DOE/EA-1839

FINAL

ENVIRONMENTAL

ASSESSMENT

ENVIRONMENTAL ASSESSMENT FOR DEPARTMENT OF ENERGY LOAN GUARANTEE TO COGENTRIX OF ALAMOSA, LLC FOR CONSTRUCTION OF THE COGENTRIX SOLAR PROJECT NEAR ALAMOSA, COLORADO

U.S. Department of Energy
Loan Programs Office
Washington, DC 20585

April 2011

SUMMARY

Introduction

The U.S. Department of Energy (DOE) is proposing to issue a loan guarantee to Cogentrix of Alamosa, LLC (Cogentrix) to support construction of a 30-megawatt (MW) high-concentrating photovoltaic energy facility (Project) in Alamosa County, Colorado.

DOE has prepared this Environmental Assessment (EA) to comply with the National Environmental Policy Act (NEPA) (42 USC 4321, et. seq.), Council on Environmental Quality regulations for implementing NEPA (40 CFR Parts 1500-1508), and DOE Implementing Procedures (10 CFR Part 1021). The EA examines the potential environmental impacts associated with the proposed action and No Action Alternative to determine whether the proposed action has the potential for significant environmental impacts. The information contained in the EA would enable DOE to fully consider the potential environmental impacts of issuing a loan guarantee for the Cogentrix project.

Purpose and Need for Agency Action

The Energy Policy Act of 2005, as amended by Section 406 of the American Recovery and Reinvestment Act of 2009, authorized DOE to issue loan guarantees for projects that "avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases; and employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued." Title XVII identified 10 categories of technologies and projects potentially eligible for loan guarantees, including those for renewable energy technologies. The two principal goals of the loan guarantee program are to encourage commercial use in the United States of new or significantly improved energy-related technologies and to achieve substantial environmental benefits. The purpose and need for agency action is to comply with DOE's mandate under EPAct 2005 by selecting eligible projects that meet the goals of the Act. DOE is using the NEPA process to assist in determining whether to issue a loan guarantee to Cogentrix to support the proposed project.

By utilizing solar energy to produce electricity, the proposed project would reduce reliance on foreign sources of energy and contribute to the avoidance and reduction of air pollutants and anthropogenic emissions of greenhouse gases by reducing the need for electricity from conventional generation facilities. Based on the Project's 30 MW net nominal output capacity rating, the facility is expected to generate approximately 76,000 megawatt-hours (MWh) of electrical power per year (assuming a 29 percent annual operating capacity factor). The Project when in commercial operation would likely displace the use of approximately 249 million cubic feet of natural gas that would have been used by a comparable conventional natural gas-fired power plant. This eliminates the generation of approximately 43,250 tons per year of carbon dioxide (CO_2) emissions, a greenhouse gas pollutant, into the atmosphere, based on the U.S. Environmental Protection Agency (USEPA) estimate of 1,135 pounds of CO_2 generated per MWh.

The Project would also displace the release of traditional air pollutants generated by natural gas-fired power plants. Annual air pollutant emissions that are expected to be avoided by the project, assuming the same amount of electrical energy were produced instead from an efficient combined cycle power plant firing natural gas, include: 97 tons of nitrogen oxides (NO_x), 94 tons of carbon monoxide (CO), 29 tons of volatile organic compounds (VOC), 13 tons of sulfur

oxides (SO_x), and 41 tons of particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}).

The Project would employ high-concentration photovoltaic (HCPV) technology, which produces more kilowatts per acre than conventional silicon-based photovoltaic technology currently in commercial use. In addition, the Project would have low water use requirements, since water is only needed for periodic washing of the solar panel surfaces to remove dirt and deposits. The proposed facility would be the first utility-scale commercial installation of the HCPV technology in the United States.

Proposed Action and Alternatives

DOE's proposed action is to issue a loan guarantee to Cogentrix to support construction of the Project in Alamosa County, Colorado. The proposed facility would contain approximately 500 HCPV solar trackers from the manufacturer Amonix. The solar trackers would consist of an HCPV solar cell panel assembly mounted on a support column. A hydraulic motor would be used to rotate and tilt the solar panel assembly throughout the day so the surface of the solar panel would always maintain an optimal angle with respect to the sun. Small groups of trackers would be connected to distribution transformers, which, in turn, would be connected to the generator step-up (GSU) transformer to increase the voltage to the required distribution voltage level. Although the Amonix HCPV system would require treated demineralized water to clean the HCPV solar panels, the on-going operation of the solar panels would not require water.

The Project would interconnect with Xcel Energy's existing Alamosa-San Luis 115-kilovolt (kV) transmission line, which runs north-south on private property immediately west of the facility. The transmission point of interconnection would be approximately 60 feet west of the project site. In addition, Cogentrix would construct a new switching station within the Project site on the western boundary.

The Project site consists of approximately 225 acres of primarily cultivated agricultural land. The HCPV solar power units use approximately 6 acres per MW of rated capacity, or approximately 180 acres for 30 MW.

A No Action Alternative is also evaluated in this EA. Under the No Action Alternative, DOE would not issue the loan guarantee to Cogentrix for the Project. Without the DOE loan, it is unlikely that Cogentrix would implement the Project as currently planned. Thus, the No Action Alternative is that no solar power facility would be constructed at the Project site.

The decision for DOE consideration presented in this EA is whether or not to approve the loan guarantee for the proposed Cogentrix facility. Prior to submitting its application, Cogentrix considered alternative sites. The Project site was specifically chosen because of its proximal location to the existing 115-kV transmission line and agricultural land use. Alternative locations, especially in native, undisturbed tracts of land, may have necessitated a longer transmission line route and potentially more infrastructure. The current Project site minimizes potential impacts to natural and socio-economic resources and maximizes solar resource given the high altitude, the amount of sunshine throughout the year, and the low rainfall, which minimizes panel soiling.

Summary of Impacts

The EA evaluates the environmental effects that could result from implementing the proposed action and No Action Alternative. Table S.1 provides a summary of the potential environmental consequences that could result from implementing the proposed action and from the No Action Alternative.

Table S.1. Summary of Impacts by Resource

Resource Area	No Action Alternative	Proposed Action
Land Use	There would be no change in existing conditions and no impacts to land use.	The Project site is zoned as Residential Rural (RU). Cogentrix received a 1041 permit for the Project and is in compliance for changes to land use of the area.
Visual Resources	There would be no change in existing conditions and no impacts to visual resources.	Visual impacts resulting from the Project would consist of the alteration of the presently open agricultural areas to a solar energy facility. While the panels would be noticeable features to those viewers within the immediate Project vicinity, the visual impact of the Project would remain fairly localized, with changes to visual quality diminishing with increasing distance.
Air Quality	There would be no change in existing conditions and no impacts to air quality.	Construction activities would produce dust and heavy-duty vehicle emissions from vehicles traveling on unpaved roads and vehicles traveling to and from the Project area. These impacts are temporary and of relatively low level, therefore, impacts to air quality from construction of the Project are expected to minimal. During operation, the proposed project would result in minor emissions of air pollutants due to employee vehicle trips, however, these emissions would be very low and would not result in long-term impacts to air quality. The project would indirectly benefit air quality by reducing air pollutants produced during fossil fuel consumption that would otherwise be used to produce conventional power.
Noise	There would be no change in existing conditions and no noise-related impacts.	Construction noise would cause a temporary and short-term increase to the ambient sound environment. Workers would be expected to wear appropriate hearing protection. No appreciable noise would be generated by the operation of the facility.
Geology	There would be no change in existing conditions and no impacts to geology.	The proposed project could impact surficial soils at the site by disturbing and exposing soils, which could subject the soils to wind and water erosion. However, erosion potential would be avoided or minimized by implementing accepted erosion control measures and BMPs during construction and operation of the Project facilities.
Water Resources	There would be no change in existing conditions and no impacts to water resources.	Erosion and sedimentation controls as described in the Project Stormwater Management Plan (SWMP) would limit potential impacts to surface water. The Project would not adversely affect the quantity or quality of groundwater resources. No impacts on wetlands or floodplains would occur.

Resource Area	No Action Alternative	Proposed Action
Biological Resources	There would be no change in existing conditions and no impacts to biological resources.	Approximately 140 acres of annually disturbed agricultural and approximately 85 acres of fallow vegetation would be removed by the Project. However, no unique habitats would be disturbed, and wildlife in the area would be displaced to similar habitats nearby. No threatened or endangered wildlife or plant species or critical habitat has been identified as occurring on the Project site. No adverse impacts to biological resources are anticipated from construction or operation of the Project.
Cultural Resources	There would be no change in existing conditions and no impacts to cultural resources.	No impacts to cultural resources are anticipated from construction or operation of the Project.
Socioeconomics	There would be no change in existing conditions and no socioeconomic or impacts.	The Project would benefit the local economy from additional expenditures and employment. Minimal impacts would be associated with the demand for temporary housing or increased demand for educational and law enforcement services.
Public Health and Safety	There would be no change in existing conditions and no impacts to public health and safety.	Construction workers would be subject to typical hazards and occupational exposures faced at other construction sites. Contractors would be required to establish and maintain a safety plan for construction activities in compliance with Occupational Health and Safety Administration (OSHA) requirements. No impacts to public health and safety are anticipated from construction or operation of the Project.
Transportation	There would be no change in existing conditions and no transportation-related impacts.	Construction and operation of the Project would have very minor, if any, impact on the traffic operations of the adjacent highway and intersections During construction, the expected increase in traffic would result in an increase in average delay of less than 2 seconds per vehicle during the peak hours at one intersection.
Waste Management	There would be no change in existing conditions and no impacts related to waste management.	Sufficient regional landfill capacity exists to accommodate construction and operation solid waste debris. No impacts to the waste management system are anticipated from construction or operation of the Project.
Cumulative Impacts	There would be no change in existing conditions and no cumulative impacts.	The cumulative contribution of impacts that the proposed action would make on the various environmental resources is expected to be minor.

CONTENTS

Appendices

Figures

Tables

ACRONYMS AND ABBREVIATIONS

AC	alternating current
APE	Area of Potential Effect
APEN	Air Pollutant Emission Notice
AQDC	Air Quality Control Division
bgs	below ground surface
BMP	Best Management Practice
CDOT	Colorado Department of Transportation
CDOW	Colorado Division of Wildlife
CDPHE	Colorado Department of Public Health and Environment
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CNHP	Colorado Natural Heritage Program
CO	carbon monoxide
dB	decibel
dBA	A-weighted sound pressure level
DC	direct current
DNL	day–night level (or Ldn)
DOE	U.S. Department of Energy
EA	Environmental Assessment
EMF	electromagnetic field
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FDCP	Fugitive Dust Control Plan
gpd	gallons per day
GSU	generator step-up
HCPV	high-concentration photovoltaic
hp	horsepower
kV	kilovolt
Leq	equivalent sound level
Ln	statistical noise level
mph	miles per hour

msl	mean sea level
MW	megawatt
MWh	megawatt-hours
NAAQS	National Ambient Air Quality Standards
NDIS	Natural Diversity Information Source
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_x	nitrogen oxides
NRCS	Natural Resource Conservation Service
NWI	National Wetland Inventory
O&M	operations and maintenance
OSHA	U.S. Occupational Safety and Health Administration
PM_{10}	particulate matter with an aerodynamic diameter of 10 microns or less
$PM_{2.5}$	particulate matter with an aerodynamic diameter of 2.5 microns or less
PPA	Power Purchase Agreement
Project	Proposed Congentrix high-concentrating photovoltaic energy facility
PSCo	Public Service Company of Colorado (Xcel Energy)
PV	photovoltaic
RO	reverse osmosis
ROI	region of influence
RU	Residential Rural
RV	recreational vehicle
SCADA	Supervisory Control and Data Acquisition System
SH	State Highway
SPCC	Spill Prevention Control and Countermeasure
SWMP	Stormwater Management Plan
SWReGAP	Southwest Regional Gap Analysis
U.S.C.	United States Code
USACE	U.S. Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VOC	volatile organic compound

1.0 PURPOSE AND NEED FOR AGENCY ACTION

1.1 Purpose and Need for Agency Action

The proposed action evaluated by the U.S. Department of Energy (DOE) in this environmental assessment (EA) is to issue a loan guarantee to Cogentrix of Alamosa, LLC (Cogentrix) to support construction of a 30-megawatt (MW) high-concentrating photovoltaic energy facility (Project) in Alamosa County, Colorado.[1]

The Energy Policy Act of 2005 (EPAct 2005), as amended by Section 406 of the American Recovery and Reinvestment Act of 2009, established a Federal loan guarantee program for eligible energy projects that employ innovative technologies. Title XVII of EPAct 2005 authorizes the Secretary of Energy to make loan guarantees for a variety of types of projects, including those that ''avoid, reduce, or sequester air pollutants or anthropogenic emissions of greenhouse gases; and employ new or significantly improved technologies as compared to commercial technologies in service in the United States at the time the guarantee is issued." The two principal goals of the loan guarantee program are to encourage commercial use in the United States of new or significantly improved energy-related technologies and to achieve substantial environmental benefits. The purpose and need for agency action is to comply with DOE's mandate under EPAct 2005 by selecting eligible projects that meet the goals of the Act. DOE is using the NEPA process to assist in determining whether to issue a loan guarantee to Cogentrix to support the Project.

Cogentrix is proposing to construct a 30-megawatt (MW) high-concentration photovoltaic (HCPV) energy facility on approximately 225 acres of currently cultivated agricultural land. The Project includes approximately 500 HCPV solar trackers, an electrical distribution system, a Supervisory Control and Data Acquisition System, an operation and maintenance building, access and maintenance roads, and a water treatment system.

Based on the Project's 30 MW net nominal output capacity rating, the facility is expected to generate approximately 76,000 megawatt-hours (MWh) of electrical power per year (assuming a 29 percent annual operating capacity factor). The Project when in commercial operation would displace the use of approximately 249 million cubic feet of natural gas that would have been used by a comparable conventional natural gas-fired power plant. This would eliminate the generation of approximately 43,250 tons per year of carbon dioxide (CO_2) emissions, a greenhouse gas pollutant, into the atmosphere, based on the U.S. Environmental Protection Agency (USEPA) estimate of 1,135 pounds of CO_2 generated per MWh.

The Project would also displace the release of traditional air pollutants generated by natural gas-fired power plants. Annual air pollutant emissions that are expected to be avoided by the project, assuming the same amount of electrical energy were produced instead from an efficient combined cycle power plant firing natural gas, include: 97 tons of nitrogen oxides (NO_x), 94 tons of carbon monoxide (CO), 29 tons of volatile organic compounds (VOC), 13 tons of sulfur oxides (SO_x), and 41 tons of particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}).

[1] The amount requested for the loan guarantee is not being disclosed at this time because it is business sensitive. Moreover, should DOE approve a loan guarantee, the amount may differ from the original request.

The Project would employ HCPV solar technology, which has higher solar-to-electrical efficiency (approximately 25%) than other commercial solar photovoltaic systems. It also requires less land than other commercial solar technologies to generate the same amount of electricity. In addition, the Cogentrix project would have low water use requirements, since water is only needed for periodic washing of the solar panel surfaces to remove dirt and deposits. The proposed facility would be the first utility-scale commercial installation of the HCPV technology in the United States.

1.2 Background

EPAct 2005 established a Federal loan guarantee program for eligible energy projects that employ innovative technologies. The two principal goals of the program are to encourage commercial use in the United States of new or significantly improved energy related technologies and to achieve substantial environmental benefits. DOE believes that commercial use of these technologies would help sustain and promote economic growth, produce a more stable and secure energy supply and economy for the United States, and improve the environment. DOE published a Final Rule that establishes the policies, procedures, and requirements for the loan guarantee program (10 Code of Federal Regulations Part 609). Title XVII of EPAct 2005 was amended by Section 406 of the American Recovery and Reinvestment Act of 2009, P.L. 111-5, to create Section 1705 authorizing a new program for rapid deployment of renewable energy and electric power transmission projects.

In July 2009, DOE issued a solicitation announcement inviting interested parties to submit proposals for projects that employ energy efficiency, renewable energy, and advanced transmission and distribution technologies that constitute New or Significantly Improved Technologies (as defined in 10 CFR Part 609). The Cogentrix Project qualifies as a stand-alone, renewable energy systems project for consideration in the DOE loan guarantee program as detailed in DOE Solicitation DE-FOA-0000140 and is eligible under the Section 1705 program. Cogentrix submitted Part 1 of the application to DOE on February, 18 2010, and Part 2 of the application to DOE on May 14, 2010.

1.3 Scope of the Environmental Assessment

This EA provides information about the potential impacts associated with guaranteeing a loan to Cogentrix and covers construction and operation of the Project. DOE has prepared this EA to comply with the National Environmental Policy Act of 1969 (NEPA), Council on Environmental Quality (CEQ) regulations implementing NEPA (40 CFR Parts 1500−1508), and DOE NEPA Implementing Procedures (10 CFR Part 1021). If no significant impacts are identified during preparation of this EA, DOE would issue a Finding of No Significant Impact. If potentially significant impacts are identified, DOE would prepare an environmental impact statement.

This EA: (1) describes the affected environment relevant to the impacts of the proposed action and No Action Alternative; (2) describes the proposed action; (3) analyzes environmental impacts associated with the proposed action and No Action Alternative; and (4) identifies and characterizes cumulative impacts that could result from the proposed action in relation to other ongoing or proposed activities within the surrounding area.

This EA has been organized into the following chapters and supporting appendices:

- Chapter 1.0, Purpose and Need: This section describes the purpose of and need for the proposed DOE action and the scope of the EA.
- Chapter 2.0, Proposed Action and Alternatives: This section describes the location of the Project and provides a description of the solar energy generation and distribution process.
- Chapter 3.0, Existing Environment and Environmental Effects: This section discusses the existing environment and the effects of the project in the areas of land use, visual resources, air quality and climate, noise, geology and seismicity, water resources, biological resources, cultural resources, socioeconomics, public health and safety, and transportation, as well as potential cumulative effects that may be associated with the project.
- Chapter 4.0, List of Agencies Contacted: This section lists Federal, state, and local agencies contacted during preparation of the EA.
- Chapter 5.0, List of Preparers: This section lists the individuals responsible for developing this EA and provides a brief description of their credentials.
- Chapter 6.0, References: This section lists the references used in preparing this EA.
- Supporting Appendices.

2.0 PROPOSED ACTION AND NO ACTION ALTERNATIVES

DOE's proposed action is to issue a loan guarantee to Cogentrix to support construction of a 30 MW HCPV energy facility near Alamosa, Colorado. This chapter describes the proposed project and the No-Action Alternative.

2.1 Cogentrix Project Description

Cogentrix is proposing to construct a 30-megawatt (MW) high-concentration photovoltaic (HCPV) energy facility on approximately 225 acres of currently cultivated, private agricultural land near the town of Alamosa, Colorado (see Figures 1 and 2). Adjacent land uses include active and inactive agriculture, irrigation, residences, and utility transmission lines. The proposed facility includes approximately 500 HCPV solar trackers, an electrical distribution system, a Supervisory Control and Data Acquisition System, an operation and maintenance building, access and maintenance roads, and a water treatment system (see Figure 3).

2.1.1 Solar Trackers

Cogentrix would install approximately 500 HCPV solar trackers from the manufacturer Amonix. The solar trackers consist of an HCPV solar cell panel assembly mounted on a support column (see Figures 4, 5, and 6). A hydraulic motor is used to rotate and tilt the solar panel assembly throughout the day so the surface of the solar panel always maintains an optimal angle with respect to the sun. Each tracker has an inverter mounted on the support column, which is physically located to minimize the effects of shadows cast by adjacent trackers when the sun is low in the sky (early morning or late afternoon). The tracker minimum height is 27 feet 6 inches; this occurs when the tracker is in the horizontal position. The tracker maximum height is 50 feet 9 inches; which occurs at sunrise and sunset. The inverter converts the direct current (DC) output power of the solar cells to alternating current (AC) power. Small groups of trackers are connected to distribution transformers, which, in turn, are connected to the generator step-up (GSU) transformer to increase the voltage to the required distribution voltage level.

The solar panels are manufactured offsite and would be delivered (in wooden crates or cardboard boxes) to the site by semi-tractor trailer truck. The solar panels are contained within a metal frame on supporting mounting structures. The solar panels would be attached to trackers made out of steel, and the trackers would be erected on drilled pier foundations.

