Saguache Solar Energy Project

Final 1041 Permit Application
Saguache County, Colorado

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List of Acronyms and Abbreviations

°F	degrees Fahrenheit
$\mu g/m^3$	micrograms per cubic meter
AM	Ante Meridian, before noon
amsl	above mean sea level
APEN	Air Pollution Emission Notice
BLM	Bureau of Land Management
BMP	best management practice
CAA	Clean Air Act
CDLE	Colorado Department of Labor and Employment
CDOA	Colorado Department of Agriculture
CDOT	Colorado Department of Transportation
CDOW	Colorado Division of Wildlife
CDPHE	Colorado Department of Public Health and Environment
CGS	Colorado Geologic Survey
CO	carbon monoxide
CO_2	carbon dioxide
County	Saguache County
CR	County Road
CSP	concentrating solar power
CWCB	Colorado Water Conservation Board
DAU	Data Analysis Unit
dBA	A-weighted sound power level
DOLA	Colorado Department of Local Affairs
EDI	electrodeionization
EPA	U.S. Environmental Protection Agency
ERZ	Energy Resource Zone
FAA	Federal Aviation Administration
FHU	Felsburg Holt and Ullevig
GEO	Governor's Energy Office
I-25	Interstate 25
kW	kilowatt
LOS	level of service
MMF	multimedia filter
mph	miles per hour
MW	megawatt
N	north
NAAQS	national ambient air quality standards
NAGPRA	Native American Graves Protection and Repatriation Act
NO	Nitric oxide
NO_x	nitrogen oxides
NO_2	nitrogen dioxide

NRCS	Natural Resource Conservation Service
O_3	ozone
OAHP	Office of Archaeology and Historic Preservation
PM	Post Meridian, afternoon
PM_{10}	particulate matter less than 10 microns
$PM_{2.5}$	particulate matter less than 2.5 microns
Project	Saguache Solar Energy Project
Project Applicant	Saguache Solar Energy, LLC
PSCo	Public Service Company of Colorado
R	range
RO	reverse osmosis
S	section
SH	State Highway
SIS	System Impact Study
SO_2	sulfur dioxide
SPCC	Spill Prevention, Control, and Countermeasures
SWMP	Stormwater Management Plan
SWPPP	Stormwater Pollution Prevention Plan
T	township
USDA	U.S. Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service

Introduction

This application is being submitted by Saguache Solar Energy, LLC (Project Applicant) per the Guidelines and Regulations for Areas and Activities of State Interest of the County of Saguache, seeking approval of a 200-megawatt (MW) solar power-generating facility by the Saguache County Board of County Commissioners (County). The Saguache Solar Energy Project (Project) consists of two 100 MW solar thermal power generating units in Saguache County, Colorado, proposed by Saguache Solar Energy, LLC, a Delaware limited liability company. Saguache Solar Energy, LLC is a Project-specific entity owned by SolarReserve, LLC, a Delaware limited liability company (SolarReserve). The Project will be developed within the "Project site" which consists of approximately 4,000 acres of a larger 6,200 acre area of privately owned land (the Property) in Saguache County Colorado. SolarReserve currently holds an option to purchase the Property. (The 6,200 acre area subject to SolarReserve's option is designated as "property being optioned" on the figures in this application.) As shown in Figure 1, the Project site is located in the San Luis Valley, where the state's best solar resources exist. The San Luis Valley is identified as one of two solar power generation development areas in the state of Colorado (RRGDATF 2007).

Numerous other sites in the San Luis Valley were considered by the Project Applicant for development of the Project. All sites evaluated were on private land; the exact locations cannot be revealed for purposes of maintaining confidentiality with the landowners. The governing principles of the Project Applicant's siting process included avoidance of environmentally sensitive lands and waters, avoidance of new overhead power lines, and minimization of environmental impacts including water utilization. Sites with wetlands, even arid wetlands, and sites with significant riparian areas were screened out as unsuitable. Sites with disturbed agricultural land were deemed to be the most favorable from an environmental standpoint since cyclic planting and harvesting diminishes the quality of wildlife habitat; such sites hold little potential for previously undiscovered cultural resource artifacts of any significance. Figure 2 shows a detailed map of the Project boundary.

The Project is based on concentrating solar-thermal power (CSP) generation technology that concentrates the sun's rays, heating a working fluid (a molten salt) that captures and stores the heat. Heat is used separately to create steam to drive a conventional turbine-generator to produce electricity. Figure 3 shows a generalized process diagram of the "central receiver" power tower CSP technology. The proposed CSP technology uses heliostats (tracking mirrors) arranged in a roughly circular array around a central tower to focus sunlight onto a thermal receiver at the top of the tower. Molten salt is heated to over 1,000 degrees Fahrenheit as it passes through the receiver and into a "hot" storage tank for later use. To generate electricity, the molten salt is circulated through a series of heat exchangers that convert water into high-pressure superheated steam. When the useful heat has been extracted, the molten salt is returned to the "cold" storage tank and then to the receiver in a continuous cycle from sunrise to sunset.

The superheated steam is used to power a highly efficient Rankine-cycle steam turbine/generator to produce electricity in a manner that is similar to any other conventional utility-scale steam-turbine generator. The exhaust steam from the turbine is condensed and returned via feedwater pumps to the heat exchangers, where the high-pressure superheated steam is generated again in a closed-loop

cycle. A small amount of the water in the steam cycle is purged to avoid buildup of concentrated impurities within the system. The turbine exhaust is cooled with an air cooled condenser, eliminating the water consumption associated with the typical wet-evaporative cooling process.

The 200 MW Project facility consists of two 100 MW units, which may be financed and constructed separately or in phases. Figure 4 shows the general preliminary site layout for both Project phases. Exhibit A provides more detailed preliminary Project design information.

Each of the two tower facilities within the Project is designed with the following components:

- An approximately 1,500 acre solar array, a roughly circular field with a radius of approximately 4,600 feet, where the heliostats are located. A conceptual heliostat arrangement is shown in Figure 5. Conceptual Heliostat front and back views are shown in Figure 6.
- An approximately 12 acre central “power island” (or “power block”) that houses the approximately 656-foot tall central receiver tower, two salt storage tanks, steam turbine generator, air-cooled condenser, transformers, heat exchangers, and related ancillary equipment.
- A control room, shop building, driveways high voltage switchyard and overhead generator tie-line.

A drawing that shows the conceptual receiver and tower elevation is provided in Figure 7. The preliminary power block design is shown in Figure 8.

Common facilities located inside the overall Project Site boundary will include:

- Common infrastructure and facilities including access roads, offices, warehouse, shop, parking lot and driveways, and up to two onsite water infiltration ponds.
- A water pipeline to convey water from its source in Alamosa County to the infiltration pond. The route will likely follow County Road 53 for two miles through Saguache County, from the county line to the southern property boundary.
- Evaporation ponds, located along the outside perimeter of the solar array.
- An onsite switchyard (one that will be common to both Project facility phases) to interconnect each respective generator to the existing 230-kilovolt (kV) Poncha-San Luis Valley transmission line, which crosses the Project site. (For the purposes of this Application, this onsite facility is referred to as the “switchyard,” and the existing San Luis Valley Substation, which is located approximately 6 miles south of the Project in Alamosa County, is referred to as the “substation”).

A unique element of the Project is the use of molten salt energy storage. Molten salt is circulated through panels of tubes in the receiver, collecting heat from the sun’s rays concentrated by the solar field. The heated salt is then routed to an insulated storage tank where it is stored with minimal heat loss. When electricity is to be generated, the “hot” salt is routed through a heat exchanger (or steam generator) to produce steam, which generates electricity in a conventional steam turbine cycle. After exiting the steam generator, the salt returns to the “cold” salt storage tank and the cycle is repeated. Molten salt storage provides a buffer, capturing and storing thermal energy when the sun is shining, even under cloudy, overcast and variable sunshine conditions, in a process that is decoupled from electricity generation. The stored thermal energy allows the generator to produce electricity when needed to meet demand on the

electricity grid, not just whenever the sun happens to be shining. The result is a more stable, controllable, and ultimately more valuable energy supply than other, more intermittent renewable energy sources can provide.

The molten salt is a combination of sodium nitrate and potassium nitrate salts with a melting temperature of 460°F. In the liquid state, the salt has the viscosity and an appearance similar to water, and is a heat storage medium that retains thermal energy very effectively over long periods of time. Once the salt has melted to a liquid form, it remains heated and in a liquid state throughout the plant's operating life without degrading. The salt that will be used is a technical-grade salt that is similar to commercial fertilizers.

It is anticipated that the Project will be completed in two phases, with commercial operation dates no earlier than June 1, 2014, and June 1, 2015, respectively. Timing of construction will be subject to other development milestones, such as securing a long-term contract (Power Purchase Agreement, or PPA) with a utility, and securing financing. The Project will deliver power to the grid by connecting to the existing 230kV transmission line that runs through the Project site via the proposed switchyard.

Public and Agency Meetings

The Preliminary 1041 Application for the Project was submitted to Saguache County on July 20, 2010. Two public meetings were held in September 2010 that offered opportunities for the Project Applicant to introduce the Project, provide opportunities for the public and County Commissioners and other agency representatives to ask questions and express concerns, and provide the Project Applicant a venue for answering and considering such questions and concerns. An informational open house hosted by the Project Applicant was held at the Saguache Town Hall (525 7th Street, Saguache, Colorado) on September 13, 2010, from 6:00 PM to 8:00 PM. A more formal meeting, hosted by the Saguache County Commissioners, was held at Center High School Auditorium (500 South Broadway St., Center, Colorado) on September 14, 2010, from 6:00 PM to 8:00 PM.

Seven 24-inch-by-32-inch posters were displayed at both public meetings. The posters covered the following topics:

- Information about how the public can provide comments about the Project
- An overview of anticipated community benefits of the Project
- A photo simulation of the Project from a location near Crestone
- A photo simulation of the Project from Highway 17
- A description of the Project
- A map showing the Project location
- An overview of the Project technology

The public meetings were advertised in the following newspapers:

- *Center Post Dispatch*
- *Pueblo Chieftain*
- *Saguache Crescent*
- *Monte Vista Journal*

- *Valley Courier/Alamosa News*
- *Del Norte Prospector*

Sign-in sheets were provided at both meetings. Based on the sign-in sheets, 23 people attended the Project Applicant's informational meeting and 43 people attended the County Commissioner meeting. Comment forms were also provided at the meetings. The forms could either be submitted during the meetings or sent in to the Saguache County Land Use Department at a later time. Seventeen written comments were received during and within a month of the two public meetings.

The Project Applicant has met with County and other local community agencies, federal and state wildlife agencies, and other agencies as listed in Table 1. The Project Applicant will continue to coordinate with local, state, and federal agencies.

Table 1:
Recent Agency and Interest Group Meetings

Meeting	Meeting Date
Melinda Meyers, Town of Moffat	September 8, 2011
Kelvin Stone and Forrest Neuerburg, Town of Center	September 7, 2011
Rio Grande Board of County Commissioners	September 7, 2011
Carrie McCool and Don Van Wormer, City of Monte Vista	September 6, 2011
Economic Development Roundtable	August 4, 2011
Darius Allen, Alamosa County Commissioner	August 3, 2011
Don Koskelin, Alamosa City Public Works Director	August 3, 2011
Mike Gibson, San Luis Valley Water Conservancy District	August 3, 2011
Brady Stagner, Superintendent, Sangre De Cristo School District	August 2, 2011
Travis Smith, San Luis Valley Irrigation District	August 2, 2011
San Luis Valley Firefighters Association	April 18, 2011
Jim Felmlee, Saguache County Emergency Manager, Center Ambulance and Fire District	January 18, 2011
Randy Arredondo, Saguache County Road and Bridge Department	January 13, 2011
Mike Norris, Saguache County Sheriff	January 12, 2011
George Welsh, Center School District	January 12, 2011
Laura Archuleta, U.S. Fish and Wildlife Service	January 12, 2011
Jason Surface, Colorado Division of Wildlife	January 12, 2011
Center Soil District Board, Natural Resources Conservation Service	January 11, 2011
Town Board of Center	June 6, 2010
George Whitten and Karla Shriver, Water Conservation District	June 6, 2010

Project Configuration Envelope

Throughout this 1041 Application, the Project is referred to as two stand-alone 100 MW CSP facilities. 100 MW is a nominal net output rating. The Applicant intends to continue to optimize the Project's design, providing the highest possible value and flexibility to the power purchase customer with the lowest total cost of renewable energy and system integration for the ratepayer. The design presented herein represents the best configuration available to the Applicant at the time of the 1041 Application's filing; however, certain aspects of the Project and technology design will be refined between issuance of a 1041 Permit and technical definition with the power purchaser prior to commencement of construction.

The applicant will keep all potential modifications to within the constraints and requirements of the approved 1041 permit, which include applicable setbacks, height limitations, building or safety standards, and impact mitigation. The project will not extend beyond the 4,000 acre Project Area, use fossil fuels for power generation, or consider more than two towers for the Project.

While observing the key constraints of the 1041 permit application, examples of potential changes that the Applicant might consider for the Project include:

- **Combining facilities.** Depending on the phasing of construction of the two contemplated CSP facilities, it may be more economical to combine and share certain facilities, such as buildings or evaporation ponds and other basic infrastructure.

- **Changing the steam turbine generator capacity.** The capacity, or megawatt rating, of the facility refers to the peak output (or "size") of the generator. With the Project's storage capability, a day's worth of stored solar energy may be released in fewer hours with a higher capacity steam turbine generator, or spread over the course of many hours with a lower capacity steam turbine generator. Unlike fossil-based power plants, this change would not impact emissions, as the thermal energy in this project is collected from 100% emission-free solar energy.

  Because the thermal energy collection is a separate process from the electric power generation, the change in the steam turbine generator size will not change the height of the tower, the number of heliostats, the water requirements, or any other project component that would be apparent to an outside observer. For a given receiver tower and heliostat configuration, an increase in the Project's output rating would yield the same daily or annual production; only, this would be delivered during a shorter daily period of turbine operation. Roughly speaking, the turbine's operating hours are inversely proportional to its size (for a given heliostat field and tower configuration).

  The Applicant has found this capacity flexibility to be critical, based on its experience with another project where the generating capacity was customized to better fit the electric utility's demands. The Applicant always customizes its projects' capacities pursuant to power purchase contract negotiations.

- **Symbiotic photovoltaic (PV) generation.** Photovoltaic technology may be used to augment the Project's output or provide power for the Project's own use. This would potentially include fixed tilt PV and/or dual axis tracking concentrating PV using the pedestals and tracking hardware already designed for heliostats. This type of change may alter the total megawatt generating capacity of the Project.

- **Final facility arrangement.** Facility layout may further refined and optimized within the bounds described in this document, including for example the final layout of the heliostat field, the service road(s) within the heliostat field, specific locations of buildings or equipment within the power block, and the locations of the evaporation ponds outside the heliostat field. Rearrangement is generally done in order to optimize costs or reduce impacts.

- **Equipment sizing.** In addition to the steam turbine generator capacity described above, other elements of the project may be sized differently in order to improve performance or cost. For instance, a slightly larger heliostat design may enable the Project to deploy fewer heliostat units in the field. Additionally, the steam generation system and cooling system will be subject to final design requirements.

- **Mitigation measures.** Modifications may be made due to wildlife mitigation strategies employed as a result of future consultation with State or Federal wildlife agencies. Adaptive management strategies could result in different operational protocols or in physical differences.

- **Construction workforce.** Contractors or subcontractors may have different workforce strategies than those anticipated by the Applicant. The Applicant does not exert control over specific hiring decisions or staffing levels, such determinations being the exclusive domain of the contractor. For example, to decrease the total construction period and associated overhead costs, the contractor might elect to utilize a greater number of workers to complete the work on a shorter schedule. Therefore, while the estimates herein were made collectively from experiences of the Applicant and its consultants under the assumed nominal construction conditions, the ultimate composition of the construction workforce may not be exactly what the Applicant has studied. More details will become known as proposals are obtained during a future competitive bid process.

- **Water supply plan.** Depending upon the decisions of other parties, including the Office of the State Engineer and Colorado Water Court, aspects of the water supply plan may be required to change. The Applicant will continue to strive to minimize the impact on water resources.

As stated above, no change to the Project design would be done outside the constraints and requirements in the 1041 Permit. Standards that would be maintained under any modification include but are not limited to dust control strategies, wildlife impacts minimization, safe handling of hazardous materials, adherence to fire or building codes, mitigation of traffic impacts, groundwater protection measures, visual impact levels minimization, and noise standards. Finally, the Project will not utilize other solar thermal generating technology, such as Stirling dish engines.

13-304(2)(a)(i) Base Area Delineation

The base area ("Project site") is approximately 4,000 acres of currently farmed land located in Township 41 North, Range 9 East in Saguache County, Colorado. Figure 9 provides an overview of land jurisdiction in the area of the Project. The Project is located in Saguache County approximately three miles north of the border with Alamosa County. State, U.S. Forest Service (USFS), U.S. Fish and Wildlife Service (USFWS), Bureau of Land Management (BLM), and National Land Trust lands are all within 20 miles of the Project. The Project will be constructed and operated on privately owned property.

13-304(2)(a)(i)(1) Base Area Map

The base area determination was made based on the area of land acquired for the Project. The base area is shown on Figure 2.

13-304(2)(a)(i)(2) Special Districts Map

Special districts are shown on Figures 10 through 14.

13-304(2)(a)(ii) Impact Area Delineation

With the exception of the socio-economic impact area and the linear facilities associated with the water supply pipeline, the impact area is defined to be the same as the base area, the approximately 4,000-acre Project Site. The socio-economic impact area is defined as Saguache County. A larger three-county "Influence Area" has also been evaluated for socio-economic impacts as further described in Section 13-304(2)(a)(iv)(2), Demographic and Economic Data and Methods of Analysis.

13-304(2)(a)(iii) Proposed Site Selection and Facility Objectives

13-304(2)(a)(iii)(1) Relationship of Project to Local Land Use Policies and Comprehensive Plans

The Project will comply with the Saguache County Land Development Code effective November 2008. This Final 1041 Application is being submitted to comply with the Saguache County code requirements.

The Project meets goals outlined in the Saguache County Master Plan adopted June 24, 2010, where applicable, as discussed below:

Goal #1—Provide for individualism and fairness for property owners and businesses while supporting existing businesses and attracting new ones.

G1-1*: Foster a business environment that encourages existing businesses and industries to remain, grow, and continue to be successful, while providing benefits to the County and its citizens.*

The Project site is located on private property, purchase of which will benefit the property owners. Property taxes from the Project will benefit Saguache County as further discussed in Section 13-304(2)(a)(vi)(2), Anticipated Revenues. The Project would be a new business in the County. The Project will reduce the use of groundwater resources as further discussed in Section 13-304(2)(d)(ii)(2), Water Rights Owned or Utilized, reducing pressure on existing agricultural businesses that will be required to procure augmentation water in the future.

G1-2: *Encourage renewable energy resource development in a manner that provides maximum benefits to local residents.*

The Project is a renewable energy development project that will benefit the residents of Saguache County with additional property tax revenues and employment opportunities. The Project Applicant has begun coordinating with local entities to ensure that benefits to local residents are maximized.

G1-4: *Support efforts to diversify businesses.*

The Project will diversify business in Saguache County by introducing a utility-scale solar energy facility, which does not currently exist in the County.

Goal #2—Protect the quality of the County's rural character, community, and many unique environmental features and natural resources through good stewardship and mitigation planning practices.

G2-3: *Continue to address measures to protect the County's many unique environmental features and natural resources.*

The Project site is located on private property that is currently being used for agricultural production, thereby minimizing and avoiding impacts to environmental features and natural resources. The Project will reduce the use of water resources as further discussed in Section 13-304(2)(d)(ii)(2), Water Rights Owned or Utilized. Furthermore, renewable energy production reduces the use of fossil fuels which emit greenhouse gases and other pollutants; thus, by reducing the environmental impact of Colorado's energy supply, the Project supports the existing environmental quality in the San Luis Valley.

G2-4: *Preserve our rural lifestyle while connecting with our future by guiding the pace, and patterns of growth in Saguache County.*

The Project will remove agricultural land from production; however, due to changing water regulations, it is likely that more land in the San Luis Valley than just the Project's would come out of agricultural production in the coming years. The voluntary removal of this land from agriculture will protect the other rural activities in Saguache County. The Project will not significantly affect the rural character of the County overall, but will connect with the County's future by introducing a significant source of solar energy production.

G2-5: *Accommodate compatible growth while preserving agricultural and range land, open space and wildlife habitat and personal property rights.*

As discussed in Section 13-304(2)(b)(ii), Impact Area Biotic Conditions, the Project will not adversely affect range land, wildlife habitat, or open space. The Project may take up to 6,200 acres of agricultural land out of production while providing benefits to private property owners and supporting local water resources as discussed in Section 13-304(2)(d)(ii)(2), Water Rights Owned or Utilized.

Goal #3: Provide adequate infrastructure, roads, and public safety

G3-1: *Encourage the development of Impact Fees for infrastructure and services as part of the development proposal review process.*

The Project Applicant is proposing a Development Agreement that will be entered into with the County that will identify the financial responsibilities of the Project Applicant.

G3-2: *Ensure that new development mitigates its proportional share of impacts on the existing transportation infrastructure.*

A traffic impact study was completed for the Project and is attached in Exhibit B. Section 13-304(2)(e)(iv)(4), Transportation, discusses road improvements and mitigation that will be implemented for construction and operation of the Project.

G3-3: *Ensure that weed control is maintained for all development.*

A weed control plan will be provided for the Project prior to the initiation of construction activities. The plan will be implemented both during construction and operations of the two Project phases.

13-304(2)(a)(iii)(2) Relationship of the Project to Other Existing and Planned Utility Facilities

Per conversations with Saguache County and review of area information, several solar energy facilities are currently planned in the San Luis Valley. If numerous projects were constructed at the same time, there is a potential for a shortage of available housing and skilled labor services. If numerous projects were being constructed in the same area, there is a potential for transportation impacts related to construction traffic. Housing is discussed in Section 13-304(2)(a)(ix)(4), current employment is discussed in Section 13-304(2)(a)(vi), and the existing transportation network is discussed in Section 13-304(2)(a)(ix)(5).

13-304(2)(a)(iv) Project Need

13-304(2)(a)(iv)(1) Public Convenience and Necessity

The San Luis Valley has been designated as an Energy Resource Zone (ERZ) by Xcel Energy (Xcel 2008) and the Western Governors' Association/U.S. Department of Energy (WGA/DOE 2009). ERZs are identified to have the potential to support competition among renewable energy developers for development of renewable resource generation projects (Xcel 2008) and are the most promising locations for solar power generation (WGA/DOE 2009). The proposed Project would have a generating capacity of

200 MW of solar power in the San Luis Valley ERZ. Through the passage of House Bill 10-1001, Colorado has recently increased its renewable energy standard to require large utilities to obtain 30 percent of their power from renewable sources by 2020.

