HUNT POWER

April 7, 2016

Christopher Lawrence
United States Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

Re: Nogales Interconnection Project Presidential Permit Application

Dear Mr. Lawrence:

Nogales Transmission, L.L.C., a subsidiary of Hunt Power, L.P., hereby submits an Application for a Presidential Permit to the Department of Energy for a proposed high-voltage direct current ("HVDC") interconnection between the electric grid in southern Arizona and the electric grid in the northwestern region of Mexico (the "Project").

The Project would consist of three components: (1) a new 10-15 acre Gateway Substation on land currently owned by Tucson Electric Power, where HVDC equipment would be located (with the HVDC tie initially sized at 150 MW, but capable of expansion, in phase two, to 300 MW); (2) a new, approximately 3-mile overhead 138 kV transmission line segment originating at UniSource Energy Services' Valencia substation in Nogales, Arizona, and extending west and south to the new Gateway Substation; and (3) a new, approximately 2-mile overhead 230 kV transmission line segment extending south from the new Gateway Substation and across the US-Mexico border to interconnect with a transmission line to be constructed in Mexico.

Included in package are four documents:

- Application of Nogales Transmission, L.L.C. for Presidential Permit
- Environmental Assessment in support of a Presidential Permit
- Biological Report
- Cultural Report

Nogales Transmission respectfully requests DOE to review the Presidential Permit Application and attached support documents. Please contact me if you have any questions or would like additional information.

Very truly yours,

Enrique Marroquin
Senior Vice President
Nogales Transmission, L.L.C.
emarroquin@huntpower.com

Nogales Interconnection Project

Nogales Transmission, L.L.C.

April 4, 2016

TABLE OF CONTENTS

UNITED STATES OF AMERICA
BEFORE THE
DEPARTMENT OF ENERGY
OFFICE OF ELECTRICITY DELIVERY AND ENERGY RELIABILITY

APPLICATION OF NOGALES TRANSMISSION, L.L.C. FOR PRESIDENTIAL PERMIT

Docket No. PP-_____

April 4, 2016

TABLE OF CONTENTS

PAGE NO.

EXHIBITS

UNITED STATES OF AMERICA
BEFORE THE
DEPARTMENT OF ENERGY
OFFICE OF ELECTRICITY DELIVERY AND ENERGY RELIABILITY

NOGALES TRANSMISSION, L.L.C. **Docket No. PP-____**

APPLICATION OF
NOGALES TRANSMISSION, L.L.C.
FOR PRESIDENTIAL PERMIT

Pursuant to Section 202(e) of the Federal Power Act ("FPA"), 16 U.S.C. § 824a (e), Executive Order No. 10485 as amended by Executive Order No. 12038, and 10 C.F.R. §§ 205.320, et seq. (2015), Nogales Transmission, L.L.C. ("Nogales Transmission") hereby applies for a Presidential Permit authorizing it to construct, operate, maintain and connect facilities for the transmission of electric energy at the international border between the United States and Mexico. As demonstrated in this Application, the proposed Presidential Permit is in the public interest. In support of this Application, Nogales Transmission states as follows:

I. INTRODUCTION

A. The Project

Nogales Transmission proposes to construct a high-voltage direct current ("HVDC") interconnection between the UNS Electric ("UNSE") system near Nogales, Arizona and the Mexican National Electric System in Sonora, Mexico (the "Project"). Nogales Transmission intends to construct the Project in two phases. The first phase would consist of a 150 megawatt ("MW") HVDC tie located at a new substation located on property currently owned by Tucson Electric Power ("TEP") (the "Gateway Substation"); a new 3-mile 138 kilovolt ("kV") transmission line that would originate UNSE's Valencia Substation in Nogales, Arizona and extend to the west and south to the new Gateway Substation; and a new approximately 2-mile 230 kV transmission line that would extend south from the Gateway Substation to the U.S.-

Mexico border where it would interconnect with a transmission line to be constructed in Mexico. The second phase would expand the HVDC converter capacity to 300 MW. Although the timing of the second phase is not yet certain, Nogales Transmission requests authority to construct the entire 300 MW project. Nogales Transmission will notify DOE prior to undertaking construction of the second phase of the Project. Nogales Transmission has discussed the Project with both Comision Federal de Electridad ("CFE") and Central Nacional de Control de Energia ("CENACE"). CFE is the Mexican state-owned electric utility and the entity that directly, or via an affiliate, would own the transmission assets that would interconnect to the Project south of the border. Furthermore, through other subsidiaries, CFE would be a market participant in Mexico, and would enter into wholesale power transactions with US and Mexican-based entities interested in buying and/or selling power across the Project. CENACE is the Independent System Operator (ISO) of Mexico's electrical grid. Its functions are similar to those of other known US-based ISOs such as CAISO, ERCOT, or PJM, including the safe and reliable operation of the electrical grid. CENACE will manage the scheduling of the Project in accordance to the rules and procedures defined by Mexican regulatory entities and in accordance with any operating protocols that are established between CENACE and its corresponding US counterparty.

II. INFORMATION REGARDING THE APPLICANT

A. Legal Name of the Applicant [10 C.F.R. § 205.322(a)(1)]

The legal name of the Applicant is Nogales Transmission, L.L.C., and its principal place of business is 1900 North Akard Street, Dallas, Texas 75201.

B. Legal Name of All Partners [10 C.F.R. § 205.322(a)(2)]

Nogales Transmission is the sole applicant. Nogales Transmission is owned by Hunt Power, L.P., a Delaware limited partnership ("Hunt Power"), which in turn is a subsidiary of Hunt Consolidated, Inc. ("HCI"). HCI is a diversified holding company for a privately-owned group of entities based in Dallas, Texas. Hunt Power develops and invests in entrepreneurial electric transmission opportunities, and is part of a larger privately-owned group of companies managed by the Ray L. Hunt family that engages in oil and gas exploration, refining, power, real estate, ranching and private equity investments. Hunt Power has played a major role in

numerous projects within the energy industry, including: the creation of Sharyland Utilities, L.P.; the development of the first commercial electric interconnection between electrical grids of Texas and Mexico; and the development and construction of approximately 300 miles of new transmission infrastructure in the Texas Panhandle and South Plains as part of Texas's Competitive Renewable Energy Zone process.

Nogales Transmission is still evaluating the final ownership structure of the Project. Nogales Transmission will bear the full costs of development of the Project, but it is possible that MEH Equities Management, a subsidiary of UNS Energy Corporation, may own a portion of the Project. Nogales Transmission will provide the DOE final ownership terms upon completion.

C. Communications and Correspondence [10 C.F.R. § 205.322(a)(3)]

All communications and correspondence related to this Application should be addressed to:

Nogales Transmission, L.L.C.
ATTN: Enrique J. Marroquin, Senior Vice President
1900 North Akard Street
Dallas, TX 75201

D. Foreign Ownership and Affiliations [10 C.F.R. § 205.322(a)(4)]

Neither Nogales Transmission nor its proposed transmission lines are owned wholly or in part by a foreign government or directly or indirectly assisted by a foreign government or instrumentality thereof. Nogales Transmission does not have any agreement pertaining to such ownership by or assistance from any foreign government or instrumentality thereof.

E. Existing Foreign Contracts [10 C.F.R. § 205.322(a)(5)]

Nogales Transmission does not have any existing contracts with any foreign government, or any foreign private concerns, relating to any purchase, sale or delivery of electric energy.

F. Opinion of Counsel [10 C.F.R. § 205.322(a)(6)]

A signed opinion of counsel that the construction, connection, operation, and maintenance of the Project is within Nogales Transmission's corporate powers and that Nogales

Transmission has complied with or will comply with all pertinent federal and state laws is provided as Exhibit "A."

III. INFORMATION REGARDING THE PROPOSED TRANSMISSION FACILITIES

A. Project Overview

The Project would consist of three components: (1) a new 10-15 acre Gateway Substation on land currently owned by TEP, where HVDC equipment would be located (with the HVDC tie initially sized at 150 MW, but capable of expansion, in phase two, to 300 MW); (2) a new, approximately 3-mile overhead 138 kV transmission line segment originating at UES' Valencia substation in Nogales, Arizona, and extending west and south to the new Gateway Substation; and (3) a new, approximately 2-mile overhead 230 kV transmission line segment extending south from the new Gateway Substation and across the US-Mexico border to interconnect with a transmission line to be constructed in Mexico. The route is planned to cross the international border at 31° 19' 57.844" N, 110° 58' 35.908" W, which is west of the Mariposa Port of Entry.

B. Technical Description [10 C.F.R. § 205.322(b)(1)(i)]

1. Number of Circuits

The transmission structures to be constructed as part of the Project would be capable of supporting two circuits. The portion of the project between Valencia and Gateway would consist of a single circuit 138 kV transmission line. The portion of the project from Gateway to the border would consist of a single circuit 230 kV transmission line. A short stretch of the project near the Gateway Substation may be configured for double circuit 230 kV, with one side energized at 138 kV and one side energized at 230 kV.

2. Operating Voltage/Frequency

The transmission line interconnecting the Valencia Substation and the new Gateway Substation would be operated at a nominal 138 kV at a frequency of 60 Hertz. The transmission line extending from the Gateway Substation and across the U.S.-Mexico border would be operated at a nominal 230 kV at a frequency of 60 Hertz.

3. Conductors

The transmission lines will utilize a single conductor per phase, 954 KCM Aluminum Conductor Steel Supported ("ACSS") conductor.

C. Additional Overhead Line Information [10 C.F.R. § 205.322(b)(1)(ii)]

1. Wind and Ice Loading Design Parameters

The transmission line will be designed in accordance with the National Electric Safety Code ("NESC") for light loading conditions (9 psf wind at 30°F) as well as a 90 mph high wind. The NESC requirements will provide the minimum criteria, and additional requirements will be evaluated during the detailed design.

2. Description and Drawing of a Typical Structure

A typical supporting structure will be a double-circuit-capable steel pole with either one or two circuits installed. Depending on structure type, the poles will either be direct-embedded or supported on concrete foundations. Drawings of the typical structures are provided as Exhibit "B." Typical structures will be designed and manufactured to meet or exceed applicable requirements specified by NESC, North American Electric Reliability Corporation ("NERC") Reliability Standards, Western Electric Coordinating Council ("WECC") regional reliability standards, or Arizona requirements.

3. Structure Spacing with Typical Ruling and Maximum Spans

The supporting structures will typically be installed along the center of the right-of-way. The typical ruling span is 700 feet. The maximum span will be approximately 1100 feet.

4. Conductor (Phase) Spacing

For 230 kV structures, the typical spacing will be 12 feet from static conductor to the nearest phase conductor, and 13 feet from phase conductor to phase conductor. For 138 kV structures, the typical spacing will be 6 feet from static conductor to the nearest phase conductor, and 6 feet from phase conductor to phase conductor.

5. Line-to-Ground Design and Conductor-Side Clearance

The minimum vertical design clearance will be as provided in the NESC. Design clearances will be based on nominal 138 kV and 230 kV line voltages and the maximum final conductor sag. Typical line to ground clearance will be 26 feet at 230 kV and 24 feet at 138 kV, which exceed NESC requirements and Arizona law.

D. General Area Map [10 C.F.R. § 205.322(b)(2)]

A general area map showing the overall system is attached as Exhibit "C." A detailed map showing the physical location, longitude and latitude, on the international border, and identifying ownership of the facilities at or on each side of the border is attached as Exhibit "D". The maps distinguish the facilities already constructed from those that will be constructed.

E. Bulk Power System Information [10 C.F.R. § 205.322(b)(3)]

1. Expected Power Transfer Capability

The lines will be designed for a maximum power transfer capability of 300 MW. The capacity of the Project is determined by the size of the DC converter unit, which initially will be 150 MW, and is consistent with normal and short-time emergency conductor ratings.

2. System Power Flow Plots

DOE regulations for a Presidential Permit require system power flow plots for the applicant's service area for heavy summer and light spring load periods, with and without the proposed international interconnection, for the year the line is schedule to be placed in service and for the fifth year thereafter. System power flow plots will be provided to DOE at the time the necessary studies are completed.

3. Interference Reduction Data

Direct and indirect impacts of the Project on radio, television and cellular telephone signals are addressed in detail in Section IV below.

4. Relay Protection

The Project's protective relaying systems will use microprocessor based devices that conform to the applicable requirements of Nogales Transmission, the Institute for Electrical and Electronics Engineers ("IEEE"), NERC Reliability Standards, and WECC regional reliability standards. Specific protection schemes, equipment, and functional devices will be determined during the Project's detailed design phase.

IV. INFORMATION REGARDING POTENTIAL ENVIRONMENTAL IMPACTS

A. Introduction

In support of this application, Nogales Transmission, through its environmental consultant, has prepared a draft Environmental Assessment which can be found in Exhibit "F". In addition, Nogales Transmission, through its environmental consultant, has also performed biological and cultural resources studies in the area. A brief discussion of these resources can be found in the remainder of this section and more detailed information is located in Exhibit "F".

B. Water Resources [10 C.F.R. § 205.322(c)(1)]

Stream locations were identified using the USGS National Hydrography Dataset (NHD) and through geographic information system-based interpretation of aerial photography and topographic contours. Streams in the route corridor consist of small, dry ephemeral drainages and intermittent washes characteristic of the region's semiarid climate and landscape. No Project-related impacts on intermittent or ephemeral streams are expected. The Project's design would avoid these resources by siting towers outside of drainages and by spanning the transmission line over washes.

No wetlands were identified during the off-site review and no evidence of wetlands based on vegetation, soils, or wetland hydrology was observed by biologists during field surveys.

FEMA floodplain maps indicate that there are flood zones associated with the Mariposa and Al Harrison Washes in the route corridor. Portions of both drainages are considered high-risk areas (Zones "A" and "AE"), which are defined as areas with a 1 percent annual chance of flooding. Moderate- to low-risk areas (Zone "X") are also present for Mariposa Wash. Base flood elevations are available for Mariposa Wash; no elevations are published for Al Harrison

Wash. Both 100- and 500-year flooding limits for Mariposa Wash overlap the route corridor, while only 100-year flood limits for Al Harrison Wash are in the route corridor.

The proposed Project is not anticipated to adversely affect natural and beneficial floodplain values or pose a significant risk. Regulated floodways would be avoided by siting towers outside of high-risk areas and by spanning the transmission line over washes. Impacts or encroachment on moderate- to low-risk areas associated with Mariposa Wash are unavoidable given the extent of flood-prone areas. Among the potential Route Segments, the Project would cross between 528 and 1,790 feet of Zone X floodplains, and 7,048 to 10,842 feet of Zone A floodplains. Permanent impacts to these areas for transmission structure foundations would range from 0 to 48 square feet in Zone X and 128 to 304 square feet in Zone A floodplains. These impacts, while permanent, would not be significant, based on the size of the area that would be affected by the Project compared with the area available in the existing floodplains to accommodate flood flows.

C. Cultural Resources [10 C.F.R. § 205.322(c)(2)]

Prior to conducting fieldwork, archival records were reviewed for information on past projects and known cultural resources in the area. Site and project records were requested from AZSITE, Arizona's statewide cultural resources database housed at the Arizona State Museum, and from the Coronado National Forest. In addition, historic maps such as General Land Office plats and aerial photographs were examined to identify historical period land uses of the area. The records check revealed that 28 archaeological surveys have taken place, and 10 sites have been recorded within 0.5 mile of the Project alignments. The previously recorded sites include five prehistoric artifact scatters, rock piles, a circa 1916 National Guard encampment, a historic period residence, and a railroad. Three of the previously recorded sites are within the alignment corridors.

Following the records review, a pedestrian survey was performed to identify cultural resources within the Project alternatives. The survey covered 206.7 acres of private land. The remaining area was not surveyed because right-of-entry had not been obtained from landowners, but additional surveys will be conducted prior to start of construction after selection of a final route as part of the state approval process. Based on the available data, no known historic properties would be directly or indirectly affected by the Project.

D. Minimum Right-of-Way Width [10 C.F.R. § 205.322(c)(3)]

The right-of-way ("ROW") width for the Project is anticipated to be 150 feet. A wider ROW may be required depending on the need for longer spans as detailed design of the Project moves forward. Minimum ROW width requirements will account for conductor blowout under specified wind conditions and for NESC clearance to future buildings or structures at the edge of the ROW. Additional permanent right-of-way may be required for access roads when it is not feasible to keep roads within the transmission line ROW. Additional temporary right-of-way may be required for wire stringing and for construction lay-down yards.

E. Biological Resources [10 C.F.R. § 205.322(c)(4)]

There is no designated or proposed critical wildlife habitat within the Project Area. Designated critical habitat for the Mexican spotted owl is adjacent to the Project Area on National Forest lands; however, there will be no impacts on this designated critical habitat or the species as a result of the Project.

Three main types of vegetation communities are found in the route corridor: Madrean Evergreen Woodland, Apacherian-Chihuahuan Mesquite Upland Scrub, and Apacherian-Chihuahuan Piedmont Semidesert Grassland and Steppe (Arizona Game and Fish Department [AGFD] 2015). The Arizona Game and Fish Department (AGFD) online environmental review tool (Project ID: HGIS-02011; accessed on August 18, 2015) also lists the following special status plant species that have been documented within three miles of the Route Corridor: large-flowered blue star (*Amsonia grandiflora*), Santa Cruz beehive cactus (*Coryphantha recurvata*), Pima pineapple cactus (*Coryphantha scheerie var. robustispina*), and supine bean (*Macroptilium supinum*). Species-specific plant surveys were conducted on November 30 and December 1, 2015, for the Pima pineapple cactus, Santa Cruz beehive cactus, supine bean, and agaves. Agaves were surveyed because of their potential as a forage resource for the lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*), an endangered species (discussed below). Fifty-three plants were recorded during the plant surveys: 27 agaves, 25 Santa Cruz beehive cacti, and one potential supine bean. No Pima pineapple cacti were documented. Forty-eight of the documented plants were recorded in the southwestern section of the Route Corridor.

The USFWS Environmental Conservation Online System – Information for Planning and Conservation (ECOS-IPaC) system was used to investigate endangered, threatened, and candidate species that may be found in the route corridor (Project Code: XJACG-X2GJB-FF7CN-JFOU3-JCWZH4; accessed on August 18, 2015). The lesser long-nosed bat (LLNB), an endangered species, is anticipated to occur in the route corridor. The LLNB occurs seasonally in Arizona from April to September in desert scrub and grassland/oak transition habitat where it feeds on nectar and pollen from the flowers of columnar cacti and agave (AGFD 2011). Because the LLNB feeds on the nectar of agave plants, the Project has the potential to affect the bat's forage species. The habitat found in the western section of the corridor is suitable for LLNB and may be a resource for this species. The Project may affect, but is not likely to have a significant adverse effect on the LLNB, given the small number of agaves that would be affected by the Project and the number of available agaves in the surrounding habitat. The number of agaves that would be affected by the Project, and that are likely to flower in any season, is small. If agaves cannot be avoided by the Project, the USFWS will need to be consulted to gain their concurrence with this determination.

F. Practical Alternatives to the Project [10 C.F.R. § 205.322(d)]

Nogales Transmission's route development process began with a public outreach effort on February 5, 2015, with a public open house and informational meeting and a separate roundtable discussion with local non-government organizations ("NGOs"). At these initial meetings, the Applicant presented a route previously approved by the Arizona Corporation Commission ("ACC") in 2001. Based on feedback received during the public open house and NGO meeting, the Applicant added new Route Segments. These Segments increased corridor sharing or addressed specific landowner concerns and were presented in a September 2015 agency meeting. Based on comments received at the agency meeting and continued outreach with landowners, additional Route Segments were included for analysis.

Detailed information regarding the Applicant's Public Involvement and Routing processes can be found in Section 1.3 and 2 of the Environmental Assessment.

No other practical alternative to the Project has been identified.

V. VERIFICATION

In accordance with 18 C.F.R. § 305.322(e), this Application has been signed and verified under oath by an officer of Nogales Transmission. A signed and notarized verification is provided as Exhibit "E".

VI. SUMMARY OF EXHIBITS

The following exhibits are included with this Application:

- Exhibit A – Opinion of Counsel
- Exhibit B – Technical Drawings
- Exhibit C – Overall System Map
- Exhibit D – International Border Crossing Map
- Exhibit E – Verification
- Exhibit F – Environmental Assessment in Support of a Presidential Permit – Nogales Interconnection Project (Hunt Power; Nogales, Santa Cruz County, Arizona; April 4, 2016)

VII. CONCLUSION

Nogales Transmission, L.L.C. respectfully requests that the Department grant the Presidential Permit requested herein by no later than December 31, 2016.

Respectfully submitted,

_____

Enrique J. Marroquin
Nogales Transmission, L.L.C

April 4, 2016

This page is intentionally left blank.

Exhibit A – Opinion of Counsel

United States Department of Energy
Office of Electricity Delivery and Energy Reliability
Washington, DC

Re: Application of Nogales Transmission, L.L.C. for Presidential Permit (Docket No. EA-____)

Ladies and Gentlemen:

I am counsel to Nogales Transmission, L.L.C., a Delaware limited liability company ("Nogales Transmission"), and have represented Nogales Transmission in connection with the Application of Nogales Transmission, L.L.C. for Presidential Permit (the "Application"). I am an attorney-at-law, authorized to practice law in the State of Georgia. I have examined such corporate records, certificates and other documents, and such questions of law, as I have considered necessary or appropriate for the purposes of this opinion. Upon the basis of such examination and as of the date hereof, it is my opinion that:

(1) Nogales Transmission is duly incorporated, validly existing, and in good standing under the laws of the State of Delaware.

(2) Nogales Transmission has the corporate power and authority to engage in the construction, connection, operation, and maintenance of the facilities as proposed in the Application.

(3) Based upon my knowledge of the facts and the law, including as a result of my consultation with outside counsel, following the issuance of the authorization sought in the Application, Nogales Transmission shall have complied with all federal and state laws applicable to the construction, connection, operation, and maintenance of the facilities as proposed in the Application.

The foregoing opinion is limited to the federal laws of the United States, the laws of the State of Texas, and the General Corporation Law of the State of Delaware as of the date hereof, and I am expressing no opinion as to the effect of the laws of any other jurisdiction.

In rendering this opinion, I have relied as to certain matters on information obtained from public officials, officers of Nogales Transmission and other sources believed by me to be responsible, and I have assumed that the signatures on all documents examined by me are genuine, assumptions which I have not independently verified.

I am furnishing this opinion solely for your benefit in connection with the Application. This opinion may not be relied upon by you for any other purpose or relied upon by or furnished to any other person without my express written consent.

Very truly yours,

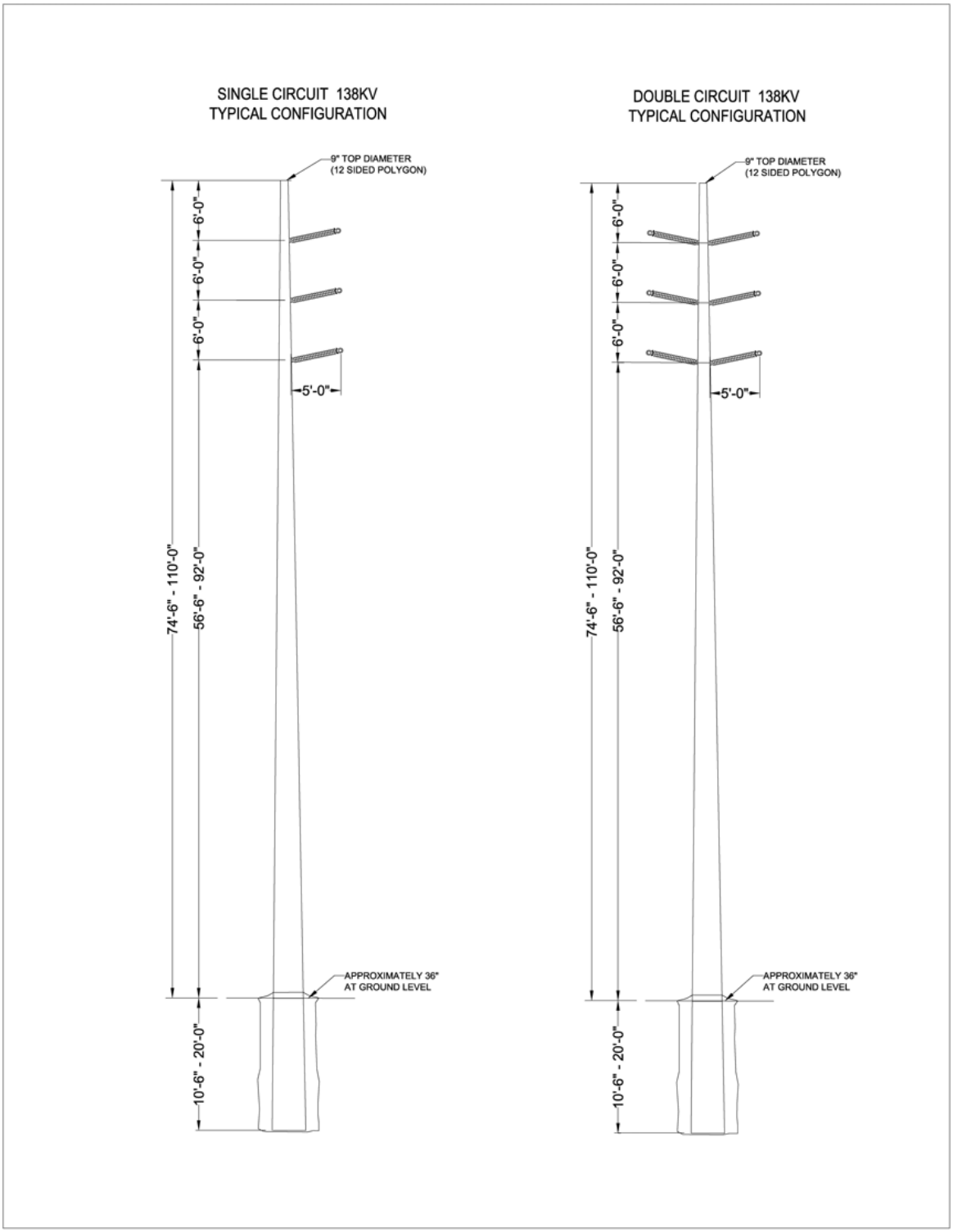
_____

Sharla Frenzel
Counsel
Nogales Transmission, L.L.C.

Dated: April 4, 2016

Exhibit B – Technical Drawings

Single and Double-Circuit 138kV Tower – Typical Configurations



Single and Double-Circuit 230kV Tower – Typical Configurations

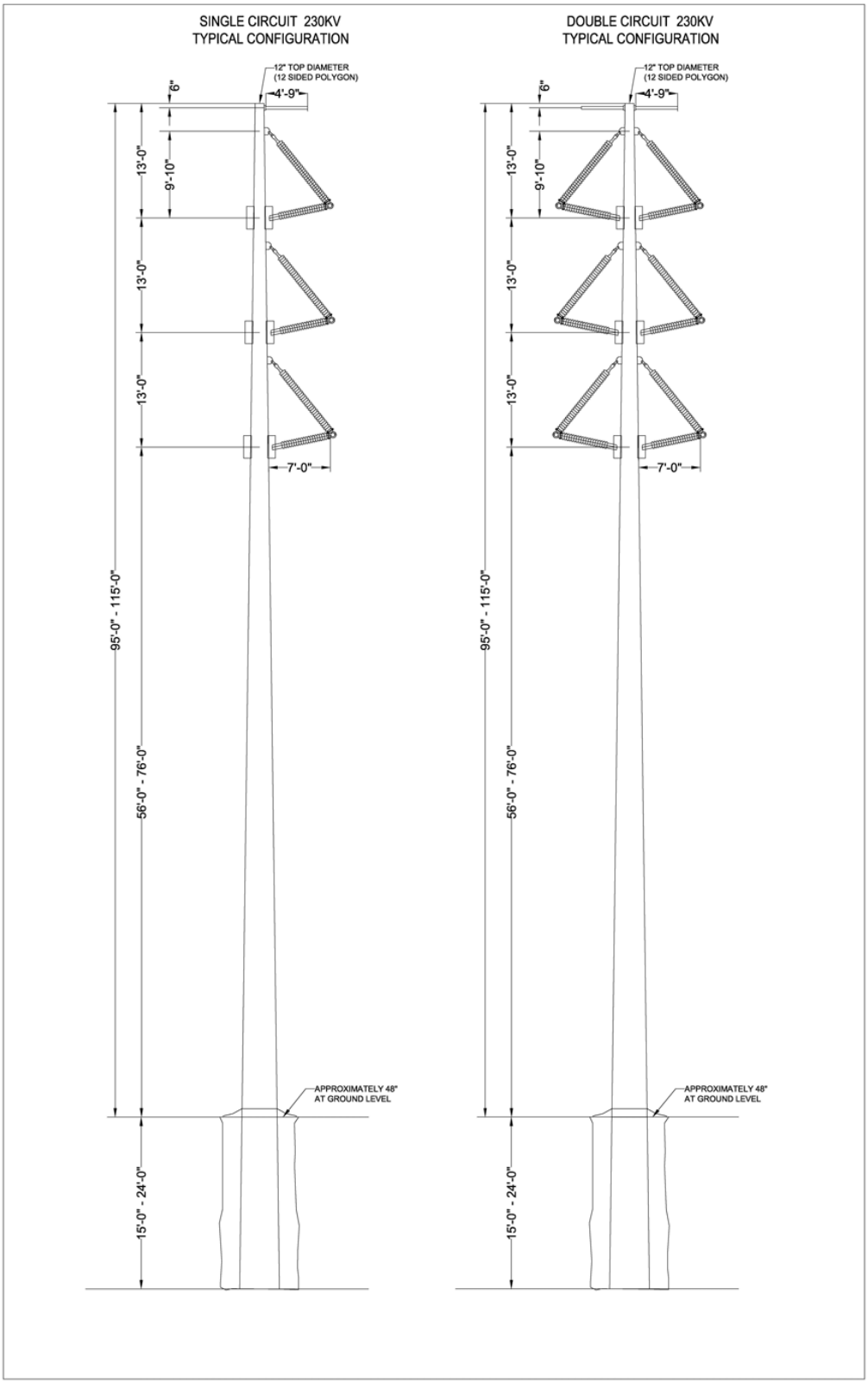


Exhibit C – Overall System Map

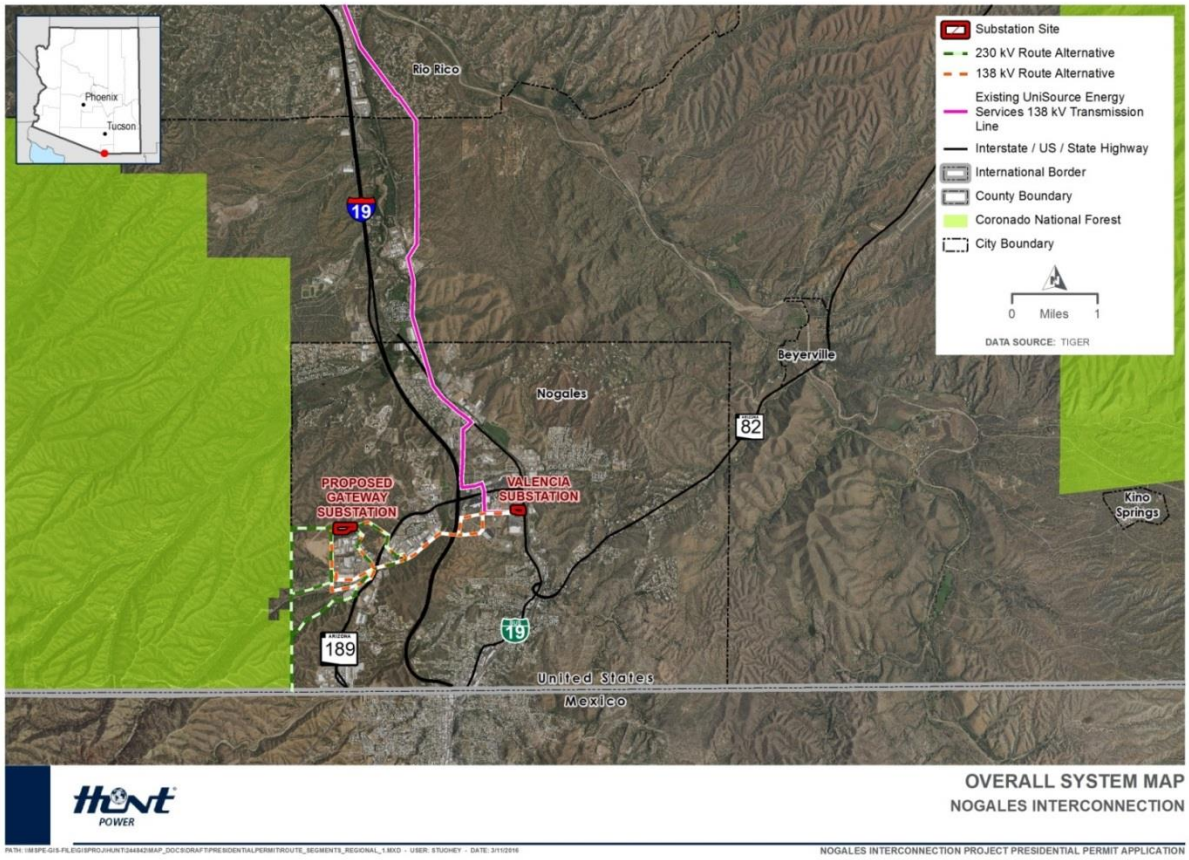


Exhibit D – International Border Crossing Map

The map below depicts the international border crossing location.

The facilities represented north of the border would be constructed as part of the project and owned by Nogales Transmission, L.L.C.

The facilities to be located south of the border would be constructed in order to interconnect the Project. Location of the facilities and ownership details will be provided to DOE as they are available.

Exhibit E – Verification

THE STATE OF TEXAS

COUNTY OF DALLAS

_____, being first duly sworn, hereby certifies under oath:

That he is _____ of Nogales Transmission, L.L.C., the Applicant, that he has read the foregoing Application for Presidential Permit and knows its content, and that the same are true and correct to the best of his knowledge and belief.

_____
Enrique J. Marroquin
Senior Vice President
Nogales Transmission, L.L.C.

Subscribed and sworn before me this _____ day of _____, 2016.

Notary Public

_____
Name

My Commission Expires: _____

Exhibit F - Environmental Assessment in Support of a Presidential Permit – Nogales Interconnection Project (Hunt Power; Nogales, Santa Cruz County, Arizona; April 4, 2016)

This page is intentionally left blank.

Completeness Checklist

Under 10 C.F.R. § 205.322, every Presidential Permit application must include the following:

	Application Requirement	Location in Application
	Application Fee ($150)	
Information Regarding the Applicant		
	Legal name of the applicant	Section II A
	Legal name of all partners	Section II B
	Name, title, address and phone number of person to whom correspondence should be addressed	Section II C
	Whether the applicant or its transmission lines are wholly or partly owned by a foreign government or instrumentality, or any agreement pertaining to such ownership by or assistance from any foreign government or instrumentality	Section II D
	All existing contracts between the applicant and any foreign government, or any foreign private concern, relating to any purchase, sale or delivery of electric energy	Section II E
	A showing that construction, connection, operation, or maintenance of the proposed facility is within the applicant's corporate power, and that the applicant has or will comply with all applicable Federal and State laws	Section II F
	A signed opinion of counsel	Section II F Exhibit A
Information Regarding the Transmission Lines Covered by the Presidential Permit		
A technical description providing:		
	number of circuits, with identification as to whether the circuits are overhead or underground	Section III B1
	operating voltage and frequency	Section III B2
	conductor size, type and number of conductors per phase	Section III B3
	wind and ice loading design parameters	Section III C1
	full description and drawing of a typical supporting structure, including strength specifications	Section III C2

Application Requirement		Location in Application
	structure spacing with typical ruling and maximum spans	Section III C3
	conductor (phase) spacing	Section III C4
	designed line to ground and conductor side clearances	Section III C5
	A map showing the overall system with a scale not greater than 1 inch = 40 km	Section III D Exhibit C
	A map showing the physical location, longitude and latitude of the facility on the international border, with a scale not greater than 1 inch = 25 miles, that indicates the ownership of the facilities at or on each side of the border	Section III D Exhibit D
Bulk power supply facility information:		
	Data regarding the expected power transfer capability, using normal and short time emergency conductor ratings	Section III E1
	System power flow plots for the applicant's service area during heavy summer and light spring load periods, with and without the proposed international interconnection, for the in-service year and five years after the in-service year	Section III E2
	Data on the line design features for minimizing television and radio interference	Section III E3
	Description of the relay protection scheme, including equipment and proposed functional devices	Section III E4
Information regarding environmental impacts:		
	Flood plains	Section IV B + Section 3.4
	Wetlands	Section IV B + Section 3.4
	Critical wildlife habitat	Section IV E + Section3.5
	Navigable waterway crossings	N/A
	Indian land	N/A
	Historic sites	Section IV C + Section 3.6
	Sites potentially eligible for listing on the National Register of Historic Places	Section IV C + Section 3.6
	Details regarding minimum ROW width for construction, operation and maintenance	Section 2.2
	Threatened and endangered species	Section 3.3 + Section 3.5

Application Requirement		Location in Application
	Description of practical alternatives and their environmental effects	Throughout
	Signature (under oath) by officer of the applicant with knowledge of the proposal	Section VII

This page is intentionally left blank.

Environmental Assessment in Support of a Presidential Permit

Nogales Interconnection Project

Hunt Power

Nogales, Santa Cruz County, Arizona

April 4, 2016

This page is intentionally left blank.

Contents

Figures

Tables

Appendices

This page is intentionally left blank.

1 Introduction

1.1 Project Overview

The Nogales Interconnection Project (Project) is being developed by Nogales Transmission, L.L.C., a subsidiary of Hunt Power, L.P (Applicant). The Project is a proposed 300 megawatt (MW) direct current (DC) interconnection, commonly known as a DC tie that would allow for an asynchronous interconnection between the electric grid in southern Arizona and the electric grid in the northwestern region of Mexico. The project will be constructed in two phases. The first phase of the Project will include the components listed below and the converter capacity will be 150 MW. The second phase, to be constructed at a time that has not yet been determined, will expand the HVDC converter capacity to 300 MW within the proposed Gateway Substation.

The Project would consist of three components:

1. A new 10- to 15-acre Gateway Substation, potentially located on land currently owned by Tucson Electric Power (TEP), where DC tie equipment for both phases would be located;
2. A new, approximately 3-mile, 138 kilovolt (kV) transmission line segment originating at the existing UniSource Energy Services (UES) Valencia Substation in Nogales, Arizona, and extending west and south to the new Gateway Substation; and
3. A new, approximately 2-mile, 230 kV transmission line segment extending south from the new Gateway Substation and across the United States-Mexico border to interconnect with a transmission line to be constructed in Mexico.

Nogales Transmission, L.L.C., will require a Presidential Permit from the Department of Energy for the border crossing as well as a Certificate of Environmental Compatibility (CEC) from the Arizona Corporation Commission (ACC) for construction of the transmission lines.

1.2 Purpose and Need

Federal regulations implementing the National Environmental Policy Act (NEPA) require an environmental assessment on any action at any time in order to assist agency planning and decision making.

1.2.1 Federal Agency Purpose and Need

The purpose and need for the DOE action is to determine whether it is in the public interest to grant or deny a Presidential Permit to Nogales Transmission for the construction, operation, maintenance, and connection of the proposed asynchronous interconnection transmission line that would cross the US international border. Like all federal agencies, DOE must comply with NEPA when it evaluates a proposal for federal action that may affect the environment. The NEPA process is intended to help decision makers understand the environmental consequences of their actions.

1.2.2 Applicant's Purpose and Need

The proposed Project consists of the new Gateway Substation located on a 10- to 15-acre parcel of land approximately three miles from the existing Valencia Substation in Nogales, Arizona; the new 3-mile, 138-kV transmission line segment originating at the Valencia Substation and extending west and south to the new Gateway Substation; and the new 2-mile, 230-kV transmission line segment extending south from the new Gateway Substation and across the US-Mexico border to interconnect with a transmission line to be constructed in Mexico. The new Gateway Substation will be approximately two miles north of the border between the United States and Mexico. The proposed Project is being developed to allow transfers of capacity and energy between the US and Mexico to serve load and enhance reliable operations of the transmission grid. The HVDC interconnection facilities initially will be 150 MW, but will be capable of being expanded to 300 MW.

The proposed Project would be available to provide reliability support to both the US and Mexico electric transmission grids. The Project would facilitate the creation of a power market to trade electricity between the US and Mexico, thus promoting a more liquid market in electricity, providing the opportunity for reduced prices to electric consumers in the region, and improving the region's ability to meet future electric capacity and energy requirements.

1.3 Benefits to the Region

The Project would support the reliability of the regional electrical grid by providing bidirectional power flow and voltage support. It would also provide emergency assistance, as needed, for the electric system both north and south of the border. Nogales is at the end of the Western Electricity Coordinating Council (WECC) grid and relies on the approximately 55-mile-long, 138 kV Vail to Valencia transmission line for its power supply. The addition of the proposed Gateway Substation and the connection to the electrical grid in Sonora, Mexico, would provide an additional source of energy for the city of Nogales in the event of a transmission line outage or other problem on the WECC system.

Benefits of the Project would include:

- providing access to other electricity sources and ancillary services, such as voltage support to each side of the border
- enabling transmission-owning utilities on both sides of the border to support each other in times of emergency
- enabling cost savings through firm and non-firm energy transactions, as well as through diversity of peak demand patterns
- providing access to an additional energy market that may allow TEP, UES, and the Mexican utility to pass along the benefits of reduced costs to retail customers
- creating regional economic development opportunities (In addition to temporary construction and supply chain jobs, the Project would create a more robust electric grid to support the region's business growth.)

1.4 Public Involvement

To engage landowners, the Applicant invited the public to attend an open house meeting on February 5, 2015. The goal of the open house was to introduce the Project, answer questions, gather input, and collect comments. Additionally, an agency and stakeholder meeting was held on September 17, 2015. The Applicant invited representatives from 20 different agencies, tribes, and nongovernmental organizations.

The Applicant gathered comments and feedback from attendees, which helped the Applicant understand local community concerns and preferences. After the agency meeting, the Applicant provided a site visit to interested parties.

Comments received during the public open house and agency meetings influenced the Project's environmental review. They are summarized below:

- Structures should not be permitted in the Roosevelt Easement (a 60-foot strip of land parallel and adjacent to the United States-Mexico border, reserved to ensure its integrity by two Presidential Proclamations in 1897 and 1907), and any transmission or associated infrastructure should not be a tool for illegal activity (e.g., anti-climb poles should be used).
- While some views were expressed about possible increased access to public lands, the U.S. Border Patrol indicated that a road could be useful for their operations without increasing illegal activity.
- Concern was expressed about impacts to game species, not just threatened and endangered species.
- Concern was expressed about transmission poles being in Arizona Department of Transportation (ADOT) right-of-way (ROW) and crossing State Route (SR) 189.
- Transmission line routing preferences were stated (e.g., farther from the U.S. Forest Service [USFS] boundary).
- It was indicated that industrial development is planned near the USFS boundary.
- Questions were asked about Mexican partners, agreements, and flow of power to and from Mexico.

The Project website contains a fact sheet, frequently asked questions, and a Project map: https://www.huntpower.com/nogalesdctie.aspx.

This page is intentionally left blank.

2 Proposed Action and Alternatives Analysis

As described in Section 1.1, the Project would consist of three components:

- A new 10- to 15-acre Gateway Substation;
- A new, approximately 3-mile, 138 kV transmission line segment from the existing UES Valencia Substation in Nogales, Arizona to the new Gateway Substation; and
- A new, approximately 2-mile, 230 kV transmission line segment from the new Gateway Substation to a transmission line to be constructed in Mexico.

This section describes the alternatives that were developed for the proposed action.

2.1 Siting Philosophy and Planning

The Project's route segment development was guided by a strategy of minimizing impacts by following existing infrastructure and developed corridors wherever possible. This approach included:

- working within or next to existing corridors and previously disturbed areas (e.g., transmission lines, roads, etc.)
- working with stakeholders to understand and avoid or minimize impacts to sensitive areas
- integrating information from existing federal and state energy and land use planning efforts
- developing responsible routes and route alternatives informed by:
    - public input
    - industry experience
    - local utility companies
    - federal, state, and local agencies
- selecting a preferred route based on landowner cooperation/agreements that will be subject to approval by the ACC pursuant to a request for a CEC for the lines.

2.1.1 Study Area Identification

The Study Area includes the Project endpoints (United States-Mexico border crossing area, proposed Gateway Substation, and existing Valencia Substation) and major routing opportunity features between the endpoints. The northern boundary minimizes potential impacts on residences, and the western boundary was chosen to avoid directly affecting the Coronado National Forest (Figure 2-1).

2.1.2 Route Segment Identification

The Applicant presented a route, previously approved in 2001 by the ACC, to landowners at the February 2015 open house (Figure 2-2). Based on feedback received during the open house, the Applicant added new Route Segments. These segments increased corridor sharing or addressed specific landowner concerns. The new route segments and the previously approved 2001 route were presented to agencies at the September 2015 meeting (Figure 2-3). Based on comments received at the agency meeting and continued outreach with landowners, additional Route Segments were included for analysis (Figure 2-4).

2.1.3 Border Crossing

The route would cross the international border at 31° 19' 57.844" North, 110° 58' 35.908" West (Figure 2-5), which is west of the Mariposa Port of Entry.

2.1.4 Preferred Route

While the Applicant is not identifying a preferred route at this time, the Applicant expects to identify a preferred route in its application submittal to the ACC.

2.2 Proposed Action Description

2.2.1 Transmission Line

The typical structure type would be a steel, single pole structure.

The Applicant anticipates that the Project would be located on new ROW that is approximately 150 feet wide. A wider ROW may be needed if areas require longer spans of conductor for the Project, angle and corner structures, or guyed structures as well as where special design requirements are dictated by topography. Generally, structures would be spaced approximately 600 to 1,000 feet apart, with shorter or longer spans as necessary. Table 2-1 provides details for the 138 kV structures, and Table 2-2 provides details for the 230 kV structures.