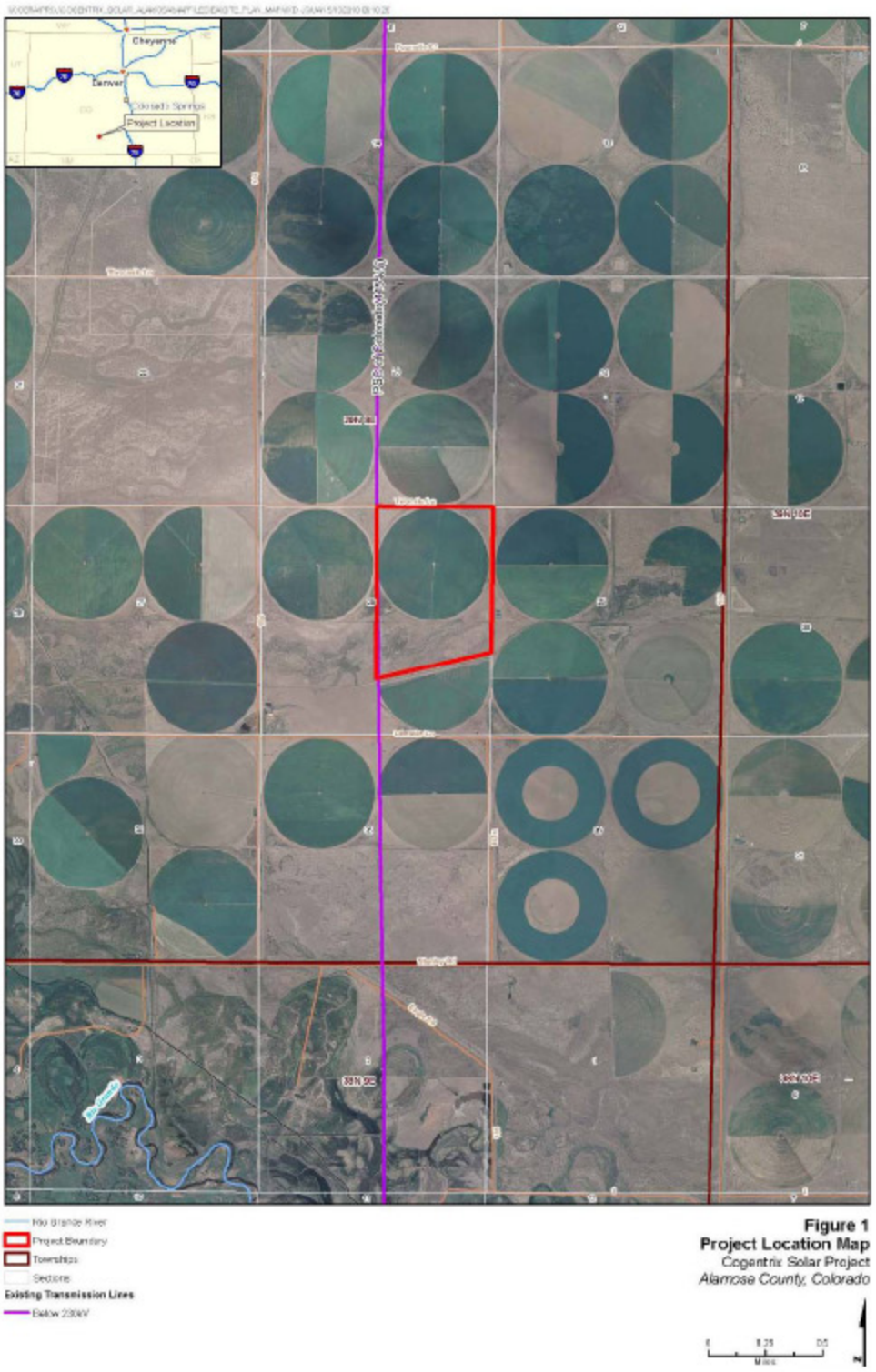


Figure 1. Project Location Map 1

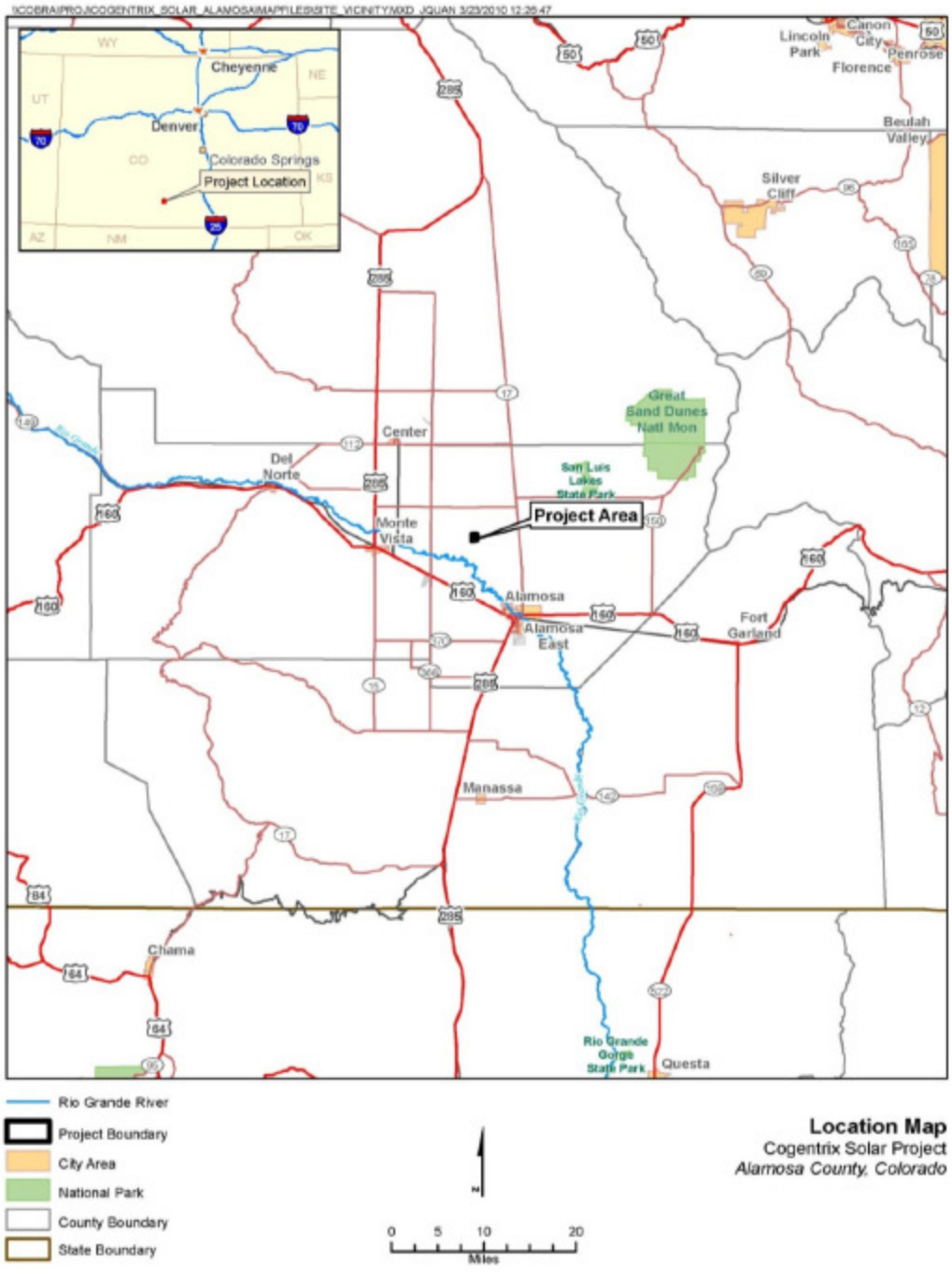
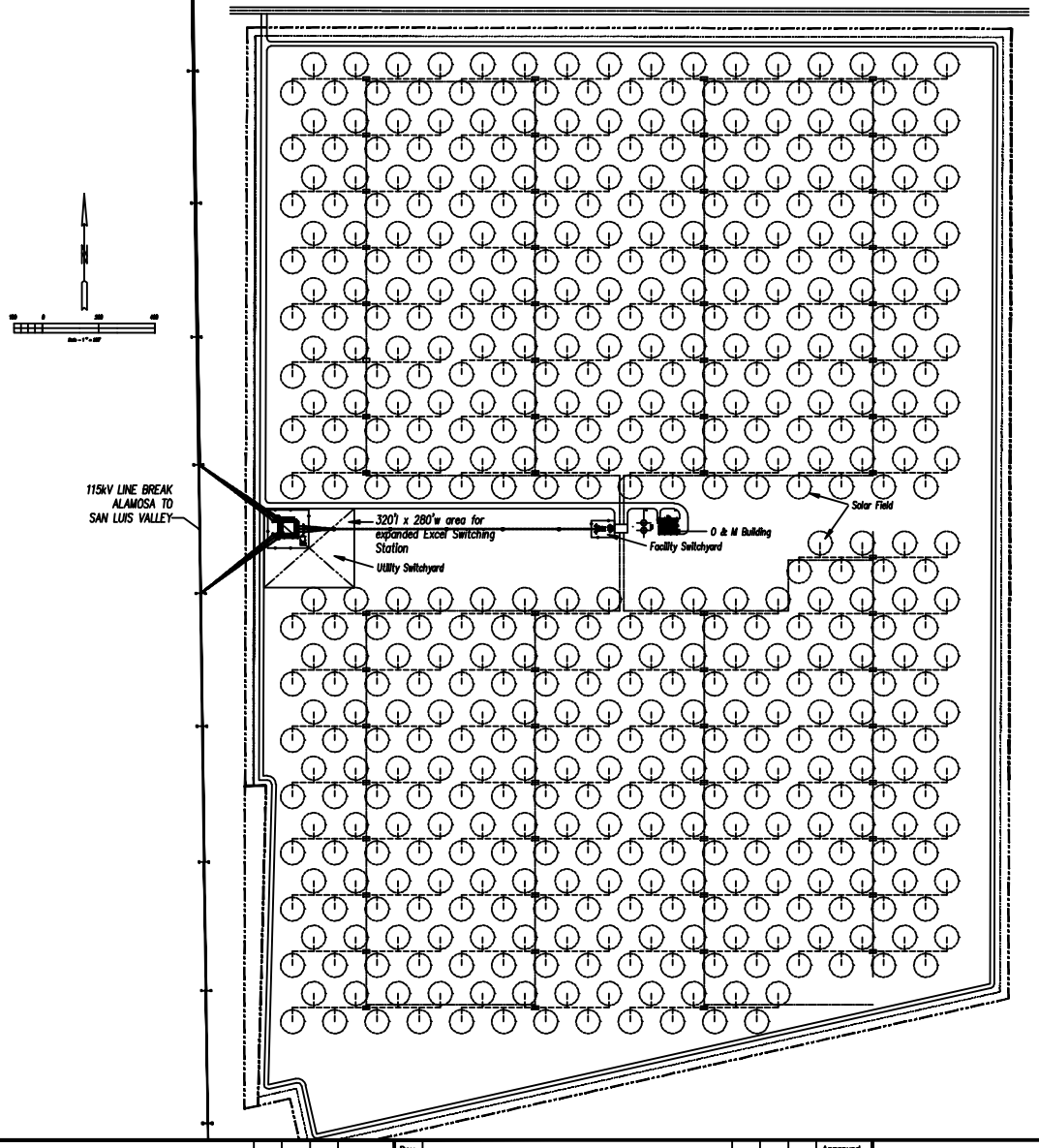


Figure 2. Project Location Map 2



LEGEND

- Pad Mounted Transformers
- Overhead Line
- 15kV Power Feeders (underground)
- 600V Power Feeders (underground)
- Tracker Radius
- Fenceline

PRELIMINARY FOR INFORMATION ONLY

Rev No	Revision	Date	Dwn	Chkd	Approved Chief Engr
A	INITIAL ISSUE				
B	INCREASED FIELD SIZE AND CHANGED NOTES				
C	REVISED FIELD SIZE PER REQUEST				
D	REVISED FIELD SIZE PER REQUEST				
E	Revised per D. Bhagat for Excel Yard Sizing 5/12/10				
F	Revised per D. Bhagat for Excel Yard Sizing 5/20/10				

Drawing Control				
Purpose	Approved By	Date	Released By	Date
For Information				
For Comment				
For Bid				
For Construction				

Engineering Review		
Disc	Engr	Date
Mech		
Elec		
Civil		
Arch		
I & C		

Dwn	Chkd	SI
VY		

Reviewed By

Mgr – Drafting & Design

Cogentrix

ALAMOSA 30MW CPV SOLAR FACILITY
PRELIMINARY SITE LAYOUT

App'd for Construction	Date	Work Order	Drawing No.	Rev
Chief Engineer	4/15/09		SF-30GA	F
	Scale 1"=200'			

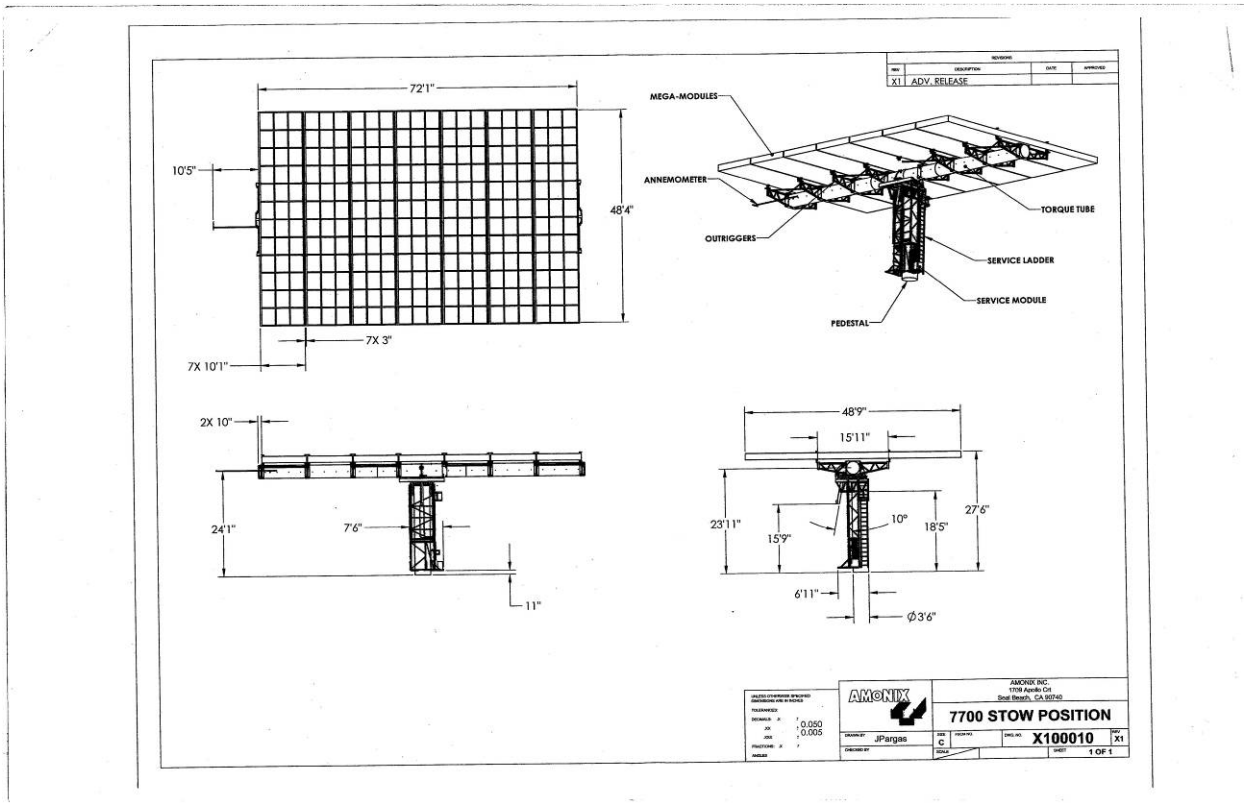


Figure 4. Amonix Specification Drawing – Stow Position

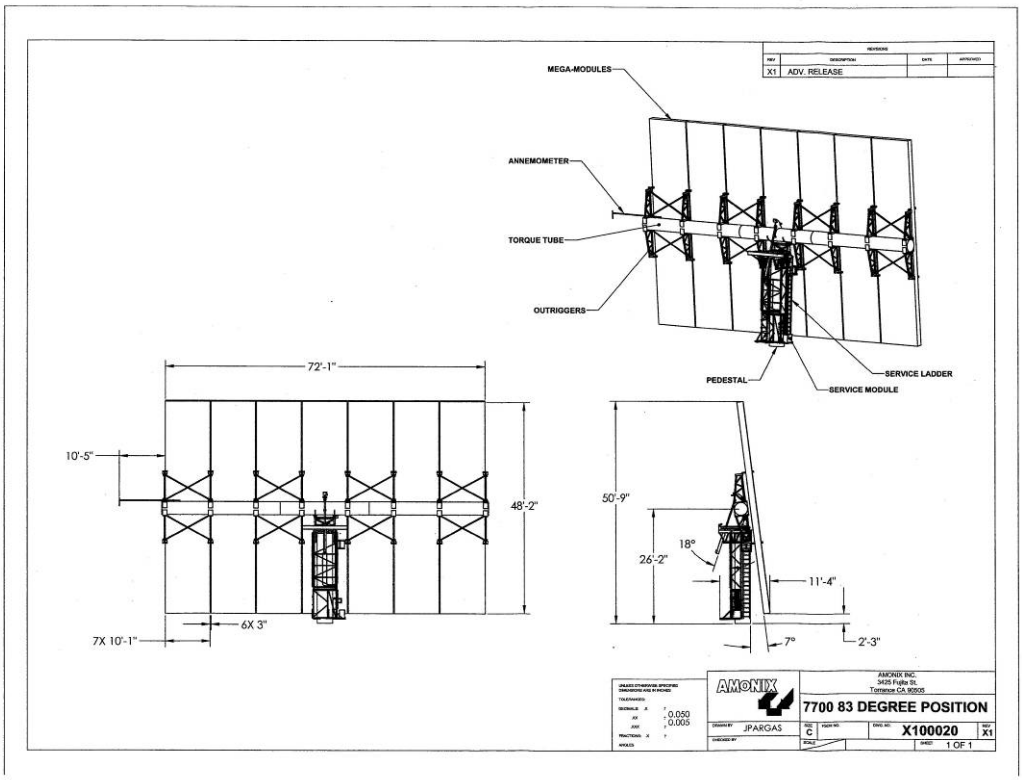


Figure 5. Amonix Specification Drawing – 83 Degree Position

Figure 6. HCPV Solar Tracker

2.1.2 Electrical Distribution System

The electrical distribution system is designed to transmit the output power of the tracker's inverters at transmission voltage level for connection to the utility grid. Tracker auxiliary loads and balance of plant system loads are supplied power via the electrical distribution system.

Groups of trackers are connected (via underground electrical cables) to a pad-mounted, oil-filled distribution transformer via a low voltage (480V) motor control center (MCC). Several strings of distribution transformers are connected in loop configurations to a centrally-located, medium-voltage (13.8kV), metal-clad switchgear lineup.

The main step-up transformer is a large, oil-filled, two-winding transformer located in the plant switchyard. The transformer low voltage (LV) winding would be connected to the main switchgear via nonsegregated-phase bus duct. The transformer high voltage (HV) winding would be connected to the plant's 115-kV switchyard main bus.

The switchyard consists of low profile, air insulated, aluminum tubular buswork arranged in a single bus-single breaker switching scheme. The buswork would transition to 115 kV overhead transmission line via dead end structure to the utility switching station, located along the western edge of the site. This overhead transmission line would transmit facility total output to the utility switching station. A line break in the existing San Luis Valley-Alamosa 115 kV transmission line would be accomplished via a three-breaker ring bus in the utility switching station. The utility switching station would consist of two dead-end structures to accommodate a single circuit of incoming and outgoing 115-kilovolt (kV) overhead lines, tubular aluminum buswork rated for line capacity, three high-voltage breakers with associated disconnect switches, instrumentation transformers, utility metering package, and control house with fiber communications and telephone line.

The PSCo 115-kv transmission line runs north-south on private property immediately west of the facility. The transmission point of interconnection would be approximately 60 feet west of the Project site on private land.

2.1.3 Supervisory Control and Data Acquisition System (SCADA)

A SCADA system would be installed to collect operating and performance data. The solar modules would be linked to one or more central computers via a fiber optic network. Fiber optic cables for the SCADA system would be installed in the collector cable trenches above the electrical conductors. The host computer is expected to be located in the Operations and Maintenance (O&M) Building at the Project site.

2.1.4 Operation and Maintenance Building

A 3,600-square-foot, single-story, pre-engineered building would be constructed for facility personnel offices, maintenance shop space, and electrical switchgear area. A graveled area for parking and storage would be provided. The O&M Building would use a new onsite groundwater well to supply water for domestic use and would discharge to an onsite septic system. The O&M Building would include office space, bathroom, a break room, a storage area, a garage for vehicles and equipment, and the SCADA equipment.

2.1.5 Access and Maintenance Roads

Minimal roads would be constructed to serve both the construction and operation of the Project. The Project would include 1,650-feet (0.31 mile) of 15-foot wide asphalt access road (total area 0.57 acre) that would be designed under the direction of a professionally licensed engineer and compacted to meet equipment load requirements. In addition, 12,400-feet (2.35 miles) of 15-foot wide all-weather gravel roads (total area 4.27 acres) would be built.

2.1.6 Water Treatment System and Storage Tanks

A skid-mounted demineralizer water treatment system would be used to provide onsite water to wash the HCPV solar panels. Processed water would be stored in a tank approximately 24 feet in diameter by 15 feet tall.

A fire/potable water storage tank would be provided to meet safety requirements. The volume of this tank would be determined based on the requirements of the local building code, National Fire Protection Association, and local jurisdictional authority.

2.1.7 Project Construction

Construction of the Project would take place over an approximate 14-month period beginning in the second quarter of 2011. A general overview of the construction activities associated with the Project is provided below.

Engineering and Final Design – Perform site surveying; site geotechnical investigations; civil engineering (roads and stormwater); and electrical engineering design (collection system and substation); and complete final structural engineering (foundations).

Site Civil Work – Establish site access; begin contractor mobilization onsite; perform site grading; build site access roads; perform clearing and grubbing of vegetation from construction and laydown areas (primarily for fire safety); construct stormwater control structures; construct O&M Building; weatherproof equipment and parts storage area (which may be separate or combined with the O&M Building); complete solar array foundation excavations and backfilling; and complete site restoration activities.

Solar Array Foundations – Install rebar for concrete foundations (if needed); and pour and cure concrete foundations.

Electrical Collection System – Construct onsite electrical substation; build electrical collection system; interconnect the solar arrays and substation with power-conducting cables and signal cables; interconnect circuits to substation; and perform required quality assurance tests.

Onsite Substation – Construct onsite substation; install transformer; perform required quality assurance tests; and energize collection system.

Solar Arrays – Deliver solar panels and components to each array; erect panels; install inverters; and perform final commissioning of each array.

Testing – Perform testing as solar arrays are erected and electrical collection systems are interconnected. All associated electrical systems, controls, and safety equipment would be calibrated and tested. Qualified technicians, solar panel commissioning experts, and electricians would test and inspect all solar components, transformers, communications systems, substation, and transmission systems to ensure that they comply with required design specifications and are

working properly and safely. Each solar array and associated piece of equipment would be tested and inspected upon individual completion before being placed in service. All required tests would be conducted and problems corrected prior to final interconnection of the Project.

Site Construction Support, Cleanup, and Restoration – Perform site restoration, cleanup, and heavy equipment demobilization. Temporary construction support activities would include removal of onsite sanitary facilities and temporary staging area.

2.1.8 Operations and Maintenance

The facility has a performance obligation of 20 years from the start of commercial operation, which is currently anticipated to occur in the second quarter of 2012. When fully operational, the Project would have approximately seven full-time jobs and three seasonal jobs.

Photovoltaic (PV) solar plants typically have low O&M requirements. During the life of the Project, there would be regular O&M site activity. Routine maintenance of the solar arrays would be necessary to maximize performance and detect potential malfunctions. Scheduled maintenance would involve a detailed program that would be continuously incorporated over the calendar year. However, the actual O&M requirements would be determined by the longevity of specific solar plant components.

A major focus of Project operations would be the monitoring system operational status, performance, and diagnostics from the main control room in the O&M building. The solar facilities output would be monitored continuously by a SCADA system that communicates major aspects of operation through communication lines to the O&M staff.

Preventative and corrective maintenance would occur outside of the O&M building. O&M procedures would be established that would define specific routine maintenance and inspection activities in accordance with the manufacturer's recommendations. O&M personnel would continuously perform preventative maintenance, including replacing lubricating fluids periodically, checking parts for wear, and recording operating parameters.

2.2 No Action Alternative

Under the No Action Alternative, DOE would not issue the loan guarantee to Cogentrix for the proposed Project. Without the DOE loan, it is unlikely that Cogentrix would implement the Project as currently planned. Thus, the No Action Alternative is that no solar energy facility would be constructed at the Project site. Traditional fossil fuel electrical generation facilities would continue to provide electricity, and there would be no reduction of GHG emissions from the use of solar generated electricity. The reduction in water use from converting the project site from irrigated agricultural land to a solar energy facility would also not occur.

2.3 Alternative Locations Considered but Eliminated

To develop a project that is both economically and technically feasible, Cogentrix followed a step-wise siting process that evaluated criteria and alternatives both at the level of general location and for the final design of the facility.

Cogentrix sought sites that included high-quality solar resource (i.e., most significant variable affecting economic performance); proximity to suitable transmission, including capital cost of transmission line construction; available land; applicable land use; and environmental and ecological considerations. Additionally, the Alamosa County region provides an excellent solar

resource given the high altitude, the amount of sunshine throughout the year, and the low rainfall, which minimizes panel soiling. Additionally, suitable agricultural sites and landowners willing to sell were sought Based on these criteria Cogentrix conducted a preliminary screening of properties within the San Luis Valley region and near the Alamosa-to-San Luis 115-kV transmission line.

Cogentrix determined the site to be suitable for solar development through an initial review of state solar resource maps and more detailed site-specific solar resource assessments. The solar potential at the proposed site is among the highest of the developable sites in Colorado. The site is ideally suited for solar development because it would utilize existing transmission infrastructure with available capacity, avoiding the need to build new transmission lines and infrastructure. Because of its unique location to adjacent and existing transmission, the excellent solar resource, and the need to reduce over-drafted aquifer- irrigated agriculture in the San Luis Valley, the site has distinct local advantages for solar energy development.

3.0 AFFECTED ENVIRONMENT AND ENVIRONMENTAL EFFECTS

This chapter describes the existing natural, physical, and socio-economic conditions of the Project area and the potential environmental effects that could result from implementing the proposed action or No Action Alternative described in Chapter 2. Additionally, a discussion of potential cumulative effects of the proposed action is provided.

3.1 Land Use

Land use is defined as the way in which a parcel of land is put to use; for example, agriculture or residential. Local land use plans establish the vision for how a jurisdiction should develop and establishes the goals, objectives, and action items for achieving that vision. The plans also establish a framework to guide and evaluate future development. These land use plans, in combination with the zoning code, provide a community the ability to evaluate the compatibility of new development and ensure that the objectives of that community are achieved.

3.1.1 Affected Environment

The Project is proposed for development on approximately a 225 acre site consisting of private fee lands located in Alamosa County, Colorado. The Project area is located within Section 26, Township 39N, and Range 9E Alamosa County, Colorado (Hooper West 7.5 minute USGS quadrangle map). The Project site is zoned as Residential Rural (RU) and is located within an irrigated crop field used for annual agricultural production. Vegetated areas outside of the irrigated crops are dominated by native and non-native species. The closest residence is 0.5 miles to the south-west of the Project site.

3.1.2 Environmental Consequences

3.1.2.1 No Action Alternative

Under the No-Action Alternative, DOE would not issue Cogentrix a loan guarantee for construction of the Project. Therefore, the Project would not proceed, and no changes would occur to the existing land use.

3.1.2.2 Proposed Action

The Project site is zoned as Residential Rural (RU). As such, the development is subject to the adopted land use requirements of Alamosa County Master Plan, and a 1041 permit is required. This land use permit is issued to address a broad array of impacts to lands and other resources within the county's boundaries. Application for a 1041 permit was submitted on April 13, 2010, to the Alamosa County Planning and Zoning Commission for review, and the permit was issued on July 28, 2010. The 1041 permit applies the provisions of the adopted zoning ordinance and its standards to the specific set of circumstances that characterize the proposed land use.

3.2 Visual Resources

Visual or scenic resources are the natural and built features of the landscape that contribute to the public's experience and appreciation of the environment. Visual resource or scenic impacts are generally defined in terms of a project's physical characteristics and their potential visibility and the extent to which the project's presence would change the perceived visual character and quality of the environment in which it would be located.

3.2.1 Affected Environment

A visual analysis was conducted to document the existing visual conditions on the Project site and the surrounding area and assesses the extent to which the proposed Project has the potential to affect the valued qualities of the area's scenic resources. The analysis was conducted using the evaluative process set out by the Federal Highway Administration in *Visual Impact Assessment for Highway Projects* (FHWA, 1988). An explanation of the methodology is in Appendix A.

Based on review of the viewshed analysis that identified the areas from where the Project would be most visible, six representative viewpoints were selected as Key Observation Points (KOPs) to serve as the basis for the analysis. From each of the viewpoints, photographs were taken of views toward the site, and these photos were used as the basis for preparing visual simulations that depict the appearance of the view with the proposed solar Project in place. Comparison of the simulation of the view with the Project in place with the photo of the view as it now appears provided the basis for identifying the changes to the visual character and quality of the view that the Project would have the potential to bring about. The locations of these KOPs are indicated in Figure 7.

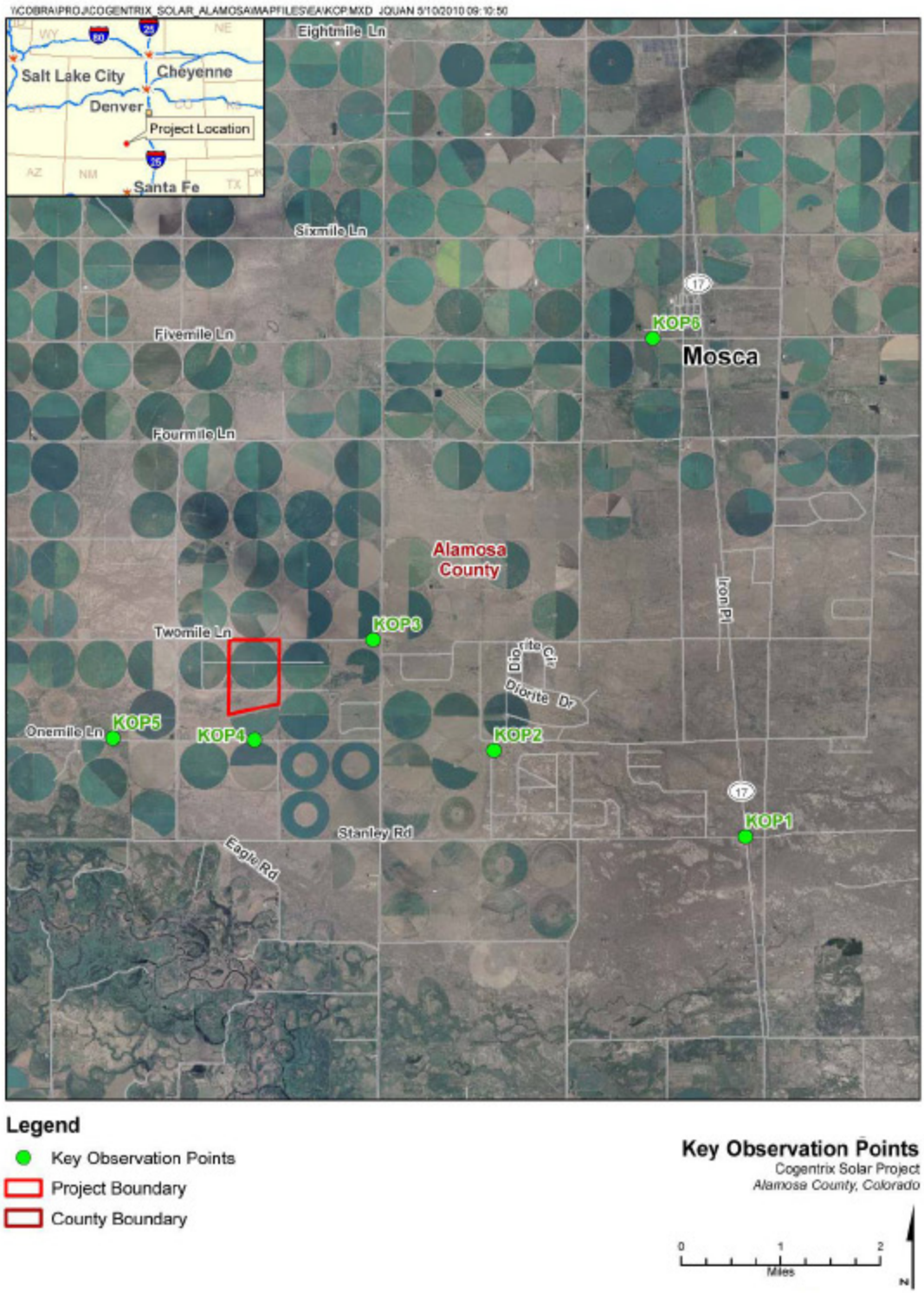


Figure 7. Key Observation Points Map

3.2.1.1 View to the Project Site from KOP 1

The existing view toward the proposed Project site from KOP 1 is depicted in Figure 8. KOP 1 is located at the intersection of State Highway 17 and Stanley Road. From this location, there is a mostly unobstructed view toward the Project Site, which is located approximately 5 miles to the northwest. The view is representative of what travelers on State Highway 17 would see when traveling north. Traffic volumes for State Highway 17 approximated 2,400 in 2008. A number of one-story, rural residences are visible in this view. Although the numbers of viewers in this location is moderate, the sensitivity of views from this area is high because they represent the views seen by residents as they travel to and from their nearby community and visitors to the area. The overall visual quality of this view is moderate. The San Juan Mountain Range in the distance contributes to the primary element of vividness and unity. At this scale, the low profile of the residences allows them to integrate well into the rural setting. However, a low voltage (wooden pole supported) power line which runs north-south one mile east of the Project site introduces a vertical visual element into a view comprised of strong horizontal patterning.

