FINAL ENVIRONMENTAL ASSESSMENT FOR THE TO'HAJIILEE SOLAR PROJECT

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List of Acronyms and Abbreviations

°C	degrees Celsius
°F	degrees Fahrenheit
AC	alternating current
AFRED	*Assessing the Feasibility of Renewable Energy Development and Energy Efficiency Deployment on Tribal Lands*
AIRFA	American Indian Religious Freedom Act
BIA	Bureau of Indian Affairs
BMP	best management practice
CBN	Cañoncito Band of the Navajo Nation
CFR	Code of Federal Regulations
cfs	cubic feet per second
cfu	colony forming units
Chapter	To'Hajiilee Chapter of the Navajo Nation
CIDH	cast-in-drilled-hole
cm	centimeter
CO_2	carbon dioxide
dB	decibel
DC	direct current
DOE	U.S. Department of Energy
EA	Environmental Assessment
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
HEC-HMS	Hydrologic Engineering Centers Hydrologic Modeling System
HEC-RAS	Hydrologic Engineering Centers River Analysis System
kg	kilogram
km	kilometer
kV	kilovolt
LCD	liquid crystal display
m	meter
m^2	square meter
MW	megawatt
MWh	megawatt-hour
mL	milliliter
NAAQS	National Ambient Air Quality Standards
NAD	North American Datum
NEPA	National Environmental Policy Agency
NHPA	National Historic Preservation Act
NIOSH	National Institute for Occupational Safety and Health
NMAC	New Mexico Administrative Code
NMED	New Mexico Environment Department
NNDFW	Navajo Nation Department of Fish and Wildlife
NNHPD	Navajo Nation Historic Preservation Department
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places

O&M	operation and maintenance
OSHA	Occupational Safety and Health Administration
PNM	Public Service Company of New Mexico
PV	photovoltaic
PV Cycle	PV Cycle Association
RCI	Rural Community Innovations
RFP	request for proposals
RPMC	Rio Puerco Management Committee
SCADA	supervisory control and data acquisition
SunPower	SunPower Corporation
SWCA	SWCA Environmental Consultants
SWPPP	Stormwater Pollution Prevention Plan
TCP	Traditional Cultural Property
TEDI	To'Hajiilee Economic Development Inc.
UL	Underwriters Laboratory
USDA	U.S. Department of Agriculture
USFWS	United Stated Fish and Wildlife Service
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator

1.0 INTRODUCTION

SWCA Environmental Consultants (SWCA) has prepared this Environmental Assessment (EA) on behalf of Rural Community Innovations (RCI) and the To'Hajiilee Economic Development, Inc. (TEDI), the incorporated economic development corporation of the To'Hajiilee Chapter of the Navajo Nation (Chapter). The Chapter is unique in that unlike most tribes nationally and chapters within the Navajo Nation, To'Hajiilee has land held in trust on its own behalf with the U.S. Department of Interior. When dealing with these trust lands, the Chapter is known as the Cañoncito Band of Navajo Indians (CBN). The community is located in To'Hajiilee, New Mexico, and the Chapter uses the Navajo designation (To'Hajiilee) for non-land issues and the Anglo-Hispanic designation (Cañoncito) for trust land issues. For this EA, the community is referred to as the CBN, while the business arm of the Chapter is referred to as TEDI.

TEDI and power industry partners are in the process of planning for a 30-megawatt (MW) solar power plant to be constructed on CBN lands. Prior to construction of the solar power plant, the Bureau of Indian Affairs (BIA) Eastern Navajo Area would need to grant approval for the execution of a master lease agreement between CBN and TEDI, as well as a sublease agreement between TEDI and the operator and/or owner of the project. This EA analyses the environmental and socioeconomic impacts of approving the lease agreements for the proposed solar project.

1.1 PROJECT LOCATION

The proposed solar project is located on CBN trust lands in western Bernalillo County, New Mexico, 2.8 km (1.8 mile) northwest of the intersection of Interstate 40 and Rio Puerco Road (Figure 1). The proposed project area is 79 hectares (195 acres) of desert scrubland and occurs within a previously disturbed yet undeveloped area. The proposed project area is located within two sections. The legal description for the project area is Section 31, Township 10 North, Range 1 West and Section 6, Township 9 North, Range 1 West (Figure 2). Universal Transverse Mercator (UTM) coordinates for the center of the proposed project area are E 318769.099 and N 3880171.301 (North American Datum [NAD] 83).

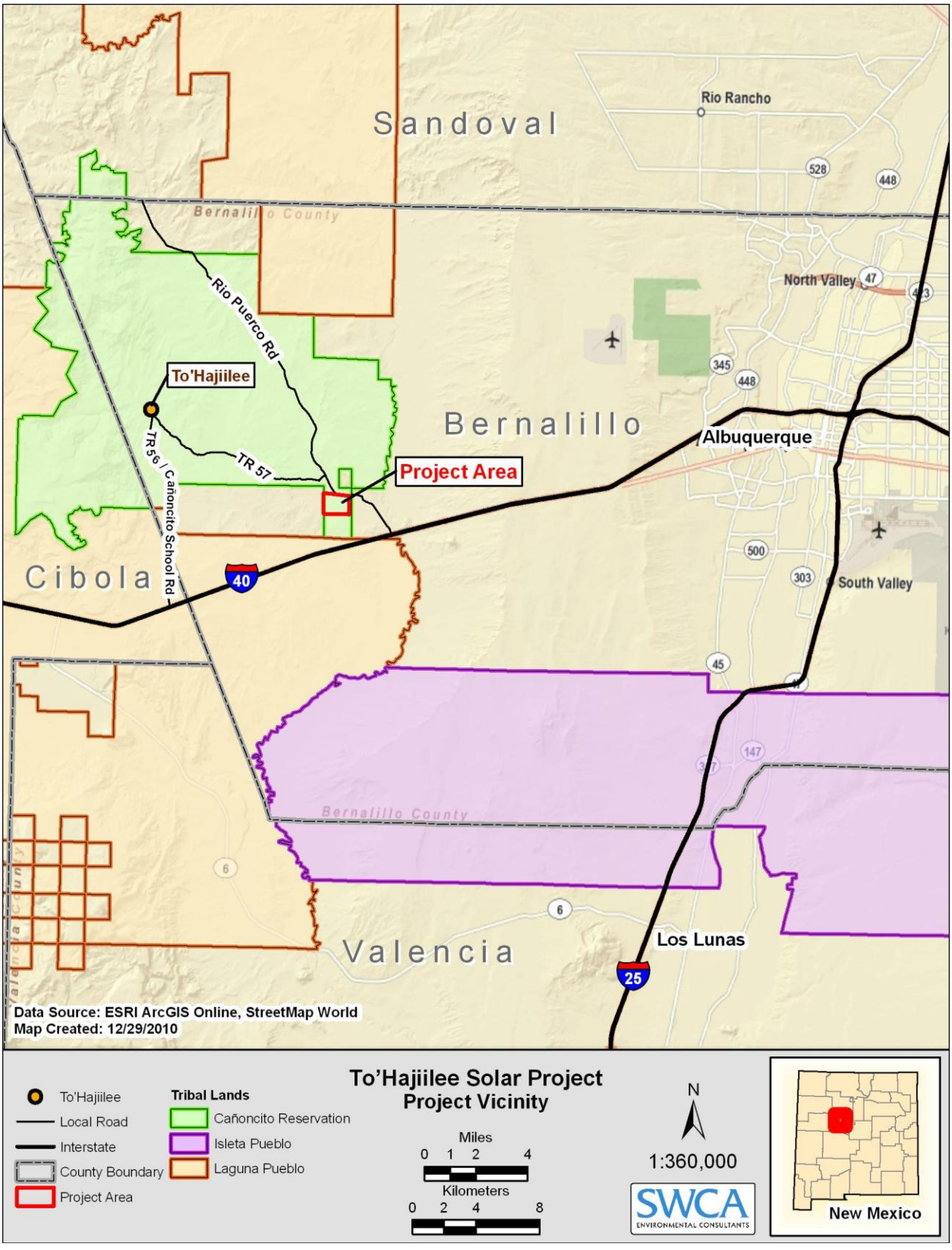

Figure 1. Project vicinity map.

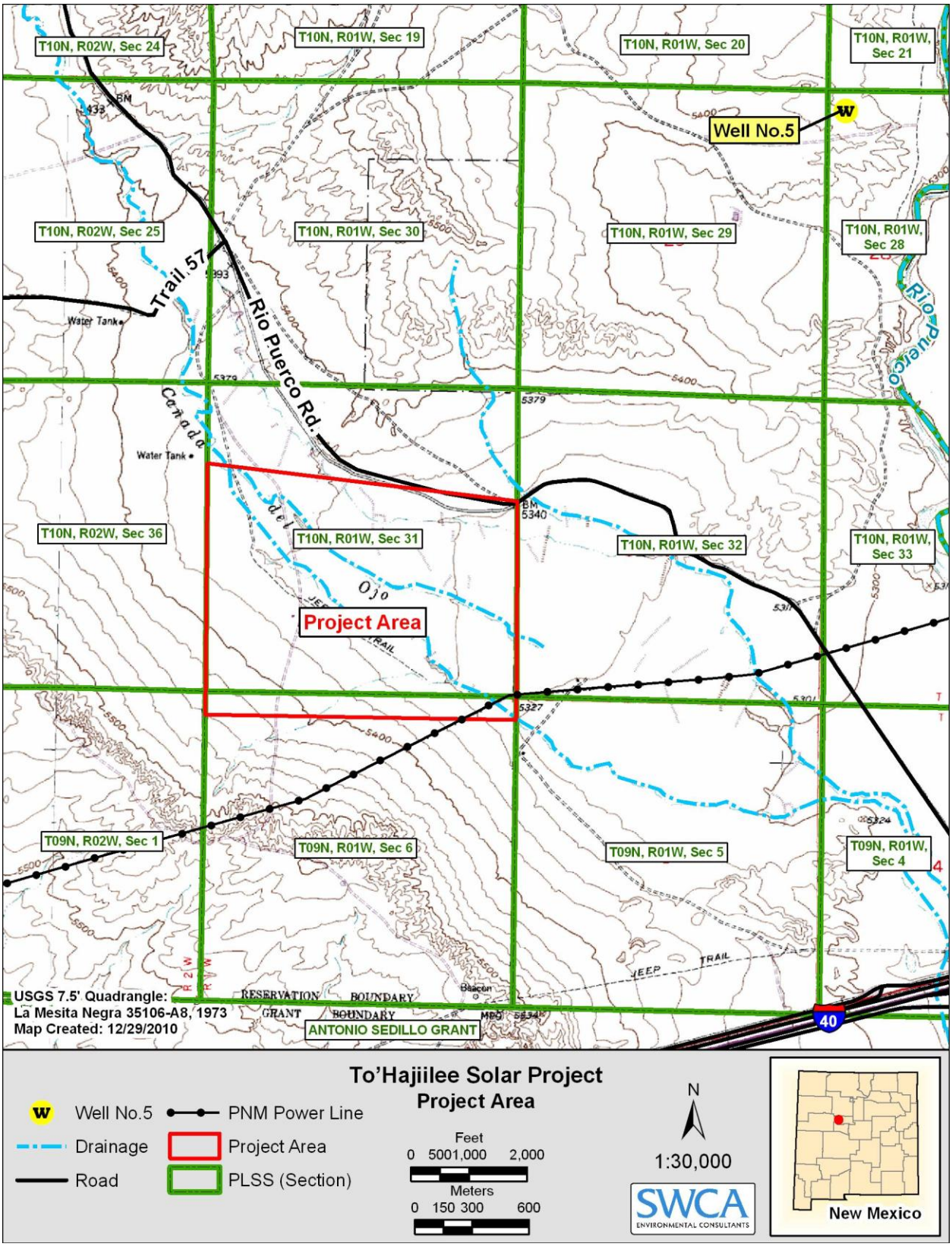

Figure 2. Project area location map.

1.2 BACKGROUND

This EA was prepared as a result of the request for BIA approval of a master lease agreement for CBN lands, which are held in trust by the U.S. government. The master lease agreement between CBN and TEDI would provide the legal instrument under which TEDI could enter into a sublease agreement with a solar operator to build a 30-MW solar power plant within Chapter trust boundaries. The purpose of the EA is 1) for the BIA to evaluate and disclose potential impacts of the proposed project and alternatives and 2) to determine whether to approve the master lease and sublease agreements.

In the early 1990s, CBN and TEDI set aside the two sections of land shown in Figure 2 for the purpose of economic development. The site was initially intended to be used for a casino development, but various challenges have prevented the project from becoming a reality. TEDI has intentionally researched and investigated renewable energy development projects as a clean and sustainable source of revenue and other economic benefits for CBN. In 2007, the CBN project site was included in the Public Service Company of New Mexico (PNM) request for proposals (RFP) for a comprehensive feasibility study to locate a 50- to 500-MW solar plant in New Mexico. As a result of being listed in the RFP, TEDI received numerous inquiries and proposals for a renewable energy project on CBN lands. Section 2.3 describes the many renewable energy projects that were considered by TEDI since 2007.

In May 2009, TEDI partnered with RCI to conduct a feasibility analysis for a utility-scale solar project. The work to be performed by RCI was to be compliant with BIA regulations and the terms of the U.S. Department of Energy (DOE) *Assessing the Feasibility of Renewable Energy Development and Energy Efficiency Deployment on Tribal Lands* (AFRED) grant funding opportunity announcement. Under AFRED funding, RCI serves as the coordinating consultant for the project. This business agreement between TEDI and RCI was submitted to DOE in May 2009. As coordinating consultant, RCI secured additional subcontractors to complete the environmental compliance and other project studies, as needed, to move the project closer to the construction phase.

In 2010, CBN passed a resolution to authorize and approve that TEDI negotiate and obtain a business lease agreement for a solar project on the set aside sections (Appendix A).

1.3 PURPOSE AND NEED

The solar project is needed to provide TEDI with a reliable, clean, and long-term source of revenue with which to support Chapter operations and provide sources of funding for economic development opportunities on Chapter trust lands, education improvements and scholarships, infrastructure developments, and improvements to the health and wellness capacity at To'Hajiilee. There are currently no large economic development projects on CBN trust land; therefore, means for providing revenue for infrastructure and educational improvements within the Chapter are necessary. In addition, more than 20% of the Chapter members are unemployed. Sections 6 and 30 were set aside in the early 1990s for the sole purpose of providing a location for economic development activities. TEDI, with the support of other project partners, has determined that a solar power plant would be a viable and sustainable use for this land.

The purpose of the Proposed Action is to approve the legal instrument needed to allow TEDI to move forward with the construction of the solar project on CBN lands. This Proposed Action would serve as a significant economic development activity for the CBN.

1.4 CONFORMANCE WITH FEDERAL GUIDELINES

The Code of Federal Regulations (CFR), 40 CFR, Parts 15–1508, and the BIA National Environmental Policy Act (NEPA) Handbook were used as guidance in developing this EA.

To meet the provisions of NEPA and related regulations, SWCA Biologist, Heather Timmons, surveyed the project area on July 7 and 23, 2010. SWCA Cultural Resource Specialists, John Rissetto, Greg Mastropietro, and Ryan Brucker, surveyed the project area from July 12 to 23, 2010.

2.0 ALTERNATIVE ANALYSIS

This section describes the alternatives that have been considered in the development of this EA. The No Action Alternative (Alternative 1) must always be considered in the EA process. Alternative 2 describes the Proposed Action, which is the approval of the master lease agreement by the BIA in order to allow building of the solar project on CBN lands.

2.1 ALTERNATIVE 1 – NO ACTION

Under the No Action Alternative, the BIA would not approve the master lease agreement between CBN and TEDI, nor the sublease agreement between TEDI and the solar project operator. To'Hajiilee would not be able to pursue the proposed project and the potential for economic development through the renewable energy project would not be realized. TEDI would need to develop new project ideas in order to generate revenue for the Chapter. Infrastructure and educational improvements that would be funded by the proposed revenue-generating project would potentially be compromised.

2.2 ALTERNATIVE 2 – PROPOSED ACTION

TEDI proposes to construct a 30-MW solar power plant on 79 hectares (195 acres) of CBN trust land (Figure 3). The solar project requires BIA approval of the master lease agreement between CBN and TEDI. Once the master lease is granted, TEDI would then enter into a sublease agreement with the operator of the solar project. Under the Proposed Action, the BIA would approve both the master lease and sublease agreements. With this approval, the sublease between TEDI and the facility operator would be granted and the solar project would be constructed. Both the lease and the sublease would be for a term of 25 years with an option to review for an additional 25 years.

The Proposed Action would install approximately 86,400 SunPower Corporation (SunPower) 425-watt modules. The modules would be solar photovoltaic (PV) panels made of high-efficiency monocrystalline silicon. The solar panel array would generate electricity directly from sunlight, collect it to a single point at a new substation within the project area, and then interconnect the power to the PNM 115-kilovolt (kV) Bluewater transmission line for delivery to customers.

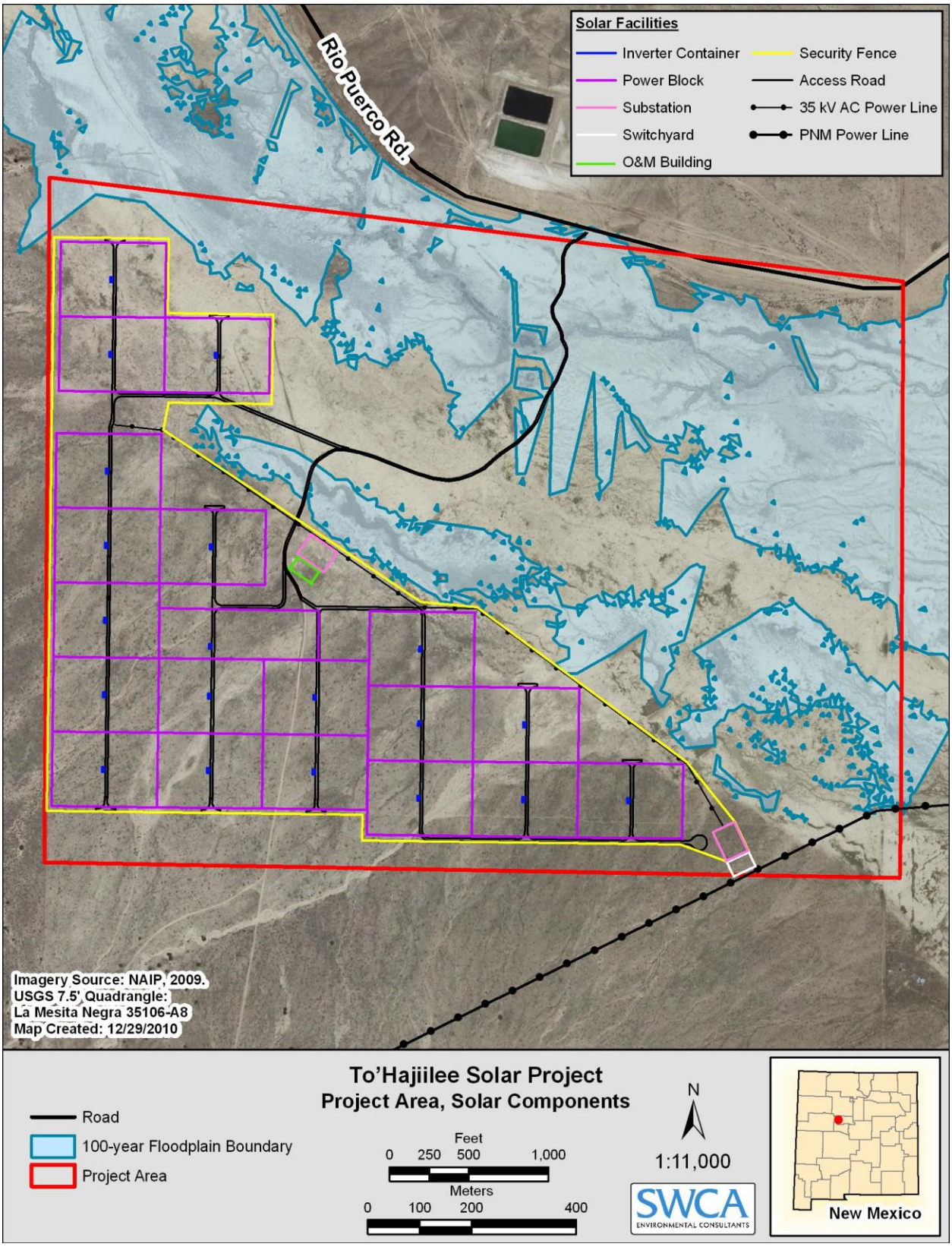

Figure 3. Map of the Proposed Action.

Solar Panel Array

The solar panel array would contain twenty 1.5-MW modular power blocks, each approximately 2.9 hectares (7.2 acres) in size. Each modular power block would contain six trackers with each tracker containing 18 rows of panels, and each row containing four "strings" of 10 panels per row (40 total panels per row). Individual PV panels and rows would be electrically connected together in series to carry direct current (DC) electricity (Appendix B). Multiple DC strings would be wired into an aboveground combiner box to merge the strings into a single medium-current cable. From the combiner boxes, the cabling would be installed underground to inverters housed in enclosures mounted on a concrete pad measuring 7.3 × 3.7 × 0.6 m (24 × 12 × 2 feet) (see Figure 3). The inverters would change the DC output from the combiner boxes to alternating current (AC) electricity. Next, the AC electricity for the modular power block would be increased to medium voltage (34.5 kV) with a standard "step-up" transformer. The medium-voltage cabling would create one to two collection circuits that would carry the electricity from the modular power blocks to a substation. Each medium-voltage collection circuit would be routed underground from the transformer pads to the perimeter of the solar panel array, then travel up a riser and run above ground on poles to a substation located adjacent to the existing PNM power line.

Tracker Units

Each 1.5-MW modular power block typically consists of six individual tracker units (see Appendix B). The tracker units contain the rows of solar PV panels oriented north to south. The tracker units would rotate the rows of solar PV panels from east to west throughout the day following the sun to maximize exposure to sunlight, thereby maximizing electrical output. The rows of each tracker unit would be linked together and rotated in unison by an industrial-grade system controller and drive unit. The tracker units would include seven major components, described below.

Drive Unit. Within a tracker unit, multiple rows of solar PV panels would be linked by a steel drive strut, which would be oriented perpendicular to the axis of rotation. Each row would be connected to the drive strut by a torque arm, which acts as a lever, enabling the drive strut to rotate the rows together as the drive unit moves the strut forward and backward. The drive unit typically is mounted at the first row in a tracker unit and consists of a 0.5-horsepower bi-directional AC motor that rotates the drive strut via an industrial-grade screw jack. The drive unit would be connected to an industrial-grade variable-frequency drive that translates commands from the control computer into AC signals that apply power to the motor, the screw jack, and finally to the drive strut and rows.