Each 100 MW phase of the Project is designed to supply more than 430,000 MWh of energy into the grid per year. Each phase of the Project will provide numerous direct and induced economic benefits to Saguache County, including approximately 450 construction jobs at peak and approximately 50 full-time operational staff, tax revenue, as well as local spending on goods and services necessary to support construction, workforce housing and subsistence, and long-term facility operation and maintenance expenditures. Because the Project Applicant's technology uses no natural gas or other combustion fuel for power generation, the Project Applicant expects significant annual and lifecycle emissions avoidance for the Project relative to other power supplies with comparable dispatch reliability. Based on a blended average of the representative Western Electricity Coordination Council generation mix of 62 percent combustion-based generation (including coal and natural gas power) and 38 percent non-combustion-based generation (including hydroelectric power), electricity sourced from the Project could offset approximately 2.4 million metric tons of equivalent carbon dioxide (CO_2) emissions each year (EPA 2005). Each phase of the Project will operate for 30 years or more under long-term contracts with power purchasers. Over an operational life expectancy of 50 years (with overhauls,) the Project could realistically avoid approximately 118 million metric tons of equivalent CO_2 emissions over its realistic lifetime. Equivalent CO_2 is calculated as a combination of both CO_2 and the greenhouse gas effects of other common combustion emissions. Additional significant direct emissions reductions are expected for criteria pollutants including sulfur dioxide, nitrogen oxides, particulate matter of 10 micrometers or less (PM10), fine particulate matter less than 2.5 micrometers (PM2.5), and volatile organic compounds (VOCs).

13-304(2)(a)(iv)(2) Demographic and Economic Data and Methods of Analysis

Information sources for demographic and economic data include the Colorado Department of Local Affairs (DOLA) Economic and Demographic Information System, U.S. Census Bureau website for 2000 census data and available estimates from more recent years, Colorado Department of Labor and Employment (CDLE), and Colorado Department of Housing. Methods of analysis are discussed in each section (see Section 13-304(2)(a)(vi), Employment and Economic Opportunities). As stated in Section 13-304(2)(a)(ix), Impact Area Delineation, the primary socio-economic area of analysis is Saguache County. However, since there is limited housing available in Saguache County, larger nearby local communities, most notably Alamosa, Del Norte and Monte Vista, are expected to house many of the workers. A wider "Influence Area," therefore, is also discussed in relation to socio-economic issues as applicable and consists of portions of a three-county area: Saguache, Alamosa, and Rio Grande. Figure II-3 of Exhibit C shows San Luis Valley and the three-county socio-economic Influence Area.

13-304(2)(a)(iv)(3) Market Function

The Project Applicant does not yet have an executed power purchase agreement with an electric utility, and is actively pursuing one. The power output of the Project will enter the grid at a new switchyard along the existing 230 kV line that bisects the site, and will supply the region and elsewhere depending on current demand. It is anticipated that 200 MW of electrical generation relative to utilities' other power

resources is such that the Project Applicant does not expect the supply from this Project to affect the general commodity pricing or overall market functionality of the electricity industry. However, the unique attributes of molten salt storage may lead to new, innovative, and cost-effective power plant operational strategies.

13-304(2)(a)(v) Support Facilities Needed

13-304(2)(a)(v)(1) Water Quality Control

13-304(2)(a)(v)(1)(a) Proposed Sewage Treatment Facilities and Nonpoint Source Controls

Sewage Treatment Facilities

The Project Applicant proposes to use two septic systems for each 100 MW Project phase, one for the administration/maintenance building and workshop (to be occupied by approximately 25 people) and one for the control and operations building in the power block (to be occupied by approximately 20 people). The major components of the proposed septic system are:

- Influent conveyance piping
- Primary septic tanks
- Distribution box
- Disposal fields

The influent conveyance piping transfers wastewater from the plumbing inside the buildings to the downstream primary septic tanks. In the primary septic tanks, the raw sewage separates into three distinct zones: a scum layer, a sludge layer, and a clear layer. Heavy solids settle to the bottom to form the sludge layer, while the lighter material floats to the top to create the scum layer. Facultative and anaerobic digestion converts the organic matter to volatile organic acids, while anaerobic processes ferment the volatile organic acids to gases (methane, CO_2, etc.). Primary septic tanks can be constructed of materials such as concrete, polyethylene and fiberglass.

The distribution box receives effluent from the septic tanks and distributes the wastewater evenly to the disposal fields under gravity. The distribution box is normally constructed of concrete, located under the ground and watertight, with a riser height suitable to be accessible at ground surface. The excavation depth of the distribution box will be determined based on what is required to obtain gravity flow from the septic tank at a minimum approved pipe slope.

Disposal leach fields involve a perforated pipe with a minimum 2 inches of leach-field rock above the pipe and minimum of 6 inches below the pipe, up to a maximum of 100 feet long. A minimum 10 inch thick cover is required above the drain rock leach field and graded to deflect runoff water away from the disposal area. Effluent from the distribution box gravity flows to the disposal leach fields, and then flows out of the perforated pipe, percolating down through the leach rock, and is then adsorbed into the ground. The total required length of perforated piping required for each septic system at the Project is dependent on the soil absorption rate that is calculated from onsite percolation testing.

The Water Quality Control Division at the Colorado Department of Public Health and Environment (CDPHE) regulates the discharge of wastewater from all septic systems with design capacities greater than 2,000 gallons per day. The system will be designed, constructed, operated, maintained, and inspected in accordance with the CDPHE Guidelines of Individual Sewage Disposal Systems. Determination of the groundwater table at each of the proposed septic systems, as well as the specific soil percolation rates, will be required. In the event that groundwater elevations are too high to allow gravity drainage to the leach field, a pumped system, along with a raised leach field, may be required.

Non-Point Source Controls

Non-point sources of pollution are sources of pollution that come from many diffuse sources and moved around the Project site via water runoff. The Project site will have best management practices (BMPs) that will be clearly described in the site Stormwater Management Plan (SWMP), prepared in compliance with the CDPHE Colorado Discharge Permit Number COR-030000.

To minimize sediment transfer and provide erosion control, an optimal mix of BMPs will be implemented during construction and operation of the site. These BMPs will include a combination of the following:

- Erosion Control—Erosion control, also referred to as soil stabilization, consists of source control measures that are designed to prevent soil particles from detaching and becoming transported in stormwater runoff. Erosion control BMPs protect the soil surface by covering and/or binding soil particles.
- Sediment Control—Sediment controls are structural measures that are intended to complement and enhance the soil stabilization (erosion control) measures and reduce sediment discharges from construction areas. Sediment controls are designed to intercept and settle out soil particles that have been detached and transported by the force of water.
- Wind Control—Wind controls prevent the transportation by wind of soil away from soil-disturbed areas of the site. The Project will consider using a dust palliative that is resin (polymer)-based. When used, it is effective for a number of days, and when the area is re-watered, the polymer will be reactivated (similar to a starch solution). It is not anticipated that magnesium chloride will be used for surface treatment. Currently, there are many commercially available dust palliatives that do not use magnesium chloride.
- Tracking Control—Tracking controls will also be implemented to prevent sediment leaving the construction site on vehicle tires.
- Waste Management, Materials Handling, and Good Housekeeping—During construction, staging areas will be provided with berms and/or dikes to prevent runon and runoff. Vehicles will be fueled, cleaned, maintained, and stored only within designated areas, and drip pans / adsorbent pads will be used for vehicle and equipment maintenance that involve grease, oil, solvents or other vehicle fluids. During operation, the power block area, which contains a majority of the processing equipment and chemicals, will be within a contained area to prevent uncontrolled run off of stormwater. Procedural and structural BMPs for collecting, handling, storing and disposing of wastes generated by the Project will be implemented to prevent release of waste materials into stormwater discharges. Workers will be trained in the importance of preventing spills and what measures to take should a spill occur. Spills

will be cleaned up immediately in accordance with applicable local and state or federal regulations, and reported internally.

13-304(2)(a)(v)(1)(b) Pollutant Loads (Point and Non-Point Sources)

There will be no point or non-point source discharges from the Project. There are two types of point source wastes generated onsite: wastewater, and solid waste.

Wastewater

There are two types of wastewater generated at the Project: domestic, and industrial. In the domestic process, all wastewater generated from toilets, showers, kitchens, and sinks will be directed into an onsite sanitary septic system and onsite leach field. The pollutant loads will be typical of a sanitary waste system of a similarly sized commercial office . In the industrial process, wastewater is generated from two key process streams: the steam cycle blow down, and reject from the water treatment operation. All industrial wastewater streams will discharge into onsite lined evaporation ponds.

The Project Applicant performed a groundwater quality investigation during October 2010 to characterize current groundwater quality in the vicinity of the Project site. The full report is provided in Exhibit D. There were no constituents of concern identified. The final refined design for the Project will include water balance studies and calculations. In general, the evaporation ponds will are used to retain water that is purged from the steam generation system to prevent concentration of solid impurities which are left behind in the heat exchangers as the steam evaporates. The evaporation ponds are lined and leak detected. A groundwater monitoring program will be implemented during Project operation to ensure area groundwater quality is not being impacted. A groundwater monitoring plan is included in Exhibit E.

Solid Waste

Waste will be generated from construction and operation of the Project. During construction, waste materials will include scrap wood, steel, glass, plastic, paper, insulation, metals, empty material containers, spent welding materials, and waste oil filters. All generated wastes will be stored in designated areas, covered and or contained per regulations applicable to the type and nature of the waste material (i.e., to prevent interaction with stormwater), and disposed of offsite at an appropriate disposal facility using a licensed waste hauler and using a proper manifest for transport. Scrap construction materials will be recycled to the greatest extent possible. During operation, primary solid wastes will be generated from power generation facility operations and maintenance activities. These will include rags, turbine air filters, machine parts, defective or broken electrical materials, empty containers, and typical refuse generated by workers and small office operations. As per construction activities, all generated waste will be stored in a designated area, covered to prevent interaction with stormwater, and disposed of offsite at an appropriate disposal facility. The Project Applicant will be in compliance with all applicable mandates and regulations, including the Colorado Air Quality Control Program and the Clean Air Act.

Hazardous waste that includes lubricating oil and chemical cleaning solutions (from periodic pipe cleaning) will be generated. Waste oil will be recycled by a certified oil recycler, and all chemical feed drains (those that collect the spillage, tank overflows, and liquid from washdowns) will be sampled and, if

not contaminated, will be released to the onsite lined evaporation ponds. All contaminated waste liquid will be recycled if possible, or disposed of at an offsite permitted facility.

Non-point source pollutants from stormwater will be controlled through the BMPs outlined in the SWMP, which may include inspections and sampling of stormwater runoff to determine pollutant loading if necessary under the CDPHE Colorado Discharge Permit Number COR-030000.

Hazardous, Wastewater, and Solid Waste Treatment, Storage and Disposal

This section identifies the hazardous materials that will be used and stored onsite. This section also includes a discussion of the provisions that will be designed into the plant for the protection of groundwater from accidental spills or leakage. Disposal options are discussed for solid wastes generated from the site, and the proposed water treatment process is described.

The Project will use limited quantities of hazardous materials during construction and operation. Both construction and operations phases are anticipated to generate limited quantities of hazardous waste and the Project is expected to qualify as an EPA Small Quantity Generator. Most of the hazardous materials that will be used for the Project are water treatment chemicals for purification of water and for control of corrosion within closed piping systems, lubricants and solvents used for equipment maintenance, and PCB-free oils contained within rotating machinery, transformers, and electrical equipment. The below sections describe the hazardous materials used and includes a table detailing the hazardous materials used during operation of the plant.

Construction Phase

Relatively small quantities of hazardous materials typical to construction of industrial facilities will be onsite during construction. These are limited to gasoline, diesel fuel, motor oil, hydraulic fluid, solvents, cleaners, sealants, welding flux, various lubricants, paint, and paint thinner. Additionally, propane or natural gas will be used to melt the sodium nitrate/potassium nitrate salt mixture.

Operations Phase

Table 1 in Exhibit F provides a list of hazardous materials expected to be used onsite during plant operations. Table 2 in Exhibit G provides chemical property information for the molten salt.

Most of the hazardous substances that will be used by the Project are either required for facility maintenance and lubrication of equipment. The facility is expected to qualify as an EPA Small Quantity Generator of hazardous wastes. Storage of these hazardous substances will be carefully contained within designated hazardous materials storage areas and their use will be proscribed in terms of hazardous materials handling plans and the facility Health and Safety Plans.

Nitrate Salts

The nitrate salts that will be utilized in the Project are ingredients typically used in common fertilizer. In the context of this Project, they do not present a risk of explosion or of fire. An explosive reaction would require chemically proportional amounts of substances known as “oxidizing agents” and “reducing agents.” While the salts are classified as oxidizing agents, an explosive reaction will be chemically

impossible given the lack of a similar amount of reducing agents located onsite. Risk of airborne release is low and limited to the construction phase only. There is virtually no risk of groundwater contamination, because the salt solidifies when exposed to atmospheric temperatures. Under the proposed utilization, the salts are contained in a "closed loop" system and will not degrade significantly over the course of the power plant's operational life; thus they will not require modification or replacement. Further discussion is provided in Exhibit G.

Scientists at Sandia National Laboratories specifically tested the fire and explosion safety risk by mixing molten salt with oils and deliberately attempting to ignite the mixture.[1] When the mixture was ignited, it did not explode and scientists concluded that "the principal reactions were between the vaporized hydrocarbons and the air above the salt bath and not with the salt itself." The brand of salt mixture was called "Hitec®" at the time. The safety test concluded that "Experimental data indicate that Hitec® is not explosive. Draw salt or any other mixtures of sodium nitrate and potassium nitrate were expected to act similarly to Hitec®." It should be noted that this study focused on another application for molten salt storage which uses high temperature oils as the heat transfer fluid, and thus has a risk of mixing flammable oils with molten salts. SolarReserve does not use high temperature heat transfer oils (such as the Therminol® brand, commonly used in solar troughs), so this mixture would never occur in the proposed Project. The study goes on conclude that "the safety concerns in a plant that uses Therminol® and nitrate salt in a heat exchanger are not anymore [sic] dangerous than using Therminol® around other high-temperature heat sources." This independent documentation, which was published in a peer-reviewed journal, shows that there is not a risk of explosion with molten salt.

Additional studies on Solar Two and molten salt energy storage are available on the Department of Energy's website at http://www.osti.gov/bridge/basicsearch.jsp. These public documents thoroughly establish the successful experiences from Solar Two, the safe and effective use of molten salt in a variety of applications, and the depth of understanding of these systems.

Accidental Release Hazards

Proper engineering controls will minimize the risk that any chemical release would expose the public to harm. The Project design will incorporate state-of-the-art chemical storage and handling facilities in compliance with the current National Fire Protection Association (NFPA) Uniform Fire Code and other applicable federal, state, and local regulations. Hazardous materials will be stored within containment areas designed to contain accidental spills and releases. With the implementation of these measures, the impacts related to the accidental release of hazardous materials will be minimized or eliminated.

Specific requirements of the Uniform Fire Code that reduce the risk of fire or the potential for a release of hazardous materials that could affect public health or the environment include:

- Provision of an automatic sprinkler system for indoor hazardous material storage areas
- Provision of an exhaust system for indoor hazardous material storage areas

[1] Pacheco, J., Showalter, S., and Kolb, W., "Development of a Molten-Salt Thermocline Thermal Storage System for Parabolic Trough Plants," Journal of Solar Energy Engineering, Special Issue: Solar Thermal Power, Vol. 124, May 2002.

- Separation of incompatible materials by isolating them from each other with a noncombustible partition
- Spill control in all storage, handling, and dispensing areas
- Separate secondary containment for each chemical storage system

The secondary containment is required to hold the entire contents of the tank plus the volume of water for the fire suppression system that could be used for fire protection for a period of 20 minutes in the event of a catastrophic spill.

A Project emergency response plan will include an inventory and location map of hazardous materials onsite and an emergency response plan for hazardous materials incidents. Specific topics addressed in the plan would include:

- Facility identification
- Emergency contacts
- Chemical inventory information (for every hazardous material)
- Site map
- Emergency notification data
- Procedures to control actual or threatened releases
- Emergency response procedures
- Training procedures
- Certification

The emergency response plan would be filed with the applicable agency for the Project site, and will be updated in accordance with applicable regulations.

In accordance with emergency response procedures specified in the plan, designated personnel will be trained as members of a plant hazardous material response team, and team members will receive the first responder and hazardous material technical training that will be presented in the plan, including training in appropriate methods to mitigate and control accidental spills.

Solid Wastes—Landfills

The Project will generate solid wastes typical of a power generating facility. These include scrap parts, rags, used filters, empty containers, and waste associated with small office operations. The quantity of all solid non-hazardous waste expected to be generated is estimated at 10 tons per year per 100 MW phase. One or more of the landfills listed in Table 2 are expected to be able to receive such solid waste.

Table 2:
Solid Waste Landfills in the Vicinity of the Project

Name	Location	Contact Information
San Luis Valley Regional Landfill	1600 County Road 44, Monte Vista, CO	(719) 852-3810
Baca Grant Subdivision	146/147 Camino Del Rey Paul Rovenelli P.O. Box 233 Saguache County Crestone, CO 81131	Not available

Table 2:
Solid Waste Landfills in the Vicinity of the Project

Name	Location	Contact Information
Colorado Natural Compost	CR 50 & CR X—3 miles south of Saguache Saguache, CO 81149 P.O. Box 405	John Baxter (719) 655-2400
Compost Technologies LLC	736 East State Highway 112 Center, CO 81125	Mark Inness, Mgr (719) 754-9092
Saguache County Landfill Saguache County Road and Bridge	8 Mi E of Saguache on Road 55 Saguache, CO 81149 P.O. Box 655, 501 4th Street P.O. Box 476	Mike Spearman, Chairman Randal H. Arredondo (719) 655-2231 (719) 655-2554
Son Dau Trust Dump Site Son Dau Trust	/4 to 1/2 mile east of Hwy 117 on CR Q 596 Stockade Ranch Road SAGUACHE County Paige, TX 78659	Brenda Swenney(512) 801-4276
Southern Colorado Farms Saguache County Specialty Investors, Ltd Specialty Investors	N of CR E & West of Hwy 17 Hooper, CO P.O. Box 47 Saguache County Hooper, CO 81136	Diana Allen (719) 378-2210 (719) 378-2210
Town of Saguache	P.O. Box 417 Saguache County Saguache , CO 81149	Daniel Pacheco, Public Works Director (719) 655-2232

Hazardous Waste Landfills

The Clean Harbors Deer Trail facility, located north of the community of Deer Trail and west of the community of Last Chance, is the only permitted hazardous waste disposal site in Colorado. On December 21, 2005, the CDPHE, Hazardous Materials and Waste Management Division, issued the Hazardous Waste Permit Renewal and Radioactive Materials License to the Clean Harbors Deer Trail Facility. The permit renewal authorizes the continued hazardous waste treatment and storage and disposal at the facility for another 5 years. The facility was first issued a hazardous waste permit in April 1987, with a permit renewal issued in February 1998. The radioactive materials license authorizes the receipt, possession, processing, and disposal of naturally occurring radioactive material. Information regarding the facility is provided below:

Clean Harbors Deer Trail facility (Laidlaw Environmental Services)
EPA ID: COD991300484
Phone: (907) 386-2293
Facility Address:108555 East Highway 36, HCR-1; Deer Trail, CO 80105
Mailing Address: 5299 DTC Boulevard, Suite 1100; Englewood, CO 80111

Point of Contact: Bill Shortreed

Hazardous Waste Operations Authorized by the Permit:

- Solidification/Stabilization
- Physical/Chemical Treatment
- Landfill
- Solvent Collection/Blending
- Microencapsulation

- Macroencapsulation
- Contracted Transportation

Waste Groups Not Accepted Under the Permit:

- Radioactive Waste
- Compressed Gases
- Reactive Waste
- Explosives
- Polychlorinated Biphenyls > 50 ppm
- Dioxin > 1 part per billion
- Infectious Waste

Wastewater Treatment Process

There will be two wastewater streams from each 100 MW phase of the Project. One will be a sanitary wastewater stream from the toilets, sinks, and showers within the administrative, office, and control room areas of the respective Project phase, and the other will be the process wastewater from the plant operations.

The sanitary wastes will be discharged to a septic tank and leach field, which is described above in Section 13-304(2)(a)(v)(1)(a), Proposed Sewage Treatment Facilities and Nonpoint Source Controls, in the subsection entitled “Sewage Treatment Facilities.”

The process wastewater from plant operations will be generated from the water treatment reject, and steam cycle blow-down. These streams will be piped to the lined evaporation ponds (as described below), where the water will be evaporated, leaving behind any solids. The ponds will be designed with sufficient capacity to retain the expected solids for the life of the plant. It is estimated that the Project will generate approximately 1,500 tons of precipitate per year. If the ponds are required to be cleaned prior to the end of the useful life of the Project, one or more ponds will be dried and the solids tested and hauled to a landfill. It is possible that the solids residue can be hauled to one or more of the landfills listed above depending on the result of waste characterization testing.

Evaporation Ponds

The double-lined evaporation ponds will provide a location for discharge of the plant wastewater effluent streams as discussed above. The plant wastewater will be piped from the power block to the evaporation ponds. The discharged wastewater will be contained, and evaporation will be the means of wastewater reduction. Precipitates will collect in the ponds as the water evaporates. The ponds will be designed, built, and operated in accordance with the CDPHE permitting requirements.

Three evaporation ponds are proposed at each Project site and will be sized based on the wastewater discharge rate, the site-specific evaporation rate, and the water quality. At this time, they are each anticipated to be six acres in size. The final design of the evaporation ponds will be based on the following operating criteria:

- Size the ponds to achieve sufficient evaporative capacity under annual average and peak discharge conditions, to allow for storage or evaporative residue for the full operational life of the Project, to maintain a minimum of 2 feet freeboard at all times, and to allow one pond to be taken out of service for 1 year for maintenance without impacting the operation of the Project.
- Meet or exceed regulatory requirements for containment of liquid designated wastes.
- Select materials that are compatible with the physical, chemical, and thermal characteristics of the wastewater and evaporation pond residue being contained.
- Protect against physical damage to the containment layers by including protective layers in the design of each evaporation pond.
- Allow for occasional removal, if needed, of contained media without otherwise damaging the integrity of the containment systems.
- Include the ability to monitor the integrity of the containment system, collect and recover leakage through the primary liner, and transfer fluids from one evaporation pond to another.