Table 2-1. Single/Double-Circuit 138 kV Structure

Structure Attribute	Description
Type of structure	Tubular steel pole
Approximate structure height	75−110 feet
Approximate structure spacing	600−1,000 feet
Anticipated number of structures per mile	5−9 structures (depending on terrain and other factors)
Anticipated ROW width	Up to 150 feet

Figure 2-1. Study Area

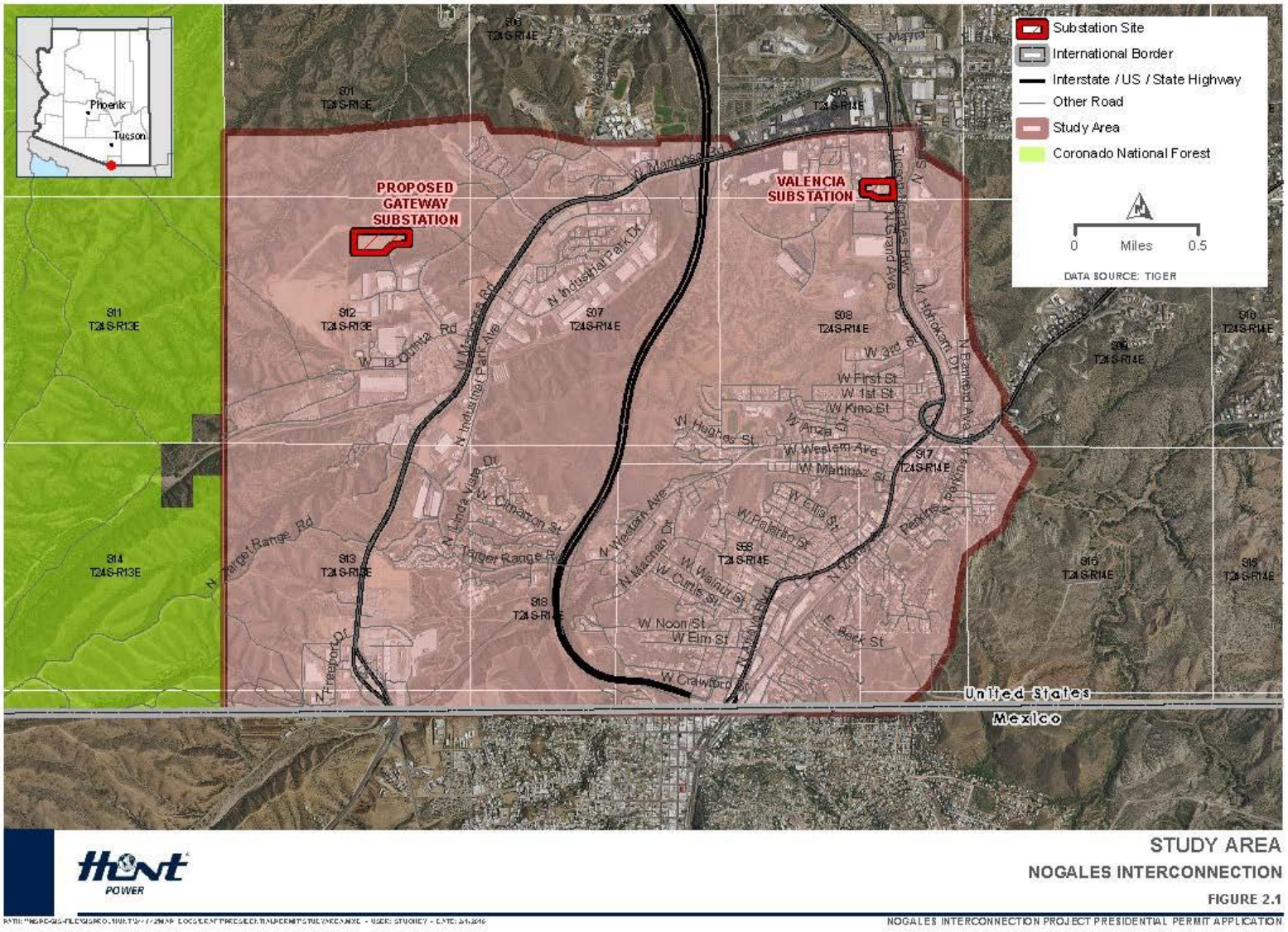


Figure 2-2. February Open House Routes

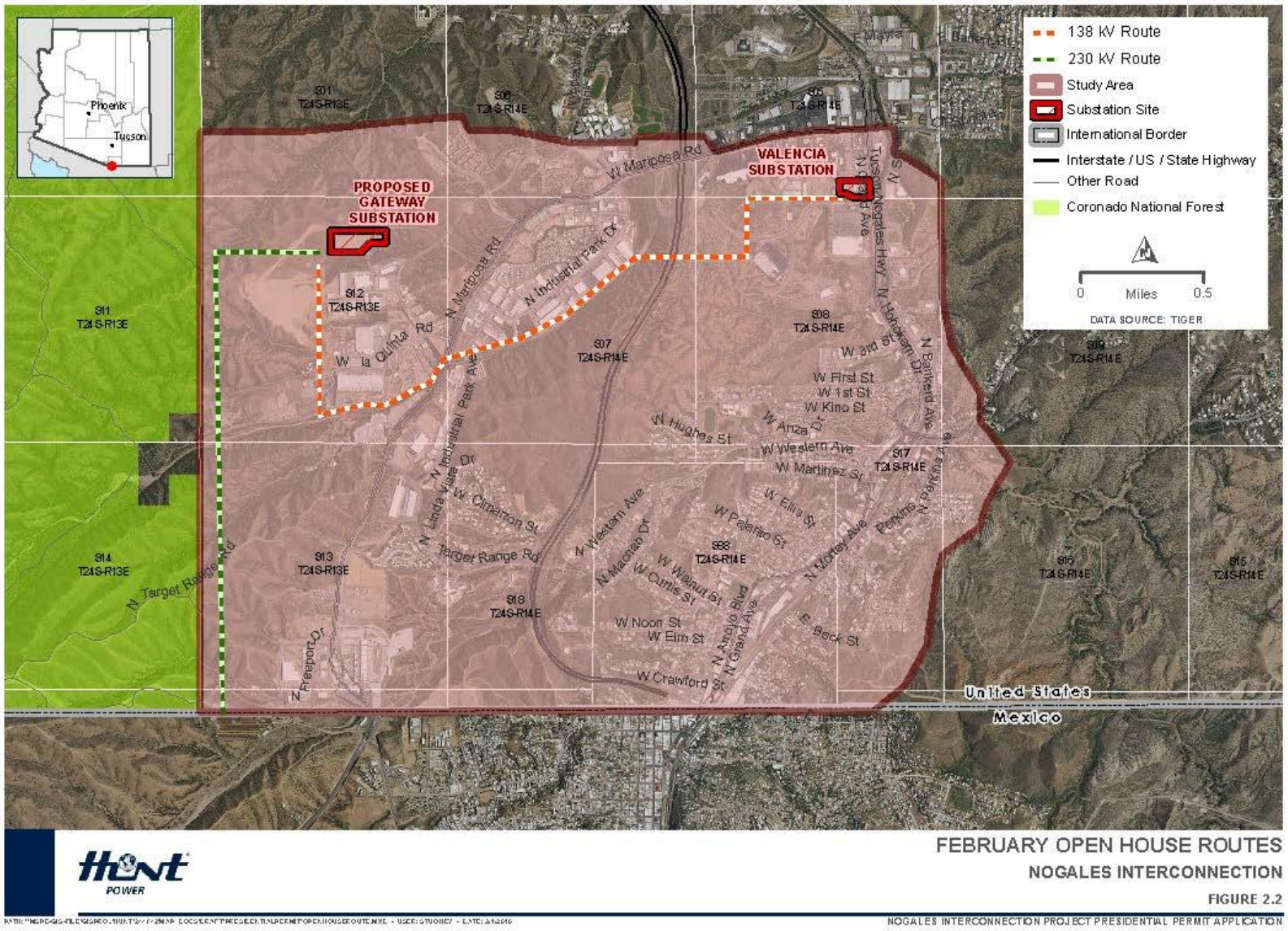


Figure 2-3. Route Segments – September 2015

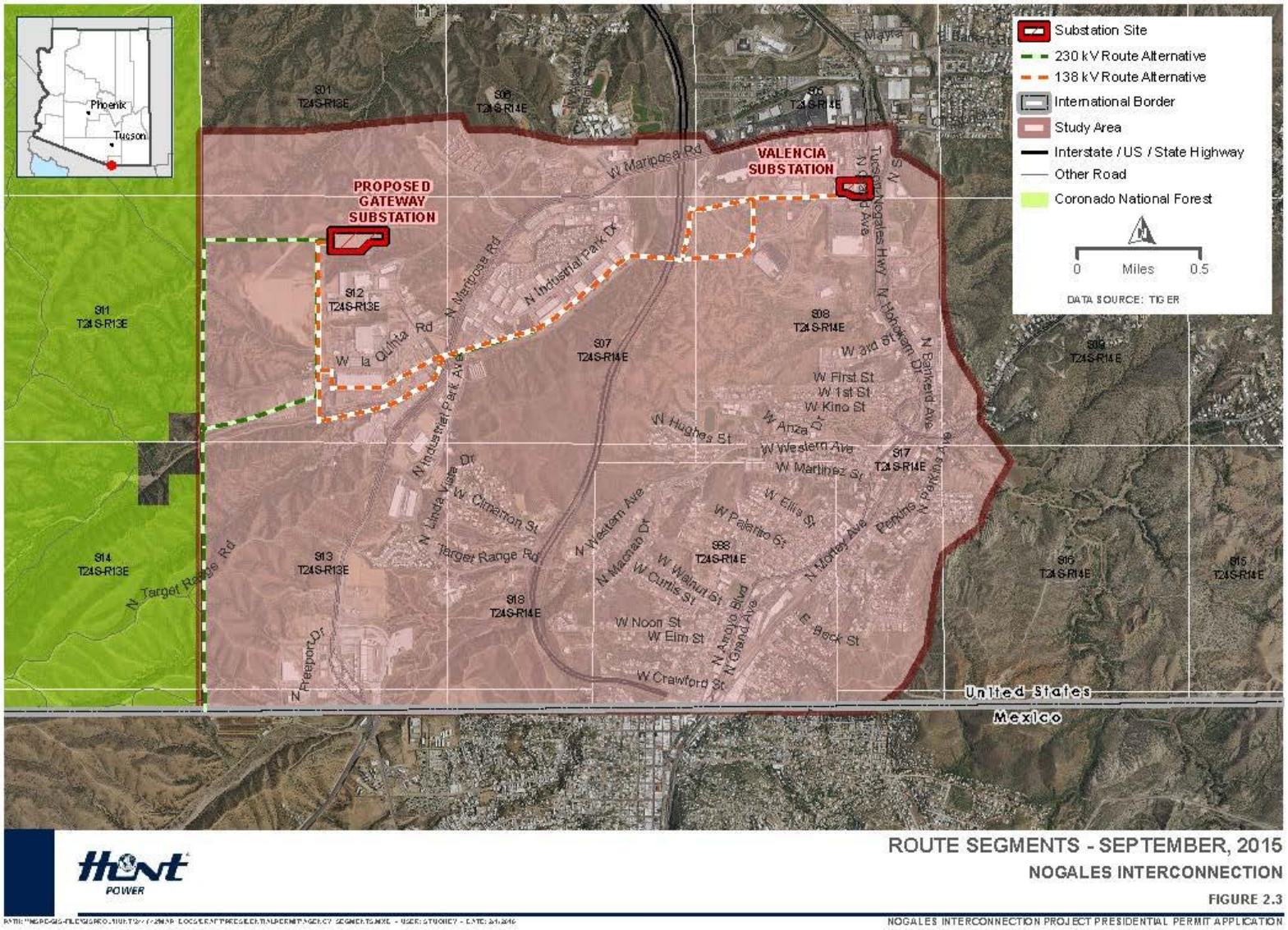


Figure 2-4. Route Segments – October 2015

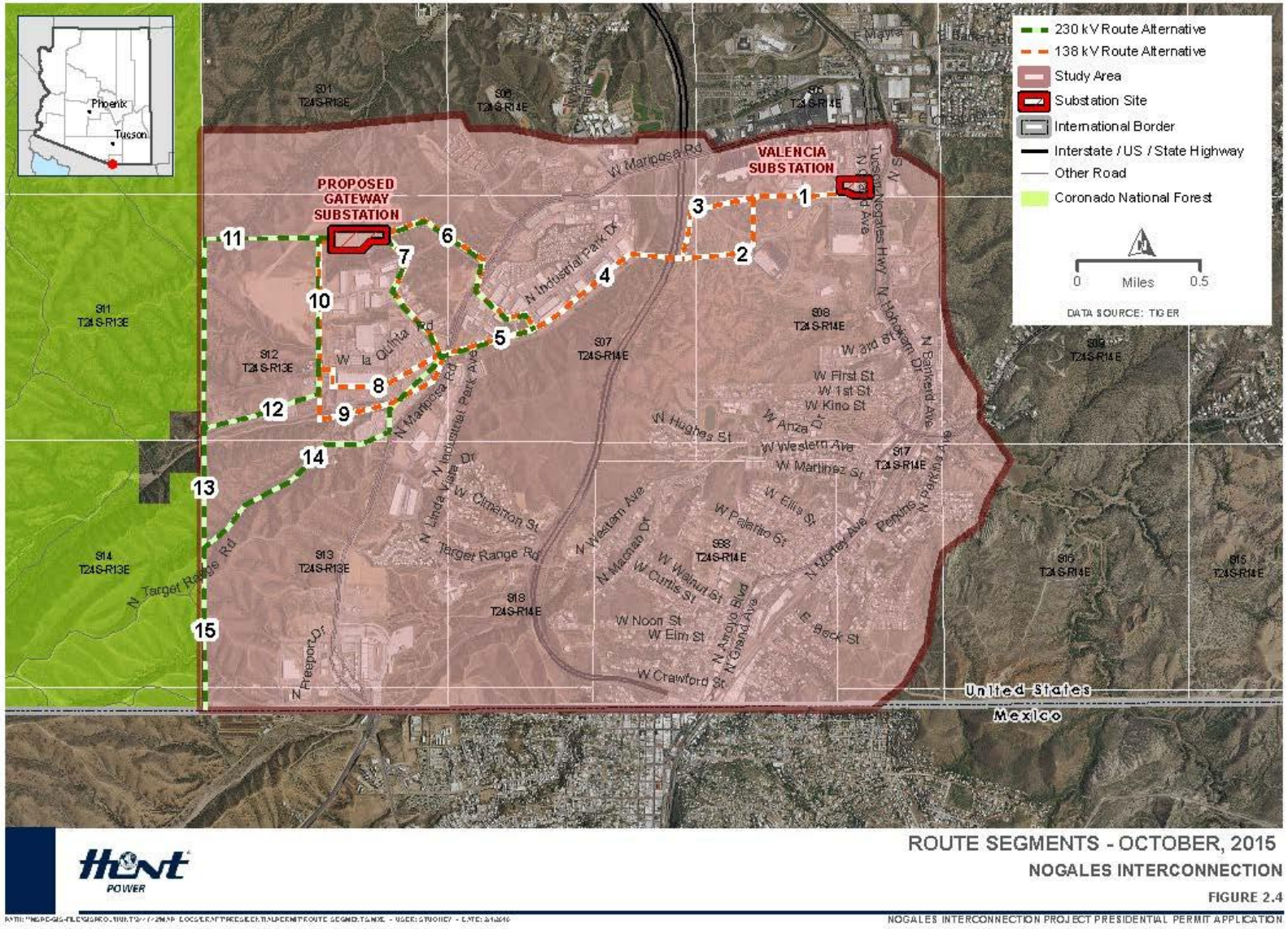


Figure 2-5. International Border Crossing

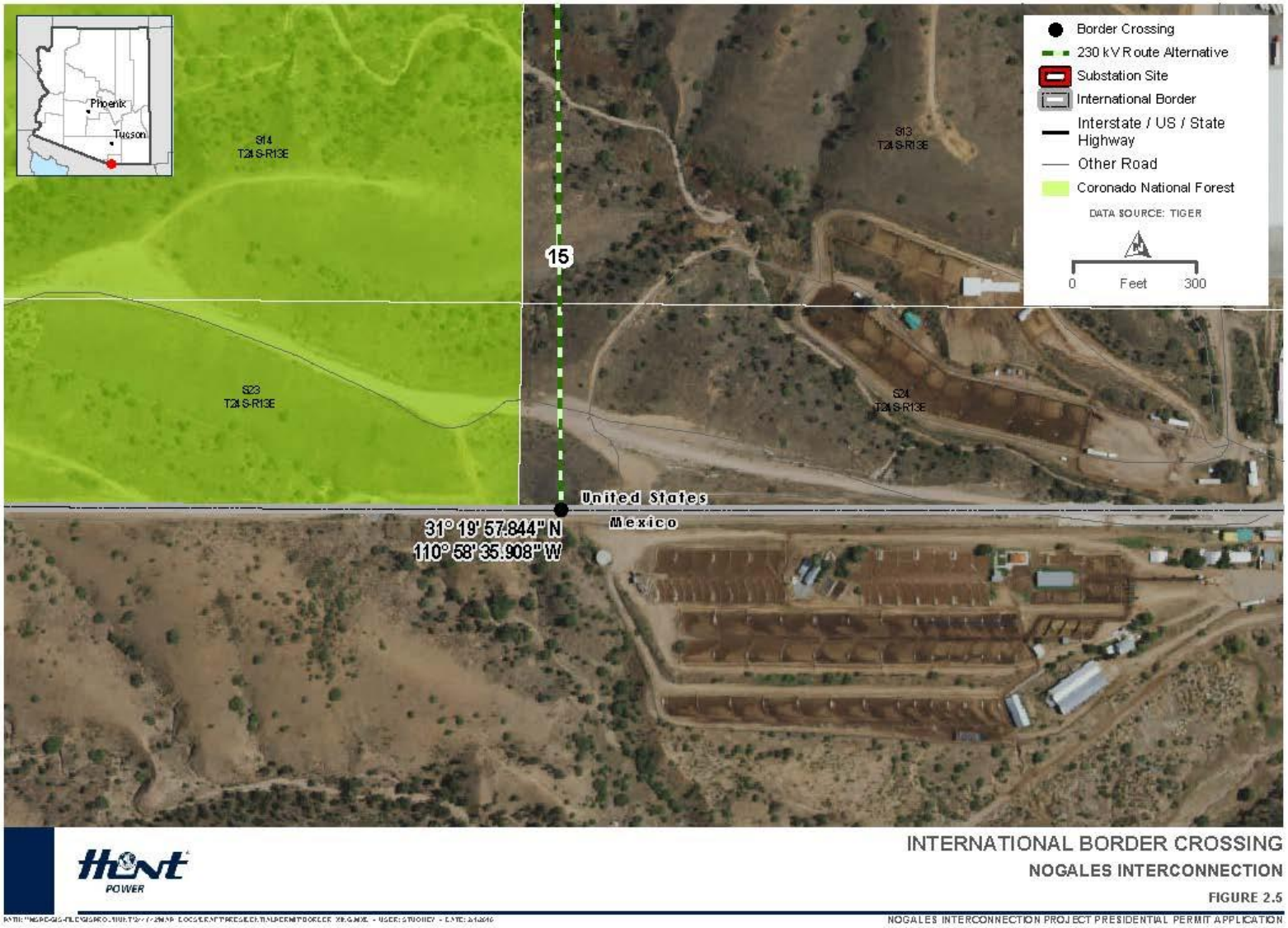


Table 2-2. Single/Double-Circuit 230kV Structure

Structure Attribute	Description
Type of structure	Tubular steel pole
Approximate structure height	95–115 feet
Approximate structure spacing	600–1,000 feet
Anticipated number of structures per mile	5−9 structures (depending on terrain and other factors)
Anticipated ROW width	150 feet

Figure 2-6 and Figure 2-7 show sample images of the structures.

2.2.2 Right-of-way and Easements

This Project would generally require a new, 150-foot-wide ROW to accommodate the transmission line. Nogales Transmission, L.L.C. would acquire easement rights across certain parcels to accommodate the facilities. The land evaluation and acquisition process would include title examination, initial landowner contacts, environmental and non-environmental survey, document preparation, and purchase. Each of these activities, particularly as it applies to easements for high-voltage transmission line facilities, is described in more detail below.

The first step in the ROW process would be to identify persons and entities that may have a legal interest in the real estate upon which the facilities would be built. To compile this list, a ROW agent or other representative engaged by the Applicant would complete a public records search of land included in the Project to determine the property's legal description and the owner(s) of record as well as to gather information regarding easements, liens, restriction, encumbrances, and other conditions of record, as needed.

After owners are identified, a ROW representative would contact each property owner or the property owner's representative. The ROW agent would explain the need for the transmission facilities and how the Project may affect each parcel. The ROW agent would also obtain information about specific construction concerns from the landowner.

The next step in the acquisition process would be evaluation of the specific parcel. For this work, the ROW agent may request Right of Entry (ROE) permission from the landowner for survey crews to enter the property to conduct preliminary survey work. ROE permission may also be requested to take soil borings to assess the soil conditions and determine appropriate foundation design. Surveys would be conducted to locate the ROW, natural features, human-made features, and associated elevations for use during the line's detailed engineering. The soil analysis would be performed by an experienced geotechnical testing laboratory.

Figure 2-6. Single and Double-Circuit 138kV Tower – Typical Configurations

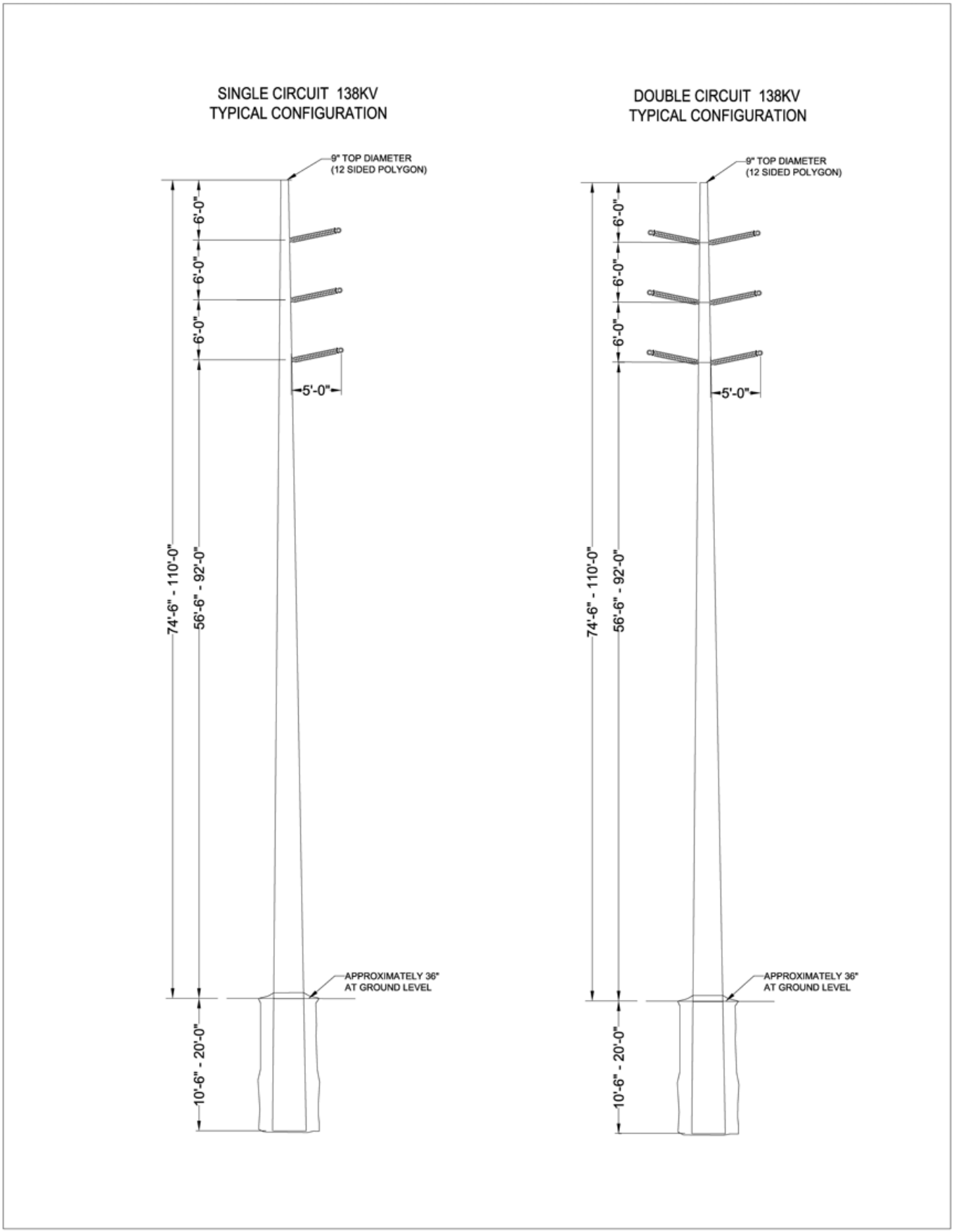
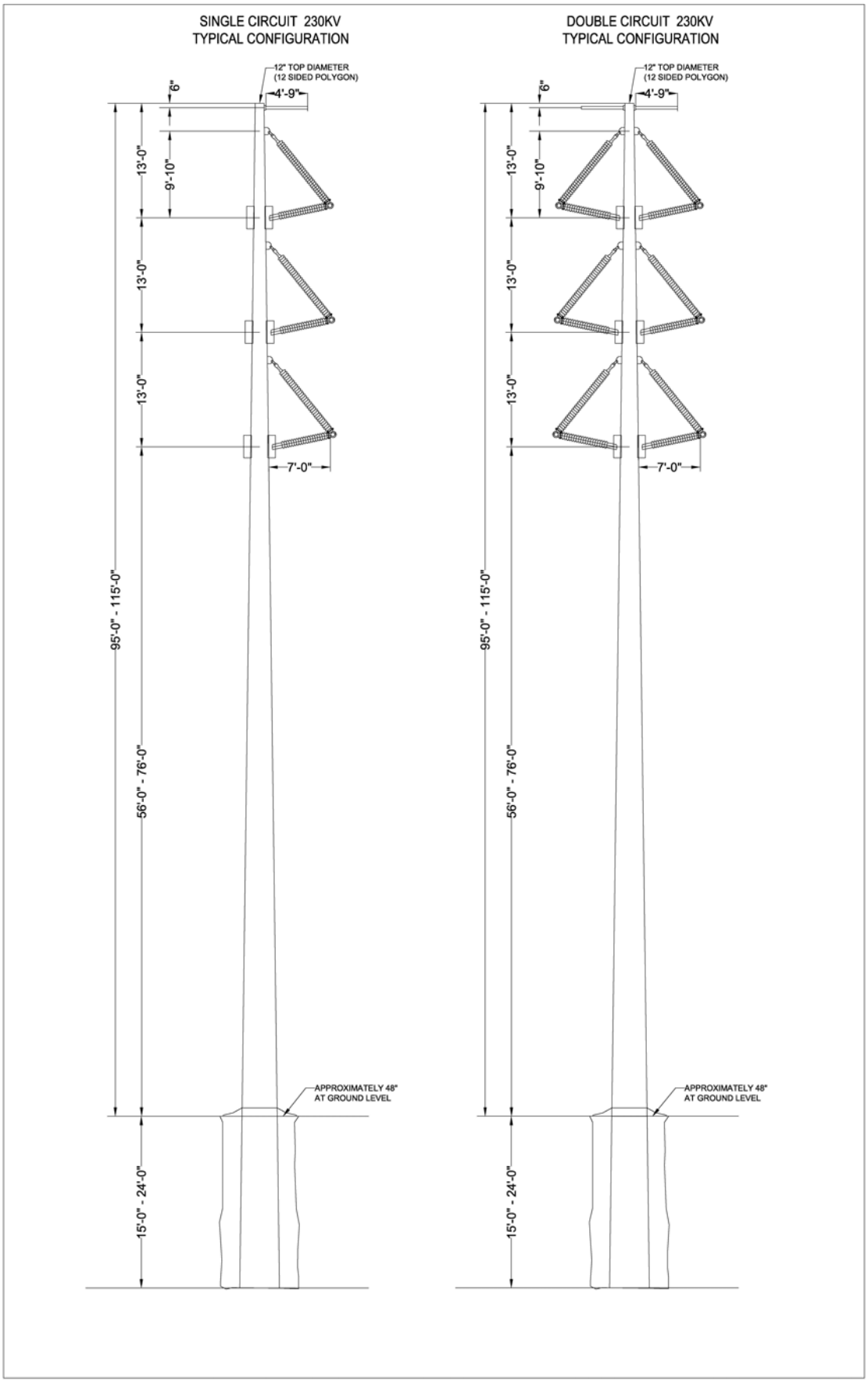


Figure 2-7. Single and Double-Circuit 230kV Tower – Typical Configurations



During the evaluation process, the location of the proposed transmission line may be staked with the property owner's permission. This means that the survey crew would locate the proposed placement of each structure on the ground and place a surveyor's stake to mark the structures' anticipated location. By doing this, the ROW agent could show the landowner where the structure(s) are anticipated to be located on the property. The ROW agent may also delineate the boundaries of the easement area required for the line's safe operation.

Prior to making offers for use of property, land value data would be collected. Based on the impact of the easement to the market value of each parcel, a fair market value offer would be developed. The ROW agent would contact the property owner to present the offer for the easement and discuss the amount of compensation for the rights to build, operate, and maintain the transmission facilities within the easement area, with reasonable access to the easement area. The ROW agent would also provide maps of the transmission line easement or site and maps showing the landowner's parcel. The landowner would be allowed a reasonable amount of time to consider the offer and to present any material that the owner believes is relevant to determining the property's value and the value of the easement.

In most cases, ROW agents are able to work with landowners to address their concerns and an agreement is reached for the utility's purchase of land rights in the form of an easement. The ROW agent would prepare the easements, obtain signatures, and record the documents required to complete each transaction. As part of the ROW acquisition process, the ROW agent would discuss the construction schedule and construction requirements with the owner of each parcel. For safe construction of the transmission line, special consideration may be needed for fences. Fences may need to be moved, and temporary or permanent gates may need to be installed. In each case, the ROW agent and construction personnel would coordinate these processes with the landowner.

2.2.3 Staging Areas

Construction materials would be hauled either directly from the local highway to structure sites or would be brought first to material staging areas and then to the structure sites. The transmission line components—including the conductor and hardware—normally are brought to the temporary staging areas on flatbed trucks. These materials are stored until needed and then loaded on flatbed trailers or trucks for delivery to the structure site where they are unloaded for installation. Staging areas would be identified and used during construction. Fugitive dust emissions at the staging areas would be mitigated by application of water sprays or other control measures as appropriate.

2.2.4 Access Roads

Five types of access would be used for the proposed transmission line: existing paved roads, existing dirt roads that would not require improvements, existing dirt roads that may require improvements, new bladed access roads, and overland access. The ROW would be accessed using existing roads and trails to the extent practicable. These existing roads and trails would be used in their present condition without improvements, unless improvements are needed or are deemed to be in the best interest of the Project and for future use. In areas where

improvements are required, roads and trails would be graded to provide a smooth travel surface.

Where existing roads and trails can be used to access the ROW, only spur roads or trails to each structure site would be required. Access on the ROW, other than in specific areas, would require a road graded to a width of up to 12 feet. Typically, new roads would go directly from structure to structure, except on hillsides, ridgebacks, rock outcrop areas, wash crossings, treed areas, or in areas where sensitive environmental resources should be avoided. In such cases, the road would follow suitable topography from structure to structure and would be built in areas that generally cause the least overall disturbance. Any access road improvements made outside the ROW would be coordinated with landowners, and any required permits or agreements would be acquired prior to construction.

New roads that must be graded for access in steep terrain (side-hill roads) would most likely exceed the 12-foot width of disturbance because of cut and fill conditions; however, the travel surface width would not exceed 12 feet.

Fugitive dust emissions from construction or use of access roads would be mitigated by application of water sprays or other control measures, as appropriate.

2.2.5 Construction Activities

Once land access is granted, preparation of the ROW for construction would begin in coordination with landowners. Underground utilities would be identified and located in cooperation with local utility companies to minimize conflicts with existing utilities along the route. Preparation for construction would begin with developing access to each structure site from existing roads. A reasonably level access path would be needed to provide for safe passage of construction equipment. At structure locations, a stable working surface free of tripping hazards would be needed for installation of foundations and guy anchors, as well as assembling and erecting structures.

2.2.5.1 Vegetation Removal

The Arizona Native Plant Law (NPL) protects many of Arizona's plants from removal and destruction (Arizona Department of Agriculture, Protected Native Plants). Plants protected by the Arizona NPL that are found in the Project area may include cactus, yucca, agave, mesquite, ocotillo, and beargrass. The Applicant will obtain the required permits if relocation of any vegetation subject to the NPL is required. (https://agriculture.az.gov/native-plant-procedures)

Much of the Project area is made up of shrub and grassland species that would not require removal. If needed, larger woody vegetation found in the ROW that is not subject to the NPL would be cut at or slightly above the ground surface. Rootstock would be left in place to stabilize existing soils.

2.2.5.2 Right-of-way Access and Construction Preparation

If temporary removal or relocation of fences is necessary, the contractor will coordinate with the landowner.

Transmission line structures generally are designed for installation at existing grades. However, if vehicles or installation equipment cannot safely access or operate near the structure, minor grading of the immediate terrain would be performed to provide a reasonably level working surface for construction and maintenance of the structure.

Construction equipment would be inspected frequently to ensure hydraulic systems and oil pans are in good condition and free of leaks. Portable spill containment materials would be required for each piece of construction equipment with the potential to discharge a significant amount of oil into the environment. Operators would be present at the nozzle at all times when refueling. In the event of a spill, the source of the spill would be identified and contained as quickly and safely as possible upon discovery. The spill and contaminated soils would be managed in accordance with all applicable federal, state, and local requirements. An emergency response contractor would be secured, if necessary, to further contain and clean up a severe spill.

In the event that protected species or cultural and historical artifacts are encountered during construction activities, Project management personnel would consult with regulatory authorities regarding appropriate construction procedures and mitigation measures, which would be determined through applicable regulatory procedures.

2.2.5.3 Structure Site Preparation

A stable working surface is required at structure locations. Structures would be assembled and erected on site. Where reinforced concrete foundations are required, large rubber-tired or track-mounted auger equipment would be used to excavate a circular hole of the appropriate diameter and depth. A temporary or permanent casing may be used to stabilize the excavation if required. Excavated material would be spread evenly around the structure base to promote site drainage. Reinforcing steel and anchor bolts would be set in position. Ready-mixed concrete would then be placed in the excavation. Concrete truck wash water would be discharged only in specially designated upland disposal areas or at the concrete batch plant.

During final restoration, ground contours would be restored to approximate pre-construction contours prior to revegetation with native species.

Fugitive dust emissions at the staging areas would be mitigated by application of water sprays or other control measures, as appropriate.

2.2.5.4 Wire Stringing

The wire stringing process would start in a set-up area prepared to accommodate the stringing equipment and materials, normally located adjacent to major angle points or near mid-span on the ROW centerline. The rope machine, conductor wire trailers, and tensioner would be located at the wire stringing set-up areas. This phase of construction would occur after the structures have been erected and insulators and stringing blocks (also called dollies or sheaves) have been installed. Stringing blocks are a type of pulley that attaches to the insulator assembly and temporarily supports a pulling rope, a wire rope or hard line, and ultimately the conductor as it is being strung between structures.

The process would start as the crew pulls a rope from one setup area to the next. The rope may be pulled down the ROW with wide-track or rubber-tired equipment, or strung by helicopter. After the rope has been strung through all the structures for all phases within the stringing

interval, the ropes would be used to pull a hard line through the dollies from one setup area to the next. A hard line set-up would be located at the opposite end of the interval from the wire stringing setup area.

Each hard line would then be attached to the conductor with an anti-rotation device and an attachment called a sock, which would be pulled back through the dollies to the end of the interval. Crew members would monitor the progress of stringing to ensure the sock does not get hung up in the dollies. One phase at a time, the conductor wire bundles would be pulled to the appropriate tension. Once all the phases have been tensioned, they would be clipped into place using permanent attachment hardware at each structure.

2.2.5.5 Water Crossings

It is anticipated that the final route will be adjacent to and will cross segments of perennial and intermittent streams. The most effective means to minimize impacts on streams during construction is to span them by placing structures above the normal high water level. The Applicant would avoid crossing waterways with construction equipment wherever practical by accessing the site from opposite sides. In areas where construction occurs close to waterways, appropriate measures would be employed to minimize soil erosion and prevent sedimentation of the waterways. The Applicant would ensure that equipment fueling and lubricating occurs at a reasonable distance from the waterways.

2.2.6 Restoration and Maintenance

Post-construction reclamation activities would include removing and disposing of debris, removing all temporary structures (including staging areas), and employing appropriate erosion control measures. Areas disturbed by construction activities would be reseeded with vegetation similar to what was removed.

Restoration and reclamation procedures following completion of repair work would be similar to those prescribed during construction.

Damage repair may require the same types of equipment used during construction, including power augers for hole boring, backhoes for excavation, and/or concrete trucks and cranes for structure erection. Other required equipment may include power tensioners; pullers; wire trailers; crawler tractors; and trucks and pickups for hauling materials, tools, and workers. Any necessary temporary staging areas outside the ROW would require authorization from the applicable landowner(s). Site and access road disturbances, such as ruts created during damage repair operations, would be restored to a satisfactory condition using rehabilitation procedures.

If during transmission line maintenance and monitoring it is determined that new or reconstruction activities should be implemented, the Applicant would notify the property owners and/or other regulatory agencies and obtain proper approvals, as necessary.

Dust control during maintenance of the transmission line would be managed the same as during construction.

2.2.7 Gateway Substation and DC Interconnection

The new 10- to 15-acre, 300 MW Gateway Substation and DC interconnection would potentially be built on land owned by TEP. The City of Nogales previously issued a conditional use permit allowing development of a substation at this location. The Applicant will need to pursue a new conditional use permit for the Project.

The Gateway Substation will be built in phases. Initial construction will be 150 MW with future expansion to 300 MW. The second 150 MW would be constructed within the existing property boundary.

2.2.7.1 Substation Construction

The substation would be constructed in compliance with applicable requirements of the National Electric Safety Code (NESC), Occupational Safety and Health Act, and state and local regulations. Designs would be completed by professional engineers with relevant experience. Contractors would be committed to safe working practices. The substation facilities would be designed to allow future maintenance with minimal impact on transmission system operation and the necessary clearance from energized equipment to ensure safety.

Standard construction and mitigation practices developed from experience with past projects as well as industry-specific best management practices (BMPs) would be employed. BMPs for the Project would be based on the specific construction design, prohibitions, maintenance guidelines, inspection procedures, and other activities involved in constructing the substation facilities. As an example, the construction schedule may be modified to incorporate a BMP that would minimize impacts during migratory bird season. As another example, in areas where construction would occur close to waterways, BMPs would be employed to prevent soil erosion and ensure that equipment fuel and lubricants do not enter the waterway.

2.2.7.2 Substation Restoration and Maintenance

Upon completion of construction activities, the Applicant would restore the remainder of the site. Post construction reclamation activities would include removing and disposing of debris, removing all temporary structures (including staging areas), and employing appropriate erosion control measures. If areas outside the substation site are disturbed by construction activities, they would be reseeded with vegetation similar to what was removed, except for vegetation that might violate height restrictions to prevent interference with the substation and the transmission lines entering the substation.

The substation and DC tie equipment would be patrolled on a routine basis. In addition, the equipment would be monitored by operations personnel. In the event of an emergency, a trained maintenance crew would immediately be dispatched to the substation to investigate and identify needed repairs and cleanup.

2.3 No-Action Alternative

Under the No-Action Alternative, the Applicant would not build the transmission line or Gateway Substation. However, the reliability concerns that prompted the need for the proposed action would remain.

2.4 Alternatives Considered but Not Further Evaluated

All alternatives under consideration are being evaluated.

This page is intentionally left blank.

3 Affected Environment, Environmental Consequences, and Mitigation Measures

This chapter discusses existing environmental conditions, potential environmental consequences resulting from the proposed action, and mitigation measures to address such impacts. In this chapter, the term Route Corridor refers to an approximately 250-foot-wide area centered on the Route Segments and the Gateway Substation area. The Route Corridor was the area investigated for environmental impacts, and falls within the larger Study Area discussed in the previous chapters. The width of the Route Corridor was selected to provide flexibility for siting the final alignment and associated ROW. The ROW used to calculate temporary impacts in this chapter is 150 feet wide. Impacts for the existing Valencia Substation are not described in detail in this chapter because it is already in place. Until a preferred route is selected and engineering is completed, it is assumed that staging areas and other temporary construction areas will be constrained to the ROW or substation site.

3.1 Land Use and Zoning

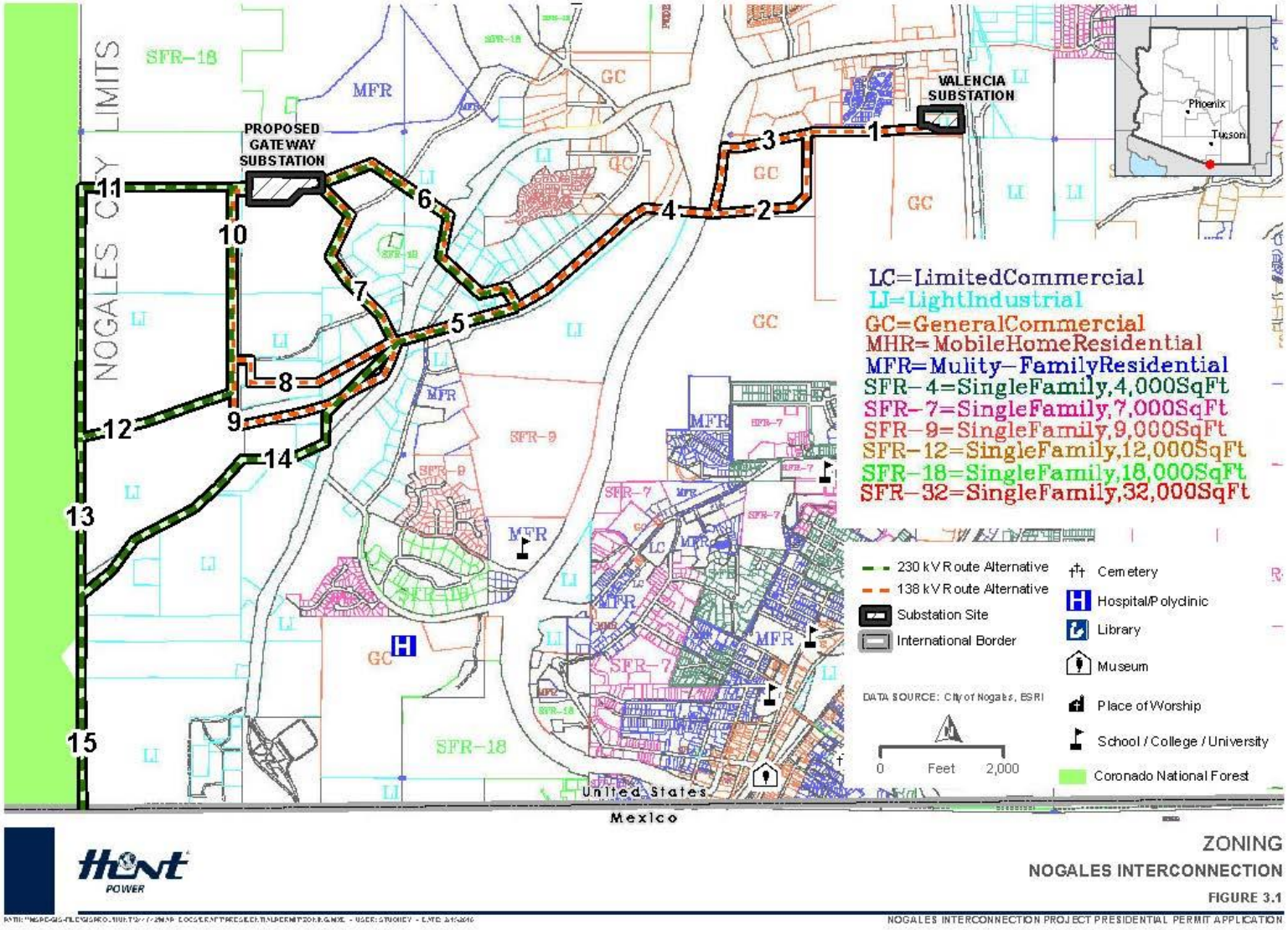
This section discusses existing land use and land cover in the Route Corridor and identifies local ordinances applicable to the proposed action. Data from the City of Nogales and the National Land Cover Database (NLCD) were used to determine existing conditions in the Route Corridor.

3.1.1 Affected Environment

Land use in the Route Corridor is a mix of general commercial, light industrial, and multifamily residential (Figure 3-1). The portion of the Route Corridor east of I-19 is primarily zoned for general commercial use, with the exception of one multifamily residential development on the southwestern side of Mariposa Road and Mastick Way, approximately 100 feet north of Route Segment 1. The area south of the residential development is an existing utility corridor. The land immediately west of I-19 is also zoned for general commercial use and then transitions to light industrial for the remainder of the Route Corridor. The westernmost portion of the Route Corridor is adjacent and runs parallel to the City of Nogales border with the Coronado National Forest. Because most land in the Route Corridor is undeveloped, the Project would avoid direct conflicts with residences, educational facilities, houses of worship, and other sensitive land uses. This includes Route Segments that run adjacent to medium- and high-intensity developed areas, such as Route Segments 1, 2, 4, 5, 6, and 8.

A 60-foot-wide strip of land parallel and adjacent to the United States-Mexico border, known as the Roosevelt Easement, was reserved to ensure its integrity by two Presidential Proclamations signed by President William McKinley and President Theodore Roosevelt in 1897 and 1907, respectively. The proposed action will preserve the integrity of this land, by not siting structures within the easement.

Figure 3-1. Zoning



The NLCD provides information on land cover types nationwide using a 16-category classification system. Using this database, the primary land cover types in the Route Corridor were identified (Figure 3-2). As summarized in Table 3-1, most land cover in the Route Corridor (72 percent) is classified as "shrub/scrub," indicating that the area is dominated by shrubs less than five meters tall.

Table 3-1. Land Cover Types in Route Corridor

Cover Type	Acreage	Percentage of Route Corridor
Developed, open space	33.2	10.9
Developed, low intensity	19.3	6.4
Developed, medium intensity	12.4	4.0
Developed, high intensity	13.3	4.4
Barren land (rock/sand/clay)	6.3	2.0
Shrub/scrub	220.2	72.2
Total	**304.9**	**99.9**[a]

Source: National Land Cover Database (2011)
[a] Because of rounding, total does not add up to 100.

Permitted land uses in the Route Corridor are regulated at the local level by City of Nogales zoning regulations. As specified in the City's Zoning Code, utility structures and facilities related to the transmission of power or communications are considered permitted conditional uses and must be approved by the City's Planning and Zoning Commission. The City of Nogales previously issued a conditional use permit (CUP) approving development of a substation at the site of the proposed Gateway Substation. The CUP has since expired and will need to be re-applied for.

3.1.2 Environmental Consequences

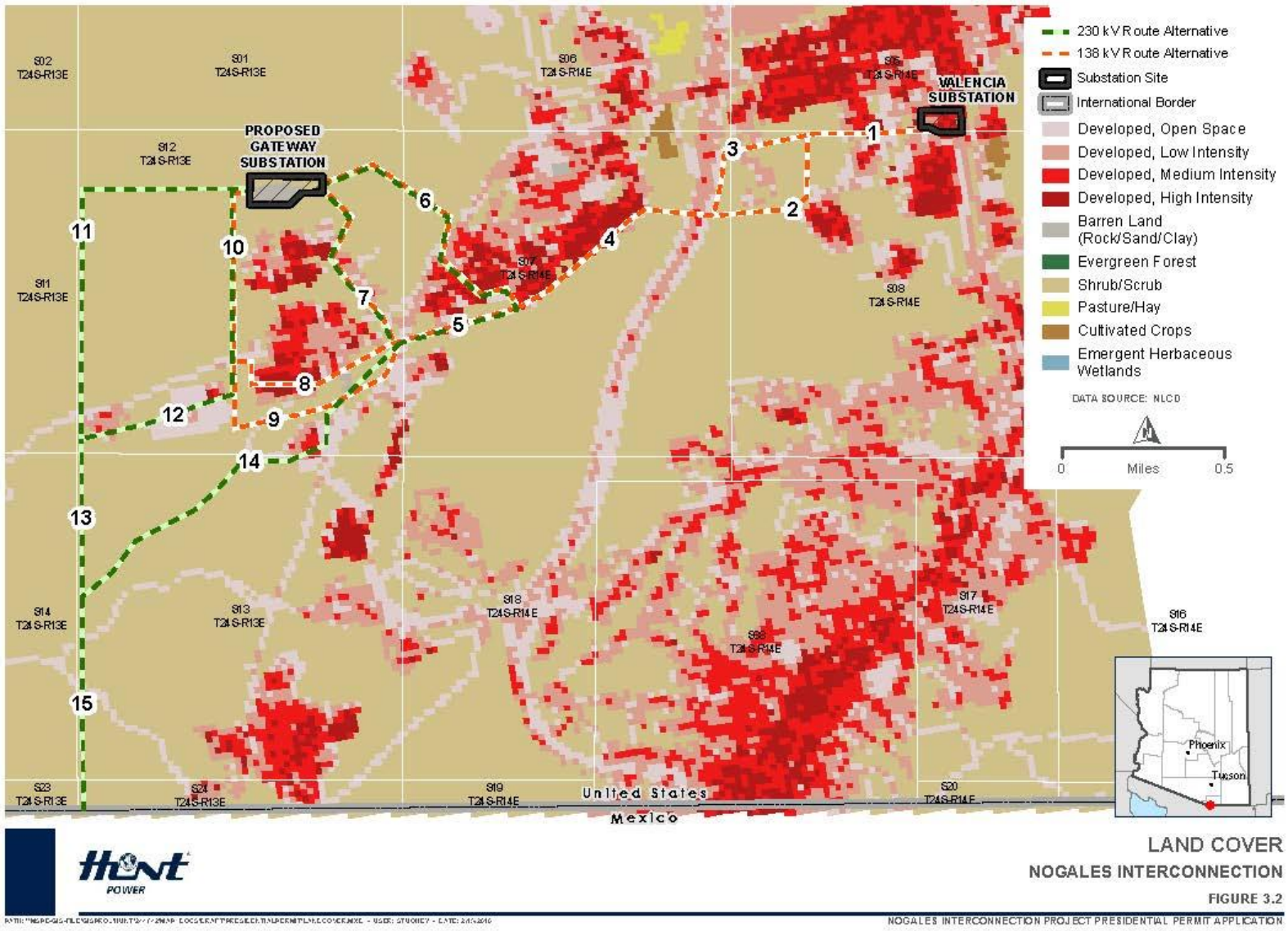
3.1.2.1 Temporary Impacts

During construction, the proposed action would have short-term direct and indirect impacts on land uses. The proposed action could disrupt residential, recreational, or commercial uses in areas along the ROW as a result of delivery of construction materials and workers in the area.