The depth of the 120-drive piers would be approximately 3.05 to 4.27 m (10–14 feet) deep (see Appendix B). A 32.4-cm × 9.5-mm (12.75 × 3/8–inch) outside diameter galvanized steel pedestal would be encased within a rebar reinforced 86- to 91-cm (34- to 36-inch) concrete pier. A finish grade would occur at each of the motor's driven pier foundations.

Tracker Controller. The tracker controller is a self-contained industrial-grade control computer that would incorporate all of the software needed to operate the system. The controller would include a liquid crystal display (LCD) monitor that displays a combination of calibration

parameters and status values, providing field personnel with a simple user-friendly configuration and diagnostic interface. The LCD would enable field adjustment, calibration, and testing.

PV Panels. The system would incorporate high-efficiency commercially available Underwriters Laboratories (UL)-listed solar PV panels that are made from monocrystalline silicon, anti-reflective glass, aluminum frame, and copper electrical wires with plastic sheathing. By design, the solar PV panels would absorb sunlight to maximize electrical output and use anti-reflective glass, resulting in approximately half the reflectance of standard residential and commercial glass. Due to the limited rotation angles, the solar PV panels have low potential for reflecting the sun's rays upon any ground-based observer. These panels would be protected from impact by tempered glass and would have factory applied ultraviolet- and weather-resistant "quick connect" wire connectors.

Steel Tracking Structure. The steel tracking structure would be able to withstand high-wind conditions (up to 145 km [90 miles] per hour), site-specific wind gust and aerodynamic pressure effects, and seismic events. The frame would be elevated to approximately 1.8 m (6 feet) above ground and would consist of long horizontal beams atop vertical piles.

The depth of the 17,280 proposed piers that support the tracking structure, not including the drive piers described above, would be approximately 1.83 to 3.05 m (6–10 feet) deep. For the greater depths of approximately 3.05 m (10 feet), 114-mm (4.5-inch) outside diameter galvanized steel-bearing pedestals would likely be used as the driven pier foundation. For the lesser depths of 1.8 to 2.4 m (6–8 feet), 30- to 60-cm (12- to 24-inch) driven piers would be the preferred pier type. Concrete piers would be used as the cast-in-drilled-hole (CIDH) foundation only as necessary based on local soil conditions. A finish grade would occur at each of the driven pier and CIDH foundations.

DC–AC Inverter. The inverter would change the electrical current from DC, which is produced in the solar cells, to AC, which would be fed into the 115-kV PNM power line.

Combiner Boxes. Combiner boxers would merge the DC module wiring into a single medium-current cable.

Data Acquisition System. Integrated with the inverter, this system is made up of multiple components, including a data logger and sensors to record AC power (kilowatts), as well as equipment to record weather conditions, including ambient temperature measured in degrees Celsius (°C), incoming solar radiation measured in watts per square meter, and wind speed measured in meters per second. The data acquisition system enables system data transfer and performance monitoring via the project on-site operation and maintenance (O&M) facility and SunPower's Operations Center located in Richmond, California.

Project Substation

The proposed substation (approximately 2,806 m², 46 × 61 m [30,000 square feet, 150 × 200 feet]) would collect the medium-voltage circuits that carry power from the transformers at each of the 1.5-MW modular power blocks. The substation would contain metering equipment, switchgear, a series of fuses and circuit breakers that act as protective relays, and transformers to step-up the voltage to match the voltage of the PNM 115-kV Bluewater transmission line.

Electricity would flow from the substation through the main transformer where it would be stepped up from 34.5-kV medium voltage to the 115-kV interconnection voltage of PNM's electric system. At this time, it is unknown which substation location would provide the optimal power to the system. As a result, two substation locations are currently proposed, and the final location would be determined once the detailed power analysis is complete (Figure 3).

Switchyard

The Proposed Action includes a switchyard that would provide the interconnection between the solar power plant and PNM's existing electric system (Figure 3). Electricity would flow from the proposed substation through the main transformer where it would be stepped up from 34.5-kV medium voltage to the 115-kV interconnection voltage of PNM electric system. The interconnection to PNM's electric system would occur in a proposed switchyard that would contain switchgear equipment and metering equipment for delivery of the output from the proposed power plant to electric transmission system, as well as an electrical ground safety grid and concrete pads to support the switchyard equipment. The 74 m2 (800-square-foot) control building would also be constructed in the switchyard that would house communications and other equipment used to reliably interconnect the solar facility to the PNM electric system. The control building would be a pre-engineered steel building approximately 17 feet high at its peak painted in a neutral-color to minimize visual impact. Although it would be located within the fenced area of the solar project and accessible only by PNM staff, the proposed switchyard would be fenced with an 8-foot-high cyclone fence topped with barbed wire, as required by utilities security standards. The control building would be located within the security fence surrounding the proposed switchyard.

O&M Building

The Proposed Action includes an O&M building located adjacent to the proposed solar array, to the east of power block six and east of the existing unnamed road within the project area. The design and construction of this building would be consistent with BIA building standards. The approximately 232 m^2 (2,500-square-foot) O&M building would provide an office, materials and equipment storage, and restroom facilities. The location of the proposed O&M building is shown in Figure 3.

The O&M building would be a pre-engineered steel building approximately 5 m (17 feet) high at its peak with a neutral-colored steel siding to minimize visual impact. The maintenance area of the building would include roll-up doors to provide equipment access to the maintenance portion of the building as well as personal access doors. Appendix B provides an elevation drawing of a typical O&M building. A parking area with three parking spaces would be provided and would comply with applicable requirements of the building code and zoning ordinance. Electric power for the O&M building would be provided by the Continental Divide Electric Company, which provides power to a groundwater well located on the north side of the proposed project area (Rob Burpo, TEDI, personal communication with Coleman Burnett, SWCA, April 13, 2011). The entire project area would be fenced to maintain security at the site.

Access Roads

The existing unnamed road within the project area would be used for the access route from Rio Puerco Road to the project area. The existing road crosses the Cañada del Ojo drainage. This road would be improved to allow for construction and maintenance vehicular access to the project area (see Figure 3). The unpaved road would be widened to 16' in width. Within the project area, a road network would be built to access each inverter equipment pad. The total miles of access roads would be approximately 6.4 km (4 miles) in length. Roads in the center of the arrays between the O&M building and the inverter equipment pads would improved as necessary for access and would most likely be graveled. Approximately 10 to 20 cm (4–8 inches) of Class 2 aggregate base would be added and compacted.

Access roads would be composed of compacted earth or gravel, depending on site specific soil conditions. Typically, the ground would be grubbed (cleared of vegetation), scarified (loosened up), moisture conditioned, compacted, and graded with a crown in the center. During decommissioning of the facility, it is anticipated that the same access roads would be used for removal of the facility components.

Table 1 provides a summary of the surface-disturbing components of the proposed solar power plant. The total area of disturbance would be approximately 79 hectares (195 acres).

Table 1. Surface Disturbance for Proposed Action

Project Component	Disturbance Area	Disturbance Depth
Tracker piers	• Maximum 24-inch diameter of concrete • 17,280 piers • 2.8 acres total of concrete to support piers	6–14 feet (depending on pier type)
Inverter pads	• 288 square feet per concrete pad • 21 pads • 6,048 square feet total of concrete pads	5 feet maximum excavation for electrical wiring with 2-foot-deep concrete pad
Substation	• 30,000 square feet	8- to 24-inch slab on grade with thickened areas under heavy equipment
O&M building	• 2,500 square feet for building footprint • 540 square feet for parking lot with 3 spaces • 20,700 square feet total for building and parking lot	Slab on grade with spread footing under bearing walls to 30 inches deep
Roads	• Maximum road width would be 16 feet • Total road length for all access roads from the Rio Puerco Road would be approximately 4 miles	4–8 inches of Class 2 aggregate with 3 inches of asphalt concrete
Security fence	• Approximately 3.5 miles of 8 feet tall security fence	Metal fence posts would be drilled to a 3- to 4-foot depth and mounted in concrete

2.2.1 CONSTRUCTION PHASE

Construction is estimated to take place over a period of ten to twelve months. Construction activities would include grading the project area as needed to meet the tolerances of the tracker

structure, installing the modules and associated infrastructure, and connecting the solar infrastructure to the existing 115-kV power line. Maximum trench depths for utility lines would be 3.4 m (11 feet), and maximum grading cuts would be approximately 2.1 m (7 feet). Erosion control fences or wattles would be placed along the edges of the construction site to minimize sediment movement off-site. Finally, straw blankets and native grass species would be planted following completion of construction for soil stabilization. Construction equipment used on-site is listed in Table 2. It is estimated that 25 to 140 full-time employees would be hired for the construction of the project.

Table 2. Construction Equipment for Solar Power Plant

Equipment	Construction Phases				
	Site Preparation	Solar Array	Lines and Poles	Fiber Optic Cable	Substation and O&M Building
Backhoes	1	2	1		1
Cranes		1	1	1	1
Pile drivers		6			
Fork lifts	1	4	1	1	1
Dozers	1				1
Excavator	1				1
Grader	1				1
Loaders, rubber-tired	1	2	1	1	
Rollers	1				1
Scrapers	1				
Trenchers		1			
Dump truck	4	1			1
Water truck	1	2			
Concrete truck	1	2	1		2
Flatbed truck		20	2	2	4
Light weight truck	6	20	4	4	8
All-terrain vehicle gator carts	6	20			

Staging and Other Temporary Work Areas

A central staging area would be delineated at the site, which would include the temporary office trailers, parking for the construction workers, and a materials delivery area (where some materials would be stored in the open or in containers). Most materials would be scheduled to arrive at the site at the time they are needed and would be sent out immediately to the area where they would be installed. Some materials may be staged near where they are needed for a short period, but the production would be fairly fast, and these temporary staging areas would move around the project area with the construction. The central staging area would be approximately 0.4 hectare (1 acre) in size.

Erosion and Sediment Control and Pollution Prevention during Construction

A Stormwater Pollution Prevention Plan (SWPPP) would be developed for the construction of the facility. The SWPPP would include a combination of measures to protect areas that are

determined to be vulnerable to erosion. Additionally, measures would be proposed in the SWPPP to control the tracking of mud onto the roads by construction vehicles.

Construction Materials

During construction, the project would involve the transport of general construction materials (e.g., concrete, aggregate, wood, metal, and fuel), as well as the materials necessary to construct the proposed solar PV array. Construction waste that is generated at the project site would be sorted to separate recyclable and non-recyclable materials. Waste would be stored in dumpsters, which would be serviced by a licensed solid waste hauler in Bernalillo County. Non-hazardous construction debris that would be generated would be disposed of in local landfills, located within approximately 64 km (40 miles) of project site, in accordance with applicable regulations.

Solar Array Construction

Support piles up to 5.5 m (18 feet) long would be installed by vibratory pile driving, which would involve inserting a steel pipe into the ground using a hydraulic vibratory pile driver. The pipe would be approximately 13 cm (5 inches) in diameter by 5.5 m (18 feet) long. The piles would be set so that approximately 1.4 m (4.5 feet) of the pile would remain above grade. This would be the foundation for the trackers. No blasting or rock breaking is anticipated during project construction. Small-truck mounted cranes or grade-all forklifts would move materials through the site and support tracker construction. Array construction would include small all-terrain vehicles to transport materials and workers on access roads and array aisles.

Solar PV panels would be manufactured off-site and shipped to the site ready for installation. Concrete pads for the drive motors would be poured using concrete from an either an off-site local batch plant or mixed on-site.

O&M Building Construction

The O&M building area would be surveyed and staked. An approximately 232-m^2 (2,500-square-foot) concrete slab would be built, corresponding to the dimensions of the building. The prefabricated steel building structure would then be assembled. The exterior finishes would be constructed as the mechanical and electrical systems are being built inside. Interior finishing work would follow, and final fixtures and equipment installed. Water would be trucked in from a nearby groundwater well (Figure 2) to supply to the O&M building with drinking water. A septic tank, approximately 500 gallons in size, and leech fields would be installed to treat the waste water produced by the O&M building. A permit would be obtained from the Navajo Nation Environmental Protection Agency (EPA) Public Works Systems Supervision Program prior to installation of the O&M building's drinking and waste water systems.

Substation

Most construction work within the substation site would be performed by crews, including site preparation and installation of substructures and electrical equipment. The site would be initially cleared and graded and security fenced for the duration of construction. New Mexico One Call would be contacted to mark the locations of existing buried utilities in the vicinity if any

excavation is proposed. Substation materials and equipment would be delivered to and stored at the substation site, as required, during the construction process.

The substation would be constructed with conventional grading and construction equipment. Grading would establish the desired site grade, and minor excavation would provide concrete footings for the substation equipment.

2.2.2 PROJECT MAINTENANCE

Maintenance for the proposed solar project would be minimal. It is estimated that six full-time employees would be hired for ongoing O&M of the project. One permanent full-time plant manager and one full-time maintenance staff would work in the O&M building. Additional support personnel would be employed, as needed. The plant manager would perform inspections, covering each portion of the array no less than once per month. Such inspections would be visual and at ground level. Monthly visual inspections and annual (minimum) preventive maintenance would be performed. Maintenance staff would traverse the site five days per week, conduct panel washing at least twice per year (as described below), and provide security to patrol the perimeter of the site. In accordance with Occupational Safety and Health Administration (OSHA) safety regulations, at least two qualified personnel would be present during all energized electrical maintenance activities at the facility. The proposed plant manager and one technician would be on-site when such activities are required. The solar power plant would be monitored during operating (daylight) hours, even though it is capable of automatic start up, shutdown, self-diagnosis, and fault detection.

Automated Facility Control and Monitoring System

The proposed facility control and monitoring system would have two primary components: an on-site supervisory control and data acquisition (SCADA) system and the accompanying sensor network. The on-site SCADA system would offer near real-time readings of the monitored devices, as well as control capabilities for the devices where applicable. Off-site monitoring/data trending systems would collect historical data for remote monitoring and analysis at the SunPower Operations Center in Richmond, California. The plant manager would use both on-site (local) and off-site (remote) O&M personnel to monitor the facility.

Local O&M personnel would use the local SCADA and monitoring system to monitor operations and control the project facilities. Remote personnel at the SunPower Operations Center located in Richmond, California, would provide continuous 24-hour-per-day, 365-days-per-year monitoring coverage of the project facilities and would respond to real-time alerts and system upsets using advanced monitoring applications that reside on the servers at the SunPower Operations Center.

Panel Washing

Panel washing would occur approximately two to four times per year, as needed, to clean the active surface of solar panels to optimize transmission of solar light and energy production. Panel washing would require approximately 95,000 gallons of water per cleaning and would be obtained from a groundwater well located 3.5 km (2.2 miles) from the project area across existing roads (see Figure 2). The Cañoncito Community Water System, operated and

maintained by the To'Hajiilee Chapter's Water Project Office, has adequate infrastructure and capacity to the serve the water requirements of the proposed project.

Site Maintenance

The project operator would provide landscape and related site maintenance throughout the life of the project. This will include vegetation maintenance and appropriate disposal of any organic and inorganic materials used in the maintenance of the property. Weed control would be conducted as needed within the project area using local grazing operations. Sheep would be allowed to enter the site and graze down the plant species to an acceptable level.

2.2.3 PROJECT DECOMMISSIONING AND SITE RECLAMATION

A Power Purchase Agreement between the project operator and a utility buyer is expected to have a term of 20 years with a renewal option of 10 to 20 years. If no contract extension is available at the end of the contract term, and if no other buyer of the energy emerges, the solar plant would be decommissioned and dismantled and the site restored. For purposes of this analysis, it is expected that the Proposed Action lifespan would be 50 years.

In January 2009, SunPower officially joined PV Cycle Association (PV Cycle), a Brussels-based PV trade association dedicated to the development of PV product recycling standards. PV Cycle was founded to implement the PV industry's commitment to set up a voluntary take-back and recycling program for end-of-life panels and take responsibility for PV panels throughout their entire value chain (PV Cycle 2010).

The proposed PV panels are expected to have a useful life (i.e., be capable of producing electricity) for 50 years or more. The panels are warranted for 25 years with a design life of more than 35 years.

Because it is expected that the proposed PV panels would continue to have a useful electricity-producing post-project life, the applicant proposes to reuse the panels when the project is decommissioned and then recycle them at the end of their useful life. Decommissioning and reuse would involve removal of the panels for sale into a secondary PV panel market. The majority of the remaining components would be recycled. Equipment such as drive controllers, inverters, transformers, and switchgear can be either reused or their components recycled. Poured concrete pads would be removed and recycled or reused as clean fill.

Appropriate hazardous materials control and erosion control measures would be used throughout the decommissioning process. It is anticipated that such controls would be substantially similar to those implemented during construction.

Post-project, it is expected that the site would be revegetated to previous site conditions to the extent feasible.

2.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

Beginning in May 2007, TEDI began to explore ways to bring revenue to CBN from the trust land that was set aside for economic development purposes in the 1990s. TEDI met with numerous renewable energy companies because Chapter members wanted to pursue clean and reliable economic development activities that served as an alternative to the casino industry. Table 3 provides a summary of the various renewable energy projects that were considered by TEDI and the limitations of each project that would hinder the project from being brought forward for full consideration as a viable alternative.

Table 3. Renewable Energy Projects Considered by TEDI Since 2007

Project/Proponent Name	Project Type	Brief Description	Project Limitation(s)
Wind Power Feasibility Study by Los Alamos and Sandia National Laboratories	Wind Feasibility Study	Wind power feasibility study for all CBN lands.	Results showed TEDI that CBN lands do not have sufficient wind speeds to sustain wind project.
Infinite Solar, LLC	Solar	Electricity would be generated by parabolic mirrors heating oil or water within a closed system.	Water supply is not sufficient for the specific solar technology. CBN did not want to allocate a large land area to support the project.
Industrial Power Technology, Inc.	Solar	The proposed solar technology was designed for commercial and residential purposes	The technology was cost-effective, but would not meet the needs of utility-scale solar. The project also had insufficient capital.
Fotowatio, USA	Solar	The proposed 40-MW facility would require 1,400 acres for the project.	Project location would be too far from the PNM line and would require rights-of-way across CBN lands. The project did not receive full CBN support.
Acciona	Solar	Originally part of Fotowatio project. Acciona proposed a 40-MW facility would require 1,400 acres for the project.	Project would require a large land area. The project was also too expensive and had insufficient capital.
First Solar Electric	Solar	The proposed solar project would cross from CBN lands to neighboring tribal land to the south.	The relationship with the neighboring tribe prohibited moving the project forward. In addition, the project proponent decided to focus efforts in the southern portion of New Mexico.
Solucar	Solar	The proposed technology was oil-based parabolic solar.	The land area needed was larger than desired by CBN.
SunEdison	Solar or wind	The proponent wanted to create renewable program on Native American lands and was interested in a long-term lease with limited revenue to CBN.	The proponent decided to work elsewhere. The CBN land base was not large enough to meet the project needs
Renewable Technologies	Solar or wind	The proponent was focused on retail and commercial-based solar.	CBN is interested in pursuing utility-scale solar projects as a first priority.

Table 3. Renewable Energy Projects Considered by TEDI Since 2007, continued

Project/Proponent Name	Project Type	Brief Description	Project Limitation(s)
Clean Technologies, Inc.	Solar or wind	The project proponent was determined to be more of a land broker than developer.	The proponent wanted to lock up several parcels of land for future development. CBN was not interested in the proposed business arrangement.
Groupo Cobra	Wind	The proponent was interested in building a wind project on the northern end of the reservation. Wind feasibility was identified as an issue.	The proposed project location would require relocation of some CBN members. The location to the existing power line was also a constraint.
RES – Americas	Solar	The proponent was interested in developing a solar project on CBN lands.	The proposed project needed more land and water than CBN was able to supply.
Q-Cells North America	Solar	The proponent was interested in developing a solar project on CBN lands.	The proposed project did not meet TEDI's capital requirements.
Great West Power Supply	Wind	The proponent was interested in building a wind project on CBN lands. Wind feasibility was identified as an issue.	The proposed project location would require relocation of some CBN members. The location of the existing power line was also a constraint.

3.0 AFFECTED ENVIRONMENT

3.1 LAND RESOURCES

3.1.1 TOPOGRAPHY AND GEOLOGY

The project area for the Proposed Action is located in western Bernalillo County, New Mexico. The project area occurs within lands managed by the BIA on behalf of CBN. The project area lies at elevations of 1,633 m (5,360 feet) above mean sea level within a northward extension of the Mexican Highland section of the Basin and Range physiographic province (Hawley 1986). The major feature of this extension is the Rio Grande Depression, which is similar in many respects to a rift valley. The study area lies within the Rio Puerco watershed, which is part of the larger Albuquerque Basin. These basins are filled with alluvium thousands of feet thick, and localized volcanic activity has also contributed to the basins' fill (Kelley 1977). The project area setting consists of alluvial flats and floodplains topped with fine eolian sandy sediment. The project is located on the La Mesita Negra (1973) U.S. Geological Survey (USGS) 7.5-minute quadrangle map. The project area traverses one geologic unit, the Quaternary-Alluvium unit, as defined by the Geologic Map of New Mexico (New Mexico Bureau of Geology and Mineral Resources 2003).

The Proposed Action project area is relatively flat, sloping slightly from southwest to northeast and is made up of semi-desert grassland that has undergone past grazing disturbance. The site is bound on all sides by undeveloped land. Rio Puerco Road runs along the northern boundary of the project area.

3.1.2 SOILS

The proposed project area intersects three major soil types, the Bluepoint loamy fine sand soil unit (BCC), the Gila-Hantz complex (GH), and the Hantz silty clay loam (Ha) (U.S. Department of Agriculture [USDA] et al. 1977). Bluepoint loamy fine sand, found in the northeast quadrant of the project area, is a soil that is defined by slow runoff with a severe hazard of soil blowing. Subsurface (1.5 m [5 feet]) soils of the Bluepoint series are defined by loamy sands. The Gila-Hantz complex, found in the northwest quadrant of the project area, is composed of well-drained soils that have formed in recent alluvium on the floodplains along the Rio Puerco. On this particular complex, soil permeability is relatively slow, runoff is medium, and the hazard of erosion is moderate or severe. Subsurface (1.5 m) soils of the Gila complex are defined by single-grained, loose sands. The Hantz silty clay loam, found in the southern quadrant of this project area, is a soil that is nearly level and has a very slow permeability, medium runoff, and a moderate hazard of water erosion and soil blowing. Subsurface (1.5 m) soils of the Hantz series are defined by silty clays (USDA et al. 1977).

3.1.3 WATER RESOURCES AND WATER QUALITY

The proposed project area is within the Rio Puerco Watershed, a watershed of the greater Middle Rio Grande sub-basin. The Rio Puerco, the largest tributary to the Middle Rio Grande Basin, has its headwaters located in the Nacimiento Mountains east of Cuba, New Mexico, and flows into the Rio Grande at Bernardo, New Mexico (Rio Puerco Management Committee [RPMC] 2001).