The ponds will incorporate the following into the design:

- Sludge build-up over 30 years
- Local ambient temperature as it relates to freeze / thaw cycle
- 3 feet of operational depth
- 2 feet of freeboard
- Base of the drainage layer of the evaporation pond must have a minimum 1 percent slope
- Side slopes within the pond are at 3 to 1 (horizontal : vertical)
- Side slopes outside the pond are at a maximum 6 to 1 (horizontal : vertical)
- Top width of berm to be a minimum of 9 feet to allow for access

The containment design for the evaporation ponds, from surface of the evaporation ponds downwards, will consists of the following:

- A primary 60-mil high density polyethylene (HDPE) liner
- A leak detection, collection, and recovery system consisting of a geonet, collection sump, and piping
- A secondary HDPE liner (minimum of 40 mil)
- A 1-foot-thick compacted, prepared native soil base

In addition, a ramp will be constructed to provide access for equipment and maintenance to each pond. At the ramp locations, there will be hard surface/protective layer above the primary HDPE liner.

The proposed liner system will be constructed of HDPE. HDPE was selected as the preferred material for the primary and secondary liners for the following reasons:

- It is chemically resistant to potentially high concentrations of dissolved salts.
- It is very durable during installation.
- It is strong and possesses desirable stress-strain characteristics.
- It is the most common synthetic material used as a liner, so there is a broad base of practical experience associated with its installation.

13-304(2)(a)(v)(2) Public Services and Facilities

13-304(2)(a)(v)(2)(a) Police and Fire Protection Requirements

The Project will rely on both onsite fire protection systems and offsite fire protection services (Center Fire Protection District) during both construction and operations. The Project Applicant has initiated coordination with Police, Fire, and other emergency services. A meeting was held with Mike Norris, the Saguache County Sheriff, on January 12, 2011. A meeting was held with Jim Felmlee, the Saguache County Emergency Manager, on January 18, 2011.

The Center Fire district is a volunteer fire district with a current staff of 26 volunteers and the capacity for 35 volunteers. Large fires often require the services of other volunteer fire departments in the San Luis Valley. Based on feedback received at a San Luis Valley Firefighters Association meeting, none of the Fire Chiefs consulted anticipate significant impacts to their districts' respective operations or equipment needs beyond that which Saguache Solar Energy, LLC will provide. Saguache Solar Energy, LLC will ensure that local fire districts understand any specialized fire-response needs of the facility and how to access the required water storage. During operations, Saguache Solar Energy, LLC will maintain first-line fire protection and life safety service onsite.

A Construction Fire Protection and Prevention Plan will be developed prior to construction for implementation during construction.

The Saguache County Sheriff's Department has an eight-person staff and will have responsibility for law enforcement and property protection on the Project site. Significant impacts are not anticipated to County law enforcement services and it does not appear necessary to hire new staff to handle responsibilities associated with monitoring the facility or enforcing traffic laws in the area.

Saguache Solar Energy, LLC will have private onsite security to supplement the County's services. Project security staff will monitor the Project site 24 hours a day, seven days a week. It is unlikely that additional police services would ever be needed at the Project site.

13-304(2)(a)(v)(2)(b) Public Road Maintenance Requirements

The Project Applicant has initiated coordination with the Saguache County Road and Bridge Department. A meeting was held with Randy Arredondo, Saguache County Road and Bridge Department, on January 13, 2011. Road maintenance protocols and commitments will be specified in a Development Agreement between the Project Applicant and the County.

Access to the site and each of the solar fields will be from County Road G (CR G). CR G can be accessed from State Highway 285 (SH 285) to the west of the Project location and State Highway 17 to the east of the Project location. CR G does not have an asphalt surface near the Project, but is surfaced with asphalt to the west of the Project near SH 285.

The period of heaviest use of CR G will occur during construction, so it is anticipated that this period will also require the most maintenance. The Project Applicant is proposing to pave the section of CR G given the anticipated heavy volume of construction traffic.

13-304(2)(a)(v)(2)(c) Educational and Health Service Requirements

The Project Applicant met with George Welsh of the Center School District on January 12, 2011. The district has capacity for 750 students; roughly 600 students were enrolled in January 2011. The Project will not contribute to a need for additional educational resources or facilities. There are four school districts in Saguache County: Center 26 JT, Sangre de Cristo, Moffat 2, and Mountain Valley RE 1. The Project site is served by two local school districts (Center 26 JT and Sangre de Cristo) as shown in Figure 10. These districts will be beneficiaries of increased property tax revenue, but they will not experience a great deal of enrollment growth associated with the Project. The potential temporary influx of a minimal amount of students associated with non-local construction workers is not expected to present a problem with respect to school capacities. Most non-local construction workers are not expected to relocate their families to Saguache County. With only an estimated 10 new workers moving to the Valley for Project operations (see Exhibit C), impacts to local school districts will be very minor.

Similarly, impacts on health services requirements are expected to be minor. The size of the Project's construction and operational workforce is small compared to the overall size of the population in the San Luis Valley. Sufficient resources are currently in place to serve any anticipated health service needs.

13-304(2)(a)(v)(2)(d) Facilities and Services Required to Provide Adequate Water Supply and Sewage Treatment

The water supply source is further discussed in Section 13-304(2)(d)(ii)(2), Water Rights Owned or Utilized. The physical source of water will likely be one or more existing or new wells in the unconfined aquifer underlying the Project site, similar to those being used currently for irrigation purposes. If any existing well will be used, a new well permit allowing use of the water for industrial purposes will be obtained from the State Engineer. The necessary well permits for any new wells to be constructed will also be obtained from the State Engineer.

As part of the Project's anticipated water supply plan, water associated with a senior surface water right will be utilized to recharge the aquifer at the Project site. This water will originate in Alamosa County, roughly 20 miles from the border with Saguache County. The route and other specifics of the pipeline conveying this water through Alamosa County will be described in greater detail during the relevant permit process with that County. As will be more specifically described in Water Court proceedings and/or permits with the State Engineer, well diversions on the Project site will likely be replaced on a one-for-one basis.

As previously discussed, Saguache Solar Energy, LLC has performed a groundwater quality study to evaluate the groundwater quality in the area of the Project site. The groundwater quality study and results are provided in Exhibit D.

The plant will have a raw water tank to provide up to 48 hours of water storage to service all facility needs. The major portion of the raw water is for plant use, while a smaller portion of the raw water will be reserved for fire water. The raw water will go through a treatment process before it is used in such plant processes as the steam cycle and mirror washing. The onsite treatment systems may include any of the following components:

- Multimedia Filter—The Multimedia Filter (MMF) contains multiple types of media. Coarse media layers are in the top of the tank to trap large particles, and successively finer layers trap successively smaller layers deeper in the bed. A coagulant is introduced before the MMF inlet to capture fine particles for ease of filtration in the MMF. The multi-media filter is backwashed using reverse or upward flow of water through the filter bed. The various layers of media retain their stratification because each material has a different density.
- Reverse Osmosis—The reverse osmosis (RO) system is a filtration process that works by using pressure to force water through a membrane, capturing solid and mineral contaminants within the membrane while allowing the pure water to pass to the other side. Membranes are periodically back-flushed to drive out (reject) accumulated filtrates. An anti-scalant and dechlorinator will be injected upstream of the RO skids to reduce the cleaning cycle of the membranes.
- Electrodeionization—Electrodeionization (EDI) is a continuous and chemical-free process of removing ionized and ionizable species from the water using direct current power. EDI is used to polish the RO permeate. EDI replaces conventional mixed bed ion exchange, avoiding hazardous chemicals used for resin regeneration and associated waste neutralization requirements.

The product from the EDI is stored in the demineralized water storage tank for solar field mirror wash (the entire field is cleaned on a roughly two-week cycle to maintain full optical performance) and steam generation makeup.

Wastewater is sent to onsite evaporation ponds. Each unit has multiple ponds that will be sized to achieve sufficient evaporative capacity under annual average and peak discharge conditions, allow for storage of up to 3 feet of evaporative residue, maintain a minimum of 2 feet freeboard at all times, and allow one pond to be taken out of service for up to one year for maintenance without impacting the operation of the plant. Specifications of evaporation ponds and containment design are further described above in section 13-304(2)(a)(v)(1)(b).

Sewage treatment will be provided through a septic tank and leach field system for each 100 MW unit as outlined in the previous section.

13-304(2)(a)(vi) Employment and Economic Opportunities

13-304(2)(a)(vi)(1) Capital Investment in Facility

Capital investment in the Project will be approximately $600 million per Project phase. However, it is important to note that this estimate will likely be influenced by factors such as inflation, materials cost, and schedule.

13-304(2)(a)(vi)(2) Anticipated Revenues

Project Revenues

The source of revenue for the Project depends upon the type of long-term arrangement between the Project and an electric utility. The expected source of revenue is through a long-term (typically 20+ years) Power Purchase Agreement (PPA) with a major Colorado utility such as Xcel Energy or Tri-State

Generation and Transmission. Alternatively, the project may enter into agreements with one or multiple other utilities interconnected to Xcel's and/or Tri-State's high voltage transmission system, or directly contract with industrial energy customers. Depending on renewable energy policy and practices, the Project may separately sell energy, operational characteristics (such as the ability to increase or decrease generation on demand), renewable energy attributes, capacity attributes, or other energy products, to one or multiple counterparties. The Project may be acquired by a utility and incorporated into that utility's generation fleet; in that case, the utility would generate the revenue by selling the Project's energy to retail customers, or to other utilities.

Tax Revenues

The Project will be built in Saguache County. The County and local taxing districts will be the principal property tax beneficiaries. Property taxes and sales and use taxes are described in detail below, in section 13-304(2)(a)(ix)(3)(f).

13-304(2)(a)(vi)(3) Employment Opportunities

13-304(2)(a)(vi)(3)(a) Positions and Salaries Anticipated

With the development of each 100 MW phase of the Project, Saguache Solar Energy, LLC anticipates a 30-month construction period that supports an average monthly work force of approximately 250 persons with a peak of approximately 450 workers. However, actual staffing decisions will be made independently by contractors and subcontractors, which may lead to deviation from the estimated workforce numbers. Each phase of facility operations, once fully operational, will support about 50 full-time employees. With both phases in service, consolidation of certain operations and administrative functions may result in some workforce optimization. The majority of construction jobs are skilled positions, which will likely require a mix of local labor force and specialized skilled workers from outside the area. Table 3 contains the maximum number of employees per shift during the construction and operation phases. Table 4 contains a listing of the number of anticipated skilled positions necessary by month over the construction period.

Table 3:
Construction Activities and Employee Data—Each 100 MW Facility

Activity	Number of Employees (approximate)	Approximate Shift Times	Duration of Activity
Construction	250 to 400+ (average)	1 (5 AM to 7 PM) with limited second shift and startup activities on 24/7	30 months
Operation and Maintenance	50	7 days a week, 24 hours a day	30+ years

The operations workforce will consist of management, engineering, and administrative staff, skilled workers, and operators. Each 100 MW facility may be operated up to 7 days a week, 24 hours per day. Security personnel will be present at the Project facility 7 days a week, 24 hours per day. Saguache Solar Energy, LLC expects that many of these jobs will be filled by local workers. Table 5 provides a listing of the general operations workforce categories.

Table 4:
Anticipated Project Construction Personnel by Discipline

	Monthly Number																														
	Compliance Plant Prep			Construction																								Commissioning			
Job Category	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Totals
CRAFT																															
Boilermakers														6	8	8	8	8	8	8	11	11	8	8	6	6	6				110
Carpenters				2	2	20	22	28	30	40	50	50	50	40	30	25	25	25	20	15	15	15	10	10	10	10	6	4	4	4	562
Electricians				2	2	4	20	36	36	48	48	56	56	56	56	56	56	56	56	56	48	48	36	36	36	24	24	24	20	16	1012
Insulators																						8	8	8	16	16	16	4	4	2	82
Ironworkers						8	20	24	26	26	32	32	32	26	30	25	25	20	20	20	20	20	20	18	18	18	12	12	6	6	516
Laborers	2	2	2	6	10	20	20	26	26	40	44	52	54	54	54	54	54	54	54	54	48	48	48	32	32	32	20	16	16	16	990
Cement Masons				1	1	1	4	4	4	4	4	6	6	6	4	4	4	4	4	4	4	4	4	4	4	4	4	2	2	0	97
Millwrights							3	3	3	16	16	16	16	16	16	16	16	16	16	16	14	14	12	12	10	10	8	6	6	6	283
Operating Engineers	2	2	2	10	22	22	22	36	40	40	36	36	30	30	30	30	24	24	24	20	20	20	20	20	20	20	15	15	15	12	659
Painters																								5	8	8	8	4	2	2	37
Pipefitters						45	60	60	80	80	80	80	80	80	80	80	80	70	70	60	60	50	50	40	40	40	40	40	40	15	1500
Teamsters	2	2	2	4	6	4	4	4	15	15	15	15	15	26	26	26	26	26	26	26	30	28	28	28	28	24	24	24	20	16	535
Heliostat Assembly Craft	0	0		0	0	0	0	15	30	45	45	45	45	45	45	45	45	45	45	45	45	0	0	0	0	0	0	0	0	0	585
Total Craft	6	6	6	25	43	124	175	236	290	354	370	388	384	385	379	369	363	348	343	324	315	266	244	221	228	212	183	151	135	95	6968
STAFF																															
Construction Staff	2	4	8	10	24	36	36	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	40	32	32	32	1016
CM Staff (SR)	1	2	3	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	141
Subcontractors	0	0	0	3	6	6	6	6	6	4	3	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	80
TA	0	0	0	0	0	0	0	0	0	0	0	2	4	4	4	4	4	4	4	4	4	4	4	4	6	6	6	6	6	6	86
Staff Total	3	6	11	18	35	47	47	51	51	49	48	50	52	51	51	51	51	51	51	51	51	51	51	51	53	53	53	45	45	45	1323
GENERATOR TIE-LINE																															
Laborer	4	4	4	4	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
Operator	8	9	4	4	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	29
Teamster	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6

Table 4:
Anticipated Project Construction Personnel by Discipline

	Monthly Number																													
	Compliance Plant Prep			Construction																							Commissioning			
Job Category	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	Totals
Electrician	7	11	11	11	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	60
Generator Tie Line Total	20	25	20	20	15	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	115
Total	29	37	37	63	93	186	222	287	341	403	418	438	436	436	430	420	414	399	394	375	366	317	295	272	281	265	236	196	180	140	8406

Table 5:
Anticipated Plant Operation Workforce

Department	Personnel	Shift
Operations	(20) Plant Operating Personnel (1) Plant Chemist	Standard 8-hour days, 4 operators per shift (5 crews of 4)
Heliostat Washing	(8) Heliostat servicemen	Standard 8-hour days
Maintenance	(4) Mechanical Technicians (4) Electrical/I&C Technicians (4) Laborers (Semi Skilled)	4x10 Hour shifts or 5 x 8 hour shifts
Administration	(6) Total (1) Plant General Manager (1) Operations Superintendent (1) Plant Engineer (1) Maintenance Manager (1) Maintenance Planner (1) Administration Assistance	4x10 Hour shifts or 5 x 8 hour shifts

Saguache Solar Energy, LLC reviewed publicly available Davis-Bacon Act wage determinations for Saguache County to provide an initial indication of craft labor payroll. Of the four available wage determination categories (Heavy, Highway, Building, and Residential), only “Heavy” and “Highway” apply to power plant construction. Excluding superintendents and other management, these two categories show similar salary rates for electricians, equipment operators, pipe fitters/plumbers, and laborers which are indicative of the craft labor force. In this analysis, it was found that salaries across craft labor categories range from $18 to $44 per hour, with a weighted average of approximately $40 per hour. Thus, the workforce is expected to earn approximately $40 per hour.

13-304(2)(a)(vi)(3)(b) Employment of Local Citizens

There will be construction employment opportunities for qualified local populations in the trades listed in Table 4 above. Prior to and during construction, the Project will utilize both local and non-local consultants and contractors for the design and construction. The design and construction scopes of work are typically bid out to a range of consultants and contractors. Depending on the experience and qualifications of the available local firms, it is expected that a large portion of the work could be performed by local firms. The ongoing operation of the facility will more than likely include local residents. Efforts to support local hiring are described further in section 13-304(2)(a)(ix)(2)(d).

13-304(2)(a)(vi)(3)(c) Low Income and Minority Population Employment Opportunities

There will be employment opportunities for local low income and minority populations. Such opportunities will likely include general construction labor jobs. Specialized skill jobs, as well as full-time operational jobs, will also be filled with these populations where possible.

13-304(2)(a)(vii) Base Area Visual Conditions

The Project site is located on approximately 4,000 acres of agricultural land in Saguache County and is bounded to the north, east, south, and west by vacant and agricultural lands (see Figures 2 and 15). Figure 16 shows property parcel boundaries, as well as identified structures and residences within a 2-mile buffer of the Project boundary. The landscape within immediate view of the Project site is flat land that is surrounded on all four sides by agricultural fields and vacant land. The landscape beyond the

immediate vicinity of the Project site is dominated in all directions by open rangeland and agricultural land. Other elements within the viewshed of the Project site include transmission and distribution lines located in the immediate vicinity of the Project site, as well as mountain ranges in the distance. There are also three pole-mounted transformers located along the south, west, and eastern boundaries of the Project site that are used to power the existing irrigation wells. Transmission and distribution structures will only be removed as a result of Project construction if those structures are no longer required.

13-304(2)(a)(viii) Base Area Noise Conditions

A noise technical report and evaluation of compliance with the Colorado noise statute for the Project is included as Exhibit H.

There are limited noise receptors surrounding the Project. There are few residences, and no hospitals, libraries, schools, places of worship, or other specific facilities where quiet is an important attribute of the environment near the Project area, although it is recognized that low noise levels and “quietude” are important attributes of Saguache County in general. The closest community to the Project site is Center, Colorado, which is approximately 6 miles to the southwest. In addition, the solar nature of the facility typically limits its primary operations and noise generating activities to the daylight and early evening hours when electricity demand and ambient noise levels are typically highest.

Construction Noise

Construction of the Project is expected to be typical of other power plants in terms of schedule, equipment used, and other types of activities. The noise level will vary during the construction period, depending on the construction phase.

Noise emission levels (A-weighted sound power levels or dBA) of the loudest equipment types generally operating at a site during each phase of construction are listed in Table 6. The composite average or equivalent site noise level, representing noise from all equipment, also is presented for each phase.

Table 6:
Construction Equipment and Composite Site—Estimated Noise Levels

Construction Phase	Loudest Construction Equipment	Equipment Noise Level (dBA) at 50 feet	Composite Site Noise Level (dBA) at 50 feet
Demolition, Site Clearing, and Excavation	Dump Truck Backhoe	91 85	89
Concrete Pouring	Truck Concrete Mixer	91 85	78
Steel Erection	Derrick Crane Jack Hammer	88 88	87
Mechanical	Derrick Crane Pneumatic Tools	88 86	87
Cleanup	Rock Drill Truck	98 91	89

Source: U.S. EPA (1971), Barnes et al. (1976), Rice Application for Certification with the California Energy Commission 2010.

The estimated average or equivalent construction noise levels projected at various distances from the site are presented in Table 7.

Table 7:
Average Construction Noise Levels at Various Distances

Construction Phase	Sound Pressure Level (dBA)			
	50 feet	1,500 feet	1 mile	15 miles
Demolition, Site Clearing, and Excavation	89	59	49	25
Concrete Pouring	78	48	38	14
Steel Erection	87	57	47	23
Mechanical	87	57	47	23
Cleanup	89	59	49	25

Noise generated during the testing and commissioning phase of the Project is not expected to be substantially different from that produced during normal full-load operation. Starts and abrupt stops are more frequent during this period, but they are usually short-lived. Certain operations may entail short periods of abnormal operation during initial trial runs and upsets until the plant control system is properly tuned.

A pre-commissioning activity known as “steam blows” is an intermittent commissioning activity occurring late in the construction process that can generate higher levels of noise. This activity is designed to clean scale and other debris from the boiler tubes and steam lines before admitting steam to the steam turbine, where the foreign material would damage the blades. In preparation for a steam blow, a temporary bypass line is attached to the main steam line upstream of the steam turbine to divert the steam to the atmosphere. Several short duration blows will be performed over a period of several days. Steam blow silencers using a water quench will be applied to minimize peak sound pressure levels.

Operations Noise

A noise model of equipment proposed for the Project has been developed using source input noise levels derived from manufacturers’ data, previous projects with similar equipment, and information available in the technical literature. Variance between actual noise levels from specific equipment is expected to be lower than the conservatively high modeled noise levels. The noise model was customized to the technology, plant equipment, and configuration proposed to be employed at the Project. For conservatism, the noise levels presented represent the anticipated steady-state level from the plant with essentially all equipment operating simultaneously.

The A-weighted sound power levels for the major noise sources used in the model are summarized in Table 8.

Table 8:
Summary of Sound Power Levels Used to Model Project Plant Operations

Plant Component	Sound Power Level, dBA
Large Cold Salt Pump, each of 3	112
Large Cold Salt Pump Motor, each of 3	116
Hot Salt Pump, each of 2	110
Hot Salt Pump Motor, each of 2	110
Small Cold Salt Pump	108

Table 8:
Summary of Sound Power Levels Used to Model Project Plant Operations

Plant Component	Sound Power Level, dBA
Small Cold Salt Pump Motor	100
Steam Turbine Generators	111
Boiler Feed Pump, each of 2	105
Boiler Feed Pump Motor, each of 2	116
Cooling Tower or Air Cooled Condenser	111
Fin Fan Cooler	102
Generator Step Up (GSU) Transformer	101
Auxiliary Transformer	90
Service Transformers, each of 2	82

The estimated noise level from facility operation at specific receptor locations are shown in Table 9.

Table 9:
Estimated Noise from Project Plant Operations at Perimeter Fence Line

Location	Facility Operations Sound Pressure Level, dBA
North Fence	47
South Fence	52
East Fence	48
West Fence	46

Operational noise will be highest in midday during the summer, when the system is both collecting solar energy and generating electricity, and cooling fans are in full operation due to the higher temperatures. Daily operation times will be longest during the summer months; typically, daily operations are expected to take place between roughly 8:00 AM and 10:00 PM. The noise modeling done in the Noise Study (Exhibit H) indicates that the maximum Project noise at any residence under normal conditions, at maximum Project output with both 100 MW facilities in operation, is not expected to exceed 46 dBA. (The residence closest to the Project boundary is owned by the Property's current owner.) The maximum property line noise level under those conditions is expected to be 49 dBA, and will occur at the southern Project Area boundary. The Project therefore conforms even with the State's most stringent noise standards set for a residential zone of 55 dBA during daytime conditions.

Noise impacts would be lower with one 100 MW facility rather than two. Noise will be significantly lower at night because the cold salt pumps will not be circulating molten salt through the tower when the sunlight is not available. Noise levels will generally be lower when the steam turbine generator is not in operation, such as what is expected to occur in the early morning hours. When temperatures are lower than summer daytime levels, noise from the cooling fans will be lower.

As an added level of conservatism, the noise model did not account for any dampening of sound by the heliostat field, which is expected to provide some far-field sound attenuation.

