Notes:

Camera Information

- Type: Iphone 12 Pro
- Sensor: Apple 12 MP 1/3.6-inch sensor
- Lens: Apple 26 mm-equivalent f/1.6 lens
- Focal Length: 4mm(26mm equivalent) | F-Stop: f/1.6 | ISO:32
- Dimensions in pixel: 4032 x 3024

KOP

- Representative View for: residents
- Location: Primitive Road
- Latitude: 31.460193° N; Longitude:110.832784° W
- View Point Elevation at Eye Level: 4,221 ft.
- Looking: southeast
- Poles Visible: Structures
- Image File Name: IMG_4906.JPG

Simulation Notes

- Photo Taken: December 2, 2022, at 11:09 am
- The image is based on a single photo and represent approximately 71 degree horizontal field of view.
- This view is approximately 1,713 feet northwest of the nearest pole represented in the simulation.
- The simulation is based on the best information available and is preliminary. Final alignment and structure locations are subject to change based on final engineering and other factors.

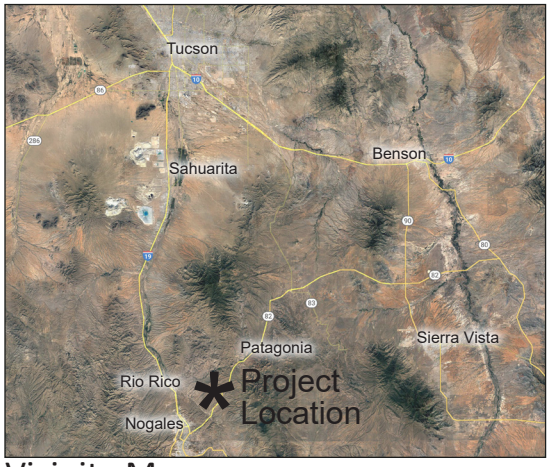
Key Observation Point (KOP) #15

Existing Condition

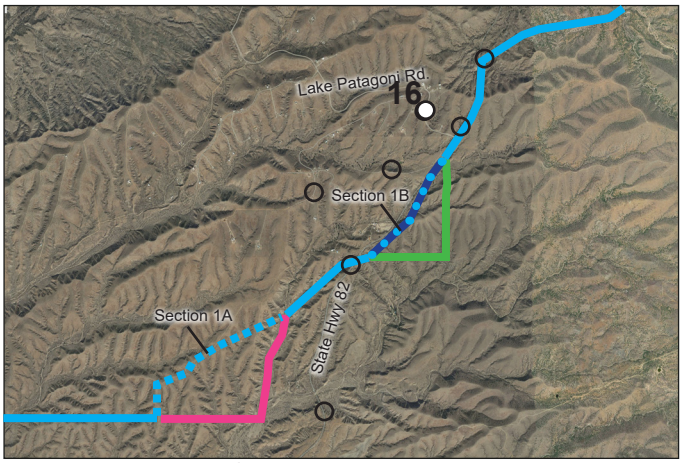
Simulated Condition - Alternative 1B

Simulated Condition - Alternative 2B

Key Observation Point (KOP) # 16



Vicinity Map



Project Map Enlargement

Notes:

Camera Information

- Type: Iphone 12 Pro
- Sensor: Apple 12 MP 1/3.6-inch sensor
- Lens: Apple 26 mm-equivalent f/1.6 lens
- Focal Length: 4mm(26mm equivalent) | F-Stop: f/1.6 | ISO:32
- Dimensions in pixel: 4032 x 3024

KOP

- Representative View for: residents and recreational users
- Location: 31 Lake Patagonia Road
- Latitude: 31.467340° N; Longitude: 110.828051° W
- View Point Elevation at Eye Level: 4,272 ft.
- Looking: south southeast
- Poles Visible: Structures
- Image File Name: IMG_4904.JPG

Simulation Notes

- Photo Taken: December 2, 2022, at 11:04 am
- The image is based on a single photo and represent approximately 71 degree horizontal field of view.
- This view is approximately 2,397 feet north northwest of the nearest pole represented in the simulation.
- The simulation is based on the best information available and is preliminary. Final alignment and structure locations are subject to change based on final engineering and other factors.

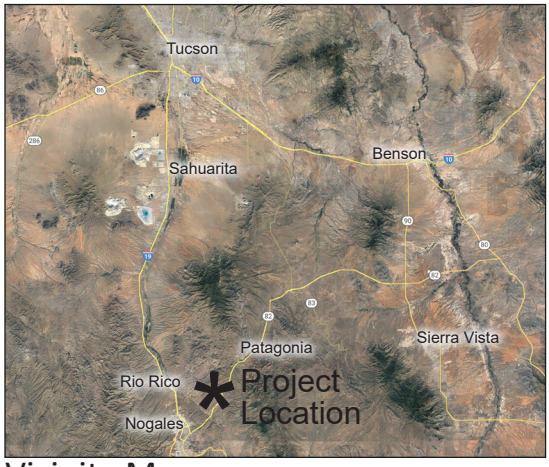
Key Observation Point (KOP) #16

Existing Condition

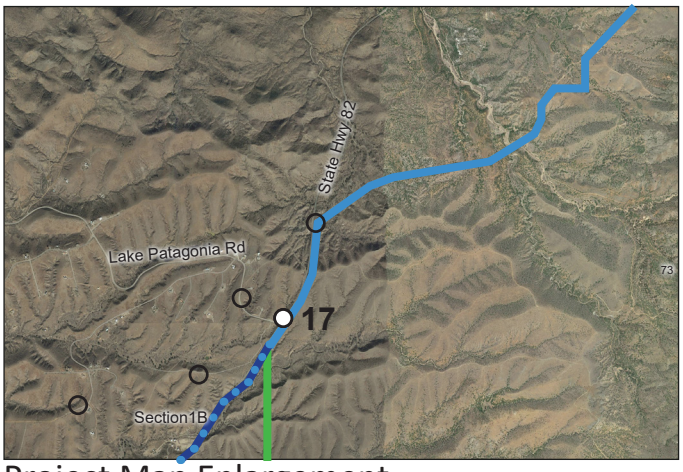
Simulated Condition - Alternative 1B

Simulated Condition - Alternative 2B

Key Observation Point (KOP) # 17



Vicinity Map



Project Map Enlargement

Legend
- Existing Transmission
- Alternative 1
- Alternative 2A
- Alternative 2B
- Alternative 2C
- KOP
- Proposed Substation
- Proposed Switchyard

Notes:

Camera Information
- Type: Canon EOS RP
- Sensor: CMOS (Full-Frame) 35.9mm x 24mm
- Lens: Canon RF 24-105mm f/4-7.1 IS STM
- Focal Length: 35mm | F-Stop: f/7.1 | ISO:100
- Dimensions in pixel: 6240 x 4160

KOP
- Representative View for: residents and recreationalists
- Location: East Patagonia Hwy @ Lake Patagonia Road
- Latitude: 31.465274° N; Longitude:110.823169° W
- View Point Elevation at Eye Level: 4,234 ft.
- Looking: southwest
- Poles Visible: Structures
- Image File Name: IMG_1412.JPG

Simulation Notes
- Photo Taken: August 12, 2022, at 2:28 pm
- The image is based on a single photo and represent approximately 54 degree horizontal field of view.
- This view is approximately 350 feet north of the nearest pole represented in the simulation.
- The simulation is based on the best information available and is preliminary. Final alignment and structure locations are subject to change based on final engineering and other factors.

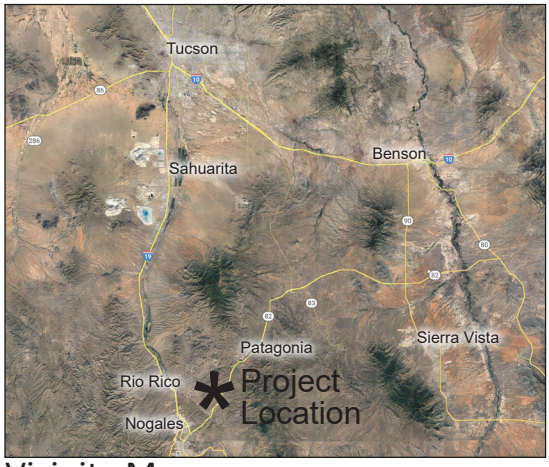
Key Observation Point (KOP) #17

Existing Condition

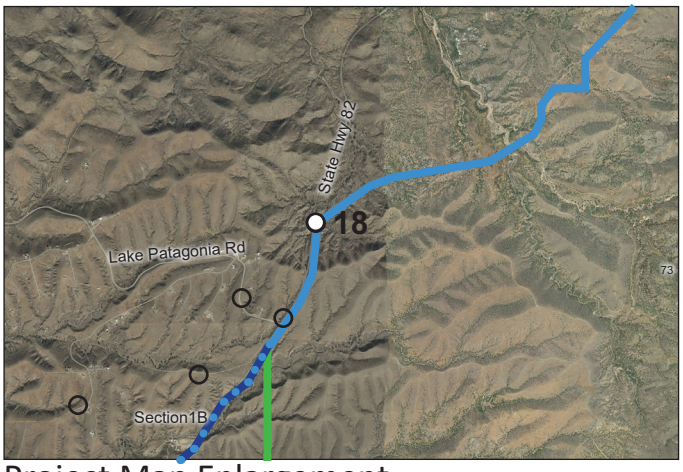
Simulated Condition - Alternative 1B

Simulated Condition - Alternative 2B

Key Observation Point (KOP) # 18



Vicinity Map



Project Map Enlargement

Notes:

Camera Information

- Type: Canon EOS RP
- Sensor: CMOS (Full-Frame) 35.9mm x 24mm
- Lens: Canon RF 24-105mm f/4-7.1 IS STM
- Focal Length: 50mm | F-Stop: f/9 | ISO:100
- Dimensions in pixel: 6240 x 4160

KOP

- Representative View for: recreationalists and tourists
- Location: East Patagonia Hwy @ El Paso Gas Easement
- Latitude: 31.473641° N; Longitude:110.820149° W
- View Point Elevation at Eye Level: 4,144 ft.
- Looking: northeast
- Poles Visible: Structures
- Image File Name: IMG_1379.JPG

Simulation Notes

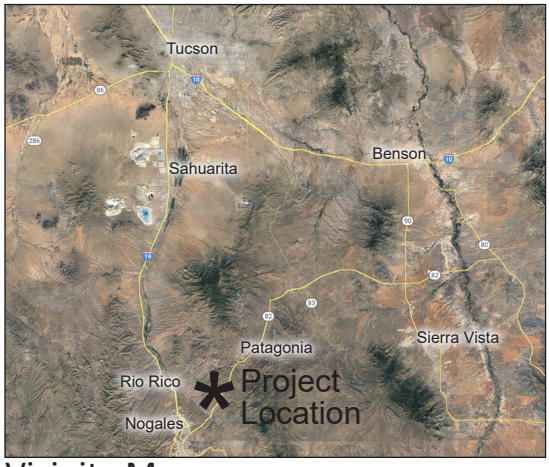
- Photo Taken: August 12, 2022, at 2:20 pm
- The image is based on a single photo and represent approximately 39.5 degree horizontal field of view.
- This view is approximately 50 feet west of the nearest pole represented in the simulation.
- The simulation is based on the best information available and is preliminary. Final alignment and structure locations are subject to change based on final engineering and other factors.

Key Observation Point (KOP) #18

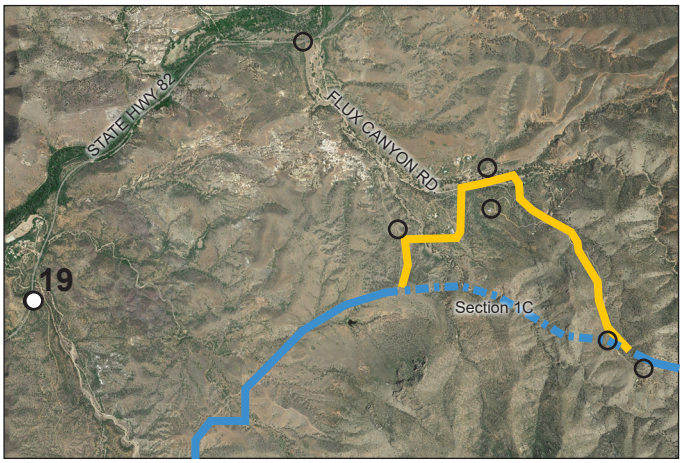
Existing Condition

Simulated Condition

Key Observation Point (KOP) # 19



Vicinity Map



Project Map Enlargement

Notes:

Camera Information

- Type: Canon EOS RP
- Sensor: CMOS (Full-Frame) 35.9mm x 24mm
- Lens: Canon RF 24-105mm f/4-7.1 IS STM
- Focal Length: 50mm | F-Stop: f/9 | ISO:100
- Dimensions in pixel: 6240 x 4160

KOP

- Representative View for: recreationalists and residents
- Location: 1476 E. Patagonia Hwy / State Route 82
- Latitude: 31.495160° N; Longitude:110.811227° W
- View Point Elevation at Eye Level: 3,946 ft.
- Looking: southeast
- Poles Visible: Structures
- Image File Name: IMG_2017.JPG

Simulation Notes

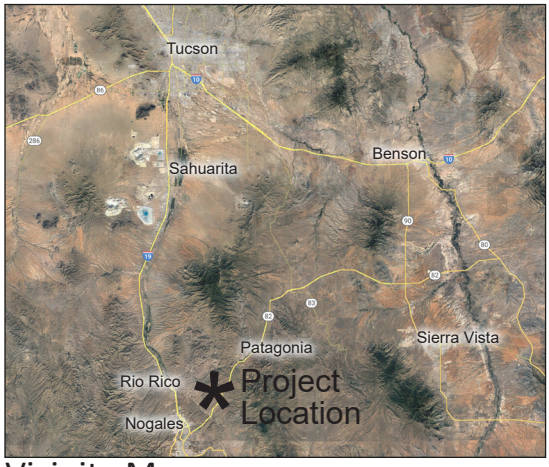
- Photo Taken: November 7, 2022, at 2:57 pm
- The image is based on a single photo and represent approximately 39.5 degree horizontal field of view.
- This view is approximately 6,191 feet northwest of the nearest pole represented in the simulation.
- The simulation is based on the best information available and is preliminary. Final alignment and structure locations are subject to change based on final engineering and other factors.

Key Observation Point (KOP) #19

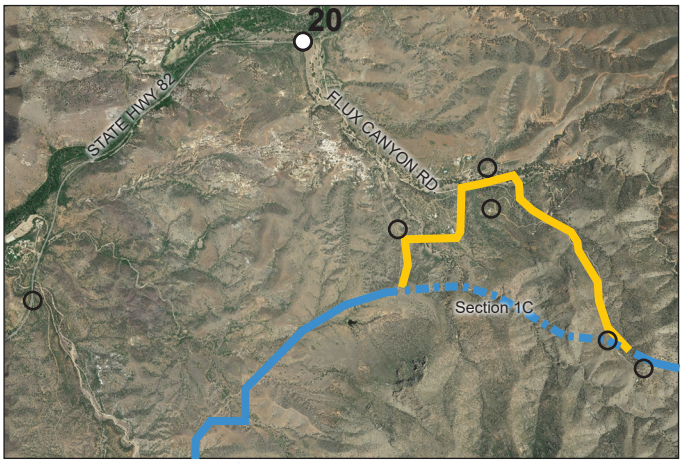
Existing Condition

Simulated Condition

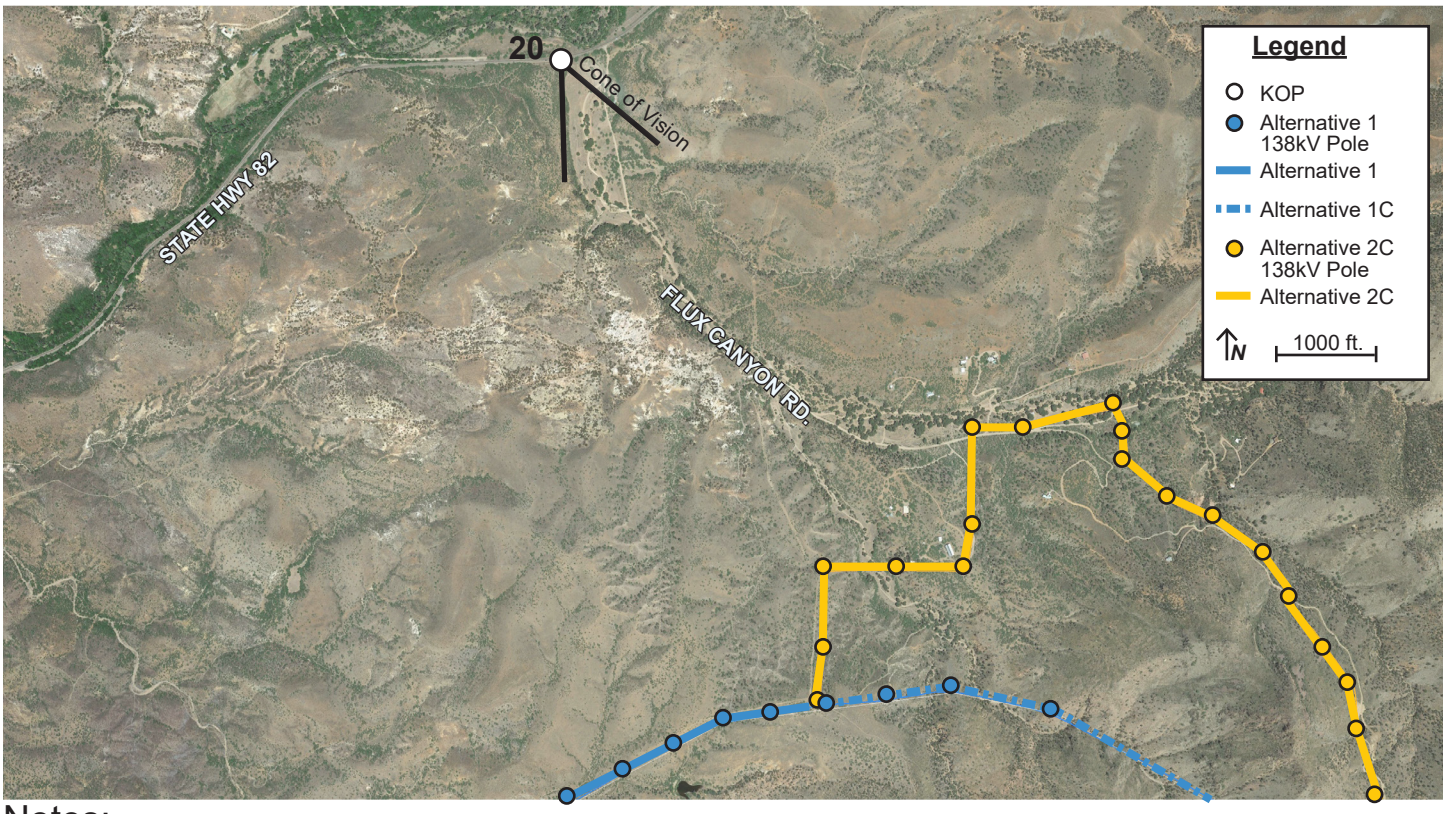
Key Observation Point (KOP) # 20



Vicinity Map



Project Map Enlargement



Notes:

Camera Information

- Type: Canon EOS RP
- Sensor: CMOS (Full-Frame) 35.9mm x 24mm
- Lens: Canon RF 24-105mm f/4-7.1 IS STM
- Focal Length: 50mm | F-Stop: f/9 | ISO:100
- Dimensions in pixel: 6240 x 4160

KOP

- Representative View for: recreationalists and residents
- Location: 1476 E. Patagonia Hwy @ Flux Canyon Rd.
- Latitude: 31.515542° N; Longitude:110.786155° W
- View Point Elevation at Eye Level: 3,956 ft.
- Looking: southeast
- Poles Visible: Structures
- Image File Name: IMG_1940.JPG

Simulation Notes

- Photo Taken: November 7, 2022, at 2:13 pm
- The image is based on a single photo and represent approximately 39.5 degree horizontal field of view.
- This view is approximately 6,323 feet northwest of the nearest pole represented in the simulation.
- The simulation is based on the best information available and is preliminary. Final alignment and structure locations are subject to change based on final engineering and other factors.