In its entirety, the runoff from the proposed project site would flow approximately 4.2 km (2.6 miles) in a southeasterly direction before draining into the Rio Puerco. Said runoff would first travel approximately 3.5 km (2.1 miles) from the proposed project area before reaching Interstate 40 and a number of human-made drainage systems designed to control and direct flows underneath the highway and away from, or under, the adjacent Route 66 Casino Hotel complex. After this check, the runoff almost immediately drains into the Rio Puerco.

As noted in the RPMC's (2001:10) *Water Restoration Action Strategy for the Rio Puerco Watershed of New Mexico*, this portion of the Rio Puerco basin is rural and has "historically been used for agriculture, grazing, logging, mining, and a wide range of recreational purposes." Because of the accelerated erosion that has been occurring in the area, the Rio Puerco Watershed has earned the reputation of one that is severely impacted and degraded. In fact, while the Rio Puerco Watershed contributes to less than 10% of the total flow, it is the primary source of silt and sediment inflow to the Rio Grande system. The specific causes of watershed decline are thought to be a result of the combined land uses mentioned above and their impact to a vulnerable landscape (RPMC 2001).

Water quality standards for the Rio Puerco are set forth in the New Mexico Standards for Interstate and Intrastate Surface Waters (New Mexico Administrative Code [NMAC] 20.6.4) (NMAC 2006). General criteria standards are established to sustain and protect existing or attainable uses of surface waters of the state. These standards advise that surface waters in the state "shall be free of any water contaminant in such quantity and of such duration as may with reasonable probability injure human health, animal or plant life or property, or unreasonably interfere with the public welfare or the use of property" (NMAC 2006:10). The designated uses of the Rio Puerco are irrigation, marginal warm water aquatic life, livestock watering, wildlife habitat, and secondary contact (NMAC 2006). Specific water quality criteria for the Rio Puerco, a part of the Rio Grande Basin, are listed below (NMAC 2006:18):

- In any single sample: pH must be within the range of 6.6 to 9.0 and temperature 32.2°C (90 degrees Fahrenheit [°F]) or less.

- The monthly geometric mean of E. coli bacteria is 126 colony forming units (cfu)/100 mL or less; single sample 410 cfu/100 mL or less.

- At mean monthly flows above 100 cfs, the monthly average concentration for total dissolved solids is l,500 mg/L or less, sulfate 500 mg/L or less, and chloride 250 mg/L or less.

Additionally, the U.S Environmental Protection Agency (EPA) has identified aluminum and sedimentation/siltation as current Total Maximum Daily Loads in this stem of the Rio Grande Basin. The former pollutant load originates in La Jara Creek, a tributary of the Rio Puerco (EPA 2007). The latter is sourced from the Rio Puerco itself, between Arroyo Chijuilla to the northern boundary of Cuba (headwaters) (EPA 2006). Probable causes for both pollutants are thought to be derived from nonpoint sources, including but not limited to rangeland grazing, drought-related impacts, channelization, and non-construction-related highway, road, and bridge runoff (EPA 2006, 2007). Both of these described sections of the Rio Puerco watershed are upstream (north) of the proposed project area.

The proposed project area generally slopes in a southeasterly direction. The major local drainage path, the Cañada del Ojo, has approximately 190.4 km² (73.5 square miles) contributing to its stormwater runoff (Bohannan Huston, Inc. 2010). The Cañada del Ojo runs from west to east through the proposed project site and under Interstate 40 before draining carried runoff into the Rio Puerco. More specifically, the proposed site is impacted by two drainage basins, here called the north and south drainages (Appendix C). The north drainage, the significantly larger basin of the two in terms of drainage area and flow velocity, runs along the north edge of the proposed site and is included in the 190.4 km² (73.5 square miles) drained by the Cañada del Ojo (Bohannan Huston, Inc. 2010). The peak discharge, by storm event, for both the northern and southern drainage is summarized in Table 4.

Table 4. Peak Discharge, by Storm Event, for the Cañada del Ojo

Hydrological Element	Drainage Area (mi^2)	Peak Discharge (cubic feet per second)			
		10-Year Storm Event	25-Year Storm Event	50-Year Storm Event	100-Year Storm Event
Northern drainage	73.5	6,552	5,186	4,035	2,659
Southern drainage	0.8	400	314	239	153

Groundwater elevations on the proposed project area are estimated to be at approximately 1,600 m (5,250 feet) in elevation, at least 22 m (72 feet) below the surface. No standing surface water was observed on the property.

3.1.4 FLOODPLAIN MANAGEMENT

The 100-year flood is the national standard used by the National Flood Insurance Program and all federal agencies for the purposes of require the purchase of flood insurance and regulating new development (Federal Emergency Management Agency [FEMA] 2010). FEMA floodplain data does not exist for the section of the Cañada del Ojo that crosses the project area. As a result, independent hydrologic modeling was completed to inform the design and layout of the Proposed Action (see Appendix C).

The analysis was broken into two phases, the Hydrologic Engineering Centers Hydrologic Modeling System (HEC-HMS) phase and the HEC-River Analysis System (HEC-RAS) phase. Under the HEC-HMS phase, the U.S. Army Corps of Engineers HEC-HMS model was used in conjunction with ArcMap to model the 10-, 25-, 50-, and 100-year storm event. The HEC-RAS phase modeled the 10-, 25-, 50-, and 100-year storm event with inundation levels and peak velocities. Table 5 and Table 6 summarize the results of the hydrologic modeling and analysis for the Cañada del Ojo northern and southern drainages, respectively.

Table 5. Hydrologic Characteristics of the Cañada del Ojo Northern Drainage

Flood Event	Maximum Flood Velocity (feet/second)	Maximum Flood Depth (feet)
10-year	8.2	9.4
25-year	9.0	9.8
50-year	10.1	10.1
100-year	10.6	10.4

Table 6. Hydrologic Characteristics of the Cañada del Ojo Southern Drainage

Flood Event	Maximum Flood Velocity (feet/second)	Maximum Flood Depth (feet)
10-year	4.1	2.6
25-year	3.9	2.7
50-year	3.7	2.7
100-year	4.3	2.9

3.1.5 AIR QUALITY AND CLIMATE

The Clean Air Act and its amendments require the EPA to set National Ambient Air Quality Standards (NAAQS) for pollutants considered harmful to public health and the environment (Public Laws 88-206, 90-148, 91-604, 95-95, and 101-549). The act also allows states to adopt additional ambient air quality standards. The State of New Mexico's ambient air quality standards are more stringent for primary pollutants than the federal NAAQS. Although the New Mexico Environment Department (NMED) Air Quality Bureau does not conduct any regional air quality monitoring, Bernalillo County has been classified by the EPA as an "attainment area," which means that ambient air quality meets the standards of the levels set in the NAAQS (NMED 2010a).

The project area is within the Albuquerque-Mid Rio Grande Interstate Air Quality Control Region 152 (NMED 2010b). The closest Class I airshed is approximately 90 km (56 miles) northeast to the Bandelier National Monument and Wilderness and the adjacent Dome Wilderness. A Class I airshed applies to wilderness areas and national parks that require the highest level of protection under the Clean Air Act.

According to the Western Regional Climate Center (2010), the normal annual precipitation for Laguna, New Mexico, 32 km (20 miles) west of the project location, and the nearest location with climate records, averaged 25.1 cm (9.89 inches) for the period of 1905 to 2006. The average maximum temperature for the area is 20.67°C (69.2°F), and the average minimum temperature is 3.17°C (37.7°F) (Western Regional Climate Center 2010).

Globally, the Earth's surface temperature has increased by about 1.2°F to 1.4ºF since 1900, with most of the warming occurring in recent decades. Anthropogenic gases, particularly carbon dioxide (CO_2), are enhancing the natural greenhouse effect and likely contributing to an increase in these global average temperatures and the related climate changes (EPA 2010). CO_2 enters the atmosphere through the burning of the fossils fuels (oil, natural gas, and coal) that we depend on to generate our daily energy needs. One potential way to slow this swift increase in climate change is through the use and development of relatively carbon-free, renewable energy resources like solar technologies. Averaging over 300 days of sunshine every year, New Mexico is second in the nation for solar resources (New Mexico Energy, Minerals and Natural Resource Department 2009). Tsoutsos et al. (2005) reiterate the main advantages of solar energy technologies being their reduced CO_2 emissions and absence of either air emissions or waste products during operation. Portable Solar Panels (2010) goes on to make a comparison: 1-kilowatt produced from solar energy eliminates 136 kg (300 pounds) of carbon dioxide from being released into the atmosphere and reduces the burning of approximately 77 kg (170 pounds) of coal.

3.2 BIOLOGICAL ENVIRONMENT

3.2.1 TERRESTRIAL ENVIRONMENT

Vegetation in the project area and vicinity are represented by the Plains and Great Basin Grasslands biotic community as defined by Brown (1994) at an elevation of 1,633 m (5,360 feet) above mean sea level.

Native plants observed during the field visit of the proposed project area include the following: greasewood (*Sarcobatus vermiculatus*), sand dropseed (*Sporobolus cryptandrus)*, fine-leaf wollywhite (*Hymenopappus filifolius*), western wheatgrass (*Pascohpyrum smithii*), broom snakeweed (*Gutierrezia sarothrae*), blue grama (*Bouteloua gracilis*), Indian ricegrass (*Achnatherum hymenoides*), ring muhly (*Muhlenbergia torreyi*), pale wolfberry (*Lycium pallidum*), and fourwing saltbush (*Atriplex canesens*) (USDA 2010). The only non-native plant identified during the survey, also considered a Class C noxious weed by the USDA, is the saltcedar (*Tamarix* sp.) (USDA 2010).

The mammals observed during the field visit of the proposed project area include Gunnison's prairie dog (*Cynomys gunnisoni)*, jackrabbit (*Lepus* sp.), eastern cottontail (*Sylvilagus* sp.), and kit fox (*Vulpes microtus*).

The birds observed during the field visit of the proposed project area include the following: western burrowing owl (*Athene cunicularia hypugaea*), common raven (*Corvus corax*), American crow (*Corvus brachyrhynchos*), western kingbird (*Tyrannus verticalis*), horned lark (*Eremophila alpestris*), turkey vulture (*Cathartes aura*), loggerhead shrike (*Lanius ludovicianus*), mourning dove (*Zenaida macroura*), and western tanager (*Piranga ludoviciana*).

The reptiles observed during the field visit of the proposed project area include side-blotched lizard (*Uta stansburiana*), western rattlesnake (*Crotalus viridis*), lesser earless lizard (*Holbrookia maculata*), and New Mexico whiptail (*Aspidoscelis neomexicana*).

3.2.2 WETLANDS

A field survey of the proposed project area was conducted on July 7, 2010. The survey showed no signs of wetlands within or adjacent to the project area.

3.2.3 THREATENED AND ENDANGERED SPECIES

SWCA has obtained and evaluated federal and state threatened and endangered species and state species of concern lists for Bernalillo County for likelihood of occurrence or habitat suitability within the project area (Appendix D). Of the 17 federally listed threatened and endangered species in Bernalillo County, two of the listed species have the potential to occur within the project area, the western burrowing owl and mountain plover (*Charadrius montanus*). Of the remaining 15 species, the project area is either clearly beyond the known geographic range of these species, or it does not contain vegetation or landscape features known to support these species, or both. SWCA also consulted the New Mexico Energy, Minerals, and Natural Resources Department's (NMAC 1995) list of rare or federally listed plants that are protected

from collection, transplant, or destruction without regulation in New Mexico. None of these species were observed in the construction area during the survey.

According to the U.S. Fish and Wildlife Service (USFWS), the project area does not lie in or near any federally proposed or designated critical habitat (USFWS 2010).

According to the Navajo Nation Department of Fish and Wildlife (NNDFW) response letter, there are no occurrence records for any NNDFW species of concern within the area indicated on the applicable USGS 7.5-minute quadrangle (La Mesita Negra, NM). However, the NNDFW letter indicated that there is potential for six species to occur: golden eagle (*Aquila chrysaetos*), pronghorn (*Antilocarpa americana*), ferruginous hawk (*Buteo regalis)*, mountain plover, southwestern willow flycatcher (*Empidonax traillii extimus*), and black-footed ferret (*Mustela nigripes*).

In addition to the species the NNDFW listed in the response letter, the western burrowing owl and kit fox were both directly observed within the project area. Both species are listed on the Navajo Endangered Species List Group 4.

3.2.4 AGRICULTURE

The proposed project area is currently used for low-intensity sheep grazing. One family has been given temporary permission to graze sheep within the project area. According to TEDI, the family has been notified of the proposed solar project and understands that grazing use would be removed from the project area if the project is approved (Dee Apache, TEDI, personal communication with Coleman Burnett, SWCA, December 14, 2010). A resolution has been passed by the Chapter authorizing that the 202.35-hectare (500-acre) parcel be set aside for the project (Appendix A).

3.3 HAZARDOUS MATERIALS

The Hazardous Materials Transportation Act defines hazardous materials as substances or materials that when transported in commerce may create a risk to health, safety, and property (49 CFR 171.8). The Comprehensive Environmental Response, Compensation, and Liability Act includes hazardous wastes (under the Resource Conservation and Recovery Act), hazardous air pollutants (under the Clean Air Act), hazardous chemical substance or mixtures (under the Toxic Substance Control Act), and substances that may present substantial danger to public health (42 United States Code 9601). SWCA has observed no evidence of hazardous waste spills or other soil contamination at the project area.

3.4 SOCIOECONOMICS

As estimated by the U.S. Census Bureau (2000), the permanent population of CBN is estimated at 1,649 residents, with a median age of 22.3 years. The median household income in 1999 was $19,107, which is less than half of the New Mexico median of $41,509. Approximately 52.4% of CBN members have earned a high school degree, 1.3% have earned a bachelor's degree, 11.2% report having not completed school, and 35.1% have not reported an education level. CBN faces a 24% unemployment rate, and 43.1% of CBN members live below the poverty level (U.S. Census Bureau 2000).

There are an estimated 506 houses located on CBN lands, of which 94 of the homes are vacant. Table 7 shows the number and percentage of CBN homes that lack basic services. As a result, the median value of the homes is estimated at $18,500, which is 17% of the New Mexico median home value of $108,100.

Table 7. CBN Housing Conditions

Lacking	Number of Homes	Percentage of Homes
Complete plumbing facilities	131	26
Complete kitchen facilities	113	22
Telephone services	186	37

Source: U.S. Census Bureau (2000).

3.5 VISUAL RESOURCES

The proposed project area is in a valley-like basin surrounded by elevated terrain. While vacant land is the predominant feature of the viewshed, there are a few residential properties adjacent to the proposed site. To the north is a neighborhood complex with approximately 90 homes (Figure 4 and Figure 5). Additionally, a few isolated homesteads are intermittently scattered adjacent to the site. The Route 66 Casino Hotel complex is located to the southeast of the project area, across Interstate 40.

Figure 4. View from the south edge of proposed project area, facing north. Neighborhood complex of homes is visible in the back-center of the picture.

Figure 5. View of the greater project area environment, facing east.

3.6 NOISE

Noise is generally defined as unwanted sound. The project area is located in an undeveloped area of CBN lands. Most noise heard in the area can be attributed to traffic on Rio Puerco Road or large truck traffic from Interstate 40. The closest noise receptor is the residential neighborhood located 0.8 km (0.5 mile) north of the proposed project. EPA guidelines, and those of many other federal agencies, state that outdoor sounds levels in excess of 55 decibels (dB) Day-Night Average Sound Level are "normally unacceptable" for noise-sensitive land uses such as residences, schools, or hospitals (EPA 1974). For occupational noise, the National Institute for Occupational Safety and Health (NIOSH) set the recommended exposure limit at 85 dB, A-weighted, as an 8-hour time-weighted average. Exposures at or beyond this level are considered hazardous (NIOSH 1998).

3.7 PUBLIC SERVICES AND UTILITIES

There is one existing power line, owned by PNM, located in the southeast corner of the project area (see Figure 3). The PNM power line carries 115 kV of electrical power and carries power from the western portion of New Mexico into Albuquerque. According to a study completed by the Western Area Power Administration, the power line can accommodate 40 to 42 additional MW of power without any upgrades to the system.

3.8 TRAFFIC AND CIRCULATION

The proposed project area is located on CBN land 3.9 km (2.4 mile) northwest of the intersection of Interstate 40 and Rio Puerco Road. Rio Puerco Road, one of two main access roads to CBN lands, is an unpaved, two-lane road that provides access to the remainder of CBN's smaller unpaved roads. The central access to the proposed project site is via the Rio Puerco exit of Interstate 40. An unnamed road connects Rio Puerco Road with the proposed solar facility. This unnamed road is currently used by local residents as an access route to lands south of the proposed project area.

3.9 ENVIRONMENTAL JUSTICE

As required by Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, this EA must address environmental justice concerns, including disproportionately high and adverse human health or environmental effects on minority and/or low-income populations. According to the U.S. Census Bureau, tribal populations are considered minority populations. The median household income for CBN members in 1999 was $19,107, which is less than half of the New Mexico median of $41,509. CBN members also face a 24% unemployment rate, and 43.1% of CBN members live below the poverty level (U.S. Census 2000). The percentage of individuals living below the poverty level in the United States in 2000 was 12.4% (U.S. Census Bureau 2000).

3.10 SAFETY AND SECURITY

Safety and security issues considered in this EA include the health and safety of area residents and the public, as well as the protection of personnel involved in activities related to the proposed construction of the solar facility.

The proposed project area is currently vacant from any residential or commercial structures. No known catastrophic events such as wildfire or earthquakes are known to have occurred in the project area. The project area is not located in an active seismic zone and no hazardous materials are currently present at the site. The Proposed Action would be located adjacent to a defined floodplain. The potential for flash flood events is present near the proposed project area.

3.11 CULTURAL RESOURCES

Federal regulations require that the BIA consider the effects of the project on historic properties in compliance with Section 106 of the National Historic Preservation Act (NHPA). Prior to the initiation of fieldwork, John Ponczynski of SWCA performed a records search at the Navajo Nation Historic Preservation Department (NNHPD) office in Window Rock, Arizona, on June 7, 2010. This search encompassed a 100-m (328-foot) buffer around the project area and revealed three previously recorded surveys, but no previously recorded sites, within this area.

SWCA conducted a Class III pedestrian cultural resources assessment survey between July 12 and 23, 2010. The cultural resource inventory was conducted to evaluate the potential for the proposed undertaking to affect significant cultural properties and meet the requirements of the NNHPD and Section 106 of the NHPA.

The purpose of the survey was to identify and record cultural resources that occur within the proposed project area. In accordance with NNHPD regulations, field crews performed in-field consultation with the To'Hajiilee Chapter House with the aim of identifying Traditional Cultural Properties (TCPs), sacred sites, and traditional use areas that could be affected by the project. An area of approximately 199 hectares (492 acres) was surveyed in the preliminary stage of the investigation. Two sites identified in the course of the investigation were determined eligible for protection as a result of consultation with NNHPD.

One of the newly recorded sites (NM-S-64-8) has been determined to be eligible for protection under the Archeological Resources Protection Act (ARPA), as well as eligible for the National Register of Historic Places (NRHP) (under Criterion D) on the strength of its potential to produce further information of scientific importance. A historic Navajo homestead (NM-S-64-11) has also been determined to be eligible for the NRHP under Criteria A and D, and SWCA further recommends the site as eligible for protection under the American Indian Religious Freedom Act (AIRFA). The site is eligible under Criterion A (as a TCP) for its association with ongoing Navajo domestic ritual and ceremony, and under Criterion D for the contribution its artifact assemblage can make toward an increased scientific understanding of early twentieth century rural Navajo domestic economic and settlement practices. Features 11 (a ruined hogan) and 19 (the remains of a sweat lodge) are also the elements of the site that make it a TCP and eligible under Criteria A and D, as well as eligible for protection under AIRFA. This being the case, therefore, any impacts to Features 11 and 19 would negatively affect the sites integrity as related to its NRHP eligibility.

4.0 ENVIRONMENTAL IMPACTS

This section describes and analyzes the reasonably foreseeable impacts of the Proposed Action and the No Action Alternative on the resources described in Section 3.0.

4.1 LAND RESOURCES

4.1.1 TOPOGRAPHY AND GEOLOGY

Proposed Action

The Proposed Action is not expected to impact the topography and geology of the project area. The proposed site was selected based on the flat topography; therefore, intensive leveling of the site is not necessary. There are no rock outcrops within the project area and the depth to bedrock is currently unknown. Approximately 120 of the drive piers may be anchored as deep as 4.3 m (14 feet). It is possible that the drive piers may come into contact with the bedrock in the area.

No Action

The No Action Alternative would result in no impacts to topography or geology because the proposed solar facility would not be constructed.

4.1.2 SOILS

Proposed Action

Three major soil types are included in the project area. Table 8 provides a brief description of each soil type and the number of acres that would be impacted by the proposed project.

Table 8. Soils Types within the Project Area

Soil Type	Acreage of Proposed Action	Description
Bluepoint loamy fine sand	124 acres	The Bluepoint series consists of deep, somewhat excessively drained soils that formed in sandy alluvial and eolian sediments on alluvial fans and terraces. Permeability is rapid. This soil is nearly level to moderately sloping. Runoff is slow and the hazard of blowing soil is severe.
Gila-Hantz complex	37 acres	The Gila series consists of deep, well-drained soils that formed in recent alluvium on the floodplains along the Rio Grande and Rio Puerco. Slopes are 0% to 2%. This soils has a hazard of erosion is moderate to severe. Runoff is medium.
Hantz silty clay loam	34 acres	The Hantz series consists of deep, well-drained soils that formed in alluvium on the flood-plain of the Rio Puerco and its tributaries. Slopes are 0% to 2%. Permeability is slow. This soil is level or nearly level. Runoff is medium. The hazards of water erosion and soil blowing are moderate.
Total	**195 acres**	

The Proposed Action would have adverse, short-term impacts to soils located within the project footprint. Construction within the proposed project area would occur on 79 hectares (195 acres) and on slopes less than 9%. This construction would be relatively shallow and restricted to those activities associated with grading and the installation of individual piers, drive motors, transformers, and the substation. Hazards for wind and water erosion for the soils in the project area are moderate to severe (USDA et al. 1977). During construction, wind erosion could affect particulate air quality.

During construction, excavated soil and waste materials would be managed and disposed of in accordance with applicable local, state, and federal regulations. A SWPPP would need to be prepared for this proposed alternative. The EPA requires National Pollutant Discharge Elimination System (NPDES) coverage under a general construction permit for construction projects that would result in the disturbance of one or more acres of total land area. A notice of intent must be filed seven days prior to the initiation of construction activities, and an SWPPP must be completed and stored at the proposed project site.