Figure 8. View to the Project Site from KOP 1

3.2.1.2 View to the Project Site from KOP 2

The existing view toward the proposed Project site from KOP 2 is depicted in Figure 9. KOP 2 is located at the northwestern edge of the rural residential community east of the Project site approximately 2 miles away. The view takes in the San Juan Mountains in the distance. This observation point is representative of the view for residents living on Basalt Drive. The sensitivity is high at this location because it is a residential area. The overall visual quality of this view is moderately high. The intactness of the view has been diminished by the power line in the middleground, contrasting against the strong horizon in the distance. The strongly defined

skyline that the mountain range creates in the distance provides a high level of vividness in this view, while the cohesion of the vegetation in the foreground with the view of the mountains in the distance creates a unified composition.

Figure 9. View to the Project Site from KOP 2

3.2.1.3 View to the Project Site from KOP 3

The existing view toward the proposed Project site from KOP 3 is depicted in Figure 10. KOP 3 is located at a residence at the intersection of County Road 2N and County Road 106 and provides a view toward the northern edge of the Project site, which lies approximately 1.0 mile away. The sensitivity of residents living at this distance from the Project site is considered to be relatively high. The landscape in this view is characterized by the flat topography and low growing vegetation. The vegetation in the foreground has been disturbed by agricultural activities, so the mountains in the background serve as the principal element of vividness. The undeveloped character of this view provides a high level of unity and intactness. The visual quality of this observation point is moderately high.

Figure 10. View to the Project Site from KOP 3

3.2.1.4 View to the Project Site from KOP 4

The existing view toward the proposed Project site from KOP 4 is depicted in Figure 11. KOP 4 is located between two residences on County Road 1N. This viewpoint is located at the southern edge of the Project area, and the view in the photo is oriented toward the north. It is representative of the views that the closest residents would experience, so viewer sensitivity is high at this location. This view offers unobstructed views of the Project site, which lies approximately 0.5 mile away. This location encompasses views of both the San Juan Mountain Range and Sangre de Cristo Mountain Range, though natural vegetation has been disturbed for agricultural purposes. Because of that, the vividness of the view here is moderate to moderately high. The disturbance of the natural vegetation for agricultural purposes does little to diminish the intactness or unity of the view. At this distance, the existing transmission line contrasts slightly against the mountain range. The overall visual quality of this view is moderate to moderately high.

Figure 11. View to the Project Site from KOP 4

3.2.1.5 View to the Project Site from KOP 5

The existing view toward the proposed Project site from KOP 5 is depicted in Figure 12. KOP 5 is located on County Road 1N approximately 1.0 miles southwest of the Project boundary. This is a representative view for residents of the area traveling east on County Road 1N, so the level of sensitivity is moderate. The view of the Sangre de Cristo Mountain Range in the background in combination with the grasses in the foreground and middle ground create a composition with high levels of vividness and unity. However, the fence in the foreground diminishes the intactness slightly. The overall visual quality is moderately high.

Figure 12. View to the Project Site from KOP 5

3.2.1.6 View to the Project Site from KOP 6

The existing view toward the proposed Project site from KOP 6 is depicted in Figure 13. KOP 6 is located at the southernmost residence of the community of Mosca on County Road 5N, looking to the southwest. The view combines agricultural features in the foreground with the San Juan Mountain Range in the distance to provide a moderate level of vividness and unity. The poles from the power line interrupt the strong horizon created by the mountain range in the distance, and the agricultural equipment also diminishes the intactness of the view slightly. The overall visual quality at this location is moderate. The northern edge of the Project boundary is approximately 4.75 miles away.

Figure 13. View to the Project Site from KOP 6

3.2.2 Environmental Consequences

This analysis documents the existing visual conditions on the Project site and the surrounding area and assesses the extent to which the proposed Project has the potential to affect the valued qualities of the area's scenic resources.

3.2.2.1 No Action Alternative

Under the No-Action Alternative, DOE would not issue Cogentrix of Alamosa, LLC a loan guarantee for construction of the Project. Therefore, the Project would not proceed, and no additional impacts to visual resources would occur.

3.2.2.2 Proposed Action

The Project includes construction of approximately 500 HCPV solar panels, each approximately 50 feet in height and 24 square feet across (Figure 6). During that time, earth moving equipment, trucks, and other heavy equipment would be in use on the Project site and within the proposed corridors for both the access roads and transmission line and temporary staging yards.

At some times, small, localized clouds of dust created during the construction phase may be visible at the site, though active dust suppression should minimize the frequency of such dust events. Because of the construction-related grading activities, areas of exposed soil and fresh gravel that contrasts with the colors of the surrounding undisturbed landscape may be visible. Any visible construction activities would be relatively short in duration, and would not result in any substantial, permanent impact to visual resources.

3.2.2.2.1 Project Impacts – KOP Analyses

Visual impacts resulting from the Project would consist of the alteration of the presently open farmland to a solar energy facility. While the panels would be noticeable features to those viewers within the immediate Project vicinity, the visual impact of the Project would remain fairly localized, with changes to visual quality diminishing with increasing distance. In the immediate vicinity, the panels would introduce a vertical patterning into the landscape composition, and in some areas would partially block views of the mountain ranges. The greatest levels of visual change would be experienced at KOPs 3, 4, and 5, where panels would be seen in close range from residences and County Road 1N.

Project effects on the visual quality of the views seen from each KOP are described below.

3.2.2.2.1.1 Impacts on View from KOP 1

Figure 14 is a simulation of the view from KOP 1 as it would appear during the Project's operational period. Although the panels would be visible at this distance, approximately 5 miles from the Project site, they would not dominate the view and would have little effect on the view's overall visual quality. The low profile of the panels would create a similar visual effect as the residences in the view. The panels would minimally block the lower views of the mountains in the distance, having little to no effect on this view's vividness, intactness, or unity. The visual quality would remain moderately high.

Figure 14. Impacts on View from KOP 1

3.2.2.2.1.2 Impacts on View from KOP 2

Figure 15 is a simulation of the view from KOP 2 as it would appear during the Project's operational period. From this observation point, the Project's features would be visible to the residents in the rural residential community. At this distance, approximately 2.0 miles from the closest Project feature, the presence of the solar panels would alter the visual character of this view from one of an undeveloped landscape to a landscape that includes a developed energy facility. The panels serve to partially block views of the mountain range in the background, diminishing the vividness of this view. The smoothness of the panels would contrast against the highly textured landscape, reducing the unity and intactness of the view to some degree. Overall, the visual quality at this location would be diminished to a small degree, changing from moderately high to moderate.

Figure 15. Impacts on View from KOP 2

3.2.2.2.1.3 Impacts on View from KOP 3

Figure 16 is a simulation of the view from KOP 3 as it would appear during the Project's operational period. From this location, the Project features would be fully visible to the residence. At this distance, the panels would become a notable visual element due to their form, texture, and proximity. The presence of the Project would change the visual character of this view from a relatively undeveloped landscape to a more developed solar energy landscape. The addition of the panels to this view would partially block views of the mountain range in the distance, diminishing the vividness. The form and smoothness of the panels contrasts against the

mountains, reducing the unity and intactness of this view. The overall effect on the landscape would reduce the visual quality from moderately high to moderate.

Figure 16. Impacts on View from KOP 3

3.2.2.2.1.4 Impact on View from KOP 4

Figure 17 is a simulation of the view from KOP 4 as it would appear during the Project's operational period. At this observation point, the Project would be visible to the residences. The presence of the solar panels would alter the existing visual character of this view, giving it a more highly developed appearance. The panels would reduce the vividness of this view by blocking views of the mountain ranges, and they would alter the intactness and unity of the landscape and horizon, as they would introduce smooth, vertical elements across the currently open and unobstructed horizon. Due to the close distance to the residences, the solar panels would become a dominant element in this view. The overall visual quality of this view would be reduced from moderately high to moderately low.

Figure 17. Impacts on View from KOP 4

3.2.2.2.1.5 Impact on View from KOP 5

Figure 18 is a simulation of the view from KOP 5 as it would appear during the Project's operational period. At this location, the panels would be visible to motorists on County Road 1N. The presence of the solar panels would alter the existing visual character of this view, giving a more highly developed appearance. The color, form, and texture of the panels would contrast against the mountains in the background. Additionally, due to the close distance from the panels, they would become a dominant element in this view. The panels would reduce the vividness of this view by blocking views of the mountain ranges, and they would alter the intactness and unity of the landscape and horizon by interrupting the continuity between the foreground and background. The overall visual quality of this view would be reduced from moderately high to moderate.

Figure 18. Impacts on View from KOP 5

3.2.2.2.1.6 Impact on View from KOP 6

Figure 19 is a simulation of the view from KOP 6 as it would appear during the Project's operational period. At this distance, the solar panels would not constitute a visually dominant element in the view. Existing agricultural equipment would partially screen views of the Project features. Consequently, the Project would not noticeably alter the character of the landscape. Because of the small apparent size of the panels as seen from this distant viewpoint, their presence would not reduce the vividness, intactness, or unity of the view. With the Project in place, the overall level of visual quality of this view would remain moderate.

Figure 19. Impacts on View from KOP 6

3.3 Air Quality

3.3.1 Affected Environment

The federal Clean Air Act established the principal framework for national, state, and local efforts to protect air quality in the United States (42 U.S.C. 7401−7642). Under the Clean Air Act, the U.S. Environmental Protection Agency (EPA) has set standards known as National Ambient Air Quality Standards (NAAQS) for six criteria air pollutants considered to be key indicators of air quality, as follows: carbon monoxide, nitrogen dioxide, ozone, sulfur dioxide, lead, and two categories of particulate matter, including particulate matter with an aerodynamic diameter of 10 microns or less (PM_{10}) and particulate matter with an aerodynamic diameter of 2.5 microns or less ($PM_{2.5}$). These standards are codified in 40 CFR 51.

A NAAQS is comprised of two parts: an allowable concentration of a criteria pollutant, and an averaging time over which the concentration is to be measured. Averaging times are based on

whether the damage caused by the pollutant is more likely to occur during exposure to a high concentration for a short time (exposure) or to a relatively lower average concentration over a longer period (chronic exposure). For some pollutants, there is more than one air quality standard, reflecting both short-term and long-term effects. Primary NAAQS define levels of air quality with an adequate margin of safety that sets limits to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary NAAQS define levels of air quality judged necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant, including protection against decreased visibility and damage to animals, crops, vegetation, and buildings. These standards are summarized in Table 1.

Table 1. National Ambient Air Quality Standards

Air Constituent	Averaging Time	NAAQS Primary	NAAQS Secondary
Carbon Monoxide (CO)	1 hour	35 ppm	None
	8 hours	9 ppm	None
Lead (Elemental) (Pb)	Rolling 3-Month Average	0.15 µg/m^3	Same as Primary
Nitrogen Dioxide (NO_2)	1 hour	100 ppb	None
	Annual (arithmetic average)	53 ppb[1]	Same as Primary
Ozone (O_3)	8 hours[2]	0.08 ppm	Same as Primary
	8 hours[3]	0.075 ppm	Same as Primary
Particulate Matter (PM_{10})	24 hours	150 µg/m^3	Same as Primary
Particulate Matter ($PM_{2.5}$)	24 hours	35 µg/m^3	Same as Primary
	Annual	15.0 µg/m^3	Same as Primary
Sulfur Dioxide (SO_2)[4]	1 hour	75 ppb	None
	3 hours	None	0.5 ppm
	24 hours	0.14 ppm	None
	Annual	0.030 ppm	None

Source: 40 CFR Part 50, National Primary and Secondary Ambient Air Quality Standards.
ppm = parts per million.
ppb = parts per billion.
µg/m^3= micrograms per cubic meter.

1- The official level of the annual NO_2 standard is 0.053 ppm, equal to 53 ppb, which is shown here in ppb units for the purpose of clearer comparison to the 1-hour standard
2- Revoked in 2008 by EPA.
3- EPA proposes that the level of the 8-hour primary standard, which was set at 0.075 ppm in the 2008 final rule, should instead be set at a lower level within the range of 0.060 to 0.070 parts per million (ppm),
4- Notwithstanding the promulgation of a single 1-hour 75 ppb SO_2 NAAQS in 40 CFR 50.17 and listed here, the older 3-hour, 24-hour, and annual SO_2 also listed here, will remain applicable. They will no longer apply to an area one year after designation of an area.

The CAA requires the EPA to assign a designation to each region of the U.S. based on the area's compliance with the NAAQS. The EPA categorizes areas with regard to compliance or non-compliance with each NAAQS as follows:

- Nonattainment – areas that currently do not meet the NAAQS

- Attainment – areas currently meeting the NAAQS
- Maintenance – areas currently meeting the NAAQS, but that previously were nonattainment
- Unclassifiable – areas that cannot be classified based on available information and are treated as attainment until proven otherwise.

Ozone nonattainment areas are further classified as extreme, severe, serious, moderate, or marginal, depending on the severity of nonattainment. Both carbon monoxide and PM_{10} nonattainment areas are further classified as serious or moderate.

Alamosa County is currently in attainment for all NAAQS criteria pollutants and is predominantly agricultural and non-industrial. Major air emission sources include agriculture, biogenic, fires, vehicles (combustion and dust), and wood burning.

Section 176(c) of the CAA requires that federal actions conform to the appropriate State Implementation Plan. The final rule for "Determining Conformity of Federal Actions to State or Federal Implementation Plans" was promulgated by EPA on November 30, 1993 (58 CFR 63214) and took effect on January 31, 1994 (40 CFR Parts 6, 51, and 93). The rule applies to all federal actions in criteria pollutant nonattainment and maintenance areas. If the proposed action were undertaken in a federally classified nonattainment or maintenance area, the regulatory provisions for conformity would apply. The proposed action lies within an attainment area for all criteria air pollutants in Alamosa County and thus the provisions of this rule do not apply.

GHGs are gases in the Earth's atmosphere that transmit short-wave incoming solar radiation, but absorb long wave infrared radiation re-emitted from the Earth's surface, or in simple terms they "trap heat." Gases exhibiting greenhouse properties come from both natural and human sources. Water vapor, CO_2, methane (CH_4), and nitrous oxide (N_2O) are examples of GHGs that have both natural and manmade sources, while other GHGs such as chlorofluorocarbons are exclusively manmade. In the U.S., GHG emissions come mostly from energy use. GHG emissions are driven largely by the combustion of fossil fuel for electricity generation, transport, and other needs. Energy-related CO_2 emissions resulting from petroleum, coal, and natural gas represent 82% of total U.S. manmade GHG emissions (NEIC 2008).

3.3.2 Environmental Consequences

3.3.2.1 No Action Alternative

Under the No-Action Alternative, there would be no new emissions or changes in air quality. The elimination of approximately 43,250 tons per year of CO_2 emissions and other air pollutant emissions would not occur as a result of replacing energy generated by natural gas-fired power plants with solar energy from the Project.

3.3.2.2 Proposed Action

Air emissions from the Project would be almost entirely generated during construction, with a small fraction generated during operation. Table 2 presents the construction emissions.

Construction emissions include NO_2, CO, SO_2, VOC, PM_{10} and $PM_{2.5}$ from construction equipment exhaust, delivery truck exhaust, and worker commute exhaust; PM_{10} and $PM_{2.5}$ from travel on paved and unpaved roads and construction activities; and VOC from road paving.

Construction activities would produce dust and heavy-duty vehicle emissions from the excavation for foundations and underground collector cable lines and travel on unpaved roads. The construction emissions from the project are broken up by construction activity: site preparation and facility road construction, electrical distribution system construction, panel and building construction, and site cleanup. For the purpose of estimating emissions, construction was planned from February 1, 2011, to April 1, 2012, with commercial operation planned for April 1, 2012. Therefore, construction emissions are presented for the years 2011 and 2012. Emission factors for vehicle exhaust were developed for 2011 and 2012 using the Environmental Protection Agency (EPA) NONROAD program for construction equipment exhaust, and the EPA MOBILE6 program for delivery truck exhaust and worker commute exhaust.

An Air Pollutant Emission Notice (APEN) was submitted to the Colorado Department of Public Health and Environment (CDPHE) Air Pollution Control Division (APCD) due to the land development being greater or equal to 25 acres and/or 6 months in duration. Land development activities release fugitive dust, a pollutant regulated by APCD. The project is eligible for a General Permit because the Project size would be less than 1,850 acres, and the permit was granted and became effective in March of 2011. The General Permit requires dust control measures including watering unpaved roads and other disturbed surface areas, a maximum vehicle speed of 30 mph on unpaved surfaces, no earthwork activities when the wind speed exceeds 30 mph, and revegetation of disturbed areas. Cogentrix has developed a Fugitive Dust Control Plan (FDCP) to minimize air emissions from construction-related ground disturbance and traffic.

Because the construction equipment and vehicles would be dispersed across a large, sparsely populated area, no impacts to surrounding residences are anticipated. Because the construction is of limited duration, the impacts to air quality from construction emissions would be minor.

Table 2. Estimated Air Emissions from Construction in Tons

	2011 Emissions						2012 Emissions					
	NO_x	CO	SO_2	VOC	PM_{10}	$PM_{2.5}$	NO_x	CO	SO_2	VOC	PM_{10}	$PM_{2.5}$
Site Prep & Facility Road Total	4.44	2.97	0	0.44	2.49	0.81	-	-	-	-	-	-
1. Construction Equipment Exhaust	4.3947	2.2459	0.0044	0.4051	0.3632	0.3523	-	-	-	-	-	-
2. Delivery Truck Exhaust	0.0144	0.0067	0	0.0014	0.0005	0.0004	-	-	-	-	-	-
3. Worker Commute Exhaust	0.0279	0.7166	0.0003	0.0279	0.0008	0.0004	-	-	-	-	-	-
4. Paved Road Fugitive Dust	-	-	-	-	0.4913	0.1212	-	-	-	-	-	-
5. Unpaved Road Fugitive Dust	-	-	-	-	0.0091	0.0009	-	-	-	-	-	-
6. Construction Activity Fugitive Dust	-	-	-	-	1.6249	0.338	-	-	-	-	-	-
7. Road Paving	-	-	-	0.001	-	-	-	-	-	-	-	-
Electrical Distribution System Total	2.99	9.14	0.01	0.55	4.78	1.39	0.31	0.89	0	0.05	0.48	0.14
1. Construction Equipment Exhaust	2.7101	2.1646	0.0026	0.2805	0.2973	0.2884	0.2845	0.2279	0.0003	0.031	0.0324	0.0314
2. Delivery Truck Exhaust	0.0097	0.0045	0	0.0009	0.0003	0.0003	0.0008	0.0004	0	0.0001	0	0
3. Worker Commute Exhaust	0.2712	6.9706	0.0028	0.2712	0.008	0.0037	0.0248	0.6591	0.0003	0.0239	0.0008	0.0004
4. Paved Road Fugitive Dust	-	-	-	-	4.4637	1.1011	-	-	-	-	0.4464	0.1101
5. Unpaved Road Fugitive Dust	-	-	-	-	0.0061	0.0006	-	-	-	-	0.0006	0.0001
Panel and Building Total	46.52	53.24	0.06	5.39	40.92	11.93	4.81	5.22	0.01	0.54	4.11	1.21
1. Construction Equipment Exhaust	38.9061	15.4719	0.0314	3.4321	2.5464	2.4701	4.1436	1.6681	0.0032	0.3685	0.2723	0.2641
2. Delivery Truck Exhaust	6.2577	2.9139	0.0117	0.5982	0.2061	0.1637	0.5396	0.254	0.0012	0.0554	0.0179	0.0138
3. Worker Commute Exhaust	1.3558	34.8528	0.0142	1.3558	0.04	0.0183	0.124	3.2955	0.0014	0.1195	0.004	0.0018
4. Paved Road Fugitive Dust	-	-	-	-	37.2759	9.1947	-	-	-	-	3.7276	0.9195
5. Unpaved Road Fugitive Dust	-	-	-	-	0.8556	0.0856	-	-	-	-	0.0856	0.0086
Site Cleanup & Demobilize Total	-	-	-	-	-	-	0.32	0.79	0	0.05	0.59	0.16
1. Construction Equipment Exhaust	-	-	-	-	-	-	0.2574	0.1001	0.0003	0.021	0.0217	0.021
2. Delivery Truck Exhaust	-	-	-	-	-	-	0.0325	0.0153	0.0001	0.0033	0.0011	0.0008
3. Worker Commute Exhaust	-	-	-	-	-	-	0.0255	0.6776	0.0003	0.0246	0.0008	0.0004
4. Paved Road Fugitive Dust	-	-	-	-	-	-	-	-	-	-	0.5474	0.135
5. Unpaved Road Fugitive Dust	-	-	-	-	-	-	-	-	-	-	0.0236	0.0024
Construction Total tons per year	53.95	65.35	0.07	6.37	48.19	14.14	5.43	6.9	0.01	0.65	5.18	1.51
Construction Total	59.38	72.25	0.08	7.02	53.37	15.65						

When the project is operational, no emissions are expected except for a small amount of tailpipe emissions from maintenance vehicles traveling and working on the site. Operation emissions include NO_2, CO, SO_2, VOC, PM_{10}, and $PM_{2.5}$ from maintenance equipment exhaust and worker commute exhaust, and PM_{10} and $PM_{2.5}$ from travel on paved and unpaved roads. Table 3 presents the operation emissions.

Table 3. Estimated Air Emissions from Operation in Tons/Year

	NO_x	CO	SO_2	VOC	PM_{10}	$PM_{2.5}$
1. Worker Commute Exhaust	0.0931	2.4732	0.0011	0.0897	0.003	0.0014
2. Maintenance Activity Equipment Exhaust	0.168	0.0843	0.0002	0.0142	0.0176	0.0171
3. Paved Road Fugitive Dust	-	-	-	-	1.6662	0.411
4. Unpaved Road Fugitive Dust	-	-	-	-	0.1519	0.0152
Operation Total	0.26	2.56	0	0.1	1.84	0.44

By utilizing solar energy to produce electricity, the proposed project would reduce reliance on foreign sources of energy and contribute to the avoidance and reduction of air pollutants and anthropogenic emissions of greenhouse gases by reducing the need for electricity from conventional generation facilities. Based on the Project's 30 MW net nominal output capacity rating, the facility is expected to generate approximately 76,000 megawatt-hours (MWh) of electrical power per year (assuming a 29 percent annual operating capacity factor). The Project when in commercial operation would displace the use of approximately 249 million cubic feet of natural gas that would have been used by a comparable conventional natural gas-fired power plant. This eliminates the generation of approximately 43,250 tons per year of CO_2 emissions, a greenhouse gas pollutant, into the atmosphere, based on the U.S. Environmental Protection Agency (USEPA) estimate of 1,135 pounds of CO_2 generated per MWh.

The Project would also displace the release of traditional air pollutants generated by natural gas-fired power plants. Annual air pollutant emissions that are expected to be avoided by the project, assuming the same amount of electrical energy were produced instead from an efficient combined cycle power plant firing natural gas, include: 97 tons of NO_x, 94 tons of CO, 29 tons of VOC, 13 tons of SO_x, and 41 tons of PM_{10}.

3.4 Noise

3.4.1 Affected Environment

Existing sources of noise in the immediate vicinity of the Project include daily traffic, operation of farm machinery, and overhead aircraft. There are no local noise ordinances.

The Occupational Safety and Health Administration (OSHA) provides standards for occupational noise exposure. Employees should not be subjected to sound exceeding levels ranging from 90 dBA for an 8-hour exposure to 115 dBA for a 0.25-hour exposure (29 CFR 1910.95).

There are several ways to measure noise, depending on the source of the noise, the receiver, and the reason for the noise measurement. Table 4 summarizes the technical noise terms used in this EA.

Table 4. Definitions of Acoustical Terms

Term	Definitions
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise at a given location.
Decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the measured pressure to the reference pressure, which is 20 micropascals.
A-Weighted Sound Pressure Level (dBA)	The sound pressure level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighted filter de-emphasizes the very low- and very high-frequency components of the sound in a manner similar to the frequency response of the human ear and correlates well with subjective reactions to noise. All sound levels in this report are A-weighted.
Equivalent Sound Level (L_{eq})	The L_{eq} integrates fluctuating sound levels over a period of time to express them as a steady-state sound level. As an example, if two sounds are measured and one sound has twice the energy but lasts half as long, the two sounds would be characterized as having the same equivalent sound level. Equivalent sound level is considered to be related directly to the effects of sound on people because it expresses the equivalent magnitude of the sound as a function of frequency of occurrence and time.
Day–Night Level (L_{dn} or DNL)	The day-night level is a 24-hour average L_{eq} where 10 dBA is added to nighttime levels between 10:00 PM and 7:00 AM. For a continuous source that emits the same noise level over a 24-hour period, the L_{dn} will be 6.4 dB greater than the L_{eq}.
Statistical Noise Level (L_n)	The noise level exceeded during n percent of the measurement period, where n is a number between 0 and 100 (for example, L_{50} is the level exceeded 50 percent of the time).

Table 5 shows the relative A-weighted noise levels (dBAs) of common sounds measured in the environment and in industry for various sound levels.

Table 5. Typical Sound Levels Measured in the Environment and Industry

Noise Source at a Given Distance	A-Weighted Sound Level in Decibels	Qualitative Description
Carrier Deck Jet Operation	140	
	130	Pain Threshold
Jet Takeoff (200 feet)	120	
Auto Horn (3 feet)	110	Maximum Vocal Effort
Jet Takeoff (2,000 feet) Shout (0.5 feet)	100	
New York Subway Station Heavy Truck (50 feet)	90	Very Annoying; Hearing Damage (8-hour, continuous exposure)
Pneumatic Drill (50 feet)	80	Annoying
Freight Train (50 feet) Freeway Traffic (50 feet)	70	Intrusive; Telephone Use Difficult
Air Conditioning Unit (20 feet)	60	
Light Auto Traffic (50 feet)	50	Quiet
Living Room or Bedroom	40	
Library Soft Whisper (5 feet)	30	Very Quiet
Broadcasting Studio	20	Recording Studio
	10	Just Audible

Source: Adapted from Table E in NY DEC, 2001.

Consider typical sounds in a suburban neighborhood on a normal or “quiet” afternoon. If a short duration of those sounds is plotted on a graph, it would look very much like Figure 20. In this figure, the background, or residential sound level in the absence of any identifiable noise sources, is approximately 45 dBA. During roughly three-quarters of the time, the sound level is

50 dBA or less. The highest sound level, caused by a nearby sports car, is approximately 70 dBA, while an aircraft generates a maximum sound level of about 68 dBA.