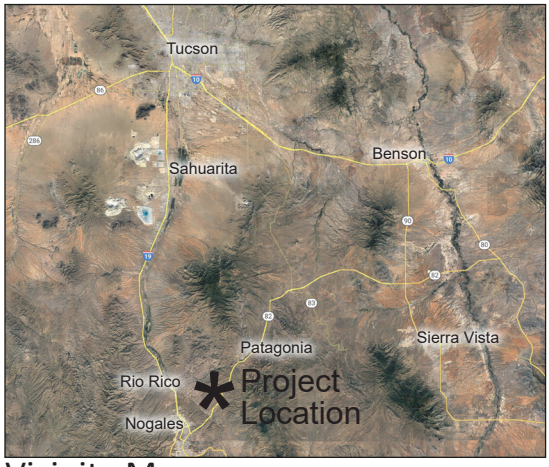
Key Observation Point (KOP) #20

Existing Condition

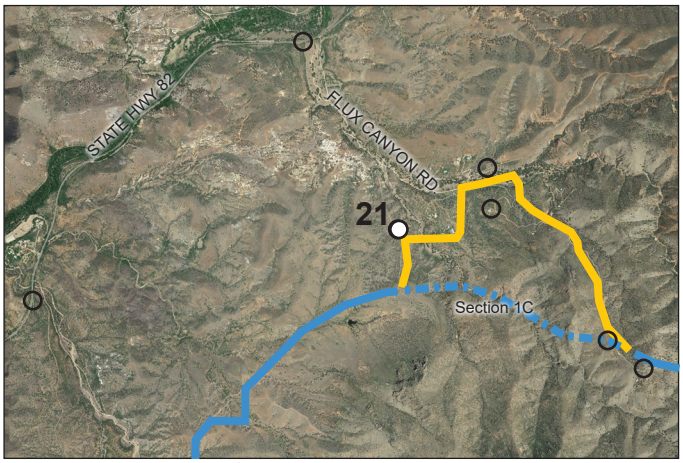
Simulated Condition - Alternative 1C

Simulated Condition - Alternative 2C

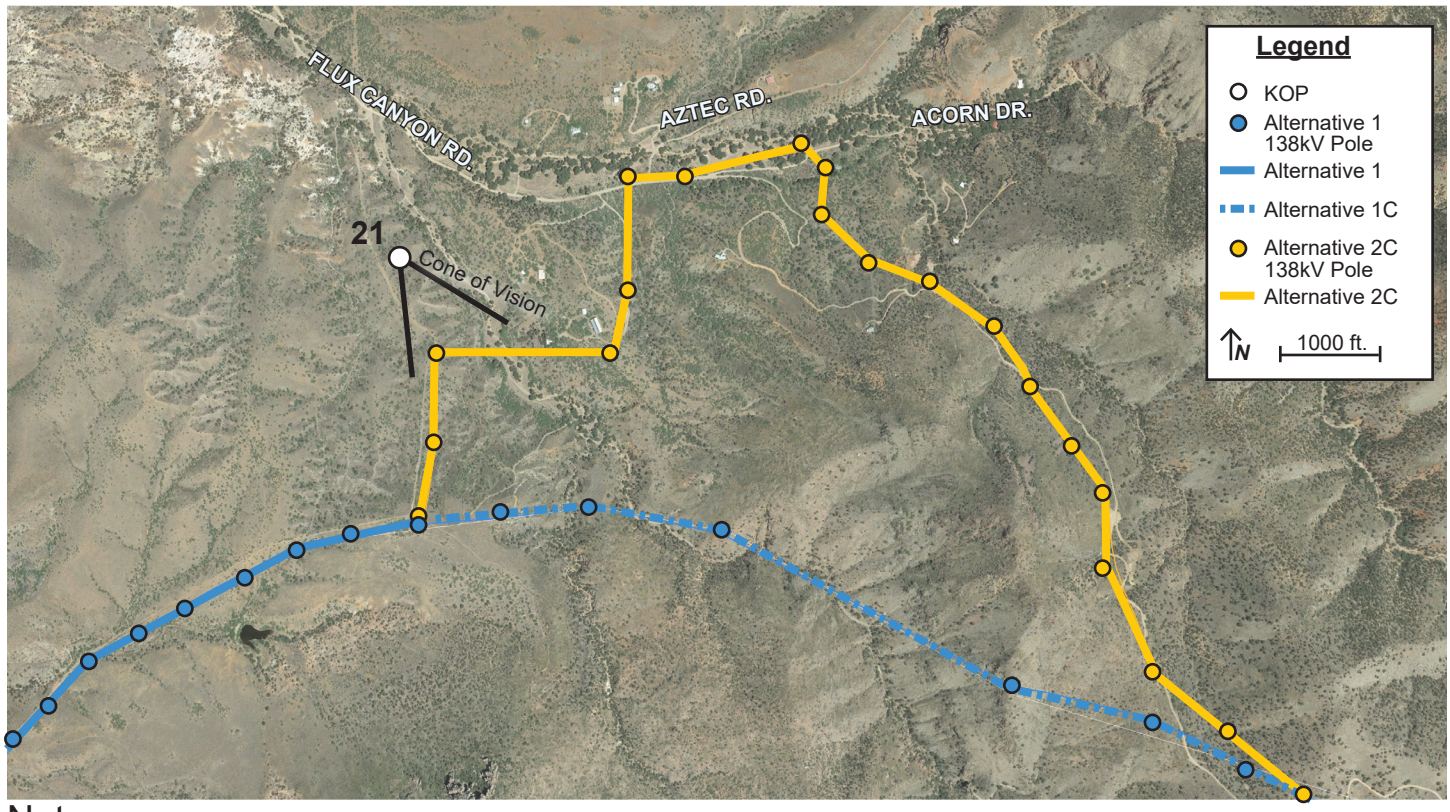
Key Observation Point (KOP) # 21



Vicinity Map



Project Map Enlargement



Notes:

Camera Information

- Type: Iphone 12 Pro
- Sensor: Apple 12 MP 1/3.6-inch sensor
- Lens: Apple 26 mm-equivalent f/1.6 lens
- Focal Length: 4mm(26mm equivalent) | F-Stop: f/1.6 | ISO:32
- Dimensions in pixel: 4032 x 3024

KOP

- Representative View for: recreationalists and residents
- Location: USFS Land
- Latitude: 31.500780° N; Longitude:110.777628° W
- View Point Elevation at Eye Level: 4,172 ft.
- Looking: southeast
- Poles Visible: Structures
- Image File Name: IMG_53.JPG

Simulation Notes

- Photo Taken: August 31, 2022, at 3:15pm
- The image is based on a single photo and represent approximately 71 degree horizontal field of view.
- This view is approximately 364 feet north northwest of the nearest pole represented in the simulation.
- The simulation is based on the best information available and is preliminary. Final alignment and structure locations are subject to change based on final engineering and other factors.

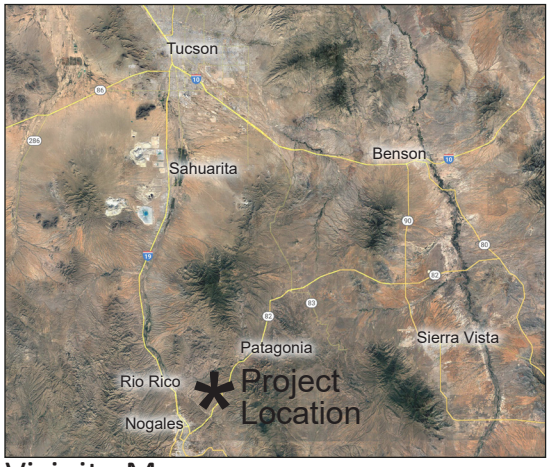
Key Observation Point (KOP) #21

Existing Condition

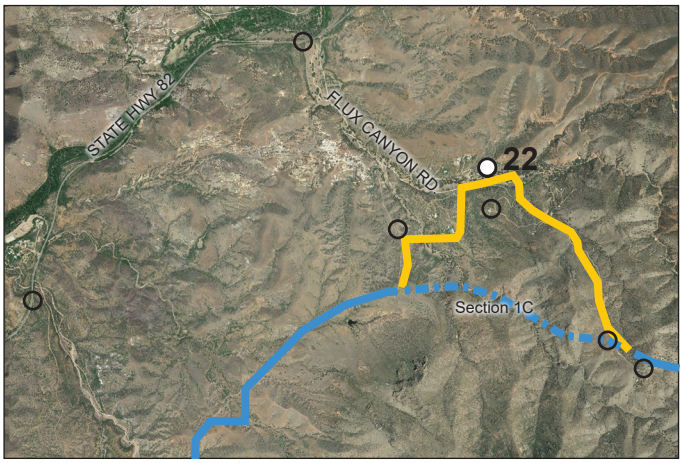
Simulated Condition - Alternative 1C

Simulated Condition - Alternative 2C

Key Observation Point (KOP) # 22



Vicinity Map



Project Map Enlargement

Notes:

Camera Information

- Type: Canon EOS RP
- Sensor: CMOS (Full-Frame) 35.9mm x 24mm
- Lens: Canon RF 24-105mm f/4-7.1 IS STM
- Focal Length: 35mm | F-Stop: f/9 | ISO:100
- Dimensions in pixel: 6240 x 4160

KOP

- Representative View for: residents
- Location: 21 Aztec Road
- Latitude: 31.505528° N; Longitude:110.769360° W
- View Point Elevation at Eye Level: 4,116 ft.
- Looking: southwest
- Poles Visible: Structures
- Image File Name: IMG_1993.JPG

Simulation Notes

- Photo Taken: November 7, 2022, at 2:42 pm
- The image is based on a single photo and represent approximately 54 degree horizontal field of view.
- This view is approximately 405 feet northeast of the nearest pole represented in the simulation.
- The simulation is based on the best information available and is preliminary. Final alignment and structure locations are subject to change based on final engineering and other factors.

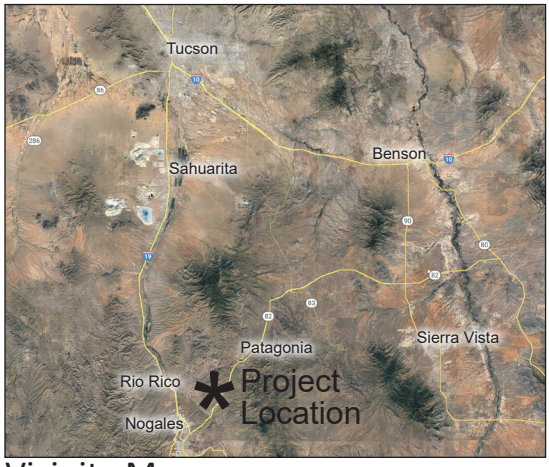
Key Observation Point (KOP) #22

Existing Condition

Simulated Condition - Alternative 1C

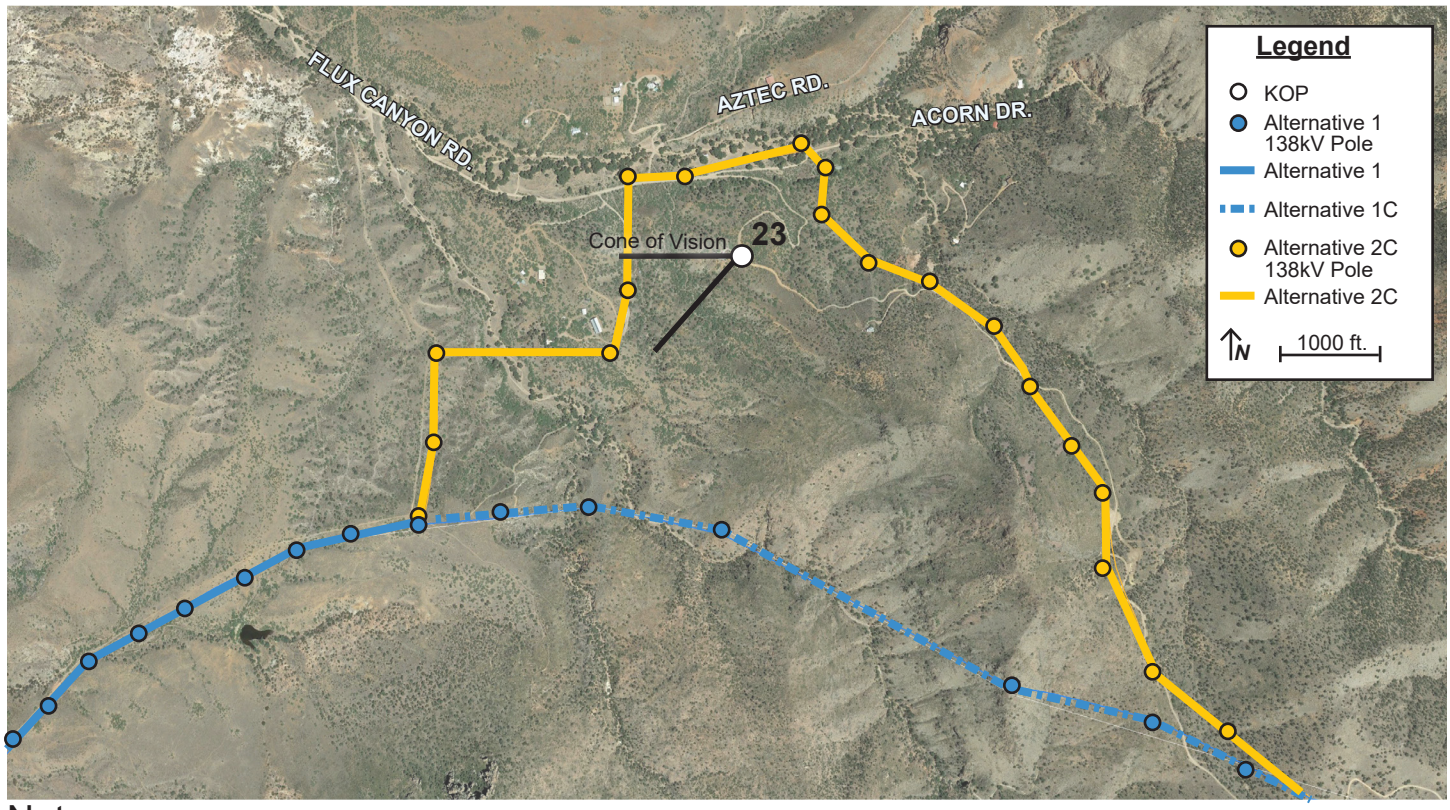
Simulated Condition - Alternative 2C

Key Observation Point (KOP) # 23



Vicinity Map

Project Map Enlargement



Notes:

Camera Information

- Type: Canon EOS RP
- Sensor: CMOS (Full-Frame) 35.9mm x 24mm
- Lens: Canon RF 24-105mm f/4-7.1 IS STM
- Focal Length: 24mm | F-Stop: f/9| ISO:100
- Dimensions in pixel: 6240 x 4160

KOP

- Representative View for: residents
- Location: Flux Canyon Road
- Latitude: 31.502353° N; Longitude: 110.768662° W
- View Point Elevation at Eye Level: 4,214 ft.
- Looking: west
- Poles Visible: Structures
- Image File Name: IMG_1957.JPG

Simulation Notes

- Photo Taken: November 7, 2022, at 2:31pm
- The image is based on a single photo and represent approximately 73.7 degree horizontal field of view.
- This view is approximately 1031 feet east of the nearest pole represented in the simulation.
- The simulation is based on the best information available and is preliminary. Final alignment and structure locations are subject to change based on final engineering and other factors.