After construction, the Proposed Action would have beneficial, long-term impacts to soils within the project footprint. The proposed solar facility would be fenced and no grazing would be allowed to occur. As a result, native vegetation would become re-established after construction disturbance (Jerry Thomas, BIA range specialist, personal communication with Coleman Burnett, SWCA, December 14, 2010). Vegetation would be maintained by the project operator if it becomes too tall and hinders the efficiency of the solar panels. The amount of particulate matter caused by wind erosion is anticipated to decrease once the project is constructed because of the protection of the site by the solar infrastructure and the re-establishment of vegetation.

No Action Alternative

The No Action Alternative would result in no impacts to soils because the proposed solar facility would not be constructed.

4.1.3 Water Resources and Water Quality

Proposed Action

The Proposed Action would result in minimal and temporary impacts to surface water resources immediately adjacent to the project area. Short-term water quality impacts may result if high-intensity rainstorms occur during construction when soil is exposed and more susceptible to being eroded and added to the sediment load. During the construction period, approximately 79 hectares (195 acres) of topsoil would be more susceptible to erosion and contribute to an increase in sediments through the water runoff from the project area. The proposed project area is approximately 1.9 km (1.2 miles) from the Rio Puerco; therefore, impacts from this action to the water quality of the greater Rio Grande watershed are expected to be negligible.

As mitigation, coverage under the NPDES construction general storm water permit requires the development of a SWPPP prior to any construction development. This SWPPP is used to implement the best sediment, erosion, and pollution prevention control measures. Additionally,

best management practices (BMPs), described in the SWPPP, will be employed to effectively reduce or prevent the discharge of pollutants into receiving waters, specifically the Rio Puerco.

No long-term impacts to surface water resources are expected. Once the project is complete, the cleared and graded grounds will be reseeded with native species.

Groundwater resources may be minimally impacted by the proposed project. The average groundwater depth in the project area is 22.25 m (73 feet) below the surface. The only drilling activity that would occur with this project is the installation of the concrete piers. The maximum depth of the piers is 4.3 m (14 feet). Approximately 95,000 gallons of water would be used per cleaning or a maximum of 380,000 gallons annually to clean the solar panels. This water would be withdrawn from water well #5 located 3.5 km (2.2 miles) from the project area. This well has the capacity to produce 245 gallons per minute, which is sufficient for the needs of the proposed solar project. The groundwater table may be temporarily impacted when water is pumped for scheduled cleaning and maintenance operations. The Cañoncito Community Water System, operated and maintained by the To'Hajiilee Chapter's Water Project Office, has adequate infrastructure and capacity to the serve the water requirements of the proposed project.

The O&M building would also include a small septic tank and leech fields to dispose of the water waste generated by the use of sinks and toilets by the maintenance employees. The soils within the project area, Bluepoint loamy fine sand, the Gila-Hanz complex, and the Hantz silty clay loam, are slightly to moderately suited for leech fields (USDA 1977). As a result, impacts to groundwater may occur depending on the frequency of use of the waste disposal system. A permit would be obtained from the Navajo Nation Environmental Protection Agency (EPA) Public Works Systems Supervision Program prior to installation of the O&M building's drinking and waste water systems.

No Action Alternative

The No Action Alternative would result in no impacts to water resources and water quality because the proposed solar facility would not be constructed.

4.1.4 FLOODPLAIN MANAGEMENT

Proposed Action

As discussed in Section 3.1.4, FEMA floodplain data are not available for the segment of Cañada del Ojo that is within the project area. The 100-year flood is the national standard used by the National Flood Insurance Program and all federal agencies for the purposes of require the purchase of flood insurance and regulating new development (FEMA 2010). A 100-year flood has a 1% chance of occurring within any given year (Dunne and Leopold 1978). Due to the lack of data, a preliminary drainage study was completed to inform all parties of the extent of the 100-year floodplain. According to the preliminary drainage study, the proposed solar facility is designed to occur outside the 100-year floodplain of the Cañada del Ojo segment that intersects the northern portion of the project area (see Appendix C). Figure 3 shows the proposed project and its proximity to the modeled floodplain. It can be expected, based on the preliminary

modeling results, that there is less than a 1% chance that the proposed project would be significantly flooded in any given year.

No Action Alternative

The No Action Alternative would result in no impacts to floodplains because the proposed solar facility would not be constructed.

4.1.5 AIR QUALITY AND CLIMATE

Proposed Action

The Proposed Action would cause a short-term, decline in localized air quality as a result of construction activities. During construction, approximately 79 hectares (195 acres) of exposed soil could contribute to an increase to the dust particulate in the local air column. Fugitive dust and vehicular emissions would contribute to air emissions of criteria pollutants, volatile organic compounds, greenhouse gases (e.g., CO_2), and a small amount of hazardous air pollutants (e.g. benzene) (Bureau of Land Management [BLM] and DOE 2010). These are considered short-term effects and would last only as long as the estimated construction period, approximately ten to twelve months. In addition, due to the remote location of the proposed project, it is expected that construction activities would contribute minimally to the concentrations of air pollutants at the nearest residences, located approximately 0.8 km (0.5 mile) to the north of the proposed solar facility.

Fugitive dust emissions from wind erosion and vehicle travel could cause impacts during the operation phase of the project. As discussed in the Section 4.1.2, native vegetation would become re-established after construction disturbance by the spread of the native seed source (Jerry Thomas, BIA range specialist, personal communication with Coleman Burnett, SWCA, December 14, 2010). The amount of particulate matter caused by wind erosion is anticipated to decrease once the project is constructed because of the protection of the site by the solar infrastructure and the re-establishment of vegetation.

There would be long-term, beneficial impacts to air quality and climate from the Proposed Action because the power generated by the solar facility would displace power that could be generated by fossil fuel sources, thereby decreasing air pollution and CO_2 emissions in New Mexico. Table 9 provides the annual emissions associated with generating 1 megawatt-hour (MWh) of electricity in fossil fuel–fired power plants. Fossil energy emissions estimates are taken from the *Draft Programmatic Environmental Impact Statement for Solar Energy Development in the Six Southwestern States* published by the BLM and DOE in 2010. Solar facility emissions were assumed to be negligible. The proposed solar facility addressed in this document is estimated to produce 80,931 MWh per year (Lance Mobley, SunPower, personal communication with Coleman Burnett, SWCA, October 12, 2010).

Table 9. Annual per MWh Emissions from Combustion-Related Power Generation

Emission	Combustible Emissions (kg/year per MWh)	Estimated Displaced Emissions (kg/year)*
Sulfur dioxide (SO_2)	0.69	55,842
Nitrogen oxides (NO_x)	1.0	80,931

Mercury (Hg)	8.0×10^{-6}	0.65
Carbon dioxide (CO_2)	716	5.8×10^{7}

* Based on proposed 80,931-MWh solar facility.
Source: BLM and DOE (2010).

No Action Alternative

The No Action Alternative would not result in a short-term, adverse impact to local air quality because the solar facility would not be built. Periodic high winds could result in suspended particulate matter that results from grazing activity within the project area and driving on the dirt road that bisects the project footprint. The No Action Alternative would not displace the electricity generated by fossil fuel–fired power plants. As a result, the No Action Alternative would modestly contribute to the long-term, adverse impact to air quality in New Mexico and climate change trends worldwide.

4.2 BIOLOGICAL ENVIRONMENT

4.2.1 TERRESTRIAL ENVIRONMENT

Proposed Action

The Proposed Action would have short-term, adverse impacts to the terrestrial environment within the project footprint. Approximately 79 hectares (195 acres) of vegetation would be removed under the Proposed Action as a result of site preparations and construction of the solar facility. Disturbance resulting from grubbing (clearing of vegetation) and grading could result in exposed soil that may increase susceptibility to infestation from exotic plant species and an increased loss of topsoil. Mitigation measures will be taken to make sure that soil and water erosion potential is minimized during and after construction.

After the construction of the facility, the disturbed area is expected to become repopulated with native vegetation from the existing seed source within the topsoil. If necessary, the project operator would install proper landscaping measures to reseed the grounds with native species.

No Action Alternative

The No Action Alternative would result in no impacts to the terrestrial environment because construction of the proposed solar facility would not occur.

4.2.2 WETLANDS

Wetlands have not been identified within the project area. As a result, wetlands would not be impacted by either the Proposed Action or the No Action Alternative.

4.2.3 THREATENED AND ENDANGERED SPECIES

Proposed Action

No federally threatened or endangered species are likely to occur within the project area. Two species, the western burrowing owl and the kit fox, are both listed on the Navajo Endangered Species List and were observed near the project footprint (see Appendix D). Two western burrowing owl nests were identified during the biological survey completed in July 2010. One kit fox was observed walking across the proposed project site during the field survey, but a den was not identified.

The NNDFW has reviewed the project and issued its approval of the project (Appendix E). There are three mitigation measures stipulated as a condition of approval. For the western burrowing owl, the NNDFW recommends no activity within 0.4 km (0.25 mile) of an active nest burrow from March 1 to August 15 and no habitat alteration year-round within 0.2 km (0.1 mile) of a nest site. For the kit fox, the NNDFW recommends no ground-disturbing activities year-round within 60 m (197 feet) of a known den site and no activity within 0.2 km (0.1 mile) of an active den from December 1 to August 31. Although the mountain plover was not observed directly within the proposed project area, the NNDFW has prescribed the need for a pre-construction survey between May 1 and June 15.

The western burrowing owl would be affected by the removal of 79 hectares (195 acres) of vegetation for installation of the proposed solar facility. The effects on the western burrowing owl would be short term, lasting the duration of the construction period because once construction is complete, the western burrowing owl could continue to use habitat within the project footprint. As shown in Figure 6, one western borrowing owl nest is located approximately 61 m (200 feet) from the existing dirt road. This road is not identified for improvements or realignment; therefore, the road is not expected to impact the existing nest location.

The Proposed Action is not expected to impact the kit fox because the amount of habitat available to the kit fox outside of the project area is vast. Furthermore, no dens were observed during the 2010 field survey. The project area may be used as foraging habitat by the kit fox; however the disturbed project area is small in comparison to the amount of foraging habitat available in the project vicinity.

The mountain plover was not observed during the 2010 field survey; however, the species may occur within the project area because the proposed project is located within the known range of the bird. The mountain plover is not expected to be impacted because the amount of habitat available to the bird outside of the project area is vast. The project area may be used as foraging habitat by the mountain plover; however the disturbed project area is small in comparison to the amount of foraging habitat available in the project vicinity.

Under this alternative, a pre-construction survey would be completed for the western burrowing owl, kit fox, and mountain plover to identify any new or modified nesting locations and dens. The mitigation measures outlined by the NNDFW would be applied to the nests and/or dens identified during the pre-construction survey.

No Action Alternative

The No Action Alternative would result in no impacts to any listed species because the disturbance of habitat associated with the construction of the proposed solar facility would not occur.

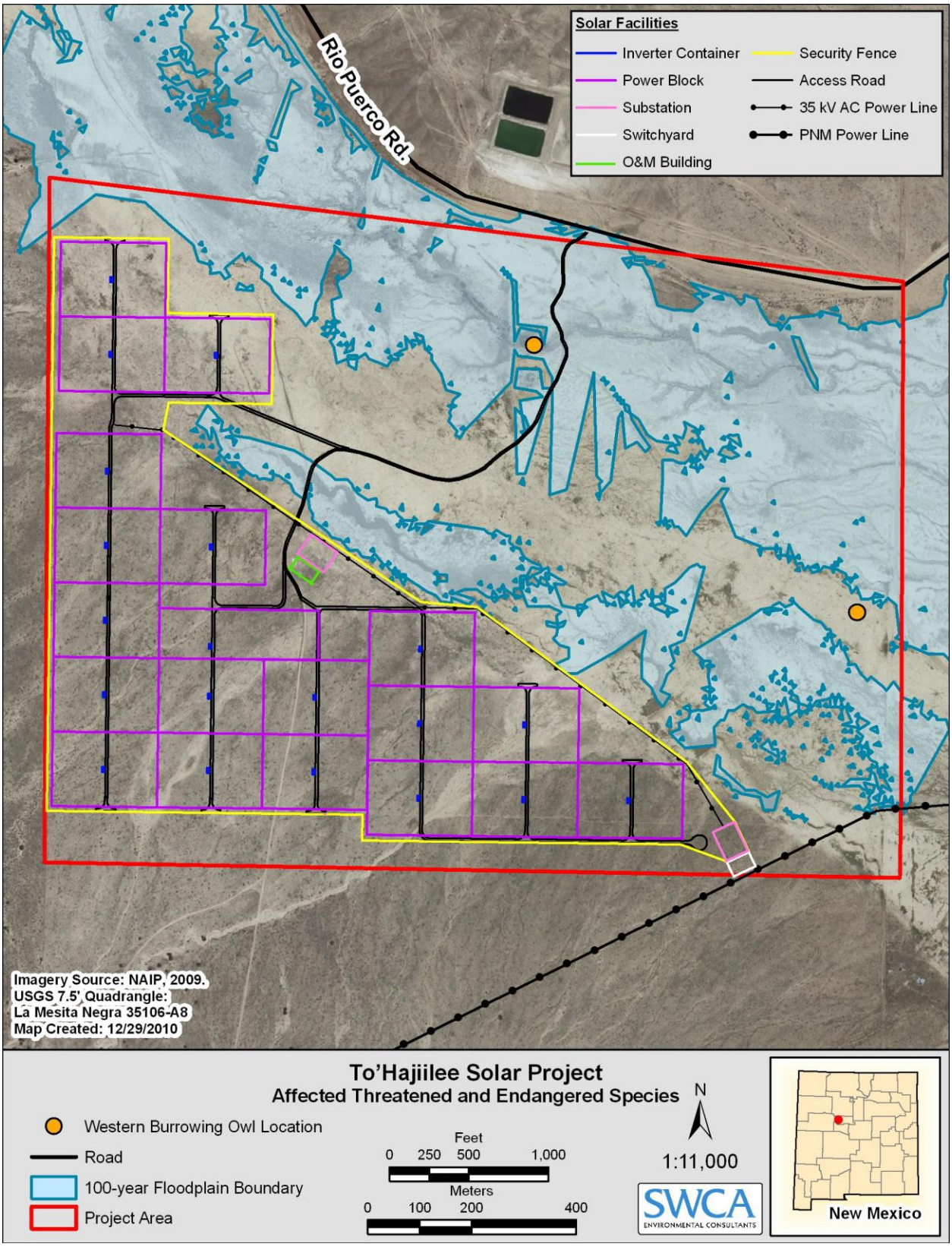

Figure 6. Western burrowing owl locations near the project footprint.

4.2.4 AGRICULTURE

Proposed Action

The Proposed Action would have adverse impacts to agricultural use and livestock grazing within the project area. Minor adverse impacts would occur because CBN has provided temporary approval for one family to conduct low-intensity sheep grazing within the project area. According to TEDI, the family has been notified of the proposed solar project and understands that grazing use would be removed from the project area if the project is approved (Dee Apache, TEDI, personal communication with Coleman Burnett, SWCA, December 14, 2010). As described in the Proposed Action, weed control would me primarily managed by allowing sheep to graze within the project area, as needed. Short-term benefits to local sheep grazing operations would occur during the weed maintenance periods.

No Action Alternative

The No Action Alternative would result in no change in land use from the current use of temporary livestock grazing.

4.3 HAZARDOUS MATERIALS

Proposed Action

Construction and decommissioning of the Proposed Action would involve the use of hazardous materials, such as diesel fuel and greases to fuel and service construction equipment. Such substances may be stored in temporary aboveground storage tanks, less than 1,100 gallons in size, or sheds located within the project area. The fuels stored on-site would be in a locked container within a fenced and secure temporary staging area. It is anticipated that no more than two 500 gallon aboveground storage tanks would be used on site. Trucks and construction vehicles would be serviced from off-site facilities. The use, storage, transport, and disposal of hazardous materials used in construction of the facility would be carried out accordance with tribal, federal, state, and local regulations. No extremely hazardous substances (i.e., those governed under 40 CFR 335) are anticipated to be produced, used, stored, transported, or disposed of as a result of project construction. Material Safety Data Sheets for all applicable materials present on-site would be made readily available to on-site personnel. Any spills larger than 25 gallons would be reported to the Navajo Nation Underground Storage Tank Program.

Operation and maintenance of the Proposed Action is not expected to require hazardous materials or generate hazardous waste. Although some transformers contain hazardous materials, those proposed to be located at the proposed project substation would use biodegradable seed oil, which is not a hazardous material (Cooper Power Systems 2005). Oil disposal would occur in accordance with applicable regulations. The PV panels and inverters would produce no waste during operation.

No Action Alternative

The No Action Alternative would result in no hazardous materials impacts because construction of the proposed solar facility would not occur.

4.4 SOCIOECONOMICS

Proposed Action

The Proposed Action would result in beneficial socioeconomic impacts to CBN and TEDI. Revenues from the solar plant would be paid to TEDI through the sub-lease agreement. TEDI would then provide funds to CBN for community improvements, based on the details of the master lease agreement. In addition to direct financial benefits, CBN members may also benefit from employment opportunities in the solar energy field. The initial construction of the solar facilities would require approximately 25-140 full-time employees over the course of an approximate period of ten to twelve months. Once the plant is fully operational, two full time employees would be required on a permanent basis. The solar operator would be encouraged to hire CBN members for both the construction and maintenance phases. Workers employed in the construction of the plant would receive training prior to the commencement of the project, in addition to on-the-job training and experience. These skills would be transferable to future construction projects, thereby improving the employees' opportunities for employment in the construction industry.

Beneficial impacts would also occur from the proposed project because the project area has been withdrawn for economic development use since the 1990s. The construction of the solar facility would fulfill the planned use for the land parcel.

No Action Alternative

The area where the proposed project would be located has been set aside for economic development purposes by CBN. Under the No Action Alternative, these sections would not be used for economic development, and therefore, would continue to be used in a manner contrary to CBN's assigned purpose. In addition, the employment and revenue benefits would not be realized.

4.5 VISUAL RESOURCES

Proposed Action

The Proposed Action is located in an area surround by undeveloped land with similar vegetation and topography as the proposed project area. Vacant land is the predominant feature of the viewshed. There is a residential neighborhood located 0.8 km (0.5 mile) north of the project area, across Rio Puerco Road. The Route 66 Casino, operated by Laguna Pueblo, is located approximately 2.7 km (1.7 miles) from the project area at the intersection of Rio Puerco Road and Interstate 40. The Proposed Action would result in a change in the area's visual resources during and after construction (Figure 7 and Figure 8). Once constructed, the solar facility would occupy 79 hectares (195 acres) of the project area. This project would be visible by both the

residents of the local residential neighborhood as well as guests staying in highest, north-facing rooms at the Route 66 Casino.

Figure 7. A representation of the project area viewshed during the construction phase.

Figure 8. A post-construction aerial representation of a similar solar facility built in Florida to produce 25 MW.

No Action Alternative

The No Action Alternative would result in no new impacts to visual resources because construction of the proposed solar facility would not occur.

4.6 NOISE

Proposed Action

The Proposed Action would result in short-term increases in noise levels during the construction phase of the project. During the operation of the solar facility, traffic noise generated by construction equipment and installation of the solar panels would have a minor impact to the adjacent land uses. Construction noises may be audible from the housing development located approximately 0.8 km (0.5 mile) to the north from the closest solar panel group. Equipment and machinery installed at the project site would meet all local, state, and federal noise regulations. Noise impacts to nearby residents would be minor during the construction phase. In order to protect the construction works on the project, construction managers would need to follow OSHA hearing protection standards.

Once construction is complete, the operation of the solar facility would produce a low level of noise, in short intervals, to the surrounding environment. In a case study provided by SunPower, it was determined that the T-0 tracker motors operate for approximately five seconds out of every two minutes. The case study found that identifiable noise from the T-0 trackers could be detected at 3 m (10 feet), but not at 6 m (20 feet), in which the noise was no longer discernable from the background noise. The tracker motor noises were described as a "whish" from the motor transmission, and the occasional bearing noise that was described as either a low rumble or a higher frequency scrape sound. This study was based on a 1.2-hectare (3-acre) project area, with an unknown number of drive motors. For the Proposed Action, approximately 120 T-0 drive motors would be located on the proposed site. The closest noise receptor would be located 0.8 km (0.5 mile), or 805 m (2,640 feet), away in the nearby residential area. Even though the number of drive motors associated with the proposed project would likely be larger than the number of drive motors used in the case study; the 132-fold distance is expected to provide a large enough buffer to dissipate the noise from the proposed project to background levels.

Additionally, noise would be generated primarily during daylight hours when angle adjustments to the trackers are made. Thus, noise pollution at night, the time when people are more sensitive to noise, would be minimal or non-existent (Tsoutsos et al. 2005). There is little to no information regarding the effects that noise from solar panels might have on the flora and fauna of the proposed project area and surrounding areas.

No Action Alternative

The No Action Alternative would result in no new noise impacts to the surrounding area because construction of the proposed solar facility would not occur.

4.7 PUBLIC SERVICES AND UTILITIES

Proposed Action

One existing power line, owned by PNM, is located in the southeast corner of the project area (see Figure 3). The PNM power line carries 115 kV of electrical power from the western portion of New Mexico into Albuquerque. According to the pre-feasibility assessment completed by Western States Energy Solutions, the power line can accommodate 40 to 42 additional MW of power without any upgrades to the system (2010). As a result, the PNM power line would not need to be upgraded to accommodate the 30-MW solar facility.

No Action Alternative

The No Action Alternative would result in no impacts to public services or utilities because construction of the proposed solar facility would not occur.

4.8 TRAFFIC AND CIRCULATION

Proposed Action

The Proposed Action would increase the traffic on the 4.5-km (2.8-mile) section of Rio Puerco Road between the project area and Interstate 40. Construction employees, materials, and equipment would use this route to access the project area on a daily basis for the ten to twelve month duration of the construction phase. Traffic would increase during the morning and evening hours to allow for transportation of construction workers. Large trucks would be entering and exiting the project area throughout the day when construction activities are taking place.

The increase to Interstate 40 traffic during the construction phase is expected to be negligible. Any delivery of large equipment or construction materials would follow the flagging and signing standards of the New Mexico Department of Transportation. In addition, the entrance and exit to the proposed project area would have signs posted in order to notify drivers of the construction activities.

After the construction phase, the traffic patterns would return to the pre-construction baseline. The estimated 2 full-time employees associated with the solar facility would not significantly increase the number of vehicles using Rio Puerco Road.

The existing unnamed road within the project area would be used for the access route from Rio Puerco Road to the project area. This road would be widened to approximately 16 feet. In addition, the road would be located within the proposed solar project, and therefore, would be located within a security fence. The unnamed road would no longer be open to the public due to the location of the proposed project and the associated security features. Residents that currently use the unnamed road for access to Rio Puerco Road would need to find an alternative access

route. According to TEDI, there is an existing alternative route, approximately 1.5 mile northwest of the southern boundary of the proposed project area and the alternative road also provides access to Rio Puerco Road (Dee Apache, TEDI, personal communication with Coleman Burnett, SWCA, December 14, 2010). The proposed project would result in a minimal and permanent detour for local traffic around the solar facility.