13-304(2)(a)(ix) Impact Area Socio-Economic Environment

13-304(2)(a)(ix)(1) Characteristics of the Existing Population

13-304(2)(a)(ix)(1)(a) Age, Income, Education, and Social Background

The Project site is located in one of the least densely populated regions in Colorado. Despite the physical size of the San Luis Valley, the three-county area in the vicinity of the Project currently has only 35,500 residents. Although Saguache County added 1,150 new residents between 2000 and 2009, the three-county area as a whole experienced very modest population growth over the past decade. The city of Alamosa, the largest municipality within the Influence Area, had a population of 9,000 residents in 2009. The area's incorporated communities comprise less than half of the area's overall population.

Tables 10 through 16 provide statistical data on the population characteristics of Saguache County. The estimated 2008 population for the County was 7,080 (Table 10). Over half of the County population resides in unincorporated areas of the County. The town of Center is the largest incorporated area with a population of 2,356. The average household size in 2008 was 2.53 and there were 1,045 vacant housing units (27 percent vacancy rate) (Table 11). The County median age is 36.9 and 53 percent of the population is included in the 25 to 64 age group (Table 12). There is a strong Hispanic population (45 percent) in the County; 71 percent of the total population is categorized as white (Table 13). Of the population 25 years and older, 70 percent have a high school education or above, and 20 percent have a Bachelor's degree or higher (see Table 14).

Per capita median household income for Saguache County was $18,976 in 2007 and $33,198 in 2008 (Table 15). Approximately 8 percent of the County's households had an income above $75,000 in 1999 (Table 16). The average weekly wage for Saguache County in fourth quarter 2009 was $582 (CDLE 2010), or $14.55 per hour, or $30,264 per year, assuming a 40-hour week worked year around.

Table 10:
Saguache County Population

Area	2000 (U.S. Census)	2008 (Estimated)
Bonanza City	14	15
Center (part)	2,363	2,356
Crestone	73	143
Moffat	114	119
Saguache	578	611
Unincorporated Area	2,775	3,836
Total County	5,917	7,080

Source: DOLA (2010a)

Table 11:
General Population Characteristics (DOLA)

Year	2000 (U.S. Census)	2008 (Estimated)
Average Household Size	2.56	2.53
Births	85	59
Deaths	51	48
Housing Vacancy Rate	25.49	27.29
Net Building Permits	134	0
Net Migration	155	154
Total Households	2,300	2,784
Total Housing Units	3,087	3,829
Vacant Housing Units	787	1,045

Source: DOLA 2010a

Table 12:
Saguache County Population by Age (2000 Census)

Age	Under 15	Aged 15 to 24	Aged 25 to 44	Aged 45 to 64	Aged 65+	Total
Number of Individuals	1,358	792	1,536	1,590	641	5,917
Percentage	23	13	26	27	11	100

Note: median age is 36.90

Source: U.S. Census Bureau (2000)

Table 13:
Saguache County Population by Race (2000 Census)

Race	Number	Percentage
One race	5,735	96.9
White	4,218	71.3
Black or African American	7	0.1
American Indian and Alaska Native	122	2.1
Asian	27	0.5
Native Hawaiian and Other Pacific Islander	0	0
Some other race	1,361	23
Two or more races	182	3.1
Hispanic or Latino (of any race)	2,678	45.3

Source: U.S. Census Bureau (2000)

Table 14:
Social Characteristics (2000 Census)

Characteristic	Number	Percentage
Population 25 years and over	3,760	64
High school graduate or higher	2,632	70
Bachelor's degree or higher	738	20
Civilian veterans (civilian population 18 years and over)	550	13
Disability status (population 5 years and over)	1,158	21
Foreign born	857	14.5
Male, Now married, except separated (population 15 years and over)	1,289	56.0
Female, Now married, except separated (population 15 years and over)	1,260	55.8
Speak a language other than English at home (population 5 years and over)	2,012	36.5

Source: U.S. Census Bureau (2000)

Table 15:
Saguache County Income

Income Type	2000 Census	Recent Data
Total personal income	$91,330,000	$130,248,000 (2007)
Per capita income	$13,121	$18,976 (2007)
Median household income	$25,495	$33,198 (2008 Census estimate)
Below the Poverty Level (individuals 18 and older)	1,325	No information available

Source: U.S. Census Bureau (2000); CDLE 2010

Table 16:
Saguache County Household Income Distribution (2000 Census)

Income Distribution	Number of Households	Percentage
Less than $10,000	411	17.8
$10,000 to $14,999	250	10.8
$15,000 to $24,999	467	20.2
$25,000 to $34,999	409	17.7
$35,000 to $49,999	332	14.4
$50,000 to $74,999	265	11.5
$75,000 to $99,999	104	4.5
$100,000 to $149,999	57	2.5
$150,000 to $199,999	4	0.2
$200,000 or more	12	0.5

Table 16:
Saguache County Household Income Distribution (2000 Census)

Income Distribution	Number of Households	Percentage
Total Households	2,311	100.0
Median household income (dollars)	25,495	—

Source: U.S. Census Bureau (2000)

13-304(2)(a)(ix)(1)(b) Neighborhood and Distinct Socio-Economic Groups

The socio-economic base area (Saguache County) is primarily a rural agricultural community and has a significant Hispanic population (about 45 percent). Center is the largest incorporated community in the County. Other communities in the County include Saguache, Crestone, Baca Grande, Moffat, and Bonanza City. Local tourism is also an important part of the area economy and character. Attractions include the Great Sand Dunes National Park and Preserve, the Rio Grande Scenic Railroad, and numerous other recreational activities. The wider three-county socio-economic Influence Area is also primarily a rural agricultural and tourism community, but also includes several larger communities such as Alamosa, Monte Vista, and Del Norte.

13-304(2)(a)(ix)(1)(c) Migrational Trends and Seasonal Fluctuations

Seasonal fluctuations in the population of the three-county Influence Area are affected by seasonal agricultural activities and tourism. In particular, the potato harvest season (roughly late October) is a source of seasonal work that draws temporary residents. Net permanent migration is low, declining from 155 in 2000 to 63 in 2010 (Table 17).

13-304(2)(a)(ix)(1)(d) Anticipated Population Changes

Table 17 provides a summary of DOLA-projected population change for Saguache County. The population is projected to generally increase by 2,678 persons between 2010 and 2035. The most significant contributor to the projected population increase is births. Net migration is projected to generally decrease from 63 to 13 persons per year between 2010 and 2035.

Table 17:
Components of Population Change—Saguache County

Population Year	2000	2010	2015	2020	2025	2030	2035
Total Population	5,954	7,270	7,919	8,562	9,105	9,556	9,948
Births	85	101	138	143	142	149	162
Deaths	51	47	55	62	73	86	99
Net Migration	155	63	49	46	34	19	13
Population Change	189	117	132	127	103	82	76

Source: DOLA (2010c)

13-304(2)(a)(ix)(2) Current Employment

13-304(2)(a)(ix)(2)(a) Description of Principal Employers

Figure II-6 in Exhibit C lists jobs by industry for the three-county area. Jobs in the Influence Area are heavily concentrated in six industries: educational services, agriculture, health care/social assistance, retail trade, public administration, and accommodation/food services. The area's largest employers are relatively small and dominated by public institutions and agricultural interests. Major employers in the San Luis Valley are listed in Figure II-7 of Exhibit C.

The total number of employees located in Saguache County in the fourth quarter of 2009 was 1,526 (CDLE 2010). The largest major industry sector was Agriculture, Forestry, Fishing and Hunting (with 27 percent of the employment), followed by Education Services (with 22 percent), and Public Administration (with 15 percent). A list of major industries in Saguache County is provided in Table 18.

Table 18:
Saguache County Major Industries (Fourth Quarter 2009)

Industry Group	Establishments	Employees
Agriculture, Forestry, Fishing and Hunting	41	419
Education Services	9	333
Public Administration	15	226
Wholesale Trade	13	118
Retail Trade	17	93
Accommodation and Food Services	10	51
Construction	18	47
Transportation and Warehousing	14	46
Health Care and Social Assistance	4	46
Utilities	6	38
Manufacturing	6	32
Other Services (except Public Administration)	7	29
Finance and Insurance	5	18
Professional, Scientific and Technical Services	7	13
Real Estate and Rental and Leasing	4	9
Administration, Support, Waste Management, Remediation	3	8
Information	0	0
Arts, Entertainment, and Recreation	0	0
Mining	0	0

Source: CDLE (2010)

13-304(2)(a)(ix)(2)(b) Unemployment and Underemployment

Figure II-8 of Exhibit C lists the number of jobs by industry located in Saguache County. The County has had stagnant employment growth since 2000. In fact, the County has lost nearly 100 jobs in the last 10 years. Since 2007, San Luis Valley unemployment rates have grown steadily, in line with national trends. Currently, unemployment rates in the Influence Area are higher than Colorado as a whole (8.6 percent). Saguache County has one of the highest unemployment rates in the state. The total civilian labor force in Saguache County for June 2010 was 2,892, of which 2,592 were employed and 300 were unemployed, a 10.4 percent unemployment rate as shown in Table 19 (CDLE 2010).

Table 19:
Saguache County Unemployment Rate (June 2010)

Civilian Labor Force	Number Employed	Number Unemployed	Unemployment Rate (%)
2,892	2,592	300	10.4

Source: CDLE (2010)

13-304(2)(a)(ix)(2)(c) Local Labor Pool Characteristics

The "labor force" is the sum of employed persons and persons seeking employment. The San Luis Valley has been hit hard by the current economic recession. The local labor force contracted as workers either left the area or simply stopped looking for work altogether. As shown in Figure II-9 of Exhibit C, Saguache County's labor force is currently still below the County's 2005's labor force.

The local labor pool in Saguache County is dominated by management, professional, and related occupations (27.9 percent) and sales and office occupations (21 percent). Farming, fishing, and forestry (14.3 percent) and Service (13.4 percent) occupations follow. There were 293 workers in the construction, extraction, and maintenance occupations living in Saguache County during 2000 (Table 20).

Table 20:
Saguache County Occupations (2000 Census)

Occupation Category	Number	Percentage
Management, professional, and related occupations	699	27.9
Sales and office occupations	526	21.0
Farming, fishing, and forestry occupations	358	14.3
Service occupations	851	13.4
Construction, extraction, and maintenance occupations	293	11.7
Production, transportation, and material moving occupations	293	11.7
Total	2,504	100

Source: U.S. Census Bureau (2010)

13-304(2)(a)(ix)(2)(d) Manpower Training and Retraining

The latest unemployment data (300 unemployed in June 2010 [CDLE 2010]) and income levels (1,325 individuals of working age below the poverty level in 2000 [Table 15; U.S. Census Bureau 2000]) for Saguache County indicate there is a potential labor force that may be interested in training/retraining to either obtain employment or obtain a job with a higher pay rate.

In order to facilitate hiring opportunities for local and County residents, the Project Applicant will conduct public meetings and/or career fairs in the town of Center to provide information about employment opportunities relating to the Project as follows: (1) at least twice during the first six months of construction during ramp-up of the workforce, and (2) at least twice during the recruitment process for permanent plant operations staff. The Project Applicant will also continue to consult with the Trinidad State Junior College, the Center Consolidated School District, and the Sangre de Cristo School District to assist with the design of a curriculum to train potential employees for the Project.

13-304(2)(a)(ix)(3) Local Governments and Special Districts

The base area is served by the Center, Baca, Alamosa County, and Northern Saguache ambulance and fire protection districts (see Figures 11 and 12). The Project site is partially located in the Center Ambulance and Fire Protection districts and the northeastern portion of the Project site is not located in an area of any ambulance or fire protection district. There are four school districts in Saguache County, including Center, Moffat, Mountain Valley, and Sangre de Cristo. The Center and Sangre de Cristo districts are located in the area of the Project site (see Figure 10). The Project site is also within the Rio Grande Water Conservation District.

Saguache County Government

13-304(2)(a)(ix)(3)(a) Map and Type of Service Description

Figures 10 through 14 show services areas and special districts located in Saguache County.

13-304(2)(a)(ix)(3)(b) Capacity and Utilization of Services

The Project Applicant will notify area fire, law enforcement, ambulance, and medical service providers prior to commencement of construction. Based on the nature of construction activities and relatively low potential for serious accidents, the Project Applicant does not expect significantly increased service requirements.

13-304(2)(a)(ix)(3)(c) Operating Revenue and Expenditures

A summary of Saguache County operating revenues and expenditures for the year 2007 are provided in Tables 21 and 22, respectively. Total revenues were $8.81 million and total operating expenditures were $7.53 million. Over half of the County's revenues came from intergovernmental sources such as highway user's tax and social services funding. Expenditures were fairly evenly allocated (19 to 29 percent of the total) to general government, social services, and public works. Public safety received 12 percent of the operating expenditures in 2007.

Table 21:
Saguache County Revenues (2007)

Revenue	Amount ($)
Total Taxes	1,423,622
Property Taxes	1,129,398
Other Taxes	294,224
Licenses, Permits, Cap Fees	37,671
Intergovernmental	5,398,696
Charges for Service	1,090,132
Miscellaneous Revenue	862,066
Total Revenue	8,812,187

Source: DOLA (2010d)

Table 22:
Saguache County Expenditures (2007)

Expenditure	Amount ($)	Percentage
General Government	1,401,747	18.6
Judicial	78,900	1
Public Safety	910,292	12.1
Public Works	2,186,994	29
Health	824,695	11
Culture and Recreation	95,297	1.3
Social Services	1,938,855	25.8
Miscellaneous Expenditures	91,763	1.2
Total Operation Expenditures	7,528,543	100

Source: DOLA (2010d)

13-304(2)(a)(ix)(3)(d) Tax Base

The state sales tax rate is 2.9 percent and the County sales tax rate is 1.0 percent. There is also a County lodging tax of 1.9 percent. Other tax sources of revenue include property taxes, various intergovernmental taxes, charges for services, and non-specific miscellaneous taxes. The 2007 assessed property value was $57.29 million (mill levy of 22.531).

The primary taxing entities at the Project site include Saguache County, San Luis Valley Water Conservation District, Rio Grande Water Conservation District, Center and Sangre de Cristo school districts, and the Center Fire District. The total mill levy varies by parcel within the site. There are 13

separate parcels within the current holdings. Levies range from 67.113 to 72.057. Figure II-11 of Exhibit C displays mill levies by taxing entities on the Project site.

13-304(2)(a)(ix)(3)(e) Current Level of Taxation

General sales and use tax revenues generated for the County were $0.1 million in 2007 (DOLA 2010b). Total 2007 tax revenues for the County were $1.42 million.

13-304(2)(a)(ix)(3)(f) Revenue Generating Capacity

Saguache County's 2010 estimated budget is $3.3 million. As is the case in many communities, staff salaries and benefits account for a large proportion of the County's general fund expenditures. Property taxes, payments in lieu of taxes and fees comprised more than 75 percent of the County's 2010 estimated revenues. Property taxes accounted for 35 percent of the County's revenues alone, generated from a County-wide assessed value of more than $60 million. In 2008, the County passed a 1 percent sales tax; however, sales tax revenues are not used in County operations, but rather are distributed as grants for community development activities in the County.

Service Districts

The primary taxing entities at the Project site include Saguache County, San Luis Valley Water Conservation District, Rio Grande Water Conservation District, Center and Sangre de Cristo school districts, and the Center Fire District. The total mill levy varies by parcel within the site. There are 13 separate parcels within the current holdings. Levies range from 67.113 to 72.057. Figure II-11 in Exhibit C displays mill levies by taxing entities on the Project site.

The County and local taxing districts will be the principal property tax beneficiaries. Residential sales and use taxes will accrue to the County as well as to other local jurisdictions, depending upon factors such as the housing choices made by construction and operational workers.

Property Tax

The 6,200-acre Property contains both land dedicated to solar production and land that will remain in agricultural production or as vacant property. These two land uses are discussed separately below.

The Colorado Division of Property Taxation is responsible for electric generating facility valuations in the state of Colorado. The land associated with the facility is not taxed separately, but it is included in the overall property valuation. The Division of Property Taxation provides a template for valuing solar facilities larger than 2 MW. The template was utilized for this study. All property calculations discussed below were approved by the Colorado Division of Property Taxation. A detailed discussion of the methodology for calculating the state property tax for the Project is provided in Exhibit C. Based on this methodology, the initial 100 MW facility will generate $424,000 in average annual revenues, or approximately $8.5 million during the first 20 years of operations. Annual property tax revenues range from $385,000 in the year 1 of operation to $465,000 in year 20.

The entire property is subject to taxation by multiple entities including the County, the Center Fire District, and two water districts. Part of the property is in the Center School district and part is in the Sangre de

Cristo District. The mill levy for both school districts is virtually the same (42 and 41 mills, respectively). Figure III-9 of Exhibit D shows the distribution of Project associated property tax revenues to the various taxing districts based on the current property tax distribution. Saguache County can anticipate $2.7 million in property tax revenue during the first 20 years of Project operations. On an annual basis, the County will receive $136,000 in annual revenue from the facility, which is an increase of approximately $125,000 over current payments from the Property. The fire district will receive about $22,000 per year. It should be noted that the distribution of revenues by district will depend on a final determination of where development occurs within the Project area. It is unlikely that all parcels on the site will be included in the initial 100 MW facility, so only certain taxing bodies will benefit from the development during the first phase.

There are currently 14 separate parcels represented by five different owners within the Property area, and all parcels are currently designated as agricultural use for property tax assessment purposes. Currently, cumulative property taxes are about $33,000 annually. It is not anticipated that all of the 6,200-acre Property will be part of the Project.

At the time Phase I operations begin, the taxing entities represented on the 100 MW facility will collectively receive $424,000 annually (see above), while the remaining portions of the Property may continue to retain their agricultural exemption.

Sales and Use Tax

Saguache County has a 1 percent sales tax on items purchased within the County. Most materials used for Project construction will likely be purchased outside of Saguache County. The local economy and local communities will benefit from the substantial fiscal stimulus generated by the addition of construction and operational payrolls brought to the region; however, Saguache County will likely feel only modest sales tax impacts, because many new employees will likely shop in Alamosa and Rio Grande counties.

The Project is a potential new draw for green tourism or “eco-tourism” in the San Luis Valley. The Project Applicant intends to support an off-site visitor center and may offer Project tours or interpretive services relating to solar thermal generating technology. The growing assemblage of attractions in the San Luis Valley, ranging from solar projects to the national park and heritage sites, will likely combine to generate more visitors, lengthier stays and more consumer spending. Over time, and if appropriately promoted, the additional economic benefits of increased tourism could be substantial.

13-304(2)(a)(ix)(4) Housing

13-304(2)(a)(ix)(4)(a) Current Housing Inventory

Table 23 displays the current housing inventory for Saguache County as of the 2000 census. Saguache County includes 3,087 total housing units, of which 2,300 are occupied (74.5 percent occupied); 707 are specified renter-occupied units; and 1,593 are specified owner-occupied units. There are 775 mobile homes in Saguache County. The median value of specified owner-occupied homes in 2000 was $73,900, and the median rent of specified renter-occupied units was $404 per month. No information could be obtained regarding year-round versus seasonal housing.

Table 23:
Saguache County Housing Inventory

Inventory Type	Subject	Number	Percentage
Summary	Total housing units	3,087	100.0
	Occupied housing units	2,300	74.5
	Owner-occupied housing units	1,593	69.3
	Renter-occupied housing units	707	30.7
	Vacant housing units	787	25.5
	For seasonal, recreational, or occasional use	361	11.7
	Rental vacancy rate (percentage)	6.9	NA
	Homeowner vacancy rate (percentage)	3.2	NA
Units in Structure	1-unit, detached	1,994	64.6
	1-unit, attached	56	1.8
	2 units	60	1.9
	3 or 4 units	31	1.0
	5 to 9 units	55	1.8
	10 to 19 units	45	1.5
	20 or more units	20	0.6
	Mobile home	775	25.1
	Boat, RV, van, etc.	51	1.7
Year Structure Built	1999 to March 2000	109	3.5
	1995 to 1998	389	12.6
	1990 to 1994	249	8.1
	1980 to 1989	432	14.0
	1970 to 1979	649	21.0
	1960 to 1969	267	8.6
	1940 to 1959	484	15.7
	1939 or earlier	508	16.5
Rooms	1 room	89	2.9
	2 rooms	210	6.8
	3 rooms	350	11.3
	4 rooms	621	20.1
	5 rooms	739	23.9

Table 23:
Saguache County Housing Inventory

Inventory Type	Subject	Number	Percentage
	6 rooms	487	15.8
	7 rooms	328	10.6
	8 rooms	127	4.1
	9 or more rooms	136	4.4
	Median (rooms)	4.9	NA
Value	Less than $50,000	209	24.9
	$50,000 to $99,999	388	46.1
	$100,000 to $149,999	132	15.7
	$150,000 to $199,999	61	7.3
	$200,000 to $299,999	16	1.9
	$300,000 to $499,999	27	3.2
	$500,000 to $999,999	5	0.6
	$1,000,000 or more	3	0.4
	Median (dollars)	73,900	NA
Gross Rent	Less than $200	92	14.4
	$200 to $299	69	10.8
	$300 to $499	186	29.0
	$500 to $749	139	21.7
	$750 to $999	27	4.2
	$1,000 to $1,499	7	1.1
	$1,500 or more	0	0.0
	No cash rent	121	18.9
	Specified renter-occupied units	641	100.0
	Median (dollars)	$404	NA

Source: U.S. Census Bureau 2000

Alamosa and Rio Grande counties have larger housing stocks than Saguache County. Reported vacancies throughout the San Luis Valley are high; however, rural area vacancy rates in this region include second homes, which are statistically considered a form of vacancy. Single family detached homes and mobile homes dominate the Influence Area's housing stock. As much as 25 percent of Saguache County's housing stock is mobile homes.

Homeownership rates throughout the Influence Area are high, perhaps reflecting the long tenure of many families in the area, and are an indication that the rental market may be small and competitive. Alamosa County has the lowest homeownership rate (and thus the highest rental rate). As the regional hub of the valley, Alamosa County contains much of the area's rental stock. In 2009, a state-funded housing needs assessment was completed for the entire San Luis Valley. At the time the analysis was completed for the study, 655 homes were for sale in the 6-county valley region in 2009. One-third of the units were priced between $100,000 and $200,000.

Eighty-two percent of the homes on the market in 2009 were for single family units and 17 percent were for manufactured or mobile homes. The average listing price for single family homes in the Influence Area was over $200,000 in Alamosa, Rio Grande, and Saguache counties. Average listing prices for mobile and manufactured homes were much less. The presence of second homes, often sold on large land parcels, likely skews reported average prices for single family homes. The San Luis Valley Housing Needs Assessment reported homes in the San Luis Valley were staying on the market for 5 months or more prior to sale. For counties in the Influence Area, the average length of time on the market for single family homes ranged from 204 days in Alamosa to 304 in Saguache. The lengthy listing period indicates that for-sale housing stock may be priced higher than buyers are willing to pay, or that the market is still softening. Lengthy listing periods can also be an indicator of poor housing quality. According to a 2007 strategy report by the Development Resources Group, a regional organization serving the San Luis Valley, "while the valley is one of the most affordable places in Colorado for housing, the economies of its lower incomes and dependence on a more limited range of industry and job opportunities result in a somewhat overall lower quality of housing stock."