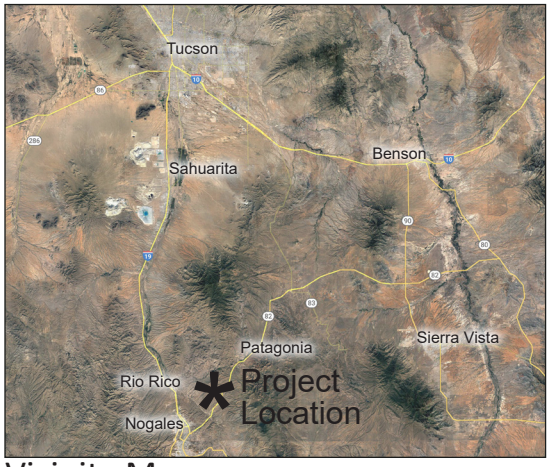
Key Observation Point (KOP) #23

Existing Condition

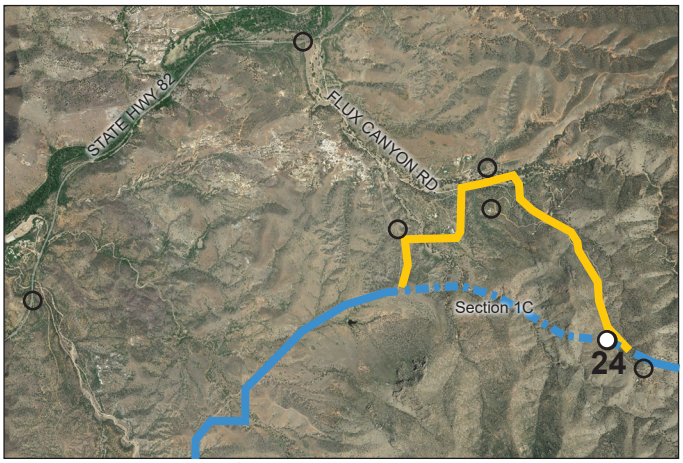
Simulated Condition - Alternative 1C

Simulated Condition - Alternative 2C

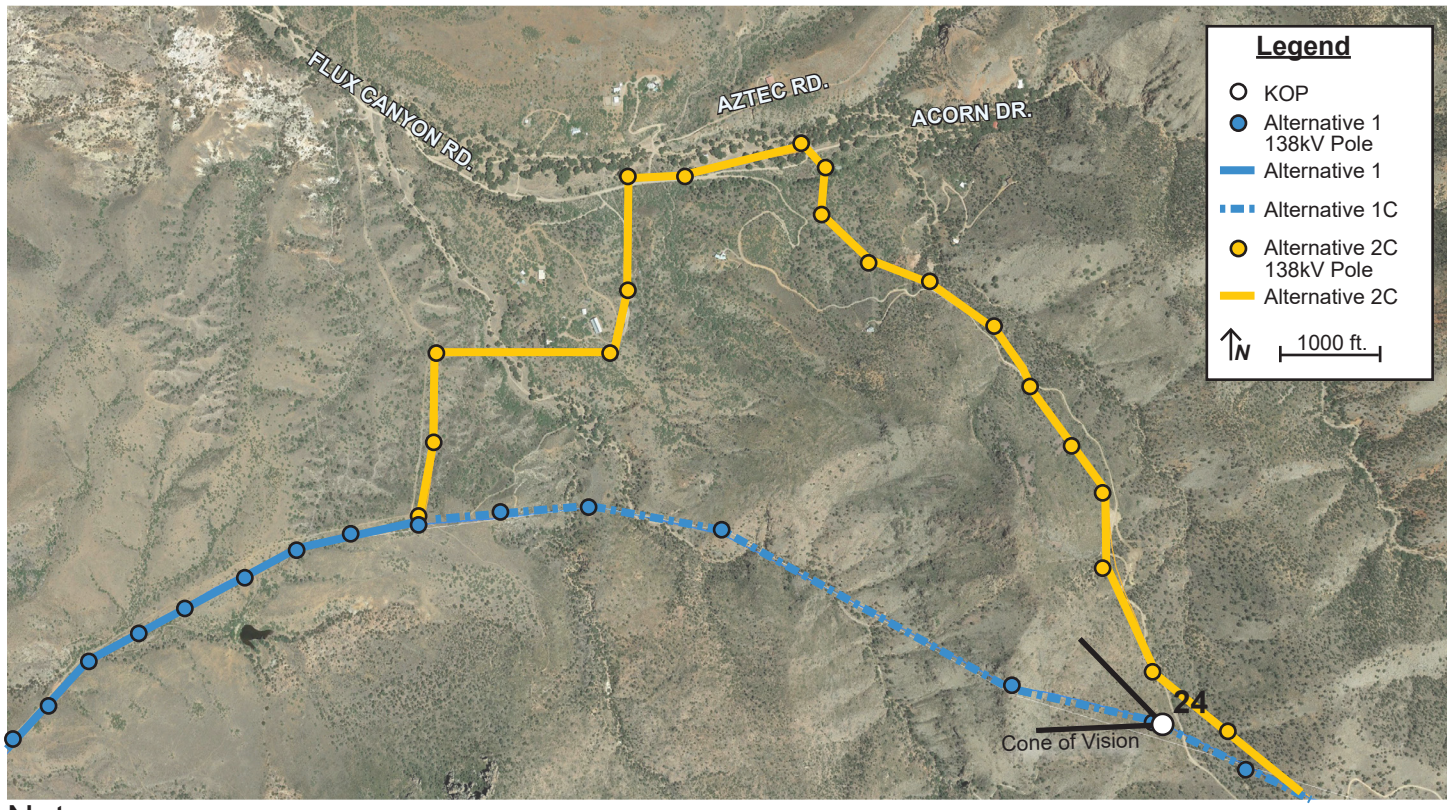
Key Observation Point (KOP) # 24



Vicinity Map



Project Map Enlargement



Notes:

Camera Information

- Type: Iphone 12 Pro
- Sensor: Apple 12 MP 1/3.6-inch sensor
- Lens: Apple 26 mm-equivalent f/1.6 lens
- Focal Length: 4mm(26mm equivalent) | F-Stop: f/1.6 | ISO:32
- Dimensions in pixel: 1280 x 960

KOP

- Representative View for: commercial and recreational users
- Location: USFS Land
- Latitude: 31.491935° N; Longitude: 110.758192° W
- View Point Elevation at Eye Level: 4,926 ft.
- Looking: northwest
- Poles Visible: Structures
- Image File Name: IMG_49.JPG

Simulation Notes

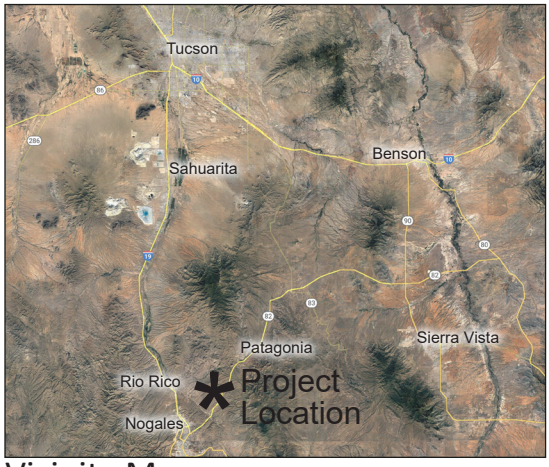
- Photo Taken: August 31, 2022, at 8:34am
- The image is based on a single photo and represent approximately 71 degree horizontal field of view.
- This view is approximately 1,136 feet southeast of the nearest pole represented in the simulation.
- The simulation is based on the best information available and is preliminary. Final alignment and structure locations are subject to change based on final engineering and other factors.

Key Observation Point (KOP) #24

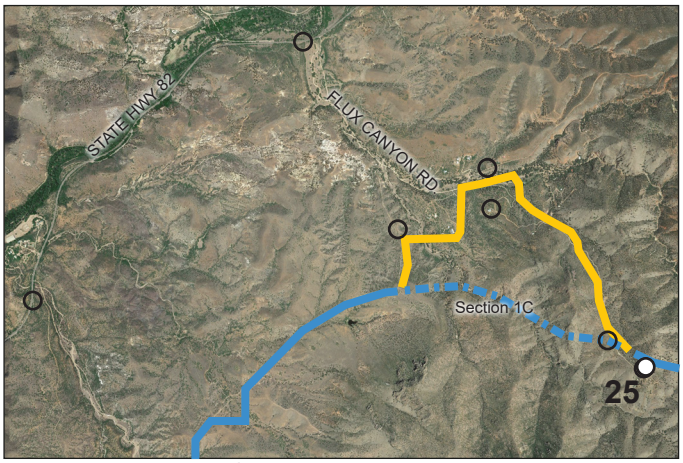
Existing Condition

Simulated Condition - Alternative 1C

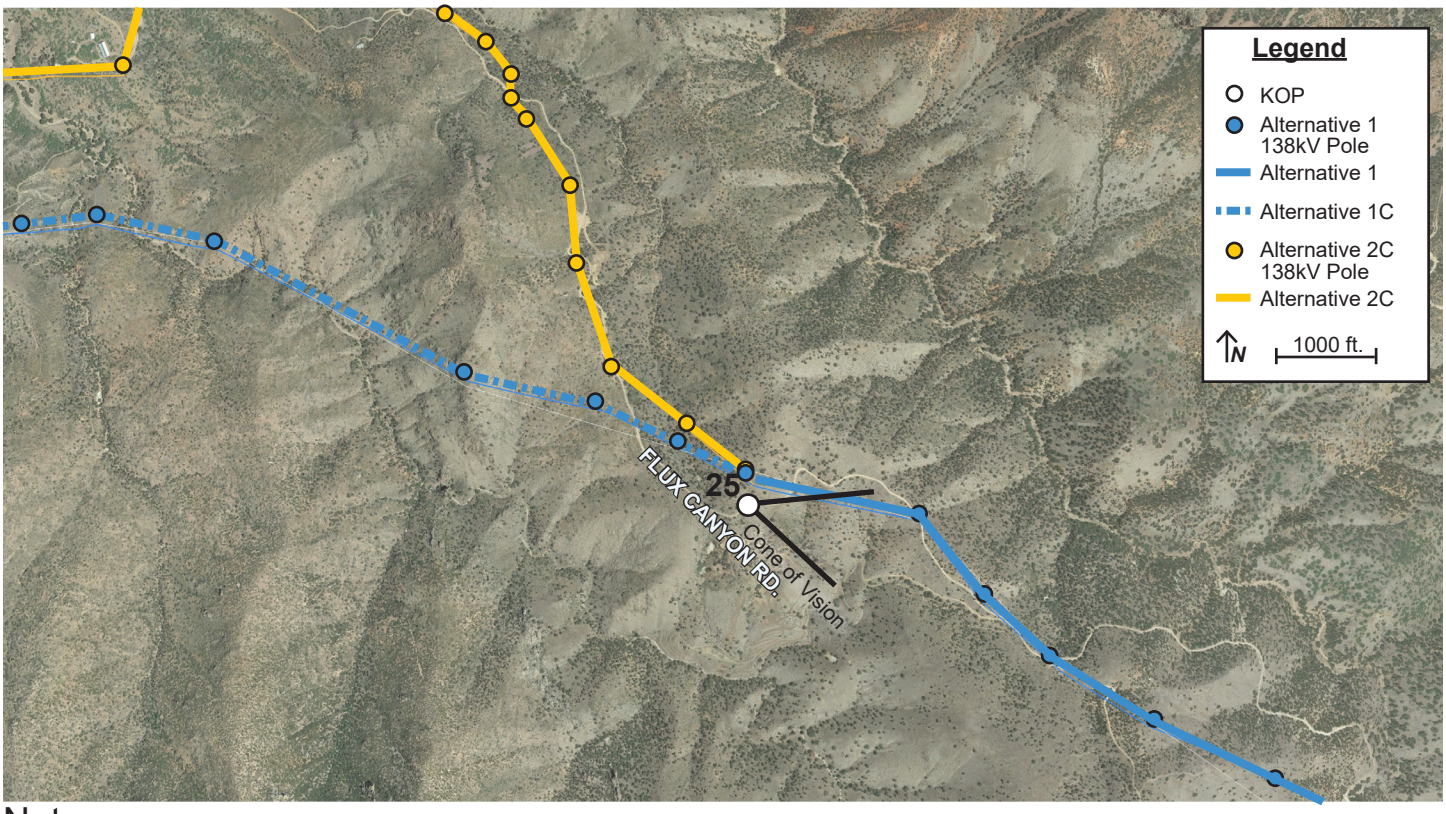
Key Observation Point (KOP) # 25



Vicinity Map



Project Map Enlargement



Notes:

Camera Information

- Type: Canon EOS RP
- Sensor: CMOS (Full-Frame) 35.9mm x 24mm
- Lens: Canon RF 24-105mm f/4-7.1 IS STM
- Focal Length: 24mm | F-Stop: f/7.1 | ISO:100
- Dimensions in pixel: 6240 x 4160

KOP

- Representative View for: recreationalists and residents
- Location: Flux Canyon Road
- Latitude: 31.489862° N; Longitude: 110.754737° W
- View Point Elevation at Eye Level: 4,953 ft.
- Looking: east
- Poles Visible: Structures
- Image File Name: IMG_1518.JPG

Simulation Notes

- Photo Taken: August 12, 2022, at 3:35 pm
- The image is based on a single photo and represent approximately 73.7 degree horizontal field of view.
- This view is approximately 587 feet west of the nearest pole represented in the simulation.
- The simulation is based on the best information available and is preliminary. Final alignment and structure locations are subject to change based on final engineering and other factors.

Key Observation Point (KOP) #25

Existing Condition

Simulated Condition

EXHIBIT H

This page intentionally left blank

EXHIBIT H: **EXISTING PLANS**

As stated in Arizona Administrative Code R14-3-219 of the Rules of Practice and Procedure Before Power Plant and Transmission Line Siting Committee, Exhibits to Application, Exhibit H:

To the extent applicant is able to determine, state the existing plans of the state, local government, and private entities for other developments at or in the vicinity of the proposed site or route.

H.1 Introduction H-2
H.2 Existing Plan Review H-2
H.2.1 Land Ownership and Jurisdiction H-2
H.2.2 Land Use Plans and Development Plans H-3
H.3 Local Government Plans H-3
H.3.1 Santa Cruz County Comprehensive Plan H-3
H.3.2 Santa Cruz County Zoning and Development Code H-3
H.3.3 Unified Nogales Santa Cruz County Transportation Plan H-4
H.3.4 2015 Nogales International Airport Master Plan H-4
H.3.5 Arizona State Land Department (ASLD) H-4
H.4 Federal H-5
H.4.1 Coronado National Forest (CNF) H-5
H.4.2 Military H-6
H.4.3 Federal Aviation Administration (FAA) H-6
H.5 Tribal H-6
H.6 Private H-7
H.7 Existing Land Use H-7
H.8 Proposed Land Uses and Developments H-9
H.9 Potential Effects H-9
H.10 Conclusion H-9
H.11 References H-10

H.1 **Introduction**

The Project will consist of building a new 138 kV transmission line approximately 20 miles in length, depending on the alternative approved, to connect the planned Rio Rico Switchyard to the planned Harshaw Substation. The Project will interconnect the existing 138 kV transmission line to the planned Substation. The Project will cross private and USFS owned land, as well as Santa Cruz County Road and ADOT ROW. One preferred route alternative has been identified, resulting from line siting studies, analysis, and a public participation process that began in 2020, with three 1.5- to 2.5-mile alternative routing options in areas of elevated community sensitivity. The proposed alternative routes are identified as Preferred Route 1, and Alternative Routes 1A, 1B, and 1C, and are described in Section B.1-4 of the application. The new line will be built of self-weathering steel monopoles ranging from 60 to 120 feet above ground, with the taller structures required for site specific clearance issues.

UNSE analyzed anticipated impacts of the Project on the existing land uses, land use plans, and any known development plans in the Project Study Area. Existing land use for the Project is mapped in Exhibit A-4. The entire Study Area is within Santa Cruz County, Arizona.

H.2 **Existing Plan Review**

The following review describes the current landscape and existing land use and land use plan goals and policies within the Project Study Area.

H.2.1 Land Ownership and Jurisdiction

"Area of jurisdiction" means the state, a county or an incorporated city or town which exercises concurrent or exclusive jurisdiction over a geographical area. “Land use jurisdiction” may include the administrative authority maintained by Federal, State, tribal, regional, or local government agencies responsible for land use planning and policies, based upon land ownership.

The Project is located wholly within Santa Cruz County and is therefore under County jurisdiction. There are Santa Cruz County-specific land use plans and policies applicable to activities within Santa Cruz County. Segments of the Preferred Route are within unincorporated Santa Cruz County public ROW and would be installed with an approved ROW permit granted by the County in accordance with Santa Cruz County Ordinance No. 1988-1.

A portion of the Project is located on USFS lands, and therefore also falls under federal agency jurisdiction. Additional federal laws will apply to this portion of the Project (see Section H.4.1).

The majority of the Preferred Route and Alternative Routes 1A, 1B, and 1C cross privately owned land, and will require the acquisition of new easements from private landowners.

During Project outreach, UNSE consulted with local, state, and federal agencies, government representatives, and stakeholders within the Study Area and along the alternative routes. Outreach and public participation activities are detailed in Exhibit J.

H.2.2 Land Use Plans and Development Plans

Local and federal agency jurisdictions that will be traversed by the Project have adopted land use plans and regulations that guide the type, time, and intensity of land use. UNSE conducted an inventory of applicable land use plans to determine which land use plans may intersect with the Project. Santa Cruz County has developed land use plans and regulations in the Study Area (see Section H.3.1).

The USFS implemented the Coronado National Forest Land and Resource Management Plan (Forest Plan) in 1986, and it was revised in 2018. The Forest Plan provides forest-specific guidance and information to oversee project and activity decision making on the CNF over the next fifteen years.

H.3 **Local Government Plans**

H.3.1 Santa Cruz County Comprehensive Plan

The Santa Cruz County Comprehensive Plan (The Plan) was originally adopted in 2004. It was revised and readopted in 2016 and is the current guiding plan. The Plan maps out Character Areas that define land use patterns and designs appropriate to different areas of the County. The Plan lays out Character Area goals for working in concert with Environmental/Open Space, Land Use, and Growth Area policies to guide the future growth and development of unincorporated Santa Cruz County. The Plan does not include guidelines for transmission line construction.

The Project traverses the Central Santa Cruz County (Greater Rio Rico) and the South-Central Santa Cruz County (Nogales East, Patagonia West, and Patagonia-Sonoita Scenic Road Corridor) Character Areas. These Character Areas have some common policy goals in The Plan. One of these is Goal 9, which states: 1) the need for new infrastructure to support economic growth; and 2) meet modern standards. The goals call for design and implementation of new infrastructure to be thoughtful and designed in such a way so as to avoid adverse effects on wildlife, the visual quality of the area, natural areas, existing developments, and public health. In accordance with The Plan, the preferred route follows existing utility corridors where feasible, provides a buffer to residential land uses, and attempts to preserve the natural and visual landscape to the extent possible.

H.3.2 Santa Cruz County Zoning and Development Code

The Santa Cruz County Zoning and Development Code states its purpose is to promote the public health, peace, safety, comfort, convenience, and general welfare of the citizens of Santa Cruz County. More specifically, the Santa Cruz County Zoning and Development Code implements the County Comprehensive Plan objectives and policies.

The Land Use Element of The Plan encourages adequate opportunity for new development while conserving traditional development patterns and densities. This policy objective is largely achieved by the Zoning and Development Code with two general types of land use intensities and densities: suburban and rural. In the Greater Rio Rico area, a more suburban development pattern is present with warehouse and employment land uses indicative of commercial and industrial zones near I-19. High and medium density residential zones round out the suburban character of the area. The South-Central Character Area is largely defined by rural ranching and low-density residential land uses. The zoning in this Character Area is composed of General Rural, and Suburban Ranch, with Industrial zoning surrounding the Nogales

International Airport. The Project is located entirely within the General Rural (GR) Zoning District. Public utility substations and associated facilities operated as part of a system servicing the public, such as transmission lines and switchyards, are permissible uses within the GR zone. Switchyards and substations are still subject to minimum front, side, and rear setbacks, as well as vegetative and masonry screening requirements.

A development plan will be submitted to Santa Cruz County for the switchyard in Rio Rico.

H.3.3 Unified Nogales Santa Cruz County Transportation Plan

The Unified Nogales Santa Cruz County Transportation Plan was initiated by ADOT in cooperation with the City of Nogales and Santa Cruz County. The project Study Area encompasses the majority of Santa Cruz County and is generally centered along I-19 for the full north-south length of the county. The stated purpose of this plan is to develop an achievable implementation plan for transportation system improvements.