No Action Alternative

The No Action Alternative would have no effect on traffic and circulation because construction of the proposed solar facility would not occur.

4.9 ENVIRONMENTAL JUSTICE

Proposed Action

The Proposed Action would generate funds for TEDI and CBN, which would be used for improvement projects on CBN lands. CBN members would receive indirect beneficial impacts from the project as a result of the additional funding. The solar operator would also be encouraged to hire CBN members for the construction and maintenance phases of the proposed project. Two full-time permanent jobs are expected to be generated by this project.

No Action Alternative

The community of To'Hajiilee and CBN members would be adversely impacted if the proposed project was not approved. The No Action Alternative would result in disproportionate impacts to minority or low-income populations because construction of the proposed solar facility would not occur and the economic development activity would not be realized.

4.10 SAFETY AND SECURITY

Proposed Action

The Proposed Action would result in short-term safety risks during the construction phase. To minimize these risks, construction activities would be performed using qualified personnel trained in proper use of the appropriate equipment, including all appropriate safety precautions. Additionally, all activities would be conducted in a safe manner and in accordance with the standards specified in OSHA regulations. The appropriate signage and barriers would be in place prior to construction activities to alert pedestrians and motorists of project activities. As mitigation, the project area would be thoroughly secured with fencing to prevent access during and after construction of the proposed solar facility.

A 2.4-m-high (8-foot-high) security fence would be erected around the project area upon completion of the construction phase of the project. Authorized personnel would be the only staff allowed to enter the project area once the project is operational.

No Action Alternative

The No Action Alternative would result in no new safety or security issues to the surrounding area because construction of the proposed solar facility would not occur.

4.11 CULTURAL RESOURCES

Proposed Action

Two cultural resource sites have been identified within the project footprint that are considered significant and eligible for the NRHP (SWCA 2010). NM-S-64-8, a prehistoric artifact scatter with significant information potential, will be avoided in its entirety by solar facility design and layout. Features 11 (a ruined hogan) and 19 (the remains of a sweat lodge) at site NM-S-64-12 (a historic Navajo homestead) will also be avoided. These site protection measures will protect the integrity of both sites as concerns their NRHP eligibility, preventing any adverse effects to historic or cultural properties. The NNHPD conducted a site visit to the project area on November 4, 2010. The NNHPD has also reviewed the cultural resources report submitted on December 2, 2010 (SWCA 2010). The NNHPD issued its concurrence letter for the proposed project (including the site protection measures listed above) on February 9, 2011 (Appendix F).

No Action Alternative

The No Action Alternative would result in no impacts to cultural resources because the project area would not be disturbed.

5.0 CUMULATIVE IMPACTS

Cumulative impacts analysis includes past, present, and future actions that could impact the same resources that are affected by the Proposed Action analyzed in this document. Past and present actions are incorporated in this document through the description of the Affected Environment in Section 3.0.

According to CBN and TEDI, a future project that could occur in the project vicinity in the next two to five years is the improvement of Rio Puerco Road by Bernalillo County. TEDI has approached the Bernalillo County Public Works Department regarding the paving of Rio Puerco Road from Interstate 40 to the boundary of CBN trust lands. This project may be supported by funds obtained by TEDI; however, funds have not been received to date. Bernalillo County has expressed interest in working with TEDI on the road project. The county maintained portion of the road is 3.9 km (2.4 miles) long and approximately 2.4 hectares (5.8 acres) in area. Short-term adverse impacts would include soil and vegetation disturbance, noise related to construction, disturbance to traffic and circulation, and increases in particulate matter related to soil disturbance. Long-term beneficial impacts from the road improvement project would include increased travel safety and improved air quality due to a reduction in road-related particulate matter.

There are no other proposed projects identified for CBN trust lands (Dee Apache, TEDI, personal communication with Coleman Burnett, SWCA, December 14, 2010). Neither CBN nor TEDI have received any permit requests, and the land adjacent to the project area is in tribal ownership; therefore, additional foreseeable future land improvements from the private sector are not expected.

According to a pre-feasibility assessment completed for the proposed project, there are other power generation projects listed in the PNM Queue that would connect to the same PNM 115 kV power line that would be utilized under the Proposed Action (Western States Energy Solutions 2010). Impacts from the proposed power generation projects would be similar to those disclosed in this EA. As with the Proposed Action, the future projects would incrementally decrease the capacity of the existing power line, and could result in the need for future upgrades. Short-term adverse impacts associated with the power line upgrade would include soil and vegetation disturbance, noise related to construction, disturbance to traffic and circulation, and increases in particulate matter related to soil disturbance. Long-term adverse impacts would include visual resource impacts and potential socio-economic impacts, if the cost of the upgrade is passed to PNM customers. Long-term beneficial impacts resulting from the power line upgrade would include improved power utility services and beneficial socio-economic impacts, if more communities would be able to develop renewable energy projects, such as the Proposed Action, because of the additional capacity within the power line.

6.0 MITIGATION MEASURES

6.1 WATER RESOURCES AND WATER QUALITY

Coverage under the NPDES construction general stormwater permit requires the development of a SWPPP to implement sediment, erosion, and pollution prevention control measures and to obtain coverage under an EPA NPDES permit. Additionally, the current construction general permit also includes state-specific requirements to implement BMPs that are designed to prevent to the maximum extent practicable, an increase in sediment, or a parameter that addresses sediment. A SWPPP will be developed prior to construction of the proposed solar facility.

6.2 AIR QUALITY AND CLIMATE

Due to the construction activity associated with the proposed project, temporary impacts to local air quality may occur. In order to minimize the effects on local air quality, regular watering of disturbed areas will be made during construction to reduce dust and other particulate matter from impacting nearby roadways and the residential area.

6.3 THREATENED AND ENDANGERED SPECIES

The NNDFW has reviewed the project and issued approval of the project (see Appendix E). There are three mitigation measures stipulated as a condition of approval. For the western burrowing owl, the NNDFW recommends no activity within 0.4 km (0.25 mile) of an active nest burrow from March 1 to August 15 and no habitat alteration year-round within 0.2 km (0.1 mile) of nest site. Although no kit fox dens were observed within the project area, the NNDFW recommends no ground-disturbing activities year-round within 60 m (197 feet) of a known den-site and no activity within 0.2 km (0.1 mile) of an active den from December 1 to August 31. Although the mountain plover was not observed directly within the proposed project area, the NNDFW has prescribed the need for a pre-construction survey between May 1 and June 15.

6.4 TRAFFIC AND CIRCULATION

Temporary signage will be posted on the affected roadways during construction. The New Mexico Department of Transportation oversize permitting process will be used to transport any oversized equipment that may be needed for the project.

6.5 SAFETY AND SECURITY

All construction activities will be performed using qualified personnel trained in the proper use of appropriate equipment, including all applicable safety precautions. All activities will be conducted in a safe manner and in accordance with the standards specified in OHSA regulations. The appropriate signage and barriers will be in place prior to construction activities to alert pedestrians and motorists of project activities. The project area will be thoroughly secured with fencing to prevent access during and after construction of the proposed solar facility.

6.6 CULTURAL RESOURCES

The Proposed Action mitigates any impacts to known cultural resources by avoiding adverse effects to eligible sites during construction of the proposed project. In the event that archeological deposits, including any Native American pottery, stone tools, bones, or human remains, are uncovered, the project will by halted and the contractor will stop all work immediately in the vicinity of the discovery and take reasonable measures to avoid or minimize harm to the finds. All archeological findings will be secured and access to the sensitive area restricted. The contractor will inform CBN and the BIA immediately. Work in sensitive areas cannot resume until consultation is completed and appropriate measures have been taken to ensure that the project is in compliance with the NHPA.

7.0 CONSULTATION

The NNDFW was consulted on this project. A biological report was submitted on September 17, 2010. The concurrence letter from NNDFW was provided to SWCA on October 11, 2010 (see Appendix E).

The NNHPD was also consulted on this project. The original cultural resources report was submitted on September 7, 2010. Upon request, SWCA hosted a field visit with NNHPD staff on November 4, 2010. The revised cultural resources report was submitted on December 2, 2010 (SWCA 2010). The concurrence letter from NNHPD was provided to SWCA on February 9, 2011.

A meeting with the BIA, TEDI, and SWCA was also held on December 14, 2010, at the community of To'Hajiilee. During that meeting, the project description was presented to BIA staff and the lease agreement was discussed. The BIA agreed to review an EA with one fully developed action alternative. All other alternatives could be disclosed as alternatives eliminated from detailed analysis. The meeting concluded with a site visit to the project area.

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9.0 LITERATURE CITED

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APPENDIX A
CBN RESOLUTION APPROVING AND AUTHORIZING SOLAR PROJECT

Canoncito Band of Navajos

P.O. Box 3992 To'hajiilee New Mexico 87026

Phone: 505-908-2730 Fax: 505-908-2731

Raymond Sanchez President
Mark Begay Vice President
Yvette Platero Secretary Treasurer
Lawrence Platero Council Delegate

RESOLUTION: TOH 10-07-01

RESOLUTION OF THE CAÑONCITO BAND OF NAVAJOS/TO'HAJIILEE CHAPTER APPROVING AND AUTHORIZING APPLICATION BY TO'HAJIILEE ECONOMIC DEVELOPMENT, INC. FOR BUSINESS LEASE ON 489.1 ACRES OF CANOÑCITO BAND LAND LOCATED IN PARTS OF SECTIONS 31 AND 6, IN ACCORDANCE WITH APPLICABLE RULES AND REGULATIONS IN 25 USC AND AS LAND OWNERS, TO DEVELOP AND CONSTRUCT A SOLAR ENERGY PLANT TO PRODUCE RENEWABLE ENERGY ON SAID CBN LANDS

WHEREAS:

1. The Cañoncito Band of Navajos ("CBN") was granted by the United States Government certain lands in New Mexico to be held in trust for CBN by the Act of August 13, 1949 and with this recognition the CBN/To'Hajiilee Chapter government has provided services to the CBN people; and

2. The CBN/To'Hajiilee Chapter ("Chapter") government currently provides services to enrolled members of the Cañoncito Band of Navajos; and

3. The Chapter delegated to the To'Hajiilee Economic Development, Inc. ("TEDI") the Chapter's responsibility for and performance of economic planning and development and other ventures and activities for the To'Hajiilee community and members of the Cañoncito Band of Navajos; and

4. Although TEDI was originally wholly owned by Dine Development Corporation ("Dine"), on September 9, 2009, full ownership was transferred from Dine to the Chapter at no cost to the Chapter, pursuant to CBN Resolution No. TOH-09-09-08-01, dated September 8, 2009, in which the Chapter requested and accepted full ownership of TEDI; and

5. In December 2008, TEDI made a formal request to the Chapter to secure a Business Lease to develop a solar energy project ("the Solar Project") on CBN land located in parts of Sections 31 and 6; and

6. The Chapter approved TEDI's request for a Business Lease at a meeting held on December 18, 2008, but the written resolution approving said request was never signed; and

7. The Chapter wishes to confirm its support of the Solar Project and approval of TEDI's request for a Business Lease for that purpose; and

8. The Chapter further agrees to authorize a right-of-way on the above-identified land in connection with the Solar Project for water, electricity, and additional archaeological and environmental clearances; and

9. A map showing the location of the Solar Project and attendant right-of way, subject to completion of the formal survey, is attached hereto as Exhibit A; and

10. A survey of the 489.1 acre Solar Project Site, prepared by Red Valley Survey, is attached hereto as Exhibit B; and

11. A survey of the proposed Right of Way through State Land Section 32, T10N, R1W, prepared by Red Valley Survey, is attached hereto as Exhibit C; and

12. The CBN wishes to authorize this Business Lease for a period of twenty-five (25) years and a renewal term of up to an additional twenty-five (25) years.

NOW THEREFORE BE IT RESOLVED:

1. The Chapter/CBN hereby approves and authorizes TEDI to negotiate and obtain a Business Lease between CBN and TEDI for the development and construction of a solar plant to be developed by TEDI; and

2. The Chapter/CBN hereby authorizes the granting of a right-of-way for electricity, water, and additional archaeological and environmental clearances, as necessary; and

3. The Chapter/CBN hereby authorizes the negotiation of a Business Lease between CBN and TEDI for a period of twenty-five (25) years, with a renewal term of up to an additional twenty-five (25) years; and

4. The Chapter/CBN hereby agrees that said Business Lease shall permit TEDI, subject to the approval of the Chapter/CBN and the Secretary of the Interior, to sublease the Business Lease to the solar plant developer/operator that will be selected by TEDI after negotiations between TEDI and potential developers/operators; and

5. The Chapter/CBN hereby authorizes and directs TEDI to take all steps necessary to obtain such Business Lease, including but not limited to dealing with the Bureau of Indian Affairs and such persons as are qualified to perform surveys, appraisals, and archaeological and environmental clearances; and

6. The membership of the Chapter/CBN hereby authorizes Chapter officials to approve and execute on behalf of the Chapter/CBN membership the Business Lease and any Sublease to be negotiated with the solar plant developer/operator on such terms as the

Chapter officials deem reasonable and appropriate without need for prior membership approval, subject to the approval of the Secretary of the Interior.

CERTIFICATION

WE HEREBY CERTIFY THAT THE FOREGOING RESOLUTION was duly discussed and considered at To'Hajiilee Community Chapter meeting in Bernalillo County, New Mexico, at which a quorum was present and that same was passed by a vote of 26 in favor, 8 opposed, and 1 abstained this 20th day of July, 2010.