Temporary impacts to land cover could include temporary conversion of shrub/scrub land cover to grassland or barren land within the ROW.

.

Figure 3-2. Land Cover



3.1.2.2 Permanent Impacts

The proposed action would have minimal, long-term, direct and indirect impacts on existing land uses. The transmission line ROW and substation required for the proposed action will remove 94 to 116 acres of land from future potential building sites because no buildings would be permitted in the transmission line ROW; however, non-structure uses such as parking would still be permitted in the ROW.

Permanent impacts to land cover from the proposed action would be minimal. From 6.6 to 8.4 acres of Shrub/scrub land cover would be converted to developed land at structure locations and access roads. The substation site will be converted from barren land to developed land. Depending on the final layout, the future substation expansion may require additional grading. This would occur immediately adjacent to the site within the existing property boundary. Any additional graded area would be converted to developed land.

3.1.3 Mitigation Measures

The following mitigation measures would be implemented to reduce the effects on land use from the proposed action:

- To minimize temporary impacts, construction would be limited to the ROW, existing access roads, and any necessary temporary construction easements (TCEs) obtained from adjacent landowners. TCEs would be located within the 250-foot-wide Route Corridor. Furthermore, in the event any new access roads are required, they would use the minimum area necessary and would be located to minimize impacts on adjacent land uses.
- The Applicant would notify affected landowners and recreational users by posting signs in areas requiring temporary closure for construction, minimize noxious weeds by cleaning seeds from ground-disturbing equipment, and repair any damage caused during construction to help reduce potential nuisance impacts to adjacent land uses.
- The proposed action would parallel existing utilities and roadways to the extent practicable to minimize fragmentation of land cover types and impacts to potential building sites.

3.2 Geology and Soils

This section describes the geologic and soil conditions in the Route Corridor and vicinity and the potential impacts of the proposed action on those resources.

3.2.1 Affected Environment

3.2.1.1 Geology

The Route Corridor falls within the Mexican Highland Section of the Basin and Range physiographic province of the Intermontane Plateaus (U.S. Department of Agriculture [USDA] Natural Resources Conservation Service [NRCS] 2015a). This province is characterized by elongated northwest-to-southeast trending mountain ranges divided by broad, smooth, alluvial valleys (USDA

NRCS 2015a).

Elevation within the Project limits ranges from approximately 3,765 feet above mean sea level (amsl; near the Valencia Substation) to 4,239 feet amsl (near the United States-Mexico border). The terrain in the Route Corridor is characterized by an extensive pattern of short, dissected ridges and draws formed along longer ridges descending from nearby mountains.

Most of the Route Corridor is covered by deep alluvium (carried by rivers and streams) from adjacent mountains. The younger deposits consist of alluvial derived sediments transported from mountains to rivers, streams, washes, and floodplains. The older deposits consist of alluvial and aeolian (wind-deposited) derived sediments found in valleys and at the base of mountains.

3.2.1.2 Geological Resources

The Santa Cruz Valley is rich in geological resources, including copper, molybdenum, and gold. According to the Arizona Geological Survey, no major mines, including major coal, oil, or gas resources, exist in the immediate Route Corridor. A sand and gravel mining operation is located southwest of the proposed Gateway Substation.

3.2.1.3 Geological Hazards

Potential geologic hazards that could affect the proposed action include faults and seismic activity, subsidence, slumping, landslides, and debris flows.

Potentially active faults are scattered throughout southeastern and central Arizona with the nearest being approximately 10 miles to the north. All of the potentially active faults in the Route Corridor have had little historical activity, low slip rates, and long intervals between ruptures. Because of these conditions, the U.S. Geological Survey (USGS) considers Santa Cruz County to be at low to moderate risk for earthquakes.

Land subsidence—attributable to groundwater withdrawal in alluvial basins—is a process of compression and subsequent consolidation of the alluvial sediments. Through geologic time, groundwater levels in the alluvial basin material were at or near the ground surface or at elevations controlled by rivers and drainage systems traversing the basins. Human activities have affected, and are continuing to affect, groundwater levels in many of these basins. Groundwater pumping, primarily for agricultural, industrial, and municipal uses, has depleted stored groundwater in many areas. Over time, and given the correct geological conditions, subsidence can lead to earth fissure. The nearest documented subsidence area is in Green Valley, Arizona, approximately 35 miles north of the Route Corridor (Arizona Department of Water Resources [ADWR] 2015). No earth fissures have been documented in the Route Corridor (Arizona Geological Survey 2015).

Generally, any steep slope is susceptible to slumping or landslides given the right conditions. Flash floods are relatively common during Arizona's monsoon season. These floods and their potential debris flows can occur in any of the many washes crossing the Route Corridor. However, most slopes in the Route Corridor are relatively short and gentle, and not highly susceptible to failure during heavy rains.

3.2.1.4 Soils

Seven soil types occur in the Route Corridor, as described in Table 3-2. Substrates in the Route Corridor are primarily well-drained, gravelly sandy loams to very gravelly sandy clay loams on slopes.

NRCS administers the Farmland Protection Policy Act of 1981 (7 United States Code [USC] Chapter 73 §§ 4201–4209). Certain soil types are considered prime farmland and are protected under the Act. There is no farmland within the Route Corridor.

Table 3-2. Soils Map Units in the Route Corridor

Soil Type	Description
Caralampi gravelly sandy loam	Well-drained, gravelly to very gravelly sandy loam soils typically found on slopes of 10 to 40 percent. Soils are derived from old alluvium and are in a medium runoff class. Not prime farmland.
Coromo soils	Well-drained, gravelly sandy loam soils typically found in floodplains with slopes of 0 to 5 percent. Soils are derived from mixed recent alluvium and are in a low runoff class. Prime farmland if irrigated.
Grabe-Comoro complex	Well-drained loam to sandy loam soils typically found in floodplains with slopes of 0 to 5 percent. Soils are derived from mixed recent alluvium and are in a low runoff class. Prime farmland if irrigated.
Grabe soils	Well-drained loam to sandy loam soils with a 0 to 1 percent slope. These soils are typically found in floodplains and have a low runoff class. Prime farmland if irrigated.
Rock outcrop-Lithic Haplustolls association	Soils found on summits, flanks, and side slopes of hills and mountains with 15 to 60 percent slopes. Not prime farmland
White House-Caralampi complex	Well-drained, gravelly to very gravelly sandy loam and gravelly to very gravelly sandy clay loam. Slopes are typically 20 to 35 percent and are in a medium runoff class. Not prime farmland.
Source: U.S. Department of Agriculture Natural Resources Conservation Service (2015b)	

3.2.2 Environmental Consequences

3.2.2.1 Geology and Soils

The risk of seismic activity is low to moderate given the area's history and the location of active faults. Although significant damage potential from seismic activity is anticipated to be low, the proposed action's design would take local seismic risk into consideration to mitigate any potential damage.

Flash floods are possible along any of the washes in the Route Corridor. Mariposa Wash, the largest wash in the Route Corridor, is adjacent to Route Segments 4, 5, and 9 and is most susceptible to flash floods. Observations during a field visit conducted by HDR on September 17, 2015 indicated that the wash was approximately 4 feet deep in some places, suggesting that a relatively large volume of water can flow through the generally dry wash.

Potential for slope failure, slumping, and landslides is low, considering the area's topography of generally gently rolling hills.

3.2.2.2 Temporary Impacts

The proposed action would result in temporary direct impacts to geologic materials and soils in the ROW and at the Gateway substation. The soil surface will be disturbed by heavy equipment traffic in the ROW, foundation construction at the new Gateway substation, and sidecasting of transmission structure foundation spoil material. Clearing vegetation in the ROW (where necessary) would decrease vegetation cover and increase the potential for erosion. The total area affected by these temporary impacts on the transmission line ROW and substation will range from 94 to 116 acres.

3.2.2.3 Permanent Impacts

The proposed action would result in permanent direct impacts to geologic materials and soils caused by the placement of transmission line structures (e.g., pole foundations) and permanent access roads. Geologic materials and soil would be permanently displaced for structure foundations, generally up to 6 feet diameter per structure, ranging from 297 to 679 cubic feet per structure. The excavated soil would be sidecast around the new pole foundation so as not to change the existing topography and drainage. Increased soil compaction would occur as a result of heavy construction equipment needed to install the transmission line structures and build the Gateway Substation. Soils and geologic materials in the ROW would also be affected by grading the proposed two-track dirt access road, which would range from 6.6 to 8.4 acres. The Gateway substation site has already been graded. However, depending on the final layout, the future substation expansion may require additional grading. This would occur immediately adjacent to the site within the existing property boundary.

3.2.3 Mitigation Measures

The following mitigation measures would be implemented to reduce the effects on geology and soils from the proposed action:

- The contractor would prepare a Notice of Intent (NOI) for coverage under the Arizona Pollution Discharge Elimination System (APDES) General Permit (and, when issued, the Multi-Sector General Permit [MSGP]) for submittal to the Arizona Department of Environmental Quality (ADEQ), and develop a Stormwater Pollution Prevention Plan (SWPPP). At the end of construction and restoration, the contractor would prepare a Notice of Termination (NOT) for submittal to the ADEQ.
- To the extent practicable, soil disturbance and excavation activities in steep slope areas would be avoided.
- Sediment and erosion control plans would be developed that specify the types of BMPs to apply. Depending on the site, BMPs may include installation of silt fence, straw bales, or ditch blocks and/or covering bare soils with mulch, plastic sheeting, or fiber rolls to protect drainageways and streams from sediment runoff.
- Erosion control measures would be inspected during construction, especially during significant rainfalls.

- Where rutting occurs, the Applicant would repair the surface and restore ground vegetation upon completion of work in a given area.
- Disturbed areas not otherwise stabilized would be revegetated once construction is complete, to the extent possible. Seed mixes would be specified based on site characteristics and in accordance with regulatory requirements.
- The introduction and establishment of noxious weeds would be minimized by prompt revegetation of disturbed areas using regional genotype native species, where appropriate, or using seed based on landowner agreements.
- The Applicant would notify the contractor of the presence of a well approximately 40 feet east of Route Segment 7, or approximately 120 feet southeast of the intersection of Mariposa Ranch and La Quinta Roads. The well would be noted on construction maps and, if necessary, marked in the field during construction.

3.3 Vegetation

This section describes the vegetation in the Route Corridor and vicinity and the potential impacts of the proposed action on those resources.

3.3.1 Affected Environment

Three main types of vegetation communities are found in the Route Corridor: Madrean Evergreen Woodland, Apacherian-Chihuahuan Mesquite Upland Scrub, and Apacherian-Chihuahuan Piedmont Semidesert Grassland and Steppe (Arizona Game and Fish Department [AGFD] 2015). Madrean Evergreen Woodland has 25 to 40 percent shrub or tree land coverage and is dominated by Emory oak (*Quercus emoryi*) and/or other evergreen oaks (*Quercus* species [sp.]). Apacherian-Chihuahuan Mesquite Upland Scrub has 10 to 15 percent shrub or tree land coverage, and Apacherian-Chihuahuan Piedmont Semidesert Grassland and Steppe has less than 10 to 15 percent shrub or tree land coverage (Malusa 2015). Less disturbed land is located in the westernmost section of the Route Corridor, where many of the 230 kV alternatives are located. The 138 kV alternatives and substations are in more developed areas.

A diverse community of trees, shrubs, succulents, forbs, and grasses is found in these vegetation communities. A greater density and diversity of plant species is found along the natural drainages. Common trees, shrubs, and succulents include seed juniper (*Juniperus monocarpa*), alligator juniper (*Juniperus deppeana*), Mexican pinyon (*Pinus cembroides*), mesquite (*Prosopis* sp.), acacia (*Acacia* sp.), desert broom (*Baccharis sarothroides*), beargrass (*Nolina* sp.), ocotillo (*Fouquieria splendens*), agave (*Agave* sp.), yucca (*Yucca* sp.), sotol (*Dasylirion* sp.), prickly pear (*Opuntia* sp.), and various other cacti. Common native grasses include grama (*Bouteloua* sp.), tobosa (*Pleuraphis* sp.), muhly (*Muhlenbergia* sp.), and threeawn (*Aristida* sp.) (Brown 1994). Invasive grasses known to occur in the area include Lehman's lovegrass (*Eragrostis lehmanniana*), Johnson grass (*Sorghum halepense*), buffelgrass (*Pennisetum ciliare*), and Bermudagrass (*Cynodon dactylon*).

The landscape in the western section of the Route Corridor has almost undisturbed natural habitat, with some evidence of grazing and development, as opposed to the eastern section where

development has replaced or affected the habitat and weedy plant species are dominant. Mariposa Wash, a major ephemeral wash, traverses the middle of the Route Corridor in a southwest-to-northeast direction. Vegetation along the wash is also associated with a disturbed landscape, and the dominant vegetation includes desert broom, mesquite, acacia, and various grass species.

The Arizona NPL (Arizona Revised Statutes [ARS] §§ 3-901 et seq.) protects many of Arizona's plants from removal and destruction (Arizona Department of Agriculture 2015). Plants protected by the Arizona NPL that are found in the Route Corridor include cacti, yucca, agave, mesquite, and beargrass. The AGFD online environmental review tool (Project ID: HGIS-02011; accessed on August 18, 2015) also lists the following special status plant species that have been documented within 3 miles of the Route Corridor:

- large-flowered blue star (*Amsonia grandiflora*)
- Santa Cruz beehive cactus (*Coryphantha recurvata*)
- Pima pineapple cactus (*Coryphantha scheerie var. robustispina*)
- supine bean (*Macroptilium supinum*)

These special status plant species are regulated at differing levels based on status and/or land ownership. All but the large-flowered blue star are protected by the Arizona NPL. The Pima pineapple cactus is also protected as a federally listed endangered species. The large-flowered blue star is a USFS sensitive species and a U.S. Fish and Wildlife Service (USFWS) species of concern. However, since the proposed action would not be on USFS or other federal land, this species does not trigger any regulatory requirements related to the Project.

Species-specific plant surveys were conducted on November 30 and December 1, 2015, for the Pima pineapple cactus, Santa Cruz beehive cactus, supine bean, and agaves. Agaves were surveyed because of their potential as a forage resource for the lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*), an endangered species. Surveys were performed in those portions of the Route Corridor where ROE was granted, accounting for 74.8 percent of the Route Corridor. Survey of the remaining ROW will be completed as soon after the ACC has selected an approved route and prior to any construction disturbance to determine whether any special status plants species are present and could be affected by the Project.

Fifty-three plants were recorded during the plant surveys: 27 agaves, 25 Santa Cruz beehive cacti, and one potential supine bean. No Pima pineapple cacti were documented. Forty-eight of the documented plants were recorded in the southwestern section of the Route Corridor. The biological field report (Appendix A) can be referenced for a more thorough discussion of biological field surveys. Special status plant species identified within the 250-foot-wide survey corridor are summarized by Route Segment in Table 3-3.

Table 3-3. Special Status Plant Species Results

Route Segment	Number Identified within Route Segment		
	Agave[1]	Supine Bean	Santa Cruz Beehive Cactus
1, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, and 14	0	0	0
2	5	0	0
11	2	1	0
15	22	0	25

Note: Segments 6, 7, 8, 9, 10, 11, 13, and 14 were partially surveyed. Overall, 74.8% of the Route Corridor has been surveyed.

[1]**Agave is not special status, but was surveyed because it is forage for lesser long-nosed bat, an endangered species.**

3.3.2 Environmental Consequences

Habitat fragmentation occurs when large sections of undeveloped land are divided into smaller sections. The environmental consequences of habitat fragmentation have been well-documented in scientific literature. Habitat fragmentation creates smaller sections of land that result in “edge effects.” Edge effects can create opportunities for introduced, invasive, or opportunistic species to replace other naturally occurring species in an ecosystem.

New permanent access roads as a result of the proposed action could contribute to habitat fragmentation and potentially lead to the creation of illegal trails and paths by off-road vehicles.

Introduced, invasive, or opportunistic species such as desert broom or invasive grasses may become more prevalent in the less-developed parts of the proposed action after construction. However, because much of the proposed action avoids large sections of undeveloped lands by following existing transmission corridors and adjacent roadways, habitat fragmentation will be minimal. Habitat fragmentation may occur in the western portions of the proposed action where Segments 11, 13, and 15 cross undeveloped lands.

3.3.2.1 Temporary Impacts

Temporary loss of vegetation would occur in areas where construction equipment and activities would trample plants. The area temporarily affected by the transmission line ROW would range from 83 to 105 acres. Vegetation removal and ground disturbance, particularly in the western section of the proposed action, may contribute to the introduction or spread of invasive species from contaminated equipment moving within the ROW.

This may also occur as a result of disturbed soils providing more favorable conditions for aggressive invasive plants. Additionally, depending on the final locations of the transmission line structures and permanent and temporary access roads, protected native plants may require removal and relocation. If protected native plants within the ROW would be affected by the proposed action, Arizona Department of Agriculture notification would be required 60 days prior to plant removal.

The substation site has already been graded and contains no vegetation. However, depending on the final layout, the future substation expansion may require additional grading. This would occur immediately adjacent to the site within the existing property boundary.

3.3.2.2 Permanent Impacts

Permanent loss of vegetation as a result of the proposed action would include vegetation removal where transmission line structures and permanent access roads would be placed. The permanent area affected would range from 6.6 to 8.4 acres. The substation site has already been graded and contains no vegetation. However, depending on the final layout, the future substation expansion may require additional grading. This would occur immediately adjacent to the site within the existing property boundary.

3.3.3 Mitigation Measures

The following mitigation measures would be implemented to reduce the effects on vegetation from the proposed action:

- Existing roads and paths would be used to the extent possible to minimize habitat fragmentation.
- Native plants protected by the Arizona NPL would be avoided to the extent possible during construction.
- Protected native plants within the ROW that cannot be avoided by construction activities would be relocated near their original locations to the extent possible.
- Disturbed soils (except permanent access roads and in the stabilized areas of the Gateway Substation) that would not be landscaped or otherwise permanently stabilized by construction would be seeded using species native to the Project vicinity to the extent possible. The AGFD would be consulted on native seed mixes.
- To prevent the introduction of invasive species seeds, the contractor would inspect all earthmoving and hauling equipment at the equipment storage facility; the equipment would be washed prior to entering the construction site.

To prevent invasive species seeds from leaving the site, the contractor would inspect all construction equipment and remove all attached plant/vegetation and soil/mud debris prior to leaving the construction site.

3.4 Water Resources

This section describes the water resources in the Route Corridor and vicinity and the potential impacts of the proposed action on those resources.

3.4.1 Affected Environment

3.4.1.1 Streams

Locations of streams were identified using the USGS National Hydrography Dataset (NHD) and through Geographic Information System (GIS)-based interpretation of aerial photography and topographic contours. Streams in the Route Corridor consist of small, dry, ephemeral drainages and intermittent washes characteristic of the region's semiarid climate and landscape. These drainage features are generally dry for long periods but may flow during high-intensity, short-duration, summer thunderstorms, and during less intense, longer duration, winter storms. Streambeds tend to be very permeable, and substantial water is lost to the subsurface as flow moves downstream.

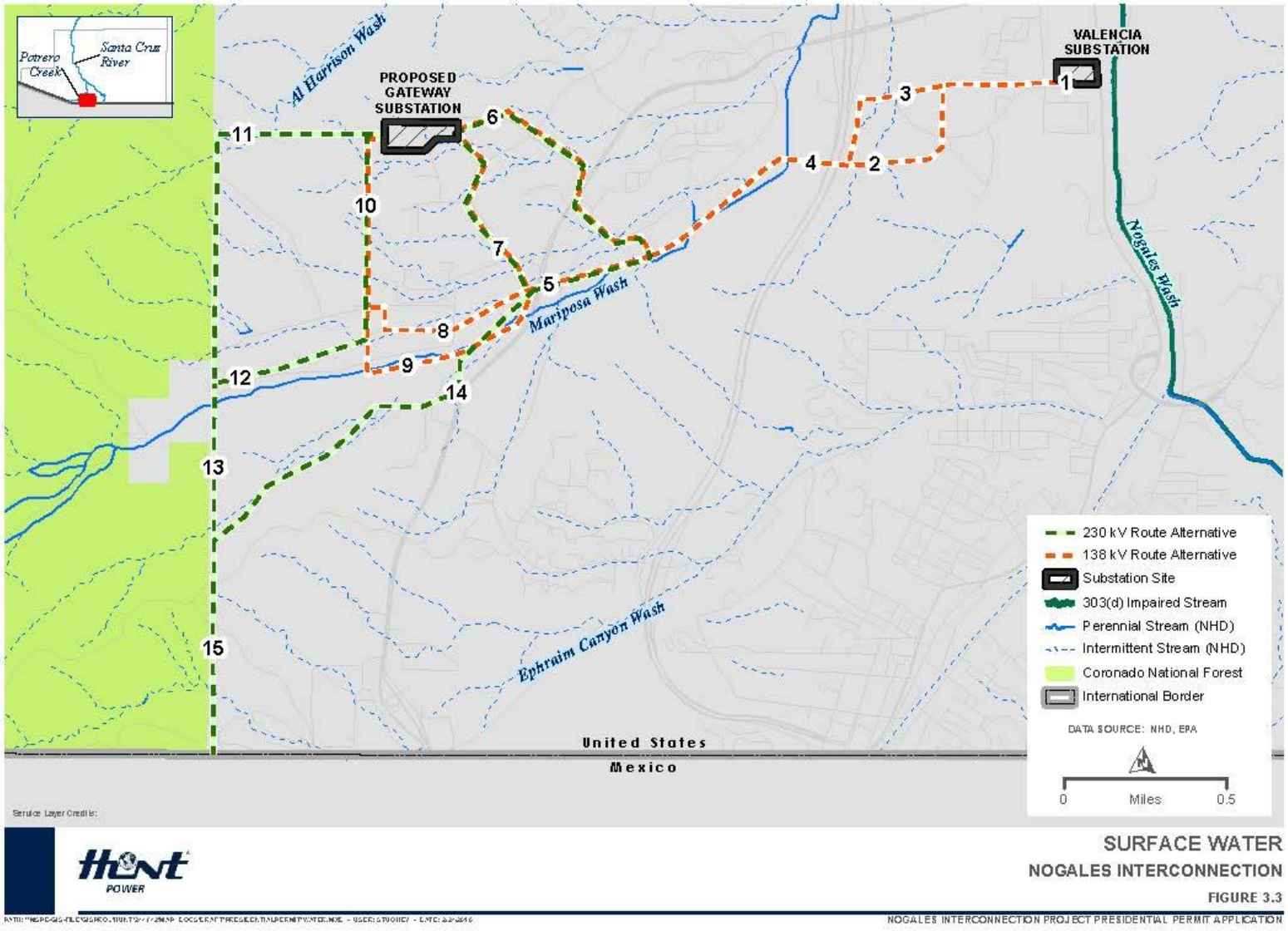
All streams in the Route Corridor are in the Nogales Wash watershed (12th level Hydrologic Unit Code 150503010309) and are tributaries of the Mariposa Wash, Al Harrison Wash, and Ephraim Canyon Wash subwatersheds. Their collective hydrologic contribution to Nogales Wash is expected to be minor at the watershed-level scale; however, periodic high water and sediment deposition events are likely to occur in Mariposa Wash during seasonal rainfall.

Nogales Wash is a Section 303(d) listed impaired waterbody (AZ15050301-011) monitored by ADEQ for ammonia, chlorine, dissolved copper, and *Escherichia coli*. Water quality in the wash is heavily influenced by rain events and subsequent urban runoff from the cities of Sonora, Mexico and Nogales, Arizona.

The streams in the Route Corridor, when flowing, are tributaries of Nogales Wash, a tributary of Potrero Creek, which flows into the Santa Cruz River (Figure 3-3). The U.S. Army Corps of Engineers (USACE) has defined a reach of the Santa Cruz River, starting near Tubac, Arizona and flowing north, as a traditional navigable water (TNW), subject to USACE's jurisdiction under authority of Section 404 of the Clean Water Act of 1972 (CWA; as amended) and Section 10 of the Rivers and Harbors Act of 1899.

This TNW is approximately 22.8 miles away by stream channel from the Route Corridor. Consequently, a USACE determination of jurisdiction would be necessary to evaluate whether a significant nexus exists between the Route Corridor drainages and the TNW or other regulated wetlands in the region. While drainages and wetlands would be avoided by spanning over them, a Nationwide Permit 12 (utility line crossings) would be required if they were determined to have Section 404/Section 10 jurisdiction.

Figure 3-3. Surface Water



3.4.1.2 Wetlands and Floodplains

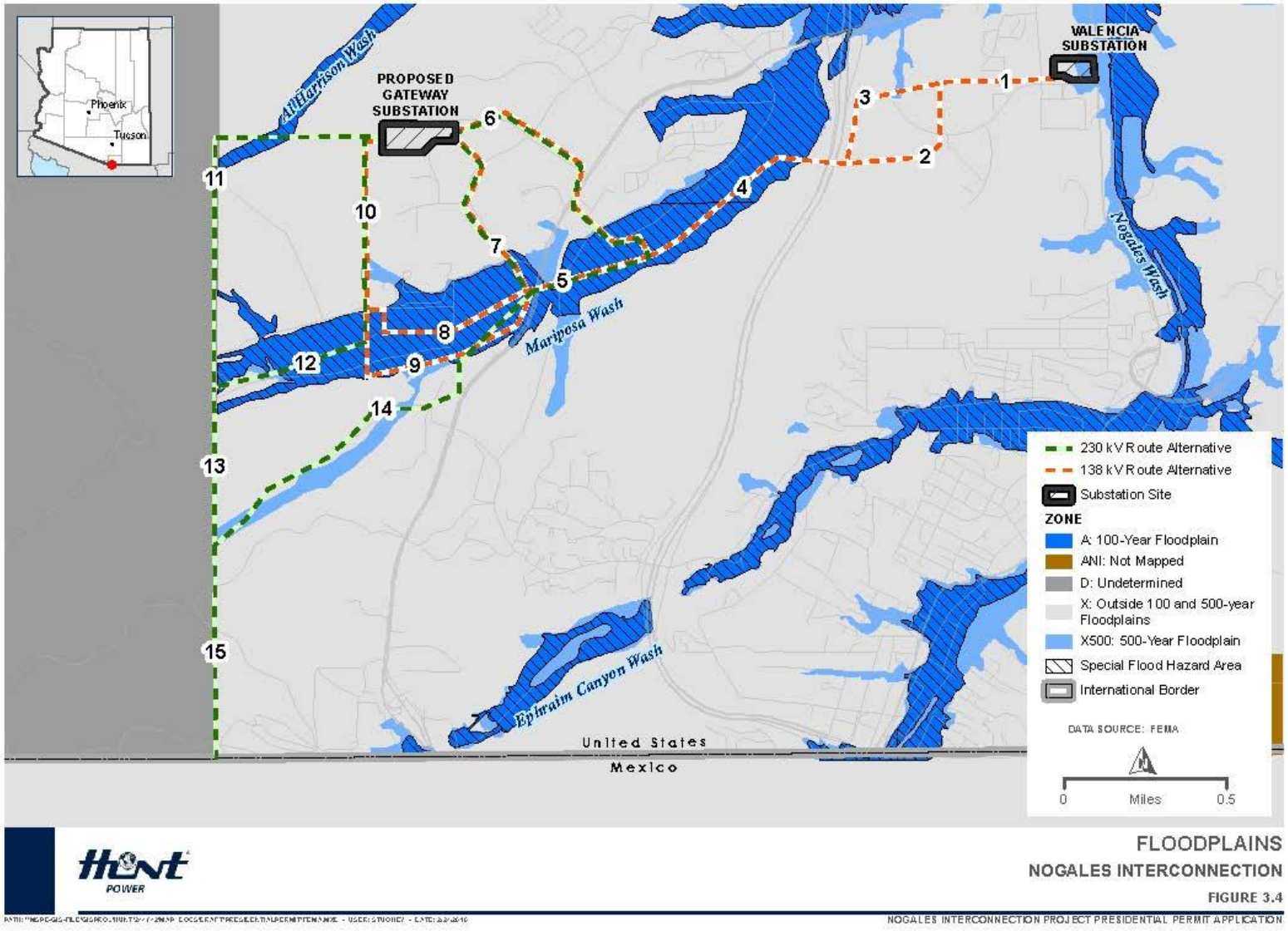
Readily available aerial photographs, natural resource mapping, and existing documentation were reviewed to determine the presence or absence of wetlands in the Route Corridor. No wetlands were identified during the off-site review and no evidence of wetlands based on vegetation, soils, or wetland hydrology was observed by biologists during field surveys.

Flood zones are areas that the Federal Emergency Management Agency (FEMA) has defined according to varying levels of flood risk. Encroachment on flood zones can reduce the normal overflow storage and conveyance area, resulting in backing up floodwaters that can affect adjacent areas by displacing floodwaters into areas not typically subject to flooding. Executive Order (EO) 11988, Floodplain Management, directs federal agencies, and the activities undertaken or authorized by them, to reduce the risk of flood loss and minimize flood impacts on human safety, health, and welfare.

Review of FEMA floodplain maps indicates that there are flood zones associated with the Mariposa and Al Harrison Washes in the Route Corridor (Figure 3-4). Portions of both drainages are considered high-risk areas (Zones “A” and “AE”), which are defined as areas with a 1 percent annual chance of flooding. Moderate- to low-risk areas (Zone “X500”) are also present for Mariposa Wash. Base flood elevations are available for Mariposa Wash; no elevations are published for Al Harrison Wash. Both 100- and 500-year flooding limits for Mariposa Wash overlap the Route Corridor, while only 100-year flood limits for Al Harrison Wash are in the Route Corridor.

In addition to the mapped floodplains, unmapped floodplains associated with smaller ephemeral and intermittent streams may exist in the Route Corridor. These unmapped floodplains are generally small and are immediately adjacent to each stream. Inundation of these floodplains is typically associated with large rainstorms. Because each stream’s drainage basin is small, rainstorms that cause flooding are localized to the immediate area around the streams. Flooding adjacent to these streams would likely be of short duration because of the high permeability of the streambed material.

Figure 3-4. Floodplains



3.4.1.3 Groundwater

The proposed action is entirely within the Upper Santa Cruz and Avra Basin Sole Source Aquifer. Three wells are within the Route Corridor: one is privately owned and the other two are publicly owned (by the City of Nogales and ADOT). Because of the depths of the aquifer and these wells (Table 3-4), no impacts resulting from the proposed action are anticipated.

Table 3-4. Wells in the Route Corridor

Route Segment	Number of Wells	Distance from Route Segment	Description
1	0	Not applicable	Not applicable
2	0	Not applicable	Not applicable
3	0	Not applicable	Not applicable
4	1	Approximately 230 feet from the Route Corridor; 70 feet deep	Exploration (owned by ADOT)
5	1	Approximately 250 feet from the Route Corridor; 500 feet deep	Groundwater
6	0	Not applicable	Not applicable
7	1	Approximately 40 feet from the Route Corridor; 360 feet deep	Groundwater
8	0	Not applicable	Not applicable
9	0	Not applicable	Not applicable
10	1	Approximately 230 feet from the Route Corridor; 600 feet deep	Groundwater
11	1	—	Nonservice
12	0	Not applicable	Not applicable
13	0	Not applicable	Not applicable
14	2	Approximately 235 feet from Route Corridor; no depths reported	Special designation/ cathodic (rust) protection
15	0	Not applicable	Not applicable

3.4.2 Environmental Consequences

3.4.2.1 Streams

Temporary Impacts

No Project-related impacts on intermittent or ephemeral streams are expected. The proposed action's design would avoid these resources by siting structures outside of drainages and by spanning the transmission line over washes. Mariposa Wash, a narrow, deeply incised wash, can be easily spanned by the proposed transmission line. Similarly, the ephemeral tributaries of the Mariposa and Al Harrison Washes are also narrow, linear features that would be avoided.

As individual features, none of the ephemeral drainages or their subbasins contributes more than a small, incremental volume of water to Nogales Wash during large rainfalls. As such, the water quality of Nogales Wash is not expected to change as a result of the proposed action. Soil disturbance during construction will temporarily increase erosion potential that could affect streams and drainage features. The Applicant would consult with ADEQ to determine whether a Section 401 State Water Quality Certification is necessary to ensure that the proposed action would not adversely affect Nogales Wash and its water quality improvement plan.

Permanent Impacts

No Project-related permanent impacts on streams are expected.

3.4.2.2 Wetlands and Floodplains

Temporary Impacts

Because no wetlands were identified in the Route Corridor, no temporary impacts to wetlands are anticipated.

The proposed action is not anticipated to adversely affect natural and beneficial floodplain values or pose a significant risk. Regulated floodways would be avoided by siting structures outside of high-risk areas and by spanning the transmission line over washes. Impacts or encroachment on moderate- to low-risk areas associated with Mariposa Wash are unavoidable given the extent of flood-prone areas. Erosion potential will temporarily increase during construction of the proposed action, which could affect regulated floodplains.

Permanent Impacts

Because no wetlands were identified in the Route Corridor, no permanent impacts to wetlands are anticipated.

Permanent impacts to floodplains for transmission structure foundations would range from 0 to 85 square feet in Zone X500 floodplains and 198 to 509 square feet in Zone A floodplains. These impacts, while permanent, would not be significant, based on the size of the area that would be affected by the proposed action compared with the area available in the existing floodplains to accommodate flood flows.

3.4.2.3 Groundwater

Temporary Impacts

No temporary impacts of any kind are anticipated to the sole source aquifer for the following reasons, described by proposed action feature:

- Access road
    - A two-track dirt road would be constructed parallel to the proposed transmission line to access and maintain the proposed Project. This road would not increase impermeable surfaces in the Route Corridor and would not impair aquifer recharge.
- Transmission line
    - Water supply wells range from 360 to 600 feet deep, and would not be impacted (Table 3-4).
    - The transmission lines would require between five and nine structures per mile. Generally, the impervious surface created by these structures would be up to 6 feet diameter each, resulting in between 650 and 1,498 square feet of total additional impermeable surface for all transmission structures.

Permanent Impacts

No permanent impacts are anticipated from the proposed action.

3.4.3 Mitigation Measures

The following mitigation measures would be implemented to reduce the effects on water resources from the proposed action:

- The proposed action design would avoid streams to the extent possible.
- A SWPPP would be prepared to comply with the APDES 2013 Construction General Permit.
- BMPs, which may include the use of temporary and permanent erosion control measures, would be identified in the SWPPP and would be implemented to minimize erosion and sedimentation.
- Standard spill-prevention measures would be implemented during construction. Spill clean-up equipment (e.g., oil-absorbent pads, dirt-moving equipment, etc.) would be available on-site during construction.
- The proposed action design would comply with the requirements and procedures for development within mapped flood-prone areas of Santa Cruz County and the City of Nogales, Arizona.
- The proposed action design would maintain existing hydrologic connectivity within all drainage features that are crossed.

- The proposed action would allow federal, state, and local government access to flood-prone areas for inspection, maintenance, flood fighting, major repairs, and data gathering.
- Gateway Substation
    - The facility would be designed to minimize the risk and impacts of oil spills, and minimal oil storage would occur on site.
    - Where equipment is filled with oil, appropriate spill containment will be provided.
    - The ground level of the substation would be graded to direct the flow of water runoff and/or minimize run-on of stormwater. The yard would be covered with a layer of gravel to reduce stormwater erosion.
    - Where necessary, stormwater measures, such as retention or detention ponds and/or perimeter ditches, would be designed and constructed to control runoff.

3.5 Wildlife

This section describes the wildlife resources in the Route Corridor and vicinity and the potential impacts of the proposed action on those resources.

3.5.1 Affected Environment

A wide variety of mammals, birds, reptiles, and amphibians are likely to use the Route Corridor throughout the year or during different times of the year. Common mammals likely to use the Route Corridor include white-tailed deer (*Odocoileus virginianus couesi*), black-tailed jackrabbit (*Lepus californicus*), cottontail rabbit (*Sylvilagus* sp.), javelina (*Tayassu tajacu*), coyote (*Canis latrans*), skunk (*Mephitis mephitis*), raccoon (*Procyon lotor*), bobcat (*Lynx rufus*), gray fox (*Urocyon cinereoargenteus*), big brown bat (*Eptesicus fuscus*), and fringed myotis (*Myotis thysanodes*). Common birds include mourning dove (*Zenaida macroura*), white-winged dove (*Zenaida asiatica*), common raven (*Corvus corax*), turkey vulture (*Cathartes aura*), and Gambel's quail (*Callipepla gambelii*). Common reptiles include the ornate tree lizard (*Urosaurus ornatus*), Clark's spiny lizard (*Sceloporus clarkii*), gophersnake (*Pituophis catenifer*), common kingsnake (*Lampropeltis getula*), and western diamond-backed rattlesnake (*Crotalus atrox*). Amphibians include Couch's spadefoot (*Scaphiopus couchii*), Mexican spadefoot (*Spea multiplicata*), and the lowland leopard frog (*Rana yavapaiensis*). White-tailed deer, black-tailed jackrabbit, cottontail rabbit, and numerous species of birds were observed during field surveys.

Wildlife is likely to be found in greater abundance in the western section of the Route Corridor, where the greatest extent of natural habitat is located; however, wildlife would also use vegetated lands found throughout the Route Corridor.

The nearest perennial body of water is Nogales Wash, approximately 600 feet east of the Valencia Substation, and numerous ephemeral washes are in the Route Corridor. A retention basin with standing water was observed during biological field surveys on December 1, 2015. Xeroriparian vegetation along these water sources and ephemeral drainages is likely to attract a wide diversity of wildlife, and the drainages serve as wildlife movement corridors.

There is no designated or proposed critical wildlife habitat within the Study Area. Designated critical habitat for the Mexican spotted owl is adjacent to the Study Area on National Forest lands; however, there will be no impacts on this designated critical habitat or the species as a result of the Project.

3.5.1.1 Endangered, Threatened, and Candidate Species

The Endangered Species Act (ESA) protects species that are in danger of becoming extinct and the habitats they live in. The USFWS Environmental Conservation Online System – Information for Planning and Conservation (ECOS-IPaC) system was used to investigate endangered, threatened, and candidate species that may be found in the Route Corridor (Project Code: XJACG-X2GJB-FF7CN-JFOU3-JCWZH4; accessed on August 18, 2015). The results are in Table 3-5. The AGFD online environmental review tool (Project ID: HGIS-02011; accessed on August 18, 2015) was also used to investigate documented endangered, threatened, and candidate species within 3 miles of the Project vicinity as well as other special status species.

Table 3-5 lists endangered, threatened, candidate, and species of concern and their likelihood of occurrence in the Route Corridor.

Table 3-5. Special Status Species Identified by the ECOS-IPaC System & AGFD Online Environmental Review Tool

Common Name Scientific Name	Federal Status	Habitat	Likelihood of Occurrence in Route Corridor
Mammals			
Jaguar *Panthera onca*	Endangered	Found in Sonoran desertscrub up through subalpine conifer forest Elevation: 1,600–9,000 feet (USFWS 2015)	Not likely to occur; this species may pass through the Route Corridor but would avoid the area if developed
Lesser long-nosed bat (LLNB) *Leptonycteris curasoae yerbabuenae*	Endangered	Desert scrub habitat with agave and columnar cacti present as food plants Elevation: 1,600–7,500 feet (USFWS 2015)	May occur; this species may pass through the Route Corridor during migration in the fall and spring; it feeds on pollen of columnar cacti and agaves when they are in bloom
Mexican gray wolf *Canis lupus baileyi*	Endangered, experimental nonessential population	Chaparral, woodland, and forested areas; may cross desert areas Elevation: 4,000–12,000 feet (USFWS 2015)	Not likely to occur; Project is in 10(j)[a] area; this species could pass through the Route Corridor but would likely avoid the area if developed
Ocelot *Leopardus pardalis*	Endangered	Variable, including thorn scrub, semiarid woodland, tropical deciduous and semideciduous forest, subtropical forest, lowland rainforest, palm savanna, and seasonally flooded savanna woodland; in Arizona, most recent (since 2009) detections have occurred in Madrean evergreen woodland Elevation: generally <4,000 feet (AGFD 2010; USFWS 2015)	Not likely to occur; this species may pass through the Route Corridor, but would likely avoid the area if developed
Sonoran pronghorn *Antilocarpa americana*	Endangered, experimental nonessential population	Broad intermountain alluvial valleys with creosote-bursage and palo verde-mixed cacti associations Elevation: 400–1,600 feet	Not likely to occur; Project is in 10(j)[a] area; no suitable habitat within the Route Corridor

Common Name Scientific Name	Federal Status	Habitat	Likelihood of Occurrence in Route Corridor
sonoriensis		(AGFD 2002a)	
Birds			
Gray hawk *Buteo plagiatus*	Species of Concern	Riparian woodlands with large trees (cottonwoods), usually near mesquite forests Elevation: not listed (AGFD 2013a)	Not likely to occur; no suitable habitat within the Route Corridor
Mexican spotted owl *Strix occidentalis lucida*	Threatened	Nests in canyons and dense forests with multilayered foliage structure Elevation: 4,100–9,000 feet (USFWS 2015)	Not likely to occur; designated critical habitat is adjacent to the Route Corridor on National Forest lands; no suitable habitat within the Route Corridor
Southwestern willow flycatcher *Empidonax traillii extimus*	Endangered	Cottonwood/willow and tamarisk vegetation communities along rivers and streams Elevation: <8,500 feet (USFWS 2015)	Not likely to occur; no suitable habitat within the Route Corridor
Sprague's pipet *Anthus spragueii*	Candidate	Strong preference for native grasslands with vegetation of intermediate height and lacking woody shrubs Elevation: <5,000 feet (USFWS 2015)	Not likely to occur; no suitable habitat within the Route Corridor
Yellow-billed cuckoo *Coccyzus americanus*	Threatened	Large blocks of riparian woodlands (cottonwood, willow, or tamarisk galleries) Elevation: <6,500 feet (USFWS 2015)	Not likely to occur; no suitable habitat within the Route Corridor
Reptiles			
Giant spotted whiptail *Aspidoscelis stictogramma*	Species of Concern	Riparian habitat dominated by sycamore, cottonwood, ash, and various grasses and forbs Elevation: sea level–4,500 feet (AGFD 2013b)	Not likely to occur; no suitable habitat within the Route Corridor
Northern Mexican gartersnake *Thamnophis eques megalops*	Threatened	Cienegas, livestock tanks, large-river riparian woodlands and forests, streamside gallery forests Elevation: 3,000–5,000 feet (AGFD 2012; USFWS 2015)	Not likely to occur; no suitable habitat within the Route Corridor
Amphibians			
Arizona treefrog *Hyla wrightorum*	Candidate	Habitat with water within Madrean oak woodlands, savannah, pine-oak woodlands, and mixed conifer forests Elevation: 5,000–8,500 feet (USFWS 2015)	Not likely to occur; no suitable aquatic habitat within the Route Corridor
Chiricahua leopard frog *Rana chiricahuensis*	Threatened	Restricted to springs, livestock tanks, and streams in upper portion of watersheds that are free from non-native predators or where marginal habitat for non-native predators exists Elevation: 3,281–8,890 feet (USFWS 2015)	Not likely to occur; no suitable aquatic habitat within the Route Corridor
Fish			
Desert sucker *Catostomus clarkii*	Species of Concern	Rapids and flowing pools of streams and rivers; adults live in stream and river pools Elevation: 480–8,840 feet (AGFD 2002b)	Not likely to occur; no suitable aquatic habitat within the Route Corridor

Common Name Scientific Name	Federal Status	Habitat	Likelihood of Occurrence in Route Corridor
Gila longfin dace *Agosia chrysogaster chrysogaster*	Species of Concern	Wide ranging from intermittent hot low-desert streams to clear and cool brooks at higher elevations; usually occupy relatively small streams Elevation: <4,900 feet (AGFD 1997)	Not likely to occur; no suitable aquatic habitat within the Route Corridor
Gila topminnow *Poeciliopsis occidentalis*	Endangered	Small streams, springs, and cienegas; vegetated shallows Elevation: <4,500 feet (USFWS 2015)	Not likely to occur; no suitable aquatic habitat within the Route Corridor
Snails			
Huachuca springsnail *Pyrgulopsis thompsoni*	Candidate	Aquatic areas, small springs with vegetation and slow to moderate flow Elevation: 4,500–7,200 feet (USFWS 2015)	Not likely to occur; no suitable aquatic habitat within the Route Corridor
Insects			
Stephan's riffle beetle *Heterelmis stephani*	Candidate	Free-flowing springs and seeps, commonly referred to as rheocrenes Elevation: 5,100–6,600 feet (USFWS 2015)	Not likely to occur; no suitable aquatic habitat within the Route Corridor

[a] A 10(j) area is an area where experimental populations of endangered or threatened species are introduced into the wild in a location that is geographically isolated from nonintroduced populations (National Marine Fisheries Service 2015).

The lesser long-nosed bat (LLNB), an endangered species, is anticipated to occur in the Route Corridor. The LLNB occurs seasonally in Arizona from April to September in desert scrub and grassland/oak transition habitat where it feeds on nectar and pollen from the flowers of columnar cacti and agave (AGFD 2011). Because the LLNB feeds on the nectar of agave plants, the Project has the potential to affect the bat's forage species. The habitat found in the western section of the Route Corridor is suitable for LLNB and may be a resource for this species.

3.5.2 Environmental Consequences

3.5.2.1 Temporary Impacts

All migratory birds are protected by the Migratory Bird Treaty Act (MBTA). This includes all common songbirds, waterfowl, shorebirds, hawks, owls, eagles, ravens, crows, native doves, swifts, martins, swallows, and others (Federal Highway Administration 2001). The migratory bird breeding season for most birds in southern Arizona is from February through August. If construction on this Project would occur during the migratory bird breeding season, breeding birds may be affected by construction activities. This would be limited to direct impacts to birds nesting in the proposed action ROW or on temporary access roads. In addition, construction activity and noise may temporarily disturb or displace animals that live in and use the habitat in the ROW.

3.5.2.2 Permanent Impacts

General impacts on wildlife as a result of the proposed action would include the permanent reduction of cover, nesting areas, and food resources caused by habitat loss, fragmentation, and human disturbance. These impacts would be minimal as a result of the placement of transmission structures and would primarily occur as a result of the construction of access roads and ROW clearing. Long-term impacts may also include transmission line collisions by flying birds and bird electrocutions.

The proposed action may affect the LLNB; however, given the small number of agaves that would be affected by the proposed action and the number of available agaves in the surrounding habitat, this effect is not likely to be adverse. The number of agaves that would be affected by the proposed action, and that are likely to flower in any season, is small. If agaves cannot be avoided by the proposed action, the USFWS will need to be consulted to gain their concurrence with this determination.

3.5.3 Mitigation Measures

The following mitigation measures would be implemented to reduce the effects on wildlife from the proposed action:

- To reduce the risk of electrocution to birds, industry standards to prevent electrocution would be implemented, if warranted.
- If vegetation removal occurs during the bird breeding season (February 1 to August 31), a qualified biologist would survey the area prior to vegetation removal. If active nests are found, those nests would be avoided until the young leave the nest.

3.6 Cultural Resources

This section describes the cultural resources in the Route Corridor and vicinity and the potential impacts of the proposed action on those resources.

Because the Project requires a Presidential Permit, it is an undertaking that must comply with Section 106 of the National Historic Preservation Act (NHPA), as amended (54 USC §§ 300101 et seq.), and its implementing regulations (36 Code of Federal Regulations [CFR] Part 800).

Section 106 requires federal agencies to take into account the effects of their undertakings on historic properties and to afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment. Historic properties are prehistoric, historic, and traditional cultural resources listed or eligible for listing in the National Register of Historic Places (National Register).

The NHPA and its implementing regulations provide the process and guidelines for historic property evaluations. To be determined eligible for inclusion in the National Register, properties must be important in American history, architecture, archaeology, engineering, or culture. They also must possess integrity of location, design, setting, materials, workmanship, feeling, and association and meet at least one of the following four criteria:

Criterion A: are associated with events that have made a significant contribution to the broad patterns of our history

Criterion B: are associated with the lives of persons significant in our past

Criterion C: embody the distinctive characteristics of a type, period, or method of construction; or represent the work of a master; or possess high artistic values; or represent a significant distinguishable entity whose components may lack individual distinction

Criterion D: have yielded, or may be likely to yield, information important in prehistory or history

Properties can be of local, state, or national importance. Typically, historic properties are at least 50 years old, but younger properties can be considered for listing if they are of exceptional importance.