Figure II-16 of Exhibit C summarizes the average listing price and average number of days on the market for single family homes and mobile and manufactured homes in the Influence Area.

Figure II-17 of Exhibit C shows local area housing rental costs. Rental prices in the San Luis Valley vary by size of unit. One-bedroom units average $399 per month, while the rent for four-bedroom units is likely closer to $1,000 per month. According to interviews with local brokers, most rentals are advertised by word of mouth or similar informal channels. As such, the availability of rental units may present more of a challenge than the costs of rental units.

Alamosa is the largest community in the Influence Area and has more than 10 motels/hotels located in and around the city with a total of more than 480 rooms. In addition, nine RV parks were identified in Alamosa County.

13-304(2)(a)(ix)(4)(b) Projected Housing Requirements

Developing a CSP facility requires a skilled construction workforce, including a large number of positions for boilermakers, iron makers, engineers, pipefitters, and millwrights, which are not common skill-sets in the area. As a result, a large share of workers is expected to migrate temporarily into the Valley. Nearby local communities—most notably Alamosa, Del Norte and Monte Vista—are expected to house most in-migrating workers. The smaller Saguache County communities of Saguache, Center, and Crestone will also see some growth pressure. Very few temporary construction workers are expected to bring a family with them. The consultants have reviewed the construction workforce requirements by specialized skill

level with the Project Applicant and local economic development staff. As shown in Figure ES-3 of Exhibit C, approximately 244 new non-local workers are expected at the peak construction period, creating a demand of approximately 116 rental units encompassing apartments, hotels, and RV parks.

Current area rental prices are low by statewide standards, but rental properties in general are few in number and the local rental market is quite informal, particularly outside of Alamosa. It is expected that during the peak demand period, the current rental supply will be supplemented by motels and RV parks temporarily converting to year-round accommodations, and likely some for-sale housing being withdrawn from the market and offered as temporary rentals. It is common practice for many skilled workers who travel to remote sites to bring their own RV or mobile home. Despite a relatively small local housing and rental market, the scale of this construction effort in relationship to the overall housing market is manageable, and pronounced increases in rental costs, or crowding-out of other rental submarkets, is not anticipated. Greater impacts would likely occur if other large construction projects occur in the same time period as the Project. At this time, a co-incident, large-scale project development is not foreseen.

Project operations will require approximately 50 full time employees. Experience shows that some skilled and semi-skilled positions will be filled by persons who originally joined the Project as part of the construction workforce and therefore will have made housing arrangements. It is estimated that full time plant operations will attract an additional 10 new workers into the area for specialized positions that cannot be easily filled from the existing workforce. This level of growth will not strain housing supplies or government services.

For a project of this nature, the Influence Area is primarily defined by worker housing needs and the commuting distance to available housing. Ultimately, local housing decisions will be dictated by the size of the Project workforce, skill requirements, worker income levels, local housing availability, commuting times and the Project Applicant's housing policies. The area's sparse population base and relatively small housing supply implies that the workforce will likely be housed across a widely dispersed area.

As construction nears, it may be determined that efforts are needed to create additional housing. This stimulation effort might include master leasing for rental purposes, soliciting new rentals through owners of vacant or for sale housing, working with RV park and motel owners to expand availability, or developing temporary housing options, such that in-migrating skilled trades can find appropriate short term accommodations. Stimulating local rental housing is a common practice for attracting short term craftsmen who are often used to bringing an RV and commuting to their primary home on weekends or other periodic bases.

Non-Local Construction Workforce

Construction activities will produce a greater impact on the area's housing markets than will operational activities, although most demand will be temporary. As estimated in Exhibit C, a total of 289 non-local individuals are anticipated to enter the area to assist in the construction process. Not all of these workers will be required at the same time, thus the in-migrating workforce is estimated to peak at about 244 workers. Based on current estimates, the number of in-migrating personnel is expected to average about 200 persons for a period of about 18 months per 100 MW phase.

Housing Demand

Based on Project assumptions discussed in Exhibit C, the construction period of one 100 MW facility is anticipated to create a peak demand for approximately 116 rental units and 12 owner-occupied units (purchases). Home purchases generated from non-local workforce will likely occur if a spouse accompanies a worker to the area and finds employment. Pressure on the local housing stock will be influenced in part by the company's housing policies. Many of the skilled workers likely to move temporarily into the area will have mobile homes or RVs and will commute home on weekends. It is a common practice for temporary personnel to bring mobile housing for this kind of short-term assignment. Saguache County may consider changes to local zoning codes or other methods to encourage development of temporary housing facilities. In many rural locations, seasonal campgrounds can be induced to open for the full year to accommodate workers. Local motels will often pursue a similar year-round strategy.

Location of Workers

Location preferences for renters will be influenced by housing availability, accessibility to the Project site, and proximity to basic amenities, such as services and grocery stores. As such, three communities are anticipated to receive much of the housing impacts: Alamosa, Monte Vista, and Del Norte. Some workers will be absorbed in Saguache, Center, and Crestone or rural areas in Saguache County. Housing demand will likely occur in rough proportion to the existing population and housing distribution. In other words, the largest community in the San Luis Valley, Alamosa, with the largest and most diverse housing stock, will likely receive the greatest population impact from the Project. Figure III-6 of Exhibit C offers an estimate of housing demand by community. The city of Alamosa has a population of about 9,000 persons that live in roughly 3,000 housing units. At peak period, the Project workforce is expected to require nearly 70 units or less than three percent of Alamosa's housing stock.

Housing Availability

Recent housing investigations in the San Luis Valley suggest a fairly tight Alamosa rental market, the result of growing student populations at Adams State College and Trinidad State Jr. College, and challenges in developing new rental housing as a result of a difficult commercial lending environment. Anecdotally, local realtors also cite a tightening in the rental market associated with the construction of smaller solar facilities near Alamosa. The rental markets in Monte Vista and Del Norte appear to be highly informal and consist largely of single family homes.

Homes in the for-sale market are sometimes leased on a month-to-month basis to provide the owner with temporary income and flexibility in case of a possible sale. Local realtors report that traditionally, for-sale homes in the San Luis Valley have not been used for rental purposes. With the prospective of attractive long-term leases associated with this Project, and the current difficulties in selling residential units, it is quite possible that local homeowners will be willing to offer long-term rentals to help supplement the local rental market.

Temporary housing (e.g., hotels, RV parks, and mobile homes) will likely supplement the existing rental market as necessary. There are currently two operating RV parks in Alamosa County, a larger KOA park and a smaller Alamosa Economy Campground. Alamosa County has identified a potential RV site in the

northern portion of the city if additional temporary housing is necessary. In similar rural environments, faced with a large influx of workers, local motels commonly rent long term, accepting the benefits of steady income over the higher per diem charges associated with nightly rentals. Saguache County's RV parks are not as organized as Alamosa County's facilities. Reportedly, migrant workers contributing to the annual wheat and potato harvests have established temporary housing sites in Center and Saguache. If required, these facilities could be expanded and winterized to accommodate temporary workers.

Despite a relatively small local rental market, the scale of this Project in relationship to the overall housing market is small, and sharp increases in rental costs or crowding of other rental submarkets is not anticipated. The construction phase of the Project will create temporary pressure on rental availability, but motels, RV parks, and conversion of for-sale units to rental units offer a rental relief valve. The temporary nature of this demand, and the prospect of spreading occupancy among multiple towns and rural enclaves, will limit the impact on housing rental rates and occupancy. Greater impacts would occur if other large solar projects are constructed in the same time period as the Project. At this time, co-incident large-scale Project development is not foreseen.

Housing for Operations Staff

Facility operations will require approximately 50 full-time employees. Experience shows that some skilled and semi-skilled positions will be filled by persons who originally joined the Project as part of the construction workforce and who will have already made housing arrangements. In total, BBC Research and Consulting estimates that full-time plant operations will attract additional 10 to 15 new workers into the area for specialized positions that cannot be easily filled from the existing workforce. Most non-local workers will eventually seek owner-occupied housing, although many will rent for a period of time before making an ownership commitment. Homeownership impacts will generally geographically resemble rental impacts; however, operational employees may gravitate more towards the larger communities so that spouses may find jobs and they have a greater range of school and housing choices. Although the local housing market is small, it is believed the modest demand associated with Project operations will be fully accommodated.

13-304(2)(a)(ix)(5) Existing Transportation Network

13-304(2)(a)(ix)(5)(a) Site Access

Primary access to the site will be from State Highway 17 and U.S. Highway 285 (U.S.285), Primary access roads within the Project site will be asphalt paved. Access road beds will typically be 24-foot-wide asphalt roads with 2-foot-wide crushed rock shoulders. A stabilized entrance/exit will be provided to clean vehicle wheels prior to exiting the construction area. The privately owned and maintained access road that will connect the Project to County Road (CR) G will be a paved road suitable for two-direction travel, and it will be a minimum of 24 feet in width.

The site is located northeast of the town of Center, Colorado. The proposed access road that will serve the Project will connect to CR G. CR G connects to U.S.285 (CR 47) to the west and to SH 17 to the east. These highways are aligned in a general north-south direction and connect to U.S.160, which serves as the primary transportation route to the town of Alamosa, Colorado. U.S.160 connects to Interstate 25 (I-25) approximately 74 miles east of Alamosa, near the town of Walsenburg, Colorado.

13-304(2)(a)(ix)(5)(b) Base Area and Impact Area Circulation

A traffic impact study was completed to document existing conditions and to assess transportation impacts during construction activities and during Project operation. The study, included as Exhibit B, provides recommended transportation network mitigation measures. Detailed data and figures showing traffic volumes and other supporting information used to develop the discussion in this section are included in the traffic impact study.

Existing Conditions

Currently, all of the roadways in the area are two-lane roads carrying relatively low levels of traffic. CR G is unimproved, other than the two miles just east of U.S.285. U.S.285, SH 117, and SH 112 are all paved roadway facilities, as is CR 53 between SH 112 and CR G. For purposes of access considerations and auxiliary lane requirements, the Colorado Department of Transportation (CDOT) classifies all of its highways based on the highway's functionality. SH 17 is classified as an R-A facility, as is U.S.285. With respect to access consideration, the R-A classification falls below just below an Expressway category and is indicative of accommodating medium to high speeds over a medium to long distance. SH 112 is classified by CDOT as an R-B facility, a rating that reflects moderate to high speeds and low traffic volumes for local rural needs.

In consultation with Saguache County Road and Bridge, traffic counts were collected along the roadways in March 2011 (Felsburg Holt & Ullevig 2011). Daily counts were collected at three locations along CR G and one along CR 53 just north of SH 112. In addition, peak hour turning movement counts were collected at the state highway intersections including U.S.285/CR G, SH 17/CR G, and SH 112/CR G. CDOT's website was utilized to obtain daily traffic volumes along the state highways. The count sheets and a figure showing the results of the traffic data are provided in Exhibit B.

In general, the roadways in the area are not heavily traveled. U.S.285 is among the busier facilities in the area, serving 1,700 vehicles per day, while SH 17 carries fewer vehicles at 1,300 per day. SH 112 serves a mere 600 vehicles per day east of CR 53. The peak hour turning movement counts were all very low at the CR G intersections; no turns exceeding 4 vehicles per hour were counted along the state highway (other than through movements along the highways). The movements at SH 112/CR 53 were slightly greater, but this intersection also sees relatively light traffic. The counts at the SH 112 intersection also reveal a traffic pattern in the area that makes use of CR 53 south of SH 112 (which is actually outside Saguache County falling on the Alamosa/Rio Grande county line).

CR G, being primarily an unimproved roadway, receives routine grading maintenance. Based on discussions with County staff, grading activity takes place along this road roughly every two weeks. The roadway is in good shape per a field visit by the traffic engineering consultant (Felsburg Holt & Ullevig), which yielded minimal washboarding; in fact, grading activity along one section of CR G was taking place on the day of the field visit.

Construction Conditions

The Project Applicant assumes a 12-month offset in beginning construction between the two 100 MW Project phases, although the timing of each phase will be dependent upon market conditions. Each facility

phase will be built in approximately 27 months of time with approximately 3 months of commissioning afterward. With a 12-month offset, total Project construction time for both phases is projected to extend to 39 months; a 15-month period would see construction activity overlapping at both facilities.

Based on workforce estimates, at peak times, one facility could generate approximately 160 to180 truck trips per day. The data provided also include the anticipated average number of construction workers needed onsite, also tabulated by month for each 27-month construction period. During peak construction times, construction worker activity could generate 1,150 to 1,200 trips per day given the estimated 450 workers on the site during the peak six-month construction period. The per-month daily estimates were converted into daily trip estimates through the following steps:

- Each truck delivery generates two trips per day, one inbound to the site and one outbound from the site.
- Construction workers will travel to the site via automobile, and it is assumed that 30 percent will car pool at two persons per vehicle. One inbound trip and one outbound trip per day.

The collective generation of the construction of the two facilities indicates that there is a six-month period in which the collective construction activity would peak. It is this six-month construction period that is the focus of the construction impact analysis.

A summary of the peak generation was derived by averaging the peak six months. Peak hour generation was developed using the following assumptions:

- Roughly 10 percent of the truck trips and deliveries occur during each of the AM and PM peak hours.
- Thirty percent of the construction workers carpool (two persons per car), resulting in a 15 percent reduction in vehicles (one car per two workers for carpoolers rather than one car per one worker).
- Eighty-five percent of the construction workers arrive during the AM peak hour and depart during the PM peak hour. A few of the workers are dropped off, and result in some outbound AM trips and inbound PM trips.

During the peak six-month period, construction activity of the two facility phases will generate between 1,600 and 1,700 vehicle-trips per day, of which 85 percent will be comprised of construction worker (passenger vehicle) activity. During peak hours, more than 600 trips per hour are estimated to occur, of which 98 percent would be construction worker commuter activity. Carpooling will be encouraged.

Much of the truck/delivery activity will tend to come from the south, likely via I-25 and into the San Luis Valley via U.S.160 over La Veta Pass. Items such as rock, cement, and water (if needed) will likely come from within the San Luis Valley and could arrive at the site from any direction. The trip distribution for construction worker trips was based on a study being prepared by BBC Research and Consulting for this Project, which indicates that the three primary communities that will see the greatest housing impact for these workers will be Alamosa, Monte Vista, and Del Norte; Center, Hooper, and Saguache will also play a role in housing workers. The preliminary results of the study also indicate that construction workers could make use of camp grounds or other nearby facilities. In essence, most of the workers will likely be living to the south of the site, so commuter-related trips will have a southern orientation.

The majority of the truck/delivery activity is estimated to arrive (and depart) from SH 17 south. The SH 17 southern leg will also play a major role in serving construction worker activity, with an estimated 35 percent coming from that direction. During the peak construction period, the level of traffic that CR G will serve will increase to 800 to 900 vehicles per day between SH 17 and CR 53, dropping to 600 to 700 vehicles per day just east of U.S.285. Along CR 53, between 500 and 600 vehicles per day are anticipated during the peak construction period.

Transportation Network Effects and Recommended Mitigation

Intersections

Given the peak hour turning movement projections at the state highway intersections, intersection Levels of Service (LOS) were calculated to assess potential traffic congestion issues. These LOS measures are based on procedures shown in the Highway Capacity Manual (Transportation Research Board 2000). LOS is a qualitative assessment of the traffic flow based on the average stopped delay per vehicles at a controlled intersection. Levels of service are described by a letter designation ranging from “A” to “F”, with LOS-A representing essentially uninterrupted flow, and LOS-F representing a breakdown of traffic flow with excessive congestion and delay. Stop-sign controlled intersection analyses report a LOS rating for the movements that yields to through traffic at the intersection. In rural areas, the convention typically establishes a LOS-C or better as the preferred LOS outcome.

Given the total peak hour turning movement projections at the state highway intersections, all movements were shown to function at a LOS-B or better. This favorable LOS is due in large part to the relatively low traffic that makes use of these intersections today. In addition to LOS measures, the state highway intersections were also assessed with respect to any need for acceleration or deceleration lanes.

Given these criteria with respect to the peak-hour projections, auxiliary lane needs were assessed for each state highway intersection. The following describe the findings of this assessment:

SH 17/CR G—The through traffic along SH 17 is low, but the northbound left turn onto CR G is relatively high. While the State Highway Access Code suggests that auxiliary lanes may be waived, this left turn movement will be heavy during the AM peak hour. In addition, 60 to 70 percent of the facilities’ truck/delivery arrivals will make use of this left turn. It is recommended that a left turn lane be constructed within the center of SH 17 to accommodate movements onto CR G. Given the posted speed limit of 65 mile per hour (mph), this lane will need to be 1,000 feet long and constructed as follows:

- Deceleration length of 800 feet, which includes a 300-foot lead-in taper
- A storage length of 200 feet given the peak demand of vehicles anticipated to use it

This deceleration lane is primarily needed for reasons of safety, especially because this intersection will likely serve the majority of the facilities’ truck and delivery traffic. No other turn lane additions are recommended at this intersection, but adequate pavement should be provided to properly accommodate turning vehicles without the need of vehicles “spilling” into opposing traffic when turning through the intersection.

U.S.285/CR G—The through traffic along U.S.285 is also low, and left turn deceleration lanes are already provided along the northbound and southbound approaches. These lanes are approximately 590 feet long with a 300 foot lead-in taper (nearly 900 feet in total). These lanes are adequate for the given traffic loading that they will accommodate. Because the through traffic is relatively low, these lanes could potentially be waived, but they already exist and are not heavily used. No improvements to these are needed. Also, no northbound right turn lane is needed since the parallel through traffic is so low. This intersection should be adequate in its current state and no lane improvements are needed. All movements through the intersection will function at a LOS-B or better during peak hours of peak construction time period.

SH 112/ CR 53—Like the other two state intersections addressed above, the peak hour through traffic along SH 112 is low, and is slightly lower than that along U.S.285 and SH 17. Also, SH 112 is a lower category of highway than U.S.285 and SH 17 (R-B rather than R-A). As such, no lane improvements are needed at this intersection. All movements through the intersection will function at a LOS-B or better during peak hours of the peak construction time period.

County Road G

No other intersection improvements will be needed, but CR G will need to be improved. The level of traffic that this roadway will serve during construction suggests that it should be paved from SH 17 to U.S.285. As mentioned, the westernmost two miles near U.S.285 are already paved, leaving 12 miles of CR G that still need a paved surface. Paving will ensure that the roadway can serve the traffic loadings anticipated and to also serve as means of controlling dust. Because the construction duration will last for over two years, there may be need for ongoing maintenance of the new CR G pavement to the point of commissioning of the facilities.

Operations Conditions

The second scenario of traffic projections entails the facilities upon commissioning and in operation. Once each phase of the Project is in operation, the level of traffic that is generated by that phase will drop considerably. The trips anticipated at that time will primarily involve site employees, and approximately 50 employees will be needed at each facility. Assuming no car-pooling, one trip in and one trip out per day for each employee, and other maintenance related trips, each phase is estimated to generate 120 to 130 trips per day. Between the two, only 250 trips per day will be generated, or just 15 percent of the trip generation during peak construction. Improvements previously recommended to support construction activity will be more than adequate to support these facilities once they are fully functional. No other improvements will be necessary.

Airspace

The Federal Aviation Administration (FAA) has airspace jurisdiction over structures that exceed 200 feet in height. Since the tower required for this technology is approximately 656 feet high, SolarReserve, LLC filed on November 6, 2010 an application for Obstruction Evaluation as required by the FAA. On December 9, 2010, the FAA provided a Determination of Presumed Hazard given the proximity of the nearest proposed tower to Leach Airport (see Exhibit I). This automatic determination was premised on incorrect operational data that indicated the use of “Category C” aircraft at Leach Airport. On May 3,

2011, Saguache County Commissioners provided a letter to the FAA clarifying that no Category C aircraft use Leach Airport.

Based on the letter by Saguache County and the balance of its Obstruction Evaluation process, the FAA provided its Determination of No Hazard on June 19, 2011. This final determination demonstrated compatibility with competing uses of the airspace, including military interests.

Additionally, the Project Applicant also requested that the Colorado Air National Guard make a determination of any impacts to its mission. On April 20, 2011, Colorado Air National Guard emailed its concurrence of no adverse impacts to its operation based on the proposed location and height of the receiver tower. These letters are provided in Exhibit I.

13-304(2)(a)(ix)(6) Historical and Archaeological Resources

13-304(2)(a)(ix)(6)(a) Description of Historical and Archaeological Sites

Cultural resources would include archeological sites, standing structures, objects, districts, traditional tribal properties, and other properties that illustrate important aspects of prehistory or history or have important and long-standing cultural associations with established communities or social groups. As described below in section 13-304(2)(a)(ix)(6)(b), there is low potential for any significant sites at the Project.

13-304(2)(a)(ix)(6)(b) Description of Individual Historical and Archaeological Resources

Previous cultural resources investigations have shown that the San Luis Valley contains many archaeological sites ranging in age from Paleoindian to Late Prehistoric times. However, these sites tend to be found in foothill areas, in dune areas in and around Great Sand Dunes National Park, and in locations near permanent and semi-permanent water sources. The Project site is in a location flat on the valley floor that has been heavily disturbed by agricultural use, which is ongoing. As a result, the Project site has a low potential for containing cultural resources.

The Native American Graves Protection and Repatriation Act (NAGPRA) of 1990 allows tribes to protect American Indian graves and to repatriate human remains. The Project Applicant must comply with this act if a burial site is encountered during construction. Any burial site identified during construction will be referred to the Colorado Office of Archaeology and Historic Preservation (OAHP).

Although there are no reservations or Bureau of Indian Affairs trust lands in Saguache County, the San Luis Valley is within the traditional range of a number of tribes, most notably the Southern Ute Tribe and the Jicarilla Apache Nation, which have reservations to the west and south of the Project site. The Jicarilla Tribal Historic Preservation Officer, the NAGPRA Coordinator at the Southern Ute Tribe, or the regional Bureau of Indian Affairs office in Albuquerque may need to be contacted if a traditional cultural property of Tribal interest is identified prior to or during construction.

A record search and review of existing records contained at the OAHP was conducted. This research was conducted to determine whether significant archeological or historic resources are located within the

vicinity of the Project and, if present, to identify the likelihood of impacts to these resources from Project development. Search results were received on September 18, 2009. OAHP files disclosed that two previous surveys had been conducted in or near the Project site and that five previously recorded sites had been recorded there.

Conner et al. (1980) provides results of a cultural resources inventory for a 230kV linear transmission line through Saguache, Chaffee and Alamosa counties. The proposed transmission line right-of-way apparently ran on a north–south axis through Sections 4, 9, 16, and 21, T41N, R9E in the Project site. Cultural resources were recorded by this survey.