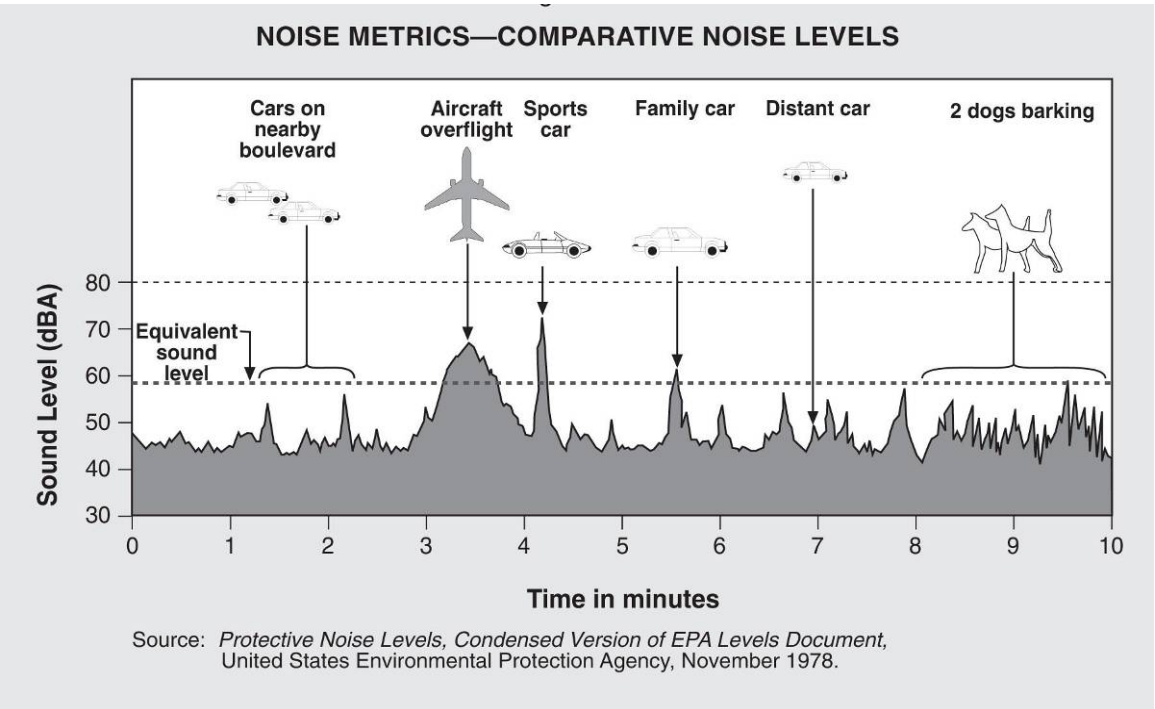


Figure 20. Noise Metrics—Comparative Noise Levels

3.4.2 Environmental Consequences

3.4.2.1 No Action Alternative

Under the No-Action Alternative, DOE would not issue Cogentrix a loan guarantee for construction of the Project and no impacts to noise levels would occur.

3.4.2.2 Proposed Action

EPA's Office of Noise Abatement and Control studied noise from individual pieces of construction equipment, as well as from construction sites for power plants and other types of facilities (see Table 6). Data from EPA for industrial projects of similar size have been used to represent the Project. These data are conservative, because the evolution of construction equipment generally has gravitated toward quieter design.

Table 6. Average Noise Levels from Common Construction at a Reference Distance of 50 Feet (dBA)

Construction Equipment	Typical Average Noise Level at 50 ft, dBA
Air compressor	81
Backhoe	85
Concrete mixer	85
Concrete pump	82
Crane, mobile	83
Dozer	80
Generator	78
Grader	85
Loader	79
Paver	89
Pile driver	101
Pneumatic tool	85
Pump	76
Rock drill	98
Saw	78
Scraper	88
Shovel	82
Truck	91

Source: U.S. EPA, 1971.

Table 7 shows the total composite noise level at a reference distance of 50 feet, based on the pieces of equipment operating for each construction phase and the typical usage factor for each piece. The noise level at 1,500 feet also is shown. The calculated level at 1,500 feet is conservative because the only attenuating mechanism considered was geometric spreading. Sound pressure level (dBA) falls inversely proportional to the distance from the sound source, which results in an approximate 6 dBA decrease with every doubling of distance from the source. (For reference, see http://www.sengpielaudio.com/calculator-distance.htm). Attenuation related to the presence of structures, trees or vegetation, ground effects, and terrain was not considered.

Construction activities would generate a temporary increase in ambient noise levels. Noise from construction would be temporary and limited to daytime hours. The Federal Transit Administration (FTA) construction noise method combines the noise levels of the two noisiest pieces of construction equipment and identifies locations where noise levels would exceed 90 dBA during the day or 80 dBA at night (FTA 2006). The nearest residence is 2,800 feet away, and based on the damping of sound level with distance, construction noise would not exceed 55 dBA. This noise level is well below the levels in the FTA guidance manual that are considered noise impacts from construction.

Regarding impacts to employees working on the site, all construction activities would be conducted in accordance with OSHA guidelines, which address noise and hearing conservation in specific standards for the construction industry. If construction workers or other contractors

or employees have the potential to be exposed to noise that exceeds OSHA standards, they would be provided personal protective equipment per the regulations.

Table 7. Composite Construction Site Noise Levels

Construction Phase	Composite Equipment Noise Level at 50 feet, dBA	Composite Equipment Noise Level at 1,500 feet, dBA
Clearing	88	58
Excavation	90	60
Foundation	89	59
Erection	84	54
Finishing	89	59

Source: EPA, 1971.

No appreciable noise would be generated by the operation of the facility. The main noise generator of the Project is the tracker pump unit located at the base of the support columns. Each tracker pump generates 59 decibels (dB) at a 25-foot distance. The tracker pump units would operate on an intermittent basis, about 15-30 seconds per every 15-minute period, during daylight hours only. The tracker repositioning maneuver, from the facing-west sunset position to the facing-east sunrise position, takes approximately 2 minutes. During the times of pump operation, the total facility sound level at the property line would be 51.5 dB. A 51.5 dB noise level is equivalent to a muffled tractor or pivot sprinkler located a quarter of a mile away.

The sound pressure level decreases by 6 dB for every doubling of the distance from the source; therefore at the nearest residence (2,800 feet away), the total facility noise level would be 20 dB. Background noise levels are approximately 40 dBA in rural residential areas and 45-dBA in agricultural cropland with equipment operating (EPA 1978). Because the facility noise contribution is more than 10 dB less than ambient noise level, noise generated by operation of the Project would not add to the noise level at the nearest residence.

3.5 Geology

3.5.1 Affected Environment

Information sources include existing U.S. Geological Survey (USGS) geologic mapping, the Natural Resource Conservation Service (NRCS) soil survey database, Colorado Geological Survey, and USGS seismic hazards mapping for the Project area were used to conduct a preliminary geotechnical review of the project site.

The topography of the Project site is flat, with an elevation of approximately 7,580 feet above mean sea level (msl). The land in the Project vicinity slopes to the east at approximately 0.1 percent. The Project is located in the San Luis Valley, which is part of the northern Rio Grande Rift geologic province. The San Luis Valley is a fault-bounded basin in-filled with sediments up to 30,000 feet in thickness. The uppermost of these sediments were deposited in a large ancient lake and are known as the Alamosa Formation (Machette, et al. 2007). The Alamosa Formation consists primarily of alternating layers of laminated sands and silts and sandy pebble gravels deposited in the ancestral lakes.

The Alamosa Formation is capped at the surface by fine-grained alluvium (stream-deposited) sediment, which is covered by a 3-foot-thick layer of wind-blown, silty loess. No bedrock is within several thousand feet of the ground surface in the Project vicinity.

Surficial soils that underlie the site consist of loamy sands, sandy loam, clay loams, and gravelly sands. These soils are typically formed in alluvium on floodplains that cover the valley floor. The primary mapped soil units at the Project site include Arena Loam, Graypoint-Gravelly land complex, Gunbarrel Loamy Sand, Mosca Loamy Sand, and San Luis Sandy Loam (NRCS 2010).

Two geologic faults are mapped in the project vicinity. The Northern Sangre de Cristo Fault is mapped approximately 20 miles to the east of the site and unnamed "Faults near Monte Vista" are mapped approximately 16 miles west of the site (Kirkham 1998a, 1998b).

3.5.2 Environmental Consequences

3.5.2.1 No Action Alternative

Under the No-Action Alternative, DOE would not issue Cogentrix a loan guarantee for construction of the Project no impacts to soils and geologic resources would occur.

3.5.2.2 Proposed Action

The proposed Project could impact surficial soils at the site by disturbing and exposing soils, which could subject the soils to wind and water erosion. However, erosion potential would be avoided or minimized by implementing accepted erosion control measures and BMPs during construction and operation of the Project facilities. These could include site drainage control, surface runoff diversion features, active grading control, energy dissipation structures, and infiltration basins to control erosion and ensure foundations and roads are not compromised due to erosion. Exposed soils that are subject to wind erosion would be minimized using standard fugitive dust management practices, including covering with fabric or other materials, dust suppressants (chemical flocculating agents), minimizing disrupted surface areas, paving certain areas, rescheduling work around especially windy days, reducing vehicle speeds, and spraying exposed work surfaces with water.

Based on review of available information and site-specific mapping, no other potential geologic impacts such as avalanches, mud flows, landslides, high radioactivity, ground subsidence, or expansive soils are anticipated. The facilities and foundations have been designed for the maximum considered earthquake according to the International Building Code. This earthquake corresponds to an event having a 2 percent probability of exceedance in 50 years (or 2,500-year return period). At the Project site, the 2,500-year event has a peak ground acceleration of 0.14g at the bedrock surface.

Farmland Conversion Impact Rating forms and supporting documentation were completed and submitted to NRCS. Construction of the facility would convert approximately 14 acres of prime or unique farmland. None of the combined ratings resulting from the NRCS evaluation exceeded 160 points. According to the Farmland Protection Policy Act, sites with a rating less than 160 need no further consideration (Appendix B).

3.6 Water Resources

3.6.1 Affected Environment

The total watershed of the San Luis Valley covers about 5 million acres. For the most part, Alamosa County occupies a closed basin with a high water table and alkaline soils. North of Alamosa is an area of interior drainage where small streams and creeks flowing from the Sangre de Cristo Mountains sink into the sediments of the valley floor. The most important source of water to the San Luis Valley is surface-inflow, which recharges the aquifers and provides directly or indirectly the majority of the water used for irrigation and domestic and industrial purposes. Several irrigation canals are present including the San Luis, Excelsior, and Empire. Surface water largely results from snowmelt and runoff. Internal drainage into San Luis Lake occurs via San Luis and Arena creeks while Big Spring Creek drains internally nearby. The southern portion of the San Luis Valley, generally south of the Rio Grande, is well-drained in terms of surface and groundwater. The northern portion of the San Luis Valley, north of the Rio Grande, encompasses approximately 2,500 square miles and is called the Closed Basin. Due to a topographic rise in the valley floor, streams that drain the northern San Luis Valley and its surrounding hills and mountains (Cochetopa Hills, northern San Juan Mountains, northern Sangre de Cristo Mountains) do not flow into the Rio Grande, rather the water is stored underground within the Closed Basin and the lowest portion of this basin is known as the sump.

Surface water in the San Luis Valley flows as intermittent and perennial streams, seeps and springs, and is stored as ephemeral and permanent playas and lakes. Portions of Alamosa, Conejos, and Saguache counties drain internally into the northern San Luis Valley groundwater aquifer or the Rio Grande. The principal drainage of the southwestern portion of the county is the Rio Grande and its major tributaries, the Alamosa River and Rock and La Jara creeks. The Rio Grande enters the San Luis Valley from the west (east flank of the San Juan Mountains), then flows southeasterly through the Valley. Reservoirs include San Luis and Head lakes, which are managed for recreation and wildlife habitat, and Adams Lake. Approximately 2.8 million acre-feet of water enter and leave the San Luis Valley annually.

The San Luis Valley has two major groundwater aquifers, the shallow or upper unconfined (Alamosa Formation) and the deep or lower confined (Santa Fe Formation). The major discharge of water from the upper unconfined aquifer results from wells, springs, and upward leakage from the lower confined to the unconfined aquifer. Groundwater is regionally separated in the shallow and deep aquifers due to a thick layer of impermeable clay, known locally as the blue clay layer, and also by lava flows. Both aquifers consist of unconsolidated clay, silt, sand, and gravel.

Wells drilled into the confined aquifer frequently produce free- flowing artesian wells. Unconfined groundwater occurs throughout the Valley floor. The confined aquifer underlies most of the Valley, extending from north of Mosca south to Romeo and from Monte Vista to east of Alamosa. The aquifers provide water that is adjudicated for irrigation. Historic to present groundwater pumping and water development have sufficiently lowered the water table to allow expansion of agriculture and access roads into the interior of the San Luis Valley.

Based on available literature, the shallow unconfined water table is anticipated to be within 5 to 10 feet below ground surface (bgs) at the Project site. A 10- to 80-foot-thick layer of “blue clay” was deposited in Lake Alamosa, and is present throughout the central and northern portions of the valley. This clay layer, which is at depths of 20 to 130 feet bgs, forms an aquitard that creates

two separate aquifers and blocks the downward movement of water. The lower confined aquifer is artesian throughout much of the Valley.

The aquifers are recharged by infiltration of applied irrigation water, canal leakage, seepage from mountain streams, and precipitation infiltration. Discharge occurs through pumping wells, springs, and upward leakage.

Two wells exist on the Project site, and 520 acre-feet per year are permitted for irrigation.

Floodplains

The project site is not located within a flood hazard area. There is no specific flood map available within the project area because there are no flood hazards in the area. Therefore, no flood hazards exist at this time in the Project vicinity, per the FEMA mapping and the Alamosa County Land Use Dept (Shirley Metzger, 2010, pers. comm.).

Wetlands and Waters of the U.S.

A survey was completed for the Project area to identify waters of the U.S. (CH2M Hill, 2010). One wetland (Wetland 1) is present within the Project area (Figure 21). The wetland is located at the eastern edge of the center-pivot agricultural field. The wetland is small, encompassing 0.07 acres. The boundary of this wetland corresponds roughly with the location of a National Wetland Inventory (NWI)-mapped wetland classified as "PEM" (NWI 2010). A PEM wetland is a Palustrine Emergent wetland under the Cowardin classification system, which is a wetland dominated by herbaceous hydrophytic vegetation (Cowardin et al., 1979). The area contains wetland vegetation such as soft stem bulrush (*Scirpus validus*) and cattails (*Typha latifolia*).

The Central Lateral, a 10-foot-wide major canal serves as the southern boundary for the Project area. No wetlands were observed along the canal. An irrigation ditch with a head gate on the Central Lateral conveys water from the lateral to the center-pivot agricultural field in the northern portion of the Project area. The ditch is 4 to 5 feet wide. At the northern end of the ditch lies an irrigation reservoir. In addition to the irrigation ditch and reservoir, the site features a short 5-foot-wide overflow ditch segment that drains excess water off into a dry upland swale in the southern portion of the Project site.

On July 21, 2010 the U.S. Army Corps of Engineers (ACOE) determined that there are no waters of the U.S. or navigable waters of the U.S. on the proposed project site (Appendix B).

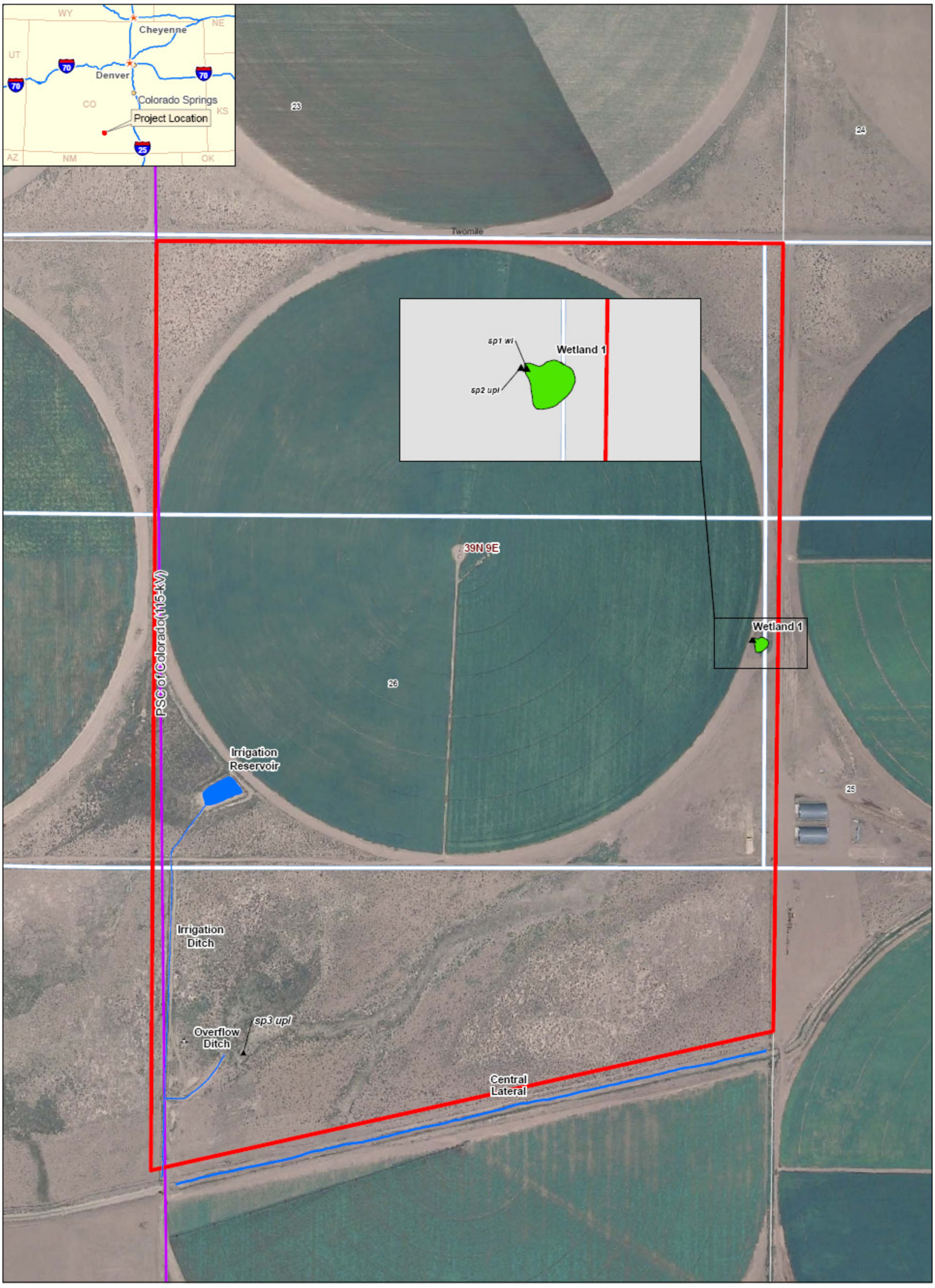


Figure 21. Water Resources Map

3.6.2 Environmental Consequences

3.6.2.1 No Action Alternative

Under the No-Action Alternative, DOE would not issue Cogentrix a loan guarantee for construction of the Project and no impacts to water resources would occur.

3.6.2.2 Proposed Action Alternative

3.6.2.2.1 Construction Water Use

Water use during construction would include applications of water for compaction, dust control, and the onsite creation of concrete if a concrete supplier cannot be located in the San Luis Valley area. The majority of the water would be used to control dust. The actual amount of water applied daily to the Project site would be variable and dependent on daily weather temperatures, humidity, wind speeds, and amounts of local precipitation. Table 8 provides an estimate of total construction water use for the Project.

Table 8. Estimated Project Construction Water Use

Material	Solar Array Foundation (Days[a])	Material per Foundation (Approximate)	Total Water Use (Approximate)
Water Use for Concrete Mixing			
Trackers - Water for concrete mixing (31 gallons water per cubic yard of concrete)	135	155 gallons per foundation	79,360 gallons (0.25 acre-feet)
Balance of Plant Foundations			12,400 gallons (004 acre-feet)
Water Use for Dust Control and Road Compaction			
Material	**Days[b]**	**Water Use Gallons/Unit**	**Total Water Use**
Compaction watering during site civil work	45	25 gallons per acre per day	225,000 gallons (0.7 acre-feet)
Dust suppression during active construction	135	100 gallons per acre per day	2,700,000 gallons (8.3 acre-feet)

[a] Assumes up to 135-day foundation construction schedule.

[b] The estimated construction period that would require water was taken from the detailed Project schedule (45 days site civil preparation and 135 days of foundation construction and erection over 200 acres).

A review of Table 8 shows that an estimated 11 acre-feet would be required to construct the Project over the14-month construction period. The current wells on site would be abandoned and a new well would be drilled for Project use. Based on existing permitted uses of 520 acre-feet per year for irrigation, the water supply available is more than adequate to support Project water use.

3.6.2.2.2 Operations Water Use

Once the Project is operational, only minimal daily water use would be required. The primary water requirement for the operational staff would occur at the O&M Building and is likely limited to restrooms, sinks/hand washing station, internal/external hose, and dishwasher. Up to 10 staff would be employed at the Project, and the operational water use would be approximately 570 gallons per day.

The solar modules must be kept clear of dirt and debris, the presence of which can affect the performance of the PV plant. O&M activities would entail a program to wash the solar panels, as needed.

The long-term need for the Project is projected to be approximately 4 acre-feet per year to wash the solar panels and office use of less than 1 acre-foot/year. Table 9 provides an estimate of the annual O&M water use requirements.

Table 9. Estimated Daily Water Use during Operations

Use	Frequency (Occurrences per Day)[a]	Consumption (Gallons per Occurrence)[a]	Total Consumption Gallons per Day (gpd) (acre-feet/year)
Bathroom sinks	60	2	60 (0.1)
Toilet flushes	60	4	240 (0.3)
Maintenance area sinks	8	30	240 (0.3)
Dishwasher	2	15	30 (<0.1)
Demineralizer Water Treatment (used to fill portable tank for solar panel washing) [b]	1[b]	7,500 [b]	7,500 (4.2)[b]
		Total	**6,570 gpd (5.0 acre-feet/year)[b]**

[a] Water usage frequency and consumption rates are based on standard commercial facility estimates and observed operational water usage patterns for previous solar generation facilities.
[b] It is assumed that the solar panel cleaning schedule would last approximately 180 days (i.e., only scheduled during frost-free period).

The Project would require approximately 5 acre-feet of water per year for operation. This water would be used for potable and sanitary purposes as well as water for washing the PV panels. Based on existing uses of the water on site and anticipated Project water use, the water supply available is more than adequate to support Project water use. Water needs would be met from a new onsite well, which would operate under an augmentation plan. An augmentation plan outlines how water actually used by the Project would be replaced. Cogentrix has coordinated with the San Luis Valley Water Conservancy District (SLVWCD) to determine the logistics and details of the augmentation plan and has submitted a permit application for a new well to the Colorado State Engineer's Office (SEO) for Project water supply.

About 30 percent of the San Luis Valley is currently irrigated for agricultural purposes with water from the Rio Grande River and well water drawn from the two primary ground water aquifers. The construction of over 2,000 miles of ditches and pumping of groundwater needed to support agricultural irrigation has substantially altered the hydrology and water quality and quantity in the San Luis Valley. Subsequently, the Project area includes approximately 225 acres of irrigated farmland. These 225 irrigated acres would be converted to a solar electrical generation facility, and taken out of agricultural production. Therefore, the construction and operation of the solar electrical generation would substantially reduce the current water consumption used for annual agricultural activities, resulting in a net water balance gain.

No surface water would be used for the Project, and construction activities are not anticipated to discharge into surface waters. Potential impacts to water quality from the Project are primarily associated with increased stormwater runoff due to increased impervious surface area as well as potential for erosion and sedimentation during ground disturbing activities if proper stormwater management is not implemented during construction. Potential impacts associated with erosion and sediment runoff would be minimal because of the lack of perennial waters and surface waters in the project area and surrounding vicinity, and the implementation of BMPs to reduce construction related erosion.

A permit must be obtained to discharge stormwater from any construction activity that disturbs at least one acre of land, and the Project has obtained a Stormwater Construction Permit. A Stormwater Management Plan (SWMP) has been developed in accordance with the Stormwater Construction Permit. The SWMP identifies potential pollutant sources and Best Management Practices (BMPs) that, when implemented, would reduce or eliminate possible water quality impacts, and provide for inspection and maintenance of BMPs. A range of BMPs to minimize disturbance, stabilize soils, protect slopes, control stormwater flows into and throughout the area would be implemented and may include silt fences, erosion logs, mulching, straw bales, and spill prevention and control. Vegetation removal would be minimized to the extent practicable and disturbed areas would be revegetated as soon as possible after disturbance.

Implementation of measures to control runoff during construction and operation of the Project would prevent significant impacts to surface waters from erosion and sedimentation. In addition, implementation of BMPs for handling, storage, and use of hazardous materials and adherence to applicable permits during construction and operation of the Project would prevent impacts on surface and groundwater resources.

Construction and operation of the Project would increase the amount of impervious surface in the area; however, facility components are discontinuous, and impacts to stormwater or water infiltration are expected to be negligible given that annual precipitation in the area is ±7-inches/year.

Demineralized water to wash the PV panels would be processed using skid-mounted demineralizer equipment, and washing of the solar panels would be designed to treat the discharge in conformance with applicable CDPHE requirements. Potentially hazardous materials would be stored indoors at the O&M building in a manner that would comply with all applicable local, state, and federal regulations.

The Project intends to install a septic tank and tile field for disposal of facility sanitary wastewater generated at the site.

Wetlands and Waters of the U.S.

The wetland within the Project area would be avoided. A portion of the agricultural ditch and the entire irrigation reservoir would be removed. The irrigation reservoir is approximately 0.29 acres and serves as a temporary holding basin that is used only when the agricultural fields are actively being irrigated (i.e., days at a time for several weeks per year). The ditches operate in a similar manner; that is, they contain water only when the fields they supply irrigation water to are active and are otherwise dry. The ditches and reservoir found in the project area do not support wetland flora or fauna. These features are man-made and used for irrigation purposes only. Filling the ditches and reservoirs would result in negligible impacts because these features

are regularly dry and would no longer be needed as the land would be converted from agricultural use. The irrigation features have been determined not to be jurisdictional waters of the U.S., and therefore not subject to permitting under the Clean Water Act. The ditches are man-made and convey flows away from the main canal; therefore, they lack the ability to impact jurisdictional waters of the U.S.

3.7 Biological Resources

3.7.1 Affected Environment

3.7.1.1 Vegetation

Southwest Regional Gap Analysis (SWReGAP) vegetation types mapped on the site include agriculture (approximately 141 acres), Intermountain Basin greasewood flat (approximately 21 acres), Intermountain Basin semi-desert shrub steppe (approximately 59 acres), and invasive annual and biennial forbland (approximately 5 acres) (USGS, 2004). Figure 22 depicts the SWReGAP vegetation in the Project area.