ADOT, in coordination with Santa Cruz County, has proposed two project alternatives to interconnect I-19 to SR 82, reaching to the Nogales International Airport. The ADOT project Alternative B calls for new roadway construction and would require acquisition of 6 miles of new road ROW. The proposed alignment of ADOT's project Alternative B would follow the rough alignment of the Project through private property. Area growth has been slower than expected since the creation of the transportation plan, so the interconnection project planning is beyond the long-term planning horizon and remains unfunded.

H.3.4 2015 Nogales International Airport Master Plan

Nogales International Airport is a general aviation facility, as defined by the Federal Aviation Administration (FAA), which means it is intended to serve the aviation needs of the community. The airport is included in the FAA's National Plan of Integrated Airport Systems (NPIAS). As such, the airport is eligible for federal development grants. Santa Cruz County owns and operates the airport, which is located approximately seven miles northeast of the central business district of Nogales, Arizona. The airport is located less than one mile southeast of alternative Section 1B.

The 2015 Nogales International Airport Master Plan sets forth an implementation plan of recommended improvements based on the potential demand horizons rather than future dates in time. Recognizing the uncertainty of economic growth, the forecast approach used in the Airport Master Plan will implement projects based on operational demand levels allowing for a nimble development response to unanticipated needs. The Airport Master Plan calls for an airfield improvement, including a 300-foot extension of Runway 3-21 to satisfy FAA recommended runway lengths to fully accommodate 75 percent of business jets.

H.3.5 Arizona State Land Department (ASLD)

Lands managed by ASLD are located within the Study Area, but no Project alternatives cross, or are located in, the immediate vicinity of these lands.

H.4 **Federal**

H.4.1 Coronado National Forest (CNF)

The Coronado National Forest Land and Resources Management Plan (Forest Plan) published in 2018 is the land management guide for the CNF and represents the latest revision of the CNF Forest Plan. The CNF administers approximately 1.78 million acres of USFS lands in southeastern Arizona. The CNF is organized into five ranger districts with each district administering one or more ecosystem management areas. The Project lies within the Sierra Vista Ranger District, which encompasses the Huachuca Ecosystem Management Area (EMA) and the Whetstone EMA. The Preferred Route on the CNF is 7.31 miles and wholly within the Huachuca EMA.

The CNF uses special use permits (SUP) to authorize various activities on Forest Service Lands to provide needed services to communities that cannot be reasonably accommodated on non-federal land. Desired conditions set forth by the Forest Plan state that environmental, social, and visual impacts are minimized and that the permit area and duration are the minimum necessary to accommodate the use. Relating specifically to electric utility lines, SUP guidelines state that:

- Lines that cross National Forest System lands to access private inholdings or Forest Service facilities should be located and designed so as to be screened by topography or vegetation as much as possible.
- Line requests to cross National Forest System lands to access private lands outside the national forest boundary should not be permitted outside of existing utility corridors.
- New or reconstructed utility lines should be placed underground when possible, to protect scenic resources, unless this is not feasible because of overriding environmental concerns or technical considerations.
- New electric transmission lines and natural gas pipelines should be located in existing corridors that meet the scenic integrity objective.

Additional management guidelines are identified in specific Land Use Zones. These are designated based on characteristics and resources of the area. The Preferred Route traverses the Roaded Backcountry Land Use Zone. This zone has one specific guideline relating to utility lines stating:

- New utility structures and power lines should be located within existing communications sites and utility corridors except as needed to meet statutory requirements, such as mining law or laws to protect public health and safety.

UNSE has submitted a Special Use Permit application (SF-299, Application for Transportation, Utility Systems, Telecommunications and Facilities on Federal Lands and Property) to the CNF, with a permit issuance requested for Q4 2023. The SF-299 application for the permit was accepted in December of 2022.[2] The preferred route generally follows the existing El Paso Natural Gas pipeline utility corridor and

[2] The acceptance of the SF-299 application signifies that the federal agency has confirmed the application package is complete. The USFS will then being the process to review the proposal, which includes a NEPA evaluation. Following proposal evaluation, the USFS will reach a decision as to whether to grant, grant with conditions, or deny the special use permit.

the existing UNSE 13.2 kV distribution line along Flux Canyon Road. Certain portions of the Preferred Route deviate from existing utility corridors to take advantage of mountainous topography to screen the project from residents near the mouth of Flux Canyon limiting social and visual impacts of the project. The project will be an above ground transmission line due to the increased environmental impacts of locating the line underground, increased costs to construct and maintain, and operational considerations for routine inspections and repairs. UNSE's engineering consultant, Sargent & Lundy, evaluated the impacts of an underground transmission line on USFS land, which was summarized in a memo submitted to the CNF as an attachment to the SF-299 SUP application (Exhibits J-22.1 and J-22.2).

H.4.2 Military

The Project is in the vicinity of Military Training Routes (MTR), Military Operations Areas (MOA), and Special Use Airspace (SUA) used by Fort Huachuca and the Tucson Air National Guard. See Exhibit H-1 for locations of military airspace intersecting the Project. FAA policies (discussed below) that generally relate to MTR, MOA and SUA are military airspace designations that define military airspace use as separate from civilian airspace. Capitol Airspace Group, airspace consultants hired by UNSE, conducted an Informal Review notification to the Department of Defense (DoD). This is recommended when a transmission line is in the vicinity of DoD operations. The DoD Aviation and Installation Assurance Siting Clearinghouse issued a written response dated November 22, 2022, stating that The Project as proposed would have minimal impact on military operations conducted in the area. On January 25, 2023, UNSE received an updated response to the Informal Review stating that The Project may impact U.S. Army test operations within the Buffalo Soldier Test and Training Range. On February 13, 2023, UNSE received notification that the Project would not result in any specific impacts to the U.S. Army's mission (see Exhibit I-3).

H.4.3 Federal Aviation Administration (FAA)

FAA jurisdiction within the central portion of the Study Area extends from the Nogales International Airport within a 3- to 5-mile radius. The FAA requires application for an obstruction evaluation for new poles within that radius to determine whether the proposed construction would obstruct aviation activities, to include flight paths or communications. A Notice of Construction may also be required depending on the results of the obstruction evaluation. Capitol Airspace Group submitted preliminary engineering for all structures on the line for Obstruction Evaluation/Airport Airspace Analysis (OE/AAA) to the FAA. The OE/AAA will conclude once the DoD has completed their Formal Review of The Project (see Section H.4.2).

H.5 **Tribal**

No tribal lands exist along the alternative routes for this Project. The following tribal nations have expressed a historical connection to the land within the Study Area and have received newsletters notifying them of the Project: The Pueblo of Zuni, Tohono O'odham Nation, Ak-Chin Indian Community, Gila River Indian Community, Salt River Pima-Maricopa Indian Community, White Mountain Apache Tribe, Mescalero Apache Tribe, Pascua Yaqui Tribe, Hopi Tribe, and the Navajo Nation. No comments have been received from any tribal nation.

H.6 **Private**

No private entity land use plans were identified on private lands in the Study Area.

H.7 **Existing Land Use**

UNSE conducted a land use inventory and an assessment of potential impacts on existing land uses that may occur as a result of construction and operation of the Project. The existing land use is generally consistent with the Santa Cruz County Comprehensive Plan, and is mapped in Exhibit H-2. Overall, the Project Study Area is a mix of developed suburban and rural undeveloped areas with residential, commercial, and industrial land uses present. The land use categories identified in Exhibit H-2 are described below.

Residential:
Residential land uses within the Study Area range from very low to medium density single-family residential areas. Exhibit H-2 depicts the locations of all residential land use as determined through Google aerial photo analysis and verified through field visits. There are 14 platted subdivisions within the Study Area; from west to east, these subdivisions become less developed and more rural in character.

Commercial:
Commercial businesses including office/business parks, retail establishments, etc., are located in the Study Area along the I-19 corridor.

Industry/Light Industry:
Produce warehouses and public utility systems are located in the Study Area in the vicinity of the I-19 corridor.

Utilities:

- Electrical transmission and distribution lines, as well as telephone and cable lines are present in the Study Area.
- Kinder Morgan owns and operates an El Paso Natural Gas Pipeline (EPNG Pipeline), which transports natural gas from the San Juan, Permian, and Anadarko basins to several Western States and Northern Mexico. The Project generally follows portions of the EPNG Pipeline. Approximately 11 miles of the EPNG Pipeline are within the Study Area.
- Residential and commercial land uses in the Study Area use propane gas services.
- Liberty Water has active water and wastewater lines in the Study Area located within 2 miles east of I-19.
- The Nogales International Wastewater Treatment plant, located directly northwest of the proposed Rio Rico Switchyard, receives wastewater from the Ambos Nogales area and is operated by the International Boundary and Water Commission.
- There are active cell towers in the Study Area, referenced in Exhibit I.

Transportation Network: I-19 and SR 82 are the major arterial corridors in the Study Area. The primary connector streets include Ruby Road, Pendleton Drive, and South River Road. Flux Canyon Road both on and off the CNF is central to the construction of the Project.

Vacant/Undeveloped Land:
East of the more suburban, Greater Rio Rico area, existing platted subdivisions north of the preferred and alternative routes are underdeveloped. South of the preferred alternative routes there are large unsubdivided properties.

Municipal Parks/Recreation Complex: See Exhibit F for a detailed discussion of Recreation in the Study Area.

Table 12 shows the percentage of different land uses throughout the preferred and alternative routes. The preferred common Route 1 and Alternative Routes 1A, 2A, 1B, 2B, and 1C consist of between 95% and 100% of vacant and undeveloped land use. Alternative Route 2C comprises the highest percentage of residential land use across all alternative routes. It is important to note that the preferred alternative, Section 1C, was developed as a direct result of public comment received during the August/November 2022 Open Houses from residents along Flux Canyon Road.

Table 12. Percentage Land Use Along Alternative Routes

Proposed Alternative Routes	Land Use	Percent of Land Use Crossed
Preferred Route 1 Common to all	Residential	0
	Public Service	0.8
	Recreational	4
	Vacant/Undeveloped	95.2
1A	Vacant/Undeveloped	100
2A	Vacant/Undeveloped	100
1B	Vacant/Undeveloped	100
2B	Vacant/Undeveloped	100
1C	USFS-Vacant/Undeveloped	100
2C	Residential	30
	Vacant/Undeveloped USFS	60
	Vacant/Undeveloped Private	10

H.8 **Proposed Land Uses and Developments**

No new proposed land uses in the Study Area have been identified through discussions with Santa Cruz County Development Services. Future development on privately owned lands under county or municipal planning jurisdiction will require approval by the respective jurisdiction's planning and development departments.

H.9 **Potential Effects**

Land use impacts may be defined primarily as 1) incompatible with existing plans or proposed land uses, plans, or developments, or 2) restrictions on a land use that would result from the construction or operation of the Project. Potential effects on future or planned land use are generally associated with Project construction rather than operation, as once construction is completed, no further land use changes are anticipated. As demonstrated in this application, the Project is compatible with local land use plans, therefore there would be no impacts of the Project anticipated on local, state, and federal land use plans within the Study Area.

Restrictions on land use would result from ROW or easement acquisition across a property. The project has fixed termini at the planned switchyard in Rio Rico, and the planned Harshaw substation. 54% of the Project would be built on private land, and 46% on USFS land. Of this, approximately 38% would follow existing utility or road ROW corridors, reducing the impact of the Project on use of the land.

Potential effects from this project on residential land use and USFS land would include restrictions on use of the land within the Project ROW.

Santa Cruz County Flood Control District (SCCFCD)

UNSE does not anticipate impacts on SCCFCD plans. Any need for SCCFCD permits would be dependent upon the actual pole placement, regardless of which of the proposed routes is constructed.

Santa Cruz County

UNSE has coordinated with Santa Cruz County throughout the development of its proposed routes. The alternative routes are compatible with the County's plans and ordinances as demonstrated in this Application. Any further coordination, including applying for permits, and completing required studies will be completed.

H.10 **Conclusion**

All proposed routes are generally consistent with local, state, and federal land use plans. The majority of the preferred and alternative routes would be constructed on easements across private property which is predominantly vacant and undeveloped. Land use impacts are anticipated to be minor to low depending on the alternative route selected. As mentioned previously, Alternative Route 2C would have more impact on existing residential land uses.

The Santa Cruz County Comprehensive Plan includes Land Use and character area goals and policies that discuss the need for new infrastructure to support economic growth and meet modern standards. Policies for land use mentioned in this plan call for the provision of new infrastructure to be thoughtfully designed

to avoid adverse effects existing land uses, as well as the natural and social environment. In accordance with The Plan, the preferred route follows existing utility corridors where feasible, provides a buffer to residential land uses, and attempts to preserve the natural and visual landscape to the extent practicable.

The Coronado National Forest Land and Resources Management Plan describes forest wide management policies and land use management guidelines. These dictate the desired conditions for USFS lands and the appropriate manner in which special uses are authorized. The Project complies with these guidelines and policies and will be subject to any conditions set forth as a result of the forthcoming analysis mandated by the NEPA.

H.11 **References**

Santa Cruz County Comprehensive Plan
https://www.santacruzcountyaz.gov/DocumentCenter/View/7400/Santa-Cruz-County-2016-Comprehensive-Plan?bidId=

Santa Cruz County Zoning and Development Code.
https://santacruzcountyaz.gov/DocumentCenter/View/14126/Santa-Cruz-County-Zoning-and-Development-Code

Unified Nogales Santa Cruz County Transportation Plan
2010https://apps.azdot.gov/ADOTLibrary/Multimodal_Planning_Division/Planning_Assistance_for_Rural_Areas_Studies/PARA-Nogales_Santa-Cruz_County_Transportation_Plan-FR-1004.pdf

2015 Nogales International Airport Master Plan

https://apps.azdot.gov/files/Airports/MP_PDF/Nogales/Nogales-Master-Plan-2015.pdf

Coronado National Forest Land and Resources Management Plan
https://www.fs.usda.gov/Internet/FSE_DOCUMENTS/fseprd583208.pdf

Santa Cruz County GIS

https://sccaz-gis.maps.arcgis.com/home/index.html

Arizona Military Regional Compatibility Project, Fort Huachuca Joint Land Use Study

https://dema.az.gov/sites/default/files/MAC-RCP_JLUS-Ft-Huachuca_2007-July.pdf

Capitol Airspace Group. 2022 personal communications.

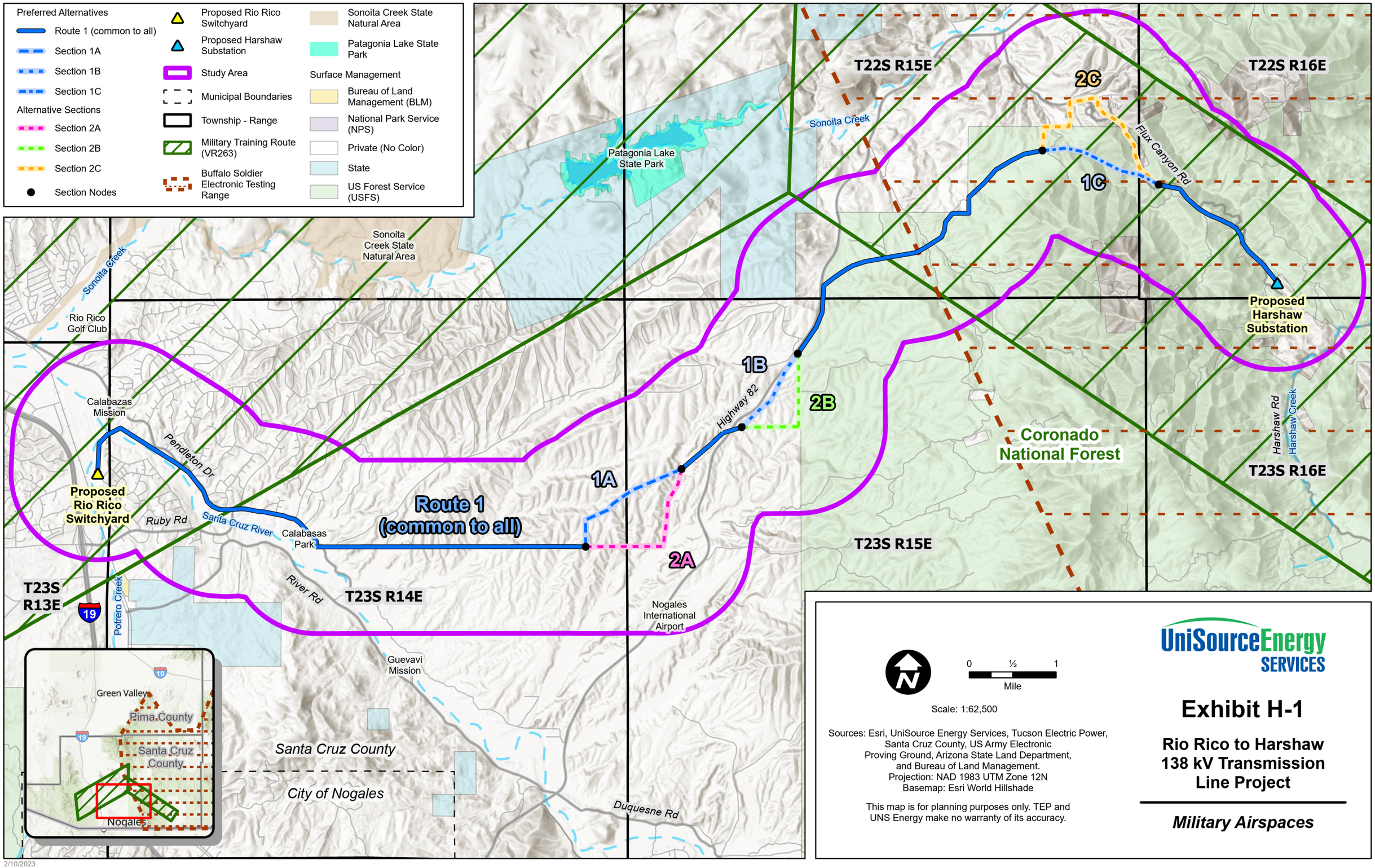
Application for a Certificate of Environmental Compatibility