Traditional cultural properties (TCPs) are a special type of property that can be human-modified locations on the landscape or naturally-occurring phenomena that are ascribed spiritual or traditional cultural importance. Because TCPs sometimes retain sacred and sensitive qualities to living communities, they may not be discussed or detailed to individuals outside those communities or made available to the public. The nature and significance of many of these properties may need to be kept confidential. Consultation with Native American tribes and other traditional communities will help to identify any TCPs in the Route Corridor.

3.6.1 Affected Environment

3.6.1.1 Records Review

Prior to conducting fieldwork, archival records were reviewed for information on past projects and known cultural resources in the area. Site and project records were requested from AZSITE, Arizona's statewide cultural resources database housed at the Arizona State Museum (ASM), and from the Coronado National Forest.

In addition, historic maps such as General Land Office plats and aerial photographs were examined to identify historical period land uses of the area. The purpose of the records review was to determine which, if any, portions of the Route Corridor had been previously investigated for cultural resources, to identify documented sites within and near the Route Corridor, and to generate expectations about the types and frequencies of cultural resources that might be encountered during field survey. The records check covered a 0.5-mile area around the alternative corridors.

A few research projects conducted in the 1940s and 1950s provided initial insights on prehistoric and protohistoric settlement in the Nogales area. This research included surveys performed by the University of Arizona within the Santa Cruz River valley, from the headwaters east of Nogales north toward Tucson (Danson 1946; Frick 1954), and work by the Amerind Foundation (DiPeso 1953) at the Palo Parado Site (San Cayetano), approximately 20 miles north of Nogales. Most work in the area, however, has been driven by cultural resource compliance projects.

The records check indicated the ADOT ROWs within the Route Corridor had been adequately surveyed for cultural resources; therefore, no new survey within the ADOT ROW was required for the Project. For the most part, land adjacent to the ADOT ROWs within the Route Corridor had not been investigated for cultural resources.

The records check revealed that 28 archaeological surveys have taken place and 10 sites have been recorded within 0.5 mile of the Project alignments. A map showing site locations is provided in Appendix B. A number of linear surveys intersected the Project alignments west of I-19; however, most of the Route Corridor had not been previously investigated (Carpenter 1995; Lascaux 1998; Lindemuth et al. 2010; Petersen 2008). The portion of the Route Corridor east of I-19 had been covered almost in its entirety by a survey performed for a private development project (Stephen 2001). The previously recorded sites include five prehistoric artifact scatters, rock piles, a circa 1916 National Guard encampment, a historic period residence, and a railroad.

The review of previous research projects suggested prehistoric and historic archaeological sites would be encountered during the survey. Three of the previously recorded sites are within the alignment corridors.

In 2001, URS Corporation (URS) surveyed 63 acres for the proposed Gateway Substation and documented two prehistoric sites: AZ EE:9:223(ASM) and AZ EE:9:224(ASM) (Bauer and Rogge 2001). Site AZ EE:9:223(ASM) was a prehistoric artifact scatter. The site's surface assemblage totaled 41 artifacts, which included nine cores and tested cobbles, five expedient scrapers or possibly utilized flakes, and debitage representing various stages of reduction. URS noted that the site was situated on shallow bedrock and concluded there was little potential for buried cultural deposits. Therefore, URS recommended the site as not eligible for listing on the National Register because of limited information potential. The proposed Gateway Substation platform was subsequently graded and the site is no longer evident.

Site AZ EE:9:224(ASM) is a prehistoric artifact scatter located east of the graded platform of the proposed Gateway Substation and remains intact. URS documented 40 artifacts at the site, which included five cores and tested cobbles, one or two utilized flakes, and debitage representing various stages of reduction. Because the site is situated on shallow bedrock, URS noted that there is little to no potential for buried deposits. Therefore, URS recommended the site as not eligible for listing on the National Register.

In 2001, Professional Archaeological Services and Technologies (PAST) surveyed a 130-acre parcel on the eastern side of I-19 for a private development project (Stephen 2001). The survey covered most of the alignment corridors between I-19 and the Valencia Substation.

PAST recorded one site adjacent to the proposed alignment, AZ EE:9:225(ASM). The site consists of five rock piles, each approximately 1.5 meters in diameter. One chipped stone flake was noted nearby, but lacked a clear association. PAST recommended the site as not eligible for listing in the National Register because of its limited data potential and questionable temporal origins.

Because of the age of most of the prior surveys, and for consistency, the alignment corridors were surveyed in full regardless of prior coverage. The one exception was the ADOT I-19 and SR 189 ROW, which had adequate coverage (Brodbeck and Marsich 2015; Bruder 1992; Grebinger 1971; Lite 1996; Lite et al. 1996; Roth 1992; Stephen 2005; Stone 1995; Walsh 2006,

2008). No sites were identified in the ADOT ROW within the transmission line alignment corridors during the surveys.

3.6.1.2 Field Survey

Following the records review, a pedestrian survey was performed to identify cultural resources within the Project alternatives. The survey covered 206.7 acres of private land. The remaining 69.6 acres in Route Segments 10, 11, 13 and 14 were not surveyed because ROE had not been obtained from landowners. The I-19 and SR 189 ROWs were not surveyed because current data were available from ADOT. Unsurveyed areas, other than the ADOT ROW, will be surveyed by qualified archaeologists after a route is approved by the ACC and prior to construction disturbance to determine whether historical properties are present that could be affected by the Project.

The survey documented two previously recorded sites, AZ EE:9:224(ASM) and AZ EE:9:225(ASM) (see Section 3.6.1.1). No new archaeological sites were identified. Furthermore, no historical built environment resources, such as historic buildings, structures, or districts, were identified.

AZ EE:9:224(ASM) is a prehistoric artifact scatter situated on the toe slope of a ridge just above an east-west trending drainage. The site is on rocky terrain with little to no potential for subsurface remains. The surface assemblage includes approximately 40 artifacts within an 80 by 45 meter area. Artifact types include cores, tested cobbles, utilized flakes, and debitage representing various stages of reduction. No diagnostic artifacts were observed. Given the low number of artifacts and absence of buried cultural deposits, the site is unlikely to yield important information, and no unique aspects of the site warrant preservation. The site was, therefore, determined not eligible for listing on the National Register because of its lack of information potential.

AZ EE:9:225(ASM) is a set of rock piles situated on a gently sloping, south-facing ridge line. At the time of the survey, the site was covered by a thick stand of Russian thistle, which made observations difficult. The site consists of five rock piles within an approximately 20 by 15 meter area. All five rock piles were approximately 1.5 meters in diameter and were composed primarily of rocks averaging about 10 to15 centimeters in size.

A single, tertiary, limestone flake was the only artifact found at the site. The age of the rock piles is unclear. The site was determined not eligible for listing on the National Register because of its limited data potential.

3.6.2 Environmental Consequences

3.6.2.1 Temporary Impacts

Based on the work to date, no known historic properties would be directly or indirectly affected by the proposed action. However, the survey is incomplete because ROE to some of the private land was not granted by the landowners. Unsurveyed portions of the proposed action's footprint, other than the ADOT ROW, will be surveyed by qualified archaeologists prior to construction disturbance to determine whether historical properties are present that could be affected by the proposed action.

Native American tribes were invited to participate in a pre-application meeting and provide comment on the proposed action. The DOE will conduct formal government to government consultation during their Environmental Assessment (EA) process (Section 106).

3.6.2.2 Permanent Impacts

As stated above, no known historic properties would be directly or indirectly affected by the proposed action. However, the survey is incomplete because ROE to some of the private land was not granted by the landowners.

3.6.3 Mitigation Measures

Currently, no historic properties have been identified that would be affected by the proposed action; therefore, no mitigation measures would be required. However, portions of the proposed action could not be surveyed because private landowners have not given ROE permission. The unsurveyed portions of the ROW, other than the ADOT ROW, will be surveyed by qualified archaeologists as soon after the ACC has selected an approved route and prior to any construction disturbance to determine whether historical properties are present that could be affected by the proposed action. Mitigation measures will be developed to address any additional affected significant historic properties discovered by the survey.

3.7 Visual Quality

This section describes the visual quality of the Route Corridor. A desktop study was conducted to establish and describe the landscape character. A combination of Google Earth review and GIS data research was used to identify vegetation, landforms, and land use to gain an understanding of the current Route Corridor landscape.

3.7.1 Affected Environment

3.7.1.1 Landscape

The Route Corridor topography is rolling terrain, heavily creased with ridges and washes, the largest being Mariposa Wash. The topography of the corridor ranges from 3,765 to 4,239 feet amsl. To the east and west, there are background mountain views of the Huachuca and Patagonia Mountains and Tumacacori Mountains, respectively. The biotic community is Semidesert Grassland and Madrean Evergreen Woodland, where the dominant native plants are mesquite trees (*Prosopis velutina*), desert broom (*Baccharis sarothroides*), and grasses.

3.7.1.2 Human Settlement

The Route Corridor traverses areas of developed and undeveloped land. For the approximate middle third of the corridor length, the corridor traverses industrial development, where most of the buildings are large, corrugated metal structures. On the southern side of this area is Mariposa Wash, a sparsely vegetated ephemeral wash.

The eastern third of the corridor traverses undeveloped land behind retail areas that line SR 189 for approximately two-thirds of a mile. The western third of the corridor traverses mostly undeveloped land, west and south to the Mexican border.

Beginning approximately 0.5 mile south of the portion of corridor between the Valencia and Gateway Substations are residential neighborhoods. The dense, downtown portion of the City of Nogales is approximately 1.5 miles southeast of the proposed corridor.

The existing Valencia Substation on the eastern end of the corridor is next to I-19 in an area of office and industrial buildings. On the western side of I-19, adjacent to the substation, are large power lines. The Mexico-to-Tucson segment of the Union Pacific Railroad parallels the eastern side of I-19. The proposed Gateway Substation location is an existing graded site used for storing construction materials, behind industrial parcels. A large parcel of land south and west of the substation has been heavily disturbed by mining operations.

3.7.1.3 Transportation

The Route Corridor, for the most part, does not parallel transportation corridors. It crosses both I-19 and SR 189 and two smaller local roads. Existing small power lines occur along these highways and local roads.

3.7.1.4 Recreation Areas

The Pajarito Wilderness area is the closest designated recreation area and is more than 10 miles west of the Route Corridor, inside the Coronado National Forest. No designated trails are in or near the Route Corridor.

Route Segments 11, 13, and 15 follow the border of the Coronado National Forest. Dirt roads and trails enter and exit the forest at this boundary, under the proposed power line alignment.

3.7.1.5 Historical Structures

No historical structures are within a viewable distance of the proposed action. However, the survey is incomplete because ROE to some of the private land was not granted by the landowners. The unsurveyed portions of the proposed action, other than the ADOT ROW, will be surveyed as soon after the ACC has selected an approved route and prior to any construction disturbance to determine whether historical structures are present that could be affected by the proposed action.

3.7.2 Environmental Consequences

The proposed action would extend for approximately 5 miles through undeveloped desert west of Nogales and adjacent to developed parcels in northern Nogales. The structures would be 75 and 110 feet tall between the Valencia and Gateway Substations, a distance of approximately 3 miles, and spaced 600 to 1,000 feet apart. From the Gateway Substation to the Mexican border, a distance of approximately 2 miles, the structures would be up to 115 feet tall and spaced 600 to 1,000 feet apart. Route Segments 11, 13, and 15 parallel the border of the Coronado National Forest, making them the most sensitive from a visual perspective when viewed from roads and trails heading west into the forest.

3.7.2.1 Landscape

Visual impacts and overall changes in aesthetics would vary depending on the terrain, vegetative cover, viewer's distance from the proposed action, and viewer's sensitivity. Because of the rolling terrain, as a viewer gets farther from the proposed action, visibility may be limited by changes in topography and natural or human-made objects.

3.7.2.2 Human Settlement

The visual impacts would vary greatly depending on the distance between the viewer and the proposed action, as well as the intervening terrain between the viewer and the proposed action. For viewers in industrial and retail areas, the power lines would be an additional vertical element in the landscape. Workers and clientele that patronize these retail areas would typically make frequent but short buying trips during business hours. They generally have low to moderate sensitivity to change. Residents would be the most sensitive viewers because they would spend the most time within view of Project elements. A multifamily residential development is approximately 100 feet north of Segment 1 of the Route Corridor, which coincides with an existing utility line. Additional residential neighborhoods can be found approximately 0.5 mile south of the corridor. Views of the proposed action from these residences would be interrupted by the rolling terrain.

3.7.2.3 Transportation

For viewers on the highways and local roads near the proposed action, the power lines would be an additional vertical element in the landscape. Motorists and truck drivers would largely travel perpendicular to the proposed action and their exposure would be regular and short-term. These viewers generally have low sensitivity to change.

3.7.2.4 Recreation Areas

Viewers in the Pajarito Wilderness area would not likely experience visual impact from the proposed action given the distance between the recreation area and the proposed action, as well as intervening vegetation and terrain.

People driving or walking into or out of the eastern border of the Coronado National Forest would have their views interrupted by the power lines. When facing east, the power lines would have the city and I-19 in the background and thus would appear as an additional urban element. Facing west, into the forest, the view of the power lines would be against undeveloped desert and would be an urban intrusion into the landscape.

3.7.2.5 Historical Structures

Because no historical structures are near the proposed action, visual impacts on historical structures are not expected; however, a final determination will be made prior to construction when ROE is gained to unsurveyed areas.

3.7.3 Mitigation Measures

Transmission lines and associated structures are normally experienced as negatively affecting landscape aesthetics. They often introduce an industrial aspect to the landscape. They are large and often highly visible structures (given their length and height) and can potentially affect many viewer groups.

The following mitigation measures would be implemented to reduce the effects on visual quality from the proposed action:

- Temporary access roads and staging areas would be revegetated following construction.
- Construction waste would be removed on a regular schedule to minimize short-term visual impacts.
- The Applicant would work with the Coronado National Forest to site poles in the least intrusive locations possible.
- Transmission lines would parallel existing ROWs, to the extent practicable.
- Towers and structures would have a nonreflective finish.
- Structures would utilize self weathering material to blend with or complement the surrounding landscape.

3.8 Socioeconomics and Environmental Justice

This section discusses the socioeconomics within the Route Corridor and identifies the potential effects the proposed action may have on the existing socioeconomic environment. Data from the U.S. Census Bureau's American Community Survey were used to determine existing socioeconomic conditions in the Route Corridor.

3.8.1 Affected Environment

The total population in the Route Corridor is 8,742, which accounts for approximately 42 percent of the total population in Nogales. The Route Corridor population is predominantly white (74.9 percent), with 94 percent of the total population Hispanic or Latino. Approximately 32 percent of all individuals in the Route Corridor are below the poverty level, slightly lower than the rate of 35 percent in Nogales. Residents in the two census tracts that occur in the Study Area have median household incomes of $34,297 and $26,216, which is consistent with the Nogales median household income of $26,333.

The largest share of the labor force, both in the Route Corridor and in Nogales, works in sales and office occupations. The top industry in the Route Corridor is retail trade (19.4 percent of total employment) followed by education services, health care, and social assistance (14.9 percent) and arts, entertainment, recreation, and accommodation (13 percent). According to recent data from the Bureau of Labor Statistics, the unemployment rate in Nogales is 10.6 percent (June 2015).

3.8.2 Environmental Consequences

The proposed action is not expected to negatively affect socioeconomic conditions in the Route Corridor. While Route Segment 1 would run adjacent to one multifamily residential development, no residences would be displaced.

Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires that federal agencies consider and address disproportionately high and adverse environmental effects of proposed federal projects on the health and environment of minority and low-income populations to the greatest extent practicable by law. The proposed action is not anticipated to adversely impact any environmental justice populations.

3.8.2.1 Temporary Impacts

Construction of the proposed action would create approximately 200 human-months of labor over a 12- to 14-month duration based on a 60-hour work week. If local contractors are used for portions of the construction, total wages and salaries paid to contractors and workers would contribute to the total personal income of the region.

3.8.2.2 Permanent Impacts

The proposed action is anticipated to provide an additional source of electricity to Nogales.

Additional income would be generated by the circulation of dollars paid out by the Applicant as business expenditures and state and local taxes. The economy would also benefit from property taxes on the transmission line and associated facilities paid by the Applicant.

3.8.3 Mitigation Measures

No negative impacts on socioeconomic conditions are anticipated. Therefore, no mitigation measures are required.

3.9 Noise

This section describes noise sources in the Route Corridor and vicinity and the potential noise impacts of the proposed action.

3.9.1 Affected Environment

The State of Arizona does not regulate environmental noise from stationary sources such as substations and transmission lines. The City of Nogales, Arizona regulates environmental noise through its noise ordinance (Nogales Code of Ordinances, Chapter 12, Article 3 Noise, Sections 12-56 to 12-63). The ordinance identifies maximum allowable noise levels (L_{max}) at the property line of the noise receiver.

The ordinance contains different L_{max} limits for daytime and nighttime, and also for different receiving land uses. The ordinance states that it is primarily (but not exclusively) intended to be applied to vehicles and stereos in vehicles. It also states that noise sources regulated by other state or federal regulatory programs are exempt from the ordinance.

The Applicant assumes that the Nogales noise ordinance is applicable to the substation. Table 3-6 identifies the maximum allowable noise levels at receiving land uses (Section 12-59, Nogales noise ordinance).

Table 3-6. Maximum Allowable Noise Levels for Continuous Noise Sources

Property Type	6 a.m. to 10 p.m. (dBA)[a]	10 p.m. to 6 a.m. (dBA)
Hospital	60	50
Residential	65	55
Commercial	70	60
Industrial	85	70

Notes: dBA = A-weighted decibels
[a] Noise level in decibels on A-weighted scale, "slow" setting, L_{max} reading.

The Gateway substation site and the surrounding land are zoned light industrial. The nearest residential land use is a mobile trailer park, located approximately 2,700 feet east of the Gateway substation property line. Maximum allowable Project-related noise at that distance (and location) is 65 A-weighted decibels (dBA) and 55 dBA during daytime and nighttime, respectively (Table 3-6). The nearest industrial property line is located approximately 330 feet south of the Gateway substation. Maximum allowable Project-related noise at that distance (and location) is 85 dBA and 70 dBA during daytime and nighttime, respectively (Table 3-6).

3.9.2 Environmental Consequences

3.9.2.1 Temporary Impacts

Temporary impacts would primarily consist of noise from activities related to the construction of the proposed action.

3.9.2.2 Permanent Impacts

Project-related noise sources would include the transmission lines (corona noise) and stationary sources at the substation (primarily the transformers). Corona noise can occur during very high humidity conditions and is sometimes audible as a crackling or sizzling sound. These conditions are expected to occur rarely given the geographic location of the proposed action in a dry, desert-like climate.

The primary noise sources at the proposed Gateway substation are: converter transformers, air-cooled liquid cooling towers that include fans, and valve enclosures that house water-cooled thyristors. Transformer noise is expected to occur continuously while the transformers are in use.

3.9.3 Mitigation Measures

The following mitigation measures would be implemented to reduce the effects of noise from the proposed action:

- the substation equipment would be designed so that the maximum noise level would be 75 dBA at three meters (approximately 10 feet) away from individual pieces of equipment and 65 dBA at the fence line.
- this design goal would result in compliance with the maximum allowable noise limits in the Nogales noise ordinance.

3.10 Electric and Magnetic Fields

This section describes electric and magnetic fields (EMF) and stray voltage, which are phenomena associated with electrical energy sources. It also describes how these phenomena are related to human health.

3.10.1 Affected Environment

EMF is produced by power lines, and these fields would induce voltages and currents on nearby conductive objects. Electric fields are produced whenever a conductor is connected to a source of electrical voltage such as plugging 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 creates an electric field 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. Table 3-7 demonstrates examples of EMF levels from various electrical sources.

Table 3-7. EMF Strength of Various Electrical Sources at Various Distances

EMF Source[a]	Distance (feet)	Strength (mG)	Distance (feet)	Strength (mG)	Distance (feet)	Strength (mG)
Microwave oven	0.5	200	1.0	4	4.0	2
Vacuum cleaner	0.5	300	1.0	60	4.0	1
Hair dryer	0.5	300	1.0	1	4.0	0
Electric shaver	0.5	100	1.0	20	4.0	0
138 kV transmission line, vertical[b]	0	40	50	11	300	0.4
230 kV transmission line, vertical[b]	0	57.5	50	19.5	300	0.8

Notes: EMF = electric and magnetic field, kV = kilovolt, mG = milliGauss
[a] Appliance magnetic field strengths are median values in mG for typical 60 hertz electrical current (National Institute of Environmental Health Sciences 1999)
[b] 138 kV and 230 kV power line ROW is up to 150 feet wide; 0-foot values represent a location directly below the lines at the lowest point of sag.

Both current and voltage are required to transmit electrical energy over a transmission line. The current (a flow of electrical charge measured in amperes) creates a magnetic field. This can fluctuate with the amount of line loading at any given time.

The voltage (force or pressure that causes the current to flow measured in units of volts or thousand volts) creates an electric field. Though an electric field is present anytime a line is energized, even from one end, the magnetic field exists only when electricity flows. It is general practice to consider both fields together as EMF values when assessing the amount of effect at the outer edge of a transmission line's ROW. EMF decreases in strength with increased distance from the source. In addition, electric fields are further weakened by obstacles such as walls, roofs, trees, and vegetation.

However, magnetic fields are not easily shielded by most materials and are primarily reduced in strength by distance alone. The EMF values associated with this Project are expected to be comparable to other 138 or 230 kV transmission lines in the state and are expected to be within generally accepted standards at the edge of the proposed ROW.

3.10.2 Environmental Consequences

3.10.2.1 Temporary Impacts

No direct or indirect effects attributable to EMF from the proposed action are expected.

3.10.2.2 Permanent Impacts

No direct or indirect effects attributable to EMF from the proposed action are expected.

3.10.3 Mitigation Measures

The proposed action will be designed to meet prudent avoidance guidance, so no mitigation measures are proposed for EMF.

3.11 Radio, Television and Cellular Telephone

This section describes the radio, television, and cellular telephone infrastructure within the Study Area and the potential impacts of the proposed action on that infrastructure.

Communication tower data was obtained from the Federal Communications Commission (FCC) and spatially analyzed in GIS to determine direct and indirect impacts.

3.11.1 Affected Environment

Communications technologies identified within the Study Area can be divided into two broad categories: omnidirectional and unidirectional signals. Omnidirectional refers to those antennae that are able to transmit or receive signals in any direction; unidirectional refers to those antennae that are able to transmit or receive signals in one direction. Microwave signals are unidirectional and all others (e.g., radio, television, communications, and cellular phone) are omnidirectional.

3.11.1.1 Omnidirectional Signals

Generally, transmission lines do not cause interference with omnidirectional radio, television, or other communication antenna reception. While it is rare in everyday operations, four potential interference sources do exist: gap discharges, corona discharges, shadowing effects, and reflection effects.

Gap discharge interference is the most commonly noticed form of transmission line interference with omnidirectional signals. Gap discharges may occur on transmission and distribution lines where small gaps (i.e., spaces) develop between mechanically connected metal parts. As sparks discharge across a gap, they create the potential for electrical noise, which can occur with any electrical line voltage. The degree of interference depends on the quality and strength of the transmitted communication signal, the quality of the antenna system, and the distance between the receiver and the electrical line. Gap discharges typically are not a design issue, but tend to be associated with equipment maintenance, occurring at areas where gaps have formed due to broken or ill fitted hardware (e.g., clamps, insulators, and brackets). Because gap discharges are a hardware issue, they can be repaired when they occur.

While gap discharges and their effects can happen on any electrical line, they typically occur on lower voltage distribution lines. The gap discharge potential of larger transmission lines, like those for this Project, tends to be minimized because there are fewer structures and a higher mechanical load on hardware.

Corona discharges can generate radio frequency electrical interference. Corona discharges are a potential issue with all transmission lines. They are caused when localized electric fields near an energized conductor produce small electric discharges ionizing nearby air. Most often, the reasons for corona discharge are related to irregularities on conductors, including scratches or nicks, dust buildup, or water drops. The air ionization caused by corona discharges results in energy loss and generates audible noise, radio noise, light, heat, and small amounts of ozone. The energy loss from corona discharges is minimized through the design process by selecting conductors properly sized for the operating voltage of the line. In the case of the Project, a three-conductor bundle in a delta arrangement was selected largely for this purpose. The potential for radio and television signal interference due to corona discharges relates to the magnitude of the transmission line-induced radio frequency noise compared to the strength of the broadcast signals. Because radio frequency noise, like electric and magnetic fields, becomes significantly weaker with distance from the transmission line conductors, very few practical interference problems occur with existing transmission lines. In most cases, the strength of the radio or television broadcast signal within a broadcaster’s primary coverage area is great enough to prevent interference.

Shadowing and reflection effects typically are associated with large structures (e.g., high buildings) that may cause reception problems by disturbing broadcast links and leading to poor radio and television reception. Although the occurrence is rare, a transmission structure or the conductor can create a shadow on adjoining properties that obstructs or reduces the transmitted signal. Structures may cause a reflection or scattering of the signal. Reflected signals from a structure result in the original signal breaking into two or more signals.

Multipath reflection or scattering interference can be caused by the combination of a signal that travels directly to the receiver and a signal reflected from the structure that travels a slightly longer distance, and thus may be received slightly later by the receiver. If one signal arrives with significant delay relative to the other, the picture quality of both analog and digital television broadcast signals may be impacted. With analog broadcasts, a second image may appear on the receiver's screen and displace the other. This type of reception interference is known as ghosting or delayed image. With digital broadcasts, the picture can become pixelated or freeze and become unstable. The most significant factors affecting the potential for signal shadow and multipath reflection are structure height above the surrounding landscape and the presence of large flat metallic facades. Potential shadow and reflection effects from the Project would be minimized because the structures will be placed 600 to 1,000 feet apart. Due to the large spaces between individual structures, the Project's structures would not create one large obstacle and broadcast signals would travel between the structures, minimizing the likelihood of shadowing and reflection effects.

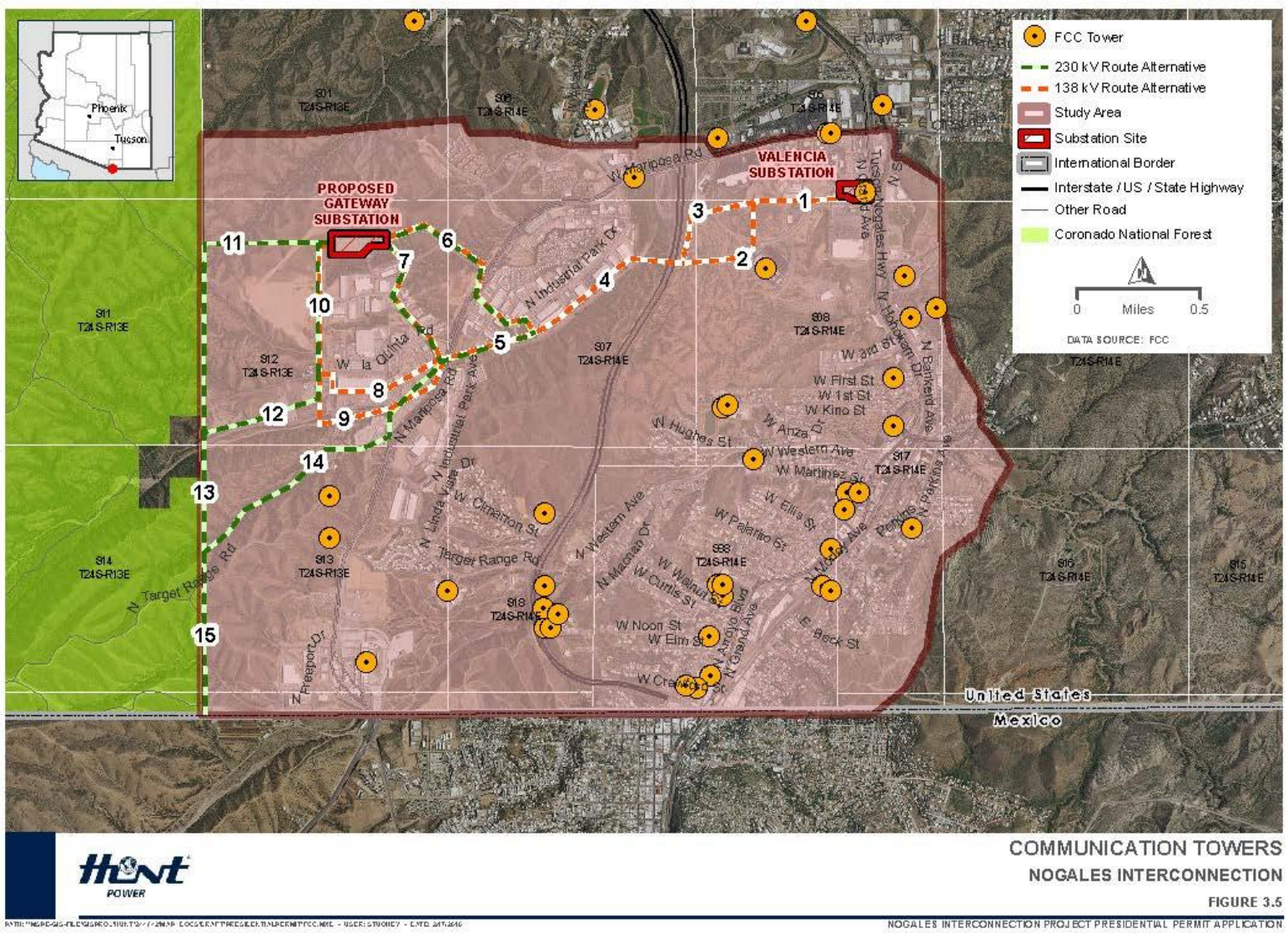
3.11.1.2 Microwave (Unidirectional) Signals

Microwave antennae are operated as high-frequency, unidirectional, point-to-point systems and depend on line-of-sight between antenna receivers. These systems are unlikely to be adversely affected by electrical noise, but could be affected by infrastructure located directly between two microwave signal points.

3.11.1.3 Existing Tower Locations

Communication tower locations were identified by accessing the FCC database (FCC 2012). Based on the data available, two towers are within 500 feet of a Route Segment; there are no communication towers within the Route Corridors. See Figure 3-5 for the locations of communication towers.

Figure 3-5. Communication Towers



3.11.2 Environmental Consequences

The Applicant is not aware of any complaints related to radio or television interference resulting from the operation of existing transmission lines located near the proposed action, and does not expect that such interference will be an issue. In addition, there are no communication towers located in the Route Corridor; therefore, construction of the Project will not directly affect any communication towers.

No indirect impacts on omnidirectional communications are anticipated as the transmission line hardware will be designed to reduce gap and corona discharges. The transmission line will be properly maintained to minimize gap and corona discharges.

Interference from transmission line corona discharges associated with the proposed action could occur for an amplitude modulation (AM) radio station within its primary coverage area, where good reception existed before the proposed action was built. That situation is unlikely, however, because AM radio frequency interference typically occurs immediately under a transmission line and dissipates rapidly with increasing distance from the line.

Frequency modulation (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 (88-108 Megahertz)
- The interference rejection properties inherent in FM radio systems make them virtually immune to amplitude type disturbances.

Television reception could be impacted by the structures or transmission line conductors. The large size of these transmission line components might cause a shadowing effect that could cause reception interferences.

In addition, corona-generated radio frequency noise and transmission line structure placement could cause interference with television broadcast signals. Because digital reception is, in most cases, considerably more tolerant of noise and somewhat less resistant to multipath reflections (i.e., reflections from structures) than analog broadcasts, interference is not anticipated. However, if the noise level or reflections are great enough, they will impact digital television reception.

Due to the higher frequencies of television broadcast signals (i.e., 54 Megahertz and above), a transmission line seldom causes reception problems within a station's primary coverage area. In the rare situation where the construction of the proposed action would cause interference within a television station's primary coverage area, the Applicant would work with the affected viewers to correct the problem. Usually any reception problem can be corrected with the addition of an outside antenna.

Radio frequency noise is not an issue for cellular phones because it is almost non-existent in the frequency range for cellular-type phones, and the technology used by cellular phones is superior to that used in two-way mobile radio units.

3.11.3 Mitigation Measures

The following mitigation measures would be implemented to reduce the effects on radio, television, and cell phone service from the proposed action:

- If television or radio interference is caused by the operation of the proposed action in those areas where good reception was available prior to construction of the proposed action, the Applicant will inspect and repair loose or damaged hardware in the transmission line.
- If interference from corona discharges does occur for an AM radio station within a station's primary coverage area with good reception before the proposed action was built, satisfactory reception could be obtained by appropriate modification of the receiving antenna system.
- A two-way mobile radio located immediately adjacent to and behind a large metallic structure (e.g., a steel transmission line structure) may experience interference because of the signal blocking effects of the structure. Moving either mobile unit by less than 50 feet so the metallic structure is no longer immediately between the two units should restore communications.
- If television interference is caused by the operation of the proposed action, the Applicant will inspect and repair any loose or damaged hardware in the transmission line.
- If necessary, the Applicant will work with tower operators to resolve any issues directly related to the proposed action.

3.12 Transportation

This section describes transportation infrastructure in the Route Corridor and the potential impacts of the proposed action on this infrastructure.

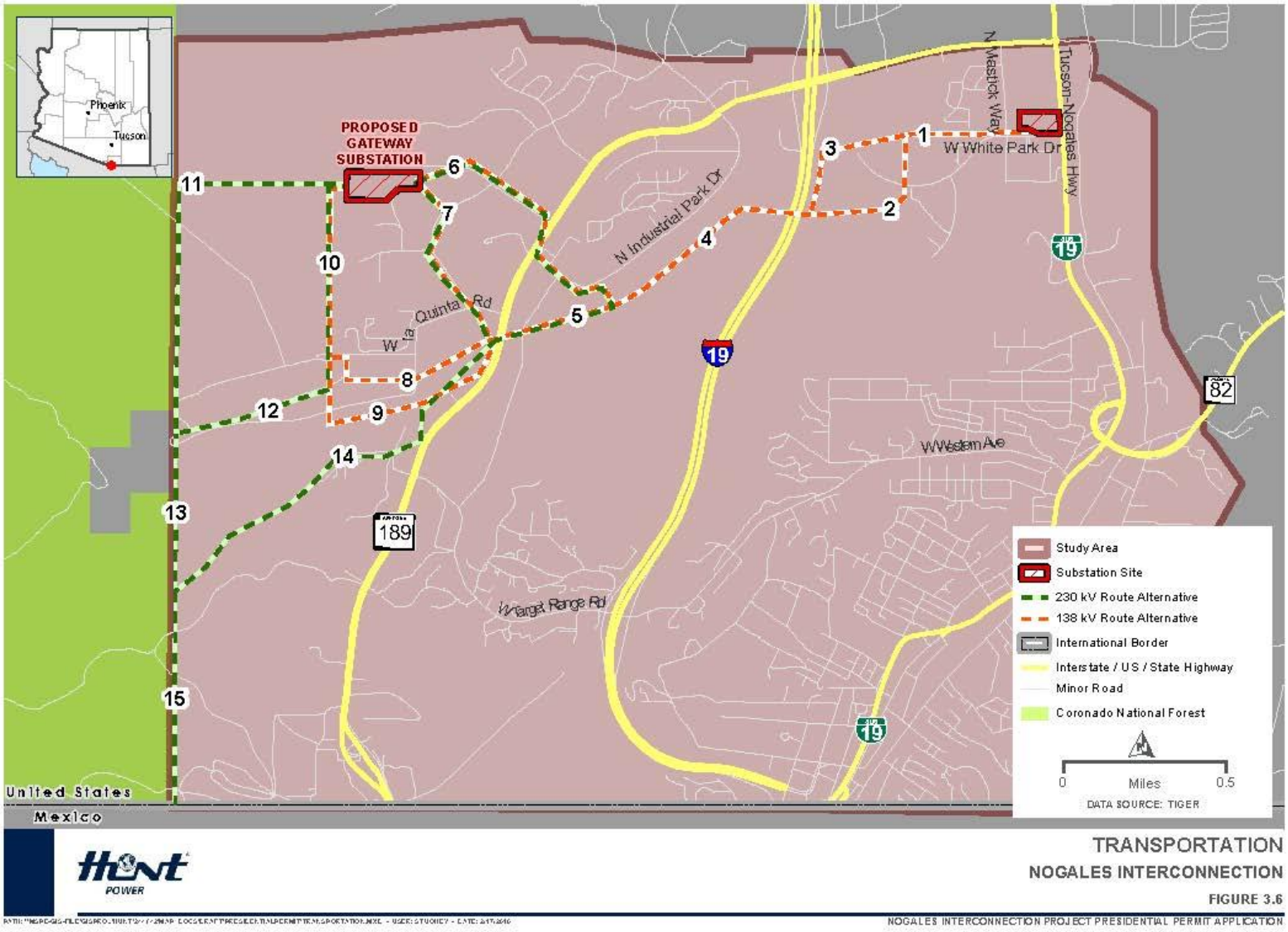
3.12.1 Affected Environment

Three major roadways are in the Route Corridor: I-19, Grand Avenue (also known as Business I-19 or the Tucson–Nogales Highway), and SR 189/Mariposa Road (Figure 3-6).

The major roadways in the Route Corridor serve one of the ten busiest cargo ports along the United States-Mexico border. They handle nearly half of all agricultural commodities entering the United States from Mexico, and between 1.2 and 1.8 million privately owned vehicles pass through the area annually (ADOT 2008).

I-19 is a designated section of the CANAMEX Corridor, which connects Mexico, the United States, and Canada. Through the 1995 National Highway Systems Designation Act, Congress established CANAMEX as a "High Priority Corridor," with a "goal of stimulating investment and economic growth in the region and enhancing safety and efficiency in the corridor" (CANAMEX Corridor Coalition 2015). SR 189 and Grand Avenue provide access from the Mexican border to Nogales, Arizona and direct connections to I-19. All three roadways pass through or near the Route Corridor in a north-south alignment.

Figure 3-6. Transportation



Four minor roads in the Route Corridor serve industrial and commercial developments in Nogales: West White Park Drive and North Mastick Way, both adjacent to the Valencia Substation; North Industrial Park Avenue, adjacent and parallel to SR 189; and West La Quinta Road, also adjacent to SR 189. Gravel roads and trails are found along the hills in the western portion of the Route Corridor, including roads for patrolling the United States-Mexico border.

Average annual traffic counts for I-19 and SR 189, the two major roads that would be crossed by the proposed transmission lines, are provided in Table 3-8.

Table 3-8. Major Roadway Traffic Volumes

Roadway	Average Annual Daily Traffic Volume
Interstate 19 (from Western Avenue to State Route 189 interchange)	11,060
State Route 189 (from Target Range Road to Industrial Park Drive)	14,902
Source: Arizona Department of Transportation (2014)	

3.12.2 Environmental Consequences

3.12.2.1 Temporary Impacts

Temporary effects on transportation and traffic would occur during construction of the proposed action. Given the presence of the additional construction-related traffic, heavier-than-usual traffic and short delays may be experienced. The temporary traffic effects would occur primarily on the four local, minor roads and two of the major roads: Grand Avenue and SR 189 (Figure 3-6).

Most of the effects would result from construction crews, equipment, and haul trucks using the roadways to access the proposed action, where construction would occur along new unpaved access roads. In locations where the unpaved construction access road would intersect existing paved roads, steel or gravel pads (track-outs) would be installed to prevent soils on construction equipment from collecting on the paved roadway. The new unpaved access road may be permanent in undeveloped parcels where existing roads are not available for operation and maintenance of the proposed action.

Minor traffic delays resulting from stringing lines across I-19 and SR 189 may occur but would occur only once at each location. The method of stringing lines across the roadways has yet to be determined.

Effects on traffic are anticipated to be greatest along SR 189 because this roadway is a primary access route to most of the Project site. However, given the large industrial presence and existing high volume of truck traffic along SR 189, the additional effects from construction traffic are anticipated to be minor. Encroachment permits from ADOT are required for lines crossing SR 189 and I-19, and utility permits may be needed to cross city roads and streets.

3.12.2.2 Permanent Impacts

No permanent impacts to transportation systems are anticipated.

3.12.3 Mitigation Measures

The Applicant would consult with ADOT and the City of Nogales and obtain any required permits prior to construction.

Impacts on the existing transportation network are anticipated to be minimal as a result of construction, operation, and maintenance of the proposed action; therefore, no additional mitigation measures are proposed.

3.13 Air Quality

This section describes existing air quality conditions in Nogales, potential air quality impacts of the proposed action, and mitigation measures to minimize such impacts.

3.13.1 Affected Environment

Air quality is measured primarily by concentrations of six criteria pollutants within a region. The six criteria air pollutants are subject to National Ambient Air Quality Standards (NAAQS) developed by the Environmental Protection Agency's (EPA) Office of Air Quality Planning and Standards, and were chosen because they are the predominant air pollutants of concern for the environment and public health.

The criteria pollutants are ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_2), lead (Pb), sulfur dioxide (SO_2), and particulate matter (PM), which includes two subcategories: particles less than 10 microns in diameter (PM_{10}) and particles less than 2.5 microns in diameter ($PM_{2.5}$). The NAAQS (40 CFR 50) are summarized in Table 3-9. Arizona has adopted the NAAQS into its rules, except that some of the more recent NAAQS are not yet included in the Arizona rules.

Nogales is in the Nogales Planning Area, which is designated as a nonattainment area (NAA) for the 24-hour PM_{10} NAAQS. The NAA and City of Nogales boundaries are shown in Figure 3-7. Figure 3-8 shows the trend of measured PM_{10} concentrations at the Nogales U.S. Post Office, at 300 North Morley Avenue (U.S. Environmental Protection Agency 2015). While a significant improvement is evidenced by reduced PM_{10} levels in recent years, the latest 3-year average, 24-hour design concentration (average of the second highest values across the 3 years) is still above the 24-hour NAAQS of 150 micrograms per cubic meter ($\mu g/m^3$).

The same area shown in Figure 3-7 as an NAA for PM_{10} is also an NAA for the $PM_{2.5}$ NAAQS. However, on January 7, 2013, EPA published in the *Federal Register* a final rule designating the Nogales Planning Area as being in attainment for the $PM_{2.5}$ NAAQS. While this indicates the 24-hour and annual NAAQS for $PM_{2.5}$ are now being met in the area, EPA still lists the official status as $PM_{2.5}$ "nonattainment" and will continue this official designation until such time as EPA approves the state-submitted $PM_{2.5}$ maintenance plan for the area. Figure 3-7 shows the past 10-year trend of $PM_{2.5}$ concentrations, indicating that in recent years air quality has improved to better than the levels of the 24-hour and annual $PM_{2.5}$ NAAQS (EPA 2015).

No monitoring data are available for the remaining criteria pollutants in EPA's database. However, it is expected that concentrations of these pollutants in the Route Corridor are significantly lower than the NAAQS levels, given the lack of substantial emissions sources of these pollutants or their precursors in and near the Route Corridor.

Table 3-9. National Ambient Air Quality Standards

Pollutant	Averaging Time	Primary Standard	Secondary Standard
Carbon monoxide (CO)	8-hour[a]	9 ppm (10 mg/m^3)	None
	1-hour[a]	35 ppm (40 mg/m^3)	None
Lead (Pb)	Rolling 3-month average	0.15 µg/m^3	Same as primary
Nitrogen dioxide (NO_2)	Annual (arithmetic mean)	0.053 ppm (100 µg/m^3)	Same as primary
	1-hour[b]	0.100 ppm (188 µg/m^3)	Same as primary
Particulate matter (PM_{10})	24-hour[c]	150 µg/m^3	Same as primary
Particulate matter ($PM_{2.5}$)	Annual (arithmetic mean)[d]	12.0 µg/m^3	Same as primary
	24-hour[e]	35 µg/m^3	Same as primary
Ozone (O_3)	8-hour[f]	0.070 ppm (2015 standard)	Same as primary
Sulfur dioxide (SO_2)	Annual (arithmetic mean)[g]	0.03 ppm	None
	24-hour[a,g]	0.14 ppm	None
	3-hour[a]	None	0.5 ppm (1,300 µg/m^3)
	1-hour[h]	0.075 ppm (196 µg/m^3)	Same as primary

Source: 40 CFR 50

Notes: mg/m^3 = milligrams per cubic meter, ppb = parts per billion, ppm = parts per million

[a] Not to be exceeded more than once per year.

b Standard is attained when the 3-year average of the eighth-highest daily maximum 1-hour average NO2 concentration does not exceed 0.100 ppm (100 ppb).

[c] Not to be exceeded more than once per year on average over three years.

[d] To attain this standard, the 3-year average at any monitor must not exceed 12.0 µg/m^3.

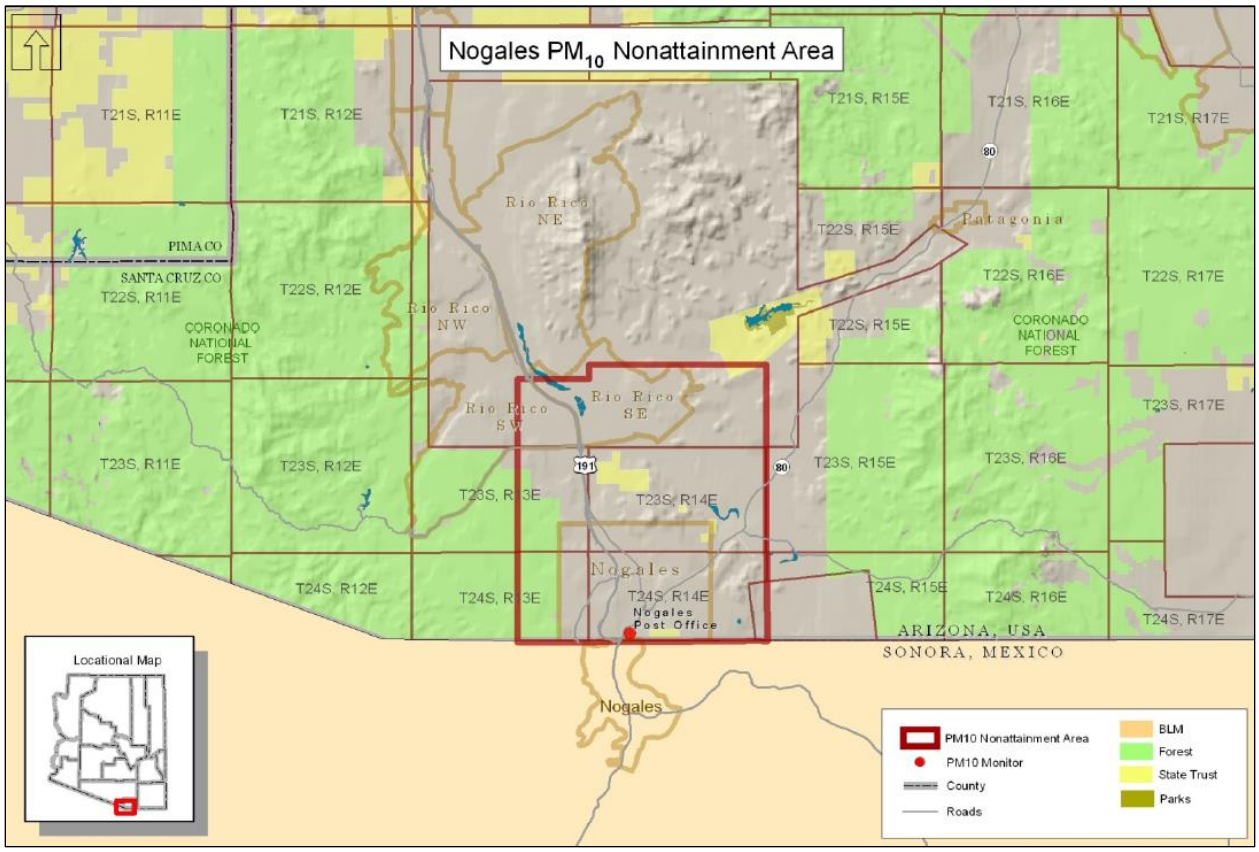
e To attain this standard, the 3-year average of the 98th percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m3 (effective December 17, 2006).

f To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average O3 concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm (effective May 27, 2008).

f To attain this standard, the 3-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.08 ppm. The 1997 standard—and the implementation rules for that standard—will remain in place for implementation purposes as EPA undertakes rulemaking to address the transition from the 1997 O3 standard (0.08 ppm) to the 2008 O3 standard (0.075 ppm).

g The annual and 24-hour SO2 NAAQS will be revoked as of 1 year after the effective date of designations for the newer 1-hour SO2 NAAQS, which EPA must complete by July 2, 2016. h Standard is attained when the 3-year average of the fourth-highest daily maximum 1-hour average NO2 concentration does not exceed 0.100 ppm (100 ppb).