Five previously recorded prehistoric archaeological sites were reported just outside the southeast boundary of the Project. These sites are 5SH416, 417, 418, 419, and 420. All were recorded in 1979 and reported in the Poncha–San Luis Valley 230kV Transmission Line Cultural Resources Inventory referenced above. All five sites were small scatters of lithic debitage with no associated culturally diagnostic artifacts. All five were evaluated as Not Eligible for the National Register of Historic Places.

The second survey was reported by the consulting firm of SWCA Inc. in 2002. This was a small block survey of an area around a dead-end structure that was conducted just outside the Project site boundary in Section 28, T41N, R9E. No cultural resources were recovered.

13-304(2)(a)(x) Impact Area Atmospheric Conditions

The U.S. Environmental Protection Agency (EPA) and the CDPHE regulate air quality in Colorado through implementation of the Federal Clean Air Act (CAA) (42 U.S.C. §§ 7401-7671q). The CAA is a federal air quality law, which is intended to protect human health and the environment by reducing emissions of specified pollutants at their source. The CAA outlines three types of airshed classification areas: Class I, II, and III. Class I areas include wilderness areas designated as of August 7, 1977, that are 5,000 acres or greater in size. Also included as Class I areas are all National Parks larger than 6,000 acres. These areas have the most stringent degree of protection from current and future air quality degradation.

The CAA requires the adoption of national ambient air quality standards (NAAQS) to protect the public health and welfare from the effects of air pollution. The CAA defines National Ambient Air Quality Standards (NAAQS) as levels of pollutant above which detrimental effects on human health and welfare could occur. Standards are provided for sulfur dioxide (SO_2), carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter less than 10 microns (PM_{10}), particulate matter less than 2.5 microns ($PM_{2.5}$), and lead, which are known as the criteria pollutants. The EPA has identified the PM_{10} particle sizes as the standard for evaluating emissions and its effect on human health.

A state or region is given the status of “attainment” if the NAAQS thresholds have not been exceeded for any criteria pollutant, or “nonattainment” for a specific pollutant if the NAAQS thresholds have been exceeded for that pollutant. An area designated as nonattainment may request redesignation if it can be shown that the area has not exceeded the NAAQS for a period of 3 years. Redesignation requires the

appropriate agency with jurisdiction over the area to prepare a maintenance plan and demonstrate compliance with NAAQS for 10 years (EPA 2009).

Saguache County is in attainment for all NAAQS standards. Great Sand Dunes National Park and La Garita Wilderness are Class I Federal airsheds near the Project. According to a May 21, 2009, report by the CDPHE Air Pollution Control Division (CDPHE 2009), the San Luis Valley Region meets air quality standards.

There exists an episodic blowing dust problem in the area, and dust is the primary emission source. In 2003, the Alamosa Natural Events Action Plan was created to address PM10 exceedances because of high wind events in the Alamosa area. The purpose of the plan is to:

- Educate the public about the problem
- Mitigate health impacts on the exposed populations during future events
- Identify and implement best available control measures for anthropogenic sources of windblown dust

Some of the best available control measures that will be implemented in Saguache County include paving or watering unpaved roads, encouraging low tilling and other soil conservation practices, and prohibiting open burning when local wind speeds exceed 5 mph.

Meteorology

The San Luis Valley is an arid cool desert with extreme daily temperature changes, but generally characterized by cold winters, moderate summers, and tremendous amounts of sunshine in all seasons.

The closest Western Regional Climate Center meteorological station to the Project is Center 4 SSW (051458) which is 9 miles southwest. Based on data records from 1941 to 2009, the average annual maximum temperature is 58.4 degrees Fahrenheit (°F), with an average peak of 80.5°F recorded in July. The average annual minimal temperature is 24.3°F with the low of -0.9°F recorded in January. The lowest temperature recorded in the data set was -41°F, which occurred on December 9, 1978. The highest temperature recorded in the data set was 95°F, which occurred on June 21, 1954.

The average total annual precipitation is 7 inches, ranging from a monthly high of 1.25 inches (recorded in August) to a low of 0.2 inches (recorded in February). The highest rainfall depth recorded in the data set was 2.18 inches, which occurred on July 25, 1989. The average total annual snowfall is 25 inches, ranging from a monthly high of 4.8 inches (recorded in December) to a low of 0 inches (recorded June through August). Average annual evaporation in the Project site, based on published evaporation-pan data at the San Luis Lakes (approximately 15 miles southeast of the Project site), is 56 inches, of which all occurs between March and October.

The closest Western Regional Climate Center meteorological station to the Project that records wind speeds is in Alamosa Airport. The airport is approximately 25 miles south of the Project site, although still within the agricultural area. The average annual wind speed is 7.5 mph; the peak speed records occur between April to June (up to 10.8 mph), and low speed records occur in December and January (approximately 5.5 mph). The prevailing wind direction throughout the year is south.

The climate and topography of the San Luis Valley is conducive to the formation of inversions, where the air temperature is actually warmer farther away from the ground. Inversions are typical in the winter months, with very low temperatures recorded at the surface as warmer winds pass over the valley and cooler air drains in from surrounding heights to fill the basin. Inversion heights generally coincide with the shift in wind direction that generally occurs close to the mountain tops.

Atmospheric stability is the tendency for air volume to move vertically. This movement happens when the temperature of an air volume is greater than the temperature of the surrounding environment, causing the air volume to rise, or alternatively, when the temperature of the air volume is cooler than surrounding environment temperature, the air volume will descend. Historical data show there are only small amounts of precipitation over the site throughout the year, and the prevailing wind is south. In addition, there are usually clear blue skies reported throughout the year. All of the above are indicators of a stable atmosphere above the Project site.

Topography

The Project site is located in the San Luis Valley, which is identified as the state's best solar resource area. It is an extensive valley that covers approximately 8,000 square miles from Colorado to New Mexico. The Project site is surrounded by mountain ranges; the Great Sand Dunes Park is to the east and the Rio Grande National Forest is to the west of the Project site (Figure 1). The average elevation of the San Luis Valley is approximately 7,700 feet above mean seal level (amsl) and the surrounding mountain peaks are above 14,000 feet amsl.

The Project is located at approximately 7,555 to 7,590 feet amsl, gently sloping southwest to northeast at approximately a 0.1 percent grade (Figure 17). Given the current use of the Project site as agricultural land and the lack of topographic relief, there are no outstanding topographic features.

Background Ambient Air Quality

The Project site is in the San Luis Valley Air Quality Planning Region. This region is in attainment for all National Ambient Air Quality Standards (NAAQS). The general air pollutants of concern in this region are particulates from blowing dust and motor vehicles. Given the low population density, the area is not intensely monitored for ambient air quality conditions. The nearest monitoring locations are two particulate monitoring sites in Alamosa, approximately 30 miles south of the Project site. The annual PM_{10} average concentrations in micrograms per cubic meter (µg/m^3) are summarized in the Table 24.

Table 24:
Alamosa, Colorado—PM10 Monitored Background Concentrations[1]

Location	**PM10 (µg/m^3)**—Annual Average					
	2005	2006	2007	2008	2009	5 Year Average
Adams State College—Edgemont Blvd.	20.6	21.6	*22.4**	*20.2**	20.9	21.1
Municipal—4th St.	23.9	*25.2**	29.1	*26.4**	24.7	25.9

* Indicates less than 75% data for one or more quarters
Source: CDPHE, 2009

13-304(2)(b)(i) Base Area Geologic and Pedologic Conditions

13-304(2)(b)(i)(1) Bedrock and Surficial Geology

The Project site is located in the San Luis Valley between the Sangre De Cristo Range to the east and the San Juan Mountains to the west. The San Luis Valley has been filled with thousands of feet of sedimentary and volcanic rock followed by hundreds of feet of unconsolidated mixed wind-borne, alluvial, and lake bed soils. Sediments up to 30,000 feet thick are present in the valley (Tweto 1979). The valley sediments lie on top of the Rio Grande Rift system Precambrian-age granite that extends southward into New Mexico and Texas. Uppermost material (as much as 100 feet) is separated from much thicker deeper soils (referred to the Alamosa Formation) by a distinctive old lakebed clay layer that divides the alluvium into unconfined (above) and confined (below) aquifers. Bedrock throughout the Project site is mapped entirely as Quaternary-Tertiary alluvium deposits of the Alamosa Formation (Green 1992) in the San Luis Valley (Figure 18).

Surficial soil types within the Project site were determined using the U.S. Department of Agriculture (USDA)–Natural Resource Conservation Service (NRCS) on-line web soil survey and mapper (NRCS 2010). The soils in the Project site are predominantly sandy loams (56 percent) and loamy sands (32 percent) (see Table 25 and Figure 19), with smaller amounts of loam and clay loams throughout. The most extensive soil units include San Luis sandy loam, Kerber loamy sand, San Luis sandy loam (drained), and Hooper clay loam (NRCS 2010). These soils are generally classified from clay and loam sand to very gravelly sand. The soils in Saguache County are very productive for agriculture. This area is nearly level and soils vary from somewhat poorly to moderately drained with slightly to moderately saline conditions. Soil types for the Project site are listed in Table 25, and soil types for the property option area (see Figure 2) are listed in Table 26.

Table 25:
Soil Types in Project Site

Soil Type	Acres	%
Arena loam	27.43	0.678329
Gunbarrel loamy sand	2.05	0.050695
Gunbarrel loamy sand, saline	57.18	1.414031
Hagga loam, dry	160.56	3.970562
Hooper clay loam	295.01	7.295438
Hooper loamy sand	208.09	5.145953
Kerber loamy sand	797.74	19.72768
Mosca loamy sand, 0 to 3 percent slopes	246.36	6.09235
San Luis sandy loam	1842.96	45.57541
San Luis sandy loam, drained	406.38	10.04956
Total	4043.76	100

NRCS (2010)

Table 26:
Soil Types in Property Option Area

Soil Type	Acres	%
Arena loam	27.43	0.437026
Gunbarrel loamy sand	322.57	5.139313
Gunbarrel loamy sand, saline	81.36	1.29626
Hagga loam, dry	160.56	2.558105
Hooper clay loam	322.19	5.133259
Hooper loamy sand	242.22	3.859145
Kerber loamy sand	1118.94	17.82739
Laney loam, 0 to 3 percent slopes	4.88	0.07775
McGinty sandy loam, 0 to 3 percent slopes	5.4	0.086035
Mosca loamy sand, 0 to 3 percent slopes	669.75	10.67072
San Luis sandy loam	2529.24	40.29685
San Luis sandy loam, drained	780.09	12.4287
Water	11.89	0.189436
Total	6276.52	100

NRCS (2010)

13-304(2)(b)(i)(2)(a) Avalanches

No avalanche hazard was identified at or in proximity to the Project site. Topography at the Project site and vicinity is located in the San Luis Valley and has very low relief. The nearest topographic features of significance are the Great Sand Dunes to the east, the Rio Grande River valley to the south, and the San Juan mountain range to the west—all approximately 12 miles from the Project. Slopes are less than 0.2 percent across the Project site.

The Project site is characterized by gently sloping to undulating topography, which trends downward from southwest to northeast across the Project area. Elevation within the Project site ranges from approximately 7,590-feet amsl to 7,558-feet amsl.

13-304(2)(b)(i)(2)(b) Mud Flows and Debris Fans

Topography at the Project site and vicinity has very low relief and mud flows or debris fans are very unlikely. In addition, there is no mapped geologic evidence of previous mud flows or debris fans in the area of the Project.

13-304(2)(b)(i)(2)(c) Unstable or Potentially Unstable Slope

Topography at the Project site and vicinity has very low relief and unstable or potentially unstable slopes are not indicated in the area of the Project site. The Project site is located in areas of low soil erosion potential (NRCS 2010).

13-304(2)(b)(i)(2)(d) Special Seismic Considerations

Based on field observations and review of referenced data available from the Colorado Geologic Survey (CGS 2010), no faults traverse the Project site. Review of referenced geologic data indicates that the nearest active fault (i.e., a fault that has experienced ground surface rupture within the past 11,000 years) to the site is the Sangre de Cristo fault zone, located within 30 miles east of the Project site.

Several simple Quaternary faults have been mapped within 30 miles of the Project site. The CGS defines a simple fault as a fault that consists of a single section which ruptured during the last paleoevent. The term “simple fault” also serves as a default category for faults that have not been studied in enough detail to warrant a designation as a sectional or segmented fault. The Lucky Boy Fault (structure number Q62) lies approximately 25 miles to the northwest of the Project site. The fault is a branch of the Western Boundary Fault that forms the western rim of the Bonanza Caldera. The most recent movement on the Lucky Boy Fault is considered to have occurred during the late Quaternary (<130,000 years before present). The Lucky Boy Fault has been assigned a Maximum Credible Earthquake magnitude 6.75.

The Mineral Hot Springs Fault (structure number Q68) lies approximately 24 miles to the northeast of the Project site. The Mineral Hot Springs Fault is a north-northwest trending fault along the western margin of the Rio Grande Rift at the northern end of the San Luis Valley, at the point where the valley narrows abruptly in width. The most recent activity on the Mineral Hot Springs Fault is considered to have occurred during the late Quaternary (<130,000 years before present).

One sectioned Quaternary fault structure has been mapped within 30 miles of the Project site. The CGS defines a sectional fault as a fault that consists of two or more sections that have ruptured independently, but each section has not been carefully evaluated in detail to accurately characterize the rupture history of each section. The Northern Sangre de Cristo Fault, Crestone Section, is a major west-dipping (60 degrees) normal fault within the Rio Grande Rift. It forms the structural boundary between the Sangre de Cristo Range on the east, and the San Luis Valley on the west. The most recent movement on the Northern Sangre de Cristo Fault, Crestone Section, is considered to have occurred during the post glacial Holocene (<15,000 years before present), with a recurrence interval of 5.0 to 11.7 thousand years, and a slip rate of less than 0.2 millimeters/year. The Sangre de Cristo Fault has been assigned a Maximum Credible Earthquake magnitude 7.5..

The distances from the site to these faults and fault zones and the ages of faulting are summarized in Table 27. The Project components will be designed and constructed to meet the applicable International Building Code requirements for the appropriate seismic hazard.

Table 27:
Faults in Site Vicinity

Fault Name	Approximate Distance From Project Site to Fault (miles)	Age of Faulting
Alamosa Horst Fault Zone West	5	Late Cenozoic (<23.7 Million Years Before Present [Ma])
Alamosa Horst Fault Zone East	13	Late Cenozoic (<23.7 Ma)
Lucky Boy Fault	25	Late Quaternary (<130 ka)

Table 27:
Faults in Site Vicinity

Fault Name	Approximate Distance From Project Site to Fault (miles)	Age of Faulting
Mineral Hot Springs Fault	24	Late Quaternary (<130 ka)
Northern Sangre de Cristo Fault, Crestone Section	27	Latest Quaternary (<15 ka)
Northern Sangre de Cristo Fault, Zapata Section	32	Latest Quaternary (<15 ka)
Villa Grove Fault Zone	30	Latest Quaternary (<15 ka)
Western Boundary Fault	30	Quaternary (<1.6 Ma)

13-304(2)(b)(i)(2)(e) Areas of High Radioactivity

No sources of radioactivity were identified in the Project site.

13-304(2)(b)(i)(2)(f) Ground Subsidence

Certain types of soils (especially silty soils) might be subject to collapse when subjected to extremely wet and/or high load conditions. No evidence of subsidence has been observed near the Project site. During future site reconnaissance and geotechnical studies, evidence of ground subsidence will be observed and documented if present. The facility will be designed to mitigate for any such subsidence issues if identified. Since most areas of the site have been irrigated for approximately 37 years, it is not expected that there are any subsidence issues of concern.

13-304(2)(b)(i)(2)(g) Expansive Soil and Rock

Swelling soils are generally characterized by a high percentage of swelling clays. The primary soils types that exist at the site are loamy sands and sands. As shown in Figure 20, the shrink-swell potential of the soils within the Project site is low with a few scattered areas with a moderate shrink-swell potential.

13-304(2)(b)(i)(2)(h) Other Geologic Conditions

The Project is very similar to a conventional electrical power plant with two exceptions, the central receiver tower and the numerous heliostats. The central receiver is a tall concrete structure with a large foundation. The heliostats will have individual foundations that will support the tracking motors, mirror modules, and structural framework. The unique aspect of these heliostat foundations is the number of foundations (planned at up to 17,500 per phase).

From a structural design perspective, the heliostats will be designed to maintain pointing accuracy under design wind and seismic loads. The heliostat foundations will extend below grade to provide the necessary lateral, axial, torsional, and moment load resistance. In that sense, the foundations will be constructed in a fashion similar to a billboard, highway sign, or a light pole (which are found in the area).

The central receiver tower will require a large concrete foundation to support the loads from the tower (including the receiver). Because these loads are significant, an independent geotechnical feasibility study was conducted by registered professional engineers to determine the suitability of the site for the Project. A copy of this study is included as Exhibit J. This study focused on the existing geological

conditions and soil parameters and the resulting impact from the proposed loading scenarios and provided approximate dimensions for the design of cast-in-drilled-hole concrete piles. The conclusions from this study confirmed that the site is suitable for the Project.

All foundation concepts for the tower discussed within the feasibility study can be constructed using conventional construction techniques. Additionally, the approximate sizing of the pile foundations to support the receiver tower does not affect the financial viability of the Project. Based on these findings, the existing geology of the site will not have a significant negative impact on the Project feasibility or construction techniques.

13-304(2)(b)(i)(3) Floodplains

The Federal Emergency Management Agency has not issued historic, current, or future maps for the Saguache County, so it is not determined whether there is a flood hazard in this region. The Colorado Water Conservation Board (CWCB) Flood Protection Program performs technical reviews for CWCB designation and approval of flood plain studies. The U.S. Geological Survey (USGS), in cooperation with the CDOT and BLM, undertook a study in 2000 to assess the magnitude and frequency of flooding in Colorado. The CWCB recommends using this USGS study to approximate peak flows in the Rio Grande Basin. However, as the Rio Grande River is 20 miles southeast from the Project site, at an elevation of 7645 feet amsl, flowing southwest (away from the site) in an established floodplain, it is not expected to cause a flooding impact to the Project site. No other existing waterways are expected to cause a flooding impact to the Project site.

13-304(2)(b)(i)(4) Topography

The Project site is located in the San Luis Valley in an area with flat to very gentle topographic relief (see Figure 17). The Project site gently slopes at approximately 0.1 percent toward the northeast. Elevations at the site are range from 7,590 feet to 7,558 feet above mean sea level. The Project facility design will not be impacted by the Project site topography. The site is flat and will require only minimal grading for site development.

13-304(2)(b)(i)(5) Mineral and Energy Resources

According to a search of Colorado Division of Natural Resources mining operations database for Saguache County (2010), mineral resources in the County are dominated by sand and gravel operations primarily used for construction purposes. Of the 19 active mining operations all are sand and gravel operations except one gold mining operation and one limestone mining operation. There are no active or inactive mining operations indicated in the Project site. Energy resources in the area include solar resources and geothermal resources. Oil and gas operations are not currently present in the San Luis Valley floor, although new operations are proposed approximately 20 miles from the site. Two exploration wells were drilled in 1951 and 1952 in the Property (Colorado Oil and Gas Conservation Commission 2010). Both wells were noted at “dry and abandoned.”

13-304(2)(b)(i)(6) Agricultural Resources

A map that shows agricultural resource areas is provided in Figure 15. The Project site has historically been used for agricultural production of crops for the past 37 years. Agricultural resources are further described and evaluated in Section 13-304(2)(e)(iv)(5), Agricultural Productivity and Agricultural Resources.

13-304(2)(b)(ii) Impact Area Biotic Conditions

13-304(2)(b)(ii)(1) Plant Communities

13-304(2)(b)(ii)(1)(a) Plant Characteristics, Quantity, and Productivity

A wetlands reconnaissance report for the Project was conducted in 2010 and is presented as Exhibit K. No significant wetlands will be disturbed.

Historically, the San Luis Valley of Colorado was characterized as the San Luis Alluvial Flats and Wetlands of the Arizona/New Mexico Plateau Ecoregion (Chapman et al. 2006). The ecoregion was once dominated by shadscale (*Atriplex confertifolia*), saltbush (*Atriplex* spp.), sagebrush (*Artemisia tridentate*), and greasewood (*Sarcobatus vermiculatus*), but native vegetation has been replaced with irrigated cropland. The historical plant community still occurs in the extreme eastern portion of the Project area. Although precipitation in the ecoregion is less than 8 to 10 inches a year, water availability through mountain runoff, a high water table, and associated springs and wetlands have made cropland irrigation possible.

According to the Colorado Geographic Analysis Program (CDOW 1998), primary plant communities within the Project site include: 98.97 percent irrigated agriculture, 0.9 percent greasewood fans and flats with irrigated agriculture and 0.11 percent greasewood fans and flats with graminoid and forb-dominated wetlands. The irrigated agriculture within the Project site is primarily wheat, potatoes, and barley. The greasewood fans and flats with irrigated agriculture, approximately 56.5 acres, have essentially been converted to cropland; there are some remnants of native vegetation on the edges of the fields. The remaining native vegetation, approximately 7.5 acres, is characterized by wetland areas where greasewood comprises more than 75 percent of total shrub cover and is mixed with various grass species (CDOW 1998). Those wetland areas will not be disturbed by the solar project's construction or operations.

The Project site has been in cultivation for approximately 37 years. There are small areas of native shrub-scrub communities, including green rabbitbrush (*Chrysothamnus viscidiflorus*), yellow prickly pear cactus (*Opuntia polyacantha*), and yellow sweet clover (*Melilotus officinalis*) that were observed in a June 2010 site visit in the unplowed corners of the agricultural fields.