Rio Rico to Harshaw

138 Kilovolt Transmission Line Project

Exhibit H-1

This page intentionally left blank


Preferred Alternatives
Route 1 (common to all)
Section 1A
Section 1B
Section 1C
Alternative Sections
Section 2A
Section 2B
Section 2C
Section Nodes
Proposed Rio Rico Switchyard
Proposed Harshaw Substation
Study Area
Municipal Boundaries
Township - Range
Military Training Route (VR263)
Buffalo Soldier Electronic Testing Range
Sonoita Creek State Natural Area
Patagonia Lake State Park
Surface Management
Bureau of Land Management (BLM)
National Park Service (NPS)
Private (No Color)
State
US Forest Service (USFS)
T22S R15E
T22S R16E
T23S R15E
T23S R16E
T23S R14E
T23S R13E
2C
1C
1B
2B
1A
2A
Route 1 (common to all)
Sonoita Creek
Patagonia Lake State Park
Sonoita Creek State Natural Area
Flux Canyon Rd
Proposed Harshaw Substation
Highway 82
Coronado National Forest
Harshaw Rd
Harshaw Creek
Rio Rico Golf Club
Calabazas Mission
Pendleton Dr
Proposed Rio Rico Switchyard
Ruby Rd
Santa Cruz River
Calabasas Park
River Rd
Potrero Creek
19
Nogales International Airport
Guevavi Mission
Santa Cruz County
City of Nogales
Duquesne Rd
Green Valley
Pima County
Santa Cruz County
Nogales
10
0
½
1
Mile
Scale: 1:62,500
Sources: Esri, UniSource Energy Services, Tucson Electric Power, Santa Cruz County, US Army Electronic Proving Ground, Arizona State Land Department, and Bureau of Land Management.
Projection: NAD 1983 UTM Zone 12N
Basemap: Esri World Hillshade
This map is for planning purposes only. TEP and UNS Energy make no warranty of its accuracy.
UniSourceEnergy SERVICES
Exhibit H-1
Rio Rico to Harshaw 138 kV Transmission Line Project
Military Airspaces
2/10/2023

This page intentionally left blank

Application for a Certificate of Environmental Compatibility

Rio Rico to Harshaw

138 Kilovolt Transmission Line Project

Exhibit H-2

This page intentionally left blank

Preferred Alternatives
- Route 1 (common to all)
- Section 1A
- Section 1B
- Section 1C

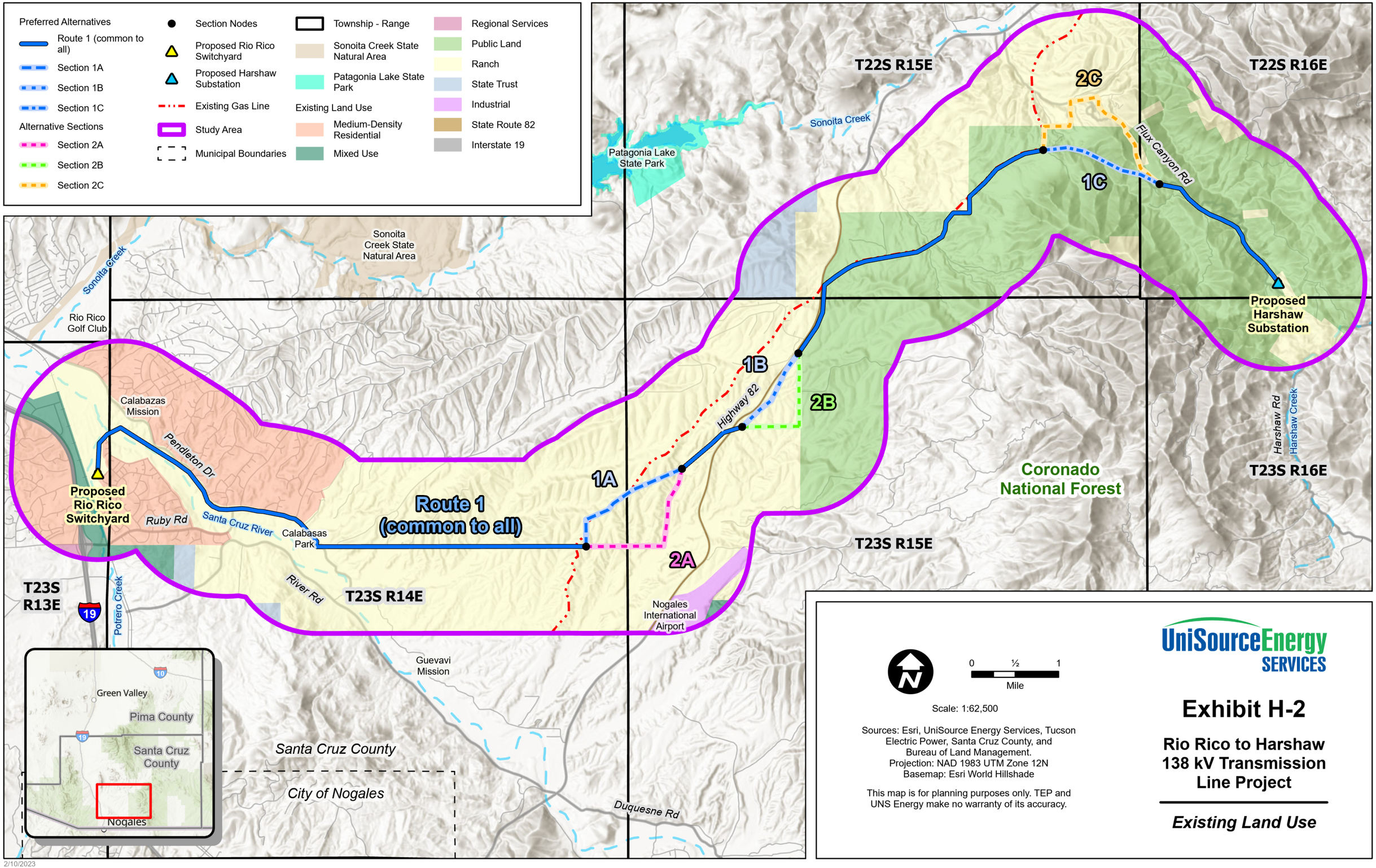
Alternative Sections
- Section 2A
- Section 2B
- Section 2C

- Section Nodes
- Proposed Rio Rico Switchyard
- Proposed Harshaw Substation
- Existing Gas Line
- Study Area
- Municipal Boundaries

- Township - Range
- Sonoita Creek State Natural Area
- Patagonia Lake State Park

Existing Land Use
- Medium-Density Residential
- Mixed Use

- Regional Services
- Public Land
- Ranch
- State Trust
- Industrial
- State Route 82
- Interstate 19



0 ½ 1
Mile

Scale: 1:62,500

Sources: Esri, UniSource Energy Services, Tucson Electric Power, Santa Cruz County, and Bureau of Land Management.
Projection: NAD 1983 UTM Zone 12N
Basemap: Esri World Hillshade

This map is for planning purposes only. TEP and UNS Energy make no warranty of its accuracy.

UniSourceEnergy SERVICES

Exhibit H-2

Rio Rico to Harshaw 138 kV Transmission Line Project

Existing Land Use

2/10/2023

This page intentionally left blank

EXHIBIT I

This page intentionally left blank

EXHIBIT I: ANTICIPATED NOISE AND INTERFERENCE WITH COMMUNICATION SIGNALS

As stated in Arizona Administrative Code R14-3-219 of the Rules of Practice and Procedure Before Power Plant and Transmission Line Siting Committee Exhibits to Application, Exhibit I:

"*Describe the anticipated noise emission levels and any interference with communication signals which will emanate from the proposed facilities.*"

I.3 Corona Noise I-4
I.4 Radio Interference I-6
I.5 Communication Interference I-6
I.6 Television Interference I-6
I.7 Electric and Magnetic Field Effects I-7
I.7.1 Existing EMFs within the Preferred Alternative Route I-7
I.7.2 Electric and Magnetic Fields Background I-7
I.8 Conclusion I-9
I.9 References I-9

I.1 **Introduction**

The Project will consist of building a new 138 kV transmission line approximately 20 miles in length, depending on the alternative approved, to connect the planned Rio Rico Switchyard to the planned Harshaw Substation. The Project will interconnect the existing 138 kV transmission line to the planned Substation. The Project will cross private and USFS owned land, as well as Santa Cruz County Road and ADOT ROW. One preferred route alternative has been identified, resulting from line siting studies, analysis, and a public participation process that began in 2020, with three 1.5- to 2.5-mile alternative routing options in areas of elevated community sensitivity. The proposed alternative routes are identified as Preferred Route 1, and Alternative Routes 1A, 1B, and 1C, and are described in Section B.1-4 of the application. The new line will be built of self-weathering steel monopoles ranging from 60 to 120 feet above ground, with the taller structures required for site specific clearance issues.

The following analysis describes the anticipated noise impacts and interference with communication signals within the Study Area. The Study Area for noise is 1 mile on either side of the Project centerline (2 miles in total width). The entire Study Area is within Santa Cruz County, Arizona. The Project will generate both audible noise during the construction and maintenance phases, and minor corona noise during operation.

I.2 **Audible Noise**

Baseline ambient noise levels in the Study Area were estimated using the relationship between population density and noise levels. Populations for the majority of the area immediately adjacent to the proposed route alternatives are rural; with a suburban character near Rio Rico. The County has an average population density of 39 people per square mile (considered low). Rio Rico has an average population density of 299 people per square mile. Typical ambient noise levels for a rural setting are less than 40 A-weighted decibels (dBA). In the western portion of the Study Area, the proposed switchyard is located within 0.25 miles of I-19 and the Union Pacific Railway (UPRR), 2.4 miles of the Project run along Pendleton Drive, and approximately 2 miles run along SR 82. Ambient noise levels in these areas are higher than the remainder of the Study Area.

Sources of noise along the preferred and alternative routes primarily relate to transportation sources and include traffic on I-19, SR 82, local access traffic, aircraft from the Nogales International Airport, and noise from UPRR. Existing land use also contributes to noise levels. There are no sensitive noise receptors such as schools, libraries, and hospital/health care facilities located in the Study Area (see Exhibit H).

Some level of audible noise will result from transmission line construction, operation, and maintenance. During construction, equipment used for assembly and erection of structures, wire pulling and splicing activities, as well as construction equipment and vehicles used to transport crews and materials will generate noise. Noise from construction activities would be audible, particularly to the closest residents. This construction noise, however, would not be considered to be a major impact because construction would occur during daytime hours when tolerance to noise is higher, and would be temporary, lasting only a few days at a time in any one location. Long-term audible noise impacts from transmission line operation and maintenance activities are expected to be minimal.

Uncontrolled noise levels for typical construction equipment are displayed in Table 13. The maximum noise levels will range between 80 to 85 dBA at 50 feet from construction equipment. As a general rule of thumb, noise levels drop 6 dBA every time the distance from a point source is doubled.

Table 13. Typical Noise Levels for Construction Equipment

Equipment	Typical Maximum Levels (dBA at 50 feet)
Front loader	80
Backhoe, excavator	80
Tractor, dozer	85
Grader, scraper	85
Dump truck	84
Pick-up truck	55
Concrete mixer truck	85
Crane (movable)	85
Pump	77
Generator	82
Compressor (air)	80

Equipment	Typical Maximum Levels (dBA at 50 feet)
Pneumatic tools	85
Compactor (ground)	80
Auger drill rig	85
Source: FHWA 2017	

Construction criteria for acceptable noise limits for nearby residents as established by the U.S. Department of Transportation (USDOT) were used to assess impacts from construction noise due to the Project (Table 14). These criteria are not standardized, but they are considered reasonable guidelines for determining construction noise impacts (USDOT 2012). The acceptability standards are given in terms of the 1-hour equivalent noise level (Leq), the 8-hour equivalent noise level (Leq), and the weighted day night average (Ldn) noise level.

Table 14. General Construction Noise Assessment Criteria Acceptable Limits

Land use	One-hour L_{eq} (dBA)		8-hour L_{eq} (dBA)		Weighted L_{dn} (dBA)
	Day	Night	Day	Night	30-day average*,**
Residential	90	80	80	70	75
Commercial	100	100	85	85	80
Industrial	100	100	90	90	85
* Note: In urban areas with very high ambient noise levels (L_{dn}>65 dBA), L_{dn} from construction should not exceed existing ambient plus-10 decibels.					
** Note: 24 hour L_{eq}, not L_{dn}					
Source: USDOT 2012					

Based on typical usage factors, the average construction noise level is conservatively estimated to be 83 dBA at 50 feet from the centerline of the transmission line. Thus, from 0 to approximately 75 feet from the transmission line, construction noise levels would slightly exceed the USDOT 8-hour Leq standards for construction in residential areas. Construction in some areas will be occurring in residential areas that are located within 0.25 miles of I-19 and the UPRR. These areas experience one-hour traffic volumes that can exceed 2,000 cars per hour (Table 15). Traffic volumes of 2,000 cars per hour can generate 73.9 dBA at 55 miles per hour traffic speed (Table 16) (ADOT, 2021).

Table 15. Traffic on Roads in the Project Area

ROAD	SPEED LIMIT (mph)	AADT
I-19	75	27,816 to 37,542
SR-82	55	1900

(ADOT, 2021)

Table 16. Noise Generated by Traffic (dBA) at 50 feet

	SPEED (MILES/HOUR)				
Vehicles /hour	**35**	**40**	**45**	**50**	**55**
500	63.2	64.4	65.6	66.8	67.9
1000	66.2	67.4	68.6	69.8	70.9
2000	69.2	70.4	71.6	72.8	73.9
3000	71.0	72.2	73.4	74.6	75.7

(WSDOT, 2020)

Noise levels associated with the transmission line construction are anticipated to decrease according to typical point source distance attenuation (Table 17). As such, at a distance of approximately 75 feet and beyond, noise is expected to be within suitable limits. Construction noise impacts will be temporary, and construction is focused around structure location, not spread along the length of the transmission line.

Construction activity related to one transmission line structure with a concrete foundation is typically completed in three days total. One to two consecutive days to drill the foundation and pour the concrete, and another day, at a later time, to set the pole. It takes less than a day to erect a typical direct embed pole. This makes the duration of direct noise impacts within 100 feet of noise receptors brief and temporary. To reduce noise impacts whenever a receptor is within approximately 100 feet of the active transmission construction area, any idling equipment will be parked as far away from the receptor as possible and turned off when possible.

Table 17. Construction Noise Level Estimates*

Distance from centerline (feet)	Estimated Construction Noise Levels Leq (dBA)	Estimated Ldn (dBA)
50	83	78
100	77	72
150	74	69
200	71	67
300	68	64
400	65	61
800	59	57

*Note: A background nighttime noise level of 45 dBA is assumed.

The majority of construction noise impacts (i.e., those beyond 100 feet) are expected to have minor short-term impacts. Typical noise levels for construction beyond 100 feet are below the USDOT acceptable limits. The majority of the work is planned to occur during the daytime period in accordance with local guidelines. No nighttime work is planned, but in the event nighttime work is necessary, UNSE will notify residents who would be affected in advance.

I.3 **Corona Noise**

Noise emanating from a transmission line is caused by corona. Corona is the electrical ionization of the air that occurs near the surface of the energized conductor and suspension hardware due to electric field strength. Certain electromagnetic effects are inherently associated with overhead transmission of electrical power at high voltage. These effects are produced by the electric and magnetic fields (EMF) of the transmission line with one of the primary effects being corona discharge. Corona effects are manifested as audible noise (AN), radio interference, and television interference. These particular effects will be minimized by line location, line design, and construction practices. Results presented in this exhibit are based on consideration of the various possible construction configurations along the alternative routes. Corona may result in AN being produced by a transmission line. Corona noise levels are typically 40 to 50 dBA at the edge of the ROW. In comparison, a vacuum cleaner typically produces 60 to 80 dBA.

The amount of corona produced by a transmission line is a function of the voltage of the line, the diameter of the conductors, the locations of the conductors in relation to each other, the elevation of the line above sea level, the condition of the conductors and hardware, and the local weather conditions. Corona typically becomes a design concern for transmission lines at 345 kV and above and is less noticeable from lines that are operated at lower voltages, such as the proposed Rio Rico to Harshaw 138 kV transmission line.

The electric field gradient is greatest at the surface of the conductor. Large-diameter conductors have lower electric field gradients at the conductor surface; hence, lower corona than smaller conductors, everything else being equal. The conductors for the Project will be of a larger diameter, and thus will have a reduced potential to create audible noise. Irregularities (such as nicks and scrapes on the conductor surface or sharp edges on suspension hardware) concentrate the electric field at these locations, increasing the electric field gradient and the resulting corona at these spots. Similarly, foreign objects on the conductor surface, such as dust or debris can cause irregularities on the surface that are a source for corona.

Corona also increases at higher elevations where the density of the atmosphere is less than at sea level. AN varies with elevation with the relationship of A/300, where A is the elevation of the line above sea level measured in meters (EPRI 2005). AN at a 600-meter (1,968.5 feet) elevation would be twice the AN at 300 meters (984.25 feet) all other things being equal. The elevations along the Project range from 3,500 feet to 5,000 feet.

Raindrops, snow, fog, hoarfrost, and condensation accumulated on the conductor surface are also sources of surface irregularities that can increase corona. During fair weather, the number of these condensed water droplets or ice crystals is usually small, and the corona effect is also small. However, during wet weather, the number of these sources increases (e.g., due to rain drops standing on the conductor) and corona effects are therefore greater. During wet or foul weather conditions, the conductor would produce the greatest amount of corona noise; yet noise generated by heavy rain hitting the ground would typically be greater than the noise generated by corona, thus masking the AN from the transmission line.

Corona produced on a transmission line can be reduced by the design of the transmission line and the selection of hardware and conductors used for the construction of the line; for instance, the conductor

hardware used to support the conductors have rounded rather than sharp edges and recessed bolts to reduce sharp edges that can contribute to corona. The conductors themselves will be installed under tension to prevent damage to the conductor and retain a smooth surface without causing nicks, burrs, or scrapes in the conductor strands.

The transmission line proposed for the Project will be designed to reduce corona generation.

I.4 **Radio Interference**

Corona-generated radio interference is most likely to affect the amplitude modulation (AM) radio broadcast band (535 to 1,605 kilohertz); frequency modulation (FM) radio is rarely affected. Only AM receivers located very near to transmission lines that are tuned to a weak station have the potential to be affected by radio interference. An example is the humming noise on an AM radio that happens when the radio is near a power line, but diminishes as the radio moves away from the line. FM radio receivers usually do not pick up interference from transmission lines, because corona-generated radio frequency noise currents decrease in magnitude with increasing frequency and are quite small in the FM broadcast band (88 to 108 megahertz). In addition, the excellent interference rejection properties inherent in FM radio systems make them virtually immune to amplitude-type disturbances.

Residential areas located in the vicinity of the Project's alternative routes are in close proximity to other existing power lines; therefore, additional radio interference as a result of the Project's implementation is not expected.

UNSE has identified one (1) active communications tower previously licensed by the FCC within 1,000 feet of the alternative routes (Exhibit I-1). UNSE has notified the tower owners of the Project via letter (Exhibit I-2). No radio interference is anticipated from the Project. Potential impacts will be further assessed following design and any impacts mitigated as needed.