Figure 3-7. City of Nogales and Nogales PM10 NAA (Nogales Planning Area)



Source: Arizona Department of Environmental Quality (2012)

Figure 3-8. Most Recent 10-year Trend of PM10 Concentrations in Nogales

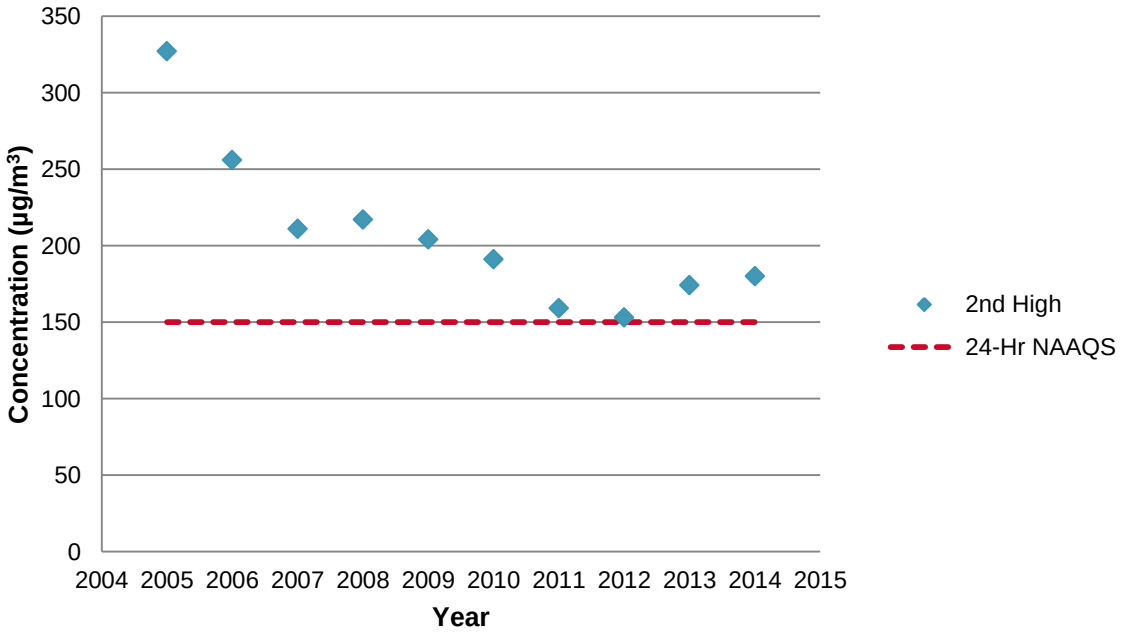
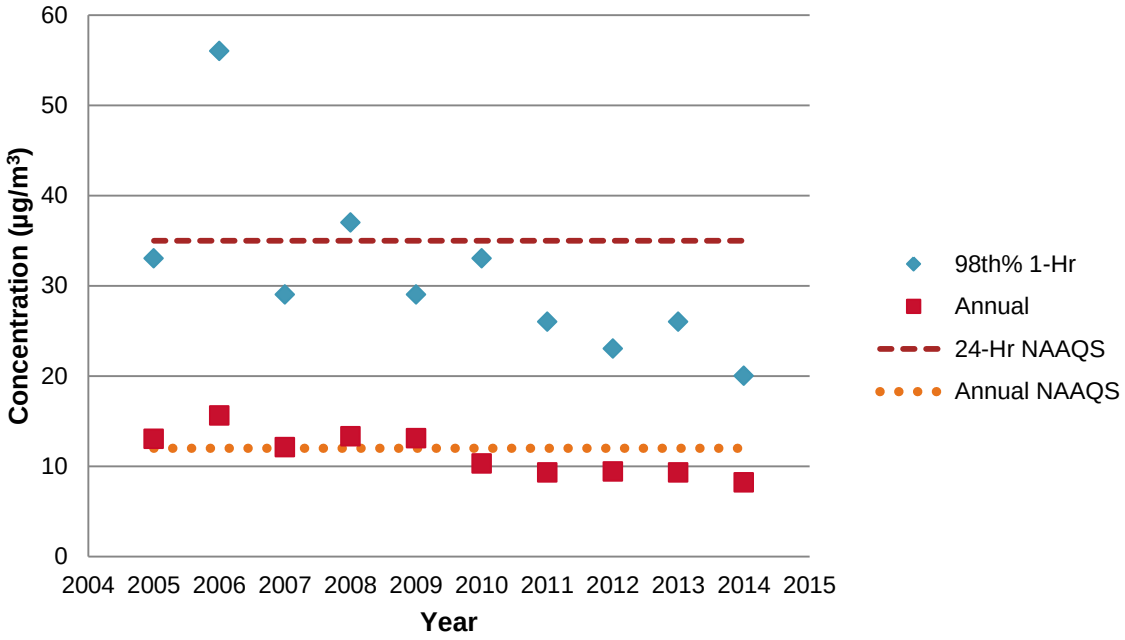


Figure 3-9. Most Recent 10-year Trend of PM2.5 Concentrations in Nogales



3.13.2 Environmental Consequences

Implementation of the proposed action could affect air quality in two phases: 1) during construction and 2) during operation of the power line. The assessment of air quality impacts in this document is qualitative for both of these phases, given the very low levels of expected impacts, except that estimates of construction PM_{10} and $PM_{2.5}$ emissions are provided to assess the potential applicability of federal General Conformity requirements under 40 CFR 93, Subpart B.

3.13.2.1 Temporary Impacts

Emissions from construction activities associated with the proposed action would include exhaust emissions from heavy equipment, including trucks, backhoes, cranes, etc. and fugitive dust emissions from construction equipment operating over unpaved areas.

Diesel-powered on-road trucks and construction equipment are now required to use ultra-low sulfur diesel fuel, containing less than 15 parts per million (ppm) of sulfur, by weight. This minimizes potential emissions of both SO_2 and PM from equipment exhausts. In addition, the use of ultra-low sulfur diesel fuel has allowed the implementation of selective catalytic reduction systems on newer construction equipment and on-road trucks, thus contributing to a nationwide decease in such emissions from both on- and non-road vehicles.

Construction of the proposed action would require relatively small parcels for transmission tower foundations/supports along the selected transmission line corridor, along with a substation facility. Therefore, a relatively small amount of excavation and other earthmoving activities would be needed. Mitigation of fugitive dust from these activities would be implemented as described in the mitigation measures section below.

For purposes of General Conformity rules (40 CFR 93, Subpart B), it is necessary to assess emission quantities of PM_{10} and $PM_{2.5}$ to compare them against the General Conformity applicability emissions thresholds of 40 CFR 93, Subpart B, § 93.153, Applicability. For direct emissions of both PM_{10} and $PM_{2.5}$, the applicability threshold is 100 tons/year. For $PM_{2.5}$ emissions, there are also General Conformity thresholds for indirect or precursor pollutants, including SO_2 and NO_2, which are set at 100 tons/year each. Because only small amounts of exhaust emissions of these precursor pollutants would occur during the construction phase, this assessment focuses on the potentially greater amounts of fugitive dust (as PM_{10} or $PM_{2.5}$) emissions that could be caused by construction.

Estimated emissions of PM_{10} and $PM_{2.5}$ for construction activities are based on EPA Publication AP-42, Section 13.2.3, which provides a gross emission factor (uncontrolled) for Heavy Construction Operations of 1.2 tons/acre/month for total PM. To estimate PM_{10} and $PM_{2.5}$, the estimation uses particle size multipliers derived from the "k" coefficients for unpaved roads in AP-42 Section 13.2.2, Table 13.2.2-2.

The total estimated area affected by construction, for the proposed action, would be approximately 94 to 116 acres, assuming all of the ROW and substation land would be disturbed (a very conservative estimate). The duration of construction is estimated at six months. Assuming a fixed proportion of the 94 to 116 acres is disturbed each month gives a total of 15.7 to 19.3 acres disturbed per month. Based on the above data and references, the estimated emissions of total PM, PM_{10}, and $PM_{2.5}$ for the 6-month duration of construction is estimated as shown in Table 3-10. Similarly, the expansion of the Gateway Substation from 150 MW to 300 MW would occur over a shorter than 6-month duration in a separate future construction phase.

The total emissions of PM_{10} and of $PM_{2.5}$ would be below the applicable General Conformity *de minimis* threshold of 100 tons/year for each particle size. Therefore, General Conformity requirements do not apply to this Project. Furthermore, recommended dust mitigation measures (Section 3.13.3) are expected to reduce emissions of fugitive dust by 50 percent or more, thus keeping emissions even lower than the uncontrolled values estimated here.

Table 3-10. Estimated PM, PM_{10}, and $PM_{2.5}$ Emissions

Particle Size	Size Multiplier	Emissions Factor (tons/acre/ month)	Distribution Area (acres/ month)	Emissions (tons/month)	Emissions (tons/year)
PM	1	1.2	15.7-19.3	18.84 – 23.16	113.04 – 166.75
PM10	0.306	0.367	15.7 – 19.3	5.76 – 7.08	34.56 – 42.48
PM2.5	0.031	0.037	15.7 – 19.3	0.58 – 0.71	3.48 – 4.26

3.13.2.2 Permanent Impacts

Operation of the proposed transmission line is not expected to result in any additional generation-related emissions in the air quality of Nogales. No fossil-fueled, electric generating plants exist in Nogales that would potentially run at a higher rate because of the availability of the proposed transmission line.

If electric generating plants outside of the Nogales NAA would run more frequently because of availability of the transmission line, it is presumed that they would operate within their permitted emission limitations and would not contribute to adverse air quality conditions in their local areas.

The new substation may create additional operational emissions of air pollutants. The substation would use some circuit breakers containing sulfur hexafluoride, a compound regulated as a greenhouse gas (GHG). GHG emissions and impacts are addressed in Section 3.14.

3.13.3 Mitigation Measures

While fugitive dust emissions of PM_{10} and $PM_{2.5}$ attributable to construction are estimated to be below the General Conformity *de minimis* levels, as shown in the prior section, ADEQ rules require that fugitive emissions be minimized under Article 6 – Emissions from New and Existing Nonpoint Sources.

At a minimum, the following two rule sections of this article appear to apply to potential fugitive dust emissions that could result from construction of the proposed Project:

- R18-2-606. Material Handling
  No person shall cause, suffer, allow or permit crushing, screening, handling, transporting or conveying of materials or other operations likely to result in significant amounts of airborne dust without taking reasonable precautions, such as the use of spray bars, wetting agents, dust suppressants, covering the load, and hoods to prevent excessive amounts of particulate matter from becoming airborne.
- R18-2-614. Evaluation of Nonpoint Source Emissions
  Opacity of an emission from any nonpoint source shall not be greater than 40% measured according to the 40 CFR 60, Appendix A, Reference Method 9. An open fire permitted under R18-2-602 or regulated under Article 15 is exempt from this requirement.

Given the above requirements and the PM_{10} nonattainment conditions in the Route Corridor, notwithstanding the fact that estimated PM_{10} emissions are below the General Conformity *de minimis* threshold, the construction-related fugitive dust emissions would be mitigated by application of water sprays and/or other control measures as appropriate to minimize such emissions.

3.14 Greenhouse Gases

This section describes greenhouse gases and the potential impacts of the proposed action on those greenhouse gases.

For the purposes of assessing existing conditions and potential impacts of GHG emissions from the proposed Project, the study area is the whole planet. Because the Project is quite small in its potential effects on the global scale, this section provides only a qualitative assessment of the potential for GHG emissions if the Project is implemented.

3.14.1 Affected Environment

GHG emissions and their global atmospheric concentrations have been generally increasing since the beginning of the industrial age. EPA has defined several gaseous compounds or groups of compounds for regulation as GHGs: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and various fluoride gases, including sulfur hexafluoride (SF_6).

Each GHG is assigned a "global warming potential" (GWP), which is an estimate of its relative effectiveness in contributing to the greenhouse effect, in comparison to CO_2. The current GWP for the above gases as listed in EPA rules (40 CFR 98) is provided in Table 3-11. Note that the GWP values are not inherent properties of the gases but, rather, are estimates of how much warming a given gas would cause, on an equivalent mass basis compared with CO_2, at a 100-year time horizon. The GWP estimates must account for atmospheric physics and chemistry in how the gas is consumed by various processes over a 100-year time horizon and how other GHGs compete for absorption of the same longwave radiation that causes the greenhouse effect. This requires extensive modeling of the anticipated behavior of each gas in the environment, so that substantial uncertainty exists in these values. Therefore, the estimates of GWP have been changed over time as scientists gain new understanding of chemical processes.

Table 3-11. Global Warming Potentials of Common Greenhouse Gases

Compound	Global Warming Potential
Carbon dioxide (CO_2)	1
Methane (CH_4)	25
Nitrous oxide (N_2O)	298
Sulfur hexafluoride (SF_6)	22,800
Source: 40 CFR 98, Subpart A, Table A-1, as of December 8, 2015	

3.14.2 Environmental Consequences

Implementation of the proposed action could affect GHG emissions in two phases: 1) during construction and 2) during operation of the power line. The assessment of GHG emissions in this document is qualitative for both of these phases, given the relatively low levels of expected emissions in comparison with state, national, or global GHG emissions.

3.14.2.1 Temporary Impacts

GHG emissions from construction activities associated with the proposed action would include combustion exhaust emissions (mainly CO_2) from heavy equipment, including trucks, backhoes, cranes, etc. as well as transport of materials and workers to and from the site. From a life-cycle perspective, GHG emissions would also result from mining and production of the raw materials used in Project construction, including concrete, steel, copper, and aluminum.

3.14.2.2 Permanent Impacts

Direct emissions of GHGs attributable to operation of the proposed action would primarily result from fuel combustion for maintenance vehicles.

Another small source of direct GHG emissions would be from any SF_6 lost from circuit breakers expected to be used for the substation. The total SF_6 amount contained in the circuit breakers of the expanded 300 MW substation is expected to be 900 pounds. Two white papers (Bessede et al. n.d.; U.S. Environmental Protection Agency n.d.) estimated leakage rates for modern circuit breakers manufactured after 2000 at less than 0.5 percent per year. Assuming 900 pounds of SF_6 in the circuit breakers, this would be 4.5 pound/year of SF_6. Multiplying by the GWP factor above would give total annual CO_2-equivalent emissions of 102,600 pounds, or 51.3 tons/year.

This is a miniscule amount compared with statewide, nationwide, or global GHG emissions, which are estimated in the tens of billions of tons per year.

Indirect GHG emissions from operation of the Project could result if the Project allows transfer of power across the United States-Mexico border that would not be generated except for the Project. Some of this power could be renewable, and some could be from fossil-fuel or nuclear power generating facilities. However, because the Project is not being built to support a new power generating facility, this is expected to be a relatively small amount of power, given the primary purpose of the Project is grid reliability.

3.14.3 Mitigation Measures

Given the relatively small scope of the proposed action, there are no opportunities for large GHG emission reductions. However, in the construction phase, GHG emissions would be minimized by shutting off equipment that is idling in between performing useful work.

4 Cumulative Impacts

In addition to analyzing the individual impacts of a proposed action, the federal environmental review process requires consideration of the cumulative environmental impacts of multiple projects within an area. In conformance with NEPA requirements, this section discusses the cumulative significance of past, present, and reasonably anticipated future projects on the environment in conjunction with the proposed Project.

4.1 Regulatory Requirement

The Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA defines cumulative impacts as:

- The impact on the environment that results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of which agency (that is, federal or non-federal) or person undertakes such other actions (40 CFR 1508.7).
- Cumulative impacts are considered direct effects, which are “caused by the action and occur at the same time and place” (40 CFR 1508.8).

4.1.1 Analysis Method

This cumulative impacts review was developed in consultation with federal, state, and local agencies responsible for various environmental resources within the CEC Approved Corridor, and is limited to those resources the agencies identified as being of concern and potentially requiring mitigation measures. This type of screening ensures that the analysis focuses on critical resources. The cumulative impacts analysis is based on existing conditions of the critical environmental resources in the Route Corridor.

4.1.2 Valued Environmental Components

Valued environmental components (VECs) are those components of the environment for which there is regulatory or public concern. VECs include the social, cultural, technical, economic, and natural components of the environment. This section follows two principles identified by CEQ when considering VECs: 1) focus only on the effects and resources within the context of the proposed action and 2) present a concise list of issues that have relevance to anticipated effects of the proposed action. Based on this guidance, the resources examined in this chapter were reviewed to determine which constituted VECs may be affected by cumulative actions. The factors used to decide which resources to review are listed below:

- Land Use and Zoning- No further consideration required.
- Geology and Soils - Further consideration of direct impacts will be determined as additional information is gathered during geotechnical investigations of the selected route and structure locations are determined.

- Vegetation – Further consideration will be required as species surveys are completed after a preferred route is identified and land access is acquired. Based on species identified in surveyed areas to date, additional rare plants may be present in unsurveyed areas that should be considered during final design.
- Water Resources – Further consideration will be required because there is anticipated potential structure placement in the floodplains.
- Wildlife - Further consideration will be required because of the potential for bird strikes and to address any regional activities that may affect special status species habitat potentially impacted by the proposed action.
- Cultural Resources - Will be determined upon completion of the cultural resources survey after a preferred route is identified and ROE is acquired. Based on surveys completed to date, no historical properties have been identified.
- Visual Quality – Further consideration will be required. Visual impacts and overall changes in aesthetics would vary depending on the terrain, topography, and vegetative cover of the landscape. Views of the Project could not be avoided completely given the Project's size and the open landscape in some parts of the Route Corridor.
- Socioeconomics and Environmental Justice – No further consideration will be required.
- Noise – No further consideration will be required.
- EMFs – No further consideration will be required.
- Radio, Television and Cellular Telephone - No further consideration will be required because transmission lines rarely result in any adverse impacts, and in the rare case that there are adverse impacts, they can be mitigated readily by tightening loose hardware or upgrading receiving antennae.
- Transportation - No further consideration will be required because of the high capacity of the existing roadway system and likelihood of mitigating any impact from construction of the proposed action.
- Air Quality – No further consideration will be required. During the construction period, vehicle emissions and fugitive dust from earth moving would be caused by construction equipment. The resulting emissions would be low and temporary, with concentrations likely not exceeding state and federal standards.
- Greenhouse Gases – No further consideration will be required.

4.1.2.1 Temporal and Spatial Boundaries

The temporal boundary is the design life of the proposed action's facilities. Spatial boundaries are based on the Route Corridor, but may vary somewhat depending on the resource at issue. The analysis was conducted considering other linear projects (e.g., pipelines, roads, and transmission lines) within a reasonable distance from the proposed Project. This approach was taken because these projects would affect the same or similar resources as those affected by the proposed action.

4.1.2.2 Reasonably Foreseeable Future Activities

Potentially relevant projects, plans, and programs that have or could occur during the same time as construction of the proposed action were identified by contacting local authorities, county agencies, and state agencies within the cumulative effect analysis area and requesting information on past, present, and proposed future land alteration and development activities.

Regulations and case law provide direction as to what constitutes a reasonably foreseeable action that should be included in a cumulative impacts review. Reasonably foreseeable activities include activities that are not speculative and that constitute an independent utility or function.

Other Energy and Transmission Line Projects

No reasonably foreseeable Projects were identified in the area. The proposed action would not interfere with any known pipelines, other transmission facilities, or electrical generation facilities, nor would any significant cumulative affects result.

Transportation Facilities

ADOT reviewed the plans for the proposed action, considered in the context of future transportation facilities and existing facility improvements. The State Route 189, International Border to Grand Avenue project is identifying alternatives for SR 189 between the point of entry and Grand Avenue, a distance of approximately 3 miles, to increase roadway capacity and improve access control along SR 189. The proposed action is necessary to address current and forecast growth in traffic (especially truck, commercial vehicle, and bus traffic) related to the recent expansion of the Mariposa point of entry (completed in late 2014), the designation of the SR 189 corridor as the southernmost segment of the proposed new Interstate 11 corridor within the CANAMEX International Trade Zone, and anticipated industrial development expansion along the SR 189 corridor.

Otherwise, transportation projects near the proposed action generally consist of routine roadway maintenance activities such as road and highway resurfacing, asphalt surface treatment, bridge repair, bituminous overlay, milling and overlay, concrete paving, railroad crossings, and pedestrian bike trail improvements.

Commercial and Industrial Development

Reasonably foreseeable development includes new industrial warehouses and commercial properties similar to what can currently be found in the area.

U.S. Border Patrol Activities

Based on discussions with U.S. Border Patrol during a meeting on September 17, 2015, they indicated they may use any new access roads developed by the Project for border patrol operations.

City of Nogales Floodplain Master Plan

The City of Nogales and the Santa Cruz County Flood Control District are in the early stages of developing a floodplain master plan to control flooding in areas around the Ephraim, Nogales, and Mariposa Washes. These plans, while not yet funded, include proposed impoundments and flood control activities in the Study Area, and at least one preliminary impoundment may be crossed by the Route Corridor.

4.1.3 Cumulative Impacts Assessment

The assessment of potential impacts is possible through the use of an interaction matrix based on the identified relevant activities. An interaction matrix not only lists activities and environmental effects, but also incorporates an association between cause and effect using evaluation criteria (CEQ 1997).

Table 4-1 contains a general description of potential cumulative impacts for the VECs identified above and further evaluated as part of the cumulative impacts assessment. As previously noted, cumulative impacts result from spatial (i.e., geographic) and temporal (i.e., time) crowding of environmental impacts. Table 4-1 lists impact criteria that reflect common categories cited in CEQ's *Considering Cumulative Effects under the National Environmental Policy Act* (1997). The cause-and-effect pathway criteria shown in Table 4-1 are used to evaluate potential interactions of past, present, and reasonably foreseeable activities listed in the table, which lead to potential cumulative impacts. Table 4-1 also suggests the types of mitigation measures that could be employed to mitigate cumulative effects, if they are determined to exist.

Table 4-1. Potential Cumulative Impacts

Resource	Project impact	Reasonably Foreseeable Activities	Cumulative impacts	Potential Mitigation Measures
Geology and Soils	Soil compaction on access roads and structure installation on shrub type landscape	Non-operations uses of access roads by U.S. Border Patrol	Increased soil compaction on access roads and adjacent lands	Paralleling existing linear utility corridors, transportation facilities, or developed areas with compatible land uses to minimize number of affected locations and to focus similar activities in one area
Vegetation	Removal of vegetation, fragmentation of plant communities	Non-operations uses of access roads by U.S. Border Patrol	Damage to vegetation on adjacent lands, weed introduction	Restore ROW with native vegetation and provide signage to discourage off-road use
Water Resources	Sedimentation, turbidity, and runoff; floodplains	Non-operations uses of access roads by U.S. Border Patrol, changes to floodplain boundaries and impoundments for flood control	Increased erosion and potential sedimentation in floodplains and waterways	Comply with all state and federal regulations regarding protection of water resources, restore vegetation in ROW, discourage off-road use with signage

Resource	Project impact	Reasonably Foreseeable Activities	Cumulative impacts	Potential Mitigation Measures
		projects		
Visual Resources	Introduce structures to shrub-type landscape	Previous power lines, pipelines, roadway infrastructure, energy corridors, and land uses	Additional visual intrusion on undeveloped areas	Paralleling existing linear utility corridors, transportation facilities, or developed areas with compatible land uses to minimize number of affected locations and to focus similar activities in one area

This page is intentionally left blank.

5 Environmental Consultation, Review, and Permit Requirements

This section summarizes the federal, state, and local regulations affecting the permitting process and the required environmental documentation for the Project.

5.1 Federal Process

The Department of Energy (DOE) is the lead federal agency for the Project. Pursuant to EO 10485 of 1953, as amended by EO 12038 and 10 CFR § 205.320, a Presidential Permit is required for the Project since it will cross the international boundary between Arizona and Sonora, Mexico. In accordance with EO 12038, DOE must determine whether issuance of a Presidential Permit for the construction, operation, maintenance, or connection of facilities for the transmission of electric energy between the United States and a foreign country is consistent with the public interest. The Project must also obtain favorable recommendations from the Secretary of State and the Secretary of Defense (EO 10485 § 1). Prior to issuance of a Presidential Permit, if the project constitutes a Major Federal Action, it must be reviewed by DOE pursuant to NEPA. NEPA requires federal agencies to consider the environmental impacts and reasonable alternatives to Major Federal Actions. An Environmental Assessment (EA) will be prepared in compliance with NEPA and DOE's implementing regulations pursuant to 10 CFR Part 1021.

The following provides a summary of the federal environmental review process under DOE regulations:

- develop and publish the Draft EA
- solicit comments from the public and agencies on the Draft EA
- develop and publish the Final EA
- issue Finding of No Significant Impact (FONSI) on potential environmental impacts of the Project and identify mitigation measures to minimize these impacts
- issue Presidential Permit

Table 5-1 provides a summary of Federal permits and clearances that must be adhered to by the Project.

Table 5-1. Federal Permits and Clearances

Approval Agency	Permit, License, Approval, Compliance, or Review	Regulatory Requirement	Notes
Department of Energy (DOE)	Presidential Permit	Executive Order (EO) 10485 of 1953, as amended by EO 12038, and 10 Code of Federal Regulations (CFR) § 205.320	A Presidential Permit is required for a utility to cross an international border.
	Environmental Assessment (EA) and Record of Decision (ROD)	National Environmental Policy Act (NEPA)	
	Clean Air Act	42 USC §§ 7401 et seq.	The Clean Air Act is the comprehensive federal law that regulates air emissions from stationary and mobile sources.
	Noise Control Act of 1972	42 USC §§ 4901 et seq.	The noise Control Act of 1972 is a federal law regulating noise pollution with the intent of protecting human health.
	Environmental Justice	EO 12898	EO 12898 states that federal agencies must identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority and low-income populations.
	Cultural Class I and III Surveys, Compliance with Section 110	National Historic Preservation Act (NHPA), §110; EO 11593	Section 110 of NHPA requires that all federal agencies assume responsibility for the preservation of historic properties that are owned or controlled by that agency.
	Compliance with Section 106	NHPA, §106 (36 CFR 800)	As part of the NEPA review the Project must comply with Section 106 of NHPA. Section 106 requires federal agencies to take into account the effects of their undertakings on historic properties, and afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment.
	Compliance with EO 13112; invasive species	64 Federal Register 6183 February 8, 1999	Requires agencies, to the extent practicable and permitted by law, to prevent the introduction of invasive species; to provide for their control; and to minimize the economic, ecological, and human health impacts that invasive species cause.

Approval Agency	Permit, License, Approval, Compliance, or Review	Regulatory Requirement	Notes
Federal Aviation Administration (FAA)	Obstruction standards, Hazards to air navigation	49 U.S. Code (USC) § 44718 and Title 14 CFR § 77	The FAA requires that projects located near regulated airports evaluate their potential to obstruct air traffic. FAA must receive prior notification regarding construction of a structure.
Federal Communications Commission (FCC)	FCC Rules and Regulations compliance	47 CFR § 15.25	FCC regulations require that transmission lines be operated so that radio and television reception are not seriously degraded or repeatedly interrupted.
U.S. Army Corps of Engineers (USACE)	Clean Water Act (CWA), Section 404 permit	CWA § 404	USACE regulates discharges of dredge or fill material into waters of the U.S. under Section 404 of the CWA.
U.S. Fish and Wildlife Service (USFWS)	Biological Opinion/Incidental Take Permit	Endangered Species Act (ESA) Section 7 Consultation, Biological Assessment (BA)	The Project must comply with the ESA (16 USC §§1531–1534) and assess potential impacts of the Project on protected species.
	Compliance with the Bald and Golden Eagle Protection Act (BGEPA)	16 USC §§ 668-668c	USFWS oversees compliance with BGEPA which prohibits anyone from "taking" birds, nests, or eggs without a permit from the Secretary of the Interior.
	Compliance with the Migratory Bird Treaty Act (MBTA)	MBTA (16 USC §§ 703-712)	The statute makes it unlawful to pursue, hunt, take, capture, kill, or sell birds listed as migratory birds without a waiver.
International Boundary and Water Commission (IBWC) Boundary and Realty Office (BRO)	License to construct facilities on IBWC right-of-way (ROW)	Multiple treaties and minutes between the United States and Mexico.	Required for any work that will take place on IBWC ROW.

5.2 State Process

In 1971, the Arizona Legislature required that the ACC establish a power plant and line siting committee. The Arizona Power Plant and Transmission Line Siting Committee (Committee) provides a single, independent forum to evaluate applications to build power plants (of 100 megawatts or more) or transmission projects (of 115,000 volts or more) in the state.

All environmental studies and public participation activity results for this Project would be compiled, formatted, and incorporated into a CEC application pursuant to the requirements of ARS §§ 40-360 et seq. and ACC Rules of Practice and Procedure R14-3-219.

The application must be accompanied by information regarding the proposed type of facilities and description of the siting area, including the affected areas of jurisdiction and estimated costs associated with the proposed facilities.

An application fee is also required by ARS §§ 40-360.09. Within 10 days after having received an application, the Siting Committee would provide public notice as to the time and place of the hearing. Typically, the applicant prepares and distributes the notice and places signs at the project site. The hearings must be held (started) no less than 30 days and no more than 60 days after the date of notice.

The Siting Committee bases its review of the CEC application on the following nine factors:

- existing state, local government, and private development plans
- biological resources
- noise emission levels and interference with communication signals
- recreational aspects
- existing scenic and cultural aspects
- total environment of the area
- technical practicability with achieving proposed objective, and previous experience with available equipment and methods
- estimated costs associated with the proposed project and the Siting Committee’s recommendation, if different than proposed project
- any additional factors (e.g., public and/or political)

The procedures for the Committee's activities are set forth in law and administrative regulations. After an application to build a power plant or transmission line is filed with the ACC, copies are sent to all members of the Committee. The chairman of the Committee sets a hearing date and provides public notice of the hearing date and location. Any member of the public can attend the hearing. The hearing will include testimony and exhibits from the applicant as well as testimony and exhibits from any groups or individuals who are granted party, or intervener, status. There is cross-examination of the witnesses by the parties. The Committee members also ask questions of the witnesses and may ask for additional information.

After all the information is before the Committee, members will discuss the matter and take a vote on whether to grant or deny a "Certificate of Environmental Compatibility," which is a formal document that is necessary before the power plant or transmission line can be built. If granted, the CEC is then forwarded to the ACC for review and action. If denied, the applicant may request that the ACC rehear the matter.

Table 5-2 provides a summary of state permits and clearances that must be adhered to by the Project.

Table 5-2. State Permits and Clearances

Approval Agency	Permit, License, Approval, Compliance, or Review	Regulatory Requirement	Notes
Arizona Corporation Commission (ACC)	Certificate of Environmental Compatibility (CEC)	Arizona Revised Statutes (ARS) Title 40, Chapter 2, Article 6.2 (§§ 40-360 through 40360.13), ACC Rules of Practice and Procedure Revised Statutes	This is required for transmission lines greater than two poles and greater than 115kiloVolts (kV).
Arizona Department of Environmental Quality (ADEQ)	Arizona Pollutant Discharge Elimination System (APDES) Stormwater permit	National Pollution Discharge Elimination System (NPDES) Clean Water Act (CWA) § 402, ARS § 490255; Arizona Administrative Code (AAC) Title 18, Chapter 11	The Environmental Protection Agency (EPA) delegates implementation of the NPDES permit program to state authorities. ADEQ implements the NPDES permit program through the APDES Stormwater Permit Program, which requires that construction activities that disturb 1 or more acres develop a Storm Water Pollution Prevention Plan (SWPPP) for the project in accordance with NPDES requirements.
	State Water Quality Certification for construction across water resources	CWA § 401	This is required for fill placed into Waters of the U.S. Application takes place concurrently with USACE 404 permit application.
	Dust Control Plan	AAC Title 18, Chapter 2, Article 6	The Project will be required to include dust mitigation measures during construction.
	Hazardous Waste Generator Registration	Hazardous Waste Control Act of 1972. Title 18, Chapter 8	This is required for generation, storage, and tracking disposal of hazardous waste during Project construction and operation.
Arizona Department of Agriculture	Application for Arizona Protected Native Plants and Wood Removal	ARS Article 11 (§§ R3-3-110- through R3-3-1111, Appendix A); ARS – Native Plant Law	This is required for displacement or removal of any protected native plant species.
Arizona Department of Transportation (ADOT)	Crossing or encroachment into state highway rights-of-way (ROW); permit for use of highway ROW	ARS § 28-7053, AAC §§ R17-3-501 through 509	This is required for encroachment onto state managed transportation ROW.
	Permit to Cross Federal Aid Highway	23 CFR § 645.213	Crossings of a federal highway require a use and occupancy permit.
Arizona Game and Fish Department (AGFD)	Coordination with U.S. Fish and Wildlife Service (USFWS)/U.S. Army Corps of Engineers (USACE) to minimize disturbance to or loss of special status wildlife species habitat; handling permit.	U.S. Fish and Wildlife Coordination Act; Threatened and endangered species review	This is performed in concurrence with Endangered Species Act (ESA) coordination.

5.3 Local Permits

The City of Nogales and Santa Cruz County hold jurisdiction over various aspects of the Project. Table 5-3 provides a summary of local permits and clearances that must be adhered to by the Project. The full extent of permitting will not be known until after a pre-application conference with the City of Nogales.

Table 5-3. Local Permits and Clearances

Approval Agency	Permit, License, Approval, Compliance, or Review	Regulatory Requirement	Notes
Santa Cruz County	Right-of-way use permit; Dust control plan; Earth-moving permit; Grading permit	County Code	Multiple County land use permits will be required for construction.
County Floodplain Department	Floodplain Use Permit	County Code as directed by the Federal Emergency Management Agency (FEMA) National Flood Insurance Program (NFIP).	Required for development in flood-prone areas as defined by FEMA.
County Air Quality District	Fugitive Dust Control Permit	Management of particulates generated by construction at the site is required; primarily typical best management practices (BMPs) are employed and would be documented in the permit application.	The Project will be required to include dust mitigation measures during construction.
City of Nogales, Arizona	Right of Way Permit	Local ordinance	The Project will be required to comply with local ordinances during construction and operation.
	General Plan Amendment	Arizona State Statutes	
	Zoning approval	Local ordinance	
	Conditional Use Permit	Local ordinance	
	Building Permit	Local ordinance	

6 Persons, Tribes, and Agencies Consulted

6.1 Federal Agencies

Federal agencies consulted for the Project include:

- USFS
- U.S. Border Patrol
- International Boundary and Water Commission (IBWC)
- DOE
- USACE
- USFWS

6.2 Tribes and Tribal Groups

Tribes and tribal organizations consulted for the Project include:

- Tohono O'odham Nation
- Pascua Yaqui Tribe

6.3 State Agencies and Officials

State agencies consulted for the Project include:

- AGFD
- State Historic Preservation Office
- ADOT

6.4 Local Utilities

Local utilities consulted for the Project include:

- UniSource Energy Services

6.5 Interest Groups

Interest groups consulted for the Project include:

- Sky Island Alliance
- Friends of the Tumacacori Highlands
- Sierra Club – Grand Canyon Chapter
- Friends of Santa Cruz River

- Center for Biological Diversity
- The Nature Conservancy
- Arizona Wilderness Coalition
- Tucson Audubon Society
- Coalition for Sonoran Desert Protection

7 Glossary and Acronyms/Abbreviations

10(j) area	an area where experimental populations of endangered or threatened species are introduced into the wild in a location that is geographically isolated from nonintroduced populations
AAC	Arizona Administrative Code
ACC	Arizona Corporation Commission
ACHP	Advisory Council on Historic Preservation
ADEQ	Arizona Department of Environmental Quality
ADOT	Arizona Department of Transportation
ADWR	Arizona Department of Water Resources
AGFD	Arizona Game and Fish Department
AM	amplitude modulation
amsl	above mean sea level
APDES	Arizona Pollution Discharge Elimination System
Applicant	Nogales Transmission, L.L.C.
ARS	Arizona Revised Statutes
ASM	Arizona State Museum
AZSITE	Arizona statewide cultural resources database
BA	Biological Assessment
bidirectional power flow	power flow in two opposite directions
BGEPA	Bald and Golden Eagle Protection Act
BMPs	best management practices
BRO	Boundary and Realty Office
Candidate/ Candidate species	species considered to be eligible for but not listed under the Endangered Species Act
CEC	Arizona Certificate of Environmental Compatibility
CEQ	Council on Environmental Quality
CH_4	methane
CO	carbon monoxide
CO_2	carbon dioxide

Committee/ Siting Committee	Arizona Power Plant and Transmission Line Siting Committee
compaction/soil compaction	when stress is applied to a soil that causes densification as air is removed from the soil
contractor	construction contractor
corona noise	noise caused by electrical discharge from high-voltage lines
CUP	Conditional Use Permit
current	a flow of electrical charge measured in amperes
CWA	Clean Water Act
dBA	A-weighted decibels, or loudness of sounds as perceived by the human ear
DC	direct current
DC interconnection	equipment that enables power to be transferred between the United States and Mexican power systems
DC tie	a common term for a direct current interconnection
DOE	U.S. Department of Energy
EA	Environmental Assessment
easement/ easement rights	legal permission to use someone else's land
ECOS-IPaC	U.S. Fish and Wildlife Service Environmental Conservation Online System – Information for Planning and Conservation system
EMF	electric and magnetic field
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ephemeral stream	stream that flows only during or immediately after a rainstorm
ESA	Endangered Species Act
experimental nonessential population	population of a federally listed endangered species that has been reintroduced to an area but is not considered essential for overall survival of the species
FAA	Federal Aviation Administration
FCC	Federal Communications Commission
FEMA	Federal Emergency Management Agency
FM	frequency modulation
FONSI	Finding of No Significant Impact

fragmentation	the division of large sections of land into smaller sections
fugitive dust	dust generated from an open source rather than being discharged to the atmosphere in a confined flow stream
GHG	greenhouse gas
GWP	global warming potential
IBWC	International Boundary and Water Commission
HVDC	high-voltage direct current
intermittent stream	stream that flows only during certain times of the year from springs, runoff, or rain
kV	kilovolt
landowner	any property owner other than Nogales Transmission, L.L.C., or Tucson Electric Power
LLNB	lesser long-nosed bat (*Leptonycteris curasoae*)
L_{max}	maximum allowable noise levels
MBTA	Migratory Bird Treaty Act
mG	milliGauss
MSGP	Multi-Sector General Permit
MVA	megavolt ampere
MW	megawatt
$\mu g/m^3$	micrograms per cubic meter
NAA	nonattainment area
NAAQS	National Ambient Air Quality Standards
National Register	National Register of Historic Places
NEPA	National Environmental Policy Act
NESC	National Electric Safety Code
NFIP	National Flood Insurance Program
NHD	National Hydrography Dataset
NHPA	National Historic Preservation Act
NLCD	National Land Cover Database
N_2O	nitrous oxide
NO_2	nitrogen dioxide
NOI	Notice of Intent

NOT	Notice of Termination
NPDES	National Pollutant Discharge Elimination System
NPL/Arizona National Plant Law	state law regulating the removal or transportation of protected native plants on both private and public lands
NRCS	Natural Resources Conservation Service
O_3	ozone
PAST	Professional Archaeological Services and Technologies
Pb	lead
PM	particulate matter
$PM_{2.5}$	particulate matter of particles less than 2.5 microns in diameter
PM_{10}	particulate matter of particles less than 10 microns in diameter
ppb	parts per billion
ppm	parts per million
prime farmland	land defined by the U.S. Department of Agriculture as having the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops
Project	Nogales Interconnection Project
revegetation	replanting native plants on ground disturbed by construction activities
ROD	Record of Decision
ROE	right-of-entry permission
Roosevelt Easement	a 60-foot-wide strip of land parallel and adjacent to the United States-Mexico border that was reserved to ensure its integrity by two Presidential Proclamations signed by President William McKinley and President Theodore Roosevelt in 1897 and 1907, respectively
Route Corridor	an approximately 250-foot-wide area centered on the Route Segments and the Gateway Substation area
ROW	right-of-way
sensitive species	species for which population viability is a concern
SF_6	sulfur hexaflouride
slip rate	rate at which two sides of a geologic fault are slipping relative to each other
slumping	mass movement of loosely consolidated sediments a short distance down slope
Species of Concern	species that are declining or appear to be in need of conservation
SO_2	sulfur dioxide

SR	State Route
staging area	area used for the storage of construction equipment and materials
stringing interval	Distance between pulling sites used during conductor stringing
Structure	transmission line structure or pole
Study Area	the area considered for location of Project facilities
subsidence	sinking or settling of the ground surface
SWPPP	Stormwater Pollution Prevention Plan
TCE	temporary construction easement
TCP	traditional cultural property
TEP	Tucson Electric Power
thyristors	a solid-state semiconductor device with four layers of alternating N- and P-type material; it acts exclusively as a bistable switch, conducting when the gate receives a current trigger, and continuing to conduct while the voltage across the device is not reversed (forward-biased)
TNW	traditional navigable water
UES	UniSource Energy Services
URS	URS Corporation
USACE	U.S. Army Corps of Engineers
USC	United States Code
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VEC	valued environmental component
voltage	force or pressure that causes the current to flow measured in units of volts or thousand volts
wash	intermittent streambed subject to flash flooding
WECC	Western Electricity Coordinating Council

This page is intentionally left blank.

8 References

Arizona Department of Agriculture. 2015. "Arizona Department of Agriculture: Protected Arizona Native Plants." Accessed September 21, 2015. https://agriculture.az.gov/protected-arizona-native-plants.

Arizona Department of Environmental Quality (ADEQ). 2012. *Final State Implementation Plan, Nogales PM_{10} Nonattainment Area, July 23, 2012*.

Arizona Department of Transportation (ADOT). 2008. *Mariposa/I-19 Connector Route Study, Final Report*, Task Assignment TPD-1308. Prepared by Wilbur-Smith Associates.

———. 2014. *Highway Performance Monitoring System Location Report for Year 2014*.

Arizona Department of Water Resources (ADWR). 2015. "Land Subsidence in Arizona." Accessed September 28, 2015. www.azwater.gov/AzDWR/Hydrology/Geophysics/LandSubsidenceInArizona.htm.

Arizona Game and Fish Department (AGFD). 1997. *Agosia chrysogaster chrysogaster*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department. Phoenix, Ariz.

———. 2002a. *Antilocarpa americana sonoriensis*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department. Phoenix, Ariz.

———. 2002b. *Catostomus clarkii*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department. Phoenix, Ariz.

———. 2010. *Leopardus pardalis*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department. Phoenix, Ariz.

———. 2011. *Leptonycteris curasoae yerbabuenae*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department. Phoenix, Ariz.

———. 2012. *Thamnophis eques megalops*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department. Phoenix, Ariz.

———. 2013a. *Buteo plagiatus*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department. Phoenix, Ariz.

———. 2013b. *Aspidoscelis stictogrammus*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department. Phoenix, Ariz.

———. 2015. "Habimap Arizona." Vegetation of Arizona layer highlighted and Project Area determined. Accessed September 15, 2015. habimap.org/.

Arizona Geological Survey. 2015. "AZGS Online Map and Database Services: Natural Hazards in Arizona." Accessed September 14, 2015. www.azgs.az.gov/map_services.shtml.

Bauer, Sharon K., and A. E. "Gene" Rogge. 2001. *Cultural Resource Survey for the Nogales Gateway Project, Nogales, Arizona*. URS Corporation, Inc., Phoenix.

Bessede, J. L., A. Buescher, R. Marshall, G. F. Montillet, and A. Stelter. n.d. *Limiting SF_6 Gas Emissions by Optimization of Design and Handling over the Life Cycle of HV Switchgear*.

Brodbeck, Mark, and Michelle Marsich 2015. A Cultural Resources Survey for the State Route 189, International Border to Grand Avenue Improvement Project, Nogales, Santa Cruz County, Arizona. Cultural Resources Report 15-4. HDR, Inc., Phoenix.

Brown, D. E. (ed.). 1994. Biotic Communities: Southwestern United States and Northwestern Mexico. Salt Lake City: University of Utah Press.

Bruder, J. Simon 1992. Cultural Resources Class III Inventory for the Mariposa Road (State Route 189) Upgrading Project, Santa Cruz County, Arizona. Dames and Moore, Inc., Phoenix.

Bureau of Labor Statistics. 2015. "BLS Data Viewer." Accessed January 14, 2016. beta.bls.gov/dataViewer/view/timeseries/LAUMC043570000000003.

CANAMEX Corridor Coalition. 2015. "CANAMEX Corridor Coalition." Accessed September 18, 2015. www.canamex.org.

Carpenter, John P. 1995. An Archaeological Assessment for the Mariposa Canyon Borrow Pit in Nogales, Arizona. Technical Report No. 95-8. Tierra Right-of-Way Services, Ltd., Tucson.

City of Nogales. 2016. "Development Standards Code: Article I-Zoning Regulations." Accessed January 7, 2016. https://imageserv5.team-logic.com/mediaLibrary/78/Article_001.pdf.

Council on Environmental Quality (CEQ). 1997. Considering Cumulative Effects under the National Environmental Policy Act.

Danson, Edward B. 1946. "An Archaeological Survey of the Santa Cruz River Valley from the Headwaters to the Town of Tubac in Arizona." Master's thesis, University of Arizona, Tucson.

DiPeso, Charles C. 1953. "Clovis Fluted Points from Southeastern Arizona." American Antiquity 19(1): 82–85.

Federal Highway Administration. 2001. "Guidance: Migratory Bird Treaty Act and Executive Order 13186." Accessed January 6, 2016. www.fhwa.dot.gov/environment/migbird.htm.

Frick, Paul S. 1954. "An Archaeological Survey in the Central Santa Cruz Valley, Southern Arizona." Master's thesis, University of Arizona, Tucson.

Grebinger, Paul F. 1971. *Hohokam Cultural Development in the Middle Santa Cruz Valley, Arizona*. Doctoral dissertation, The University of Arizona, Tucson.

Lascaux, Annick 1998. *A Class III Archaeological Inventory of Fifty-eight 30-Meter-Diameter Light and Power Pole Locations along the International Border, Nogales, Santa Cruz County, Arizona*. SWCA, Inc., Environmental Consultants, Tucson.

Lindemuth, J., C. Welch, and M. Hopkins 2010. *Cultural Resources Survey for the Proposed Road Improvements Totaling 5 Kilometers (3 Miles) West of the Mariposa Commercial Port-of-Entry near Nogales, Arizona, Santa Cruz County, Arizona*. Gulf South Research Corporation and Northland Research Inc., Tempe.

Lite, Jeremy A. 1996. *A Cultural Resources Survey of 1.10 Miles of State Route 189 (Mariposa Road) Right-of-Way, Mileposts 0.0 to 0.3 and Mileposts 3.0 to 3.8, Nogales, Santa Cruz County, Arizona*. Archaeological Research Services, Inc., Tempe.

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 0.0 to 30.0), Santa Cruz, Arizona*. Archaeological Research Services, Inc., Tempe.

Malusa, J. 2015. "Firescape." Ecosystem descriptions for Apacherian-Chihuahuan Mesquite Upland Scrub, Apacherian-Chihuahuan Semi-Desert Grassland and Steppe, and Madrean Encinal listed under the Chiricahua and Galiuru menus. Accessed September 15, 2015. www.azfirescape.org/home.

National Institute of Environmental Health Sciences. 1999. "Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields." Environmental Health Information Service. www.niehs.nih.gov/health/topics/agents/emf/index.cfm.

National Land Cover Database. 2011. "National Land Cover Database 2011 (NLCD 2011)." Accessed January 7, 2016. http://www.mrlc.gov/nlcd2011.php.U.S. Environmental Protection Agency (EPA). 2015. "Sole Source Aquifers." Accessed September 28, 2015. www3.epa.gov/region09/water/groundwater/ssa.html.

National Marine Fisheries Service. 2015. "Section 10 of the Endangered Species Act of 1973." Accessed September 21, 2015. www.nmfs.noaa.gov/pr/pdfs/laws/esa_section10.pdf.

Petersen, Eric S. II 2008, An Archaeological Survey for the EPNG Line 2143 Year 2008 Pipeline Integrity Program, Pima and Santa Cruz Counties, Arizona. Cultural Resources Report No. 08-33. SWCA, Inc., Environmental Consultants, Tucson.

Roth, Barbara 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, Inc., Tucson.

Scholten et al. 2005. "Unipolar Cardiac Pacemakers in Electromagnetic Fields of High Voltage Overhead Lines." *Journal of Medical Engineering and Technology* 29(4): 170–175.

Stephen, David V. M. 2001. *Letter report for the Escalada Commerce Center Project*. Cultural Resources Report 011355, Professional Archaeological Services and Technologies, Inc., Tucson.