13-304(2)(b)(ii)(1)(b) Endangered or Threatened Plant Species

The Endangered Species Act (ESA) mandates that actions are not to jeopardize the continued existence of listed species. The USFWS maintains a list of federal threatened and endangered plant species. Species listed by the USFWS often have low population sizes, are sensitive to habitat alterations, or have

cultural significance and require protective measures for their perpetuation. The USFWS lists 13 endangered or threatened plant species within the state of Colorado (Table 28; USFWS 2010). Of these species, none are listed as occurring within Saguache County (USFWS 2010)

Table 28:
Special Status Plant Species for Colorado

English Name (Scientific Name)	Status1	General Habitat Associations	Occurrence
Beardtongue, Penland *(Penstemon penlandii)*	FE	Endemic to alkaline shale of the Troublesome Formation along the Troublesome Creek in northern Colorado.	None
Bladderpod, Dudley Bluffs *(Lesquerella congesta)*	FT	Endemic to Piceance Basin at junction of Piceance Creek and Ryan Gulch.	None
Butterfly plant, Colorado (*Gaura neomexicana* var. *coloradensis*)	FT	Found on subirrigated, alluvial soils along North and South Platte River drainages.	None
Cactus, Knowlton (*Pediocactus knowltonii*)	FE	Found on gravel pavements in pinyon-juniper woodlands.	None
Cactus, Mesa Verde (*Sclerocactus mesae-verdae*)	FT	Found in the Four Corners region of Colorado on shallow soils derived from Mancos and Fruitland formations	None
Cactus, Uinta Basin hookless (*Sclerocactus glaucus*)	FT	Found on alluvial soils along the Green, Colorado and Gunnison Rivers.	None
Ladies-tresses, Ute (*Spiranthes diluvialis*)	FT	Found on silty loamy alluvial soils associated with wetlands or floodplains of perennial streams in intermountain valleys.	None
Milk-vetch, Mancos (*Astragalus humillimus*)	FE	Found in the Four Corners region of Colorado on sandstone rimrock ledges and mesa tops in Point Lookout sandstone.	None
Milk-vetch, Osterhout (*Astragalus osterhoutii*)	FE	Endemic to Muddy and Troublesome Creek drainages on shale and siltstone barrens in high elevation sagebrush habitats.	None
Mustard, Penland alpine fen (*Eutrema penlandii*)	FT	Endemic to the Mosquito Range of central Colorado in alpine tundra on calcareous substrate.	None
Phacelia, North Park (*Phacelia formosula*)	FE	Endemic to sandy soils in sparsely vegetated areas of the Coalmont Formation in North Park, Colorado.	None
Twinpod, Dudley Bluffs (*Physaria obcordata*)	FT	Endemic to oil shale barrens in the Piceance Basin in northwest Colorado.	None
Wild-buckwheat, clay-loving (*Eriogonum pelinophilum*)	FE	Endemic to Mancos shale badlands in salt-mixed desert shrub community.	None

[1] FE = Federally endangered, FT = Federally threatened
[2] USFWS (2009), NRCS (2009)

Species distribution information in the NRCS plants database is often based on documented occurrences where prior surveys have taken place rather than on systematic surveys; therefore, a lack of records does not necessarily indicate that a species is absent from a particular area. The Project site is in active agricultural production, and has been for approximately 37 years. Given the active agricultural use of the Project site, it is unlikely that protected or special interest plant species would occur in the Project site.

13-304(2)(b)(ii)(1)(c) Disturbance and Current Indications of Stages in Ecological Succession

The presence of noxious weeds typically is indicative of a history of disturbance, whether natural or man-made, within an area. Noxious weeds, as defined by the Colorado Noxious Weeds Act of 2003, are non-native species that meet at least one of the following criteria regarding their negative impacts:

- Aggressively invades or is detrimental to economic crops or native plant communities
- Is poisonous to livestock
- Is a carrier of detrimental insects, diseases, or parasites
- Has direct or indirect effects that are detrimental to the environmentally sound management of natural or agricultural systems

The Colorado Department of Agriculture (CDOA) lists 70 species as noxious and invasive plant species in Colorado under the Colorado Noxious Weed Act (CODA 2009a). Under this act, noxious weeds are divided into three lists based on appropriate management techniques: species identified on List A are species to be eliminated prior to seed development, species identified on List B are species for which there are statewide management plans to stop the spread of these species, and species identified on List C are species for which there are statewide management plans to provide additional support and education to local authorities to manage the species. Of the 70 species, 9 species have been identified in Saguache County (Table 29, CDA 2009b). None of these species has been found on the Project Site.

Table 29:
Noxious Weeds for Saguache County, Colorado

English Name (Scientific Name)	Status[1]	General Habitat Associations	Occurrence
Black henbane (*Hyoscyamus niger*)	B	Found in most soil types, most suitable are sandy or well-drained loam soils.	None
Canada thistle (*Cirsium arvense*)	B	Grows in a variety of soils and can tolerate up to 2% salt content. It is most competitive in deep, well-aerated, productive, cool soils. It is less common in light, dry soils.	None
Diffuse knapweed (*Centaurea diffusa*)	B	Typically found in disturbed, overgrazed areas. It is most competitive on dry sites, and rapidly invades disturbed areas.	None
Field bindweed (Convolvulus arvensis)	C	Not restricted to certain soils and occurs in cultivated areas, pastures, roadsides, and waste areas between 4,000 and 8,000 feet in elevation.	None
Hoary cress (*Cardaria draba*)	B	Typically found on unshaded, generally open areas of disturbed ground. It is most competitive on alkaline soils with moderate amounts of precipitation.	None
Leafy spurge (*Euphorbia esula*)	B	Not restricted to certain soils and occurs in pastures, agronomic crops, roadsides, waste places, and rangeland.	None

Table 29:
Noxious Weeds for Saguache County, Colorado

English Name (Scientific Name)	Status[1]	General Habitat Associations	Occurrence
Musk thistle (*Carduus nutans*)	B	Typically found in disturbed, overgrazed areas. It is most competitive on dry sites. Also found in rangelands, roadsides, riparian areas, and trails.	None
Russian knapweed (*Acroptilon repens*)	B	Not restricted to certain soils and occurs in pastures, agronomic crops, roadsides, waste places, and rangeland.	None
Spotted knapweed (*Acroptilon*)	B	Commonly occurs with diffuse knapweed in disturbed, overgrazed areas. It has a wide moisture tolerance, tolerating dry and wet conditions.	None

Source: CDOA (2009b)

[1] A = All populations designated for eradication; B = managed to decrease likelihood of spread, C = managed by local authorities

13-304(2)(b)(ii)(2) Terrestrial Wildlife

13-304(2)(b)(ii)(2)(a) Presence and Relative Importance of Species

The Project site is situated within the San Luis Valley and is located along the western edge of the Central Flyway, a migratory corridor for avian species between wintering grounds in South America and summer breeding grounds throughout North America. The nearby Alamosa and Monte Vista National Wildlife Refuges have records of more than 200 avian species occurring in the region. Of note is the greater sandhill crane (*Grus canadensis tabida*), which has peak migration stopover within the San Luis Valley of approximately 17,000 individuals. The sandhill crane is considered a species of special concern in Colorado, a non-regulatory status that indicates species of local concern and local management interest.

To identify potential avian impacts associated with building and operating the solar energy generation facility, surveys were performed at the Project from March 19 to May 30, 2011, which included the mid-spring through early summer seasons. Fixed point count surveys (800-meter radius) were conducted at 4 points distributed throughout the Project boundary and within a 2-mile buffer. In addition to general avian surveys, sandhill crane surveys were conducted from March 19 to April 19, 2011 while cranes were present during spring migration. Biologists conducted crane surveys for 2 hours before sunset and for 2 hours after sunrise on consecutive days.

Mean avian use was low at the two count locations located inside the Project boundary (8.8 birds/20 min), which is predominantly potato agriculture compared to the count locations outside of the Project boundary (27.0 birds/20 min or 3 times the amount inside the Project boundary), located in grasslands and shrublands, and water and associated riparian vegetation.

During surveys, 1,306 sandhill cranes (maximum 350 in one observation more than 2 miles from the Project boundary) were observed foraging, roosting, or in flight. Sandhill cranes were not found to roost or forage within the Project boundary and most observations occurred in a matrix of winter wheat stubble and rangeland to the northwest of the Project boundary.

Raptor use of the Project was low (only one northern harrier was observed within the Project boundary), and no raptor nests were found within the Project boundary likely due to the limited nesting and foraging habitat.

The Project is proposed on already converted landscape with little wildlife value. The habitat within the Project boundary consists primarily of potato agriculture with only sparse remnant natural habitat remaining. The avian count data and the crane survey data indicate that use within the Project boundary is low and that areas of higher use are found where natural habitat (grassland, shrubland) and water are available. Development of the Project will result minimal loss of wildlife habitat and low risk to raptors as no nests are located within the Project boundary and the potato fields likely do not provide suitable foraging areas.

Colorado has 18 species of bats that occur within the boundary of the state and 10 of these species are confirmed to occur within Saguache County. None of these bats is federal or state listed as threatened or endangered and only the Townsend's big-eared bat (*Corynorhinus townsendii pallescens*) is considered a state species of special concern. All bat species in Colorado are considered non-game mammals and protected by Colorado law. In the San Luis Valley, a large Brazilian free-tailed bats colony (approximately 250,000 individuals) is located more than 20 miles to the northeast of the Project site at the Orient Mines.

Although bat studies were not conducted, high concentrations of bats are unlikely to occur within the Project site because roosting and foraging habitat is not as suitable within the Project site as it is elsewhere. It is unlikely, therefore, that the development of the Project site would adversely affect bats.

Additionally, the San Luis Valley region has large populations of big game animals, including American elk, mule deer, and pronghorn. American elk populations within the Project site are managed under the Data Analysis Unit (DAU) plan for the Northern San Luis Valley Floor Herd (E-55) (Wagner 2006). Specifically, the plan's objective is to minimize the elk population to decrease conflicts between production agriculture and elk. A DAU plan is not available for the mule deer herds within the Project site, which falls within D-36 and D-37; however, the Colorado Department of Wildlife (CDOW) has developed a management plan for the nearby Lower Rio Grande Herd and the plan offers suggestions of regional plan objectives (D-35). The plan's objective is to increase mule deer populations for the herd while being conscious of potential increase in game damage complaints from production agriculture (Weinmeister 2008). Pronghorn populations in the vicinity of the Project site are managed under the DAU plan for the Northern San Luis Valley Herd. Specifically, the plan's objective is to increase pronghorn populations within the region and to increase license types to decrease subsequent increases in game damage claims.

During the bird surveys, biologists recorded observations of big game and other mammals. No big game and very few mammals of any kind (the most numerous being ground squirrels in center pivot corners) were seen during the actual surveys on the Project site (i.e., the avian survey presented in Exhibit M), and no large game was seen.

13-304(2)(b)(ii)(2)(b) Distribution of Species

Avian species within the San Luis Valley are concentrated in wetland areas within the valley, such as Russell Lakes State Wildlife Area, Alamosa National Wildlife Refuge, Monte Vista National Wildlife Refuge; along the Rio Grande basin; and isolated ponds. Distribution of avian species is highly dependent upon time of year, i.e., the number of individuals peaks during spring and fall migration periods. Because the Project site is currently agricultural cropland, there is a potential for migratory and resident avian species to utilize the Project site as foraging habitat. A total 176 birds were observed within the Project boundary including 175 birds from 17 species and 1 bird that could not be identified to species during the fixed-point count surveys; overall mean bird use during the surveys was 8.80 birds/20 min. A total 540 birds were observed at points outside the Project boundary including 467 birds from 35 species and 73 birds that could not be identified to species during the fixed-point count surveys; overall mean bird use during surveys was 27.0 birds/20 min. The avian count data and the crane survey data indicate that avian use within the Project boundary is low, whereas areas of higher use are found where natural habitat (grassland, shrubland) and water are found. The Project is proposed on agricultural land with little wildlife value, and the habitat within the Project boundary consists primarily of potato agriculture with only sparse remnant natural habitat remaining. Development of the Project will result in minimal loss of wildlife habitat and low risk to raptors as no nests are located within the Project boundary and the potato fields likely do not provide foraging areas.

The distribution of big game species is highly dependent upon the time of year. In summer, elk populations appear to peak along the valley floor, including areas within the Project site, with more individuals using the northern portions of the valley floor (Figure 21) (Wagner 2006). Deer populations on the valley floor appear to concentrate along the Rio Grande basin and agricultural areas immediately adjacent, approximately 15 miles south of the Project site (Figure 22) (Weinmeister 2008). Areas along the San Luis Creek near Villa Grove, approximately 20 miles north of the Project site, have the highest concentration of pronghorn (Weinmeister 2008). The Project site is outside the main production and summer range of elk, the known areas of occurrence for the resident population of mule deer, and outside the known areas of occurrence for resident populations of pronghorn. Given the distances to known areas of high use for big game species, it is therefore unlikely that the development of the Project site will have negative impacts on these species.

13-304(2)(b)(ii)(2)(c) Biological Features

The basic biological features of the Project and the general area are described above. There is currently little valuable habitat in the Project site for mammal or avian species. The avian count data and the crane survey data indicate that avian use within the Project boundary is low, and that areas of higher use are found outside of the Project site where natural habitat (grassland, shrubland) and water are located. The habitat within the Project boundary consists primarily of potato, lettuce, and alfalfa crops; only sparse remnants of natural habitat remain, so development of the Project will result in minimal loss of wildlife habitat. Furthermore, development of the Project will result in low risk to raptors because no nests are located within the Project boundary and the agricultural fields likely do not provide valuable foraging areas.

13-304(2)(b)(ii)(2)(d) Federal and State Threatened and Endangered Species

Federally Protected Species

The ESA, as administered by the USFWS, mandates protection of species federally listed as threatened or endangered and their associated habitats. The ESA makes it unlawful to "take" a listed species. Take is defined as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect or attempt to engage in any such conduct." Significant modification or degradation of listed species' habitats are considered "harm" under ESA regulations and projects that have such potential will require consultation with USFWS and may require special permitting or mitigation measures to avoid or reduce impacts to these species. Candidate species receive no statutory protection from the USFWS; however, they do receive full protection once listed.

In Colorado, 18 wildlife species are listed as federally endangered or threatened and 5 are listed as federal candidate species (USFWS 2009). Of these, 10 federally listed species were identified as potentially occurring in Saguache County: Mexican spotted owl (*Strix occidentalis lucida*), southwestern willow flycatcher (*Empidonax traillii extimus*), bonytail (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), greenback cutthroat trout (*Oncorhynchus clarki stomias*), humpback chub (*Gila cypha*), razorback sucker (*Xyrauchen texanus*), Uncompahgre fritillary butterfly (*Boloria acrocnema*), black-footed ferret (*Mustela nigripes*), and lynx (*Lynx canadensis*) (Table 30). The USFWS identified five candidate species as potentially occurring in Saguache County: greater sage-grouse (*Centrocercus urophasianus*), Gunnison sage-grouse (*Centrocercus minimus*), yellow-billed cuckoo (*Coccyzus americanus*), Rio Grande cutthroat trout (*Oncorhynchus clarki virginalis*), and Gunnison's prairie dog (*Cynomys gunnisoni*) (Table 30). Additionally, the CDOW lists the federally endangered whooping crane (*Grus americana*) as occurring within Saguache County. No federally listed bird species were observed during systematic surveys; no other federally listed species were observed incidentally.

Table 30:
Federally and State Protected Species for Saguache County, Colorado

Common Name	Scientific Name	Federal/State Status[1]	Likelihood of Occurrence in Project Site[2]	Habitat Association
Amphibians				
Northern leopard frog	*Rana pipiens*	SC	Low	Found in southern Colorado occurring in or near wetlands, ponds, reservoirs, and irrigation ditches. Likelihood of the occurrence low given lack of open water within Project site.
Birds				
American peregrine falcon	*Falco peregrinus anatum*	SC	Low	Rare spring and fall migrant. Nests near cliffs and forages over adjacent coniferous and riparian forests. Can also be found in grasslands and agricultural areas. Likelihood of the occurrence low given lack of distribution of species in relation to Project site.
Bald eagle	*Haliaeetus leucocephalus*	FP, ST	Unlikely	Known winter resident in south-central Colorado. Occurs near large, fish-bearing water bodies with tall roosting trees and snags for nesting and roosting. Likelihood of the occurrence

Table 30:
Federally and State Protected Species for Saguache County, Colorado

Common Name	Scientific Name	Federal/State Status[1]	Likelihood of Occurrence in Project Site[2]	Habitat Association
				unlikely given lack of suitable habitat within the Project site.
Burrowing Owl	*Athene cunicularia*	ST	Low	Open grasslands usually associated with prairie dog towns. Likelihood of occurrence is low given habitat within the Project site and distribution of the species.
Ferruginous hawk	*Buteo regalis*	SC	Observed	Winter resident and rare summer resident; occurs in grasslands and semi-desert shrublands. Generally avoids areas of intensive agriculture or human activity. Likelihood of occurrence moderate given distribution of species within the San Luis Valley and distance from Project site to know nest location.
Gunnison sage-grouse	*Centrocercus minimus*	FC, SC	Unlikely	Historically occurred in southwestern Colorado occurring in habitats with large expanses of sagebrush. Likelihood of occurrence unlikely given an absence of suitable habitat such as large expanses of sagebrush.
Greater sage-grouse	*Centrocercus urophasianus*	FC, SC	Unlikely	Occurs in large expanses of open sagebrush flats or hills above 4,000 feet amsl. Likelihood of occurrence unlikely given species distribution and absence of suitable habitat such as large expanses of sagebrush.
Mexican spotted owl	*Strix occidentalis lucida*	FT, ST	Unlikely	Rare in Colorado, found in rocky canyons with evergreen oaks prominent in understory and overstory of pines. Restricted to southern Rocky Mountains; occurs in canyons and montane forests. Likelihood of occurrence unlikely given an absence of suitable habitat such as forested land and caves.
Mountain plover	*Charadrius montanus*	SC	Moderate	Casual migrant in northwestern and west-central valleys and San Luis Valley. Occurs in prairie grasslands, arid plains, and fields. Likelihood of occurrence is moderate given distribution and presence of suitable habitat within the Project site.
Greater sandhill crane	*Grus Canadensis tabida*	SC	Observed	Abundant migrant in San Luis Valley occurring in mudflats near reservoirs, in moist meadows, and in agricultural areas. Likelihood of occurrence is low given distribution, migratory patterns, and absence of suitable habitat within the Project site.
Southwestern willow flycatcher	*Empidonax traillii extimus*	FE, SE	Unlikely	Migrant. Occurs in dense riparian habitats with saturated soils, standing water or nearby streams, or pools. Occurs in dense riparian habitats with saturated soils, standing water, or nearby streams or pools. Likelihood of the occurrence unlikely given lack of suitable habitat within the Project site.
Yellow-billed cuckoo	*Coccyzus americanus*	FC, SC	Unlikely	Rare migrant and occasional summer resident; occurs in lowland riparian forests and urban areas with tall trees. Rare migrant and occasional summer resident; occurs in lowland riparian forests and urban areas with tall trees. Likelihood of the occurrence unlikely given lack of suitable habitat within the Project site.
Whooping crane	*Grus americana*	FE, SE	Unlikely	Rare migrant to western valleys and extremely uncommon migrant to San Luis Valley occurring in mudflats near reservoirs

Table 30:
Federally and State Protected Species for Saguache County, Colorado

Common Name	Scientific Name	Federal/State Status[1]	Likelihood of Occurrence in Project Site[2]	Habitat Association
				and in agricultural areas. Likelihood of occurrence unlikely given distribution, migratory patterns, and absence of suitable habitat within the Project site.
Mammals				
Black-footed ferret	*Mustela nigripes*	FE, SE	Unlikely	Re-introduced rare resident. Historically occurred in shortgrass and mid-grass prairies to semi-desert shrublands. Restricted to habitats with active prairie dog colonies. Likelihood of occurrence unlikely because only historical records exist and no prairie dog colonies exist within the Project site of sufficient size to support black-footed ferrets.
Canada lynx	*Lynx canadensis*	FT, SE	Unlikely	Reintroduced resident; occurs in boreal and montane regions dominated by coniferous and conifer-hardwood forests, typically above 4,000 feet amsl. Likelihood of occurrence is unlikely given absence of suitable habitat.
Gunnison's prairie dog	*Cynomys gunnisoni*	FC	Low	Restricted to southwestern and south-central Colorado; occurs in high mountain valleys and plateaus at elevations of approximately 6,000 feet amsl to approximately 12,000 feet amsl in open slightly brushy country with scattered junipers and pines. Likelihood of occurrence is low given the marginally suitable habitat in unplowed corners of agricultural fields in the Project site.
Northern Pocket Gopher	*Thomomys talpoides macrotis*	SC	High	Common throughout Colorado; occurring in a variety of habitats including pasturelands, shrublands and grasslands upwards to alpine tundra. Likelihood of occurrence high given distribution and potential suitable habitat within the Project site.
Townsend's big-eared bat	*Corynorhinus townsendii pallescens*	SC	Unlikely	Found throughout Colorado; occurs in mines, caves and structures in woodlands and forests to elevations of 9,500 feet amsl. Likelihood of occurrence unlikely given lack of suitable habitat within the Project site.
Wolverine	*Gulo gulo*	SE	Unlikely	Reintroduced extremely rare resident. Historically found in higher elevations in areas of heavy timber. Likelihood of occurrence unlikely given lack of suitable habitat within the Project site.
Fish				
Rio Grande cutthroat trout	*Oncorhynchus clarki virginalis*	FC, SC	Unlikely	Species is restricted to headwaters of Rio Grande river in San Luis Valley. Likelihood of occurrence is low given an absence of fish-bearing streams.
Bonytail	*Gila elegans*	FE, SE	Unlikely	Found historically throughout Colorado River drainage in eddies and pools, not swift currents. Likelihood of occurrence unlikely given lack of suitable habitat within the Project site.
Colorado pikeminnow	*Ptychocheilus lucius*	FE, ST	Unlikely	Found in Yampa, Green, White, Colorado, and Gunnison rivers, occurring in swift flowing waters with quiet, warm backwaters.

Table 30:
Federally and State Protected Species for Saguache County, Colorado

Common Name	Scientific Name	Federal/State Status[1]	Likelihood of Occurrence in Project Site[2]	Habitat Association
				Likelihood of occurrence unlikely given lack of suitable habitat within the Project site.
Greenback cutthroat trout	*Oncorhynchus clarki stomias*	FT, ST	Unlikely	Found only in headwaters of Arkansas and South Platte River systems, occurring in cold, clear streams of moderate grade. Likelihood of occurrence unlikely given lack of suitable habitat within the Project site.
Humpback chub	*Gila cypha*	FE, ST	Unlikely	Found in Yampa, Gunnison, Green, and Colorado rivers, occurring in slow-moving eddies and pools. Likelihood of occurrence unlikely given lack of suitable habitat within Project site.
Razorback sucker	*Xyrauchen texanus*	FE, SE	Unlikely	Found in lower, mainstream Colorado, Gunnison, lower Yampa, and Green rivers, occurring in areas of strong currents and backwaters. Likelihood of occurrence unlikely given lack of suitable habitat within Project site.
Invertebrates				
Umcompahgre fritillary butterfly	*Boloria acrocnema*	FE	Unlikely	All known colonies occur on BLM or USFS land in San Juan Mountains in southwestern CO, occurring in moist alpine slopes above approximately 10,000 feet amsl. Likelihood of occurrence unlikely given lack of suitable habitat within Project site.
Reptiles				
Midget faded rattlesnake	*Crotalus viridis concolor*	SC	Unlikely	Found in western Colorado occurring on rocky outcrops near sagebrush and semiarid deserts. Likelihood of occurrence unlikely as the distribution of this subspecies occurs outside the Project site.