The most common vegetation communities in the area are cool-weather agricultural crops such as hay, winter wheat, and potatoes. Intermountain Basin Greasewood Flats are found in between the agricultural fields, and species associated with this community include greasewood (*Sarcobatus vermiculatus*), saltbush (*Atriplex canescens*), shadscale saltbush (*Atriplex confertifolia*), and winterfat (*Krascheninnikovia lanata*). The Intermountain Basin Semi-Desert Shrub Steppe type includes blue grama (*Bouteloua gracilis*), saltgrass (*Distichlis spicata*), needle and thread grass (*Hesperostipa comata*), Sandberg reedgrass (*Poa secunda*), alkali sacaton (*Sporobolus airoides*), saltbush, sand sagebrush (*Artemisia filifolia*), ephedra (*Ephedra* spp.), rabbitbrush (*Ericameria nauseosa*), broom snakeweed (*Gutierrezia sarothrae*), winterfat, and big sagebrush (*Artemisia tridentata*). Weedy species in the area include tumbleweed (*Salsola* spp.), burningbush (*Kochia scoparia*), and halogeton (*Halogeton glomeratum*).

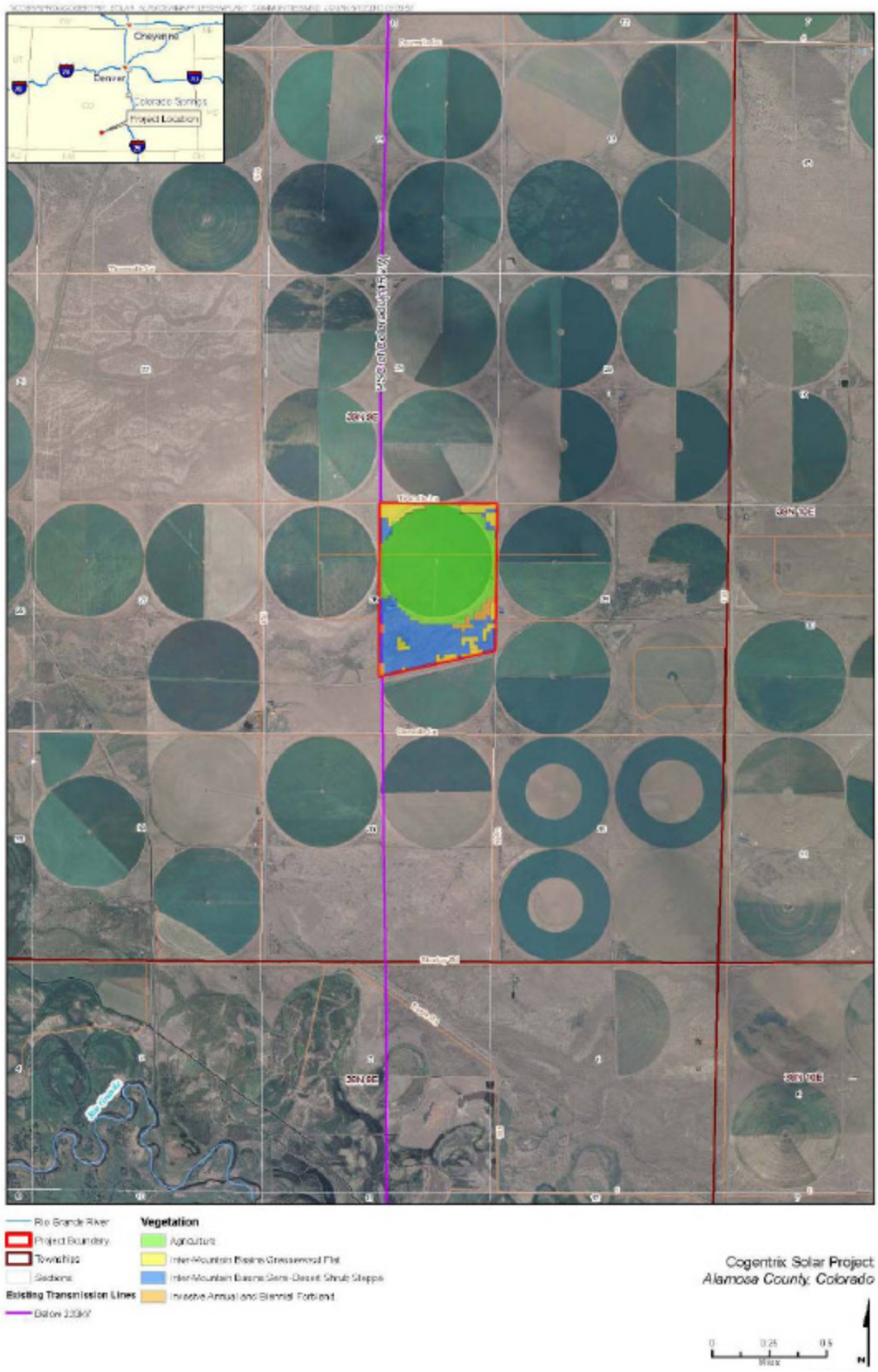


Figure 22. Plant Communities

3.7.1.2 Wildlife

Lists of terrestrial and special status species and occurrence data in Alamosa County were obtained from U.S. Fish and Wildlife Service (USFWS) and Colorado Division of Wildlife (CDOW). These lists were examined to assess the potential of terrestrial and special status species occurrences and designated critical habitat in the Project area. A field survey was conducted to determine if the Project site contains potentially suitable habitat for sensitive wildlife species (CH2M Hill, 2010).

Colorado Natural Heritage Program (CNHP) Biodiversity Tracking and Conservation System data were acquired for the Project area. CNHP tracks occurrence records of significant natural communities and rare, threatened, or endangered plants and animals within Colorado. The CNHP report includes resources known to occur within the specific Project site and resources known from similar landscapes near the site.

Table 10 presents CDOW listed species, habitat associations, and the presence/absence of suitable habitat in the Project area. CDOW species of special concern do not have a statutory mandate for protection and the use of the term does not necessarily mean that the species will eventually be proposed for listing as a threatened or endangered species under the Endangered Species Act (ESA). It is important to note that Table 10 is based on Alamosa County occurrence data from CDOW Natural Diversity Information Source (NDIS), and species distribution and life histories found in NDIS and NatureServe.

Table 10. CDOW Listed Species, Species Habitat Association, and Presence/Absence of Suitable Habitat in the Project Area or Potential of Species to be in the Project Area

Common Name	Scientific Name	Status	Habitat Association	Presence/Absence of Suitable Habitat in Project Area or Potential of Species to be in Project Area
Northern leopard frog	*Rana pipiens*	SPECIAL CONCERN	Wet meadows and the banks and shallows of water bodies and irrigation ditches.	Absent
Whooping Crane	*Grus americana*	State Endangered	Mudflats around reservoirs and in agricultural areas. Uncommon spring and fall migrant in the San Luis Valley.	Very unlikely to be found as a migrant in Project area.
Bald eagle	*Haliaeetus leucocephalus*	State Threatened	Habitat includes reservoirs and rivers. In winter, they may also occur locally in semideserts and grasslands, especially near prairie dog towns.	Absent
Burrowing Owl	*Athene cunicularia*	State Threatened	Occurs in grasslands in or near prairie dog towns. Summer resident, mostly in eastern Colorado.	No prairie dogs colonies exist in the Project area. Due to the frequent ground-disturbance activities associated with agricultural practices, burrowing owls are unlikely.
Sandhill Crane	*Grus canadensis*	SPECIAL CONCERN	Migrants occur on mudflats around reservoirs, in moist meadows, and in agricultural areas. Abundant spring and fall migrant in the San Luis Valley. CDOW states peak migration may	The cranes feed and rest in agricultural areas, and may be present on the Project site during migration.

Table 10. CDOW Listed Species, Species Habitat Association, and Presence/Absence of Suitable Habitat in the Project Area or Potential of Species to be in the Project Area

Common Name	Scientific Name	Status	Habitat Association	Presence/Absence of Suitable Habitat in Project Area or Potential of Species to be in Project Area
			be as high as 17,000.	
Ferruginous Hawk	*Buteo regalis*	SPECIAL CONCERN	Grasslands and semidesert shrublands; nests in isolated trees, on rock outcrops, or ground. Winter residents concentrate around prairie dog towns.	May forage in the Project area.
Peregrine Falcon	*Falco peregrinus*	SPECIAL CONCERN	Nests on cliffs and forages over adjacent coniferous and riparian forests.	Absent; may be seen as migrant in Project area.
Western Snowy Plover	*Charadrius alexandrinus nivosus*	SPECIAL CONCERN	Beaches, dry mud or salt flats, and sandy shores of rivers, lakes, and ponds.	Absent
Long-Billed Curlew	*Numenius americanus*	SPECIAL CONCERN	Short-grass grasslands and sometimes wheat fields or fallow fields. Nests usually close to standing water.	Absent; may be found as migrant in Project area.
Northern Pocket Gopher	*Thomomys talpoides*	SPECIAL CONCERN	Agricultural and pasturelands, semidesert shrublands, and grasslands into alpine tundra.	May be present.
Midget faded rattlesnake	*Crotalus viridis concolor*	SPECIAL CONCERN	Plains, grasslands, shrublands, and woodlands of western Colorado.	Absent

Threatened and Endangered Species

Table 11 provides a list of the USFWS endangered, threatened, and candidate species for Colorado under the Endangered Species Act that have the potential to occur in Alamosa County (USFWS, 2010). No critical habitat is designated in Alamosa County (USFWS, 2010). Habitat associations are based on life histories from NatureServe (NatureServe, 2009).

Table 11. USFWS Endangered, Threatened, and Candidate Species List and Potential Occurrence within the Cogentrix of Alamosa, LLC Project Area

Common Name	Scientific Name	Status	Habitat Association	Presence/Absence of Suitable Habitat in Project Area
Black-footed ferret	*Mustela nigripes*	Endangered	This species is limited to open habitat, the same habitat used by prairie dogs: grasslands, steppe, and shrub steppe. Resting and birthing sites are in underground burrows, generally made by prairie dogs.	Absent
Canada lynx	*Lynx canadensis*	Threatened	Generally occurs in boreal and montane regions dominated by coniferous or mixed forest with thick undergrowth, but also sometimes enters open forest, rocky areas, and tundra to forage for abundant prey.	Absent

Table 11. USFWS Endangered, Threatened, and Candidate Species List and Potential Occurrence within the Cogentrix of Alamosa, LLC Project Area

Common Name	Scientific Name	Status	Habitat Association	Presence/Absence of Suitable Habitat in Project Area
Gunnison's prairie dog	*Cynomys gunnisoni*	Candidate	The montane habitat of Gunnison's prairie dog in central and south-central Colorado and north-central New Mexico consists primarily of grass/forb/shrub (sagebrush, rabbitbrush, and/or greasewood) habitats, including abandoned cultivated land, on valley floors and in stream valleys and mountain meadows, on high-elevation plateaus and benches, and in intermountain valleys.	Suitable habitat may be present in the non-agricultural portion of the Project area. No individuals, burrows, or signs observed. Not found onsite.
Mexican spotted owl	*Strix occidentalis lucida*	Threatened	Highest densities occur in mixed-conifer forests that have experienced minimal human disturbance. In the southwestern United States, most common where unlogged closed-canopy forests occur in steep canyons. Uneven-aged stands with high basal area and many snags and downed logs are most favorable.	Absent
Rio Grande cutthroat trout	*Oncorhynchus clarki virginalis*	Candidate	Most populations are restricted to small headwater streams where allochthonous materials are the primary energy input.	Absent
Southwestern willow flycatcher	*Empidonax traillii extimus*	Endangered	Thickets, scrubby and brushy areas, open second growth, swamps, and open woodland.	Absent
Yellow-billed cuckoo	*Coccyzus americanus*	Candidate	Open woodland (especially where undergrowth is thick), parks, deciduous riparian woodland. In the West, nests in tall cottonwood and willow riparian woodland.	Absent

3.7.2 Environmental Consequences

3.7.2.1 No Action Alternative

Under the No-Action Alternative, DOE would not issue Cogentrix a loan guarantee for construction of the Project and no impacts to vegetation or biological resources would occur.

3.7.2.2 Proposed Action Alternative

3.7.2.2.1 Vegetation and Wildlife

Approximately 200 acres of annually disturbed agricultural lands would be removed due to construction and operation of the Project. However, similar developed agricultural land is abundant and available as habitat to wildlife and for vegetation growth in the surrounding area.

The Project area has been extensively modified by agricultural activities and irrigation projects. Most of the Project area is plowed farm lands that retain limited natural habitat features. Fallow land south of the plowed fields sustains desert scrub vegetation and corresponding fauna; however, much of this land has been modified to facilitate water storage for irrigation and groundwater recharging. Impacts to wildlife from construction and operation of the Project are expected to negligible. In addition, long-term population impacts to wildlife are not expected as a result of construction or operation of the Project.

A CNHP data search was conducted for the Project site and 2-mile radius of the Project site. Data from CNHP show records for ferruginous hawk, bald eagle, silky pocket mouse, and southwestern willow flycatcher. However, none of the records of occurrence is documented within the proposed Project site. Bald eagle and southwestern willow flycatcher observations are associated with the Rio Grande River and these species are not likely to be found on the Project

site. The ferruginous hawk sightings are also from the Rio Grande River area. CNHP does not have occurrence records of silky pocket mice from the Project site but the species has been found in adjacent areas. Silky pocket mice require generally continuous short to midgrass prairie or herbaceous cover on loamy soils with small amounts of bare ground. It is unlikely silky pocket mice use the active agricultural field in the Project site, but could be potentially found in the greasewood and desert scrub habitats. Conversely, whooping crane, burrowing owl, sandhill crane, peregrine falcon, and long-billed curlew are unlikely to be found in the Project site. No migration routes or breeding grounds were identified within the Project area.

The Project area is within bald eagle winter forage area. The bald eagle is a Colorado state threatened species and is protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Protection Act. Bald eagles are typically found close to large bodies of water and perennial rivers; therefore, the Project area provides only marginal foraging habitat for bald eagles.

Threatened and Endangered Species

Based on species habitat requirements and distributions and habitats available in the Project site, it is unlikely that federally listed threatened or endangered species would occur in the Project site. In addition, no designated critical habitat occurs within the Project area. Therefore, no federally listed threatened or endangered species or critical habitat would be impacted by the proposed project. CDOW concurred with the no effect determination for the proposed project, and USFWS also determined that the proposed project would have no effect on federally listed threatened and endangered species or their habitat. Letters from both agencies are contained in Appendix B.

3.8 Cultural Resources

3.8.1 Affected Environment

A Class I literature and records review for cultural resource surveys and identified resources within 1 mile of the proposed project area was conducted on March 29, 2010. Cultural resource records were obtained through COMPASS, the Colorado Office of Archaeology and Historic Preservation's online database for cultural resources and previous investigations. A Class III pedestrian survey was conducted on March 31, 2010. The objective of this inventory was to meet federal and state requirements and assess potential effects to prehistoric and historic properties. The cultural resource inventory was a non-collecting, 100 percent pedestrian survey with 30-meter transect coverage throughout the Area of Potential Effect (APE), defined as the 225 acre Project site. The project area has been extensively modified by agricultural activities and irrigation projects.

During the Class III cultural resource inventory, two sites and one isolated find were identified. Site 5AL851.1 is the Central Lateral Canal of the San Luis Valley Canal. The resource is eligible for listing on the National Register of Historic Places (NRHP) based on Criteria A, B, and C set forth in the National Park Service regulations (36 CFR 60.4) at the local and state levels of significance. The Central Lateral Canal runs along the southern and southwestern edge of the project site. Site 5AL852 is a historic debris scatter that is not eligible for NRHP listing. Isolated find 5AL853 is a single glass electrical insulator that is ineligible for NRHP listing (Figure 23).

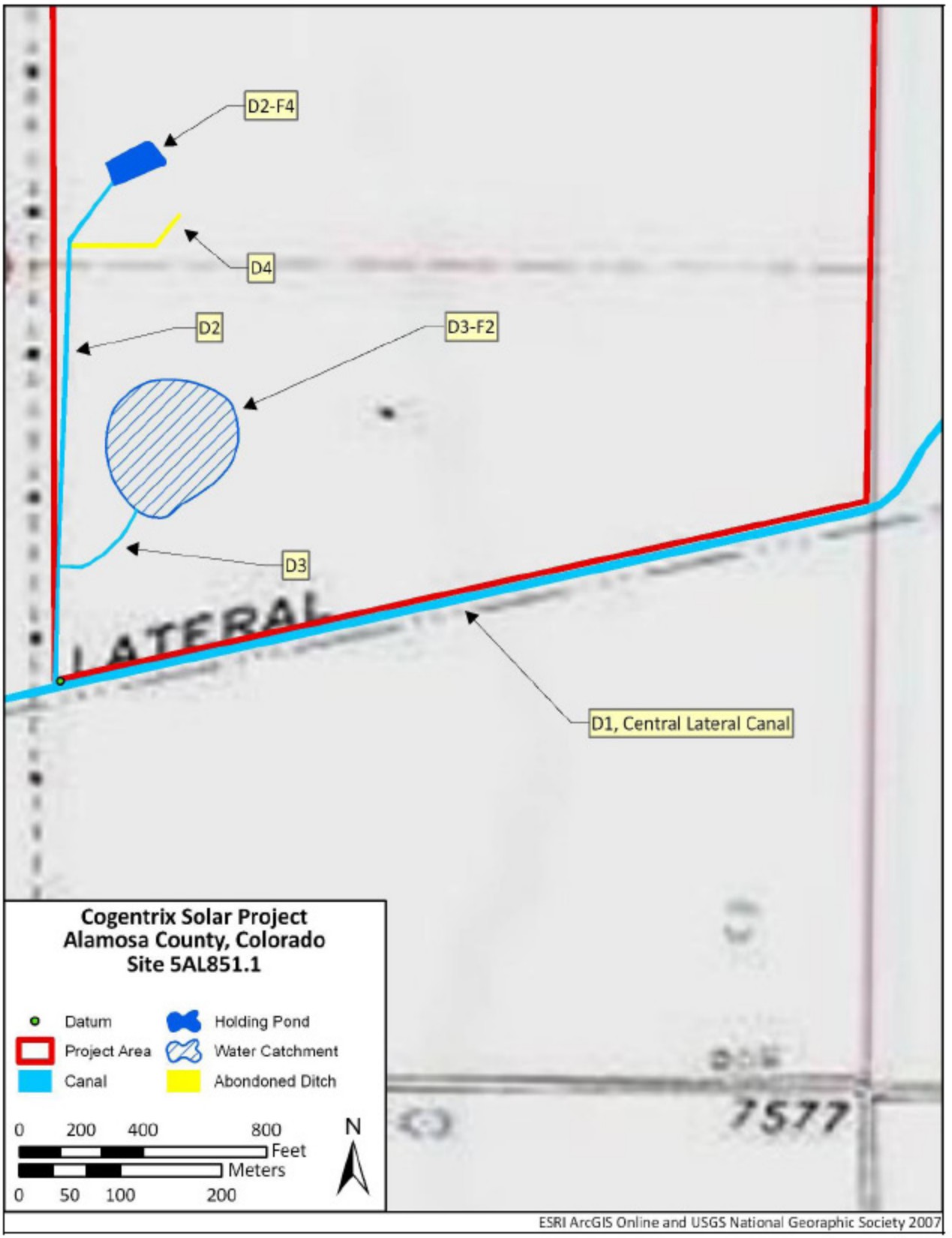


Figure 23. Cultural Survey Map

3.8.2 Environmental Consequences

3.8.2.1 No Action Alternative

Under the No-Action Alternative, DOE would not issue Cogentrix a loan guarantee for construction of the Project and no impacts to cultural resources would occur.

3.8.2.2 Proposed Action Alternative

3.8.2.2.1 Construction and Operation Impacts

The Cogentrix project would not affect the Central Lateral Canal which runs along the boundary of the project site. The Canal would be completely avoided during construction of the proposed project, and a silt fence barrier would be erected between the canal and the construction zone to protect the canal during construction activities. The undertaking would not alter, directly or indirectly, any of the characteristics of the Central Lateral Canal that qualify it for NRHP listing, nor would it diminish the Canal's integrity.

Operation of the Project would not result in any impact to cultural resources that may significantly impair the health, safety, or welfare of the resource or the health, safety, or welfare of the present or expected resources in the area of site influence.

DOE has extended the opportunity to engage in government to government consultation on the proposed project to thirteen Federally-recognized Tribes that may have an historical interest in Alamosa County based on a list of Tribal contacts used by the Bureau of Land Management San Luis Valley Public Lands Office. To date no concerns have been reported to DOE and no known ethnographic resources have been identified in the APE.

Prior ground disturbance is likely to have uncovered any potential cultural or historical resources that may be present; therefore, the proposed project is not expected to have any indirect or direct effects on cultural or historical resources. The Colorado State Historic Preservation Office concurred with DOE's finding of no historic properties affected for the proposed project (Appendix B).

3.9 Socioeconomics and Environmental Justice

3.9.1 Affected Environment

The proposed Project is located approximately 10 miles northwest of the town of Alamosa, the county seat of Alamosa County and an equal distance east of Monte Vista, the county seat of neighboring Rio Grande County in south-central Colorado. These two counties form part of a well-recognized region referred to as the San Luis Valley that is comprised of five contiguous counties: Alamosa, Conejos, Costilla, Mineral, Rio Grande, and Saguache. Workers who reside in Alamosa County overwhelmingly also work in Alamosa County (64.3 percent in 2008) with most employed in the City of Alamosa (52.8 percent in 2008). Additionally, 7.0 percent of residents of Alamosa County work in neighboring Rio Grande County. Together, Alamosa and Rio Grande counties contained 58.8 percent of the total population of the six-county region in 2008.

Between 2000 and 2008, the population of the six-county region of influence (ROI) increased by just over 2,270 residents or less than 5 percent. During the same time period, the population of the State of Colorado increased by 16.5 percent. Of the counties comprising the ROI, Saguache County experienced the largest numeric increase between 2000 and 2008 (1,163 residents), followed by Alamosa County, which had an increase of 937 residents as can be seen from

Table 12. Many of the incorporated communities, almost all of which have modest populations, experienced a net decrease in size.

Table 12. Population for Counties and Places, 2000 and 2008

			Change		
	2008	2000	Numeric	Percent	Av. Ann. %
State of Colorado	5,011,390	4,301,261	710,129	16.51%	1.93%
Alamosa County	15,903	14,966	937	6.26%	0.76%
Alamosa	8,502	7,960	542	6.81%	0.83%
Hooper	122	123	-1	-0.81%	-0.10%
Unincorporated Area	7,279	6,883	396	5.75%	0.70%
Conejos County	8,382	8,400	-18	-0.21%	-0.03%
Antonito	813	873	-60	-6.87%	-0.89%
La Jara	853	877	-24	-2.74%	-0.35%
Manassa	985	1,042	-57	-5.47%	-0.70%
Romeo	390	375	15	4.00%	0.49%
Sanford	757	817	-60	-7.34%	-0.95%
Unincorporated Area	4,584	4,416	168	3.80%	0.47%
Costilla County	3,501	3,663	-162	-4.42%	-0.56%
Blanca	373	391	-18	-4.60%	-0.59%
San Luis	708	739	-31	-4.19%	-0.53%
Unincorporated Area	2,420	2,533	-113	-4.46%	-0.57%
Mineral County	988	831	157	18.89%	2.19%
Creede	431	377	54	14.32%	1.69%
Unincorporated Area	557	454	103	22.69%	2.59%
Rio Grande County	12,608	12,413	195	1.57%	0.20%
Center (part)	26	29	-3	-10.34%	-1.36%
Del Norte	1,715	1,705	10	0.59%	0.07%
Monte Vista	4,357	4,529	-172	-3.80%	-0.48%
South Fork	653	604	49	8.11%	0.98%
Unincorporated Area	5,857	5,546	311	5.61%	0.68%
Saguache County	7,080	5,917	1,163	19.66%	2.27%
Bonanza City	15	14	1	7.14%	0.87%
Center (part)	2,356	2,363	-7	-0.30%	-0.04%
Crestone	143	73	70	95.89%	8.77%
Moffat	119	114	5	4.39%	0.54%
Saguache	611	578	33	5.71%	0.70%
Unincorporated Area	3,836	2,775	1,061	38.23%	4.13%
6-County ROI	48,462	46,190	2,272	4.92%	0.60%

Source: Colorado Department of Local Affairs, State Demography Office, 2009

Over the period 2010 – 2025, the population of the ROI is projected to increase by about 11,250 residents or 22.8 percent at an average annual rate of 1.4 percent. This compares to an average annual rate of 1.8 percent for the State of Colorado. Of the counties within the ROI, the rate of growth for Alamosa County is projected to exceed that of the state (1.9 percent annually) while the rates for Conejos, Costilla and Mineral counties are forecast at less than 1 percent annually.

Environmental Justice

Executive Order 12898 requires federal agencies to take appropriate steps to identify and avoid disproportionately high and adverse effects of federal actions on the health and surrounding environment of minority and low-income populations. The Council on Environmental Quality (CEQ) has issued guidance to federal agencies to ensure that environmental justice concerns are effectively identified and addressed throughout the NEPA process. DOE guidance recommends that DOE consider pathways or uses of resources that are unique to a minority or low-income community before determining that there are no disproportionately high and adverse impacts on the minority or low-income population.

The proportion of the total population categorized as minority varies noticeably across the counties of the ROI. Minority population is defined as all persons with the exception of non-Hispanic whites and is, thus a melding of all racial minorities and persons of Hispanic or Latino ethnicity. Table 13 contains numeric and percentage information for the counties of the ROI, individual counties, and the State of Colorado. The minority population (in 2000) for the state stood at 25.6 percent compared to 49.6 percent for the ROI. Of the counties comprising the ROI, Costilla County had the highest proportion of minority residents (72.0 percent) while Mineral County registered the lowest proportion (5.3 percent). The Hispanic population comprised 17.1 percent of total population at the state level and 46.6 percent for the ROI. The proportions of racial minorities in the counties of the ROI are less than or equal to the value for the state, with the exception of American Indian.