Raymond Secatero, President

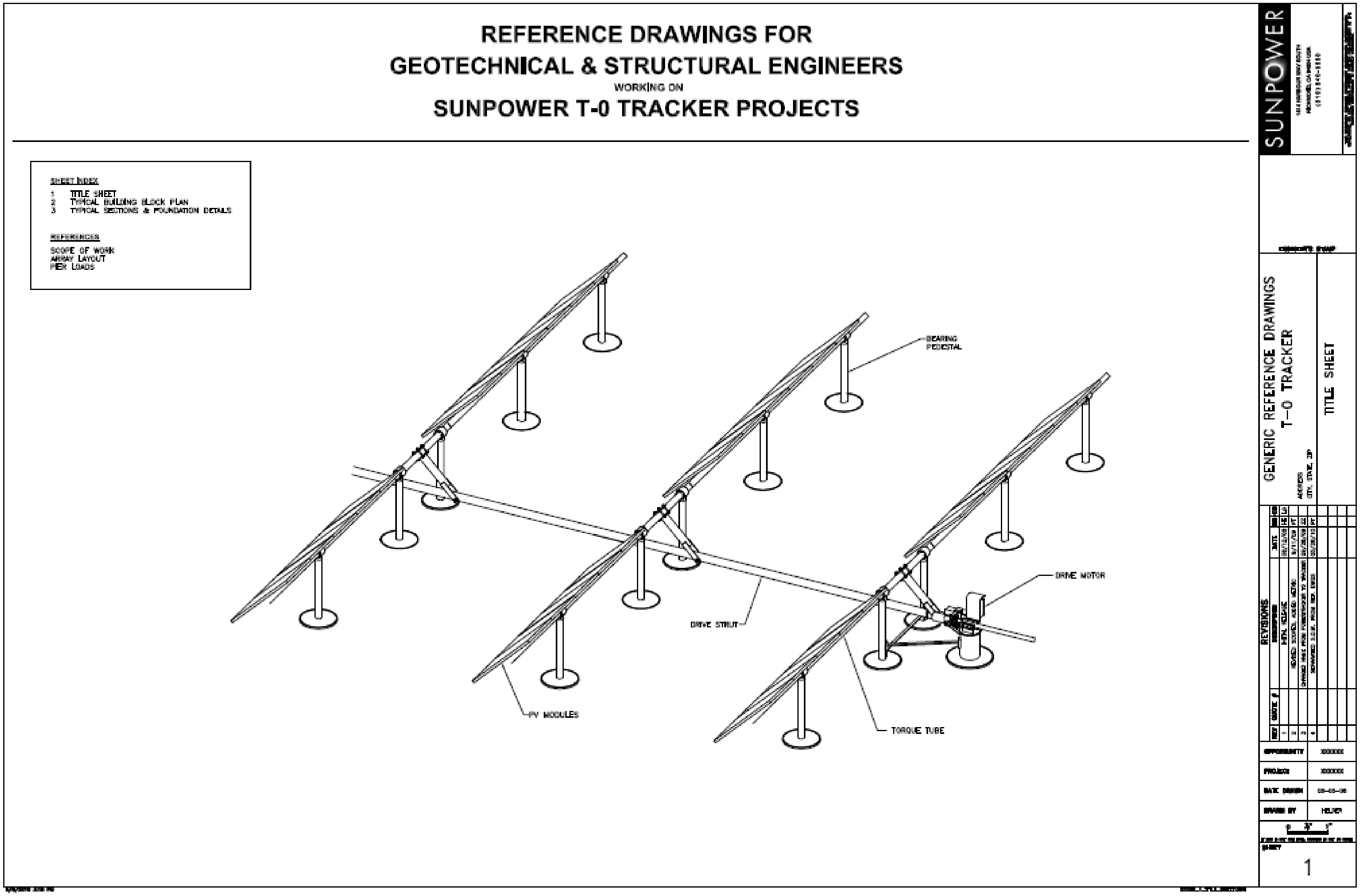
Mark Begay, Vice President

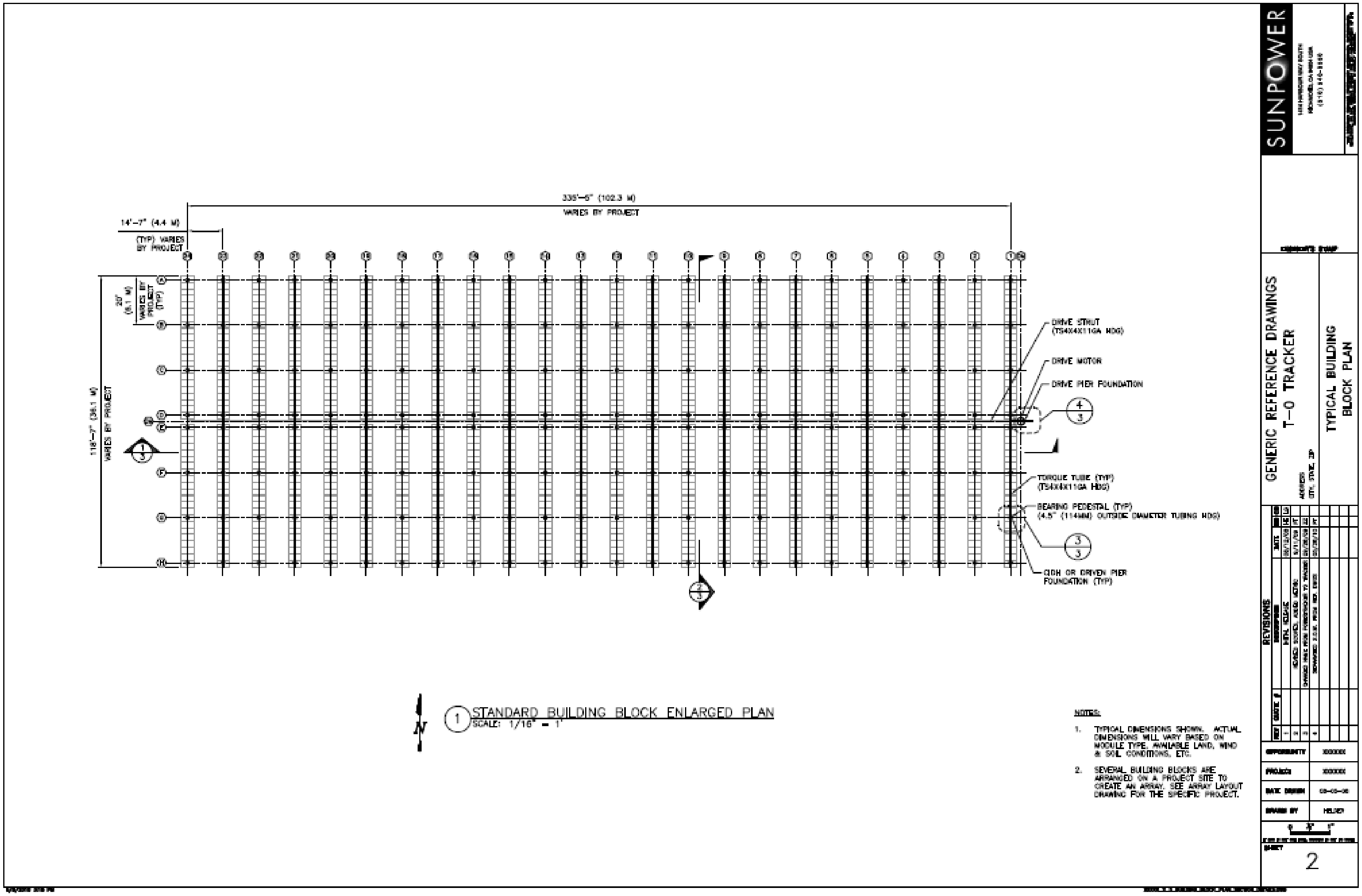
Yvette Platero, Sec/Treasurer

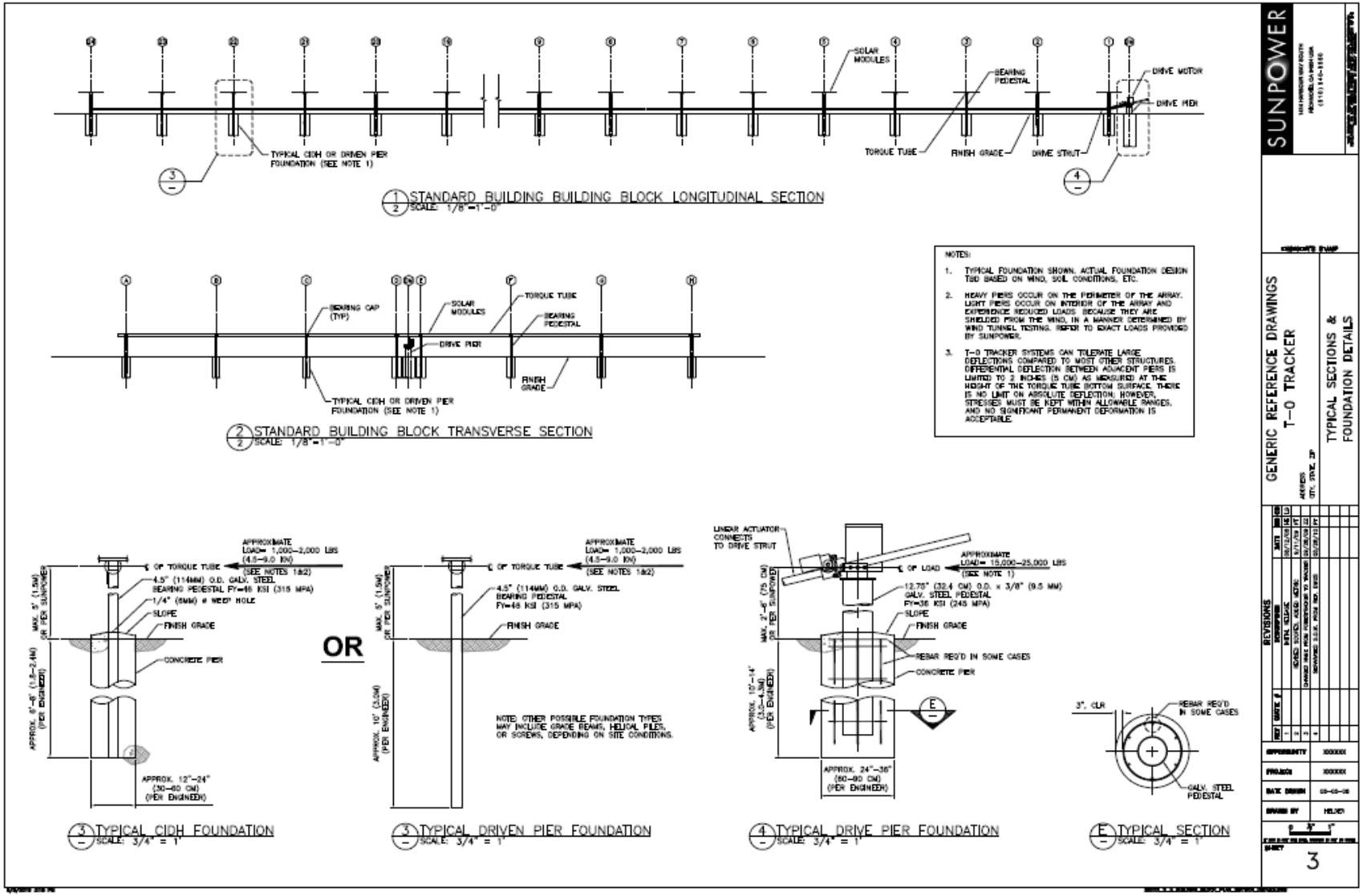
Lawrence R. Platero, Council Delegate

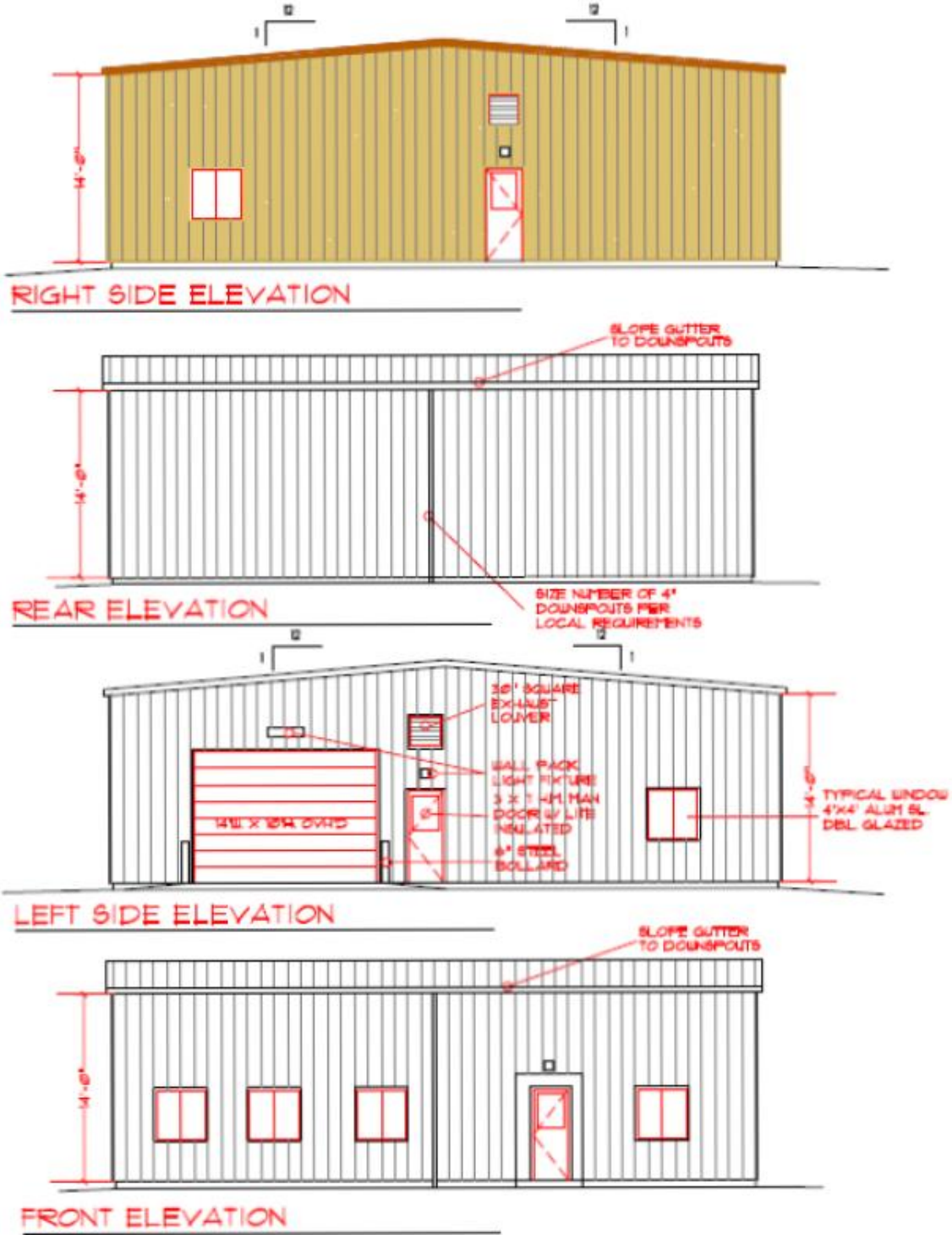
Page 3 of 3

APPENDIX B
TYPICAL DRAWINGS OF SOLAR PANELS AND PIERS


REFERENCE DRAWINGS FOR
GEOTECHNICAL & STRUCTURAL ENGINEERS
WORKING ON
SUNPOWER T-0 TRACKER PROJECTS
SHEET INDEX
1 TITLE SHEET
2 TYPICAL BUILDING BLOCK PLAN
3 TYPICAL SECTIONS & FOUNDATION DETAILS
REFERENCES
SCOPE OF WORK
ARRAY LAYOUT
PIER LOADS
BEARING PEDESTAL
DRIVE MOTOR
DRIVE STRUT
PV MODULES
TORQUE TUBE
SUNPOWER
GENERIC REFERENCE DRAWINGS
T-0 TRACKER
TITLE SHEET
REVISIONS
1


335'-6" (102.3 M)
VARIES BY PROJECT
14'-7" (4.4 M)
(TYP) VARIES BY PROJECT
20' (6.1 M) VARIES BY PROJECT (TYP)
118'-7" (36.1 M) VARIES BY PROJECT
DRIVE STRUT (TS4X4X11GA HDG)
DRIVE MOTOR
DRIVE PIER FOUNDATION
TORQUE TUBE (TYP) (TS4X4X11GA HDG)
BEARING PEDESTAL (TYP) (4.5" (114MM) OUTSIDE DIAMETER TUBING HDG)
CIDH OR DRIVEN PIER FOUNDATION (TYP)
STANDARD BUILDING BLOCK ENLARGED PLAN
SCALE: 1/16" = 1'
NOTES:
1. TYPICAL DIMENSIONS SHOWN. ACTUAL DIMENSIONS WILL VARY BASED ON MODULE TYPE, AVAILABLE LAND, WIND & SOIL CONDITIONS, ETC.
2. SEVERAL BUILDING BLOCKS ARE ARRANGED ON A PROJECT SITE TO CREATE AN ARRAY. SEE ARRAY LAYOUT DRAWING FOR THE SPECIFIC PROJECT.
SUNPOWER
GENERIC REFERENCE DRAWINGS
T-0 TRACKER
TYPICAL BUILDING BLOCK PLAN
REVISIONS
2


SOLAR MODULES
BEARING PEDESTAL
DRIVE MOTOR
DRIVE PIER
TYPICAL CIDH OR DRIVEN PIER FOUNDATION (SEE NOTE 1)
TORQUE TUBE
FINISH GRADE
DRIVE STRUT
1 STANDARD BUILDING BUILDING BLOCK LONGITUDINAL SECTION
SCALE: 1/8" = 1'-0"
BEARING CAP (TYP)
SOLAR MODULES
TORQUE TUBE
BEARING PEDESTAL
DRIVE PIER
FINISH GRADE
TYPICAL CIDH OR DRIVEN PIER FOUNDATION (SEE NOTE 1)
2 STANDARD BUILDING BLOCK TRANSVERSE SECTION
SCALE: 1/8" = 1'-0"
NOTES:
1. TYPICAL FOUNDATION SHOWN. ACTUAL FOUNDATION DESIGN TBD BASED ON WIND, SOIL CONDITIONS, ETC.
2. HEAVY PIERS OCCUR ON THE PERIMETER OF THE ARRAY. LIGHT PIERS OCCUR ON INTERIOR OF THE ARRAY AND EXPERIENCE REDUCED LOADS BECAUSE THEY ARE SHIELDED FROM THE WIND, IN A MANNER DETERMINED BY WIND TUNNEL TESTING. REFER TO EXACT LOADS PROVIDED BY SUNPOWER.
3. T-0 TRACKER SYSTEMS CAN TOLERATE LARGE DEFLECTIONS COMPARED TO MOST OTHER STRUCTURES. DIFFERENTIAL DEFLECTION BETWEEN ADJACENT PIERS IS LIMITED TO 2 INCHES (5 CM) AS MEASURED AT THE HEIGHT OF THE TORQUE TUBE BOTTOM SURFACE. THERE IS NO LIMIT ON ABSOLUTE DEFLECTION; HOWEVER, STRESSES MUST BE KEPT WITHIN ALLOWABLE RANGES, AND NO SIGNIFICANT PERMANENT DEFORMATION IS ACCEPTABLE.
APPROXIMATE LOAD= 1,000–2,000 LBS (4.5–9.0 KN) (SEE NOTES 1&2)
℄ OF TORQUE TUBE
4.5" (114MM) O.D. GALV. STEEL BEARING PEDESTAL FY=48 KSI (315 MPA)
1/4" (6MM) ø WEEP HOLE
SLOPE
FINISH GRADE
CONCRETE PIER
MAX. 5' (1.5M) OR PER SUNPOWER
APPROX. 8'–0" (1.5–2.4M) (PER ENGINEER)
APPROX. 12"–24" (30–60 CM) (PER ENGINEER)
3 TYPICAL CIDH FOUNDATION
SCALE: 3/4" = 1'
OR
APPROXIMATE LOAD= 1,000–2,000 LBS (4.5–9.0 KN) (SEE NOTES 1&2)
℄ OF TORQUE TUBE
4.5" (114MM) O.D. GALV. STEEL BEARING PEDESTAL FY=48 KSI (315 MPA)
FINISH GRADE
MAX. 5' (1.5M) OR PER SUNPOWER
APPROX. 10' (3.0M) (PER ENGINEER)
NOTE: OTHER POSSIBLE FOUNDATION TYPES MAY INCLUDE GRADE BEAMS, HELICAL PILES, OR SCREWS, DEPENDING ON SITE CONDITIONS.
3 TYPICAL DRIVEN PIER FOUNDATION
SCALE: 3/4" = 1'
LINEAR ACTUATOR CONNECTS TO DRIVE STRUT
APPROXIMATE LOAD= 15,000–25,000 LBS (SEE NOTE 1)
℄ OF LOAD
12.75" (32.4 CM) O.D. x 3/8" (9.5 MM) GALV. STEEL PEDESTAL FY=36 KSI (245 MPA)
SLOPE
FINISH GRADE
REBAR REQ'D IN SOME CASES
CONCRETE PIER
MAX. 2'–6" (75 CM) OR PER SUNPOWER
APPROX. 12'–14' (3.5–4.3M) (PER ENGINEER)
APPROX. 24"–36" (60–90 CM) (PER ENGINEER)
4 TYPICAL DRIVE PIER FOUNDATION
SCALE: 3/4" = 1'
3", CLR
REBAR REQ'D IN SOME CASES
GALV. STEEL PEDESTAL
E TYPICAL SECTION
SCALE: 3/4" = 1'
SUNPOWER
GENERIC REFERENCE DRAWINGS
T-0 TRACKER
TYPICAL SECTIONS & FOUNDATION DETAILS
REVISIONS
OPPORTUNITY XXXXXX
PROJECT XXXXXX
DRAWN BY HLW
SHEET 3


RIGHT SIDE ELEVATION
SLOPE GUTTER TO DOWNSPOUTS
REAR ELEVATION
SIZE NUMBER OF 4" DOWNSPOUTS PER LOCAL REQUIREMENTS
LEFT SIDE ELEVATION
TYPICAL WINDOW 4'X4' ALUM SL DBL GLAZED
SLOPE GUTTER TO DOWNSPOUTS
FRONT ELEVATION

APPENDIX C
FLOODPLAIN MODELING REPORT FOR THE PROPOSED PROJECT AREA

Bohannan Huston

Courtyard I
7500 Jefferson S. NE
Albuquerque NM
87109-4335
www.bhinc.com
voice: 505.823. 000
facsimile: 505.798.7988
toll free: 800.877.3332

September 30, 2010

Jason Claiborne
SunPower Corporation
1414 Harbour Way South
Richmond, California 94804

Re: To'Hajiilee Preliminary Drainage Study
BHI Project # 20110155

Dear Mr. Claiborne,

BHI is pleased to submit our preliminary drainage study for the SunPower Corporation for use in planning and feasibility of a solar array in To'Hajiilee, New Mexico.

The site is located in Township 10 North, Range 1 West, Section 31 approximately 20 miles west of Albuquerque. A preliminary drainage analysis was completed to determine approximate inundation levels and velocities during a 10-year, 25-Year, 50-year and 100-year storm event. The analysis was preformed utilizing the New Mexico State Highway and Transportation Department Drainage Manuals. Precipitation Data was collected from National Oceanic and Atmospheric Administration. Soil classifications were determined using the Natural Resources Conservation Service. The latest USGS topographical maps were used to determine elevation and drainage basin sizing. Topography and Aerial Imagery, which were completed for the Middle-Region Council of Governments in 2008, were used to complete the HEC-RAS modeling and Inundation Mapping.

In the existing condition, the site is undeveloped and generally slopes from northwest to southeast. Along the north boundary of the site is a major drainage path called the Canada Del Ojo. The Canada Del Ojo reaches approximately 27.5 Miles before intersecting the site and has approximately 73.5 square miles contributing to the storm water runoff. The Canada Del Ojo runs from west to east along the site and eventually drains into the Rio Puerco immediately after crossing Interstate 40. The site is impacted by two drainage basins, the Northern Drainage Basin and the Southern Drainage Basin. The Northern Drainage Basin runs along the north top of the site and is included in the 73.5 square miles that is drained by the Canada Del Ojo. The Southern Drainage Basin Runs along the southern part of the site and is drained by a smaller tributary which eventually drains into the Canada Del Ojo after leaving the east end of the site.

The analysis was broken into two phases, the HEC-HMS phase and the HEC-RAS phase. Under the HEC-HMS phase, the US Army Corp of Engineers HEC-HMS was used in conjunction with ARC-Map to model the 10-year, 25-Year, 50-year and-100 year storm event. Peak discharge characteristics for each basin's results are summarized in the table below.

Peak Discharge					
Hydrological Element	Drainage Area (Mi2)	Peak Discharge 100 Year Storm (CFS)	Peak Discharge 50 Year Storm (CFS)	Peak Discharge 25 Year Storm (CFS)	Peak Discharge 10 Year Storm (CFS)
Northern Basin	73.5	6552	5186	4035	2659
Southern Basin	0.8	400	314	239	153

During the HEC-RAS phase, the US Army Corp of Engineers HEC-HMS was used in conjunction with ARC-Map to model the 10-year, 25-Year, 50-year and 100-year storm event with inundation levels and peak velocities. The results are displayed in the attached inundation maps and peak velocity maps. The inundation maps display that during each storm event the North East portions of the site will be impacted by offsite storm water with depths increasing as you get closer to the limits of the Canada Del Ojo and the smaller tributary to the south. The same can be observed in the velocity mapping.

If this site is chosen for development, we recommend that a design level topographical survey be completed. This will allow for more detailed Hydrological Models so that inundation levels and velocities may be more fully understood. Once completed, a detailed grading and drainage plan can be developed to mitigate storm water runoff with the proposed development. Due to the close proximity of the proposed development to the Canada Del Ojo, a 401/404 permit may be required prior to construction. We recommend that permit requirements be verified with the regulating jurisdiction if this site is selected for further investigation.

Sincerely,

Roy Glenn Gibson, P.E.
Project Manager
Municipal Engineering

RGG/le
Enclosures

cc: Jim Flint, BHI (w/encl.)