Stephen, David V. M. 2005. *Cultural Resources Survey of the Nogales SR-189 ADOT Project near Nogales, Santa Cruz County, Arizona*. Cultural Resources Report No: 051715, Professional Archaeological Services and Technologies, Inc., Tucson.Stone, Bradford W. 1995. *Cultural Resources Survey of an Aggregate Materials Source and Alternate Sources within the Interstate 19 Traffic Median North of the Mariposa Road/Interstate 19 Traffic Interchange, Santa Cruz County, Arizona*. Archaeological Research Services, Inc., Tempe.

U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS). 2015a. "Land Resource Regions and Major Land Resource Areas of the U.S., the Caribbean, and the Pacific Basin." Accessed September 14, 2015. soils.usda.gov/MLRAExplorer.

———. 2015b. "NRCS Web Soil Survey." Accessed September 14, 2015. websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx.

U.S. Environmental Protection Agency (EPA). 1995. *Publication AP-42, Fifth Edition, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources*. Section 13.2.3 Heavy Construction Operations. January.

———. 2006. Publication AP-42, Fifth Edition, Compilation of Air Pollutant Emission Factors, Volume 1: Stationary Point and Area Sources. Section 13.2.2 Unpaved Roads. November.

———. 2013. "Determination of Attainment for the Nogales Nonattainment Area for the 2006 Fine Particle Standard; Arizona; Determination Regarding Applicability of Clean Air Act Requirements. Federal Register 78(4): 887–889, January 7.

———. 2015. "AirData." Accessed October 2015. http://www3.epa.gov/airdata/.U.S. Fish and Wildlife Service (USFWS). 2015. "Quick Reference Guide to All Arizona Species." Arizona Ecological Services – Southwest Region. Accessed January 6, 2016. www.fws.gov/southwest/es/arizona/Documents/MiscDocs/AZSpeciesReference.pdf.

———. n.d. SF_6 Leak Rates from High Voltage Circuit Breakers – U.S. EPA Investigates Potential Greenhouse Gas Emissions Source. J. Blackman, Program Manager, U.S. Environmental Protection Agency, M. Averyt, ICF Consulting, and Z. Taylor, ICF Consulting.

Walsh, Mary-Ellen 2006. A Cultural Resources Survey of a Proposed Access Road West of State Route 189 at Milepost 0.095, Nogales, Santa Cruz County, Arizona. Technical Report No. 065250, Logan Simpson Design, Inc., Tempe.

———. 2008. 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. Report 085115. Logan Simpson Design, Inc., Tempe.

Appendix A: Biological Report

Appendix B: Cultural Report

Biological Field Report for the Nogales Interconnection Project, Nogales, Santa Cruz County, Arizona

Nogales Interconnection Project

Hunt Power

Nogales, Santa Cruz County, Arizona

January 5, 2016

This page is intentionally left blank.

Biological Field Report

Prepared for

Hunt Power
1900 North Akard Street
Dallas, Texas 75201-2300

Prepared by

HDR, Inc.
3200 East Camelback Road, Suite 350
Phoenix, Arizona 85018

January 5, 2016

This page is intentionally left blank.

Contents

Attachments

Figures

This page is intentionally left blank.

1 Project Summary

The Nogales Interconnection Project is a proposed 300 megawatt (MW) direct current (DC) interconnection, commonly known as a DC tie that would allow for an asynchronous interconnection between the electric grid in southern Arizona and the electric grid in the northwestern region of Mexico. The Project will be constructed in two phases. The first phase of the Project will include the components listed below and the converter capacity will be 150 MW. The second phase, to be constructed at a time that has not yet been determined, will expand the HVDC converter capacity to 300 MW within the proposed Gateway Substation.

The Project proposed by Hunt Power would support the reliability of the electrical system, including bidirectional power flow and voltage support, as well as emergency assistance, as needed, for the electric system both north and south of the U.S.-Mexico border. HDR was hired by Hunt Power to help with the study and permitting involved with the Nogales Interconnection Project. Part of that study included an assessment of biological resources in relation to the Project and applicable regulatory concerns in support of documentation to comply with the National Environmental Policy Act of 1969, as amended. Pre-field analysis revealed that the potential existed for four species of special concern to occur within the Project limits. A field survey was conducted on November 30 and December 1, 2015, to survey for the individual species that included the Pima pineapple cactus (*Coryphantha robustina* ssp. *robustina*), Santa Cruz beehive cactus (*Coryphantha recurvata*), supine bean (*Macroptilium supinum*), and agave species. Agave species were surveyed because of their potential as a forage resource for the lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*). During the field survey, Santa Cruz beehive cactus, agaves, and one potential supine bean were documented in the study area. No Pima pineapple cacti were found.

2 Introduction

The Nogales Interconnection Project has been proposed by Hunt Power to occur both north and west of the city of Nogales, Arizona. Nogales is a small city in southeastern Arizona and is the first populated area after crossing the U.S.-Mexico border on Interstate 19.

The Project would consist of three components:

1. A new 10- to 15-acre Gateway Substation, potentially located on land currently owned by Tucson Electric Power (TEP), where DC tie equipment for both phases would be located;
2. A new, approximately 3-mile, 138 kilovolt (kV) transmission line segment originating at UniSource Energy Services' Valencia Substation in Nogales, Arizona, and extending west and south to the new Gateway Substation

3. A new, approximately 2-mile, 230 kV transmission line segment extending south from the new Gateway Substation and across the U.S.-Mexico border to interconnect with a transmission line to be constructed by the Comisión Federal de Electricidad

Nogales is at the end of the Western Electricity Coordinating Council (WECC) grid and relies on the approximately 55-mile-long Vail to Valencia 138 kV transmission line for its power supply. The addition of the proposed Gateway Substation and connection to the electrical system in Sonora, Mexico, would provide an additional source of energy for the city of Nogales in the event of a transmission line outage or other problem on the WECC system (Hunt Power 2015).

A desktop study was initially conducted to determine the potential biological concerns in the study area. The U.S. Fish and Wildlife Service (USFWS) Environmental Online Conservation System (ECOS) – Information for Planning and Conservation (IPaC) system (Project Code: XJACG-X2GJB-FF7CN-JFOU3-JCWZH4; accessed on August 18, 2015) and the Arizona Game and Fish Department (AGFD) On-line Environmental Review Tool (Project ID: HGIS-02011; accessed on August 18, 2015) were used to identify plants, animals, and other environmental factors that may need special consideration in the study area. These tools identified numerous plants, animals, and environmental factors that could potentially occur in the study area. After analysis by an experienced HDR biologist, four species were identified with the potential to occur in the Project limits.

Biological field surveys were then performed in the study area to locate and document Pima pineapple cactus, Santa Cruz beehive cactus, supine bean, and agaves. Pima pineapple cactus, Santa Cruz beehive cactus, and supine bean have all been documented within 3 miles of the Project vicinity. The lesser long-nosed bat is an endangered species that uses agaves as a food source.

3 Regulatory Framework

3.1 Federal Endangered Species Act

The Endangered Species Act (ESA) of 1973 was enacted to provide a legal avenue to conserve endangered and threatened species and their habitat. It defines an endangered species as any species that is in danger of extinction throughout all or a significant portion of its range. The ESA makes it unlawful for anyone to “take” an endangered wildlife species; plants are protected under separate provisions of the ESA. To “take” means to “harass, harm, pursue, hunt, shoot, wound, trap, kill, capture, or collect, or attempt to engage in any such conduct.” To “harm” means actually killing or injuring wildlife and “may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering” (USFWS 2013a). Federally listed endangered plant species are provided protection on federal lands where it is illegal to collect or intentionally harm them; move them into, out of, or through the United States; involve in interstate or foreign commerce;

or damage, destroy, or move on private property in violation of any state law or regulation.

The lesser long-nosed bat and Pima pineapple cactus are listed as endangered under the ESA.

3.2 Migratory Bird Treaty Act

The Migratory Bird Treaty Act makes it illegal for anyone to pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess, offer for sale, sell, offer to purchase, purchase, deliver for shipment, ship, cause to be shipped, deliver for transportation, transport, cause to be transported, carry, or cause to be carried by any means whatever, receive for shipment, transportation or carriage, or export, at any time, or in any manner, any migratory bird, or any part, nest, or egg of any such bird (USFWS 2015a).

The term “take” has a broad definition. Habitat destruction and alteration do not qualify as a “take” as long as these activities involve no loss to birds, eggs, or nests (Federal Highway Administration 2001). Birds protected under the Act include all common songbirds, waterfowl, shorebirds, hawks, owls, eagles, ravens, crows, native doves, swifts, martins, swallows, and others.

If construction on this Project occurs during the migratory bird breeding season, breeding birds may be affected by construction activities and measures to avoid a “take” would be required or a permit from USFWS may be necessary. The breeding season for most migratory birds in southern Arizona is from February through August.

3.3 Arizona Native Plant Law

Because so many rare and unusual native plants exist in Arizona, special protections for these plants are necessary. The Arizona Native Plant Law (NPL) protects many of Arizona’s native plants from indiscriminant removal and destruction (Arizona Department of Agriculture [ADA] 2015). All of Arizona’s native cacti, agaves, and many other desert native plants are protected by the Arizona NPL.

The Arizona NPL gives plants varying levels of protection based on their rarity or where they are found; sensitivity to environmental impacts; cultural, historical, and/or aesthetic value; and other factors that may affect a native plant. The Pima pineapple cactus and Santa Cruz beehive cactus are listed as highly safeguarded species by the Arizona NPL. Highly safeguarded plants are given exclusive protections. Permits for collecting or moving highly safeguarded native plants are issued only for scientific or impending destruction purposes (ADA 2015). This category includes those species of native plants and parts of plants, including the seeds and fruit, whose prospects for survival in Arizona are in jeopardy, or that are in danger of extinction throughout all or a significant portion of their ranges, and those native plants that are likely within the foreseeable future to become jeopardized or in danger of extinction throughout all or a significant portion of their ranges. This category also includes

those plants resident to Arizona and listed as endangered, threatened, or category 1 in the ESA (P.L. 93–205; 87 Stat. 884; 16 United States Code sections 1531 et seq.), as amended, and any regulations adopted under that act (Arizona State Legislature 3-903).

The supine bean is listed by the Arizona NPL as a salvage restricted plant. Salvage restricted plants require the use of salvage permits, tags, and seals before collection can occur. This category includes those native plants that are not included in the highly safeguarded category but are nevertheless subject to a high potential for damage by theft or vandalism.

4 Species Information

4.1 Pima pineapple cactus

The Pima pineapple cactus (PPC) species name, *robustispina*, is based on the species' stout and thick spines (Breslin et al. 2015). The PPC is a small hemispherical cactus measuring 4 to 18 inches tall and 3 to 7 inches in diameter that can grow singly or in clumps (USFWS 1993). The stem is large with pronounced tubercles (projections from the stem of the plant) that have grooves on the upper side. It usually grows as a solitary plant but often has clusters of smaller plants "pups" at the base of a larger plant. The spines occur in clusters, called areoles, located at the tip of each tubercle. Each areole has between 7 and 20 straw-colored radial spines and 1 to 4 (usually 1) pronounced central spines that are rigid and thick. Flowering appears to depend on monsoonal moisture and usually occurs in late June to as late as mid-August (Breslin et al. 2015). It produces yellow flowers during the summer monsoon (July and August) and is an obligate outcrosser, pollinated primarily by cactus bees (*Diadasia rinconis*) (Roller 1996; McDonald and McPherson 2005). Fruits are elongated greenish berries with a slimy internal liquid surrounding the seeds when fully ripe (Breslin et al. 2015).

The PPC occurs in Pima and Santa Cruz Counties, Arizona, and in north-central Sonora, Mexico (Baker and Butterworth 2013). Within Arizona, the range of the PPC extends from the Santa Rita Mountains west to the Baboquivari Mountains and north to Tucson (USFWS 2007). This cactus occurs at low densities in semi-desert grassland and Sonoran desert-scrub in flat areas on alluvial fans and hilltops (USFWS 1993). Occupied sites are characterized by silty to gravelly alluvial soils. Associated plant species include desert zinnia (*Zinnia acerosa*), snakeweed (*Gutierrezia sarothrae*), burroweed (*Isocoma tenuisecta*), buckwheat (*Eriogonum* spp.), white-thorn acacia (*Acacia constricta*), creosotebush (*Larrea tridentata*), chain-fruit cholla (*Cylinropuntia fulgida*), and velvet mesquite (*Prosopis velutina*) (USFWS 1993, 2007).

The primary threat to the subspecies is habitat loss resulting from residential and commercial development (USFWS 2007). Mining, agriculture, off-road recreation, and road construction have also contributed to losses. Up to 75 percent of the cactus' historical range has been altered by the introduction of nonnatives grasses

including Lehmann lovegrass (*Eragrostis lehmanniana*), Boer lovegrass (*E. curvula*), and buffelgrass (*Pennisetum ciliare*), resulting in a regime of more frequent and intense fires as well as increased competition for resources such as light, nutrients, and water (Roller 1996; USFWS 1993, 2007).

Pima pineapple cactus (***Coryphantha robustispina* ssp. *robustispina***)

4.2 Santa Cruz beehive cactus

The Santa Cruz beehive cactus species name, *recurvata*, is based on this plant's distinctive downward-curving central spine. The Santa Cruz beehive cactus ranges from 4 to 8 inches high by 4 to 7 inches in diameter and is globular to cylindrical in shape (Breslin et al. 2015). It is a low-growing plant that starts as an individual stem and grows into large clumps up to 30 inches wide (Breslin et al. 2015). The spines are straw-colored or tan and turn gray in old age. Spines are located in clusters, called areoles, and have between 12 and 20 radial spines per areole, and 1 to 2 central spines that have a distinctive downward projection. Flowers are small for the overall size of the plant and range from 0.5 to 1 inch in length; flowering is triggered by monsoonal moisture. They appear in summer and are arranged in a ring around the upper portion of the stem. The fruit is a greenish, elongated berry about 0.5 inch long and 0.12 inch wide that ripens between November and January (Breslin et al. 2015).

The Santa Cruz beehive cactus is found in mountainous regions of Santa Cruz County, Arizona. This is the only place where this plant occurs in the United States,

but it does occur to the south into Sonora, Mexico (Breslin et al. 2015). It occurs on alluvial soils in valleys and foothills in desert grassland and oak woodland on rocky hillsides with good grass cover (AGFD 2001). Associated plant species include beargrass (*Nolina* sp.), side-oats grama (*Bouteloua curtipendula*), bluestem (*Andropogon* sp.), western coral bean (*Erythrina flabelliformis*), prickly pear (*Opuntia* sp.), hopbush (*Dodonaea viscosa*), and rainbow cactus (*Echinocereus rigidissimus*) (AGFD 2001).

Threats to the species include collection and degradation of habitat attributable to livestock grazing and road construction and maintenance (AGFD 2001).

Santa Cruz beehive cactus (***Coryphantha recurvata***)

4.3 Supine bean

The supine bean is a perennial herb known to occur in grass woodlands in Santa Cruz and Pima Counties, Arizona; also, there are two historical records in Sonora and Nayarit, Mexico (Arizona Rare Plant Committee [ARPC] 2000; Toolin 1982). It has prostrate, creeping stems arising from an elliptical tuber that ranges in size from 3 to 14 cm (ARPC 2000). The leaves are opposite with 3 lanceolate leaflets that taper from the base to the tip; each leaflet ranges from 0.6 to 1.2 cm wide by 3 to 8 cm long. It has an unusual breeding syndrome of being able to produce flowers and seeds both above and below ground. Aboveground flowers are salmon-colored with keeled petals that are up to 11 mm long and born on an erect, unbranched inflorescence that originates at the base of the leaf petioles. Seed pods are 8 to

15 mm, oblong, and usually contain a single seed (ARPC 2000). Underground flowers are self-fertilizing, yellow with salmon coloration, and 5 to 6 mm long; they are born on branched inflorescences that grow under leaf litter or under rocks (ARPC 2000). The supine bean produces flowers and fruits after the onset of summer rains in July. The species is typically associated with grama grasses (*Bouteloua* spp.) (Desert Botanical Garden 1987; NatureServe 2015). According to the species information, this species is very difficult to see in the field unless they are flowering because the leaves are narrow and look similar to the inflorescences of grama grasses (NatureServe 2015).

The primary threat to this species is development and possibly overgrazing by cattle (NatureServe 2015).

Photograph taken by Sue Rutman (USFWS)

Supine bean (***Macroptilium supinum***)

4.4 Lesser long-nosed bat

The lesser long-nosed bat (LLNB) was listed as endangered in 1988 (USFWS 1988). In March 1997, the LLNB Recovery Plan was completed. In 2013, an initiation of status review to down-list the LLNB from endangered to threated was published in the *Federal Register* (USFWS 2013b). The species, however, remains listed as endangered. No critical habitat has been designated for this species.

The LLNB is a medium-sized bat with a wingspan of 14 to 16 inches and an average weight of 8 ounces. Their dense fur is a pale-gray above and brown below. Their

snout is elongated with a triangular nose-leaf. The LLNB has large eyes and small ears compared with other bats in Arizona (AGFD 2011).

Historically, the LLNB ranged from south-central and southeastern Arizona and southwestern New Mexico through the lowland deserts of Mexico and as far south as El Salvador. While their current range is similar, numbers of individuals have decreased dramatically. LLNBs arrive in Arizona from central Mexico in April and move from the southwestern part of the state to the southeastern part over the summer (USFWS 2015b). The species is found in southern Arizona from the Picacho Mountains southwest to the Agua Dulce Mountains and southeast to the Galiuro and Chiricahua Mountains. Fewer individuals are found outside of this range (AGFD 2011).

The LLNB seasonally occurs in Arizona from April to September in desertscrub and grassland/oak transition habitat where it feeds on nectar and pollen from the flowers of columnar cacti and agave. An LLNB female arrives in Arizona pregnant and joins a maternity colony with thousands of individuals. Each female births one pup in May; by July the young can fly. By the end of July the maternity colony breaks up and disperses. Males form separate and smaller colonies (AGFD 2011).

The LLNB typically feeds on columnar cacti during the early summer and agaves from late summer into early fall. From April through July, the LLNB can be found at elevations under 3,500 feet above mean sea level and from July through September their range increases to 5,500 feet above mean sea level to feed on agave until they fly south (AGFD 2011). Roost sites typically include caves, mines, and abandoned buildings (USFWS 2001).

Photograph taken by Merlin D. Tuttle (Bat Conservation International)

Lesser long-nosed bat (*Leptonycteris curasoae yerbabuenae*)

5 Study Area

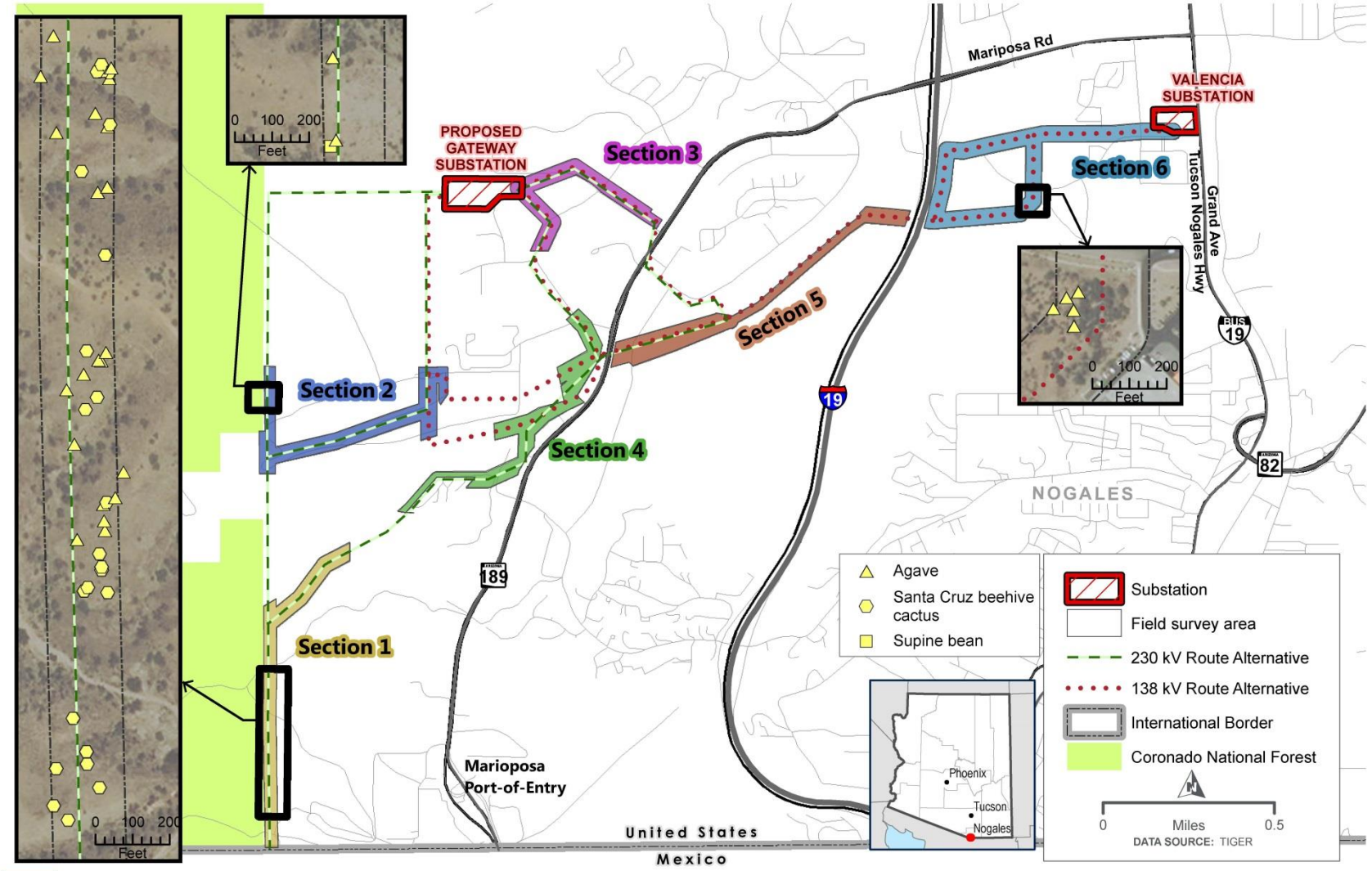
Three main types of vegetation communities are found in the Project area: Madrean Evergreen Woodland, Apacherian-Chihuahuan Mesquite Upland Scrub, and Apacherian-Chihuahuan Piedmont Semidesert Grassland and Steppe (AGFD 2015). Madrean Evergreen Woodland has 25 to 40 percent shrub or tree land coverage and is dominated by Emory oak (*Quercus emoryi*) and/or other evergreen oaks (*Quercus* sp.). Apacherian-Chihuahuan Mesquite Upland Scrub has 10 to 15 percent shrub or tree land coverage and Apacherian-Chihuahuan Piedmont Semidesert Grassland and Steppe has less than 10 to 15 percent shrub or tree land coverage (Malusa 2015). Less disturbed vegetation is in the westernmost section of the Project area where, generally, the 230 kV transmission line alternatives have been proposed. Vegetation along the 138 kV alternatives and substations has been disturbed by development.

A diverse community of trees, shrubs, succulents, forbs, and grasses is found in these vegetation communities. A greater density and increase in plant species composition is found along the ephemeral drainages. Common trees, shrubs, and succulents include one seed juniper (*Juniperus monocarpa*), alligator juniper (*Juniperus deppeana*), Mexican pinyon (*Pinus cembroides*), mesquite (*Prosopis* sp.), acacia (*Acacia* sp.), desert broom (*Baccharis sarothroides*), beargrass, ocotillo (*Fouquieria splendens*), agave (*Agave* sp.), yucca (*Yucca* sp.), sotol (*Dasylirion wheeleri*), prickly pear, and various other cacti. Common native grasses include grama, tobosa (*Pleuraphis* sp.), muhly (*Muhlenbergia* sp.), and threeawn (*Aristida* sp.) (Brown 1994). Invasive grasses observed in the area include Lehman's lovegrass (*Eragrostis lehmanniana*), Johnson grass (*Sorghum halepense*), buffelgrass, and Bermudagrass (*Cynodon dactylon*).

The Project area is shown in Figure 1. The landscape in the Project area varies from nearly undisturbed natural habitat to cleared parcels with warehouses. To describe the Project area more accurately, the Project area shown in Figure 1 has been divided into separate sections based on similar characteristics. Each section that was surveyed is highlighted on the figure.

Sections 1 and 2 border the Coronado National Forest. The landscape in section 1 is characterized by northeast-to-southwest trending dissected ridges with moderately steep slopes on a predominantly loose and rocky substrate. Ephemeral washes are between these ridges. The tree land coverage in this area is consistent with Apacherian-Chihuahuan Mesquite Upland Scrub and Apacherian-Chihuahuan Piedmont Semidesert Grassland and Steppe. Vegetation in this area includes oak trees growing among various species of grass. Succulents that are present include agave, sotol, beargrass, Santa Cruz beehive cactus, Arizona rainbow hedgehog cactus (*Echinocereus rigidissimus*), pancake pincushion cactus (*Mammillaria heyderi* ssp. *macdougalii*), and barrel cactus (*Ferocactus* sp.). The ground surface in the eastern half of section 2 has been cleared or disturbed with some regrowth that is predominantly desert broom. Section 3 is similar to section 1 without as much elevation change.

Figure 1. Area surveyed and results



Madrean Evergreen Woodland (on left) transitioning to Apacherian-Chihuahuan Piedmont Semidesert Grassland and Steppe (on right); typical habitat found in section 1

Looking east from the top of a rocky hill across the Project area in section 2; vegetation in the Project area is predominantly desert broom

Moving east, the Project area becomes more developed. Warehouses and other cleared areas are along both sides of Mariposa Canyon Wash in section 4 and on the northwestern side of Mariposa Canyon Wash in section 5. Several concrete drainage aprons are in these two sections that allow runoff from surrounding areas to reach Mariposa Canyon Wash. A natural gas pipeline is present along a southeastern section of Mariposa Canyon Wash between North Mariposa Road and Interstate 19 in section 5.

Sections 4 and 5 also parallel Mariposa Canyon Wash. Vegetation along this wash and within sections 4 and 5 includes some trees, shrubs such as desert broom and acacia, and grasses that range from a dense land coverage to sparse with open, rocky soil.

Looking east at Mariposa Canyon Wash in section 5 of the Project area

Drainage apron leading to Mariposa Canyon Wash in section 5

Natural gas pipeline on the southeastern side of Mariposa Canyon Wash in section 5

Section 6 is in the northeastern section of the Project area. This area has some small, rolling hills and is dominated by grasses and shrubs on an open, gravelly soil. The dominant vegetation is mesquite, acacia, desert broom, and grasses. A small retention basin with water is west of the Valencia Substation.

Landscape in Section 6

Small retention basin west of the Valencia Substation in Project area

6 Methods

The Project area was surveyed on November 30 and December 1, 2015, for agaves, Pima pineapple cactus, Santa Cruz beehive cactus, and supine bean by two HDR biologists. Referring to Figure 1, the colored sections represent the 250-foot-wide corridors within which the proposed 230 kV and 138 kV line alternatives could be located and where biological surveys were performed.

Biological surveys were performed after dividing the 250-foot-wide survey area into four approximately 65-foot-wide transects. The 65-foot-wide transects were then walked in a zigzag pattern throughout the survey area with the purpose of searching for the study species. When a study species was found, the location and notes pertaining to the age, health, and number of young (if present) were recorded and a photograph was taken. A Trimble Nomad Global Positioning System device with ArcPad 10 software was used to record data. Photographs were taken with a digital camera and documented in a paper notebook.

7 Results

Figure 1 shows the locations of the study species documented during field surveys. A total of 53 plants were recorded during field surveys: 27 agaves, 25 Santa Cruz beehive cacti, and 1 potential supine bean. No Pima pineapple cacti were found. Referring to Figure 1, 45 points were recorded in section 1, 3 were recorded in section 2, and 5 were recorded in section 6. No study species were recorded in

sections 3, 4, or 5. The potential supine bean was recorded in section 2; however, species identification was not confirmed. The 5 points recorded in section 6 were a cluster of agaves adjacent to a Home Depot store.

Unconfirmed supine bean found in section 2

8 Conclusions

Protected native plants were documented within the study area. Most of the study species as well as the undisturbed and undeveloped habitat are in the southwestern section of the Project area. Depending on impacts to the study species, it may be necessary to consult with USFWS and notify ADA prior to Project construction. A Biological Assessment may be needed if impacts to agaves, a lesser-long-nosed bat forage species, were to occur as result of the Project.

Numerous other protected native plants including cacti, agaves, yuccas, and various trees were observed during field surveys and will require coordination with ADA if impacts to plants cannot be avoided.

9 Literature Cited

Arizona Department of Agriculture. 2015. “Protected Arizona Native Plants.” Accessed December 10, 2015. https://agriculture.az.gov/protected-arizona-native-plants.

Arizona Game and Fish Department (AGFD). 2001. *Coryphantha recurvata*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Ariz.

_____. 2011. *Leptonycteris curasoae yerbabuenae*. Unpublished abstract compiled and edited by the Heritage Data Management System, Arizona Game and Fish Department, Phoenix, Ariz.

_____. 2015. “Habimap Arizona.” Vegetation of Arizona layer highlighted and study area determined. Accessed September 15, 2015. http://habimap.org/.

Arizona Rare Plant Committee (ARPC). 2000. “Arizona Rare Plant Field Guide.” Accessed December 10, 2015. http://www.aznps.com/rareplants.php.

Arizona State Legislature. 2015. “3-903. Protected group of plants; botanical names govern; categories of protected plants; power to add or remove plants; annual hearing.” Accessed December 15, 2015. http://www.azleg.state.az.us/FormatDocument.asp?inDoc=/ars/3/00903.htm&Title=3&DocType=ARS.

Baker, M. A., and C. A. Butterworth. 2013. “Geographic Distribution and Taxonomic Circumscription of Populations with *Coryphantha* Section *Robustispina* (Cactaceae).” *American Journal of Botany* 100: 984–97.

Breslin, Peter, Rob Romero, Greg Starr, and Vonn Watkins. 2015. In *Field Guide to Cacti and Other Succulents of Arizona*, pp. 38–41.Tucson, Arizona: Tucson Cactus and Succulent Society.

Brown, D.E. (ed.). 1994. *Biotic Communities: Southwestern United States and Northwestern Mexico*, pp. 59–65, 123–131. Salt Lake City: University of Utah Press.

Desert Botanical Garden. 1987. “Picture of Preserved Specimen with Field Notes.” Accessed December 19, 2015. http://symbiota.org/imglib/seinet/DES/DES00032/DES00032164.jpg.

Hunt Power. 2015. “Nogales Interconnection Project Fact Sheet.” Accessed December 15, 2015. http://www.huntpower.com/nogales.aspx.

Malusa, J. 2015. “Firescape.” Ecological Systems Index for Apacherian-Chihuahuan Mesquite Upland Scrub, Apacherian-Chihuahuan Semi-Desert Grassland and Steppe, and Madrean Encinal listed under the Chiricahua and Galiuru menus. Accessed September 15, 2015. http://www.azfirescape.org/home.

McDonald, C. J., and G. R. McPherson. 2005*. Pollination of Pima Pineapple Cactus* (Coryphantha scheeri *var*. robustispina): *Does Pollen Flow Limit Abundance of this Endangered Species?* U.S. Forest Service.

Nature Serve. 2015. “NatureServe Explorer: An Encyclopedia of Life: Profile for *Phaseolus supinus*.” Accessed December 14, 2015. http://explorer.natureserve.org/servlet/NatureServe?searchName=Phaseolus+supinus.

Roller, P. S. 1996. "Distribution, Growth, and Reproduction of Pima Pineapple Cactus (*Coryphantha scheeri Kuntz* var. *robustispina Schott*)." Thesis, University of Arizona, Tucson.

Toolin, L. J. 1982. "Status Report for *Phaseolus supinus*." Albuquerque, New Mexico: U.S. Fish and Wildlife Service. Accessed through the Center for Plant Conservation National Collection Plant Profiles website. Accessed December 10, 2015. http://www.centerforplantconservation.org/collection/cpc_viewprofile.asp?CPCNum=3382

U.S. Department of Transportation, Federal Highway Administration. 2001. "Guidance: Migratory Bird Treaty Act and Executive Order 13186." Accessed December 18, 2015. http://www.fhwa.dot.gov/environment/migbird.htm.

U.S. Fish and Wildlife Service (USFWS). 1988. "Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for Two Long-Nosed Bats." *Federal Register* 50(190): 38456–60.

_____. 1993. "Endangered and Threatened Wildlife and Plants; Determination of Endangered Status for the Plant Pima Pineapple Cactus (*Coryphantha scheeri* var. *robustispina*); Final Rule." *Federal Register* 58(183): 49875–80.

_____. 2001. *Lesser Long-nosed Bat (*Leptonycteris curasoae yerbabuenae*) General Species Information*. Arizona Ecological Services Field Office, Phoenix, Ariz.

_____. 2007. "Five-Year Review for Pima Pineapple Cactus (*Coryphantha scheeri* var. *robustispina*)." Accessed December 3, 2014. http://www.fws.gov/southwest/es/arizona/pima.htm.

_____. 2013a. "ESA Basics: 40 Years of Conserving Endangered Species." Accessed December 15, 2015. http://www.fws.gov/endangered/esa-library/pdf/ESA_basics.pdf.

_____. 2013b. "Endangered and Threatened Wildlife and Plants; 90-Day Finding on a Petition To Delist or Reclassify From Endangered to Threatened Five Southwest Species." *Federal Register 78*(174): 55046–51.

_____. 2015a. "Migratory Bird Treaty Act." Accessed December 18, 2015. https://www.fws.gov/laws/lawsdigest/migtrea.html.

———. 2015b. "Lesser Long-Nosed bat (*Leptonycteris curasoae yerbabuenae*): Environmental Conservation Online System." Accessed December 11, 2015. http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A0AD#lifeHistor.

This page is intentionally left blank.

Attachment A - USFWS and AGFD Reports

My project

IPaC Trust Resource Report

Generated August 18, 2015 03:59 PM MDT

US Fish & Wildlife Service

IPaC Trust Resource Report

Project Description

NAME

My project

PROJECT CODE

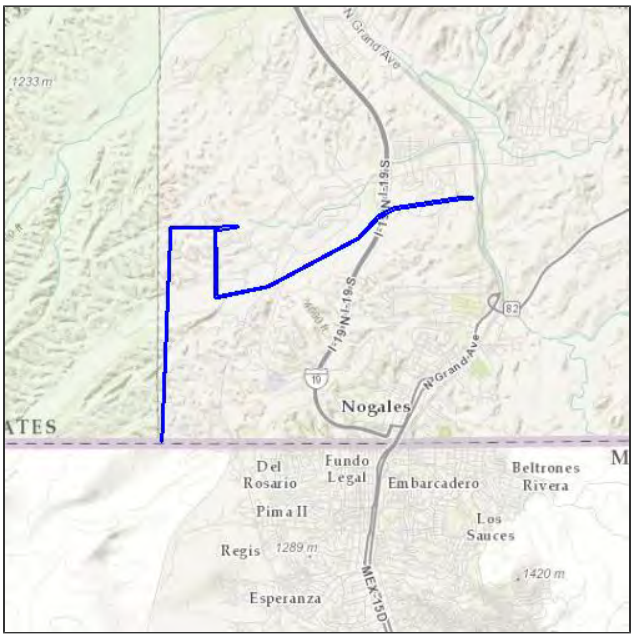
XJACG-X2GJB-FF7CN-JFOU3-JCWZH4

LOCATION

Santa Cruz County, Arizona

DESCRIPTION

No description provided



U.S. Fish & Wildlife Contact Information

Species in this report are managed by:

Arizona Ecological Services Field Office
2321 West Royal Palm Road, Suite 103
Phoenix, AZ 85021-4915
(602) 242-0210

Endangered Species

Proposed, candidate, threatened, and endangered species that are managed by the Endangered Species Program and should be considered as part of an effect analysis for this project.

This unofficial species list is for informational purposes only and does not fulfill the requirements under Section 7 of the Endangered Species Act, which states that Federal agencies are required to "request of the Secretary of Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action." This requirement applies to projects which are conducted, permitted or licensed by any Federal agency.

A letter from the local office and a species list which fulfills this requirement can be obtained by returning to this project on the IPaC website and requesting an Official Species List from the regulatory documents section.

Amphibians

Arizona Treefrog Hyla wrightorum — **Candidate**

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=D03S

Chiricahua Leopard Frog Rana chiricahuensis — **Threatened**

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=D02F

Birds

Southwestern Willow Flycatcher Empidonax traillii extimus — **Endangered**

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B094

Sprague's Pipit Anthus spragueii — **Candidate**

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0GD

Yellow-billed Cuckoo Coccyzus americanus — **Threatened**

CRITICAL HABITAT
There is **proposed** critical habitat designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B06R

Fishes

Gila Topminnow (incl. Yaqui) Poeciliopsis occidentalis **Endangered**

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=E00C

Flowering Plants

Pima Pineapple Cactus Coryphantha scheeri var. robustispina **Endangered**

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=Q27M

Insects

Stephan's Riffle Beetle Heterelmis stephani **Candidate**

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=I0CB

Mammals

Jaguar Panthera onca **Endangered**

CRITICAL HABITAT
There is **final** critical habitat designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A040

Lesser Long-nosed Bat Leptonycteris curasoae yerbabuenae **Endangered**

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A0AD

Ocelot Leopardus (=Felis) pardalis **Endangered**

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A084

Sonoran Pronghorn Antilocapra americana sonoriensis **Endangered**

CRITICAL HABITAT
No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A009

Reptiles

Northern Mexican Gartersnake Thamnophis eques megalops **Threatened**

CRITICAL HABITAT
There is **proposed** critical habitat designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=C04Q

Snails

Huachuca Springsnail Pyrgulopsis thompsoni **Candidate**

CRITICAL HABITAT

No critical habitat has been designated for this species.

https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=G05C

Critical Habitats

Potential effects to critical habitat(s) within the project area must be analyzed along with the endangered species themselves.

There is no critical habitat within this project area

Migratory Birds

Birds are protected by the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act.

Any activity which results in the take of migratory birds or eagles is prohibited unless authorized by the U.S. Fish and Wildlife Service (1). There are no provisions for allowing the take of migratory birds that are unintentionally killed or injured.

You are responsible for complying with the appropriate regulations for the protection of birds as part of this project. This involves analyzing potential impacts and implementing appropriate conservation measures for all project activities.

Baird's Sparrow Ammodramus bairdii — **Bird of conservation concern**
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B09B

Bell's Vireo Vireo bellii — **Bird of conservation concern**
Season: Breeding

Bendire's Thrasher Toxostoma bendirei — **Bird of conservation concern**
Year-round

Black-chinned Sparrow Spizella atrogularis — **Bird of conservation concern**
Season: Wintering

Black-throated Gray Warbler Dendroica nigrescens — **Bird of conservation concern**
Season: Breeding

Brewer's Sparrow Spizella breweri — **Bird of conservation concern**
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0HA

Burrowing Owl Athene cunicularia — **Bird of conservation concern**
Year-round

Canyon Towhee Pipilo fuscus — **Bird of conservation concern**
Year-round

Common Black-hawk Buteogallus anthracinus — **Bird of conservation concern**
Season: Breeding

Elegant Trogon Trogon elegans — **Bird of conservation concern**
Year-round

Elf Owl Micrathene whitneyi — **Bird of conservation concern**
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0GV

Gilded Flicker Colaptes chrysoides — **Bird of conservation concern**
Year-round
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0EG

Golden Eagle Aquila chrysaetos — **Bird of conservation concern**
Year-round
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0DV

Grasshopper Sparrow Ammodramus savannarum ammolegus — **Bird of conservation concern**
Year-round

Lark Bunting Calamospiza melanocorys — **Bird of conservation concern**
Season: Wintering

Loggerhead Shrike Lanius ludovicianus — **Bird of conservation concern**
Year-round
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0FY

Lucy's Warbler Vermivora luciae — **Bird of conservation concern**
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0DL

Mccown's Longspur Calcarius mccownii — **Bird of conservation concern**
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0HB

Mountain Plover Charadrius montanus — **Bird of conservation concern**
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B078

Northern Beardless-tyrannulet Camptostoma imberbe — **Bird of conservation concern**
Season: Breeding

Peregrine Falcon Falco peregrinus — **Bird of conservation concern**
Year-round
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0FU

Red-faced Warbler Cardellina rubrifrons — **Bird of conservation concern**
Season: Breeding

Rose-throated Becard Pachyramphus aglaiae — **Bird of conservation concern**
Season: Breeding

Rufous-winged Sparrow Aimophila carpalis — **Bird of conservation concern**
Year-round

Sonoran Yellow Warbler Dendroica petechia ssp. sonorana — **Bird of conservation concern**
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0F7

Sprague's Pipit Anthus spragueii — **Bird of conservation concern**
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0GD

Swainson's Hawk Buteo swainsoni — **Bird of conservation concern**
Season: Breeding
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B070

Varied Bunting Passerina versicolor — **Bird of conservation concern**
Season: Breeding

Williamson's Sapsucker Sphyrapicus thyroideus — **Bird of conservation concern**
Season: Wintering
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0FX

Phainopepla phainopepla nitens — **Bird of conservation concern**
Year-round
https://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B0E6

Refuges

Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. If your project overlaps or otherwise impacts a Refuge, please contact that Refuge to discuss the authorization process.

There are no refuges within this project area

Wetlands

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

Project proponents should discuss the relationship of these requirements to their project with the Regulatory Program of the appropriate U.S. Army Corps of Engineers District.

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.

There are no wetlands identified in this project area

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:

Hunt Power

Project Description:

The Nogales Interconnection Project (Project) is a proposed 150-megawatt (MW) direct current (DC) interconnection, commonly known as a DC tie, which will allow for an asynchronous interconnection between the electric grid in southern Arizona and the electric grid in the northwest region of Mexico. The Project will consist of three components: 1. A new 10-15 acre Gateway Substation on land currently owned by Tucson Electric Power (TEP), where DC tie equipment would be located. 2. A new, approximately 3-mile, 138-kilovolt (kV) transmission line segment originating at UniSource Energy Services' (UES') Valencia Substation in Nogales, AZ, and extending west and south to the new Gateway Substation. 3. A new, approximately 2-mile, 230-kilovolt (kV) transmission line segment extending south from the new Gateway Substation and across the U.S.-Mexico border to interconnect with a transmission line to be constructed by the Comisión Federal de Electricidad (CFE).

Project Type:

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

Contact Person:

Joseph Chernek

Organization:

HDR Engineering

On Behalf Of:

CONSULTING

Project ID:

HGIS-02011

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.

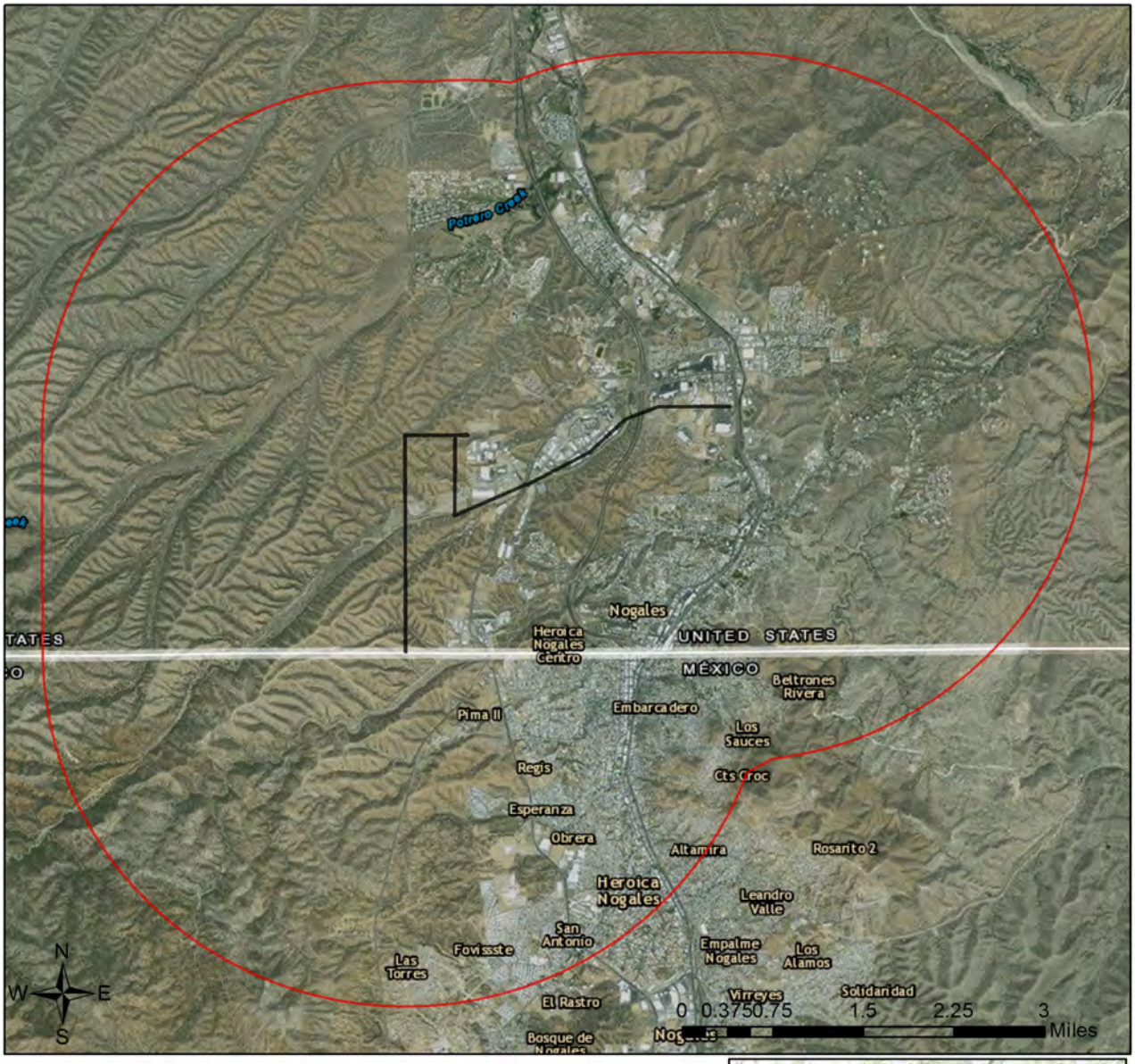
Locations Accuracy Disclaimer:
Project locations are assumed to be both precise and accurate for the purposes of environmental review. The creator/owner of the Project Review Report is solely responsible for the project location and thus the correctness of the Project Review Report content.