Table 13. Population by Race and Ethnicity (2000)

	Total	Hispanic	White alone	Black or African American alone	American Indian and Alaska Native alone	Asian alone	Native Hawaiian and Other Pacific Islander alone	Some other race alone	Two or more races	Minority Population
State of Colorado	4,301,261	735,099	3,558,579	159,279	43,101	93,306	4,298	310,552	132,146	1,099,742
Alamosa County	14,966	6,222	10,713	100	258	125	30	3,141	599	6,827
Conejos County	8,400	4,965	6,081	19	183	12	4	1,809	292	5,134
Costilla County	3,663	2,469	2,237	18	91	41	15	1,067	194	2,636
Mineral County	831	10	793	0	6	0	0	4	28	44
Rio Grande County	12,413	5,183	9,209	9	98	56	5	2,581	455	5,416
Saguache County	5,917	2,697	4,263	11	75	34	0	1,370	164	2,875
ROI	46,190	21,546	33,296	157	711	268	54	9,972	1,732	22,932

PERCENT CONTRIBUTION	Hispanic	White alone	Black or African American alone	American Indian and Alaska Native alone	Asian alone	Native Hawaiian and Other Pacific Islander alone	Some other race alone	Two or more races	Minority Population
State of Colorado	17.1%	82.7%	3.7%	1.0%	2.2%	0.1%	7.2%	3.1%	25.6%
Alamosa County	41.6%	71.6%	0.7%	1.7%	0.8%	0.2%	21.0%	4.0%	45.6%
Conejos County	59.1%	72.4%	0.2%	2.2%	0.1%	0.0%	21.5%	3.5%	61.1%
Costilla County	67.4%	61.1%	0.5%	2.5%	1.1%	0.4%	29.1%	5.3%	72.0%
Mineral County	1.2%	95.4%	0.0%	0.7%	0.0%	0.0%	0.5%	3.4%	5.3%
Rio Grande County	41.8%	74.2%	0.1%	0.8%	0.5%	0.0%	20.8%	3.7%	43.6%
Saguache County	45.6%	72.0%	0.2%	1.3%	0.6%	0.0%	23.2%	2.8%	48.6%
ROI	46.6%	72.1%	0.3%	1.5%	0.6%	0.1%	21.6%	3.7%	49.6%

Source: Census 2000 Summary File 3 (SF 3) – Sample Data

Since 1969, per capita personal income (unadjusted for inflation) has continuously risen, excepting short-lived downturns. All the counties of the ROI have had values below that of the State of Colorado, with the exception for a brief period of Mineral County. Relative to the nation, per capita income in all the counties of the ROI has lagged the national level with Conejos County almost consistently below 50 percent.

For the State of Colorado, 9.3 percent of the population was classed as falling below the poverty level in 2000, as can be seen from Table 14. For the ROI, this proportion stood at just over 20 percent and varied from a high of 26.8 percent in Costilla County to a low of 10.2 percent in Mineral County.

Table 14. Population by Poverty Status (2000)

	Total Population	Income in 1999 Below Poverty Level	Percent Below Poverty Level
State of Colorado	4,202,140	388,952	9.3%
Alamosa County	14,052	2,992	21.3%
Conejos County	8,349	1,918	23.0%
Costilla County	3,650	978	26.8%
Mineral County	831	85	10.2%
Rio Grande County	12,179	1,769	14.5%
Saguache County	5,873	1,325	22.6%
ROI	44,934	9,067	20.2%

U.S. Census Bureau, Census 2000

Employment (full- and part-time) in the ROI increased consistently over the period 1970 through 2005, faltering between 2005 and 2007. Employment doubled from just over 13,000 jobs in 1970 to over 26,550 jobs in 2007. Much of this employment is concentrated in Alamosa and Rio Grande counties, which together accounted for the large majority of the gain in employment. While employment in the entire ROI grew at an average annual rate of 1.9 percent between 1970 and 2007: that in Alamosa County grew at a rate of 2.4 percent and Rio Grande County grew at 2.7 percent. The State of Colorado over this time period grew at a rate of 3.1 percent.

Wage levels in the counties of the ROI have, over the period 2000-2008, progressively increased in all the counties. Levels in Alamosa County have consistently exceeded those in other counties of the ROI; however, ROI levels have remained below those of the state as a whole.

Local Governments and Special Districts

The major local governmental entities include the following: county sheriff's office, municipal police department, Colorado State Patrol office, fire protection district, fire department, ambulance service, emergency management, hazardous materials response team, and state college.

The counties of the ROI contain a total of 14 school districts, which together, operated 50 schools in 2008. With the exception of two small school districts (Moffat 2 School District in Saguache County and Sargent RE-33J School District in Rio Grande County), all school districts experienced a decline in student enrollment between 2000 and 2009. Many of the school districts also saw a decline in staff, however, the declines were smaller than the corresponding declines in enrollment and a number of school districts saw increases in staff levels. One result of these somewhat opposing trends was a decline in pupil teacher ratios in virtually all school districts.

For the counties reporting, there were four county sheriff's offices, three city police departments, and one college police department. The eight law enforcement agencies had a total of 116 employees, consisting of 77 officers and 39 civilians.

It is estimated that the ROI contained a total of 24,500 permanent housing units in 2009. This number includes mobile homes, trailers, recreational vehicles (RVs), and vans but not temporary

accommodations such as hotel and motel rooms. The large majority of the housing stock is comprised of single family units (virtually all detached) with the multiple family structures located mainly in Alamosa and Rio Grande counties. Over 20 percent of total housing units are comprised of mobile homes and trailers in Saguache, Costilla and Conejos counties while Mineral County has only 8 percent in this category.

3.9.2 Environmental Consequences

3.9.2.1 No Action Alternative

Under the No-Action Alternative, DOE would not issue Cogentrix a loan guarantee for construction of the Project and no impacts to socioeconomics would occur.

3.9.2.2 Proposed Action Alternative

It is anticipated that during the construction phase of the Project, which could last about 14 months, there would be an average of 100 workers onsite. The number of onsite workers could peak at 120. For purposes of analysis, it is assumed that:

- The monthly construction workforce would number 100 persons.
- The majority of the construction workforce (75 percent) would be drawn from the local area.
- The remaining 25 percent of the construction workforce would relocate temporarily in the ROI.
- Temporarily relocating construction workers would be unaccompanied by family members.
- Temporarily relocating construction workers would reside primarily in hotel and motel rooms and campgrounds and secondarily in permanent rental housing in the ROI.
- 75 percent of the temporarily relocating construction workers would reside in single-occupancy rental units
- 25 percent of the temporarily relocating construction workers would reside in double-occupancy rental units
- Temporarily relocating construction workers would spend about $115 per day for lodging, meals, and incidentals such as gasoline and entertainment in the ROI.

As of January, 2010, there were an estimated 1,930 unemployed persons in the ROI: a number adequate to meet the workforce requirements of the Project. However, it can be assumed that there would not be a perfect match between the skills and experience of the available workers and the requirements of the Project. Thus, it is assumed that 25 percent of the workforce would be comprised of workers who would temporarily relocate to the region. The remaining 75 percent of the construction workforce would be filled by locally available workers.

Approximately 25 temporarily relocating construction workers would require temporary accommodations in the ROI. Some of these persons would double-up and the total number of rental housing units required throughout the year would probably number just over 20. Assuming a rental housing vacancy rate of 6 percent (and a “natural” vacancy rate of 3 percent), it is estimated that there could be 160 permanent rental housing units available for rent in the ROI. In

addition, hotel and motel occupancy rates rarely exceed 80 percent, thus, temporary accommodations would also be available.

The temporary worker residents would purchase lodging and make expenditures for food, gasoline and recreation. Assuming an expenditure of about $115 per day (the current federal per diem for the area), aggregate expenditures could total almost $1 million annually. Such expenditures could be expected to stimulate additional economic activity and added employment for the duration of the stimulus. Assuming all the expenditures are for the consumption of goods and services derived locally, the additional employment could number 10 full-time jobs throughout the regional economy.

Beneficial impacts can be anticipated in terms of additional expenditures and employment in the local economy. Minimal adverse impacts would be associated with the demand for temporary housing or increased demand for educational and law enforcement services.

When fully operational, it is expected the Project would create approximately seven full-time jobs with an expected annual payroll of $850,000 and three seasonal jobs with an additional annual payroll of approximately $55,000. Operational staff would be on duty during the day, and CPV panel washing and some maintenance activities would be performed at night.

Environmental Justice

The proposed project is not expected to result in substantial environmental, human health, or economic impacts on surrounding populations. Furthermore, since the proposed action would benefit the local economy, including low-income and minority households, these individuals would not experience a disproportionate share of the impacts of the project.

3.10 Public Health and Safety

3.10.1 Affected Environment

Some of the occupational hazards associated with solar energy projects are similar to those of the heavy construction and electric power industries, while others are unique to solar energy projects (i.e., fire risk, electromagnetic fields, and rotating equipment).

3.10.2 Environmental Consequences

3.10.2.1 No Action Alternative

Under the No-Action Alternative, DOE would not issue Cogentrix a loan guarantee for construction of the Project and no impacts to public health and safety would occur.

3.10.2.2 Proposed Action Alternative

3.10.2.2.1 Construction

Cogentrix would require outside contractors to meet strict safety qualifications, and all workers are trained in company standard operating procedures before entering the Project site. Cogentrix would develop and maintain an Emergency Plan specific to the conditions of the Project that would be implemented by a Site Safety Coordinator. The U.S. Occupational Safety and Health Administration (OSHA) Standard at 29 CFR 1910.38 provides general requirements for employee emergency plans and fire prevention plans. All onsite employees would undergo initial training and refresher training of the Emergency Plan. All contractors and subcontractors

working onsite would be required to have their own Health and Safety Plan, and their staff would be trained and experienced in the daily implementation of that plan.

The Emergency Plan for the Project would address the following elements in sufficient detail to ensure that adequate protection is provided to all personnel onsite at the time of the emergency:

- Identification of site individuals responsible for actions under the Emergency Plan;
- Description of the Project site and facilities;
- Listing and description of emergency types covered by the plan;
- Emergency notification procedure;
- Emergency contact information;
- Information regarding access to emergency medical assistance and care, including any special procedures for remote locations (i.e., air evacuation, search and rescue, etc.);
- Site evacuation procedure for all personnel, including employees, contractors, and visitors known to be on the site;
- Procedures to be carried out for each category of emergency listed in the plan, including any special requirements for personnel who may be required to stay behind to ensure the orderly shutdown of critical site procedures; and
- Procedures to ensure all site personnel, including visitors, are trained in their responsibilities under the plan.

A copy of the Emergency Plan would be provided to local emergency services to inform them of the nature and plans of the Project, and to enable them to more effectively aid in our response. The local emergency services personnel would be invited to conduct a site visit to review the site layout and facilities, and to discuss the Emergency Plan with the Site Safety Coordinator. This visit would allow them to make their own assessment of the site and to suggest any improvements and additions to the Site Plan. The General Contractor would meet with local emergency and law enforcement agencies to coordinate plans for the site.

Medical emergencies generally would be handled by calling 911 and alerting the emergency medical system. Calls to 911 would dispatch the appropriate fire and/or ambulance crews. Cogentrix would ensure site access requirements are met at all times during construction and operation of the Project for both daytime and nighttime response calls.

Fire emergencies generally would be handled by calling 911 and alerting the Alamosa County Sheriff and Police office, which, in turn, would page the appropriate fire crews for dispatch. Cogentrix would proactively coordinate with the rural fire department to minimize fire safety hazards, coordinate response efforts, and effectively train on-site construction workforce on fire safety issues.

Because the Project site is located within an irrigated agricultural field, the highest expected fire risk is that of a grass fire during the hot, dry summer season. The construction manager would be responsible for staying abreast of fire conditions in the Project area and implementing any

necessary fire precautions. The Project site roads would act as firebreaks and provide quick access for fire trucks and personnel in the event of a grass fire.

Prior to construction, a Fire Protection and Prevention Plan would be developed and implemented in coordination with the Alamosa County Fire Department. The Fire Protection and Prevention Plan would be enforced both during construction and operation of the Project. Cogentrix also would hold meetings with local fire officials from Alamosa County fire districts to discuss preventive measures during construction and operation of the Project and would continue to coordinate closely with the local fire district(s).

Cogentrix would provide the Alamosa County Fire Department with a copy of the final as-built engineering drawings. Construction service vehicles assigned to the Project site would be equipped with a portable fire extinguisher of a 4A4OBC or equivalent rating.

3.10.2.2.2 Operation

As is the case with almost any complex electric machine, there is some potential for fire inside the mechanized tracker motors. With the types of modern solar arrays proposed, however, motor malfunctions leading to fires in an enclosed compartment would be an extremely rare event. The O&M Building would be equipped with a set of portable fire extinguishers. Unlike thermal power plants, solar projects pose a much smaller risk of explosion or fire potential because there is no need to transport, store, or combust fuel to generate power. Fire risk would be minimized by facility and electrical design. In addition, a Fire Prevention Plan would be enforced during both construction and operation to mitigate fire risks.

The plant switchyard and utility switching station would be designed and constructed with a robust grounding system to mitigate potential lightning strike damage, including an underground ground grid (consisting of multiple grounding rods and direct-buried copper cable) and overhead shield wires that span across steel pole structures to provide a cone of protection over the switchyard and substation.

Because transformers are filled with mineral oil, they present a potential fire risk. Transformers would be surrounded by a containment trough filled with heavy, nonflammable gravel, which limits the surface area of exposed. By reducing the surface area of a potential mineral oil spill, the containment trough would reduce the fire hazard potential from the oil.

Large electromagnetic fields (EMFs) and potential adverse health effects are primarily associated with high voltage ac overhead transmission lines. Such EMFs are not an issue related to solar PV panels or its electrical distribution system, which would predominately use shielded medium voltage (13.8kV) cables routed underground. Overhead transmission lines (115 kV) for the Project would cross areas that are not inhabited or not used on a regular basis so that regular long-term exposure of individuals to EMFs does not occur. Because of the distance of the proposed transmission line routes from any residences or metallic structures, nuisance shock potential caused by induced EMF is very low.

With the possible exception of indirect impacts created by lightning and exceptionally high wind speeds, all of the health and safety environmental impacts addressed herein that derive from the electro-mechanical nature of the Project can be addressed and minimized by prevention, safety zone setbacks, and proper operating procedures.

The Project would not utilize or store materials of the nature and quantity that would make the facility a likely or successful target for terrorist activities or other intentional acts of destruction. Nonetheless, Cogentrix would employ security measures to restrict access to unauthorized persons and to screen authorized personnel entering the facility.

3.11 Transportation

3.11.1 Affected Environment

The existing transportation network in the Project vicinity consists of State Highway (SH) 17 and Alamosa County roads (Figure 24). SH 17 is a two-lane roadway classified as an Other Principal Arterial – Rural by the Colorado Department of Transportation (CDOT). SH 17 has a posted speed limit of 65 miles per hour (mph) and is a designated truck route. The segment of SH 17 north of Alamosa operates with a volume-to-capacity ratio of less than 0.85 (CDOT 2010); therefore, the portion of this highway in the Project vicinity has excess capacity.

The Alamosa County road network in the Project vicinity is composed of two-lane gravel roads on a grid. In addition, there are several unpaved roads that provide access to farm fields from this grid network. Existing roads adjacent to the Project site are Two Mile Lane North, County Road 105, and One Mile Lane North.

Traffic volumes on the surrounding rural roads are approximately 20 vehicles per day with the volume increasing during peak seasonal agricultural planting and harvesting activities. There is minimal heavy truck use on the unpaved roadways, which are generally 24 feet wide with no shoulders and have a gravel surface. Because many of these roads do not have posted speed limits, the default limit is 55 mph per Colorado statute. The area terrain is fairly flat and the majority of traffic is to and from Alamosa to the south.

The CDOT collects traffic counts and maintains a traffic count database for state highways. Where direct counts are not available, counts are estimated based on permanent and short term traffic counts. In 2008, south of Two Mile Road South, SH 17 carried 2,400 vehicles daily. Near Mosca, the average annual daily traffic was 1,800 vehicles on SH 17 in 2008. According to CDOT, trucks comprise around 10 percent of the traffic and approximately 11 percent of the daily traffic occurs in the peak hour.

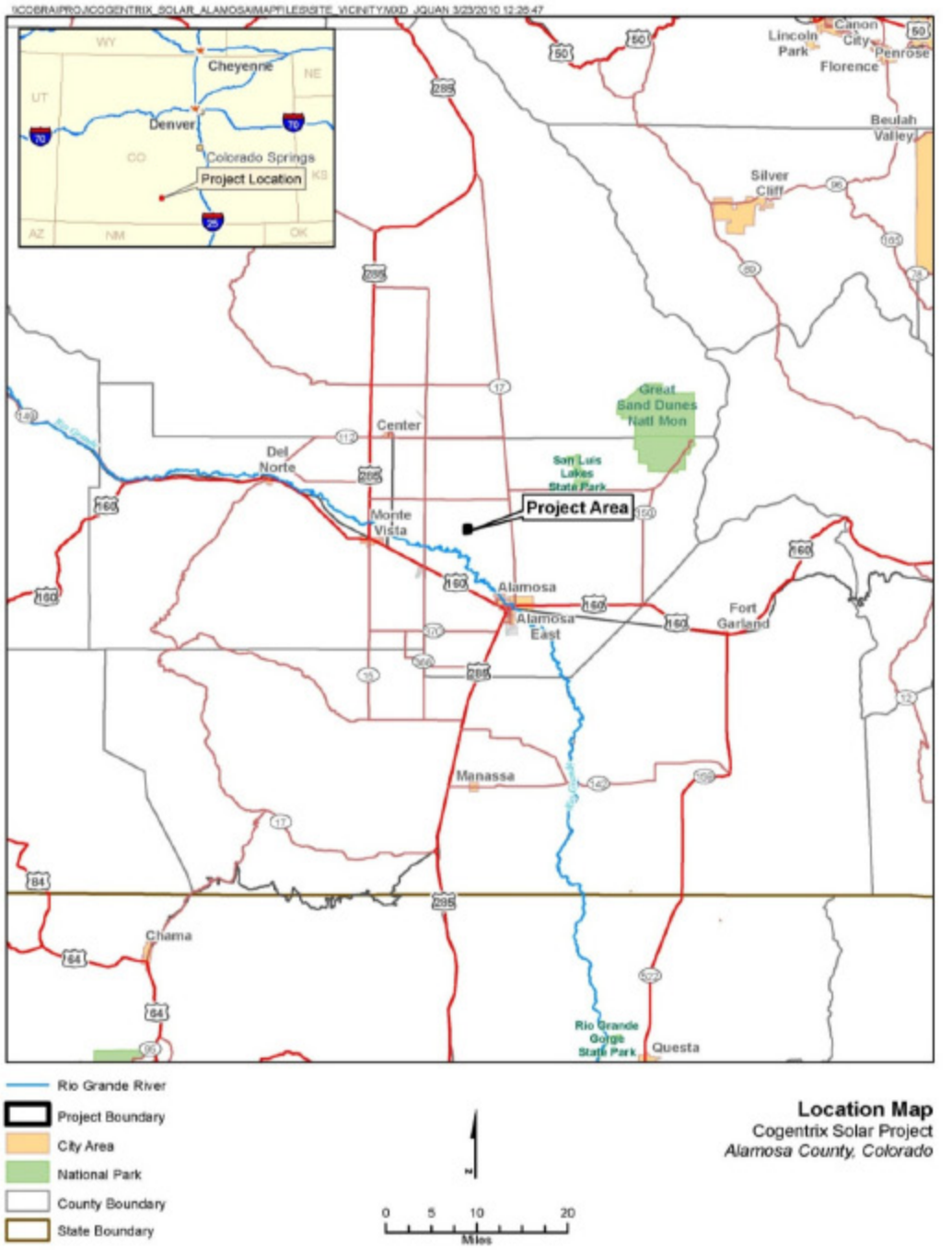


Figure 24. Local Roadways

3.11.2 Environmental Consequences

3.11.2.1 No Action Alternative

Under the No-Action Alternative, DOE would not issue Cogentrix of Alamosa, LLC a loan guarantee for construction of the Project and no impacts to transportation would occur.

3.11.2.2 Proposed Action Alternative

Access to the site is planned to utilize the SH 17 and Stanley Road intersection. Vehicles would travel west on Stanley Road for approximately 3.67 miles, then north on County Road 106 for 2 miles, then west on Two Mile Lane North to the site access. The intersection of SH 17 and Stanley Road is unsignalized and the stop control is on Stanley Road. There are no exclusive turn lanes at this intersection.

The Project site access would be constructed on the south side of Two Mile Lane North and would be controlled by a stop sign. This access would accommodate the construction deliveries and workforce, as well as the operations workforce.

Internal to the site, unpaved roads would be constructed to provide access to the PV equipment. Because SH 17 is a designated truck route, it is designed to accommodate heavy vehicular loads and should not be permanently affected by the Project construction. No changes are proposed to SH 17. Contractors would comply with existing federal, state, and county requirements and restrictions to protect the road network and the traveling public. In addition, load limits would be observed at all times to prevent damage to existing paved road surfaces.

The Project would generate 10 new permanent jobs in the area, seven full-time positions and three seasonal positions. The Project would generate approximately 240 daily trips for workers and 18 delivery trucks during the peak construction period and 20 daily trips for operations personnel once construction is complete.

Based on the traffic analysis prepared to support the development of a 1041 permit, construction and operation of the Project would have very minor, if any, impact on the traffic operations of the adjacent highway and intersections (Appendix C). The small expected increase in traffic from operations personnel is expected to have a negligible effect on the traffic operations of the surrounding transportation network. The level of service is expected to remain LOS A or B for all of the highway segments and intersection approaches/movements.

During construction, the expected increase in traffic would result in an increase in average delay of less than 2 seconds per vehicle during the peak hours for the eastbound and westbound approaches at SH 17 and Stanley Road. This is primarily due to the increase in construction traffic on SH 17. All of the highway segments and intersection approaches/movements are expected to operate at LOS A or B. Once construction is complete, the LOS with the operations-generated traffic would remain the same as the existing condition for these approaches.

3.12 Waste and Hazardous Materials Management

3.12.1 Affected Environment

The San Luis Valley Regional Solid Waste Facility is located approximately 18 miles southeast of the Project site.

3.12.2 Environmental Consequences

3.12.2.1 No Action Alternative

Under the No-Action Alternative, DOE would not issue Cogentrix of Alamosa, LLC a loan guarantee for construction of the Project and no impacts related to waste management would occur.

3.12.2.2 Proposed Action Alternative

Construction and operation of the Project would generate a limited amount of solid waste. Solid waste products generated during construction activities consist almost exclusively of shipping material. During operation, waste would be collected by a private solid waste management company once a week and disposed of in a permitted landfill. The San Luis Valley Regional Solid Waste Facility is located approximately 18 miles southeast of the Project site and has sufficient capacity to accommodate Project solid waste. Solid waste would be recycled to the maximum extent practicable. These materials would be stored and hauled separately to the appropriate recycling center. No hazardous waste and materials would be used or generated during construction.

The following hazardous materials would be used or generated during operation:

- Each solar tracker would have approximately 35 gal of hydraulic fluid.
- A reverse osmosis (RO) system would be used in the demineralization process to treat water for washing the solar panels. The RO unit would require approximately 55 gallons of sulfuric acid and approximately 22 gallons of an anti-scaling agent onsite at any one time. The water treatment chemicals and equipment would be located within the Administrative/Maintenance Building. The chemicals would be stored on pallets with integrated secondary containment. Additionally, the entire maintenance area of the building is contained by a perimeter curb. All floor drains lead to a sump located within the building. The sump would discharge to the double-lined, impermeable evaporation basin.
- One main Generator Step-Up (GSU) transformer would contain approximately 4,000 gallons of non-PCB, transformer oil and would be located within a reinforced concrete secondary containment designed for the oil volume plus required freeboard for accumulated precipitation.
- The forty-three field transformers would contain 450-gallons of non-PCB transformer oil each and would be located within concrete secondary containment designed for the oil volume plus required freeboard for accumulated precipitation.

Management of hazardous materials during the Project operations would pose little risk of significant environmental impacts. A Spill Prevention Control and Countermeasure (SPCC) Plan would be required for the facility. The SPCC Plan would be prepared prior to commercial operations and the plant's staff would be trained in the Plan's implementation. All hazardous materials used and generated during operations would be carefully managed in compliance with the manufacturers' guidance and in accordance with state and federal standards.

3.13 Cumulative Impacts

The term "cumulative effect" is defined in CEQ regulations as "the impact on the environment, which results from the incremental impact of the action when added to other past, present, or reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions" (40 CFR 1508.7).

This chapter defines the area DOE considered in the cumulative effects analysis, provides an overview of relevant past and present actions in the Project vicinity, presents the reasonably foreseeable actions in the area of consideration based on information from local planning agencies and the availability of documentation for future projects, and concludes with the cumulative effects analysis.

3.13.1 Past, Present, and Reasonably Foreseeable Actions

Past, present, and reasonably foreseeable activities affecting Alamosa County resources based on a review of Alamosa County planning and zoning proposals include:

- Residential and ranchette development
- Electric transmission line construction
- Solar power generation
- Agricultural development

Historical projects and development have already occurred in the region and consist of additional baseline impacts. These projects are summarized in below.

Agriculture: Agriculture occurs throughout the region, with most activities implementing irrigation. Agricultural activities will continue, although some small areas have been converted to other uses, such as power development.

Grazing: Grazing occurs throughout the region on state, federal, and private fee lands. Grazing is expected to continue, to occur, although some small grazing areas have been converted to other uses, such as residential and ranchette development.

Road Development: A network of state and county roads has already been developed in the region. Many are unpaved, and some are minimally maintained. Average daily traffic volumes are exceedingly low on most state highways. Unpaved county roads are used primarily by local residents and agricultural employees. Vehicular travel on dirt roads generates fugitive dust emissions, which also can have both direct and indirect impacts on adjacent vegetation and proximal wildlife.

Solar Projects: Development of additional solar projects could occur in Alamosa County. At this time, several solar project applications have been filed with the Planning and Zoning Department in Alamosa County.

Aurora Solar Project: Aurora Solar, a subsidiary of Iberdrola Renewables, plans to build a 32-MW photovoltaic solar plant on 325 acres in the north end of Alamosa County and also construct a 4.5-mile power line to carry its electricity to a substation next to the existing SunEdison plant. Alamosa County Commissioners have approved the Project. However, a power purchase agreement (PPA) has not been signed to date.

Greater Sandhill Project: SP Systems, a subsidiary of SunPower Corporation, is proposing to construct and operate the proposed Greater Sandhill solar facility in Alamosa County, Colorado, a 19.2-MW photovoltaic solar facility in Alamosa County, Colorado. The Project has received a PPA from Xcel Energy.

Lincoln Renewable Energy Project: Lincoln Renewable Energy is proposing to construct a 37.4-MW solar plant in Alamosa County, Colorado. Alamosa County Commissioners have approved the Project. However, a PPA has not been signed to date.

Southern Colorado Transmission: Line Project. The San Luis Valley-Calumet-Comanche Transmission Project is a single, joint project proposed by two electric utilities - Tri-State Generation and Transmission Association, Inc. and Public Service Company of Colorado (Xcel Energy). The project is intended to address reliability concerns and facilitate the development of renewable energy in south-central Colorado by using one common set of facilities. Development of new transmission line has been substantially delayed due to legal developments. At this time, it is uncertain on the potential for construction and development of the transmission line.

SunEdison Solar Energy Project: In December 2007, the 8.22-MW PV solar plant was connected to the Xcel grid and began delivering generated solar electricity. The SunEdison solar plant is sited on approximately 80 acres. The facility generates approximately 17,000 MW hours of electricity annually, delivering enough clean energy to power 1,500 homes.

3.13.2 Cumulative Effects Analysis

This section analyzes the cumulative effects from the past, present, and reasonably foreseeable future projects in conjunction with the Project. This analysis addresses only the resources to which the Project has the potential to contribute an incremental positive or negative impact.