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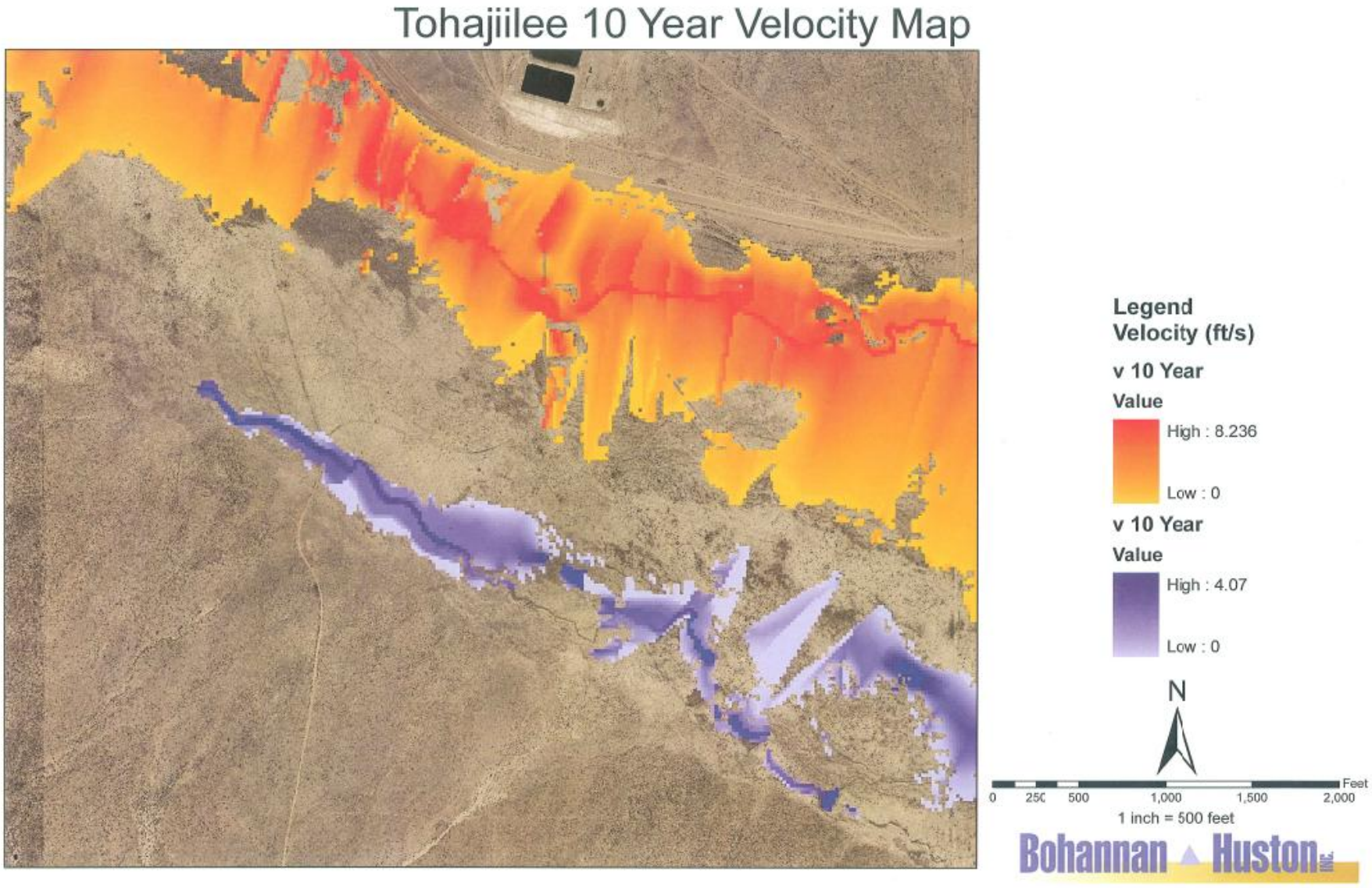
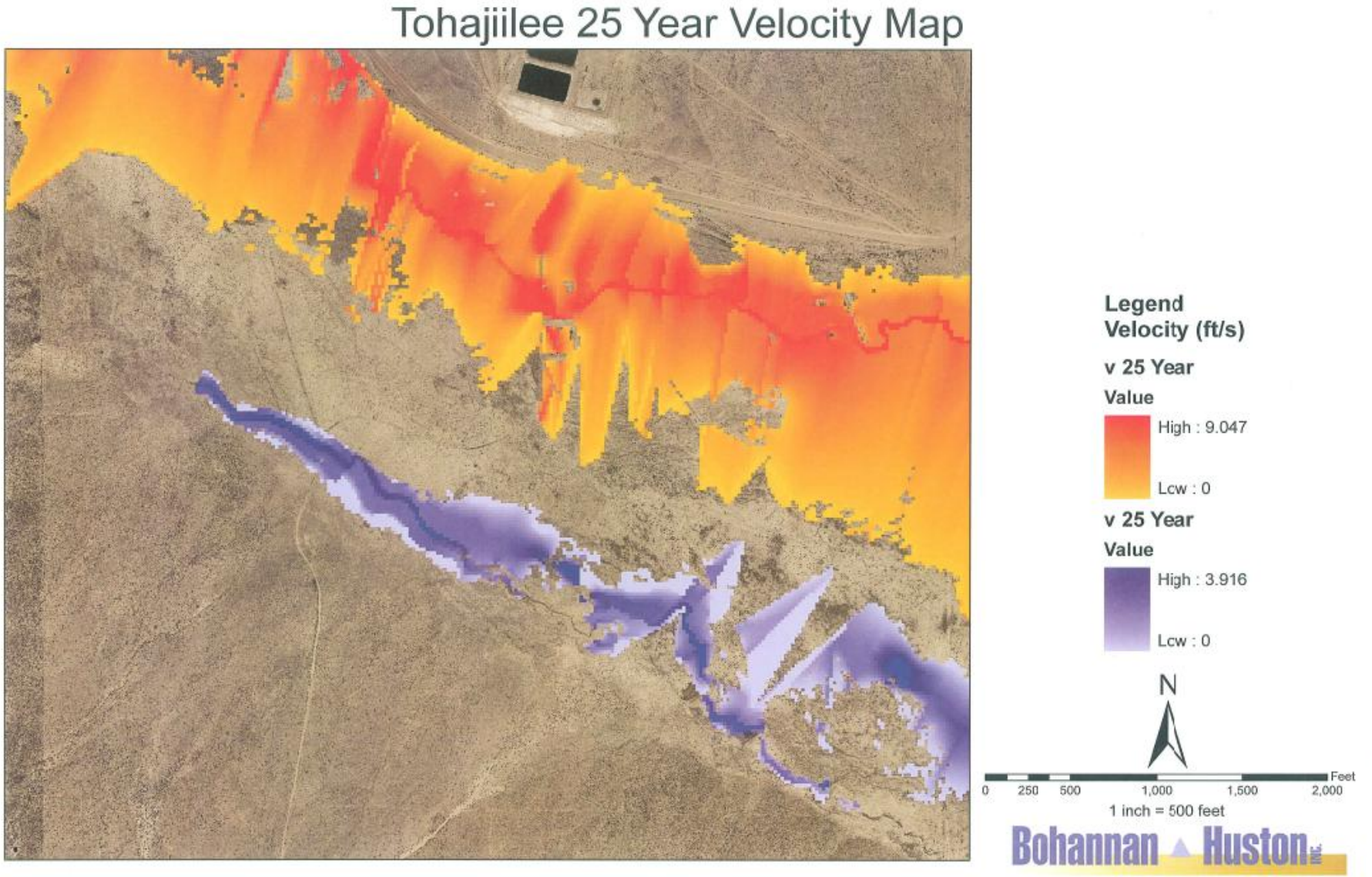
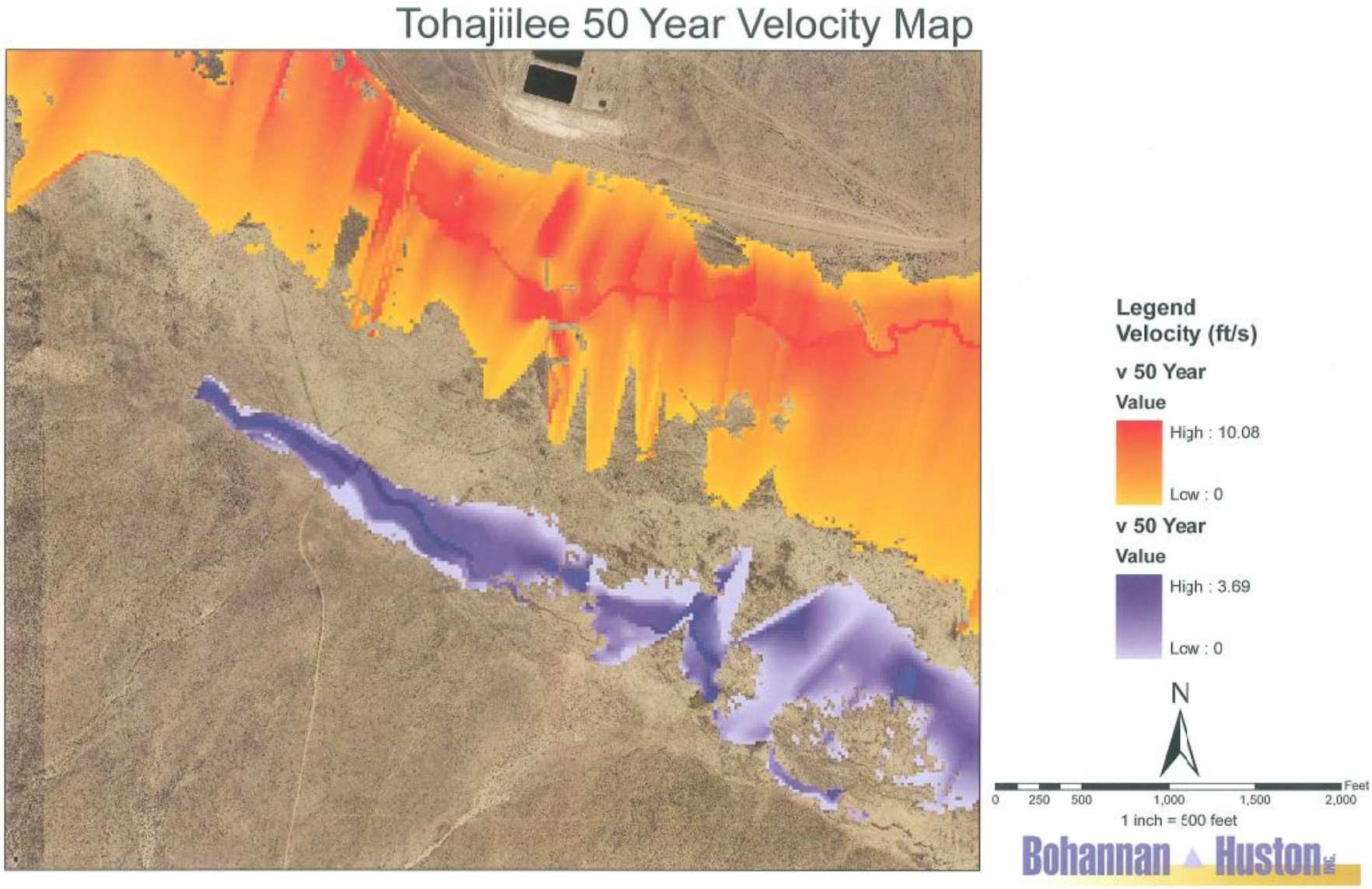
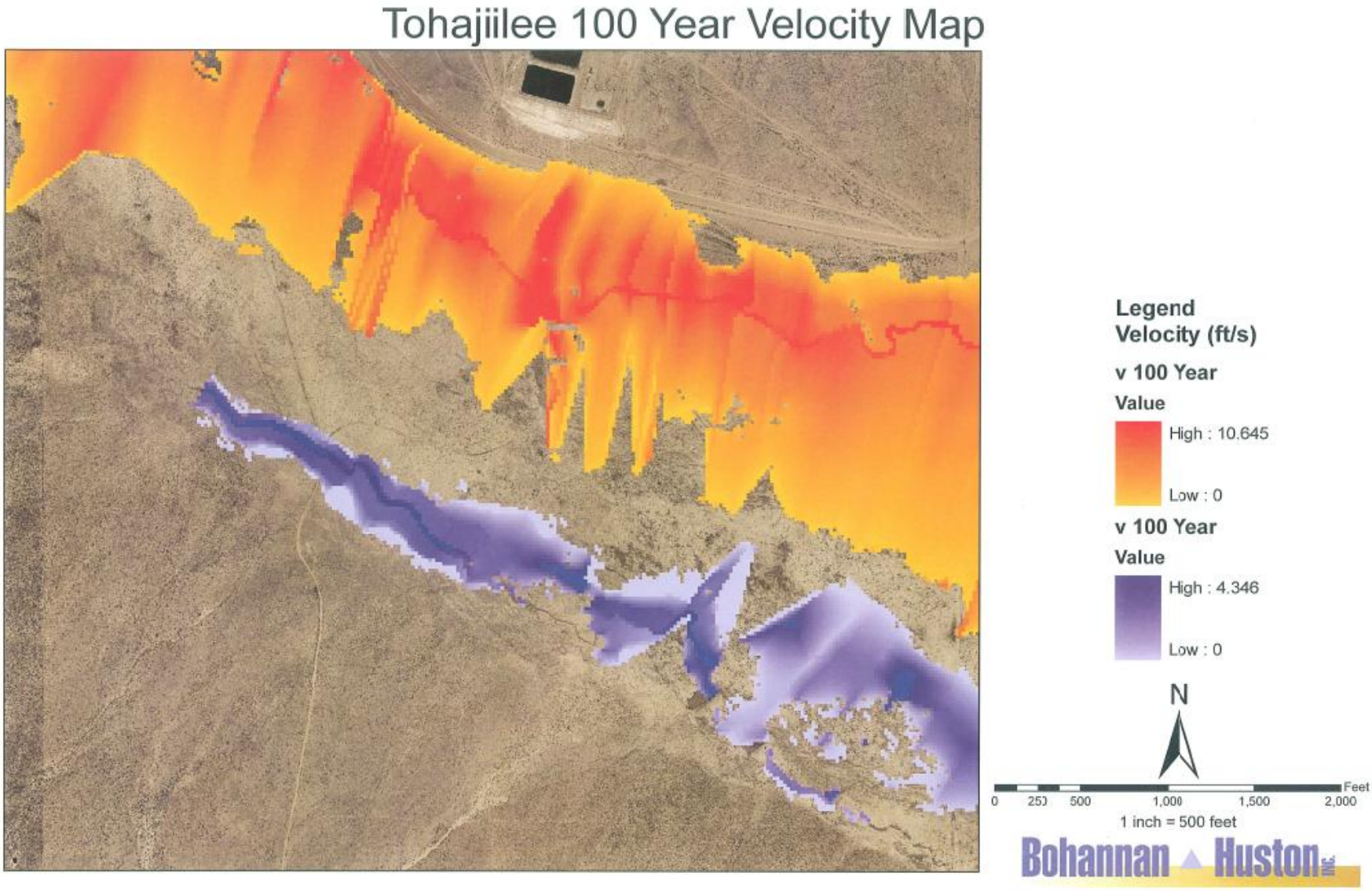
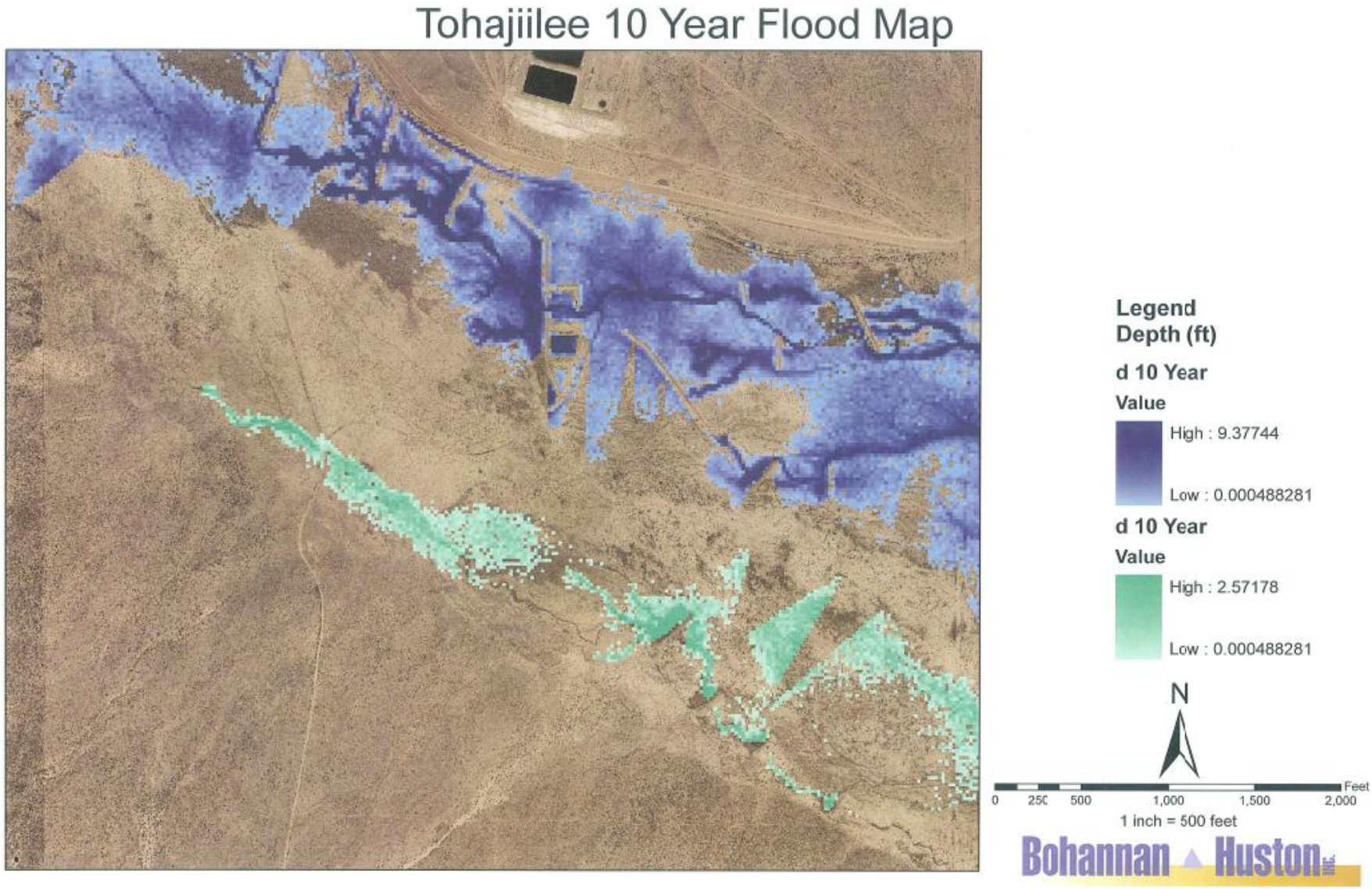
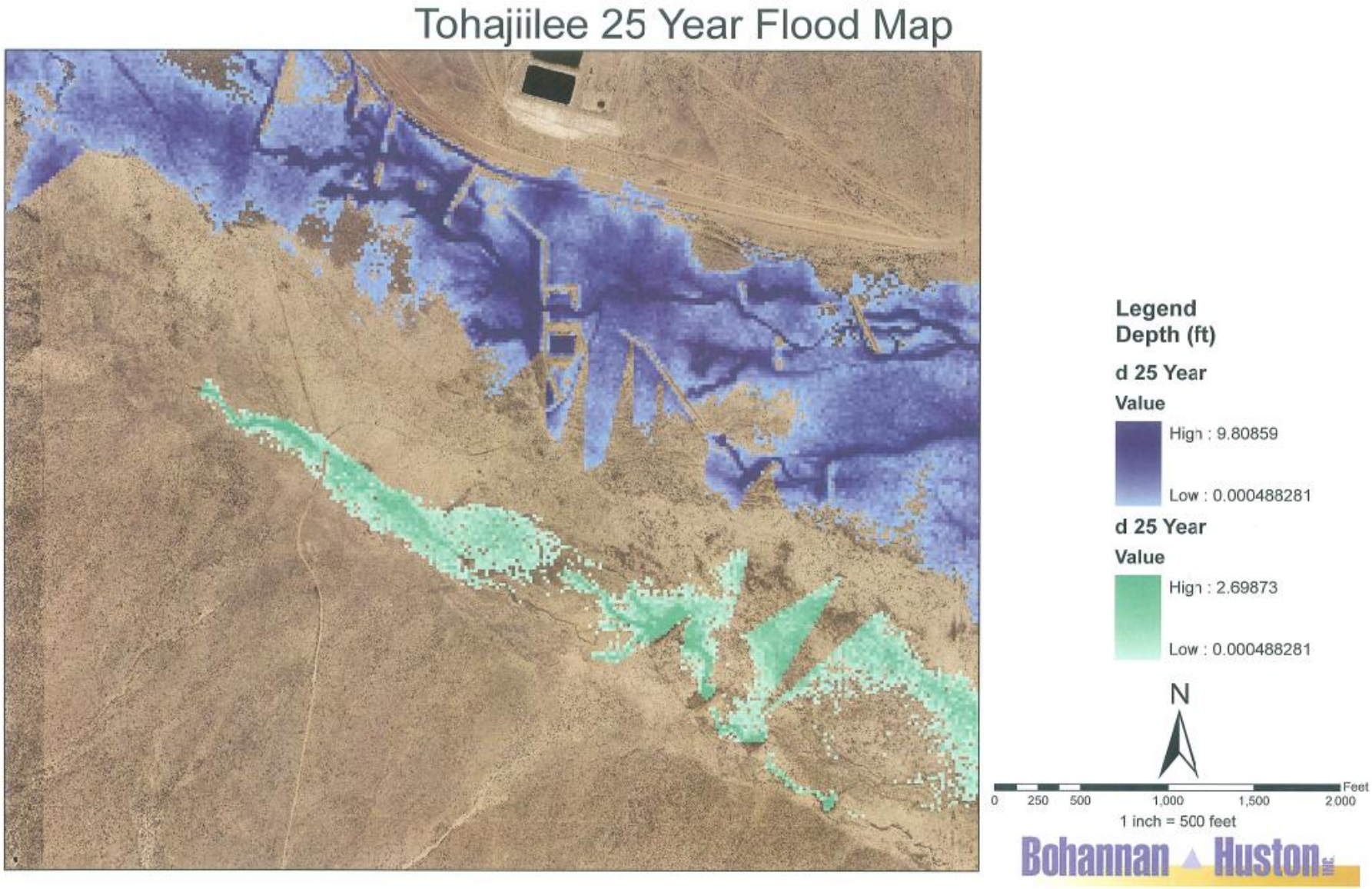

Tohajiilee 10 Year Velocity Map
Legend
Velocity (ft/s)
v 10 Year
Value
High : 8.236
Low : 0
v 10 Year
Value
High : 4.07
Low : 0
N
Feet
0
250
500
1,000
1,500
2,000
1 inch = 500 feet
Bohannan Huston INC.


Tohajiilee 25 Year Velocity Map
Legend
Velocity (ft/s)
v 25 Year
Value
High : 9.047
Lcw : 0
v 25 Year
Value
High : 3.916
Lcw : 0
N
0
250
500
1,000
1,500
2,000
Feet
1 inch = 500 feet
Bohannan Huston Inc.

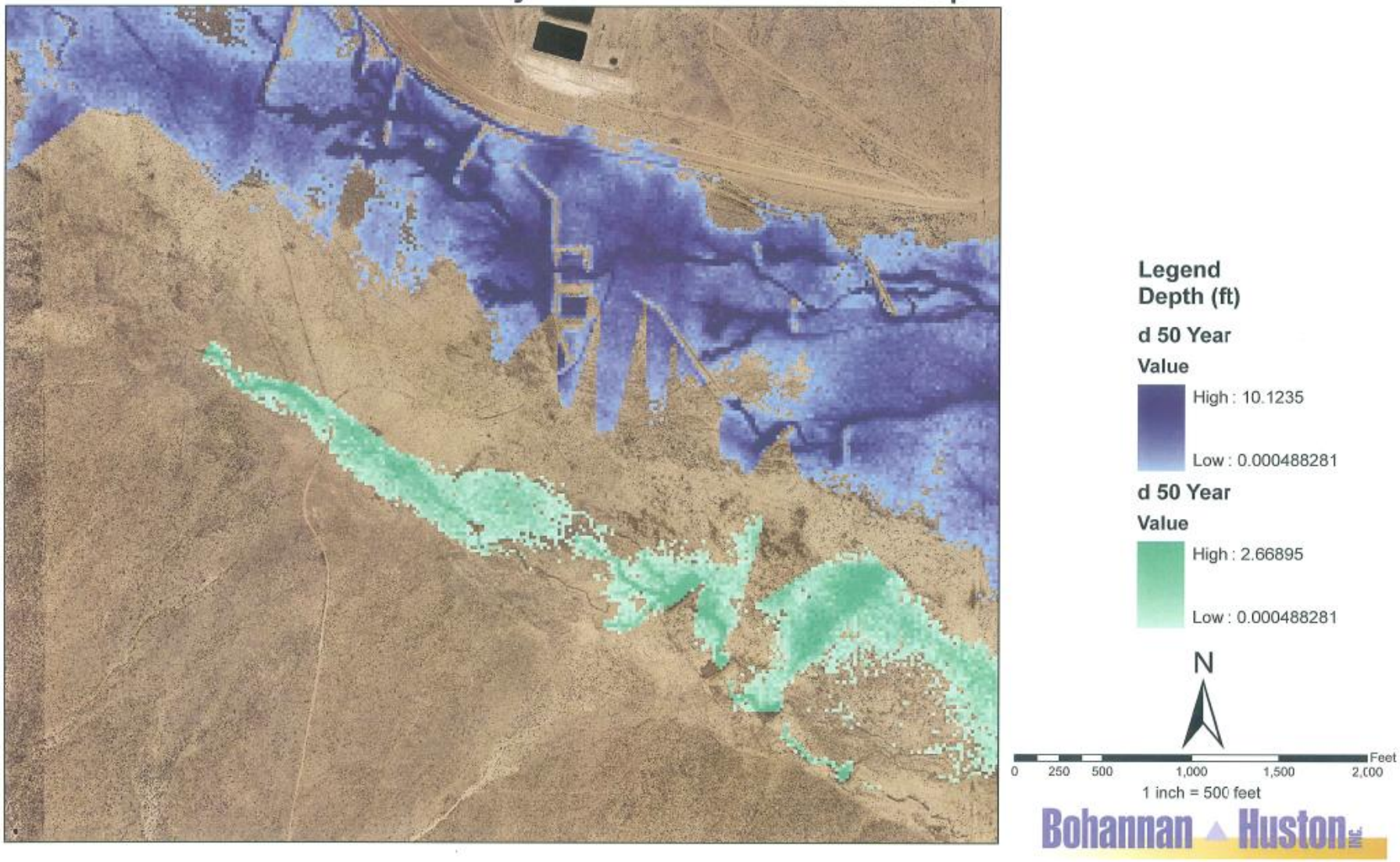

Tohajiilee 50 Year Velocity Map
Legend
Velocity (ft/s)
v 50 Year
Value
High : 10.08
Low : 0
v 50 Year
Value
High : 3.69
Low : 0
N
Feet
0
250
500
1,000
1,500
2,000
1 inch = 500 feet
Bohannan Huston Inc.


Tohajiilee 100 Year Velocity Map
Legend
Velocity (ft/s)
v 100 Year
Value
High : 10.645
Low : 0
v 100 Year
Value
High : 4.346
Low : 0
N
0
250
500
1,000
1,500
2,000
Feet
1 inch = 500 feet
Bohannan Huston Inc.