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

Hunt Power

Aerial Image Basemap With Locator Map



Project Boundary

Buffered Project Boundary

Project Size (acres): 38.04

Lat/Long (DD): 31.3501 / -110.9686

County(s): Santa Cruz

AGFD Region(s): Tucson

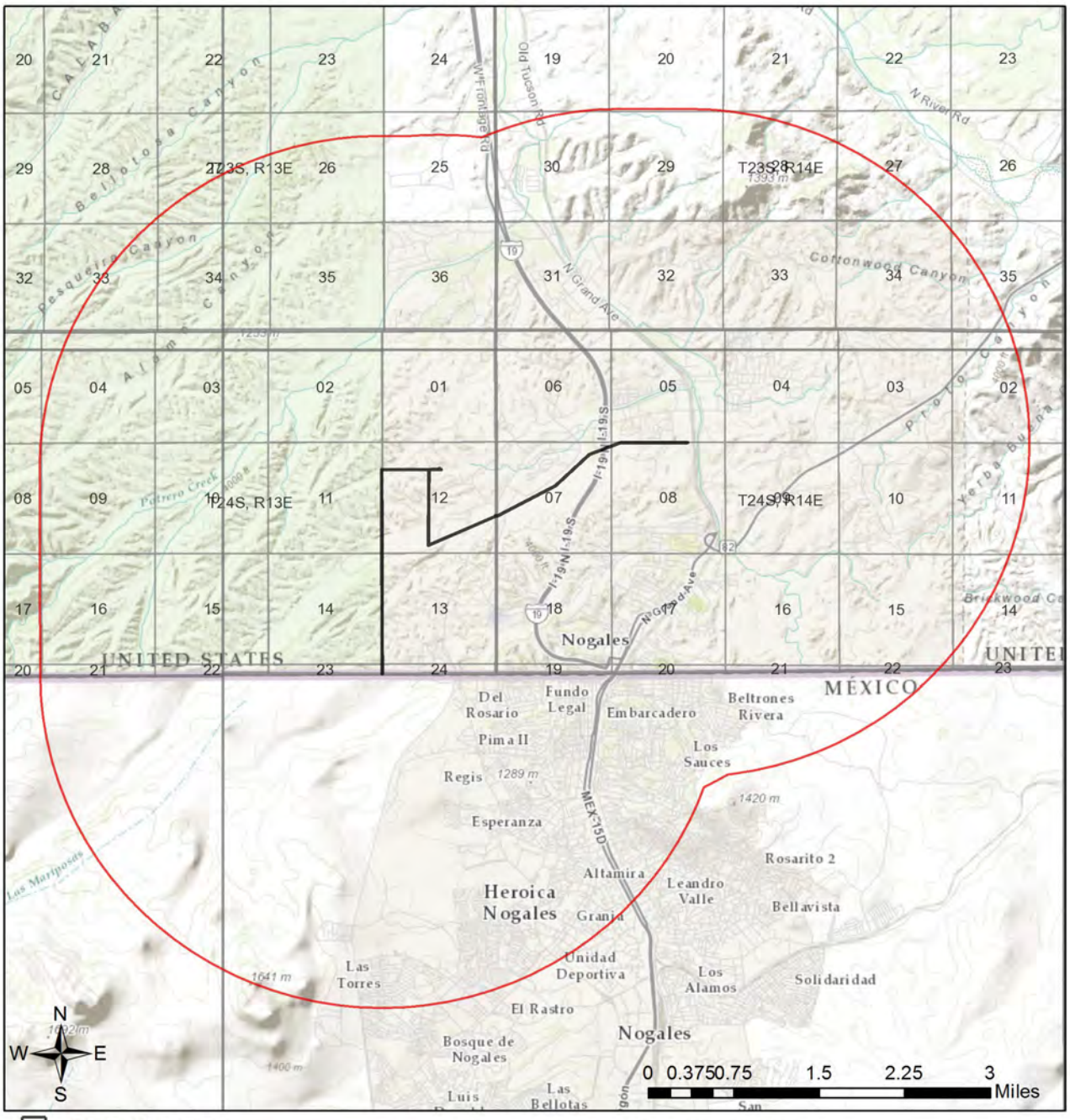
Township/Range(s): T24S, R14E; T24S, R13E

USGS Quad(s): NOGALES

Service Layer Credits: Sources: Esri, HERE, DeLorme, TomTom, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong),

Hunt Power

Web Map As Submitted By User



- Project Boundary
- Buffered Project Boundary
- Quadrangles
- Sections
- Townships

Project Size (acres): 38.04

Lat/Long (DD): 31.3501 / -110.9686

County(s): Santa Cruz

AGFD Region(s): Tucson

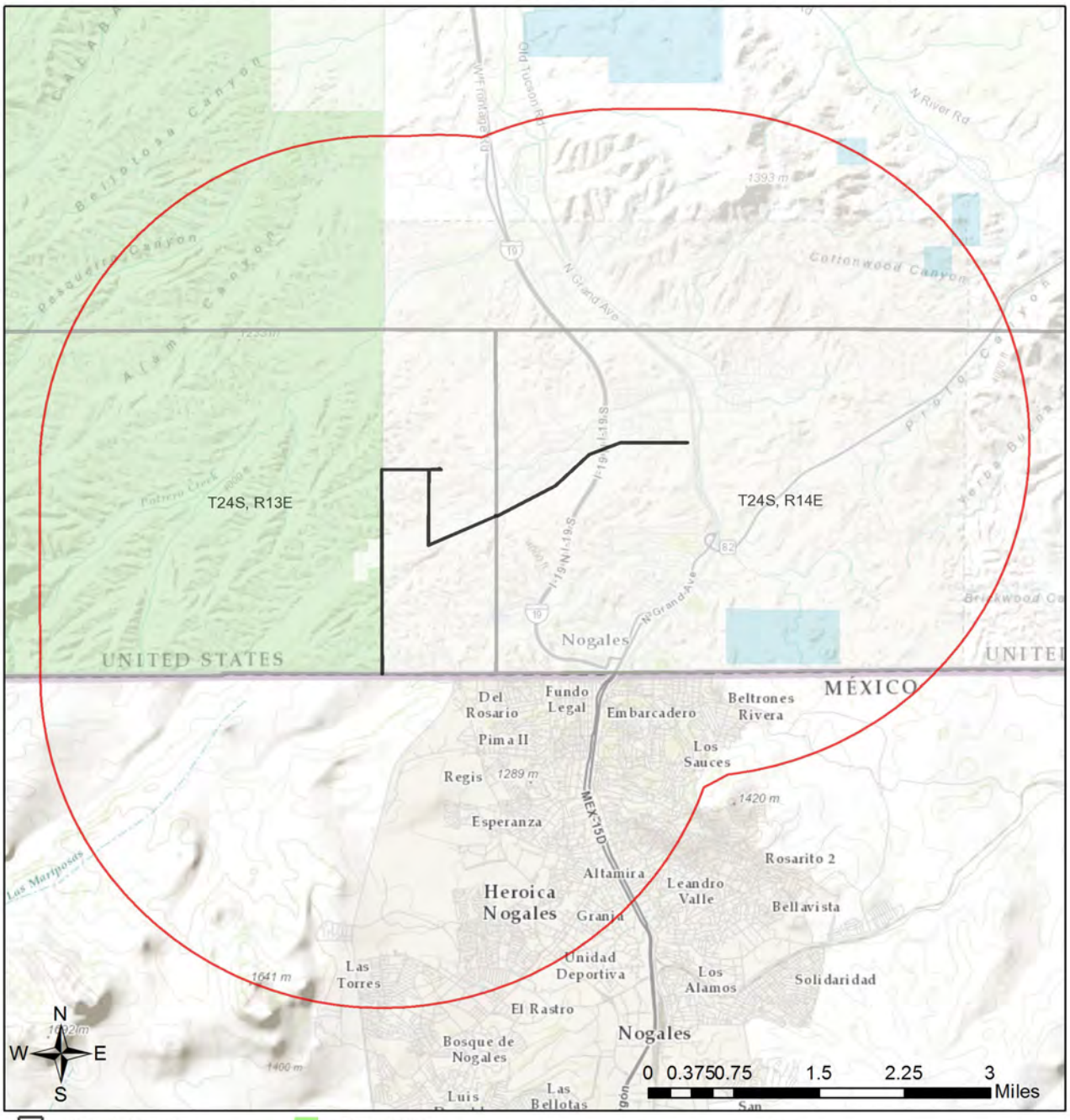
Township/Range(s): T24S, R14E; T24S, R13E

USGS Quad(s): NOGALES

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Hunt Power

Topo Basemap With Township/Ranges and Land Ownership



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

Project Size (acres): 38.04

Lat/Long (DD): 31.3501 / -110.9686

County(s): Santa Cruz

AGFD Region(s): Tucson

Township/Range(s): T24S, R14E; T24S, R13E

USGS Quad(s): NOGALES

Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community

Special Status Species and Special Areas Documented within 3 Miles of Project Vicinity

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Agosia chrysogaster chrysogaster	Gila Longfin Dace	SC		S		1B
Amsonia grandiflora	Large-flowered Blue Star	SC	S			
Antilocapra americana sonoriensis	10J area for Sonoran Pronghorn	LE,XN				
Aspidoscelis stictogramma	Giant Spotted Whiptail	SC	S			1B
Buteo plagiatus	Gray Hawk	SC				
CH for Strix occidentalis lucida	Mexican spotted owl Designated Critical Habitat					
Camptostoma imberbe	Northern Beardless-Tyrannulet		S			1B
Canis lupus baileyi	10J area Zone 2 for Mexican gray wolf	LE,XN				
Catostomus clarkii	Desert Sucker	SC	S	S		1B
Coccyzus americanus	Yellow-billed Cuckoo (Western DPS)	LT	S			1A
Coryphantha recurvata	Santa Cruz Beehive Cactus		S		HS	
Coryphantha scheeri var. robustispina	Pima Pineapple Cactus	LE			HS	
Gyalopion quadrangulare	Thornscrub Hook-nosed Snake		S			1B
Macroptilium supinum	Supine Bean	SC	S		SR	
Santa Rita - Tumacacori Linkage Design	Wildlife Corridor					

Note: Status code definitions can be found at http://www.azgfd.gov/w_c/edits/hdms_status_definitions.shtml.

Species of Greatest Conservation Need
Predicted within Project Vicinity 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
Amazilia violiceps	Violet-crowned Hummingbird		S			1B
Ammodramus savannarum perpallidus	Western Grasshopper Sparrow					1B
Ammospermophilus harrisii	Harris' Antelope Squirrel					1B
Amphispiza quinquestriata	Five-striped Sparrow					1B
Anthus spragueii	Sprague's Pipit	C*				1A
Antrostomus ridgwayi	Buff-collared Nightjar		S			1B
Aquila chrysaetos	Golden Eagle	BGA		S		1B
Aspidoscelis stictogramma	Giant Spotted Whiptail	SC	S			1B
Botaurus lentiginosus	American Bittern					1B
Buteo regalis	Ferruginous Hawk	SC		S		1B
Catostomus clarkii	Desert Sucker	SC	S	S		1B
Chordeiles minor	Common Nighthawk					1B
Coccyzus americanus	Yellow-billed Cuckoo (Western DPS)	LT	S			1A

Species of Greatest Conservation Need
Predicted within Project Vicinity based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
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
Cynanthus latirostris	Broad-billed Hummingbird		S			1B
Dipodomys spectabilis	Banner-tailed Kangaroo Rat			S		1B
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	Northern Pygmy-owl					1B
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 getula nigrita	Western Black Kingsnake					1B
Lasiurus blossevillii	Western Red Bat		S			1B
Lasiurus xanthinus	Western Yellow Bat		S			1B
Leopardus pardalis	Ocelot	LE				1A
Leptonycteris curasoae yerbabuenae	Lesser Long-nosed Bat	LE				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
Melospiza lincolnii	Lincoln's Sparrow					1B
Melozone aberti	Abert's Towhee		S			1B
Micruroides euryxanthus	Sonoran Coralsnake					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

Species of Greatest Conservation Need
Predicted within Project Vicinity based on Predicted Range Models

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Nyctinomops femorosaccus	Pocketed Free-tailed Bat					1B
Odocoileus virginianus	White-tailed Deer					1B
Oxybelis aeneus	Brown Vinesnake		S			1B
Pachyramphus aglaiae	Rose-throated Becard		S			1B
Panthera onca	Jaguar	LE				1A
Passerculus sandwichensis	Savannah Sparrow					1B
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
Senticolis triaspis	Green Ratsnake		S			1B
Setophaga petechia	Yellow Warbler					1B
Sialia sialis fulva	Azure Bluebird					1B
Tadarida brasiliensis	Brazilian Free-tailed Bat					1B
Tantilla yaquia	Yaqui Black-headed Snake		S			1B
Thamnophis eques megalops	Northern Mexican Gartersnake	PT	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					1B

Species of Economic and Recreation Importance Predicted within Project Vicinity

Scientific Name	Common Name	FWS	USFS	BLM	NPL	SGCN
Callipepla gambelii	Gambel's Quail					
Cyrtonyx montezumae	Montezuma Quail					1C
Odocoileus hemionus	Mule Deer					
Odocoileus virginianus	White-tailed Deer					1B
Patagioenas fasciata	Band-tailed Pigeon					1C
Pecari tajacu	Javelina					
Puma concolor	Mountain Lion					
Zenaida asiatica	White-winged Dove					

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

Project Type Recommendations:

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

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 May 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 herptefauna (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 (http://azstateparks.com/SHPO/index.html).

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

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:

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/environmental-services/np1

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 http://www.fws.gov/southwest/es/arizona/ or:

Phoenix Main Office
2321 W. Royal Palm Rd, Suite 103
Phoenix, AZ 85021
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

Analysis indicates that your project is located in the vicinity of an identified wildlife habitat linkage corridor. Project planning and implementation efforts should focus on maintaining adequate opportunities for wildlife permeability. For information pertaining to the linkage assessment and wildlife species that may be affected, please refer to: http://www.corridordesign.org/arizona. Please contact your local Arizona Game and Fish Department Regional Office for specific project recommendations: http://www.azgfd.gov/inside_azgfd/agency_directory.shtml.

A Class III Cultural Resources Survey for the Nogales Interconnection Project, Nogales, Santa Cruz County, Arizona

Nogales Interconnection Project

Hunt Power

Nogales, Santa Cruz County, Arizona

January 16, 2016

This page is intentionally left blank.

A Class III Cultural Resources Survey for the Nogales Interconnection Project, Nogales, Santa Cruz County, Arizona

Prepared for

Hunt Power
1900 North Akard Street
Dallas, Texas 75201-2300

Prepared by

Mark Brodbeck

Submitted by

Mark Brodbeck, MA RPA, Principal Investigator
HDR, Inc.
3200 East Camelback Road, Suite 350
Phoenix, Arizona 85018

HDR Cultural Resources Report 15-9

January 16, 2016

This page is intentionally left blank.

STATE HISTORIC PRESERVATION OFFICE
SURVEY REPORT SUMMARY FORM

I. REPORT TITLE (whether technical report or SRSF only submitted)

Report Title: A Class III Cultural Resources Survey for the Nogales Interconnection Project, Nogales, Santa Cruz County, Arizona

Report Author: Mark Brodbeck

Date: 01**/**16/2016 **Report No.:** 15-9 ☐ **Check if this submittal is SRSF for Negative Survey**

II. AZSITE & SHPO INFORMATION

ASM Accession Number: n/a **AAA Permit No.:** 2015-64bl **SHPO**

Project Locator UTMs: 503802 **m**E, 3468805 mN **Zone:** 12 NAD 83

USGS 7.5' Quadrangle Names: Nogales, AZ (1981)

III. CONSULTING FIRM INFORMATION

Organization/Consulting Firm: HDR, Inc.

HDR Project Number: 244842

Contact Name: Mark Brodbeck

Address: 3200 East Camelback Road, Suite 350, Phoenix, Arizona 85018

Phone: (602) 522-7700 **Email:** mark.brodbeck@hdrinc.com

IV. AGENCY/PROJECT INFORMATION

Lead Agency/Project Number: Federal Energy Regulatory Commission

Agency Project Name/Number: n/a

Nearest City/Town & County: Nogales, Santa Cruz County

Project Sponsor: Hunt Power

Funding Source(s): Private

Other Permitting/Land Agencies & Permit Numbers: n/a

ASLD Lease Application No.: n/a

V. PROJECT DESCRIPTION

The Nogales Interconnection Project is being developed by Nogales Transmission, L.L.C., a subsidiary of Hunt Power, L.P. The Project is a proposed 150 megawatt (MW) direct current (DC) interconnection, commonly known as a DC tie, that will allow for an asynchronous interconnection between the electric grid in southern Arizona and the electric grid in the northwest region of Mexico.

The Project will consist of three components:

(1) a new 10- to 15-acre Gateway Substation, potentially located on land currently owned by Tucson Electric Power (TEP), where DC tie equipment would be located;

(2) a new, approximately 3-mile 138 kilovolt (kV) transmission line segment originating at the UniSource Energy Services (UES) Valencia substation in Nogales, Arizona, and extending west and south to the new Gateway Substation; and

(3) a new, approximately 2-mile 230 kV transmission line segment extending south from the new Gateway Substation and across the U.S.-Mexico border to interconnect with a transmission line to be constructed by the Comisión Federal de Electricidad (CFE).

Nogales Transmission, L.L.C., is also applying to the Arizona Corporation Commission (ACC) for a Certificate of Environmental Compatibility.

VI. AREA OF POTENTIAL EFFECTS/PROJECT AREA DESCRIPTION

The area of potential effects (APE) is defined as a 200-foot-wide corridor along the proposed transmission line alignment, the Valencia and Gateway Substations, plus a 0.25-mile buffer beyond the project footprint for the consideration of indirect effects to historic properties.

VII. PROJECT AREA INFORMATION

Total Acres: 276.3 **NAD 83; Zone:** 12 **Meridian:** Gila and Salt River Baseline and Meridian

Justification for areas not surveyed (identify land jurisdiction): 206.7 acres of private land were surveyed. The remaining 69.6 acres were not surveyed because right-of-entry had not been obtained from the landowners. The portions of the alternative alignments within Arizona Department of Transportation (ADOT) right-of-way (ROW) were not surveyed because of existing coverage. Steep sloping hillsides immediately north of Target Range Road in Section 13 could not be surveyed because of their dangerous incline; the steep slopes were inspected visually from the top and bottom of the ridge.

Project Location

Land Jurisdiction	Legal Description (T, R, Q, S)	Acres Surveyed	Acres Not Surveyed
Private	Township 24 South, Range 13 East, Sections 12, 13, and 24 Township 24 South, Range 14 East, Sections 5, 7, and 8	206.7	69.6

VIII. INVENTORY CLASS COMPLETED

☐ **Class I Inventory only** ☒ **Class III Intensive Field Survey**

☐ **Other: Identify and provide justification:**

IX. CLASS III SURVEY PERSONNEL AND METHODS

Field Personnel

Project Principal Investigator: Mark Brodbeck/26 years experience in Arizona

Project Director/Field Supervisor: Mark Brodbeck/26 years experience in Arizona

Crew: Eric Albright (20 years experience in Arizona)

Date(s) of Fieldwork: The survey was performed on November 23 and 24, 2015

Methods & Area Surveyed: Class III full coverage pedestrian survey with transects spaced 20 m apart. Survey generally covered 200 to 250 foot wide corridors along the alternative alignments.

Linear Miles; transect intervals m apart Coverage (%): acres:

Block Survey 206.7 acres**; transect intervals** <20 **m apart Coverage (%):** 95

Site recording criteria used [e.g., ASM, other (identify)]: ASM

Ground Surface Visibility: Approximately 75 percent

Integrity of Survey Area Current condition; include disturbances, erosion, flooding, dense vegetation, etc.: The portion of the APE in undeveloped areas, mostly the western portion, was is good condition with little to no disturbances; portions of the APE within developed areas were heavily disturbed by construction and heavy earth-moving activities.

X. CULTURAL RESOURCES

☐ **No cultural resources identified**

☐ **Isolated occurrences only Number of IOs recorded:** 4

☒ **Archaeological sites present; site summary table attached**

Number of Previously Recorded Sites: 2

Number of Newly Recorded Sites: 0

Number of Sites Not Re-located: 0

☐ **Historic period buildings/structures etc. documented/evaluated; historic property inventory forms attached**

None identified

RECOMMENDATIONS

HDR performed a Class III survey of alternative alignments for the Nogales Interconnection Project. The survey covered 206.7 acres of private land. The remaining 69.6 acres were not surveyed because right-of-entry had not been obtained from the landowners. The Interstate 19 and State Route 189 ROWs were not surveyed because current data were available from ADOT. It is recommended that any unsurveyed portions of the APE used for the project, other than the ADOT ROW, be surveyed by qualified archaeologists to determine whether historic properties are present that could be affected by the project. The cultural resources report will be amended after permissions have been obtained and the survey is completed.

The Class III survey documented two previously recorded sites. No new sites were identified. Site AZ EE:9:224(ASM) is a sparse prehistoric artifact scatter. Site AZ EE:9:225(ASM) is a set of rock piles. Both sites are recommended ineligible for listing on the National Register of Historic Places because of their limited information potential. Avoidance measures or further treatment should not be required at either site.

Should any archaeological resources be discovered during implementation of this project, all surface-disturbing activities in the area of discovery should immediately cease until Hunt Power can be notified and can arrange for a qualified archaeologist to assess the find. If human remains or funerary objects are discovered, the Arizona State Museum should be notified, as required by Arizona Revised Statutes § 41-865.

Recommended Finding of Project Effect

☐ **No Historic Properties Affected**

☒ **No Adverse Effect**

☐ **Adverse Effect**

*Based on areas surveyed.

***Final Draft Report Reviewed By (Consultant):**

Reviewer's Name	Title	Years Experience
Susanna Schippers	Technical Editor	15

***Not necessary to repeat this information in the technical report.**

CONSULTANT CERTIFICATION (Signature of Responsible Party, All Technical Report/SRSF submittals)

I certify the information provided herein has been reviewed for content and accuracy and all work meets applicable agency standards.

Mark Bodbeck _____ **Date:** January 12, 2016

Signature

Principal Investigator

_____

Title

Site Management Summary Table

Site number	Newly/ Previously recorded	Land jurisdiction	Legal description (T, R, Q, S)	Datum UTMs (NAD 83)	Site type	Cultural/ Temporal affiliation	Eligibility status,[a] Criterion/ Criteria	Treatment recommendation(s)
Archaeological sites								
AZ EE:9:224(ASM)	Previously recorded	Private	T24S, R13E, Section 12 NE¼	503504 mE, 3469572 mN	Artifact scatter	Prehistoric, possibly Archaic	Recommended not eligible	No treatment required
AZ EE:9:225(ASM)	Previously recorded	Private	T24S, R14E, Section 8 NW¼	505875 mE, 3469788 mN	Rock piles	Indeterminate	Determined not eligible	No treatment required

[a] Recommended by recorder, determined by State Historic Preservation Office or agency.

This page is intentionally left blank.

Contents

Attachments

Tables

Figures

1 Introduction

The Nogales Interconnection Project (Project) is being developed by Nogales Transmission, L.L.C., a subsidiary of Hunt Power, L.P (Applicant). The Project is a proposed 300 megawatt (MW) direct current (DC) interconnection, commonly known as a DC tie that would allow for an asynchronous interconnection between the electric grid in southern Arizona and the electric grid in the northwestern region of Mexico. The project will be constructed in two phases. The first phase of the Project will include the components listed below and the converter capacity will be 150 MW. The second phase, to be constructed at a time that has not yet been determined, will expand the HVDC converter capacity to 300 MW within the proposed Gateway Substation. The project is located on the western side of Nogales in Santa Cruz County, Arizona (Figures 1 and 2).

The Project would consist of three components:

1. A new 10- to 15-acre Gateway Substation, potentially located on land currently owned by Tucson Electric Power (TEP), where DC tie equipment for both phases would be located;
2. A new, approximately 3-mile, 138 kilovolt (kV) transmission line segment originating at the existing UniSource Energy Services (UES) Valencia Substation in Nogales, Arizona, and extending west and south to the new Gateway Substation; and
3. A new, approximately 2-mile, 230 kV transmission line segment extending south from the new Gateway Substation and across the United States-Mexico border to interconnect with a transmission line to be constructed in Mexico.

The proposed project requires a Presidential Permit for the international border infrastructure crossing and approval by the Federal Energy Regulatory Commission (FERC). Nogales Transmission, L.L.C., is also applying to the Arizona Corporation Commission (ACC) for a Certificate of Environmental Compatibility.

Because the project requires a federal permit and regulatory approval, the project is an undertaking subject to compliance with Section 106 of the National Historic Preservation Act (54 United States Code § 300101 et seq). Section 106 requires federal agencies to take into account the effects of their undertakings on cultural resources that qualify for listing on the National Register of Historic Places (National Register), referred to as historic properties. FERC is the lead federal agency for the Project's Section 106 compliance.

At the request of Hunt Power, HDR performed a Class III cultural resources survey of the Project corridor to determine whether any historic properties are present that could be affected by the proposed undertaking. The fieldwork was conducted on November 23 and 24, 2015, and required 4 person days to complete.

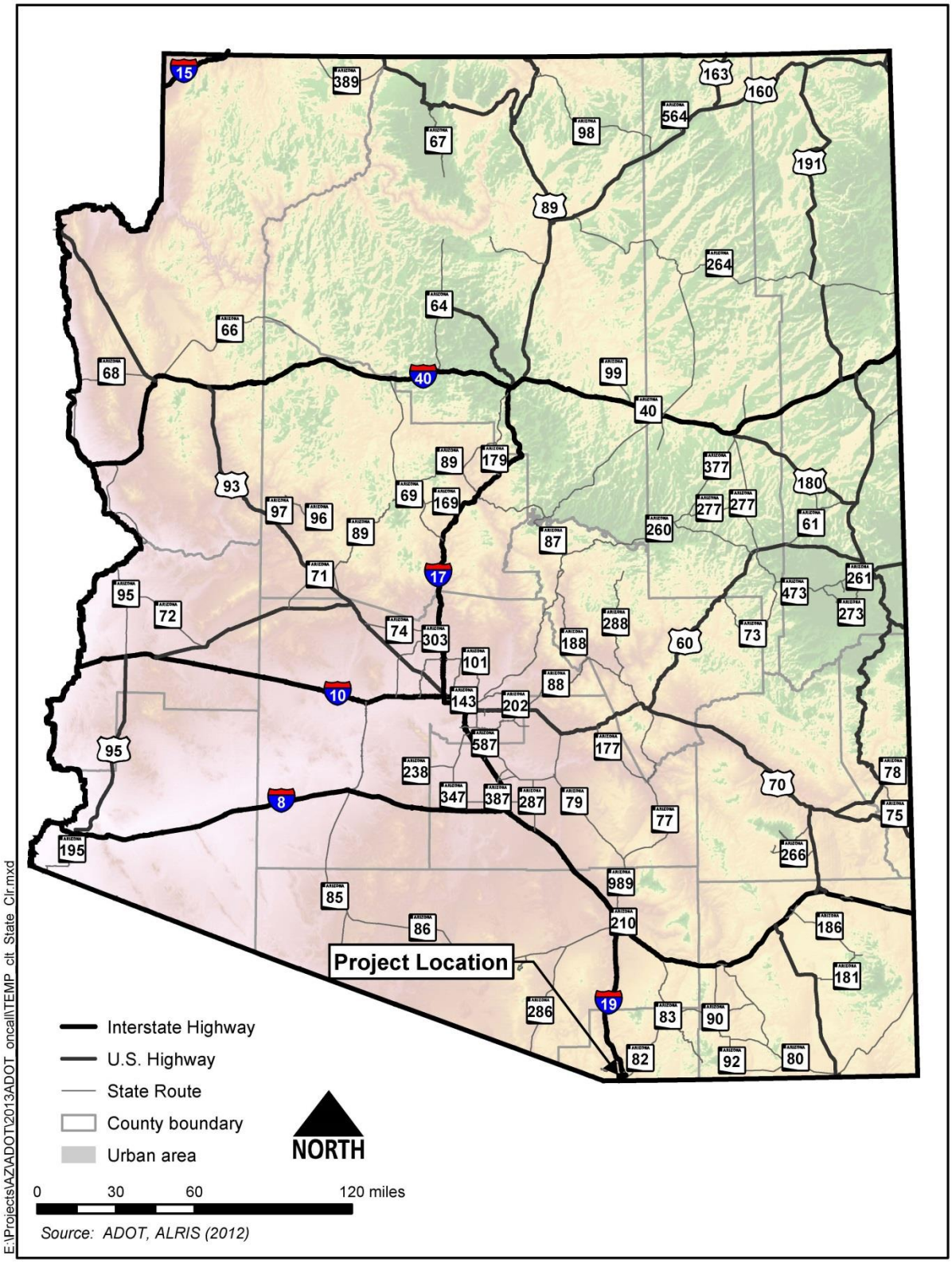


Figure 1. Project location

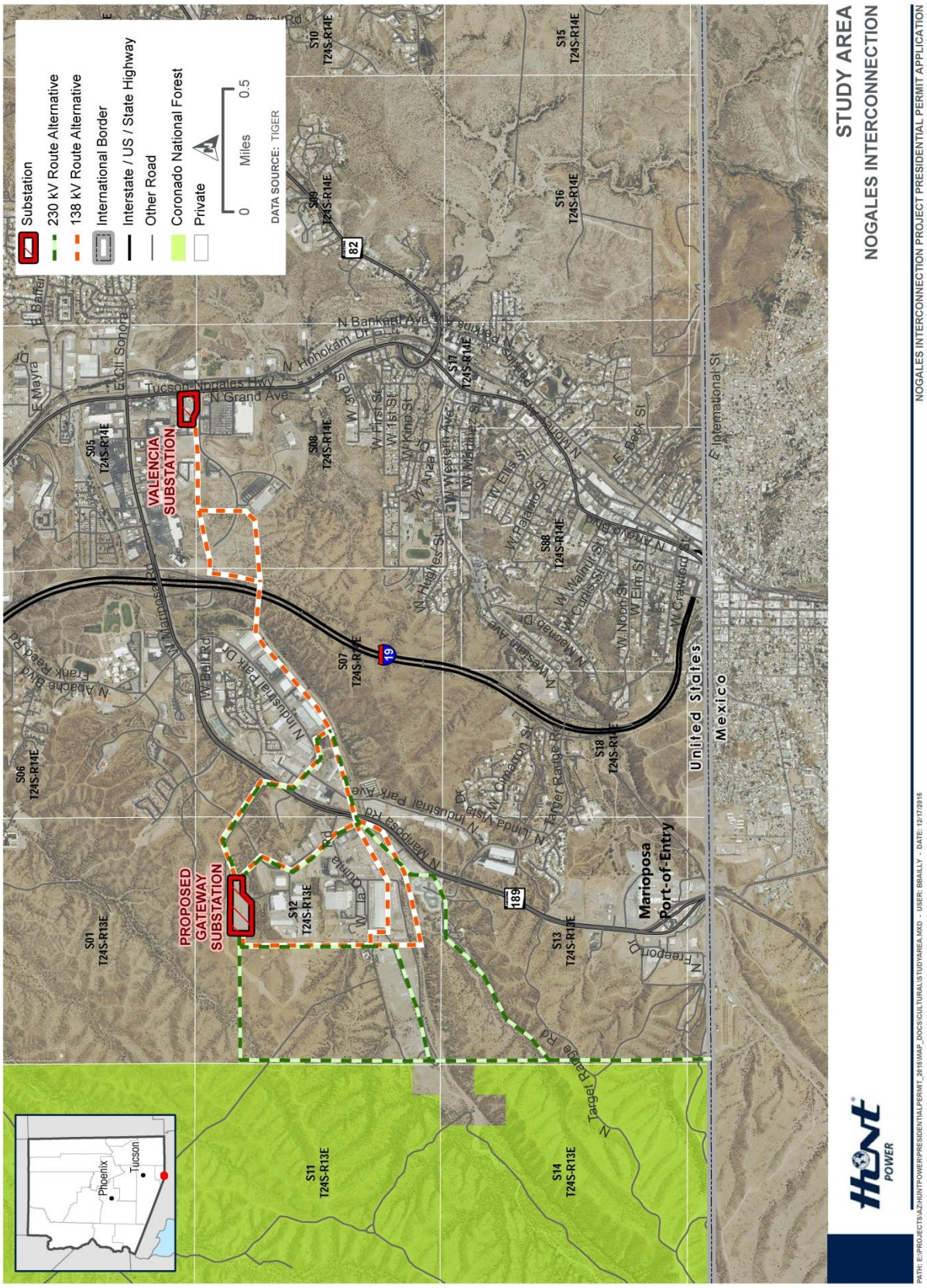


Figure 2. Project study area

1.1 Project Location

The Project is located on the western side of Nogales in southern Santa Cruz County. The Project area extends north-to-south from the U.S.-Mexico border approximately 0.7 mile west of the Mariposa port-of-entry to the Gateway Substation approximately 2 miles to the north, and east-to-west approximately 2 miles between the Gateway and Valencia Substations. The proposed alignments are on private land and highway right-of-way (ROW) owned by the Arizona Department of Transportation (ADOT). The legal description for the Project is Sections 12, 13, and 24 of Township 24 South and Range 13 East, and Sections 5, 7, and 8 of Township 24 South and Range 14 East (Nogales, AZ [1981] U.S. Geological Survey 7.5-minute quadrangle map; Gila and Salt River Base Line and Meridian).

1.2 Area of Potential Effects

The Project area of potential effects (APE) is the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if such properties exist [36 Code of Federal Regulations Part 800.16(d)]. The APE is influenced by the scale and nature of the undertaking and may be different for different kinds of effects caused by the undertaking. The APE for the proposed Project includes a 200-foot-wide corridor along the proposed transmission line alignment, the Valencia and Gateway Substations, plus a 0.25-mile buffer beyond the Project footprint for the consideration of indirect effects to historic properties.

2 Regulatory Context

2.1 National Historic Preservation Act

As noted previously, because of the federal involvement, the Project is an undertaking that requires compliance with Section 106 of the National Historic Preservation Act, as amended (54 United States Code § 300101 et seq.), and its implementing regulations (36 Code of Federal Regulations Part 800). FERC is the lead federal agency for the Project's Section 106 compliance.

Cultural resources generally include archaeological sites, historical buildings and structures, artifacts, and places of traditional, religious, and cultural importance. "Historic properties" are prehistoric and historical cultural resources listed or eligible for listing in the National Register. The National Historic Preservation Act, as amended, and its implementing regulations provide the process and guidelines for historic property evaluations. To be determined eligible for inclusion in the National Register, properties must be important in American history, architecture, archaeology, engineering, or culture. They also must possess integrity of location, design, settings, materials, workmanship, feeling, and association, and meet at least one of the following four criteria:

Criterion A:	are associated with events that have made a significant contribution to the broad patterns of our history
Criterion B:	are associated with the lives of persons significant in our past
Criterion C:	embody the distinctive characteristics of a type, period, or method of construction; or represent the work of a master; or possess high artistic values; or represent a significant distinguishable entity whose components may lack individual distinction
Criterion D:	have yielded, or may be likely to yield, information important in prehistory or history

Properties can be of local, state, or national importance. Typically, historic properties are at least 50 years old, but younger properties can be considered for listing if they are of exceptional importance.

3 Environmental Setting

The APE is situated in the upper reaches of the Santa Cruz River drainage in southern Arizona, extending northward from the U.S.-Mexico border. The area is within the Basin and Range physiographic province, which is characterized by broad alluvial valleys separated by steep-sided, fault-block mountain ranges (Chronic 1983). The Patagonia Mountains are approximately 13 miles to the east. The Atascosa Mountains are approximately 11 miles to the northwest. The San Cayetano Mountains are approximately 10 miles to the north. The APE crosses perpendicular to a series of steep-sided ridges north from the border and then trends eastward following Maricopa Canyon across undulating terrain towards Nogales Wash, a tributary to the Santa Cruz River (Figures 3 and 4). The eastern end of the Project, just south of Maricopa Road and Grand Avenue, is near Nogales. Land use in the Project area in mixed. The western portion of the Project area is largely undeveloped land. The central portion of the Project area is transportation-related commercial and industrial along the State Route (SR) 189 corridor. The eastern end is mostly commercial east of Interstate 19 (I-19).

The APE and vicinity has a continental climate with hot summers and cool winters. Average annual rainfall is 18 inches. The elevation ranges from 3,800 to 4,000 feet above mean sea level. The APE is situated at the transition between the Semidesert Grassland and Interior Chaparral vegetative communities (Brown 1994). The Semidesert Grassland biotic community is found at elevations ranging from 4,000 to 5,500 feet above mean sea level. This biotic community is characterized by grasses, flowering annuals, shrubs, cacti, and agaves.

Figure 3. Overview of Project area, south of Target Range Road, facing north

Figure 4. Overview of Project area east of I-19, facing east

Common flora of the biotic community include black grama, Chino grama, mesquite, sotol, prickly pear, and cholla. Much of this community has been heavily grazed, resulting in a decrease in perennials and the presence of introduced annuals. Red brome (*Bromus rubens*) is a prevalent annual. Interior chaparral is a vegetation community growing at mid-elevations (3,000 to 6,000 feet above mean sea level) on the foothills and slopes of the mountain ranges. Chaparral vegetation contains many species, usually including shrub live oak, birchleaf mountain-mahogany, skunkbush sumac, a variety of silktassels, desert ceanothus, Arizona rosewood, barberry, cliffrose, hollyleaf buckthorn, and manzanita.

4 Cultural Setting

Previous investigations in the area have provided useful summaries of the region's cultural history; see Bruder and Garcia (2002), Douglas (1991), Hill and Bruder (2000), Walsh (2010), Woodward (1984), and Woodward and Francissena (1984). These cultural chronologies are framed within five main developmental periods, based on general trends in material culture, subsistence and settlement strategies, and social and economic structure. The five periods are: Paleoindian (pre-9000 B.C.), Archaic (9000 to 300 B.C.), Formative (300 B.C. to A.D. 1450), Protohistoric (A.D. 1450 to 1840), and Historic (1853 to 1950). This discussion of the cultural setting provides the contextual framework for evaluating cultural resources identified in the APE for National Register eligibility and developing management recommendations.

4.1 Paleoindian Period

The earliest evidence of human occupation in southern Arizona and the greater American Southwest dates to the Paleoindian period (pre-9000 B.C.) (Cordell 1997; Haury 1950). During this time, small bands of nomadic hunter-gatherers traversed the landscape in seasonal rounds. Their subsistence depended on hunting small and big game and gathering wild plants and other resources (Irwin-Williams 1979). Hallmarks of Paleoindian artifact assemblages include diagnostic lithic tool-manufacturing technologies, Clovis and Folsom spear points, and contextual associations with bones of extinct Pleistocene fauna such as mammoth, bison, tapir, camel, and horse. The San Pedro River valley, approximately 50 miles east of Nogales, has several well-known mammoth kill sites including Murray Springs, Naco, Lehner, and Escapule (Agenbroad 1975; Haury and others 1953, 1959; Haynes 1966; Hemmings and Haynes 1969; Huckell 1984). Numerous Clovis points were discovered at each of those sites and at many others in southeastern Arizona (Agenbroad 1975; Bryan and Gidley 1926; DiPeso 1953; Haury and others 1953; Hemmings and Haynes 1969; Sayles and Antevs 1941; Woosley and Kriebel 1985).

4.2 Archaic Period

The end of the Paleoindian period coincided with significant climatic changes at the end of the Pleistocene era, which ultimately led to a reorganization of subsistence and settlement strategies throughout the Southwest. The Archaic cultural tradition in southeastern Arizona is termed the Cochise, which is further subdivided into the Sulphur Springs, Chiricahua, and San Pedro phases. The Sulphur Springs phase (10,500 to 9000 B.C.) is the oldest and may be contemporaneous with the Paleoindian cultural tradition (Douglas and Brown 1984). The subsequent Chiricahua phase (9000 to 1500 B.C.) extended from the end of the Pleistocene to approximately 1500 B.C. The available information indicates that, during these cultural phases of the Archaic, southern Arizona was occupied by highly mobile populations moving in seasonal rounds that produced similar projectile point types (Hill and others 1999). During the final phase of the Archaic, the San Pedro, dating from approximately 1500 B.C. to A.D. 300, distinctive cultural features emerged, including pit houses, storage pits, projectile points, and burial features. These artifacts and features both separate this phase from the preceding Archaic cultural assemblages and suggest continuity between Archaic and later Formative populations in southeastern Arizona (Hill and others 1999; Reid and Whittlesey 1997). Increased reliance on agricultural pursuits is notable, with the adoption of various Mesoamerican cultigens, most notably maize (Cordell 1997). The increase in sedentism and reliance on agricultural practices in the Tucson Basin during this time resulted in it being designated the Early Agricultural period (circa 1200 B.C. to A.D. 500) (Mabry and Clark 1994).

4.3 Formative Period

During the Formative period (300 B.C. to A.D. 1450), the predominant cultural tradition in the vicinity of the current Project area probably would be identified as Hohokam, with the Mogollon cultural tradition evident father east. The Hohokam were village-dwelling farmers and artisans who frequently practiced irrigation agriculture and produced copious amounts of elaborately decorated ceramics and shell jewelry (Crown 1987; Crown and Judge 1991; Haury 1976; Wilcox and Sternberg 1983). Four (some scholars argue for five) major periods characterize the Hohokam chronology, which, in turn, are divided into a number of phases based on differences in decorated ceramics, other artifact styles, architectural styles, and mortuary practices.

The Hohokam cultural tradition is distinguished by the development of hierarchical settlement systems; large-scale irrigation agriculture; production of red-on-buff pottery; highly stylized artifacts made of shell, stone, and bone; wide-ranging trade networks; a highly developed burial ritual involving cremations; and the development of public architecture that included ballcourts and platform mounds (Crown and Judge 1991; Wilcox 1979, 1980). The Hohokam “core area” is viewed as the Gila-Salt Basin, which, in turn, was seen as having been surrounded by a number of peripheral subareas. Peripheries south and east of the Gila-Salt Basin include the

Safford, San Pedro, Tucson Basin, and Upper Santa Cruz areas (Cable and Doyel 1987).

The Mogollon cultural tradition likely developed from the preceding San Pedro phase. In its earliest manifestations, Mogollon material culture is largely the same as that of the preceding Archaic, with the addition of plain brown ware ceramics. Later in the Mogollon sequence, circa post A.D. 1050, pit houses were replaced with surface pueblo structures (Reid and Whittlesey 1997). Variability between mountain and valley environments and differential cultural diffusion from adjacent cultural traditions, such as the Ancestral Pueblo and Hohokam, produced considerable regional diversity in the Mogollon cultural tradition (Bronitsky and Merritt 1986). Intrusive ceramics from different areas of Arizona, New Mexico, and northern Mexico are not uncommon (Diehl 2000).

4.4 Protohistoric Period

The Protohistoric period (A.D. 1550 to 1800s) represents the time between the end of the Hohokam cultural tradition and the entry of Europeans for exploration and settlement. Aboriginal groups who occupied south-central Arizona at the time of European contact included the Pima, Tohono O'odham, Sobaipuri, and, to the north and east in mountainous areas, the Apache. Piman speakers, who may be descendants of the Hohokam, generally occupied the river valleys, including the Santa Cruz River valley, living in dispersed rancherias. Their dwellings consisted of shallow depressions with brush superstructures, and they used canal irrigation in some of their agricultural pursuits. The Apache pursued a more nomadic lifeway, subsisting chiefly by means of hunting, gathering, and raiding strategies. Archaeological evidence of their presence consists primarily of ephemeral camp sites with ceramic and lithic materials distinct from those of the Hohokam or Piman speakers.

4.5 Historic Period

The Historic period (1691 to 1900s) began with the entry of Spanish explorers into what is now Arizona in the 1500s. Father Eusebio Kino, an Italian Jesuit priest, was sent to northern New Spain as part of the Spanish Crown's effort to Christianize native peoples of the New World. Kino recorded his 1691 travels through the region, thus providing the first written records of the area. The Spanish developed a stronger influence in the area when Father Visitor Antonio Leal, in consultation with Kino, decided to establish the first Spanish mission in southern Arizona in 1701. The site chosen was the village of Guevavi, located approximately 5 miles northeast of the present Project area (Shelley and Altschul 1987). The mission was spiritually and economically unsuccessful, and was slowly eclipsed in importance by missions to the north.

By 1767, the Jesuits relinquished control of the mission to the Franciscans and, soon after, Guevavi ceased to exist as a settlement. The base of the Spanish operations shifted to the north around Tubac, Tumacacori, Tucson, and San Xavier (Shelley and

Altschul 1987). The southern portion of the Santa Cruz River valley was essentially abandoned.

The area came under Mexican control in 1821, after Mexico became independent of Spain, but this had little impact at the northern edge of Hispanic settlement. As New Spain moved northward, the Spanish encouraged settlement of the area by making large grants to potential settlers. Most of these grants were allotted between 1820 and 1833. Near the Project area, the Baca family was given 94,289 acres of land as partial repayment for land they donated to the town of Las Vegas, New Mexico. Southern Arizona became part of the United States through the 1848 Treaty of Guadalupe-Hidalgo and the Gadsden Purchase of 1854.

Americans continued the ranching and mining activities of the earlier historic era, but also vigorously pursued the subjugation of native societies. Stage and then railroad lines followed the establishment of settlements and, in turn, triggered further development. Except for the urban Tucson metropolitan area, however, much of southern Arizona remains rural even today.

Nogales consisted of a ranch, which also acted as a stage station and livestock center in 1855 when Lt. N. Michler visited the area (Granger 1983). Because the ranch was located along Nogales Wash, it served as a focal point for people traveling between the United States and Mexico. Although the Santa Cruz River valley acted as a thoroughfare between Arizona and Mexico, the area remained sparsely populated until the 1880s. This lack of settlement was partially in response to intensive Apache raiding. Raiding was the Apaches' economic form of warfare. The principal objective of these raids was to obtain booty, especially horses.

The first permanent settlement on the Arizona side of the international border was begun in 1880 with the establishment of the trading post of Jacob Isaacson, who supplied mercantile goods and medicine on the road and at the various mining camps in the area south and east of Tucson. The New Mexico-Arizona Railroad was constructed in 1881 and 1882 by the Atchison, Topeka and Santa Fe Railway (Walker and Bufkin 1986). When the New Mexico-Arizona Railroad was completed, Euroamerican settlement of the area increased, inhibiting the success of the Apache raids. Entrepreneurs, miners, and settlers who anticipated that Nogales would become a border boom town flocked to the area. Copper mining achieved some success north of Nogales, especially at San Xavier (Walker and Bufkin 1986).

The physical and civic development of Nogales during its first 10 years included churches, hotels, electricity service, water storage facilities, seven newspapers, and several mercantile establishments. The Pima County Board of Supervisors incorporated the town of Nogales in 1893. Following incorporation, economic development and growth continued and Nogales became the only center of commerce on Arizona's border, an international shipping point on a major rail line, and the hub of regional mining activity in the surrounding mountains.

A military post named Camp Steven D. Little operated in Nogales from 1910 to 1933. The presence of U.S. military troops at Nogales and other border towns from El Paso to California evolved initially to ensure the international boundary was respected at

the outbreak of the Mexican Revolution in 1910. In 1918 and 1919, the border posts were used as training facilities for troops headed for Europe during World War I. The military facilities were maintained along the border through the 1920s, although they were fewer in number.

By the 1930s, residential neighborhoods had been constructed around the downtown area. Nogales emerged from the Depression with a population of about 5,500 people and a weakened local economy. The shipping industry would remain modest through World War II, but a new industry, tourism, became a major driving force in the regional and local economy. Today, Nogales has a population of over 20,000 people and is a major center for international commerce and distribution.

5 Previous Investigations

Prior to conducting the fieldwork, HDR reviewed existing records and archival sources for information on past projects and known cultural resources in the area. HDR requested site and project records from AZSITE, Arizona's statewide cultural resources database housed at the Arizona State Museum (ASM), and from the Coronado National Forest. In addition, historic maps such as General Land Office plats and aerial photographs were examined to identify historical period land uses of the area. The purpose of the records search was to determine which, if any, portions of the Project area have been previously investigated for cultural resources, to identify documented sites within and near the Project area, and to generate expectations about the types and frequencies of cultural resources that might be encountered during field survey. The records check covered a 0.5-mile area around the alternative corridors.

A few research projects conducted in the 1940s and 1950s provided initial insights on prehistoric and protohistoric settlement in the Nogales area. These included surveys performed by the University of Arizona within the Santa Cruz River valley from the headwaters east of Nogales north toward Tucson (Danson 1946; Frick 1954), as well as work by the Amerind Foundation (DiPeso 1953) at the Palo Parado Site (San Cayetano) about 20 miles north of Nogales. Most work in the area, however, has been driven by cultural resource compliance projects.

The records check indicated the ADOT ROWs within the study area have been previously surveyed for cultural resources; therefore, it is unlikely that new survey within ADOT ROW would be required for the Project. For the most part, land adjacent to the ADOT ROWs within the study area has not been investigated for cultural resources. Portions of the Project footprint outside ADOT ROW would require cultural resource survey; this would include new ROW and temporary construction easements.

The records check revealed that 28 archaeological surveys have taken place, and 10 sites have been recorded within 0.5 mile of the Project alignments (Figure 5; Tables 1 and 2). A map showing site locations is provided in Appendix A. A number of linear surveys intersected the Project alignments west of I-19; however, most of

the Project area had not been previously investigated (Carpenter 1995; Lascaux 1998; Lindemuth and others 2010; Petersen 2008). The portion of the Project area east of I-19 had been covered almost in its entirety by a survey performed for a private development Project (Stephen 2001). The previously recorded sites include five prehistoric artifact scatters, rock piles, a circa 1916 National Guard encampment, a historic period residence, and a railroad. The results of the previous projects suggested prehistoric and historic archaeological sites would be encountered during the survey. Three of the previously recorded sites are within the alignment corridors.

In 2001, URS Corporation (URS) surveyed 63 acres for the proposed Gateway Substation and documented two prehistoric sites: AZ EE:9:223(ASM) and AZ EE:9:224(ASM) (Bauer and Rogge 2001). Site AZ EE:9:223(ASM) was a prehistoric artifact scatter. The site's surface assemblage totaled 41 artifacts, which included nine cores and tested cobbles, five expedient scrapers or possibly utilized flakes, and debitage representing various stages of reduction. URS noted that the site was situated on shallow bedrock and concluded there was little potential for buried cultural deposits. Therefore, URS recommended the site as not eligible for listing on the National Register because of limited information potential. The proposed Gateway Substation platform was subsequently graded and the site is no longer evident.

Site AZ EE:9:224(ASM) is a prehistoric artifact scatter. The site is located east of the graded platform of the proposed Gateway substation and remains intact. URS documented 40 artifacts at the site, which included five cores and tested cobbles, one or two utilized flakes, and debitage representing various stages of reduction. Because the site was set on shallow bedrock, there is little to no potential for buried deposits. URS recommended the site as not eligible for National Register listing. HDR located the site during the current survey and recorded its present condition.