Air Quality

Diesel engine trains, ranching and agricultural activities, graveled roads, wind and soil erosion, forest and range fires, trash burning, fireplaces, local and regional transportation, and residential and commercial buildings all contribute cumulatively to the overall air quality within the San Luis Valley. Project construction activities could incrementally increase localized impacts to air quality from fugitive dust emissions derived from construction traffic and wind erosion. Fugitive dust associated with construction activities and construction vehicle emissions could potentially cause particulate concentrations to increase above normal background levels, causing localized dust impacts. However, dust emissions would not contribute to cumulative impacts to regional air quality because they would be localized, temporary, and controlled by access road dust abatement measures to minimize impacts. More importantly, the Project would avoid cumulative pollutant emissions from fossil-fired facilities that would be necessary to generate equivalent amounts of power.

Greenhouse Gases and Global Climate Change

While the scientific understanding of climate change continues to evolve, the Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report has stated that warming of the Earth's climate is unequivocal, and that warming is very likely attributable to increases in atmospheric greenhouse gases caused by human activities (anthropogenic) (IPCC 2007). The IPCC's Fourth Assessment Report indicates that changes in many physical and biological systems, such as increases in global temperatures, more frequent heat waves, rising sea levels, coastal flooding, loss of wildlife habitat, spread of infectious disease, and other potential

environmental impacts are linked to changes in the climate system, and that some changes may be irreversible (IPCC 2007).

The release of anthropogenic greenhouse gases and their potential contribution to global warming are inherently cumulative phenomena. Greenhouse gas emissions from the proposed action are relatively small compared to the 8,026 million tons (7,282 million metric tonnes) of CO_2-equivalent greenhouse gases emitted in the U.S. in 2007 (EIA 2007) and the 54 billion tons (49 billion metric tonnes) of CO_2-equivalent anthropogenic greenhouse gases emitted globally in 2004 (IPCC 2007). However, emissions from the proposed action in combination with past and future emissions from all other sources would contribute incrementally to the climate change impacts described above. However, at present there is no methodology that would allow DOE to estimate the specific impacts (if any) this increment of climate change would produce in the vicinity of the facility or elsewhere.

Greenhouse gas emissions caused by construction and operation of the proposed project would be more than offset by the positive impact of displacing the use of approximately 249 million cubic feet of natural gas that would have been used by a comparable conventional natural gas-fired power plant. This would eliminate the generation of approximately 43,250 tons per year of CO_2 emissions into the atmosphere.

Surface and Groundwater

About 30 percent of the San Luis Valley is currently irrigated for agricultural purposes with water from the Rio Grande River and well water drawn from the two primary ground water aquifers. The construction of over 2,000 miles of ditches and pumping of groundwater needed to support agricultural irrigation has substantially altered the hydrology and water quality and quantity in the San Luis Valley. Subsequently, the Project area includes approximately 225 acres of irrigated farmland. These 225 irrigated acres would be converted to a solar electrical generation facility, and taken out of agricultural production. Therefore, the construction and operation of the solar electrical generation would substantially reduce the current water consumption used for annual agricultural activities, resulting in a net water balance gain. Accordingly, the Project would not have a cumulative impact on regional water supplies.

Existing agricultural activities, livestock grazing, and transportation corridors all contribute to cumulative impacts on surface water through some level of increased sedimentation. Implementation of mitigation measures to control runoff during construction and operation of the Project would minimize impacts to surface waters from erosion and sedimentation. In addition, implementation of BMPs for handling, storage, and use of hazardous materials and adherence to applicable permits during construction and operation of the Project would prevent cumulative impacts on surface and groundwater resources.

No surface water would be used for the Project, and construction activities are not anticipated to discharge into surface waters. During construction, water is required for dust. This water would be obtained from a well and permitted by the State of Colorado. After the Project is operational, minimal quantities of water are needed.

Scenic Quality

To the extent that solar panels developed as a part of the proposed Project would affect the aesthetic quality of views, the degree of these effects would be dependent on the distance from which they are viewed. According to the systematic observations of the solar panels seen at

varying distances, the degree of perceived visual dominance of panels of the size that are being proposed for this Project have the greatest potential to be visually dominant within a distance of about 2 miles from the structures and tapers off to a moderate level after about 4 miles, and not visible after about 5 miles. Based on this distance and the distance of proposed solar facilities from the Project site, the proposed Project would not have a cumulative impact on views.

Wildlife

The extensive development of agricultural fields and irrigation systems within the San Luis Valley has resulted in significant disturbance and fragmentation of vegetation communities. Localized and regional direct and indirect effects and increased human presence in rural areas have contributed to extensive cumulative impacts including loss of vegetation communities and a net reduction in wildlife habitat.

The Project would be constructed within an existing irrigated agricultural field. Reduced avian and wildlife use is anticipated near the solar field due to maintenance activities and reduced habitat effectiveness because of the presence of access roads and large gravel pads underlain the solar field. The presence of solar panels may potentially change the local landscape so that avian and wildlife use patterns are altered, thereby displacing wildlife away from the Project facilities. However, it is unlikely that displacement of avian and wildlife during construction or operation would result in any population impacts at the Project site due to the abundance of both undisturbed native and agricultural habitat in the region. Therefore, potential impacts to wildlife species would not contribute to any regional cumulative impacts on local or regional avian and wildlife populations.

4.0 LIST OF AGENCIES CONTACTED

Alamosa County Land Use Office
8900 Independence Way
Alamosa, CO 81101

Department of the Army
Albuquerque District, Corps of Engineers
799 E. 3rd Street, #2
Durango, CO 81301

Fish and Wildlife Service
Ecological Services
Colorado Field Office
P.O. Box 25486-DFC (MS 65412)
Denver, CO 80225

NRCS Alamosa Field Office
101 South Craft Dr., Ste B
Alamosa, CO 81101

State Historic Preservation Officer
Colorado History Museum
1300 Broadway
Denver, CO 80203

5.0 LIST OF PREPARERS

U.S. Department of Energy

Thomas, Sharon
NEPA Document Manager
M.E.M., Environmental Management
B.S., Marine Science

Cogentrix

Chaffee, Mark
BS, Civil Engineering
Years of Experience: 28

Fromm, Thomas
BS, Environmental Science
Years of Experience: 29

Neff, Rick
MS, Civil Engineering
BS, Environmental Engineering
Years of Experience: 32

CH2M HILL

Butler, Josh
MS, Civil Engineering
BS, Civil Engineering
Years of Experience: 16

Clayton, Christopher
Ph.D., Geography
MA, Geography
BA, Geography
Years of Experience: 30

Dinges, Monika
MS, Environmental Engineering
BS, Chemical Engineering
Years of Experience: 10

Helton, Clint
MA, Anthropology
BA, Language and Literature

Years of Experience: 10

Henning, Ryan
MS, Conservation Biology
BS, Biological Science
Years of Experience: 21

Lee, Brian
BA, Environmental Population and Organismic Biology
Years of Experience: 6

Lynch, Zeke
MS, Civil Engineering, Traffic Emphasis
BS, Civil Engineering
Years of Experience: 12

McCusker, Caitlin
MURP, Urban and Regional Planning
BA, Political Science and Spanish
Years of Experience: 3

Oakes, Katy
MS, Natural Resource Management
BS, Wildlife Biology
Years of Experience: 8

Priestley, Thomas
Ph.D., Environmental Planning
MLA, Environmental Planning
MCP, City Planning
BUP, Urban Planning
Years of Experience: 28

Schulze, Randy
MS, Environmental Engineering Sciences
BS, Biological Sciences
Years of Experience: 21

Quan, Jeremey
BS, GIS and Cartography
Years of Experience: 5

Warren, Greg
MS, Geology
BS, Geology
Years of Experience: 17

6.0 REFERENCES

CH2M HILL. 2010. Biological Survey Report for the Alamosa Solar Project. Prepared for Cogentrix Energy, LLC. May 2010.

Colorado Department of Transportation (CDOT), 2010. CDOT Website. http://www.dot.state.co.us/App_DTD_DataAccess/index.cfm Accessed March 5.

Colorado Division of Wildlife (CDOW). 2007. "Threatened & Endangered List." Last updated October 15, 2007. http://wildlife.state.co.us/WildlifeSpecies/SpeciesOfConcern/ ThreatenedEndangeredList /ListOfThreatenedAndEndangeredSpecies.htm. Accessed March 10, 2010.

Cowardin et al., 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. http://el.erdc.usace.army.mil/emrrp/emris/emrishelp2/cowardin_report.htm.

Energy Information Administration (EIA). 2007. Report # DOE/EIA-0573.

Federal Transit Administration (FTA). 2006. Transit Noise and Vibration Impact Assessment. FTA-VA-90-1003-06. May 2006.

Intergovernmental Panel on Climate Change (IPCC). 2007. Fourth Assessment Report, Climate Change 2007: Synthesis Report, Summary for Policy Makers. November 17.

Kirkham, R.M., compiler, 1998a, Fault number 2321b, Northern Sangre de Cristo fault, Zapata section, in Quaternary fault and fold database of the United States: U.S. Geological Survey website, http://earthquakes.usgs.gov/regional/qfaults, accessed 03/09/2010 10:13 AM.

Kirkham, R.M., compiler, 1998b, Fault number 2315, Faults near Monte Vista, in Quaternary fault and fold database of the United States: U.S. Geological Survey website, http://earthquakes.usgs.gov/regional/qfaults, accessed 03/09/2010 10:12 AM.

Machette, M. N., Coates, M. M., and Johnson, M. L., 2007. "2007 Rocky Mountain Section Friends of the Pleistocene Field Trip – Quaternary Geology of the San Luis Basin of Colorado and New Mexico, September 7-9, 2007." U. S. Geological Survey Open-File Report 2007-1193.

Metzger, Shirley, 2010.Personal Communication, Land Use Department, Alamosa County, Colorado. March 10.

National Energy Information Center. 2008. Greenhouse Gases, Climate Change, and Energy. Available at: http://www.eia.doe.gov/oiaf/1605/ggccebro/chapter1.html.

National Wetland Inventory (NWI), 2010. "NWI Wetland Mapper." http://www.fws.gov/ wetlands/data/Mapper.html.

Natural Resources Conservation Service (NRCS), 2010. "Online Soil Survey Geographic (SSURGO) for Alamosa County, Colorado." U.S. Department of Agriculture, Natural Resources Conservation Service. http://websoilsurvey.nrcs.usda.gov/. Accessed February 2010.

NatureServe, 2009. "NatureServe Explorer: An online encyclopedia of life [web application]." Version 7.1. NatureServe, Arlington, VA. Available at http://www.natureserve.org/explorer. Accessed March 10, 2010.

State of Colorado Department of Local Affairs, State Demography Office, 2009

U.S. Census Bureau, 2000. Census 2000.

U.S. Census Bureau, 2000. Census 2000 Summary File 3 (SF 3) – Sample Data.

U.S. Environmental Protection Agency. 1971. Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances. 1971.

U.S. Environmental Protection Agency. 1978. Protective Noise Levels Condensed Version of EPA Levels Document. November 1978.

U.S. Fish and Wildlife Service (USFWS), 2010. "Colorado Field Office County List." Updated January 2010.

U.S. Fish and Wildlife Service (USFWS), 2010. http://criticalhabitat.fws.gov/USFWS Critical Habitat Portal. Accessed March 10, 2010.

U.S. Geological Survey (USGS) National Gap Analysis Program, 2004. "Provisional Digital Land Cover Map for the Southwestern United States." Version 1.0. RS/GIS Laboratory, College of Natural Resources, Utah State University.

U.S. Geological Survey (USGS), 2008. Earthquake Hazards Program, National Seismic Hazard Mapping Project Web Page. URL: http://eqhazmaps.usgs.gov. Accessed February 2010.

APPENDIX A

Visual Resources Analysis Methodology

VISUAL RESOURCES ANALYSIS METHODOLOGY FOR THE COGENTRIX ALAMOSA SOLAR PROJECT

Visual or scenic resources are the natural and built features of the landscape that contribute to the public's experience and appreciation of the environment. Visual resource or scenic impacts are generally defined in terms of a project's physical characteristics and the potential visibility and the extent to which the project's presence would change the perceived visual character and quality of the environment in which it would be located. This analysis documents the existing visual conditions on the Project site and the surrounding area and assesses the extent to which the proposed Project has the potential to affect the valued qualities of the area's scenic resources.

The Federal Highway Administration Visual Impact Assessment Methodology

This analysis was conducted using the evaluative process set out by the Federal Highway Administration in *Visual Impact Assessment for Highway Projects* (FHWA, 1988). This analysis approach was developed by a major federal agency that invested considerable resources in its creation, testing, and implementation, and as a result, this approach is robust and is now widely used to provide systematic and objective evaluations of visual change.

The FHWA visual quality and aesthetics assessment method used for this analysis addresses three primary questions:

- What are the visual qualities and characteristics of the existing landscape in the project area?
- What are the potential effects of the project on the area's visual quality and aesthetics?
- Who would see the Project, and what is their likely level of concern about or reaction to how the project visually fits within the existing landscape?

Applying the FHWA visual quality assessment method entails six steps:

1. Establish the project's area of visual influence.
2. Determine who has views of and from the project ("viewer").
3. Describe and assess the landscape that exists before project construction ("affected environment").
4. Assess the response of viewers looking at and from the project, before and after project construction ("viewer sensitivity or concern").
5. Determine and evaluate views of the project for before and after project construction (simulations).
6. Describe the potential visible changes to the project area and its surroundings that would result from the project.

The first three steps were conducted for the project, in order to establish the baseline conditions as viewed from specific locations in the surrounding area. The project's potential changes to the visible landscape and likely viewer responses to those changes were then assessed and

systematically compared against the baseline conditions to determine the nature and degree of potential impacts to visual resources.

Specialized Tools and Vocabulary

The FHWA system uses a generally accepted set of tools and well-defined terminology. The following fundamental terminology is used throughout this analysis.

Views are what can be seen from the project area and what can be seen of the project area from the surrounding neighborhoods and communities. Because it is not possible to depict every view toward the project features, representative views have been selected to represent types of views that are available to the general public. The viewpoints from which these representative views are seen are called Key Observation Points (KOPs).

Viewshed is the area surrounding a project area from which the project is, or potentially could be, visible to viewers.

Simulations are images depicting views that have been modified by computer modeling to show the proposed project within the existing landscape.

Viewers are people who have views of the project. Viewers are usually discussed in terms of general categories of activities (such as residents, workers, recreationists [park users, boaters, or bicyclists], pedestrians, or motorists [both commuters and leisure travelers]) and are referred to as "viewer groups."

Viewer sensitivity (or level of concern) is a combination of the following factors for a specific view:

- How many people have that view and what types of viewers are they?
- How long can they see the view? Residents and recreationists generally have views of long duration while bicyclists and motorists typically have short-duration views.
- What is their likely level of concern about the appearance, aesthetics, and quality of the view? Level of concern is a subjective response that is affected by factors such as the visual character of the surrounding landscape, the activity a viewer is engaged in, and their values, expectations, and interests. Generally residents and recreationists are considered to be highly sensitive viewers, and local business staff and commuters are considered to be less sensitive.
- Low viewer sensitivity exists when there are few viewers who experience a defined view when viewers are not likely to be highly concerned about the view. High viewer sensitivity exists when there are many viewers who have a view frequently or for a long duration, as well as viewers (many or few), such as those in a residential neighborhood, who are likely to be very aware of and concerned about the view. Viewer sensitivity or level of concern does not imply support for or opposition to a proposed project; it is a neutral term that is an important parameter in assessing visual quality.

Visual character is an impartial description of what the landscape consists of and is defined by the relationships between the existing visible natural and built landscape features. These relationships are considered in terms of dominance, scale, diversity, and continuity. Visual character-defining resources and features include:

- Landforms: types, gradients, and scale.
- Vegetation: types, size, maturity, and continuity.
- Land uses: height, bulk, scale, and architectural detail of associated buildings and ancillary site uses.
- Transportation facilities: types, sizes, scale, and directional orientation.
- Overhead utility structures and lighting: types, sizes, and scale.
- Open space: type (e.g., parks, reserves, greenbelts, and undeveloped land), extent, and continuity.
- Viewpoints and views to visual resources.
- Water bodies, historic structures, and downtown skylines.
- Apparent "grain" or texture, such as the size and distribution of structures and unbuilt properties or open spaces of the landscape.
- Apparent upkeep and maintenance.

Viewing distance is the distance between the viewed object and the viewer. The closer the viewer is to a viewed object the more detail can be seen and the greater the potential influence the object has on visual quality. For this analysis, four viewing distances were used. They are 1) immediate foreground (between 0 and approximately 300 feet of the viewers), 2) foreground (between 300 feet and ½ mile), 3) middleground (between 0.5 and 4 miles, and 4) background (beyond 4 miles).[2]

Visual quality is an assessment of the composition of the character-defining features for selected views. Under the FHWA visual quality analysis system, the characteristics are evaluated in terms of vividness, intactness, and unity (which are defined below) and are scored for these characteristics. The scores are then averaged for a total visual quality score between 1 and 7, where a low score represents low visual quality and a higher score represents high visual quality. This assessment asks: Is this particular view common or dramatic? Is it a pleasing composition (a mix of elements that seem to belong together) or not (a mix of elements that either do not belong together or are eyesores and contrast with the other elements in the surroundings)?

Visual quality is evaluated and discussed using these terms:

- Vividness is the degree of drama, memorability, or distinctiveness of the landscape components.
- Intactness is a measure of the visual integrity of the natural and human-built landscape and its freedom from encroaching elements. This factor can be present in well-kept urban and rural landscapes, as well as in natural settings. High intactness means that the landscape is free of unattractive features and is not broken up by features and elements that are out of

[2] This categorization of distance zones is well established among visual resource analysis practitioners and has been adopted by the United States Forest Service as part of its Scenery Management System (United States Department of Agriculture Forest Service, 1995)

place. Low intactness means that visual elements can be seen in a view that are unattractive and/or detract from the quality of the view.

- Unity is the degree of visual coherence and compositional harmony of the landscape considered as a whole. High unity frequently attests to the careful design of individual components and their relationship in the landscape or an undisturbed natural landscape.

Study Procedure

The study process began with a review of maps, on which the project features had been plotted, and the determination of the project's viewshed. A viewshed analysis is most commonly a computer-generated graphic that relies upon the maximum elevations of the project features and surrounding topography to identify locations from which the project would theoretically be visible via an unobstructed or partial line-of-sight.

For the Project, a viewshed radius of 8 miles was assumed. Results of this analysis indicated the areas from which the solar panels associated with the Project have the potential to be visible. Accessible viewpoints were identified within the viewshed. The site and surrounding areas were visited in order to document the existing visual conditions in the Project area. Photographs were taken toward the locations of the Project features from representative viewpoints, and from this set of views, six KOPs were selected to use as the basis for the analysis.

From each of the KOPs, a photograph was taken to provide the basis for development of a simulation to depict the view as it would appear with the completed Project in place. The photographs used as the basis for the simulations were all taken with a digital camera set to take photos equivalent to those taken with a 35-mm camera using a 50-mm focal length. In most cases, single-frame images were used to create the simulations. In a few cases, where a wider angle of view was required, two or more frames were stitched together to create a panoramic view. For each view, computer modeling and rendering techniques were used to produce the simulated images. Existing topographic and site data provided the basis for developing an initial digital model. Project engineers provided site plans and digital data for the proposed facilities. These were used to create three-dimensional (3-D) digital models of the solar facility. These models were then combined with the digital site model to produce a complete computer model of the Project.

For each simulation viewpoint, a viewer location was digitized from topographic maps and scaled aerial photographs, using 5 feet as the assumed viewer eye level. Computer "wire frame" perspective plots were then overlaid on the photographs of the views from the simulation viewpoints to verify scale and viewpoint location. Digital visual simulation images were produced as a next step based on computer renderings of the 3-D model combined with high-resolution digital versions of base photographs. The final "hardcopy" visual simulation images that appear in this document were produced from the digital image files using a color printer.

Comparison of the "before" photographs with the simulations of the Project as it would appear after construction provided the basis for determining Project impacts on views and visual quality. In comparing the pre-construction and post-construction conditions, use was made of the numerical rating sheets that the FHWA has devised as an aid to implementation of its visual impact procedure. Comparison of the evaluations of the existing views with the evaluation of the simulations of the views as they would appear with the Project constructed, provided a

systematic and consistent basis for evaluating the degree of visual change that would occur as a result of the Project's development. These evaluations of the before and after views provided the backdrop for the qualitative assessments of visual conditions and visual change presented in this analysis.

APPENDIX B

Agency Correspondence

U.S. Department of Agriculture

FARMLAND CONVERSION IMPACT RATING

PART I *(To be completed by Federal Agency)*	Date Of Land Evaluation Request 10/15/2010
Name Of Project Cogentrix of Alamosa, LLC Solar Project	Federal Agency Involved Department of Energy
Proposed Land Use Solar energy facility	County And State Alamosa County, Colorado
PART II *(To be completed by NRCS)*	Date Request Received By NRCS

Does the site contain prime, unique, statewide or local important farmland? *(If no, the FPPA does not apply -- do not complete additional parts of this form).*	Yes ☒	No ☐	Acres Irrigated	Average Farm Size
Major Crop(s) Potatoes, Barley, Alfalfa	Farmable Land In Govt. Jurisdiction Acres: 82,756	% 100	Amount Of Farmland As Defined in FPPA Acres: 82,756	% 100
Name Of Land Evaluation System Used LESA	Name Of Local Site Assessment System -		Date Land Evaluation Returned By NRCS 10/15/10	

PART III *(To be completed by Federal Agency)*	Alternative Site Rating Site A	Site B	Site C	Site D
A. Total Acres To Be Converted Directly	140			
B. Total Acres To Be Converted Indirectly	85			
C. Total Acres In Site	225	0.0	0.0	0.0
PART IV *(To be completed by NRCS)* Land Evaluation Information				
A. Total Acres Prime And Unique Farmland	14			
B. Total Acres Statewide And Local Important Farmland	140			
C. Percentage Of Farmland In County Or Local Govt. Unit To Be Converted	.002			
D. Percentage Of Farmland In Govt. Jurisdiction With Same Or Higher Relative Value	80%			
PART V *(To be completed by NRCS)* Land Evaluation Criterion Relative Value Of Farmland To Be Converted *(Scale of 0 to 100 Points)*	20	0	0	0

PART VI *(To be completed by Federal Agency)* Site Assessment Criteria *(These criteria are explained in 7 CFR 658.5(b)*	Maximum Points				
1. Area In Nonurban Use		15			
2. Perimeter In Nonurban Use		10			
3. Percent Of Site Being Farmed		17			
4. Protection Provided By State And Local Government		20			
5. Distance From Urban Builtup Area		15			
6. Distance To Urban Support Services		15			
7. Size Of Present Farm Unit Compared To Average		3			
8. Creation Of Nonfarmable Farmland		0			
9. Availability Of Farm Support Services		5			
10. On-Farm Investments		20			
11. Effects Of Conversion On Farm Support Services		0			
12. Compatibility With Existing Agricultural Use		0			
TOTAL SITE ASSESSMENT POINTS	160	0	0	0	0
PART VII *(To be completed by Federal Agency)*					
Relative Value Of Farmland *(From Part V)*	100	20	0	0	0
Total Site Assessment *(From Part VI above or a local site assessment)*	160	120	0	0	0
TOTAL POINTS *(Total of above 2 lines)*	260	140	0	0	0

Site Selected:	Date Of Selection	Was A Local Site Assessment Used? Yes ☐ No ☒

Reason For Selection:

(See Instructions on reverse side)

Form AD-1006 (10-83)

This form was electronically produced by National Production Services Staff

DEPARTMENT OF THE ARMY
ALBUQUERQUE DISTRICT, CORPS OF ENGINEERS
799 E. 3rd Street, #2
Durango, Colorado 81301
970-375-6235
FAX 970-375-9531

July 21, 2010

REPLY TO
ATTENTION OF:

Regulatory Division

SUBJECT: Action No. SPA-2010-00294 and SPA-2010-00295, Cogentrix Alamosa Solar Project Site

Matt Kizlinski
CH2M HILL
9191 South Jamaica Street
Englewood, Colorado 80122-5946

Dear Mr. Kizlinski:

The U.S. Army Corps of Engineers (Corps) is in receipt of your letter dated May 13, 2010, requesting a jurisdictional determination for a proposed solar farm site in Alamosa County, Colorado. We have assigned Action No. SPA-2010-00294 and SPA-2010-00295 to this activity. To avoid delay, please include these numbers in all future correspondence concerning this project.

We have reviewed this request in accordance with Section 404 of the Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act of 1899 (RHA). Under Section 404, the Corps regulates the discharge of dredged and fill material into waters of the United States, including wetlands. The Corps responsibility under Section 10 is to regulate any work in, or affecting, navigable waters of the United States. Based on your description of existing on-site conditions, other information available to us, and current regulations and policy, we have determined that there are no waters of the United States or navigable waters of the United States on the proposed project site. However, it is incumbent upon you to remain informed of any changes in the Corps Regulatory Program regulations and policy as they relate to your project.

The Corps based this decision on an approved jurisdictional determination (JD) that there are no waters of the United States on the project site. The basis for this approved JD is that the project site contains an upland stock pond and artificial waters.

The JD form is available at
http://www.spa.usace.army.mil/reg/Jurisdictional_Determinations/jurisdictional_determinations.

asp. This approved JD is valid for a period of no more than five years from the date of this letter unless new information warrants revision of the determination before the expiration date.

You may accept or appeal this approved JD or provide new information in accordance with the Notification of Administration Appeal Options and Process and Request For Appeal (NAAOP-RFA). This form is available at http://www.spa.usace.army.mil/reg/Administrative%20Appeals/appeals_process.asp. If you elect to appeal this approved JD, you must complete Section II (Request For Appeal or Objections to an Initial Proffered Permit) of the form and return it to the Army Engineer Division, South Pacific, CESPD-PDS-O, Attn: Tom Cavanaugh, Administrative Appeal Review Officer, 1455 Market Street, Room 1760, San Francisco, CA 94103-1399 within 60 days of the date of this notice. Failure to notify the Corps within 60 days of the date of this notice means that you accept the approved JD in its entirety and waive all rights to appeal the approved JD.

If you have any questions concerning our regulatory program, please contact me at 970-375-6235 or by e-mail at Hildreth.L.Cooper@usace.army.mil. At your convenience, please complete a Customer Service Survey on-line available at http://per2.nwp.usace.army.mil/survey.html.

Sincerely,

Hildreth Cooper
Regulatory Project Manager

STATE OF COLORADO

Bill Ritter, Jr., Governor
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF WILDLIFE
AN EQUAL OPPORTUNITY EMPLOYER

Thomas E. Remington, Director
6060 Broadway
Denver, Colorado 80216
Telephone: (303) 297-1192
wildlife.state.co.us

For Wildlife-
For People

July 15, 2010

Katy Oakes
CH2MHILL
9193 S. Jamaica St.
Englewood, CO. 80112

Dear Katy,

Thank you for the opportunity to review the Biological Survey Report for the Congentrix Engergy project in Alamsoa Colorado. Due to the location and current agricultural management of the project site, impacts to wildlife and wildlife habitat should be minimal. The presence of sensitive species is unlikely and there should be no effect from this project. If you have any further concerns regarding this project please feel free to contact us.