I.5 **Communication Interference**

The US Army operates the Buffalo Soldier Electronic Testing Range from Fort Huachuca, Arizona in Cochise County (Exhibit H-1). Fort Huachuca, located 20 miles east of the Study Area, is a key national defense asset and includes the Electronic Proving Ground that tests electronic and communications equipment, along with pilotless planes carrying photographic equipment for reconnaissance missions. The Joint Interoperability Test Command established the Buffalo Soldier Electronic Test Range, consisting of 2,500 square miles of electromagnetically quiet, high-altitude bowl to conduct full-frequency, full-power jamming as part of the DoD's cyber warfare testing (US Army, 2022). The Test Range overlaps the Study Area as shown in Exhibit I-2. A submittal was made to the DoD to review the proposed transmission line and ensure that the Project will not have a negative effect on the Electronic Test Range. On February 13, 2023, UNSE received notification that the Project would not result in any specific impacts to the mission of the Electronic Test Range (see Exhibit I-3).

I.6 **Television Interference**

Interference with traditional television reception affects only over-the-air signals of local television stations and does not impact Cable or satellite stations. Any impacts 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 voltage would not exceed 138 kV, television interference is not expected.

I.7 Electric and Magnetic Field Effects

I.7.1 Existing EMFs within the Preferred Alternative Route

There are existing electrical facilities within the Study Area. Within the Preferred Route, the following electrical facilities exist:

- On the east side of I-19, there is a 138 kV line connecting Sonoita Substation to the Valencia Substation.
- Along Pendleton Road there is a 13.2 kV distribution line
- Distribution lines (13.2 kV) are present in many areas within the Study Area along the Preferred Route from, including near Pendleton Road; along SR 82; and Flux Canyon Road

The Latnex model MG-2000 TD Triple Axis Pro EMF Meter with Datalogger was used to record measurements of existing EMFs directly under the existing electrical facilities.

Measurements were taken at the centerline of the existing electrical facilities. They were taken on February 7, 2023, between 1:30-2:30 pm, with a temperature in the mid 50's °F. At the time the measurements were taken the load does not represent a peak load and therefore the EMF readings taken do not represent the maximum EMFs produced by the existing electrical facilities. The measured values EMFs was measured as:

- Existing 138 kV transmission line near the proposed Rio Rico Switchyard: 1.79 milligauss (mG)
- 13.2 kV distribution line near intersection of Pendleton and Ruby roads: 1.08 mG
- 13.2 kV distribution line near intersection of Flux Canyon Road and northern edge of CNF boundary: 1.94 mG

I.7.2 Electric and Magnetic Fields Background

EMFs are everywhere; they occur naturally in every atom of matter. The Earth's surface has a natural electric field which is created by electric charges in the upper atmosphere. The Earth also has a strong magnetic field, which is evidenced by the use of compasses for navigation. The magnetic field is created by electric currents in the magma of the Earth's core.

EMFs are also produced by power lines. These fields may induce voltages and currents on nearby conductive objects. Electric fields are produced whenever a conductor is connected to a source of electrical voltage. An example of this is the plugging of a lamp into a wall outlet in a home. When the lamp is plugged in, a voltage is induced in the cord to the lamp, which causes an electric field to be created around the cord. Magnetic fields are produced whenever an electrical current flows in a conductor. In the lamp example, if the lamp is turned on (allowing electricity to flow to the lamp), a magnetic field is created around the lamp cord in addition to the electric field. These fields exist around overhead and underground power lines, house wiring, computers, power tools, appliances, and anything that carries or uses electricity, and EMF strength is typically measured in mG.

Table 18 displays the magnetic field strength from various electrical sources. This information was provided in a poster available to the public at the Open House Meetings (see Exhibit J-14). It is general practice to consider both electric and magnetic fields together in assessing the amount of effect at the outer edge of a transmission line's ROW.

Table 18. EMF Strength of Various Electrical Sources at Various Distances

EMF Source [1]	Distance	Strength	Distance	Strength	Distance	Strength
Microwave Oven	0.5 feet	200 mG	1.0 feet	4 mG	4.0 feet	2 mG
Vacuum Cleaner	0.5 feet	300 mG	1.0 feet	60 mG	4.0 feet	1 mG
Hair Dryer	0.5 feet	300 mG	1.0 feet	1 mG	4.0 feet	0 mG
Electric Shaver	0.5 feet	100 mG	1.0 feet	20 mG	4.0 feet	0 mG
138 kV Transmission Line, vertical [2]	0 feet	16.4 mG	50 feet	6.9 mG	500 feet	<0.14 mG

[1] Appliance magnetic field strengths are median values in mG for typical 60 Hz electrical current (source: USNIEHS 1999, DOE 1995

[2] Irvington – East Loop Transmission Line EMF Analysis Rev. 0, November 26, 2019, prepared by Power Engineers. Location 2 from study was used as this represents a configuration and current on the line similar to that expected for the Project

Although researchers and scientists have heavily studied this issue since the 1970s, they have not confirmed that any adverse health effects have been caused by exposure to low-level EMFs.

- After a recent review of scientific literature about the issue, the World Health Organization (WHO) called for continued research but concluded that, "…current evidence does not confirm the existence of any health consequences from exposure to low level electromagnetic fields."
- In 1997, a National Research Council committee studying the issue concluded, "…the current body of evidence does not show that exposure to these fields presents a human-health hazard. Specifically, no conclusive and consistent evidence shows that exposures to residential EMF produce cancer, adverse neurobehavioral effects, or reproductive and developmental effects."
- Similarly, in 1999, the National Institute of Environmental Health Sciences (NIEHS) reported to the U.S. Congress that, "No consistent pattern of biological effects from exposure to EMF had emerged from laboratory studies with animals or with cells."
- According to the National Cancer Institute: "No consistent evidence for an association between any source of non-ionizing EMF and cancer has been found, despite numerous epidemiologic studies and comprehensive reviews of scientific literature."

This research has been performed through epidemiological, animal, biological and clinical studies.

The EMFs associated with power lines and electrical devices are much weaker than those associated with other sources such as microwaves or radio waves. These EMFs, at the low end of the electromagnetic spectrum, are described as "non-ionizing" because they are not known to damage DNA or cells directly (WHO, 2021).

Past studies on 138 kV transmission lines have yielded results where maximum calculated magnetic fields were less than or equivalent to the median magnetic field produced by a food processor from 6 inches away, 30 mG. Measurements collected immediately below the existing 138 kV transmission line in Rio Rico were well below this value, measure 1.79 mG.

From these studies, at the edge of ROW, calculated magnetic fields were found to be weaker than the median magnetic field while standing 6 inches away from a conventional video display terminal for a personal computer (POWER, 2019). A hair dryer or microwave oven from a half foot away can be found to produce stronger magnetic fields than were calculated at any of the locations analyzed along similar routes (POWER, 2019). It is anticipated that the EMFs from this Project will be less than or equal to those for 138 kV transmission lines with similar properties.

I.8 **Conclusion**

Based upon current measurements within the Study Area and past studies for 138 kV transmission lines similar to the Project, it is expected that the EMF values associated with this Project, regardless of alternative route, are expected to be comparable to other 138 kV transmission lines in the state, and are expected to have EMF values at the edge of ROW that are less than or equal to common household appliances. Furthermore, using engineering judgement, the EMFs emitted by the Project will be comparable to some corridors with existing facilities.

I.9 **References**

American Cancer Society: www.cancer.org/cancer/cancer-causes/radiation-exposure/extremely-low frequencyradiation.html.

Environmental Protection Agency: www3.epa.gov/radtown/electricmagnetic-fields.html.

Federal Highway Administration (FHWA). 2017. Construction Noise Handbook. http://www.fhwa.dot.gov/environment/noise/construction_noise/handbook/handbook09.cfm. Accessed January 2017.

IEEE/ANSI Standard C2-2007. National Electrical Safety Code.

National Academy of Sciences, 1977. Guidelines for Preparing Environmental Impact Statements on Noise. Washington D.C.

National Academy of Sciences, 1996. Possible Health Effects of Exposure to Residential Electric and Magnetic Fields. National Research Council.

National Cancer Institute: https://www.cancer.gov/.

ADOT. (2021). 2021-2025 Five-Year Transportation Facilities Construction Program. Retrieved from Arizona Department of Transportation Current Five-Year Program: https://azdot.gov/planning/transportation-programming/current-five-year-program

ADOT. (2021). ADOT Highway Performance Monitoring System - Average Annual Daily Traffic Report 2021. Phoenix: Arizona Department of Transportation.

NIEHS. (2021). Electric & Magnetic Fields. Retrieved from National Institute of Environmental Health Sciences: www.niehs.nih.gov/health/topics/agents/emf/

US Army. (2022). US Army Fort Huachuca. Retrieved from History of Fort Huachuca: https://home.army.mil/huachuca/index.php/about/history#:~:text=This%20new%20role%20continues%20to,as%20part%20of%20the%20DoD's

WHO. (2021). Electromagnetic Fields. Retrieved from World Health Organization: www.who.int/peh-emf/en/

WSDOT. (2020, August). Ch 7 Construction Noise Impact Assessment. Retrieved from WSDOT Biological Assessment Preparation Manual & Templates: https://wsdot.wa.gov/sites/default/files/2018/01/18/Env-FW-BA_ManualCH07.pdf

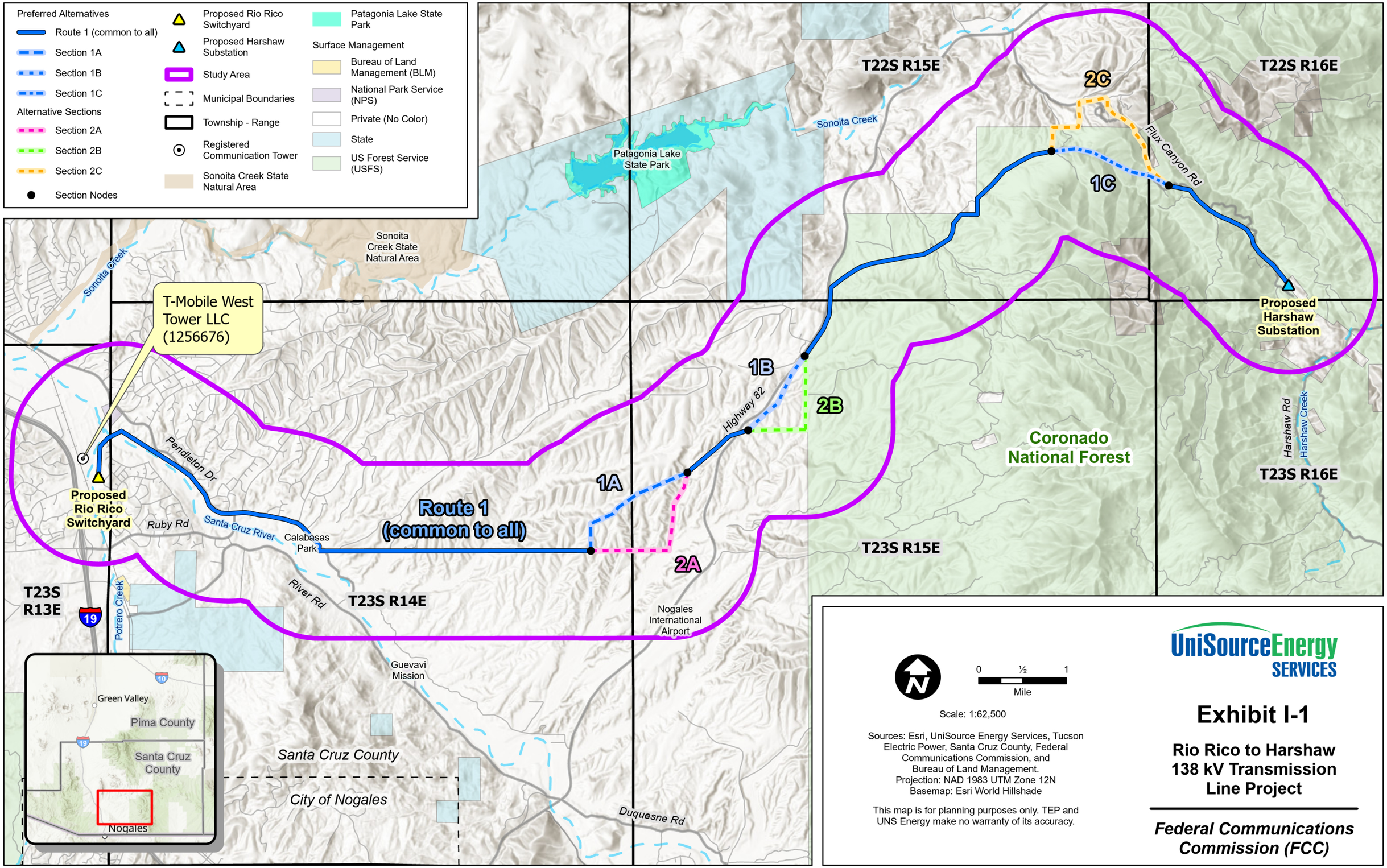
Application for a Certificate of Environmental Compatibility

Rio Rico to Harshaw

138 Kilovolt Transmission Line Project

Exhibit I-1

This page intentionally left blank


Preferred Alternatives
Route 1 (common to all)
Section 1A
Section 1B
Section 1C
Alternative Sections
Section 2A
Section 2B
Section 2C
Section Nodes
Proposed Rio Rico Switchyard
Proposed Harshaw Substation
Study Area
Municipal Boundaries
Township - Range
Registered Communication Tower
Sonoita Creek State Natural Area
Patagonia Lake State Park
Surface Management
Bureau of Land Management (BLM)
National Park Service (NPS)
Private (No Color)
State
US Forest Service (USFS)
T22S R15E
T22S R16E
T23S R15E
T23S R16E
T23S R14E
T23S R13E
Sonoita Creek
Patagonia Lake State Park
Sonoita Creek State Natural Area
Flux Canyon Rd
Harshaw Rd
Harshaw Creek
Coronado National Forest
Proposed Harshaw Substation
1A
1B
1C
2A
2B
2C
Highway 82
Route 1 (common to all)
T-Mobile West Tower LLC (1256676)
Proposed Rio Rico Switchyard
Pendleton Dr
Ruby Rd
Santa Cruz River
Calabasas Park
River Rd
Potrero Creek
19
Nogales International Airport
Guevavi Mission
Santa Cruz County
City of Nogales
Duquesne Rd
Green Valley
Pima County
Santa Cruz County
Nogales
10
0 ½ 1
Mile
Scale: 1:62,500
Sources: Esri, UniSource Energy Services, Tucson Electric Power, Santa Cruz County, Federal Communications Commission, and Bureau of Land Management.
Projection: NAD 1983 UTM Zone 12N
Basemap: Esri World Hillshade
This map is for planning purposes only. TEP and UNS Energy make no warranty of its accuracy.
UniSourceEnergy SERVICES
Exhibit I-1
Rio Rico to Harshaw 138 kV Transmission Line Project
Federal Communications Commission (FCC)

2/10/2023

This page intentionally left blank

Application for a Certificate of Environmental Compatibility

Rio Rico to Harshaw

138 Kilovolt Transmission Line Project

Exhibit I-2

This page intentionally left blank

4346 E Irvington Rd, Mail Stop OH 131
Tucson, AZ 85714

Telephone: 520-633-8693

February 13, 2023

Nicole Larsen
Regulatory Supervisor
T-Mobile West Tower LLC
12920 SE 38th Street
Bellevue, WA 98006

Subject: Proposed Rio Rico to Harshaw 138-kilovolt (kV) Transmission Line Project

Dear Nicole,

UniSource Electric (UNSE) has identified you as a potential stakeholder for the proposed Rio Rico to Harshaw 138-kilovolt (kV) Transmission Line Project. The Rio Rico to Harshaw Project will involve construction of an approximately 20-30 mile, single-circuit transmission line that will interconnect with UNSE's existing 138-kV transmission system at a proposed switchyard near Interstate 19 in the Rio Rico area in Santa Cruz County, Arizona. The transmission line will terminate at a planned substation on private land on an in-holding of the Coronado National Forest. The line will serve the Hermosa Project, a mine exploration project owned by Arizona Minerals Inc. (AMI), a subsidiary of South32, while improving service for residential and other electric customers in the vicinity, including the Flux Canyon, San Rafael Valley, Washington Camp and Lochiel areas.

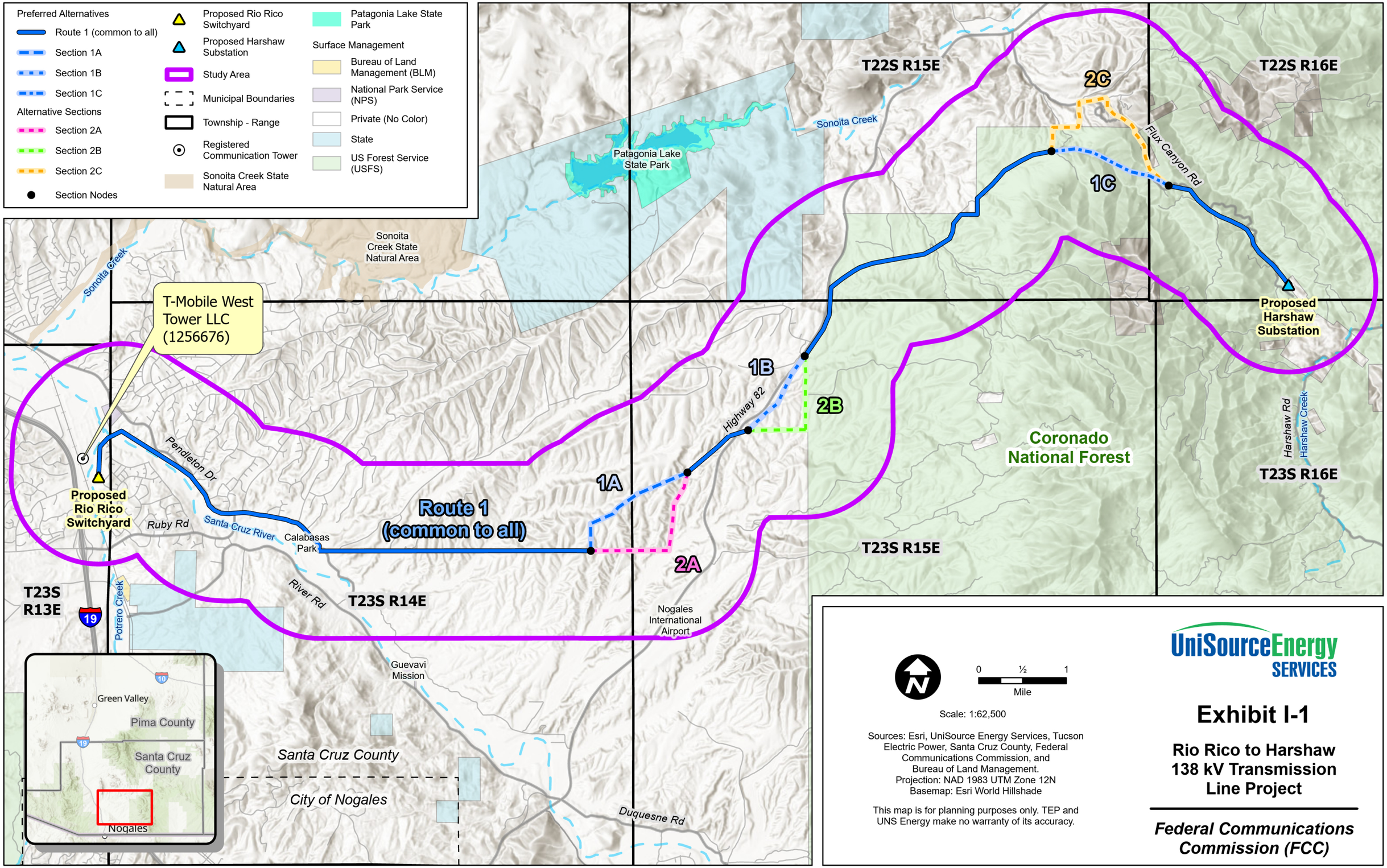
The project includes the erection of several new transmission structures, as well as a new switchyard in Rio Rico. You have been identified through the Federal Communications Commission website as owning an antenna structure in the vicinity of the project. As part of UNSE's line siting application with the Arizona Corporation Commission, we are soliciting comments from parties that may be affected. To submit comments please contact Christopher Ortiz y Pino at 520-633-8693, or email at Christopher.OrtizYPino@tep.com. For more information please visit uesaz.com/rio-rico-to-harshaw.