In 2001, Professional Archaeological Services and Technologies (PAST) surveyed a 130-acre parcel on the eastern side of I-19 for a private development project (Stephen 2001). The survey covered most of the alignment corridors between I-19 and the Valencia Substation. PAST recorded one site adjacent to the proposed alignment, AZ EE:9:225(ASM). The site consists of five rock piles, each approximately 1.5 m in diameter. One chipped stone flake was noted nearby, but lacked a clear association. PAST recommended the site not eligible for listing in the National Register because of its limited data potential and questionable temporal origins. HDR located the site during the current survey and recorded its present condition.

Because of the age of most of the prior surveys, and for consistency, the alignment corridors were surveyed in full regardless of prior coverage. The one exception was the ADOT I-19 and SR 189 ROW, which had adequate and recent coverage (Brodbeck and Marsich 2015; Bruder 1992; Grebinger 1971; Lite 1996; Lite and others 1996; Roth 1992; Stephen 2005; Stone 1995; Walsh 2006, 2008). No sites were identified in the ADOT ROW within the transmission line alignment corridors.

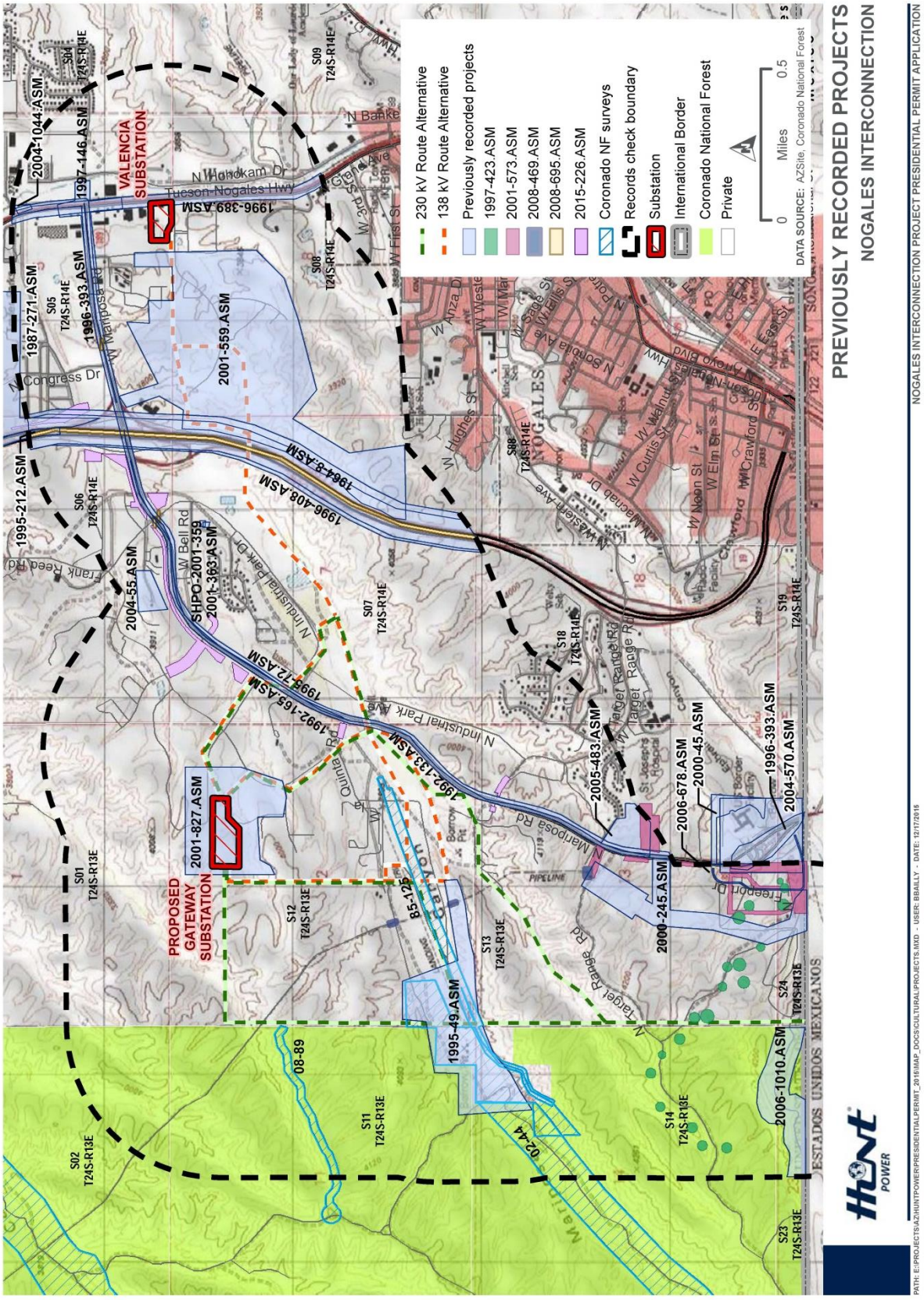


Figure 5. Previous surveys

Table 1. Previously recorded sites and historic districts

Site number	Type	National Register status (Criterion)	References
AZ EE:4:43(ASM)	New Mexico and Arizona Railroad	Eligible (A and C)[a]	Lite 1997a
AZ EE:9:54(ASM)	Prehistoric artifact scatter	Eligible (D)	Lite and others 1996
AZ EE:9:86(ASM)	Prehistoric artifact scatter/habitation	Not evaluated	AZSITE records
AZ EE:9:107(ASM)	Prehistoric artifact scatter (El Macayo)	Eligible (D)	Deaver and Van West 2001; Gardiner and Huckell 1987; Neily and Euler 1987; Slawson 1991
AZ EE:9:109(ASM)	National Guard encampment, circa 1916	Not evaluated	Gardiner and Huckell 1987; Neily and Euler 1987; also see Deaver and Van West 2001
AZEE:9:172(ASM)	New Mexico and Arizona Railroad	Eligible A	Lite 1997a
AZ EE:9:177(ASM)	Residence, circa 1940s/1960s	Not eligible	Lite 1997a
AZ EE:9:223(ASM)	Prehistoric lithic scatter	Not eligible	Bauer and Rogge 2001
AZ EE:9:224(ASM)	Prehistoric artifact scatter	Not eligible	Bauer and Rogge 2001
AZ EE:9:225(ASM)	Rock piles	Not eligible[a]	Stephen 2001

[a] with State Historic Preservation Office concurrence

Table 2. Previous projects

Project number	Project name	Company/ Organization	Results	Reference
1964-8.ASM	I-19, Tucson to Nogales	Arizona Highway Department	AZ EE:9:53(ASM) AZ EE:9:54(ASM) AZ EE:9:68(ASM)	Grebinger 1971
85-125.CNF	Materials Site 7238	Coronado National Forest	No information	No information
1987-271.ASM	Santa Cruz County Court House	ASM	AZ EE:9:107(ASM) AZ EE:9:108(ASM) AZ EE:9:109(ASM)	Gardiner and Huckell 1987
1992-133.ASM	Mariposa Road (SR 189) Upgrading Project	Dames and Moore, Inc.	No sites	Bruder 1992
1992-165.ASM	ROW Survey Along SR 189, Arizona	Tierra Right-of-Way Services, Ltd.	No sites	Roth 1992
1995-212.ASM	Mariposa Road/I-19	Archaeological Research Services, Inc.	No sites	Stone 1995
1995-49.ASM	Mariposa Canyon Survey	Tierra Right-of-Way Services, Ltd.	AZ EE:9:159(ASM)	Carpenter 1995
1995-72.ASM	Tucson-Nogales Fiber Optics ROW	Archaeological Consulting Services, Ltd.	No sites	Adams and Hoffman 1995
1996-389.ASM	ADOT/Business 19/ Nogales	Archaeological Research Services, Inc.	AZ EE:9:107(ASM)	Lite 1997a
1996-393.ASM	State Route 189/Nogales	Archaeological Research Services, Inc.	AZ EE:9:172(ASM)	Lite 1996
1996-408.ASM	Interstate-19 Between Nogales and Amado	Archaeological Research Services, Inc.	AZ EE:9:54(ASM)	Lite and others 1996
1997-146.ASM	Business-19/SR 189/ Nogales	Archaeological Research Services, Inc.	AZ EE:9:172(ASM) AZ EE:9:176(ASM) AZ EE:9:177(ASM)	Lite 1997b
1997-423.ASM	Nogales Survey	SWCA, Inc. Environmental Consultants	AZ EE:9:179(ASM)	Lascaux 1998
2000-245.ASM	Ductos de Nogales Lateral Pipeline Project	URS Corporation	No sites	Bauer and others 2000
2001-363.ASM	Nogales Cell Tower Survey	Aztlan Archaeology, Inc.	No sites	Slawson 2001
2001-559.ASM	Escalada Commerce Center	Professional Archaeological Services and Technologies, Inc.	AZ EE:9:225(ASM)	Stephen 2001
2001-573.ASM	Ductos de Nogales Lateral Pipeline Project – Addendum	Environmental Planning Group	No sites	Hill 2001

Table 2. Previous projects

Project number	Project name	Company/ Organization	Results	Reference
2001-827.ASM	Nogales Gateway Project	URS Corporation	AZ EE:9:223(ASM) AZ EE:9:224(ASM)	Bauer and Rogge 2001
2002-44	Potrero Fuelwood	Coronado National Forest	No information	No information
2004-1044.ASM	Mariposa Road to Junction I-19	HDR	No sites	Touchin 2004
2004-55.ASM	Nogales 6	Tierra Right-of-Way Services	No sites	AZSITE records
2004-570.ASM	US Visit Mariposa	Logan Simpson Design	No sites	Breen 2004
2005-483.ASM	Nogales ADOT	Professional Archaeological Services and Technologies	No sites	Stephen 2005
2006-1010.ASM	Border Light Survey I and II	Northland Research	No sites	Lindemuth and others 2010
2006-678.ASM	SR 189 at MP 0.095	Logan Simpson Design	No sites	Walsh 2006
2008-89	Virtual Fence	Coronado National Forest	No information	No information
2008-469.ASM	EPNG Line 2143 Year 2008 PIP	SWCA, Environmental Consultants	No sites	Petersen 2008
2008-695	I-19 sign Rehab	Logan Simpson Design.	No sites	Walsh 2008
2015-226	SR 189, International Border to Grand Avenue	HDR	AZ EE:9:54(ASM) AZ EE:9:86(ASM)	Brodbeck and Marsich 2015

6 Survey Methods

HDR surveyed the alignment corridors on November 23 and 24, 2015. The crew included Mark Brodbeck as field supervisor and principal investigator and archaeologist Eric Albright. Mr. Brodbeck holds a Master of Arts in Anthropology and meets the Secretary of the Interior's Professional Qualification Standards for Archaeology (36 Code of Federal Regulations Part 61). The survey took 4 person days to complete.

The survey covered 206.7 acres of private land. The remaining 69.6 acres of the Project area were not surveyed because the landowners had not given permission to access their property. Overall, surface visibility was fair to good, ranging from about 50 to 75 percent. Steep slopes immediately north of Target Range Road in

Section 13 could not be accessed safely because of the extreme incline. This area was inspected from the top and bottom of the hillside. Given the extreme terrain, it is not likely that any substantial remains of prehistoric human activity would be present.

As standard practice, HDR defines archaeological sites according to site-recording criteria established by ASM:

- any concentration of 30 or more artifacts or other cultural items of a single class in a discrete scatter
- any concentration of 20 or more artifacts of more than one artifact class in a discrete scatter
- one or more archaeological features in temporal association with any number of artifacts
- two or more temporally associated features without artifacts

Cultural manifestations not meeting these criteria are recorded as isolated occurrences unless otherwise noted at the discretion of the field supervisor. Intuitively, sites that generally display integrity of location are potentially interpretable in terms of past human behavior and activities. In contrast, isolated occurrences are single artifacts or relatively few artifacts spatially scattered and/or disassociated manifestations lacking contextual information. When encountered, sites are recorded in the field through written notes, photographs, and sketch maps. The locations of sites and isolated occurrences are recorded with Global Positioning System units and are plotted on aerial photographs and 7.5-minute U.S. Geological Survey (USGS) topographic quadrangles. A Sony DSC-W220 camera was used for digital photography. All artifacts photographed were returned to their provenienced location. No artifacts were collected.

7 Survey Results

The Class III survey documented two previously recorded sites, AZ EE:9:224(ASM) and AZ EE:9:225(ASM), and four isolated occurrences. No new archaeological sites were identified. A map showing survey results is in Appendix B.

AZ EE:9:224 (ASM)

Site Type:	Artifact scatter
Age:	Prehistoric; possibly Archaic
Cultural Affiliation:	Indeterminate
Location:	The site is on the eastern side of the Gateway Substation platform, approximately 175 m north of the end of the paved section of Mariposa Ranch Road. T24S, R13E, NE¼ of Section 12.
Site Dimensions:	80 m by 45 m
UTMs:	503504 mE, 3469572 mN (site center)
Landform:	Toe slope of southward-facing ridgeline
Elevation:	4,020 feet
Land Jurisdiction:	Private
USGS Map Reference:	Nogales, AZ (1981) 7.5-minute quadrangle

Site AZ EE:9:224(ASM) is prehistoric artifact scatter (Figure 6). The site was originally recorded by URS during a survey for the Gateway Substation (Bauer and Rogge 2001). The site is east of the platform on the toe slope of a ridge just above an east-to-west trending drainage. A small, north-to-south ephemeral drainage cuts through the middle portion of the site. Intrusive igneous rocks are scattered across the site. Primary vegetation includes mesquite and bunch grasses.

URS described the site as a surface assemblage with 40 artifacts, including five cores and tested cobbles, one or two utilized flakes, and debitage representing various stages of reduction that included bifacial thinning flakes (Bauer and Rogge 2001). No diagnostic artifacts were observed. The artifacts are predominantly chalcedony, with a few chert items present as well. Small nodules of both types of stone are available in local washes. URS also noted that a few additional artifacts could be shallowly buried at the site, but there was little potential for subsurface archaeological deposits.

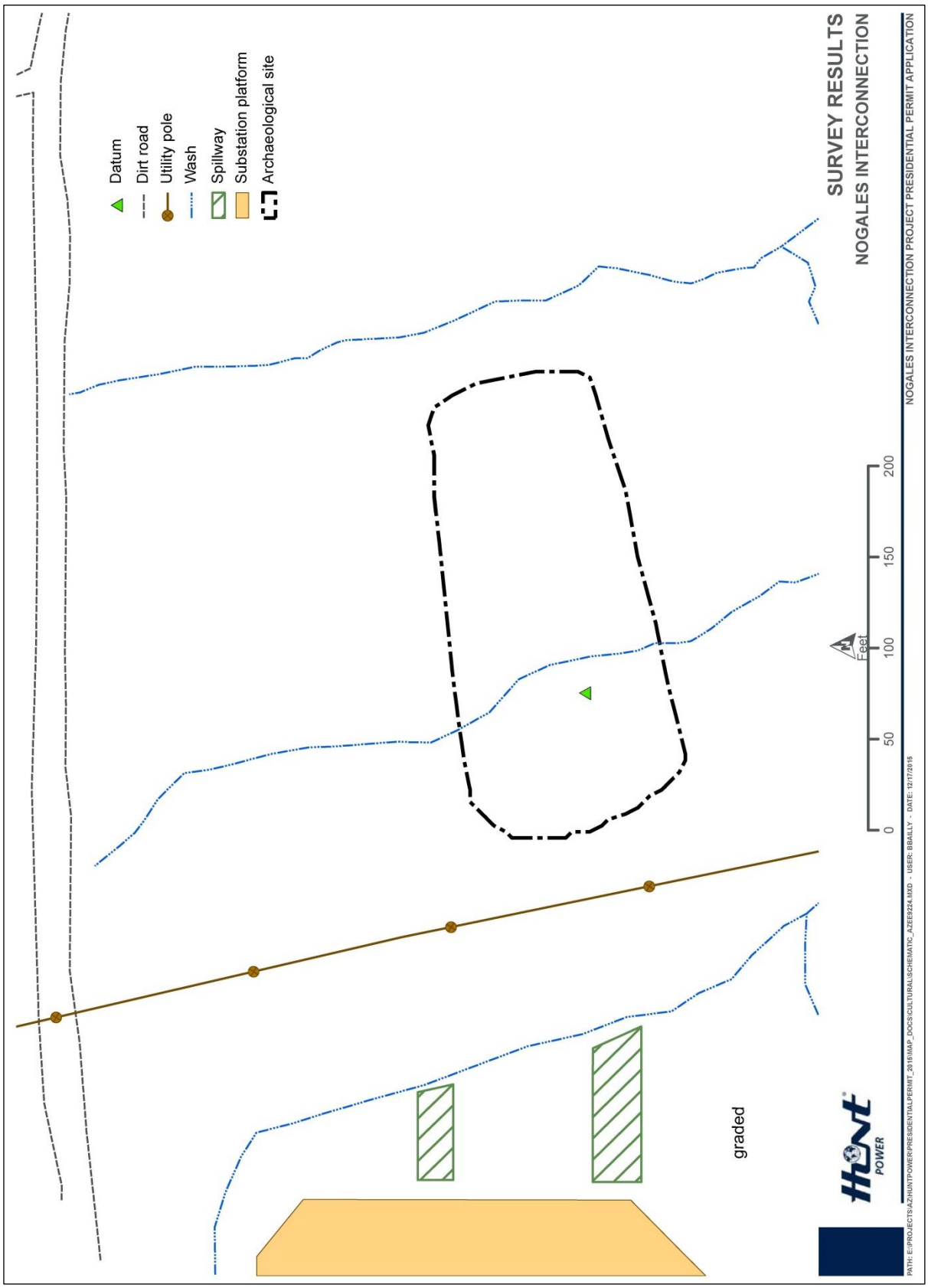


Figure 6. AZ EE:9:224(ASM), site map

HDR found the site as described by URS (Figure 7). The only notable change to the area is the construction of the substation platform and its associated drainage just west of the site, which required heavy earth-moving activity. Despite its close proximity, the site did not seem to be affected by the construction. The site reflects aboriginal occupation, but the lack of cultural and temporal diagnostics provides no basis for more precise dating of the site. The lack of ceramics suggests a potential pre-Formative period association, and the bifacial thinning flakes reflect a lithic reduction technology common during the Archaic era. However, this does not preclude the possibility that the site is of later origin and simply reflects activities that did not involve use of ceramics and other artifact types. The relatively small artifact assemblage and lack of surface features indicate that this site probably represents a single brief episode of reduction of local tool stone and some activity that also involved use of expediently produced flakes.

Figure 7. Overview of AZ EE:9:224(ASM), facing southwest

Recommendation: The site is in good condition and has only been slightly affected by livestock grazing. Nevertheless, it consists of a relatively sparse artifact scatter lacking diagnostics that has been thoroughly documented by archaeological survey. Further study of the site is unlikely to yield important information, and there are no unique aspects of the site that warrant preservation. HDR agrees with URS's original recommendation that the site be considered ineligible for listing on the National Register and should not require further treatment.

AZ EE:9:225(ASM)

Site Type:	Rock piles
Age:	Indeterminate
Cultural Affiliation:	Indeterminate
Site Dimension:	20 m by 15 m
Location:	The site is approximately 215 m north of White Park Drive (north of Home Depot); T24S, R14E, NW¼ of Section 8
UTMs:	505875 mE, 3469788 mN (site datum)
Landform:	Gently sloping, southward-facing ridge
Elevation:	3,820 feet
Land Jurisdiction:	Private
USGS Map Reference:	Nogales, AZ (1981) 7.5-minute quadrangle

AZ EE:9:225(ASM) is a set of rock piles (Figure 8). The site was originally recorded by PAST for the Escalada Commerce Center development Project (Stephen 2001). The site is approximately 215 m north of White Park Drive (north from the Home Depot) on a gently sloping south-facing ridge line. Vegetation observed by HDR includes mesquite, bunch grasses, and a thick stand of Russian thistle.

PAST described the site as a set of five rock piles within an approximately 20 m by 15 m area (Stephen 2001). All five rock piles were approximately 1.5 m in diameter and were composed of rocks averaging about 10 to 15 cm in size. A few larger rocks, up to about 40 cm in size, were also included. PAST also noted one tertiary limestone flake within approximately 8 m of the rock piles. HDR found the site as described by PAST but, unfortunately, it was covered with a thick stand of knee-high Russian thistle, which made surface observations difficult and updating the site map impossible (Figures 9 and 10).

Recommendations: The site appears to be in fair condition, although it was difficult to assess given the cover of thick Russian thistle. A temporary road was bladed east-to-west across the southern end of the site, which may have affected the southernmost rock pile. PAST interpreted the site as a possible small agave cultivation area, although the origin of the rock piles remains unknown and, in fact, could be modern or natural. Furthermore, it is unclear whether the single flake artifact observed is ancillary to the site or reflects an actual prehistoric association. PAST recommended the site as ineligible for listing on the National Register given its limited data potential. AZSITE records indicate the State Historic Preservation Office concurred with the eligibility recommendation on November 9, 2009.

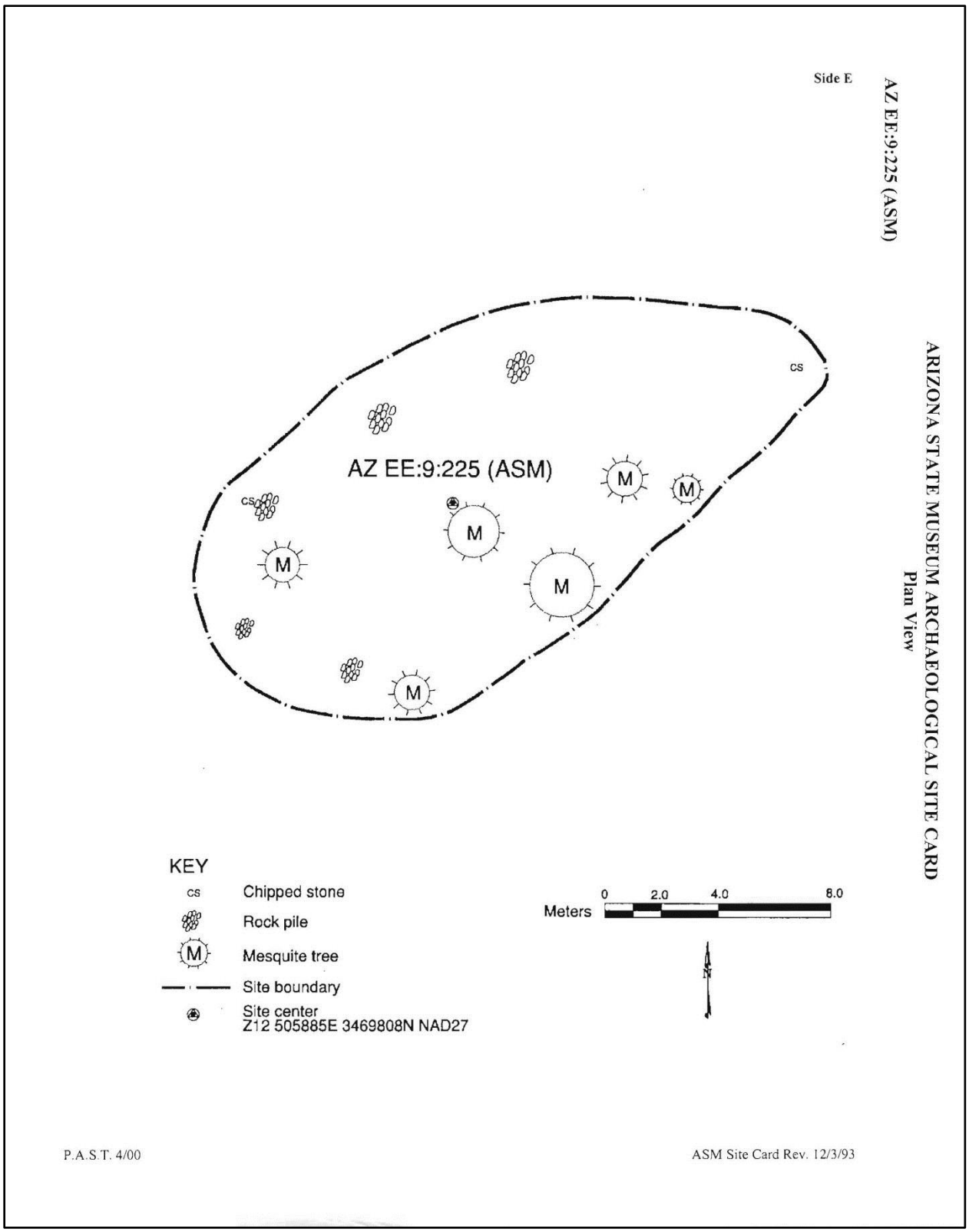


Figure 8. AZ EE:9:225(ASM), site map (reproduced from the ASM site card)

Figure 9. AZ EE:9:225(ASM), overview facing south

Figure 10. AZ EE:9:225(ASM), rock pile

The cover of thick Russian thistle across the site made surface observations difficult, and, as a result, the HDR archaeologists were not able to retrieve any additional evidence to indicate the site's function, age, or cultural affiliation. In the absence of any new information, HDR recommends that the site's prior determination remains valid. The site is recommended ineligible for National Register listing; no further treatment is warranted.

Isolated Occurrences

Four isolated occurrences were recorded during the survey (Table 3). The locations are provided in Appendix A. Isolate 1 was a quartzite core. Isolate 2 was a plainware sherd. Isolate 3 was a set of three crushed circa 1960s car bodies used for erosion control along the northern side of the wash paralleling Industrial Park Drive (Figure 11). Isolate 4 was a pink secondary chert flake. The isolates are of limited information potential and do not qualify for National Register listing as objects.

Table 3. Isolated occurrences

Number	Description	UTMs (NAD 83)
1	Quartzite core	503573 mE 3469441 mN
2	Plain ware sherd	504306 mE 3469034 mN
3	Crushed car bodies used for erosion control	504197 mE 3468907 mN
4	Pink secondary chert flake	503583 mE 3469415 mN

Figure 11. Isolate 3, circa 1960s car body embedded in side of wash

8 Summary and Management Recommendations

HDR performed a Class III survey of alternative alignments for the Nogales Interconnection Project. The survey covered 206.7 acres of private land. The remaining 69.6 acres was not surveyed because right-of-entry had not been obtained from the landowners. The I-19 and SR 189 ROWs were not surveyed because current data were available from ADOT. It is recommended that any unsurveyed portions of the APE used for the project, other than ADOT ROW, be surveyed by qualified archaeologists to determine whether historical properties are present that could be affected by the Project. The cultural resources report will be amended after permissions have been obtained and the survey is completed.

The Class III survey documented two previously recorded sites. No new sites were identified. Site AZ EE:9:224(ASM) is a sparse prehistoric artifact scatter. Site AZ EE:9:225(ASM) is a set of rock piles. Both sites are recommended ineligible for listing on the National Register because of their limited information potential. Avoidance measures or further treatment should not be required at either site.

Should any archaeological resources be discovered during implementation of this Project, all surface-disturbing activities in the area of discovery should immediately cease until Hunt Power can be notified and arrange for a qualified archaeologist to

assess the find. If human remains or funerary objects are discovered, the ASM should be notified, as required by Arizona Revised Statutes § 41-865.

9 References

Adams, Kim, and Teresa Hoffman
1995 *Archaeological Assessment of a Proposed Fiber Optic Cable Right-of-Way between Tucson, Pima County, and Nogales, Santa Cruz County, Arizona*. Archaeological Consulting Services, Ltd., Tempe.

Agenbroad, Larry D.
1975 Bison Remains at Murray Springs, Arizona. *The Kiva* 4(4): 309–14.

Bauer, Sharon K., and A. E. “Gene” Rogge
2001 *Cultural Resource Survey for the Nogales Gateway Project, Nogales, Arizona.* URS Corporation, Inc., Phoenix.

Bauer, Sharon K., A. E. “Gene” Rogge, and Cara Lonardo
2000 *Cultural Resources Overview and Identification Survey Report for the Ductos de Nogales Lateral Pipeline Project, Nogales, Santa Cruz County, Arizona*. URS Dames and Moore, Inc., Phoenix.

Breen, Judy
2004 *Archaeological Survey of Mariposa (MAP) Land Port of Entry, Santa Cruz County, Arizona*. Report 035212-007. Logan Simpson Design, Inc., Tempe.

Brodbeck, Mark, and Michelle Marsich
2015 *A Cultural Resources Survey for the State Route 189, International Border to Grand Avenue Improvement Project, Nogales, Santa Cruz County, Arizona*. Cultural Resources Report 15-4. HDR, Inc., Phoenix.

Bronitsky, Gordon, and James D. Merritt
1986 *The Archaeology of Southeastern Arizona: A Class I Cultural Resource Inventory.* Bureau of Land Management Cultural Resource Series Monograph No. 2. Arizona State Office of the Bureau of Land Management, Phoenix.

Brown, David E. (editor)
1994 *Biotic Communities: Southwestern United States and Northwestern Mexico*. University of Utah Press, Salt Lake City.

Bruder, J. Simon
1992 *Cultural Resources Class III Inventory for the Mariposa Road (State Route 189) Upgrading Project, Santa Cruz County, Arizona*. Dames and Moore, Inc., Phoenix.

Bruder, J. Simon, and Daniel Garcia
2002 *A Cultural Resource Survey at the Santa Cruz River Bridge on SR 82, Santa Cruz County, Arizona*. EcoPlan Associates, Inc., Mesa.

Bryan, Kirk, and James W. Gidley
1926 Vertebrate Fossils and Their Enclosing Deposits from the Shore of Pleistocene Lake Cochise, Arizona. *American Journal of Science* 11: 477–88.

Cable, John, and David E. Doyel
1987 Pioneer Period Village Structure and Settlement Pattern in the lower Salt River Valley. In *The Hohokam Village: Site Structure and Organization*, edited by D. E. Doyel, pp. 21–70. American Association for the Advancement of Science, Glenwood Springs.

Carpenter, John P.
1995 *An Archaeological Assessment for the Mariposa Canyon Borrow Pit in Nogales, Arizona*. Technical Report No. 95-8. Tierra Right-of-Way Services, Ltd., Tucson.

Chronic, Halka
1983 *Roadside Geology of Arizona*. Mountain Press Publishing, Missoula.

Cordell, Linda
1997 *Archaeology of the Southwest,* 2nd edition. Academic Press, Inc., San Diego.

Crown, Patricia L.
1987 Classic Period Hohokam Settlement and Land Use in the Casa Grande Ruins Area, Arizona. *Journal of Field Archaeology* 14: 147–62.

Crown, Patricia L., and James Judge (editors)
1991 *Chaco and Hohokam: Prehistoric Regional Systems in the American Southwest*. School of American Research Press, Santa Fe.

Danson, Edward B.
1946 *An Archaeological Survey of the Santa Cruz River Valley from the Headwaters to the Town of Tubac in Arizona*. Master's thesis, The University of Arizona, Tucson.

Deaver, William L., and Carla R. Van West
2001 *El Macayo: A Prehistoric Settlement in the Upper Santa Cruz River Valley*. Technical Series 74, Statistical Research, Inc. Tucson.

Diehl, Allison Cohen
2000 *Cultural Resources Survey of Culvert Extension Areas along State Route 80 between Douglas and Silver Creek, Cochise County, Arizona*. Desert Archaeology, Inc., Tucson.

DiPeso, Charles C.
1953 Clovis Fluted Points from Southeastern Arizona. *American Antiquity* 19(1): 82–85.

Douglas, Diane L.
1991 *Cultural Resources Class I Inventory for the Mariposa Road (State Route 189) Upgrading Project, Santa Cruz County, Arizona*. Dames & Moore, Inc., Phoenix.

Douglas, John E., and Linda J. Brown
1984 *Archaeological Survey in the San Bernardino Valley, Southeastern Arizona.* Manuscript prepared by the Anthropological Resource Center of Cochise College, Douglas, Arizona.

Frick, Paul S.
1954 *An Archaeological Survey in the Central Santa Cruz Valley, Southern Arizona*. Masters thesis, The University of Arizona, Tucson.

Gardiner, Ronald, and Bruce B. Huckell
1987 *Report on the Mapping and Testing of AZ EE:9:107, AZ EE:9:108, and AZ EE:9:109 at Nogales, Arizona on Bureau of Land Management Land Proposed as the Site for the New Santa Cruz County Administrative Complex*. Cultural Resource Management Division, Arizona State Museum, Tucson.

Granger, Byrd H.
1983 *Arizona Names*. Falconer Publishing, Tucson.

Grebinger, Paul F.
1971 *Hohokam Cultural Development in the Middle Santa Cruz Valley, Arizona*. Doctoral dissertation, The University of Arizona, Tucson.

Haury, Emil W.
1950 *The Stratigraphy and Archaeology of Ventana Cave, Arizona*. University of New Mexico Press, Albuquerque.

Haury, Emil W.
1976 *The Hohokam, Desert Farmers and Craftsmen*. University of Arizona Press, Tucson.

Haury, Emil W., Ernst Antevs, and John F. Lance
1953 Artifacts with Mammoth Remains, Naco, Arizona. *American Antiquity* 19(1): 1–24.

Haury, Emil W., Edwin B. Sayles, and W. W. Wasley
1959 The Lehner Mammoth Site, Southeastern Arizona. *American Antiquity* 25(1): 2–30.

Haynes, C. Vance, Jr.
1966 Elephant Hunting in North America. *Scientific American* 214: 104–22.

Hemmings, E. T., and C. Vance Haynes, Jr.
1969 The Escapule Mammoth and Associated Projectile Points, San Pedro, Arizona. *Journal of the Arizona Academy of Science* 5: 184–88.

Hill, Matthew E., Jr.
2001 *Cultural Resources Overview and Identification Survey Report for the Ductos de Nogales Lateral Pipeline Project, Nogales, Santa Cruz County, Arizona – Addendum.* Environmental Planning Group, Inc., Phoenix.

Hill, Matthew E., Jr., and J. Simon Bruder
2000 *Passive Accumulations: Archaeological Investigations in Support of Reconstruction and Extension of Runway 12L-30R at Williams Gateway Airport, Mesa, Arizona*. Dames & Moore Intermountain Cultural Resources Services Research Paper No. 51. Dames & Moore, Inc., Phoenix.

Hill, Matthew E. Jr., Daniel Garcia, and J. Simon Bruder
1999 *Cultural Resources Survey in the Vicinity of Danger Wash Bridge #67, Cochise County, Arizona*. Dames & Moore, Phoenix.

Huckell, Bruce
1984 The Paleo-Indian and Archaic Occupation of the Tucson Basin: An Overview. *The Kiva* 49 (3-4): 133–45.

Irwin-Williams, Cynthia
1979 Post-Pleistocene Archeology, 7000–2000 B.C. In *Southwest*, edited by A. Ortiz, pp. 31–42. Handbook of North American Indians, Vol. 9, William C. Sturtevant, general editor. Smithsonian Institution, Washington, D.C.

Lascaux, Annick
1998 *A Class III Archaeological Inventory of Fifty-eight 30-Meter-Diameter Light and Power Pole Locations along the International Border, Nogales, Santa Cruz County, Arizona*. SWCA, Inc., Environmental Consultants, Tucson.

Lindemuth, J., C. Welch, and M. Hopkins
2010 *Cultural Resources Survey for the Proposed Road Improvements Totaling 5 Kilometers (3 Miles) West of the Mariposa Commercial Port-of-Entry near Nogales, Arizona, Santa Cruz County, Arizona*. Gulf South Research Corporation and Northland Research Inc., Tempe.

Lite, Jeremy A.
1996 *A Cultural Resources Survey of 1.10 Miles of State Route 189 (Mariposa Road) Right-of-Way, Mileposts 0.0 to 0.3 and Mileposts 3.0 to 3.8, Nogales, Santa Cruz County, Arizona*. Archaeological Research Services, Inc., Tempe.

1997a *A Cultural Resources Survey of Existing and Proposed Arizona Department of Transportation Right-of-Way at the Intersection of Business-19 and State Route 189 in Nogales, Santa Cruz County, Arizona*. Archaeological Research Services, Inc., Tempe.

1997b *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*. Archaeological Research Services, Inc., Tempe.

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 0.0 to 30.0), Santa Cruz, Arizona*. Archaeological Research Services, Inc., Tempe.

Mabry, Jonathan B., and Jeffery J. Clark
1994 Early Village Life on the Santa Cruz River. In *Archaeology in Tucson: Newsletter of the Center for Desert Archaeology* 8(1). Center for Desert Archaeology, Tucson.

Neily, Robert B., and R. Thomas Euler
1987 *A Cultural Resource Inventory of Bureau of Land Management Land Proposed as the Site for the New Santa Cruz County Administrative Complex*. Cultural Resource Management Division, Arizona State Museum, Tucson.

Petersen, Eric S. II
2008 *An Archaeological Survey for the EPNG Line 2143 Year 2008 Pipeline Integrity Program, Pima and Santa Cruz Counties, Arizona*. Cultural Resources Report No. 08-33. SWCA, Inc., Environmental Consultants, Tucson.

Reid, Jefferson, and Stephanie Whittlesey
1997 *Archaeology of Ancient Arizona.* The University of Arizona Press, Tucson.

Roth, Barbara
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, Inc., Tucson.

Sayles, Edwin B., and Ernst Antevs
1941 *The Cochise Culture*. Medallion Paper 29. Gila Pueblo, Globe.

Shelley, S. D., and J. H. Altschul
1987 *Cultural Resources Literature Search and Survey of Portions of Nogales Wash and Potrero Creek, Southern Arizona*. Report prepared for the Los Angeles District, United States Army, Corps of Engineers. Technical Series No. 6, Statistical Research, Inc.

Slawson, Laurie V.
1991 *Archaeological Investigations in Nogales, Arizona: A Limited Testing Program at AZ EE:9:107(ASM)*. Technical Series 27, Cultural and Environmental Systems, Inc., Tucson.

Stephen, David V. M.
2001 *Letter report for the Escalada Commerce Center Project*. Cultural Resources Report 011355, Professional Archaeological Services and Technologies, Inc., Tucson.

2005 *Cultural Resources Survey of the Nogales SR-189 ADOT Project near Nogales, Santa Cruz County, Arizona*. Cultural Resources Report No: 051715, Professional Archaeological Services and Technologies, Inc., Tucson.

Stone, Bradford W.
1995 *Cultural Resources Survey of an Aggregate Materials Source and Alternate Sources within the Interstate 19 Traffic Median North of the Mariposa Road/Interstate 19 Traffic Interchange, Santa Cruz County, Arizona*. Archaeological Research Services, Inc., Tempe.

Touchin, Jewel
2004 *A Cultural Resources Survey of a Temporary Construction Easement at the Southeast Corner of the Business-19 and Baffert Drive Intersection in Nogales, Santa Cruz County, Arizona*. Cultural Resource Report 04-06, HDR Engineering, Inc., Phoenix.

Walker, H. P., and D. Bufkin
1986 *Historical Atlas of Arizona*. Second edition. University of Oklahoma Press, Oklahoma.

Walsh, Mary-Ellen
2006 *A Cultural Resources Survey of a Proposed Access Road West of State Route 189 at Milepost 0.095, Nogales, Santa Cruz County, Arizona*. Technical Report No. 065250, Logan Simpson Design, Inc., Tempe.

2008 *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*. Report 085115. Logan Simpson Design, Inc., Tempe.

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, Inc., Tempe.

Wilcox, David R.
1979 The Hohokam Regional System. In *An Archaeological Test of Sites in the Gila Butte-Suntan Region, South-Central Arizona,* edited by Glen E. Rice, David R. Wilcox, Kevin Rafferty, and James Schoenwetter, pp. 77–116. Arizona State University Anthropological Research Papers 118, Tempe.

1980 The Current Status of the Hohokam Concept. In *Current Issues in Hohokam Prehistory: Proceedings of a Symposium,* edited by David E. Doyel and Fred Plog, pp. 236–242. Arizona State University Anthropological Research Papers 23, Tempe.

Wilcox, David R., and Charles Sternberg
1983 *Hohokam Ballcourts and Their Interpretation.* Arizona State Museum Archaeological Series 160, Tucson.

Woodward, James
1984 *Nogales Historic Building Survey*. Janus Associates, Inc., Phoenix.

Woodward, James, and Shawna P. Francissena
1984 *Nogales Multiple Resource Area National Register of Historic Places – Nomination Form*. Submitted June 14, 1985.

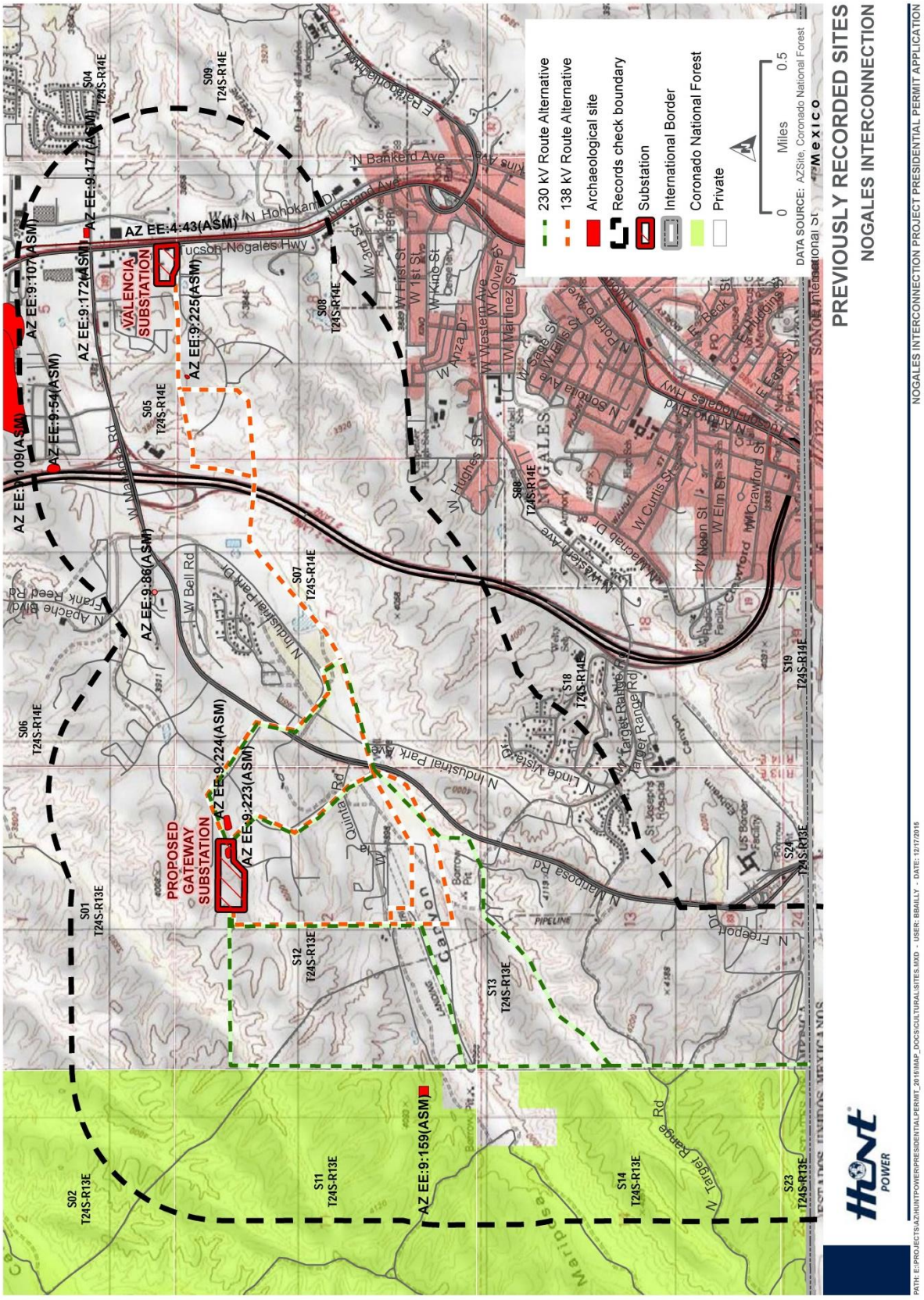
Woosley, Anne I., and Carol D. Kriebel
1985 *Amerind Pleistocene Lake Studies I: The Archaeology of the Willcox Playa*. The Amerind Foundation, Inc., Dragoon.

This page is intentionally left blank.

Attachment A: Previous Recorded Sites

This appendix contains sensitive information about the location of cultural resources and is provided for information only as allowed by Hunt Power. This appendix is not for distribution.

This page is intentionally left blank.



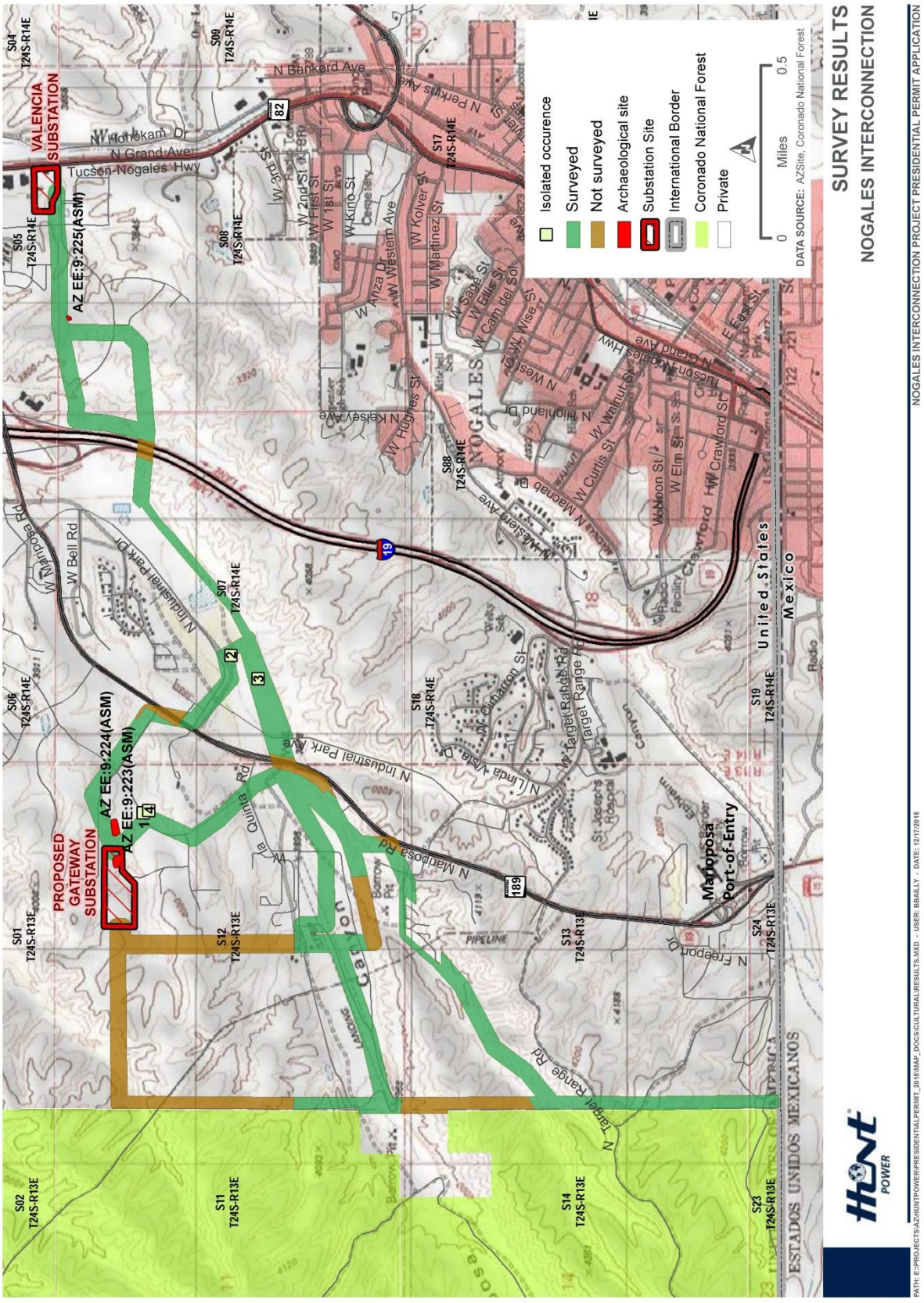
Previously recorded sites

This page is intentionally left blank.

Attachment B: Survey Results

This appendix contains sensitive information about the location of cultural resources and is provided for information only as allowed by Hunt Power. This appendix is not for distribution.

This page is intentionally left blank.



Survey results

This page is intentionally left blank.