Thank You,

Rick Basagoitia,
Area Wildlife Manager – San Luis Valley
Colorado Division of Wildlife

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Colorado Field Office
P.O. Box 25486-DFC (MS 65412)
Denver, Colorado 80225

IN REPLY REFER TO:
ES/CO: Solar/Cogentrix
TAILS 65412-2010-CPA-0079

JUL 15 2010

Ms. Katy Oakes
Project Scientist
CH2M Hill
9193 South Jamaica Street
Englewood, Colorado 80112

Dear Ms. Oakes:

In response to your letter dated 17 May 2010 we reviewed the information provided regarding Cogentrix Solar Services (Cogentrix), LLC proposed solar project in Alamosa County. These comments are prepared in accordance with Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et. seq.).

Cogentrix is proposing to construct and operate a 30-megawatt concentrating photovoltaic energy facility in Alamosa County, Colorado on about 225 acres of land which is primarily cultivated agricultural land. The proposed project will include approximately 500 High Concentration Photovoltaic (HCPV) solar trackers which consist of an HCPV solar cell panel assembly mounted on a support column. A hydraulic motor is used to rotate and tilt the solar panel assembly throughout the day to always maintain an optimal angle with respect to the sun. The proposed project will connect to Public Service Company of Colorado's Alamosa-to-San Luis 115-kV transmission system via a line break and a proposed new substation adjacent to the proposed project.

Based on the *Biological Survey Report for the Alamosa Solar Project* prepared by CH2M Hill staff, a determination of No Effect was made for federally listed species. We concur with your determination of No Effect for federally-listed species based on the information you supplied.

Along with the ESA, please be aware of the potential application of the Migratory Bird Treaty Act (MBTA) and the Bald/Golden Eagle Protection Act (BGEPA) to your project. Under the MBTA, it is unlawful, unless permitted by regulations, to pursue, hunt, take, capture, kill or attempt to take, capture, or kill any migratory bird by any means or in any manner. The MBTA does not require intent to be proven and there is no incidental take provision. The BGEPA prohibits an individual (or company) from knowingly, or with wanton disregard for the consequences of this act, taking any bald or golden eagles or their body parts, nests, or eggs, which includes collection, molestation, disturbance, or killing activities.

Thank you for the opportunity to review the proposed project. If we can be of further assistance, please contact Laura Archuleta at (719) 655-6121

Sincerely,

Susan C. Linner
Colorado Field Supervisor

ref: :\Archuleta\Solar\SLV\Alamosa County\Cogentrix.Solar.2010.rtf

HISTORY Colorado

December 10, 2010

Sharon R. Thomas
Environmental Protection Specialist
Department of Energy
Washington, DC 20585

Re: Cogentrix of Alamosa, LLC 30-Megwatt High-Concentrating Photovoltaic Energy Facility on Approximately 225 Acres, Alamosa County, Colorado (CHS #58515)

Dear Ms. Thomas,

Thank you for your correspondence dated November 29, 2010 (received by our office on December 1, 2010) regarding the subject project.

Following our review of the documentation provided, we concur that 5AL851.1 supports the eligibility of the larger linear resource of which it is a part. We further concur that site 5AL852 and isolated find 5AL853 are **not eligible** for the National Register of Historic Places (NRHP). Please note that the site form for 5AL851.1 uses the wrong Smithsonian site number in numerous places (5LA851.1). We have changed this on the form which will go into our files, but wanted to inform you for your records.

As the project has been modified to avoid all impacts to 5AL851.1, we concur that a finding of **no historic properties affected** is appropriate for the proposed project.

Should unidentified archaeological resources be discovered during the course of the project, work must be interrupted until the resources have been evaluated in terms of the National Register of Historic Places eligibility criteria (36 CFR 60.4) in consultation with our office.

Thank you for the opportunity to comment. If we may be of further assistance please contact Shina duVall, Section 106 Compliance Manager, at (303) 866-4674 or shina.duvall@chs.state.co.us.

Sincerely,

Edward C. Nichols
State Historic Preservation Officer
ECN/SAD

APPENDIX C

Traffic Analysis

TECHNICAL MEMORANDUM CH2MHILL

Cogentrix Alamosa 30 MW Solar Project - Traffic Analysis

PREPARED FOR: Katy Oakes

PREPARED BY: Zeke Lynch

DATE: March 19, 2010

Introduction

The following memo has been prepared to support the development of a 1041 permit for the Solar Energy Project in Alamosa, Colorado for Cogentrix Solar Services, LLC. This memorandum documents the assumptions, methodology, and conclusions for analysis of transportation facilities in the study area; and specifically addresses the following Alamosa County Guidelines and Regulations for Areas and Activities of State Interest for section 6.303(2)(a)(ix)(E) Existing Transportation Network:

1. Access to site
2. Circulation within base area and commuting patterns in impact area
3. Capacities of arterial streets within impact area
4. Maintenance provisions and costs

Site Description

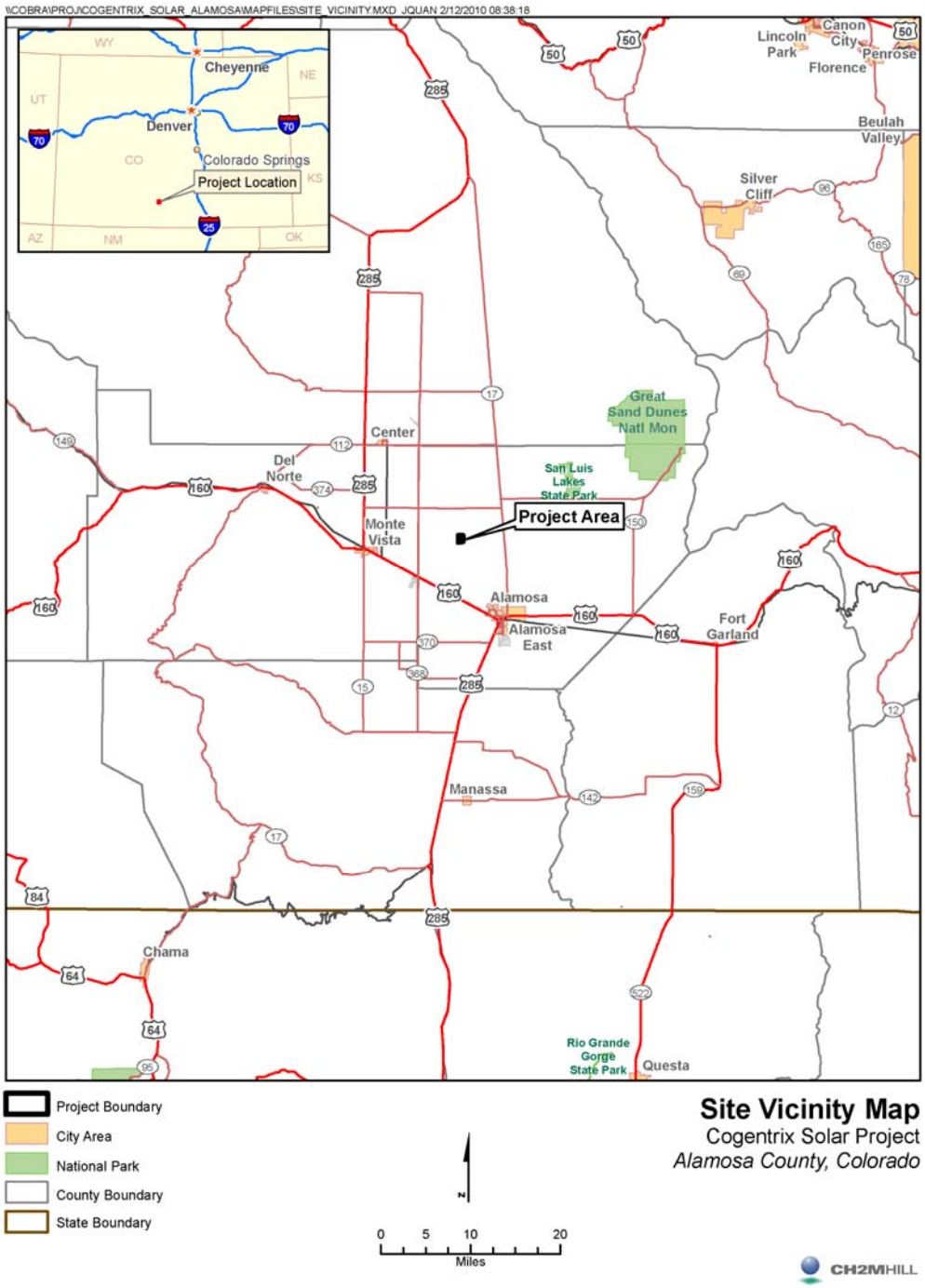
As shown in Exhibit 1, Cogentrix Solar Services plans to construct and operate a 30-megawatt solar energy facility in Alamosa County, Colorado. The Project consists of construction of approximately 464 high-concentration photovoltaic solar trackers and a single story pre-engineered personnel building northwest of the City of Alamosa. The project site is approximately 225 acres of currently cultivated agricultural land that is flat. The site is located west of State Highway 17 (SH 17), and is bordered on the north by Two Mile Lane North, on the east by County Road 105, on the south by One Mile Lane North, and on the west by the existing Xcel/PSCo transmission line.

Existing Transportation Network

The existing transportation network in the Project vicinity consists of SH 17 and Alamosa County roads. SH 17 is a two-lane roadway classified as an Other Principal Arterial – Rural by the Colorado Department of Transportation (CDOT). SH 17 has a posted speed limit of 65 miles per hour (mph) and is a designated truck route. The segment of SH 17 north of Alamosa operates with a volume to capacity ratio of less than 0.85 (CDOT, 2010); therefore, the portion of this highway in the Project vicinity has excess capacity.

The Alamosa County road network in the Project vicinity is composed of two-lane gravel roads on a grid. In addition, there are several unpaved roads that provide access to farm fields from this grid network. Existing roads adjacent to the Project site are Two Mile Lane North, County Road 105, and One Mile Lane North.

EXHIBIT 1
Site Vicinity Map



Based on recently completed studies at similar sites in the vicinity, traffic volumes on the surrounding rural roads are approximately 20 vehicles per day with the volume increasing during times of agricultural activities. There is minimal heavy truck use on the unpaved roadways which are generally 24 feet wide with no shoulders and have a gravel surface. Since many of these roads do not have posted speed limits the default limit is 55 mph per State statute. The area terrain is fairly flat and the majority of traffic is to and from Alamosa to the south.

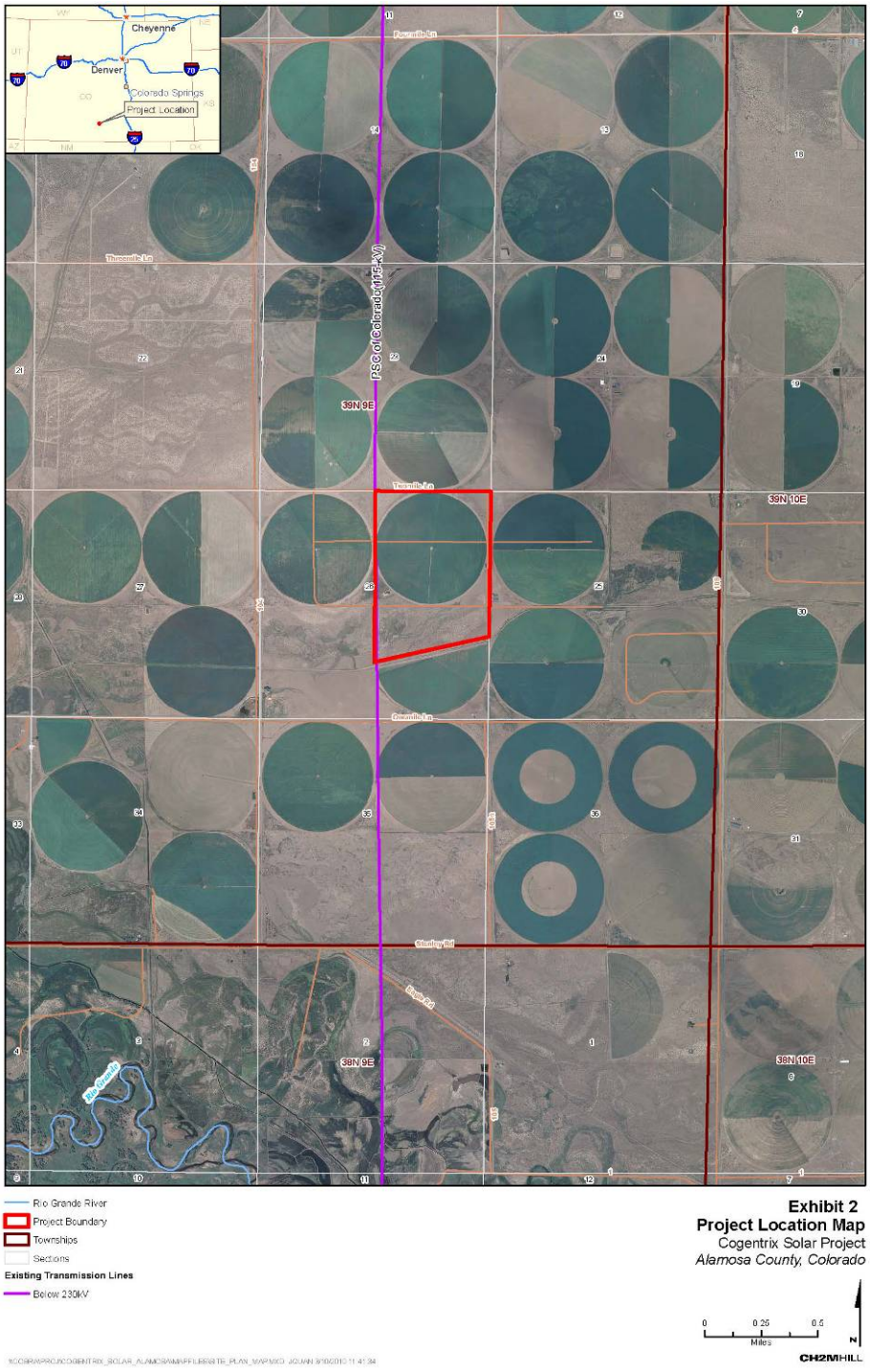
Proposed Transportation Network

Access to the site is planned to utilize the SH 17 and Stanley Road intersection. As shown in Exhibit 2, vehicles will travel west on Stanley Road for approximately 3.67 miles, then north on County Road 106 for 2 miles, and then west on Two Mile Lane North to the site access. The intersection of SH 17 and Stanley Road is unsignalized and the stop control is on Stanley Road. There are no exclusive turn lanes at this intersection.

The Project site access will be constructed on the south side of Two Mile Lane North and will be controlled by a stop sign. This access will accommodate the construction deliveries and workforce, as well as the operations workforce. Prior to Project construction, a condition assessment will be performed on the route access roads of Stanley Road, County Road 106, and Two Mile Road North to determine if improvements are needed to accommodate the trips generated by the construction. If any are required, the extent of the improvements will be defined at that time in consultation with Alamosa County. Any modifications to the existing unpaved roadways will be designed in accordance with Alamosa County standards.

Internal to the site, unpaved roads will be constructed to provide access to the PV equipment. Because SH 17 is a designated truck route, it is designed to accommodate heavy vehicular loads and should not be permanently affected by the Project construction. No changes are proposed to SH 17. Contractors will comply with existing federal, state, and county requirements and restrictions to protect the road network and the traveling public. In addition, load limits will be observed at all times to prevent damage to existing paved road surfaces.

EXHIBIT 2
Site Map



Traffic Data

The Colorado Department of Transportation collects traffic counts and maintains a traffic count database for state highways. Where direct counts are not available, counts are estimated based on permanent and short-term traffic counts. In 2008, south of Two Mile Road South, SH 17 carried 2,400 vehicles daily. Near Mosca, the average annual daily traffic was 1,800 vehicles on SH 17

in 2008. According to CDOT, trucks comprise around 10 percent of the traffic and approximately 11 percent of the daily traffic occurs in the peak hour.

Trip Generation and Distribution

The project is expected to generate approximately 100 new jobs over the course of the 14.5-month construction period commencing in August 2010. At the peak of construction approximate 120 personnel are expected onsite. Post construction, it is expected that the project will have seven full-time employees and three seasonal employees for operations.

The equipment will be delivered in the following categories:

- Pedestals (support columns),
- Drive heads (placed on top of pedestals),
- Service modules (inverter, hydraulics, and tracking controls),
- Torque tubes (mega-module support), and
- Mega-modules (the solar panels).

The drive heads, service modules, pedestals and mega-modules will all be transported via standard semitrailers and flatbeds falling under the CDOT legal dimensions and maximum width of 8 feet 6 inches, height of 13 feet, and gross weight of 80,000 pounds; with trailers not to exceed 57 feet 4 inches in length. The torque tubes will be approximately 72 feet long and will likely require a CDOT permit due to load length.

The Project will generate approximately 240 daily trips for workers and 18 delivery trucks during the peak construction period and 20 daily trips for operations personnel once construction is complete.

Construction Trips (Personnel)

The Project is expected to employ 120 construction workers during the peak construction phase. The following assumptions were used to calculate the personnel trips generated by the Project:

- Construction will occur in one shift during the day.
- The work week is six 12 -hour days.
- All workers arrive in the morning peak hour and depart in the evening peak hour.
- Personnel will not leave the site during the shift.

These assumptions result in the estimation of 120 additional vehicles per day, or 240 daily trips, traveling on the adjacent roadway network to access the Project site during the peak work month. Assuming approximately 90 percent approach from the south and 10 percent approach from the north yields the following additional daily trips on SH 17:

- SH 17 north of Stanley Road: 20 trips
- SH 17 south of Stanley Road: 220 trips

Construction Trips (Trucks)

Based on the 464 photovoltaic solar trackers required, each PV tracker assembly will require 2.5 trucks, for a total of 1,160 trucks over the 14.5-month construction duration. Because one concrete mixer can supply two tracker foundations, 232 concrete trucks are expected during construction. An additional 50 trucks will be needed for building, equipment, and transformer foundations. This yields a total of 1,442 truck deliveries during the construction period. Using

these estimates, on average, approximately 100 trucks per month or four trucks daily will access the site. However, during the peak construction, upwards of 18 trucks per day would be expected. All of these trucks are expected to arrive from the south, resulting in an increase in traffic on SH 17 south of Stanley Road of 18 trucks per day or approximately two trucks during the peak hours.

Total Construction Trips

Based on the assumptions for personnel and trucks, approximately 10 additional cars (20 trips) are expected north of Stanley Road on SH 1 7. South of Stanley Road traffic is expected to temporarily increase by 110 cars (220 trips) and 18 trucks per day during the peak of construction.

Operations Trips (Personnel Only)

The Project is expected to employ 10 personnel to conduct daily operations, seven full-time and three seasonal. The trip generation process used the following assumptions to calculate the personnel trips generated by operations of the Project:

- Operations will occur in one shift during the day.
- All personnel arrive in the morning peak hour and depart in the evening peak hour.
- Personnel will not leave the site during the day.
- Each person will drive one vehicle to the site.

These assumptions result in the estimation of 10 additional vehicles per day, or 20 daily trips, traveling on the adjacent roadway network for operations personnel to access the site. Assuming 80 percent from the south and 20 percent from the north yields the following trips on SH 17:

- SH 17 north of Stanley Road: 4 trips
- SH 17 south of Stanley Road: 16 trips

Traffic Operations

In order to assess the potential traffic impacts associated with the proposed project, existing traffic conditions were analyzed both with and without the project during the peak hours (existing and construction) as well as after construction when the plant is operational. The Transportation Research Board's *Highway Capacity Manual*, the CDOT website, and previous similar studies in the vicinity of the project area were used as resources for this analysis.

Methodology

The operating conditions, or Level of Service (LOS), provided by the highways and study area intersections were assessed using *Highway Capacity Manual* two-lane highway and unsignalized intersection methodologies. LOS is a term used to describe operating conditions in a traffic stream and motorists' perceptions of those conditions. Six LOS classifications are given a letter designation from A to F with "A" representing the best operating conditions and "F" the worst. LOS D or better is typically considered acceptable for peak hour operations.

For two-lane highways, LOS is defined in terms of average travel speed and percent time spent following another vehicle. For unsignalized intersections, LOS is defined in terms of average delay per vehicle by movement. The method incorporates delay associated with deceleration, acceleration, stopping, and moving up in the queue. For side street stop-controlled intersections, delay is typically represented in seconds for the minor street approaches and the left turns from the major street.

Assumptions

A directional distribution on SH 17 of 70 percent southbound in the morning and 70 percent northbound in the evening is an estimate based on information from previously completed studies and local perspective from Alamosa County. The percent no-passing zones are estimated to be 20 percent. According to CDOT data, the peak hour is approximately 11 percent of the daily volume for all roadways. Based on available count information, directional distribution assumptions, and engineering judgment, turning movement volumes were estimated at the SH 17 and Stanley Road intersection. These estimates were used to evaluate existing intersection level of service. Traffic data from 2008 were the most recent available information. For purposes of this analysis, because minimal background traffic growth is expected, the available counts are assumed to represent existing 2010 traffic conditions. Site generated traffic was added to the existing volumes to determine intersection level of service during the construction and operations periods. Both AM and PM peak-hour operations are presented.

Existing Conditions

As shown in Exhibit 3, all of the facilities operate at very desirable level of service during the peak hours. The highway segments and intersections analyzed currently operate at LOS A or B. On the highways, the average travel speed is relatively high and the percent time spent following another vehicle correspondingly low. At the intersections, the approaches and movements experience an average delay of 10 seconds per vehicle.

EXHIBIT 3
Existing Traffic - Peak Hour Conditions

Facility	Average Annual Daily Volume	Peak Hour Volume	Percent Trucks	Peak Hour LOS
Highway				
SH 17 North of Stanley	1,800	200	10%	A/A
SH 17 South of Stanley	2,400	260	10%	B/B
Intersection				
SH 17 & Stanley Road				
EB Approach	N/A	15/15	10%/10%	B/A
WB Approach	N/A	15/15	10%/10%	A/B
NB Left	N/A	5/5	10%/10%	A/A
SB Left	N/A	5/5	10%/10%	A/A

Source: CH2M HILL, 2010. (AM /PM)

Construction Conditions

Construction of the proposed project is anticipated to commence in August 2010 and last approximately 14.5 months. As shown in Exhibit 4, the expected increase in construction traffic results in a minor increase in delay for the eastbound and westbound approaches at SH 17 and Stanley Road. This is primarily due to the increase in construction traffic on SH 17. All of the highway segments and intersection approaches/movements are expected to operate at LOS A or B.

EXHIBIT 4
Existing Traffic Plus Construction Traffic - Peak Hour Conditions

Facility	Average Annual Daily Volume	Peak Hour Volume	Percent Trucks	Peak Hour LOS
Highway				
SH 17 North of Stanley	1,810	210	10%	A/A
SH 17 South of Stanley	2,528	372	8%	B/B
Intersection				
SH 17 & Stanley Road				
EB Approach	N/A	15/137	10%/3%	B/B
WB Approach	N/A	15/15	10%/10%	B/B
NB Left	N/A	117/5	3%/10%	A/A
SB Left	N/A	5/5	10%/10%	A/A

Source: CH2M HILL, 2010. (AM /PM)

Operating Conditions

The site will generate 10 new permanent jobs in the area, seven full-time positions and three seasonal positions. The small expected increase in traffic from operations personnel is expected to have a negligible effect on the traffic operations of the surrounding transportation network. As shown in Exhibit 5, level of service is expected to remain LOS A or B for all of the highway segments and intersection approaches/movements.

EXHIBIT 5
Existing Traffic Plus Operating Traffic - Peak Hour Conditions

Facility	Average Annual Daily Volume	Peak Hour Volume	Percent Trucks	Peak Hour LOS
Highway				
SH 17 North of Stanley	1,804	202	10%	A/A
SH 17 South of Stanley	2,416	268	10%	B/B
Intersection				
SH 17 & Stanley Road				
EB Approach	N/A	15/35	10%/10%	B/A
WB Approach	N/A	15/15	10%/10%	B/B
NB Left	N/A	21/5	10%/10%	A/A
SB Left	N/A	5/5	10%/10%	A/A

Source: CH2M HILL, 2010. (AM /PM)

Future Conditions

A 14.5-month construction timeline is currently anticipated. Due to the relatively short duration of construction at the site and the expectation that the number of operations personnel will remain constant, future traffic operations were not analyzed.

Other Design Considerations

Signing and Striping

Based on aerial and available site photographs, it appears that signing and striping in the area is adequate and maintained. Should construction activities extend beyond the expected 14.5-month period, “truck entering highway” warning signs could be implemented to warn drivers on SH 17.

Sight Distance

Site access will be designed to ensure adequate horizontal and vertical sight distance on Two Mile Lane North. The access will be located where no obstructions are within the sight triangles.

Pavement Maintenance

No pavement assessment was performed as part of this analysis. However, based on aerial and available site photographs, it appears the pavement condition of SH 17 is similar to that of other area rural highways and adequately accommodates the existing truck traffic. Due to the short

duration of planned construction, a need for long term pavement maintenance beyond that which is already completed by the State is not anticipated.

Intersection Turning Radii

The largest trucks expected onsite will deliver the torque tube solar components, which are approximately 72 feet long, and will likely require a CDOT permit due to load length. Any modifications to the existing unpaved roadways, for purposes of accommodating larger vehicles, will be designed in accordance with Alamosa County standards.

Requirements, Restrictions, and Permits

During project construction, roads and highways may be impacted by vehicles hauling materials to and from the site. Contractors will comply with existing federal, state, and county requirements and restrictions to protect the road network and the traveling public. In addition, load limits will be observed at all times to prevent damage to existing road surfaces. Arrangements to transport oversized loads will be coordinated with and approved by CDOT. Heavy trucks are not expected to access the site during the operations period.

Summary and Conclusions

The construction and operations of the Project will not significantly impact the traffic operations of the adjacent highway and intersections. The SH 17 intersection with Stanley Road will provide acceptable operations to the individual movements. During the peak construction period, the eastbound and westbound approaches will experience an increase in average delay of less than 2 seconds per vehicle during the peak hours. This will be a temporary condition during the peak construction period. Once construction is complete, the LOS with the operations-generated traffic will remain the same as the existing condition for these approaches. Thus, no improvements are recommended to the existing highway or intersection. The proposed intersection with the site access road and Two Mile Lane North should be constructed in compliance with Alamosa County standards for unsignalized intersections; and necessary improvements should be constructed to accommodate oversized vehicles if needed.

References

CDOT. 2010. Web site. http://www.dot.state.co.us/App_DTD_DataAccess/index.cfm Accessed on March 5, 2010.

Transportation Research Board, 2000. *Highway Capacity Manual*, Washington DC, 2000;