Respectfully,

Christopher Ortiz y Pino
Environmental Land Use Planner II
Tucson Electric Power Company

Enclosure: Map of proposed transmission line project

This page intentionally left blank


Preferred Alternatives
Route 1 (common to all)
Section 1A
Section 1B
Section 1C
Alternative Sections
Section 2A
Section 2B
Section 2C
Section Nodes
Proposed Rio Rico Switchyard
Proposed Harshaw Substation
Study Area
Municipal Boundaries
Township - Range
Registered Communication Tower
Sonoita Creek State Natural Area
Patagonia Lake State Park
Surface Management
Bureau of Land Management (BLM)
National Park Service (NPS)
Private (No Color)
State
US Forest Service (USFS)
T22S R15E
T22S R16E
T23S R15E
T23S R16E
T23S R14E
T23S R13E
Sonoita Creek
Patagonia Lake State Park
Sonoita Creek State Natural Area
Flux Canyon Rd
Harshaw Rd
Harshaw Creek
Coronado National Forest
Proposed Harshaw Substation
1A
1B
1C
2A
2B
2C
Highway 82
Route 1 (common to all)
T-Mobile West Tower LLC (1256676)
Proposed Rio Rico Switchyard
Pendleton Dr
Ruby Rd
Santa Cruz River
Calabasas Park
River Rd
Potrero Creek
19
Nogales International Airport
Guevavi Mission
Santa Cruz County
City of Nogales
Duquesne Rd
Green Valley
Pima County
Santa Cruz County
Nogales
10
0 ½ 1
Mile
Scale: 1:62,500
Sources: Esri, UniSource Energy Services, Tucson Electric Power, Santa Cruz County, Federal Communications Commission, and Bureau of Land Management.
Projection: NAD 1983 UTM Zone 12N
Basemap: Esri World Hillshade
This map is for planning purposes only. TEP and UNS Energy make no warranty of its accuracy.
UniSourceEnergy SERVICES
Exhibit I-1
Rio Rico to Harshaw 138 kV Transmission Line Project
Federal Communications Commission (FCC)

2/10/2023

This page intentionally left blank

Application for a Certificate of Environmental Compatibility

Rio Rico to Harshaw

138 Kilovolt Transmission Line Project

Exhibit I-3

This page intentionally left blank

OFFICE OF THE ASSISTANT SECRETARY OF DEFENSE
3400 DEFENSE PENTAGON
WASHINGTON, DC 20301-3400

ENERGY, INSTALLATIONS
AND ENVIRONMENT

January 25, 2023

David Beranek
Capitol Airspace Group
5400 Shawnee Road, Suite 304
Alexandria, VA 22312

Dear Mr. Beranek,

I am contacting you to follow up on the Informal Review notification the Department of Defense sent to you on 22 November 2022. As we reviewed further, upon further review by the U.S. Army, it has been determined that the Rio Rico to Harshaw 138-kV Transmission Line Project, located in Santa Cruz County, Arizona, as proposed, may have an impact on military operations conducted in the area.

The proposed siting location of the transmission line project may impact U.S. Army test operations within the Buffalo Soldier Test & Training Range. Please contact Mr. Louis Vanderbeek (louis.e.vanderbeek.civ@army.mil), to discuss this proposal.

Please note that this informal review by the DoD Military Aviation and Installation Assurance Siting Clearinghouse does not constitute an action under 49 United States Code Section 44718 and that the DoD is not bound by the conclusion arrived at under this informal review. To expedite our review in the Obstruction Evaluation Airport Airspace Analysis (OE/AAA) process, please add the project number 2022-10-T-DEV-24 in the comments section of the filing. If you have any questions, please contact me at steven.j.sample4.civ@mail.mil.

Sincerely,

Steven J. Sample
Executive Director
Military Aviation and Installation
Assurance Siting Clearinghouse

[redacted]

From: Vanderbeek, Louis Edward CIV USARMY ATEC (USA) [redacted]
Sent: Monday, February 13, 2023 8:45 AM
To: David Beranek
Cc: Sample, Steven J CIV OSD OUSD A-S (USA); Townes, Daniel W CTR OSD OUSD A-S (USA)
Subject: RE: Response Letter for the Rio Rico to Harshaw 138-kV Transmission Line Project

Good Morning Mr. Beranek,
After further review and clarification from Mr. David Goad (ATEC G4), the U.S. Army Electronic Proving Ground has been unable to identify any specific mission impacts which would warrant the project being further delayed. If possible I would like to remain your point of contact should any changes come from this project which would require any additional consideration.
Thank you.

VR
Louis Vanderbeek
Range/Training Coordinator
U.S. Army Electronic Proving Ground
[redacted]

-----Original Message-----
From: David Beranek [redacted]
Sent: Thursday, February 2, 2023 10:06 AM
To: Vanderbeek, Louis Edward CIV USARMY ATEC (USA)
[redacted]
Cc: Sample, Steven J CIV OSD OUSD A-S (USA) [redacted]
Townes, Daniel W CTR OSD OUSD A-S (USA) [redacted]
Subject: [URL Verdict: Neutral][Non-DoD Source] RE: Response Letter for the Rio Rico to Harshaw 138-kV Transmission Line Project

All active links contained in this email were disabled. Please verify the identity of the sender, and confirm the authenticity of all links contained within the message prior to copying and pasting the address to a Web browser.

Mr. Vanderbeek,

Per the findings letter (attached) for the DoD Informal Review request submitted through the DoD Clearinghouse for the proposed Rio Rico To Harshaw Transmission Line project in Santa Cruz County, Arizona, you were identified as a POC to initiate discussions on the potential project effects to US Army test operations within the Buffalo Soldier Test & Training Range. On behalf of the project team, Capitol Airspace would like to initiate those discussions.

As an update, if you didn't already know, on January 24th 2023, the project was formally filed with the FAA under Aeronautical Study Numbers (ASNs) 2023-AWP-1560:1659-OE and 2023-AWP-1662:1749-OE.

If there is any additional information you need from the project team at this point for your review, or any questions prior to our discussions, please let us know and we'll work to get that over to you.

Look forward to discussing the proposed project with you in the near term.

Thanks,

David

David Beranek

[redacted]

Capitol Airspace Group

6350 Walker Lane, Suite 450

Alexandria, VA 22310

Caution-www.capitolairspace.com <

Caution-http://www.capitolairspace.com/ >

< Caution-http://www.capitolairspace.com/ >

[redacted]

Capitol Airspace will be closed in observance of Presidents' Day on February 20th, 2023.

The office will reopen on Tuesday, February 21st, 2023.

From: Townes, Daniel W CTR OSD OUSD A-S (USA)[redacted]
Sent: Wednesday, January 25, 2023 11:52 AM
To: David Beranek [redacted]
Cc: Sample, Steven J CIV OSD OUSD A-S ([redacted]
Subject: RE: Response Letter for the Rio Rico to Harshaw 138-kV Transmission Line Project

Good morning Mr. Beranek,

We were recently notified of a potential impact to the U.S. Army related to the development of the Rio Rico to Harshaw 138-kV Transmission Line Project.

Please see the attached "updated" IR response letter. Our apologies for any inconvenience. Thank you.

Respectfully,

Dan Townes

Military Aviation and Installation Assurance Siting Clearinghouse

Office of the Assistant Secretary of Defense (Sustainment)

[redacted]

From: Townes, Daniel W CTR OSD OUSD A-S (USA)
Sent: Monday, November 28, 2022 8:11 PM
To: 'David Beranek' <[redacted]
Cc: Sample, Steven J CIV OSD OUSD A-S (USA) [redacted]
Subject: Response Letter for the Rio Rico to Harshaw 138-kV Transmission Line Project

Good afternoon Mr. Beranek,

Attached is the Informal Review Response Letter for the Rio Rico to Harshaw 138-kV Transmission Line Project.

Thank you for the opportunity to review your project.

Respectfully,

Dan Townes

Military Aviation and Installation Assurance Siting Clearinghouse

Office of the Assistant Secretary of Defense (Sustainment)

[redacted]

This page intentionally left blank

EXHIBIT J

This page intentionally left blank

EXHIBIT J: **SPECIAL FACTORS**

As stated in Arizona Administrative Code R14-3-219 of the Rules of Practice and Procedure Before Power Plant and Transmission Line Siting Committee Exhibits to Application, Exhibit J:

Describe any special factors not previously covered herein, which applicant believes to be relevant to an informed decision on its application.

J.1 Introduction J-1
J.2 Public Involvement Program Summary J-2
J.2.1 Jurisdictional and Other Stakeholder Briefings J-2
J.2.2 Jurisdictional and Other Stakeholder Summaries J-3
J.2.3 News Media J-3
J.2.4 Newsletters/Postcards/Fact Sheets J-3
J.2.5 Public Open House J-4
J.2.6 Telephone Information Line J-6
J.2.7 Internet Website J-6
J.2.8 Comment Tracking Database J-6
J.3 Comments Received J-7
J.4 Social Media J-8
J.5 Undergrounding Transmission Studies J-8
J.6 Environmental Justice J-9

J.1 **Introduction**

The Project will consist of building a new 138 kV transmission line approximately 20 miles in length, depending on the alternative approved, to connect the planned Rio Rico Switchyard to the planned Harshaw Substation. The Project will interconnect the existing 138 kV transmission line to the planned Substation. The Project will cross private and USFS owned land, as well as Santa Cruz County Road and ADOT ROW. One preferred route alternative has been identified, resulting from line siting studies, analysis, and a public participation process that began in 2020, with three 1.5- to 2.5-mile alternative routing options in areas of elevated community sensitivity. The proposed alternative routes are identified as Preferred Route 1, and Alternative Routes 1A, 1B, and 1C, and are described in Section B.1-4 of the

application. The new line will be built of self-weathering steel monopoles ranging from 60 to 120 feet above ground, with the taller structures required for site specific clearance issues.

A public involvement program was initiated in September 2020 and continued to February 2023 to notify and inform the public, agencies, public officials, community leaders, and other affected stakeholders about the Project.

J.2 **Public Involvement Program Summary**

Public participation is an important part of UNSE's environmental planning and siting process. Public involvement and communications activities were conducted to inform the public of the need and benefits of the Project and to solicit public input.

The public planning process was intended to ensure effective and timely communication among UNSE staff, the public, agencies, and stakeholders. UNSE used several different public outreach efforts to inform affected members of the community in the Study Area. Those efforts included:

- Three virtual stakeholder meetings (August 18, 2022; November 15, 2022; January 24, 2023)
- Individual stakeholder meetings with ADOT and Santa Cruz County
- Three virtual Public Open House Meetings (September 24, 2020; May 13, 2021; August 25, 2022 – at same time as in-person meeting)
- Three In-Person Public Open House Meetings (August 25, 2022; November 17, 2022; January 25, 2023)
- Tools:
    - Five newsletter mailings, including one postcard, in English and Spanish
    - Project telephone information line in English and Spanish
    - Project email address
    - Project-specific webpage on UNSE's Internet website in both English https://uesaz.com/rio-rico-to-harshaw and Spanish https://www.uesaz.com/proyecto-de-la-linea-de-transmision-rio-rico-harshaw/ including an online comment form
    - Facebook and Instagram advertisements were posted preceding four of the Public Open Houses – May 2021, August 2022, November 2022, and January 2023 (Exhibit J-24)

The outreach effort was designed to offer interested parties an opportunity to gain information and provide input. Throughout the planning process, the public was provided the opportunity to review, comment on the Project, and influence the line siting process. The various methods of communication and public interaction listed above are explained in Exhibit B and the Line Siting Study, Exhibit B-1.

J.2.1 Jurisdictional and Other Stakeholder Briefings

In order to introduce the Project, provide project updates, and gauge the level of stakeholder concern, UNSE developed a Master List of Stakeholders (jurisdictions, agencies, utilities, etc.) that received all Project meeting invitations, notices, and updates (Exhibit J-1). At Stakeholder briefings, UNSE representatives explained the purpose and need of the Project, provided the Project's description and the environmental siting process, and asked for suggestions and opinions. In return, the stakeholders provided UNSE with concerns and input on sensitive resources within the Project Study Area. The lists of

attendees at each stakeholder meeting and the PowerPoint presented at each are located in Exhibits J-2 through J-7.

J.2.2 Jurisdictional and Other Stakeholder Summaries

Outside of stakeholder briefings, UNSE engaged in specific conversations and correspondence with a number of agencies, jurisdictions, and organized members of the public throughout the planning and siting process. These included discussions with Santa Cruz County, CNF, ADOT, Kinder Morgan, Patagonia Lake area residents, and Marshall Magruder. Meeting summaries can be found in Exhibit J-18 through 21.2.

J.2.3 News Media

News media also has provided project coverage of the Project has occurred, including:

Nogales International (August 30, 2022) – Exhibit J-23.1
'Can't you find some other way?' Public weighs in on power line for Hermosa mine Link: https://www.nogalesinternational.com/news/can-t-you-find-some-other-way-public-weighs-in-on-power-line-for-hermosa/article_a74a9d6e-2881-11ed-8624-6b807f7ba710.html

Nogales International (November 22, 2022) – Exhibit J-23.2
Residents still skeptical of South32-funded power line
Link: https://www.nogalesinternational.com/news/residents-still-skeptical-of-south32-funded-power-line/article_dae87d6e-6a92-11ed-bc44-af604055a3ca.html

J.2.4 Newsletters/Postcards/Fact Sheets

UNSE developed a mailing list that included all property owners, residents, and business owners in the Project Study Area. The notification area for the Project is larger than the Study Area. The mailing list was updated prior to each mailing. The average number of addresses noticed was over 13,000. All mailings are included in Exhibit J-8.1 to 8-5.

UNSE prepared and mailed five newsletters throughout the course of the project.

Newsletter #1 was dated September 2020 and was mailed to approximately 11,000 residents, business owners, landowners, and agency/organization representatives in the Study Area. Newsletter #1 introduced the project and provided project details, including the Study Area, project purpose and benefits, project timelines, the planning process, provided information on an upcoming public open house, and instructions on how to comment and be a part of the process.

Newsletter #2 was dated April 2021 and was mailed to approximately 14,000 residents, business owners, landowners, and agency/organization representatives in the Study Area. Newsletter #2 provided public open house meeting information, restated project purpose and benefits, and emphasized ways UNSE was receiving public responses. A map of potential line route links was provided.

Newsletter #3 was dated August 2022 and was mailed to approximately 14,000 residents, business owners, landowners, and agency/organization representatives in the Study Area. Newsletter #3 provided public open house meeting information, restated project purpose benefits, and emphasized ways UNSE was receiving public comments. An updated map of potential line route links was provided.

Newsletter #4 was a postcard announcing the upcoming public open house, the availability of an interactive project map, and ways to comment on the project. It was mailed in November 2022 to approximately 14,000 residents, business owners, landowners, and agency/organization representatives in the Study Area.

Newsletter #5 was dated January 2023 and was mailed to approximately 13,000 residents, business owners, landowners, and agency/organization representatives in the Study Area. Newsletter #5 provided public open house meeting information, restated project purpose and benefits, project timelines, and emphasized ways UNSE was receiving public comments. A map of the preferred route and alternatives was provided.

All the newsletters provided information in both English and Spanish.

J.2.5 Public Open House

All public open house events were noticed to the public via a newsletter or postcard mailing and public notice in the newspaper. Copies of the public notices are in Exhibit J-8.6 to 8.11. Social media ads were posted prior to public open houses 2, 3, 4, and 6 (Exhibit J-24). A presentation was shown at each open house and stakeholder meeting, and exhibit boards were arranged around the meeting room for the in-person open houses. Copies of all the presentations and exhibit boards are attached as Exhibits as indicated in Table 19 and Table 20.

Table 19. Open House Information

OPEN HOUSE NO	DATE	LOCATION	METHOD	NUMBER ATTENDED	PPT / BOARDS EXHIBIT NO
1	9/24/2020	Virtual	Virtual only	Not Available	Exhibit J-9
2	5/13/2021	Virtual	Virtual only	Not Available	Exhibit J-10
3	8/25/2022	Quality Hotel Americana Nogales	Hybrid	17 in-person 13 virtual	Exhibit J-11
4	11/17/2022	Quality Hotel Americana Nogales	In-person	42	Exhibit J-12
5	1/25/2023	Quality Hotel Americana Nogales	In-person	28	Exhibit J-13

Table 20. Stakeholder Meeting Information

STAKEHOLDER MTG NO	DATE	METHOD	NUMBER ATTENDED	PPT EXHIBIT NO
1	8/18/2022	Virtual only	13	Exhibit J-3

2	11/15/2022	Virtual only	13	Exhibit J-5
3	1/24/2023	Virtual only	16	Exhibit J-7

At each in-person public open house, manned stations were available for people to view information or ask questions (Table 21). UNSE staff and subject matter experts were present at each station and throughout the Open House to allow for each attendee to be able to ask questions.