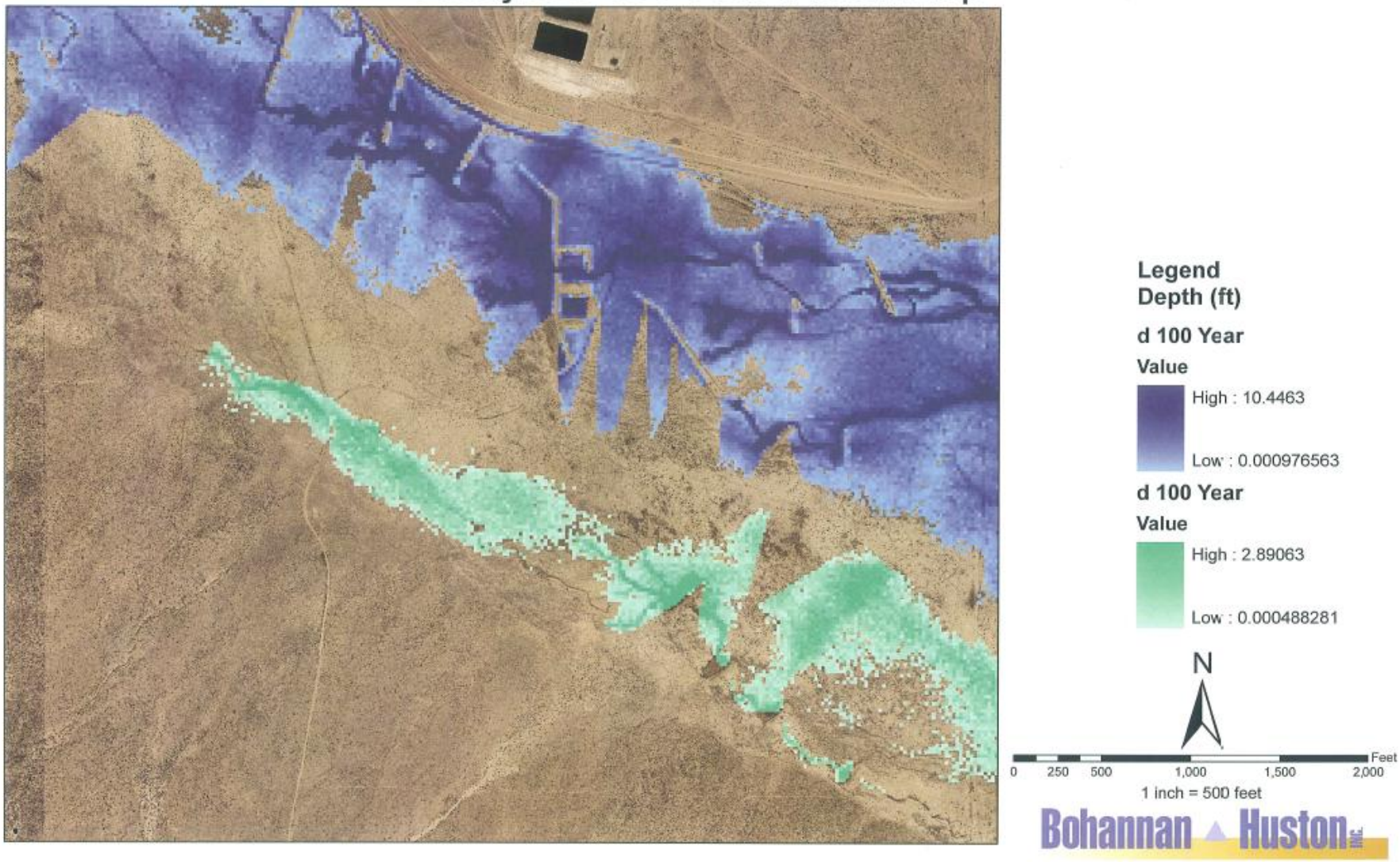

Tohajiilee 10 Year Flood Map
Legend
Depth (ft)
d 10 Year
Value
High : 9.37744
Low : 0.000488281
d 10 Year
Value
High : 2.57178
Low : 0.000488281
N
0
250
500
1,000
1,500
2,000
Feet
1 inch = 500 feet
Bohannan Huston Inc.


Tohajiilee 25 Year Flood Map
Legend
Depth (ft)
d 25 Year
Value
High : 9.80859
Low : 0.000488281
d 25 Year
Value
High : 2.69873
Low : 0.000488281
N
0
250
500
1,000
1,500
2,000
Feet
1 inch = 500 feet
Bohannan Huston Inc.

Tohajiilee 50 Year Flood Map



Tohajiilee 100 Year Flood Map



APPENDIX D
LIST OF FEDERAL THREATENED, ENDANGERED, AND SPECIES OF CONCERN, AND STATE THREATENED AND ENDANGERED SPECIES FOR BERNALILLO COUNTY, NEW MEXICO

Table B.1. Threatened and Endangered Species in Bernalillo County, New Mexico

Common Name (Scientific Name)	USFWS Status*	Range or Habitat Requirements	Potential for Occurrence in Project Area	Determination of Effect
Rio Grande silvery minnow (*Hybognathus amarus*)	E	While it tolerates a wide variety of habitats, the species prefers large streams with slow to moderate current over a mud, sand, or gravel bottom. USFWS critical habitat has been designated.	Unlikely to occur. The project area does not contain any aquatic habitat.	No effect.
Aplomado falcon (*Falco femoralis septenrionalis*)	E	Habitat of consists of grassy plains interspersed with mesquite (*Prosopis* sp.), cactus (*Opuntia* sp.), and yucca (*Yucca* sp.).	Unlikely to occur. The project area is outside the known geographic range for the aplomado falcon. No suitable habitat in the project area.	No effect.
Arctic peregrine falcon (*Falco peregrinus tundrius*)	SoC	A very rare migrant through the state, found in a variety of habitats. Nests on steep cliffs >30 m (98 feet) tall (typically greater than 45 m [148 feet]) in a scrape on sheltered ledges or potholes. Foraging habitat quality is an important factor; often, but not always, extensive wetland and/or forest habitat is within the falcon's hunting range of less than 12 km (7.5 miles). Variability in topographic features, such as elevation and slope, may also indicate the availability of prey.	Unlikely to occur. No suitable nesting habitat is located in the project area, and suitable foraging habitat in the project area is not likely.	No effect.
American peregrine falcon (*Falco peregrinus anatum*)	SoC	In New Mexico, the breeding territories center on cliffs that are in wooded or forested habitats, with large "gulfs" of air nearby in which these predators can forage.	Unlikely to occur. No suitable nesting habitat is located in the project area, and suitable foraging habitat in the project area is not likely.	No effect.
Baird's sparrow (*Ammodramus bairdii*)	SoC	Baird's sparrow is a grassland species which breeds in the northern Great Plains from the Canadian prairie provinces south to Montana and the Dakotas. It is a migrant in New Mexico, occurring primarily in the eastern plains and southern lowlands, and it may winter in some locales.	Unlikely to occur. The project area is outside breeding and migration ranges. Rare migrants possible.	No effect.
Bell's vireo (*Vireo bellii*)	SoC	In New Mexico this species characteristically occurs in dense shrubland or woodland along lowland stream courses.	Unlikely to occur. No suitable habitat located within the project area.	No effect.
Black tern (*Chlidonias niger*)	SoC	Found near water at lower (850–1,675 m [2,800–5,500 feet]) and middle (1,525–2,300 m [5,000–7,500 feet]) elevations. Breeds in marshes and wetlands.	Unlikely to occur. There is no marsh habitat within the project area.	No effect.

Common Name (Scientific Name)	USFWS Status*	Range or Habitat Requirements	Potential for Occurrence in Project Area	Determination of Effect
Western burrowing owl (*Athene cunicularia hypugaea*)	**SoC**	**Variable in open, well-drained grasslands, steppes, deserts, prairies, and agricultural lands, often associated with burrowing mammals. Sometimes in open areas such as vacant lots near human habitation, golf courses, or airports.**	**Known to occur. Specimen was observed during surveys and possible burrows were recorded.**	**May affect, likely to adversely affect.**
Common black-hawk (*Buteogallus anthracinus*)	SoC*	Characteristically found in the Southwest in cottonwood (*Populus* sp.) and other woodlands along permanent lowland streams. Breeding hawks require mature, well-developed riparian forest stands (e.g., cottonwood bosques) that are near permanent streams where principal prey species are available.	Unlikely to occur. There are no permanent streams within the project area. The project area is outside the geographic range for this species.	No effect.
Mexican spotted owl (*Strix occidentalis lucida*)	T	Found in mature, montane forests and woodlands and steep, shady, wooded canyons. Can also be found in mixed-conifer and pine-oak vegetation types. Generally nests in older forests of mixed conifers or ponderosa pine (*Pinus ponderosa*)–Gambel oak (*Quercus gambelii*). Nests in live trees on natural platforms (e.g., dwarf mistletoe [*Arceuthobium* sp.] brooms), snags, and canyon walls at elevations between 1,250 and 2,743 m (4,100–9,000 feet).	Unlikely to occur. The project area is outside the geographic range for breeding records of this species and does not contain mixed-conifer and pine-oak vegetation types.	No effect.
Mountain plover (*Charadrius montanus*)	**Pro-posed (T)**	**Typically nests in flat to slightly rolling expanses of grassland, semi-desert, or badland, in an area with short, sparse vegetation, large bare areas (often one-third of total area), and that is typically disturbed (e.g., grazed); may also nest in plowed or fallow cultivation fields. Nest is a scrape in dirt often next to a grass clump or old cow manure pile. Migration habitat is similar to breeding habitat.**	**May occur. The project is within the known range and suitable habitat exists within the project area.**	**May affect, not likely to adversely affect.**
Northern goshawk (*Accipiter gentilis*)	SoC	Prefers coniferous forests, but will also inhabit deciduous and mixed forests from sea level to subalpine areas. This bird may also be found in urban forested parks. In New Mexico goshawks occur locally in mature, closed-canopied coniferous forests of mountains and high mesas.	Unlikely to occur. No close canopied forests exist within the project area.	No effect.

Common Name (Scientific Name)	USFWS Status*	Range or Habitat Requirements	Potential for Occurrence in Project Area	Determination of Effect
Southwestern willow flycatcher (*Empidonax traillii extimus*)	E	Found in dense riparian habitats along streams, rivers, and other wetlands where cottonwood, willow (*Salix* sp.), boxelder (*Acer negundo*), saltcedar (*Tamarix* sp.), Russian olive (*Elaeagnus angustifolia*), buttonbush (*Cephalanthus occidentalis*), and arrowweed (*Pluchea sericea*) are present. Nests are found in thickets of trees and shrubs, primarily those that are 4 to 7 m (13–23 feet) tall, among dense, homogeneous foliage. Habitat occurs at elevations below 2,590 m (8,500 feet).	Unlikely to occur. The project area does not contain sufficient riparian vegetation or stands of dense vegetation. Saltcedar located in the project area is too sparse to support the species.	No effect.
Yellow-billed cuckoo (*Coccyzus americanus*)	C	Typically found in riparian woodland vegetation (cottonwood, willow, or saltcedar) at elevations below 2,011 m (6,600 feet). Dense understory foliage appears to be an important factor in nest site selection.	Unlikely to occur. The project area does not contain sufficient riparian woodland vegetation (cottonwood, willow, and present saltcedar does not have a dense understory).	No effect.
Black-footed ferret (*Mustella nigripes*)	E	Occurs mainly in Mixed Shrub habitat type. Closely associated with prairie dogs (*Cynomy*s sp.) whose burrows provide excellent retreats. The dependency of the black-footed ferret on this food item is so great that reduction in numbers of ferrets is directly related to reduction in prairie dogs. This species is apparently extirpated in New Mexico, having been last confirmed there in 1934.	Unlikely to occur. No records of the black-footed ferret from New Mexico since 1934.	No effect.
New Mexican meadow jumping mouse (*Zapus hudsonius luteus*)	C	Mesic habitats that contain permanent streams, moderate to high soil moisture, and dense and diverse streamside vegetation consisting of grasses, sedges, and forbs.	Unlikely to occur. There are no mesic habitats within the project area.	No effect.
Townsend's big-eared bat (*Corynorhinus townsendii*)	SoC	Roosts, raises young, and hibernates primarily in sandstone or limestone caves, lava tubes, mine tunnels, and other human-made structures; uses a variety of habitats for foraging, including coniferous forests and piñon-juniper woodlands, deciduous riparian woodlands, and desertlands.	Unlikely to occur. The project area does not contain any caves, lava tubes, or suitable human-made structures. Potential foraging habitat may exist.	No effect.

Common Name (Scientific Name)	USFWS Status*	Range or Habitat Requirements	Potential for Occurrence in Project Area	Determination of Effect
Source for range and habitat information: New Mexico Department of Game and Fish (2010); USFWS (2010); New Mexico Rare Plant Technical Council (1999) *Status: C = Candidate. Candidate species are those for which the USFWS has sufficient information on biological vulnerability and threats to support proposals to list as endangered or threatened under the Endangered Species Act. However, proposed rules have not yet been issued because they are precluded by other listing activity that is a higher priority. This listing category has no legal protection. SoC = Species of concern. Species for which further biological research and field study are needed to resolve their conservation status or are considered sensitive, rare, or declining on lists maintained by natural heritage programs, state/tribal wildlife agencies, other federal agencies, or professional/academic scientific societies. Species of concern are included for planning purposes only. E = Endangered. The Endangered Species Act specifically prohibits the take of a species listed as endangered. Take is defined by the Endangered Species Act as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to engage in any such conduct. T = Threatened. The Endangered Species Act specifically prohibits the take of a species listed as threatened. Take is defined by the Endangered Species Act as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to engage in any such conduct.				

APPENDIX E
CONCURRENCE LETTER FROM THE NAVAJO NATION DEPARTMENT OF FISH AND WILDLIFE

NNDFW Review No. 10SWCA03

BIOLOGICAL RESOURCES COMPLIANCE FORM
NAVAJO NATION DEPARTMENT OF FISH AND WILDLIFE
P.O. BOX 1480, WINDOW ROCK, ARIZONA 86515-1480

It is the Department's opinion the project described below, with applicable conditions, is in compliance with Tribal and Federal laws protecting biological resources including the Navajo Endangered Species and Environmental Policy Codes, U.S. Endangered Species, Migratory Bird Treaty, Eagle Protection and National Environmental Policy Acts. This form does not preclude or replace consultation with the U.S. Fish and Wildlife Service if a Federally-listed species is affected.

PROJECT NAME & NO.: To'hajiilee Solar Generation Facility

DESCRIPTION: Proposal to construct, operate and maintain a solar generation facility. The collected energy will be converted on site and transferred along existing 115kV transmission lines. The final solar generation facility will have a 200-acre footprint. Ground-disturbing activities will include vegetation removal and grading.

LOCATION: West of Albuquerque and north of Interstate 40, Sections 6 & 10, T10N, R1W, Bernalillo County, NM.

REPRESENTATIVE: Matthew Bandy, Project Manager, SWCA Environmental Consultants

ACTION AGENCY: Rural Community Innovations

B.R. REPORT TITLE / DATE / PREPARER: BE for Proposed To'hajiilee Solar Generation Facility /August 2010/Timmons, SWCA Enviromental Consultants

SIGNIFICANT BIOLOGICAL RESOURCES FOUND: Area 3. The Western Burrowing Owl and Kit Fox were observed during the field reconnaissance of the project area on July 7 & 23, 2010.

POTENTIAL IMPACTS

NESL SPECIES POTENTIALLY IMPACTED: (1) Athene cunicularia hypugaea (Western Burrowing Owl), NESL G4, MBTA; and (2) Vulpes macrotis (Kit Fox); NESL G4

FEDERALLY-LISTED SPECIES AFFECTED: NA

OTHER SIGNIFICANT IMPACTS TO BIOLOGICAL RESOURCES: (1) A 43.41-acre Gunnison's prairie dog (Cynomys gunnisoni) complex was observed in the central portion of the project area. The prarie dog is an important prey source.

AVOIDANCE / MITIGATION MEASURES: (1) No activity within 0.4 km (¼ mi) of an active ATCUHY nest burrow during 1 MAR-15 AUG and ATCUHY habitat will not be altered year-round within 0.2 km (0.1 mi) of nest site; (2) No ground-disturbing activities, year-round, within 60 m of known VUMA den-site and no activity within 0.2 km (⅛ mi) of active VUMA den during 1 DEC-31 AUG (NESL Species Accounts, 2008).

CONDITIONS OF COMPLIANCE*: (1) A pre-construction survey will be required for the Mountain Plover (Charadrius montanus) during the appropriate field season of 1 MAY-15 JUN where suitable habitat exists.

FORM PREPARED BY / DATE: Pamela A. Kyselka/30 September 2010

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Page 1 of 2

NNDFW – B.R.C.F.: FORM REVISED 12 NOV 2009

COPIES TO: (add categories as necessary)

☒ BIA ☐ _____

2 NTC § 164 Recommendation: Signature Date

☐Approval
☒Conditional Approval (with memo)
☐Disapproval (with memo)
☐Categorical Exclusion (with request letter)
☐None (with memo)

10/01/10

Gloria M. Tom, Director, Navajo Nation Department of Fish and Wildlife

*I understand and accept the conditions of compliance, and acknowledge that lack of signature may be grounds for the Department not recommending the above described project for approval to the Tribal Decision-maker.

Representative's signature Date

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Page 2 of 2
NNDFW –B.R.C.F.: FORM REVISED 12 NOV 2009

PRESIDENT
JOE SHIRLEY, JR.
VICE PRESIDENT
BEN SHELLY

NAVAJO FISH AND WILDLIFE P.O. BOX 1480 WINDOW ROCK, AZ 86515

30 September 2010 10SWCA03

Matthew Bandy, Project Manager
SWCA Environmental Consultants
5647 Jefferson Street NE
Albuquerque, New Mexico 87109

Mr. Bandy,
The Navajo Nation Department of Fish and Wildlife (NNDFW) reviewed the proposed To'hajiilee Solar Generation Facility located west of Albuquerque, NM. The purpose of this letter is to inform you that we are granting the proposed project a Conditional Approval. The project is approved with the following condition:

(1) A pre-construction survey will be required for the Mountain Plover (Charadrius montanus) during the appropriate field season of 1 MAY-15 JUN where suitable habitat exists.

Please contact me at 928-871-7065 with any questions that you have concerning the review of this project.

Sincerely,

Pamela A. Kyselka, Wildlife Biologist
Navajo Natural Heritage Program – Environmental Review
Navajo Nation Department of Fish and Wildlife

CONCURRENCE

Gloria Tom, Director
Navajo Nation Department of Fish and Wildlife

xc: nnhp_file
BIA, Harrilene Yazzie

APPENDIX F
CONCURRENCE LETTER FROM THE NAVAJO NATION HISTORIC PRESERVATION DEPARTMENT

CULTURAL RESOURCES COMPLIANCE FORM

THE NAVAJO NATION
HISTORIC PRESERVATION DEPARTMENT
PO BOX 4950
WINDOW ROCK, ARIZONA 86515

ROUTING: COPIES TO
NM SHPO
REAL PROPERTY MGT/330
XX SWCA

NNHPD NO. **HPD-10-871- *REVISED***
OTHER PROJECT NO.
SWCA 2010-309

PROJECT TITLE: A Cultural Resources Inventory for the Proposed Tohajiilee Solar Generation Facility, Tohajiilee, Bernalillo County, New Mexico

LEAD AGENCY: BIA/NR

SPONSOR: ***To'Hajiilee Economic Development, Inc., PO Box 3168, To'Hajiilee, NM 87026***

PROJECT DESCRIPTION: The proposed undertaking will involve the construction of a solar generation facility. The facility will include an array of Sun Power 400 or 425 watt series of Photovoltaic modules with SunPower T0 tracker electric motor drives for collection solar energy, pad-mounted transformers with combiner boxes and inverters on 200-acres. Ground disturbance will be intensive and extensive with the use of heavy equipment.

LAND STATUS: ***Canoncito Band of Navajo Trust Land***

CHAPTER: Tohajiilee

LOCATION: T.10N, R.1W - Sec. 31; T.9N, R.1W -Sec. 6; La Mesita Negra Quadrangle, Bernalillo County, New Mexico NMPM

PROJECT ARCHAEOLOGIST: John Rissetto, Jennifer Walborn, & Matthew Bandy

NAVAJO ANTIQUITIES PERMIT NO.: B10372

DATE INSPECTED: 07/12/10 - 07/23/10

DATE OF REPORT: 07/23/10

TOTAL ACREAGE INSPECTED: 492.7-ac

METHOD OF INVESTIGATION: Class III pedestrian inventory with transects spaced 15 m apart.

LIST OF CULTURAL RESOURCES FOUND:	(5) Sites (NM-S-64-8, NM-S-64-9, NM-S-64-10, NM-S-64-11, NM-S-64-12); (35) Isolated Occurrences (IO); (1) In-Use Site (IUS)
LIST OF ELIGIBLE PROPERTIES:	(1) Site (NM-S-64-8)
LIST OF NON-ELIGIBLE PROPERTIES:	(4) Sites (NM-64-9, NM-S-64-10, NM-S-64-11, NM-S-64-12); (35) IO; (1) IUS
LIST OF ARCHAEOLOGICAL RESOURCES:	(1) Site (NM-S-64-8)

EFFECT/CONDITIONS OF COMPLIANCE: **No historic properties will be affected with the following conditions:**

Site NM-S-64-8:
1. Site boundary will be flagged/ fenced by a qualified archaeologist prior to ground disturbing activities.
2. Site will be avoided by all ground disturbing activities by a minimum of 50-ft
3. Two track road will be closed to project-related traffic.
4. All construction activities within 50-ft of the site will be monitored by a qualified archaeologist.
5. A monitoring report/letter will be submitted to NNHPD within 30-days of monitoring.

HPD-10-871/ SWCA 2010-309
Page 2, continued

Site NM-S-64-11:
1. Full recordation of the site & consultation with NNHPD has exhausted all research potential, however, features 9 & 11 of the site will be flagged for avoidance by a qualified archaeologist prior to ground disturbing activities.
2. Features 9 & 11 of site will be avoided by all ground disturbing activities by a minimum of 50-ft
3. All construction activities within 50-ft of the features will be monitored by a qualified archaeologist.
4. A monitoring report/letter will be submitted to NNHPD within 30-days of monitoring.

Sites NM-S-64-9, NM-S-64-10, NM-S-64-12:
No further work is warranted.

In the event of a discovery ["*discovery*" means any previously unidentified or incorrectly identified cultural resources including but not limited to archaeological deposits, human remains, or locations reportedly associated with Native American religious/traditional beliefs or practices], all operations in the immediate vicinity of the discovery must cease, and the Navajo Nation Historic Preservation Department must be notified at (928) 871-7148.

FORM PREPARED BY: Tamara Billie
FINALIZED: December 27, 2010

Notification to
Proceed Recommended: Yes XX No ___
Conditions: Yes XX No ___

1-4-11
Alan S. Downer, Navajo Nation Historic Preservation Officer — Date

Navajo Region Approval: Yes ✓ No ___

1-31-11
Bill, Regional Director — Date