Table 21. Open House Stations

STATION	AVAILABLE INFORMATION OR ACTIVITY
Greeting desk	Sign-in sheet, copies of the latest newsletter
Purpose and Need	Exhibit to explain the need of the project and how the proposed line would provide the requested service and operate within the USNE system
Geographic Information System Station	Two manned GIS stations were available for attendees to examine proposed project activities in proximity to their residence or other areas of interest
Line Siting Process	Exhibits outlined the state's line siting process, the resources evaluated in the CEC, and the steps taken to evaluated potential links and site the line
Environmental Review	Exhibit to outline the USFS process and environmental resources evaluated during the Special Use Permit process
Electro Magnetic Field (EMF)	Exhibit described the various EMFs emitted by power lines and household appliances
Visual Simulations	Exhibits of renderings of the existing and proposed conditions from various Key Observation Points along the Project (Open House 5 had an interactive station)
Structure and Facility Details	Drawings of the proposed structures and switchyard; and engineering information including information on overhead vs underground transmission lines
Large format maps	Three large format maps of the Study Area by thirds were on tables for mark-up by attendees, and one large format map of the entire Study area was on the wall for discussion
Comment forms	Two tables were available for attendees to fill out provided comment forms for submittal at the greeting desk on their way out, or to take home and mail later

STATION	AVAILABLE INFORMATION OR ACTIVITY
Presentation	PowerPoint presentation was shown on a continuous loop

J.2.6 Telephone Information Line

A toll-free telephone information line was established for the Project. The automated message, in either English or Spanish, encouraged callers to leave a message requesting more information or a return call. The telephone numbers were available in the newsletters, postcards, and on the Project website. The information line voicemails were checked regularly (and more frequently following newsletter mailings and public open houses); all messages that required a response were answered by one of the appropriate project team members. To date a total of 16 voicemails were received. All messages received were entered into the comment tracking database.

J.2.7 Internet Website

The Internet has evolved into a primary source of information for the public, therefore UNSE maintains a website featuring project webpages for ongoing transmission line projects. The site address is http://www.uesaz.com. A page devoted to the Project was added to the UNSE website before other public participation activities commenced, and was updated throughout the planning process. The specific Project page is https://uesaz.com/rio-rico-to-harshaw (Exhibit J-19.1). A separate Spanish language page is also updated and can be found at https://www.uesaz.com/proyecto-de-la-linea-de-transmision-rio-rico-harshaw/ (Exhibit J-19.2).

The Project webpage was updated regularly to include both general and specific information on the Project, including the latest maps and the Project newsletters. After the public open house, the displays and graphics presented were added to the Project webpage. The webpage also allowed people to submit comments or request more information via an online public comment form, and provided the toll-free project information line number. A snapshot into statistics for the website reveals that between August 2020 and February of 2023, the Project's webpage was viewed 2,298 times, with the Spanish version viewed 67 times within that same period of time. There were 1,769 unique visitors on the webpage, and visitors' average time spent on the webpage was 4 minutes and 6 seconds.

J.2.8 Comment Tracking Database

Comments were received via Wufoo, an online comment form tied to the Project webpage, and MetroQuest survey, a geographically enabled comment form. Comments were also received by phone, mail, and email. All Public comments received were entered into the comment database; areas of interest or concern, and/or route preferences, when stated, were noted and tracked. The tracked areas of interest included health and safety, cost, appearance, location, underground, and natural resources. This information was used to better understand the concerns of the community regarding the Project, and incorporate the concerns into UNSE's plans where possible.

J.3 **Comments Received**

At the time of preparation of the application, a total of 172 public comments (Exhibit J-15) were received regarding the Project from the various sources discussed above (see Exhibit J-17 for map of location of comments received).

Figure 3 shows the count of various methods used to submit comments. Figure 4 shows the count of each type of concern noted in the comments. Respondents indicated that location and environment were chief concerns with undergrounding and location making up the majority of the total comments received.

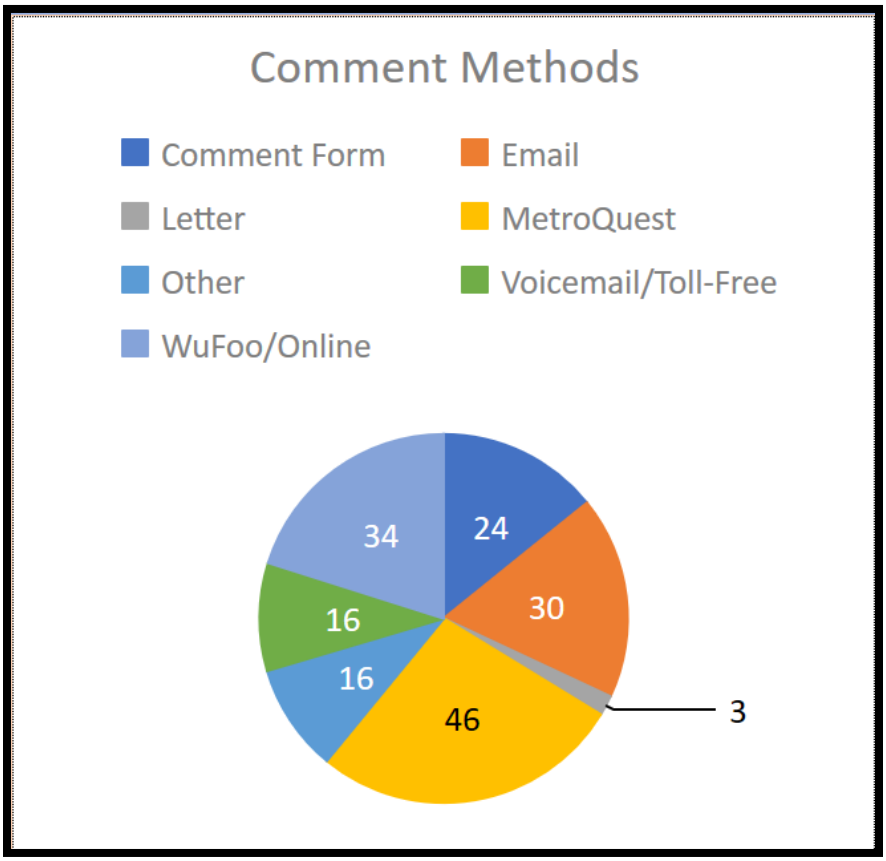


Figure 3. Comment Methods

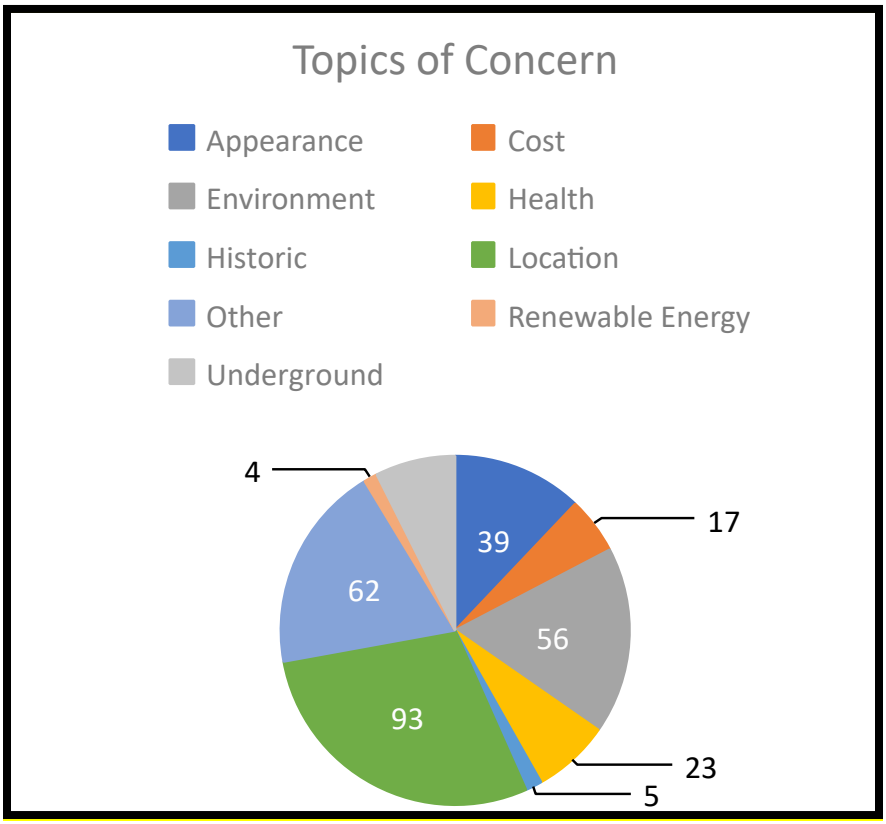


Figure 4. Public Comments and Concerns by Topic

J.4 **Social Media**

Four Facebook advertisements were posted preceding Open Houses 2, 3, 4, and 5 (Exhibit J-24).

J.5 **Undergrounding Transmission Studies**

UNSE engaged an independent engineering firm, Sargent & Lundy, LLC, to conduct a study to determine the costs and constraints associated with undergrounding high voltage transmission line in a rural environment.

The study spoke to the disadvantages related to underground construction. In addition to cost, underground construction has additional operational, system loss, performance, maintenance, and reliability concerns when compared to overhead construction.

Underground installation would require that the transmission line and associated facilities be encased in a concrete duct-bank. This concrete encasement makes repairs to conductors lengthy and costly. Areas where the underground transmission are placed may also be disrupted which may cause disruption in traffic patterns.

Underground transmission lines have significant capacitance losses, due to the fact the cable has a thin layer of insulation to the ground versus overhead cables. Underground cables generally heat up more quickly, both by the fact that soil can thermally insulate the cables, and the sheath in the design of the

underground cable which creates additional heat by induced current. Bonding methods can mitigate heating due to induced current in underground lines but, if not correctly managed, can result in damage to the cable jacket. The inability to remove heat from the transmission line in underground construction results in a reduced rating of the transmission line. The cable per phase requirement to remove heat significantly increases the cost of underground construction as the conductor itself is one of the more costly components of underground construction.

Underground construction results in a greater EMF as calculated at the centerline of the alignment, 1 meter (3.28 ft) above the ground. The resulting calculated EMF is 208.837 mG. This is considerably greater than that of overhead construction calculated at the same height above the earth. As with overhead construction, the EMF dissipates as one moves away from the centerline of the alignment.

Underground construction also incurs a greater disturbance footprint for construction and for maintenance as the entire alignment would be trenched at a width wide enough to enable the required depth of cable emplacement, which is topographic dependent. Due to the highly varied terrain in the eastern portion of the project, trenching for underground construction would disturb a greater footprint that overhead construction (see Exhibit J-22.2 (UG memo for USFS) Section 2.0).

Inspection and maintenance of underground lines carries with it the requirement for personnel to enter buried manholes to access the lines. In order to enter each manhole, an outage on the line is required. Due to the varied terrain, the number of manholes is approximately 20, and the inspection of each manhole would require an approximate outage length of 8 hours. This equates to one outage a weekday for a month.

Underground transmission construction costs ranging between 10 and 12 times greater than overhead construction. See Exhibit J-22.1 for the final underground cost study that was conducted for the Project, and Exhibit J-22.2 for the memo provided to the USFS summarizing the study.

J.6 **Environmental Justice**

Executive Order 12898 – Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations was signed on February 16, 1994. It focuses attention on the environmental and human health effects of federal actions on minority and low-income populations with the goal of achieving environmental protection for all communities. The Office of Environmental Justice under the Environmental Protection Agency (EPA) works to address disproportionately adverse human health and environmental impacts in overburdened or disadvantages communities.

UNSE has reviewed the proposed project and evaluated the Project area to determine if low-income or minority populations are being disproportionately impacted by the Preferred Route or Alternatives. Review of Census data indicates that the western and eastern portions of the Study Area (Census Tract 9661.09 and Census Tract 9661.11) are of lower income than the central portion (Census Tract 9661.10) (Figure 5, Figure 6). All three Census Tracts are of similar race composition (Figure 7). A report was also generated on the Environmental Protection Agency EPA's Environmental Justice Screening and Mapping Tool, Version 2.1 – EJScreen (Exhibit J-25).

UNSE has concluded that since all Census Tracts are being equally impacted and equally benefited by the Proposed Project, that no low-income or minority communities are being disproportionately impacted by the Project.

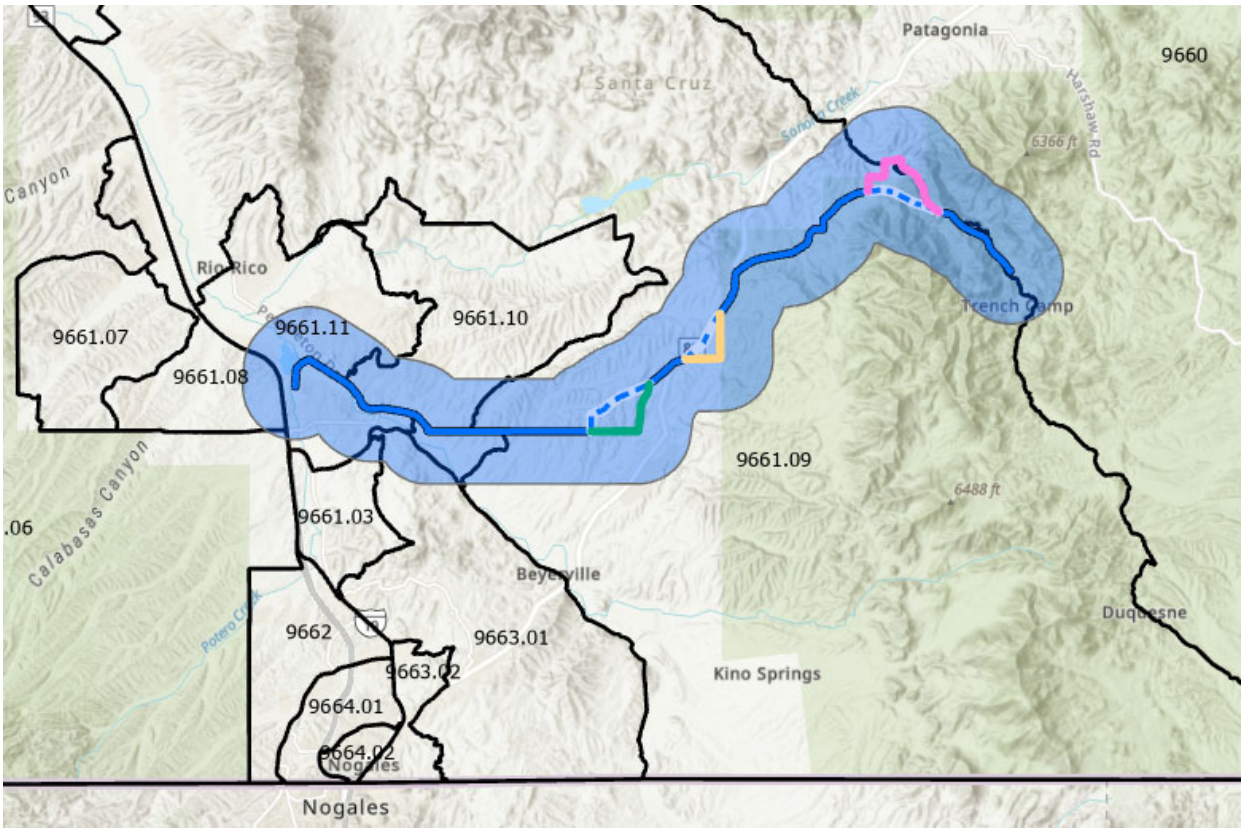


Figure 5. Census Tracts in the Project Area

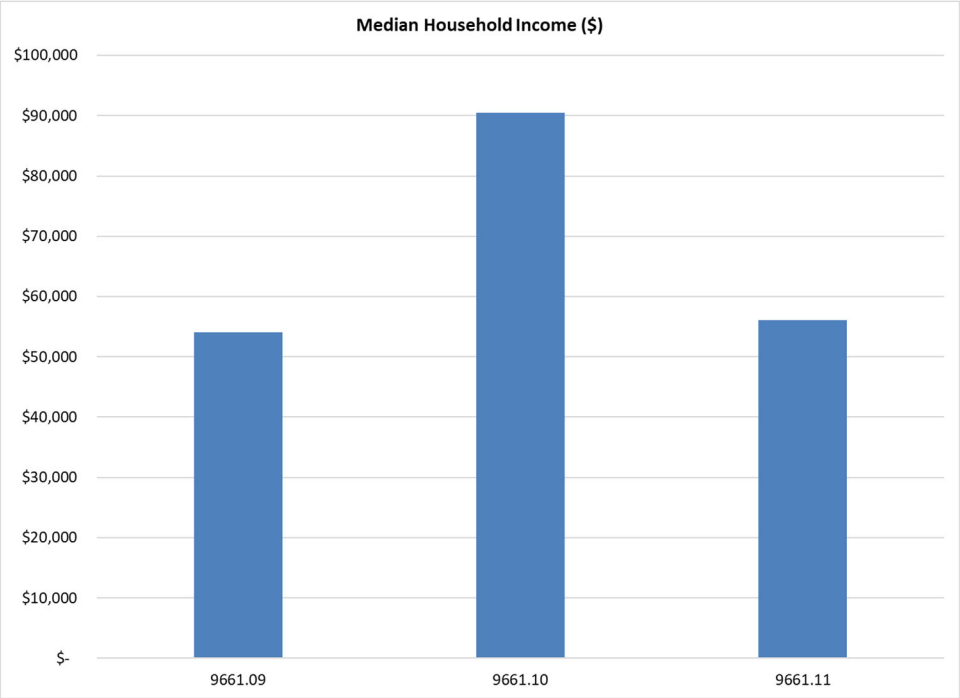


Figure 6. Median Household Income in Census Tracts in Project Area

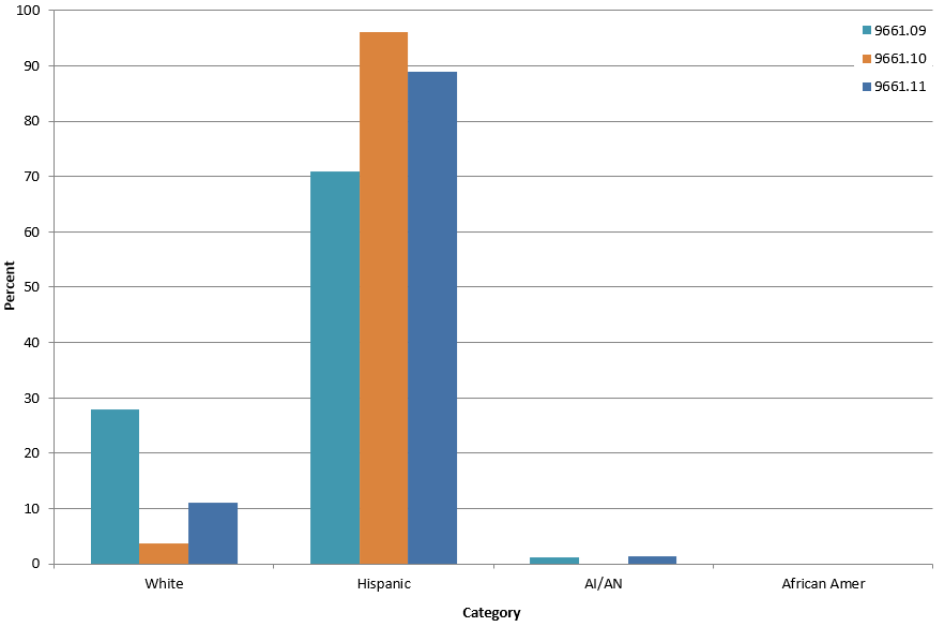


Figure 7. Race Percentages in Census Tracts in Project Area