1 FE = Federally endangered, FT = Federally threatened, FC = Candidate for federal listing, FP = Federally protected by Bald and Golden Eagle Protection Act., SE = State endangered, ST = State threatened, SC = Species of Concern

2 USFWS 2010, CDOW 2009

State Listed Species

In addition to federal listing, most states, including Colorado, list species that are declining and in danger of becoming extinct within the state's borders. State endangered and threatened wildlife species are protected under Colorado law. CDOW regulations prohibit the taking, possession, transportation, or sale of any of the animal species designated by state law as endangered or threatened without the issuance of a permit. The CDOW lists 31 species as endangered or threatened within the state, of which 7 species potentially occur in Saguache County: bald eagle (*Haliaeetus leucocephalus*), black-footed ferret, lynx, Mexican spotted owl, southwestern willow flycatcher, western burrowing owl (*Athene cunicularia*), whooping crane, and wolverine (*Gulo gulo*) (see Table 30).

Additionally, the CDOW maintains lists of species of state special concern that have no protection or associated regulations; however, they include species of local concern and are highlighted by the CDOW as priorities for conservation measures outside the state's endangered species regulations. The species of state special concern by the CDOW that potentially occur within Saguache County are northern leopard frog (*Rana pipiens*), American peregrine falcon (*Falco peregrinus anatum*), ferruginous hawk (*Buteo regalis*), Gunnison's sage grouse (*Centrocercus minimus*), mountain plover (*Charadrius montanus*), sandhill crane (*Grus canadensis tabida*), northern pocket gopher (*Thomomys talpoides macrotis*), Townsend's big-eared bat (*Corynorhinus townsendii pallescens*), and midget faded rattlesnake (*Crotalus viridis concolor*).

The ferruginous hawk and the sandhill crane, both species of state special concern, were observed during avian surveys. No other state listed bird species were observed during systematic surveys; no other federally listed species were observed incidentally.

13-304(2)(b)(ii)(2)(e) Unique State Species

All terrestrial species protected by state and federal law and those species of special concern for Saguache County have ranges that include areas outside Colorado. Within Colorado, the species have preferred habitats that are outside the Project site, so the Project is unlikely to have negative impacts on any of the species.

Species of Concern Conclusion

No federal threatened, endangered, candidate species were observed during point count or crane surveys or as incidentals. Two golden eagles were observed near the Project's area incidentally during the avian surveys; however, no eagle nests were detected, and the area within the Project boundary provides little foraging habitat. No concentrations of golden eagles were found during any aspect of the survey work.

No state threatened or endangered species were observed during avian surveys or as incidental observations. The ferruginous hawk and greater sandhill crane are listed species of state special concern by the CDOW. The Brewer's sparrow, ferruginous hawk, and golden eagle are also listed as birds of conservation concern within Bird Conservation Region 16. Brewer's sparrows were observed at point count location 01 and 04 outside of the Project boundary where remnant patches of native vegetation were present. Ferruginous hawks were only observed outside the Project boundary during raptor nest surveys. The potential impact to these species is low because limited foraging and nesting habitat exists within the Project site.

13-304(2)(b)(ii)(3) Aquatic Wildlife

13-304(2)(b)(ii)(3)(a) Presence and Relative Importance of Species

Given the absence of wetlands and bodies of water within the Project site, there are no known occurrences of aquatic wildlife within the Project site.

13-304(2)(b)(ii)(3)(b) Map of Streams, Lakes and Reservoirs Which Provide or Have Potential for Habitat

Within the Project site, there are no known occurrences of streams, lakes, or reservoirs that provide or have the potential to provide habitat for aquatic wildlife.

13-304(2)(b)(ii)(3)(c) Map of Biological Features

Within the Project site, there are no known occurrences of spawning beds, runs, or similar biological features that provide or have the potential to provide habitat for aquatic wildlife.

13-304(2)(b)(ii)(3)(d) Endangered Species (Federal or State) or Any Which are Unique in Their Colorado Distribution

The Rio Grande cutthroat trout is currently a candidate species under consideration for federal listing by the USFWS and is designated as a species of concern by the CDOW. The Rio Grande cutthroat trout is a subspecies of cutthroat trout endemic to the Rio Grande, Pecos River, and, possibly, the Canadian River Basin of New Mexico and Colorado. The Rio Grande cutthroat trout is limited in distribution and restricted to the headwaters of the Rio Grande River in the San Luis Valley, which lie outside the bounds of the Project site; therefore, the use of water resources for the Project will not impact the Rio Grande cutthroat trout.

13-304(2)(c) Permit for Pipelines or Storage Areas

Although the Applicant proposes to construct a pipeline to deliver water to the Project site and will incorporate storage areas within the Project, these facilities are all incidental to and encompassed by the overall Project. The Applicant therefore requests that any submittal requirements set forth in Section 13-304(2)(c) be waived, if and to the extent they are viewed as applicable to the Project. As more particularly set forth in Section 13-304(2)(d) of the Application, prior to construction of the Project, a comprehensive water supply plan for the Project will be completed which involves the delivery of surface water to the Project site via pipeline for the purpose of replacing any groundwater utilized at the site for Project operations. Implementation of this water supply plan will require approvals by both the Colorado State Engineer and the Water Court, which approvals will require an analysis of many of the same criteria enumerated in Section 13-304(2)(c).

13-304(2)(d) Site Selection and Construction of a Power Plant

13-304(2)(d)(i) Map of Resource Areas to be Utilized as Sources of Energy

Figures 1 and 2 show the general vicinity of the Project.

13-304(2)(d)(ii) Description of Water System Proposed

See Section 13-304(2)(a)(v)(2)(d), Facilities and Services Required to Provide Adequate Water Supply and Sewage Treatment.

13-304(2)(d)(ii)(1) Source of Supply, Volume and Rate of Flow at Full Development

The proposed source of water supply for the Project is the shallow, unconfined aquifer beneath the Project site. The Project will consist of up to two individual solar plants (Project phases), each of which will use two or more wells for water supply. The estimated volume of water for each Project is 150 acre-feet per year. The maximum flow rate expected at full development for each Project will occur during the summer months and is expected to be up to 300 gallons per minute. Also see Section 13-304(2)(a)(v)(2)(d), Facilities and Services Required to Provide Adequate Water Supply and Sewage Treatment.

13-304(2)(d)(ii)(2) Water Rights Owned or Utilized

The Project will utilize significantly less water than what is currently consumed on the Project site. An estimate of the amount of groundwater that is currently being pumped for crop irrigation within the Project site was performed by Agro Engineering (2011) (see Exhibit N). The analysis indicated that approximately 8,800 acre-feet per year are used for irrigation today, while the Project will use approximately 150 acre-feet per year per Project phase.

All water rights currently associated with the property are groundwater sources. In accordance with applicable water law, the Project Applicant will be required to file a Change of Use Permit and propose an Augmentation Plan with the Colorado Water Court in order to continue using wells on the site. Given the likely timeline of filing in Water Court, it is unlikely that the proceeding will close prior to the receipt of a 1041 Permit, but the Project Applicant is submitting the most up-to-date information available at the time of the 1041 filing. The Project Applicant will follow all applicable laws and regulations with regard to water use in the State of Colorado.

The Augmentation Plan may, for reliability reasons, include conveying surface water to the site via a small diameter pipeline (i.e., 4 to 6-inch-diameter) pipeline, and/or include a small recharge or infiltration pond (i.e., up to 10 acres) for each Project phase. Details of the Augmentation Plan are subject to ongoing commercial discussions with potential sellers of senior surface water rights. The Project Applicant will submit the most up-to-date information available at the time of the 1041 filing, and is willing to update Saguache County regularly as the plan develops.

The Project Applicant will provide the requested information on storage, treatment, and disposal of water as applicable, and will also engage a local water resources firm to study historical consumptive use at the site. Historical consumptive use will be compared against projected Project-related use to validate forecasted water savings.

Water rights for several irrigation wells are included under the option agreement with the current owners of the Property, and will be conveyed to the Project Applicant when the Option is exercised. Section 13-

304(2)(a)(v)(2)(d), Facilities and Services Required to Provide Adequate Water Supply and Sewage Treatment, provides additional information.

13-304(2)(d)(ii)(3) Points of Diversion

As shown in Exhibit E, multiple groundwater wells currently exist within the Project Area and many are used for center pivot irrigation. Existing wells will be used wherever practical. As described in section 13-304(2)(d)(ii)(2), it is anticipated that a surface water right might be required for reliability reasons, but details are subject to ongoing commercial discussions with potential sellers of senior surface water rights. It is not anticipated that the Project will use any surface water rights currently located in Saguache County.

13-304(2)(d)(ii)(4) Volume of Stream Flow to Remain Unused Between Points of Diversion

Not applicable. It is not anticipated that the Project will have any effect on unused stream flow between any two points of diversion.

13-304(2)(d)(ii)(5) Dependability of Supply (physical and legal)

A reliable physical and legal supply of water will be required for both the construction and operational aspects of the Project. During construction, a relatively small amount of raw water will be required for concrete preparation, dust control, road building, equipment washing, sanitary needs, and similar purposes. Once the Project becomes operational, water will be required for mirror washing, dust control, steam generation and steam cycle makeup, indoor sanitary facilities, and other similar power plant uses. It is anticipated that these operational requirements for each phase of the Project will consume approximately 150 acre-feet per year.

The physical source of water will likely be one or more existing or new wells in the unconfined aquifer underlying the Project site, similar to those being used currently for irrigation purposes. If any existing well will be used, a new well permit allowing use of the water for industrial purposes will be obtained from the State Engineer. The necessary well permits for any new wells to be constructed will also be obtained from the State Engineer. Diversions of groundwater through the wells at the site will be replaced by the delivery to the site (likely via pipeline) of a like amount of water available under senior surface water rights, decreed for diversion from the Rio Grande River, and replaced to the aquifer via recharge facilities to be constructed onsite. As will be more specifically described in Water Court proceedings and/or permits with the State Engineer, well diversions will likely be replaced on a one-for-one basis.

In addition to the required well permits, the primary components of the proposed legal source of water supply for the Project include (1) lease/purchase by Project Applicant of senior surface water rights, decreed for diversion from the Rio Grande River (the “Water Rights”); (2) dry-up of the land historically irrigated by the Water Rights; and (3) delivery to the site of only that amount of water historically consumed by irrigation under the Water Rights, as determined by the Water Court, for recharge of, and storage in, the aquifer. The Project Applicant will apply to the Water Court for approval of the necessary applications to change the approved uses of the Water Rights and for approval of a Plan for Augmentation. Prevention of potential injury to other water users and protection of aquifer levels will be

appropriately addressed in the terms and conditions of the Water Court decrees issued with respect to the applications. It should be noted that the land historically irrigated by senior Water Rights, and dried up in stage 2 above, will be located outside of Saguache County.

In general, groundwater consumption at the Project site will decrease dramatically over historical levels, since the current agricultural activities on the Property consume approximately 8,800 acre-feet of groundwater per year (see Exhibit N). The removal from active irrigation of the land on which the Project will be constructed and operated will decrease future demand on the unconfined aquifer and assist with restoration of the aquifer.

13-304(2)(d)(ii)(6) Effects on Downstream Users

To obtain the necessary approvals from the State Engineer and the Water Court, the Project Applicant will be required to demonstrate that its water plan will not materially injure other water uses. The Project Applicant will comply with all terms and conditions of its well permits and all applicable decrees of the Water Court. Because the water to be delivered to the Project site will be limited to only that amount of water actually consumed through the historical irrigation use of the Water Rights, the water available in the River to downstream users and the aquatic ecosystem will remain unchanged. There will be no effects on downstream users. The water quality for downstream users will be protected.

13-304(2)(d)(iii) Description of Air Pollution Control Measures

The Project Applicant has met with the County Road Bridge Department and the Center Soil Conservation District / NRCS, and has discussed dust control. Saguache Solar Energy, LLC will be in compliance with all applicable mandates and regulations, including the Colorado Air Quality Control Program and the CAA.

The main sources of emissions from the Project will be short-term emissions during construction. Construction-related emissions will include the exhaust from construction equipment (including vehicles transporting personnel, equipment, and supplies) and fugitive dust and particulate matter (PM_{10}) from grading, earth moving, concrete batch plants, and equipment/vehicles traveling on paved and unpaved roads.

Another source of construction related emissions will come from the use of diesel-powered construction equipment that has been known to produce O_3 precursor emissions and combustion related particulate emissions. To help address these emissions, the Project will include standard mitigation measures for construction equipment.

The Project is anticipated to generate very little NOx, CO, or VOC pollutants during its normal operation due to occasional testing of its normal emergency response equipment. The Project will not utilize supplemental fuel such as natural gas, neither for power generation nor for process heat, which would result in any associated air pollution. The following sections outline air pollution control measures that will be employed during specific Project elements.

Construction

Air pollution control measures will be implemented during construction of the Project, and will be modeled after BMP number EC-14, Wind Erosion/Dust Control, as found in the Urban Storm Drainage Criteria Manual Volume 3 (November 2010)[2], as appropriate. Such BMPs may include:

- Covering or applying dust suppressants or crushed aggregate to soil stockpiles and disturbed areas when inactive for more than 2 weeks. The Applicant will consider using a dust palliative that is resin (polymer) based. When used, it is effective at binding loose particles for a number of days, and when the area is re-watered, the polymer is reactivated to continue its binding action. It is unlikely that magnesium chloride will be used for surface treatment because it is hydroscopic and tends to attract moisture.
- Watering of unpaved roads and disturbed or denuded areas.
- Limiting onsite vehicle speeds to under 15 mph and enforcement of the speed limit.
- More frequent watering during periods of high winds when excavation/grading is occurring and minimizing grading activities during peak wind periods.
- Sweeping any onsite paved roads and entrance roads on an as-needed basis.
- Replacing ground cover in disturbed areas as soon as practical.
- Covering truck loads when hauling material that could be entrained during transit.
- Maintaining all diesel-fueled equipment per manufacturer's recommendations to reduce tailpipe emissions.
- Limiting diesel heavy equipment idling to less than 5 minutes, to the extent practical.
- Selecting construction equipment and off-road vehicles that use propane, compressed natural gas, and electric power to the extent practical based on regional availability of equipment and alternative fueling means.

Concrete Batch Plants

The Project will require a large volume of concrete to construct the central tower and foundations for the plant equipment, buildings, tower, and heliostats. In addition to the conventional construction equipment and techniques, it is expected that one or more temporary portable concrete batch plants would be used to provide the concrete for the Project. Rock, sand, cement, and water would likely be proportioned and mixed onsite in mobile concrete batch plants. The aggregate, sand, and cement would be stored onsite to support the concrete mixing operation. The temporary portable batch plants would be located near the power block, within a laydown area, or in the heliostat field. Up to three portable batch plants (per phase) would be located onsite at any one time.

Anticipated air emissions from the batch plants would be in the form of particulate matter (PM_{10}), consisting primarily of cement, aggregate, and sand dust. Point sources are the dust collectors for each batching unit. Fugitive sources include the transfer of sand and aggregate and wind erosion from sand and aggregate storage piles. The amount of fugitive emissions generated during the transfer of sand and aggregate depends primarily on the surface moisture content of these materials.

[2] http://www.udfcd.org/downloads/down_critmanual_volIII.htm

Dust collectors will be used to control particulate matter emissions from the loading and unloading of silos. Additional controls will include water sprays, enclosures, hoods, curtains, shrouds, and chutes. The movement of heavy trucks over unpaved or dusty surfaces in and around the plant will be controlled by good maintenance practices, wetting of the road surface with water, and/or the use of dust suppressants.

Salt Melting and Conditioning

During the commissioning phase of the plant, the solid form of the thermal storage salt (which will become the “molten salt”) will be melted into the molten salt storage tanks. This is a one-time process to prepare for the life of the project. The salt melting and conditioning will be completed with temporary gaseous fuel (natural gas or propane) fired heaters. The thermal storage salt consists of sodium nitrate and potassium nitrate. Because the natural form of sodium nitrate contains a trace impurity amount of magnesium nitrate, the melting of the salt will oxidize this impurity to magnesium oxide. Any magnesium oxide produced would remain in the molten salt mixture as fine solid particles that eventually settle to the bottom of the tanks. The oxidation process will also release a molecule of nitrogen dioxide (NO_2) for every molecule of magnesium nitrate. Because NO_2 is a regulated air pollutant as a lower atmosphere ozone precursor, the Project will implement control measure for this emission stream pursuant to applicable state and federal regulations. The salt melting and heating processes will also produce limited emissions of air pollutants resulting from the combustion of gaseous fuels from the temporary gas-fired convection heaters. However, the heaters will be equipped with ultra-low NOx burners and flue gas recirculation to reduce potential emissions to the lowest extent. Minimal to no fugitive particulate emissions will be generated during the handling of the solid salts because the solid salts will be handled in an indoor environment. Furthermore, the salts are highly hydrophilic (high tendency in absorbing moisture) and, if exposed to atmospheric temperatures, tend to solidify and remain in solid form.

To further reduce the potential emission from the salt melting process, SolarReserve is in the process of identifying sources and methods to further reduce the magnesium impurity in the salt. If achievable, the emission control process from the salt impurity oxidation will become unnecessary.

In the event that ultralow magnesium impurity salts are not available, the release of NO_2 from the salt conditioning process would be controlled by a multi-stage chemical wet scrubber. The Project may also consider other control options such as the use of selective catalytic reduction.

Operation

The generation of electricity will not require the combustion of fossil fuels. The only emission sources for the operation of the Project will be from emergency backup diesel fire pumps (two each) and from emergency backup diesel generators (two each). These units will only be operated during tests and during an emergency (which would require one or more of these units to operate). Testing times will be in accordance with National Fire Protection Association standards and insurance requirements for testing of emergency generators. All four emission sources will be outfitted with emission controls to meet applicable EPA standards.

13-304(2)(e)(i) Summary of Natural and Socio-Economic Environmental Constraints

As demonstrated in this application, the Project will have minimal impact to the environment and will have a positive impact to the socio-economic environment of Saguache County. The construction of the Project may voluntarily remove up to 6,200 acres of currently farmed agricultural land from production, reducing competitive pressure on existing agricultural operations for water rights. Each 100 MW phase of the Project will contribute revenue directly to the local economy via increased annual property tax revenues of approximately $424,000 and increased employment opportunities during construction. Some of the construction workforce is expected to be sourced from the local population, although many workers will likely be sourced from outside Saguache County. Non-local construction workers are expected to seek local living accommodations as well as food and other services during each phase's approximately 30-month construction period. The Project will contribute revenue indirectly to the local economy via an increase in demand for local goods and services during construction. The temporary nature of this demand during construction, and the prospect of spreading occupancy among multiple towns and rural enclaves, will limit the impact on housing rental rates and occupancy levels.

13-304(2)(e)(ii) Present Use of Resources within Impact Area

Land

Land use/land cover within the Project site is predominantly cultivated crops (lettuce, potatoes, alfalfa, barley, and others) and shrublands. The Project site is zoned agricultural.

Water

The onsite agricultural wells are currently used for irrigation of cultivated crops. It is estimated that crops consume approximately 6,300 acre-feet of groundwater per year in the immediate area of the Project (see Exhibit N). Total groundwater pumping for irrigation in this area is estimated at 8,800 acre-feet per year. The remaining 2,500 acre-feet per year would have deep percolated and recharged back to the unconfined aquifer.

Air

Not applicable.

Biotic

Currently, the primary use of biotic resources within the Project site is for commercial cropland agriculture.

Geologic

Not applicable.

Socio-Economic Resources

Existing socio-economic resources within the impact area include an agricultural operation and a few residences. More detailed information on these existing resources in the San Luis Valley as opposed to Influence Area or Project site is provided in Section 13-304(2)(a)(ix), Impact Area Socio-Economic Environment.

13-304(2)(e)(iii) Alternative Uses of Resources

Land

The alternative use of developing the Project would retain the land in its current agricultural use. Energy demands would need to be met from other sources. This alternative would not meet the objectives of the Project.

Water

If the Project were not developed, the groundwater rights associated with the property would remain in its current agricultural use. Similarly, the groundwater use would likely remain the same for production of agricultural resources, at a rate of approximately 8,800 acre-feet per year. In the future, it is likely that significant augmentation water would be necessary to support the continued use of these groundwater rights.

Air

Not applicable.

Biotic

If the Project is not constructed, the Project site would remain as agricultural cropland.

Geologic

Not applicable.

Socio-Economic Resources

If the Project is not constructed, there would not be any associated socio-economic benefits to the local economy from increased tax revenues, additional employment opportunities, or indirect boosts to the local economy during construction activities. Socio-economic resources would be expected to grow or contract at previously projected rates without the Project. If the Project is not constructed, the availability of local temporary housing would not be affected during the Project construction period. Ongoing agricultural operations elsewhere in the area would not enjoy the reduced economic pressure on scarce water resources that would otherwise result from the Project’s removal of irrigated agricultural land from production.

13-304(2)(e)(iv) Analysis of Effects

13-304(2)(e)(iv)(1) Hydrologic, Atmospheric, Geologic, Pedologic, Biotic, Visual, and Noise Impacts

The Project will have minimal or no effect on hydrologic, atmospheric, geologic, or pedologic resources. Biotic, visual, and noise impacts are discussed below.

Biotic Resources

Potential impacts to biotic resources may be either directly or indirectly impacted by the Project and may be either permanent or temporary in nature. Potential impacts as they pertain to the Project site are described below.

Direct

Any alteration, disturbance, or destruction of biological resources that would result from Project-related activities is considered a direct impact. Examples of potential direct impacts would be clearing native vegetation, encroaching into wetlands, diverting natural surface water flows, or the loss of individual species and/or their habitats. Within the Project site, there is limited native vegetation, no significant observable wetlands or other natural surface water, and no known occurrences of federally and state protected wildlife species; therefore, the potential direct impacts from developing the CSP solar facility within the Project site are limited.

Indirect

As a result of Project-related activities, sensitive biological resources may also be affected in a manner that is not direct. Examples of potential indirect impacts would be elevated noise, dust, air emissions, soil compaction, increased human activity, decreased water quality, or the introduction of invasive wildlife and plants (noxious weeds or other non-native species). During the construction and operation of the Project, the applicant will implement management plans in compliance with federal, state, and Saguache County regulations (as appropriate) to limit noise, dust, air emissions, soil compaction, and water runoff that may decrease water quality and introduction of noxious weeds.

Permanent

All impacts that result in the long-term or irreversible removal of biological resources are considered permanent. Examples of permanent impacts would be clearing of native vegetation or loss of wildlife habitat by clearing land for site development, or constructing solar collectors, buildings, and permanent roads. The area within the Project will be cleared, grubbed, and graded level to the extent necessary. All vegetation within the heliostat array fields may be cut or removed to the soil surface to reduce the risk of fire. Occasional cutting of the vegetation will be required to control plant re-growth. There is a limited potential for increased soil erosion with the complete removal of vegetation within the Project site, because management plans to limit erosion will be implemented during construction and operation of the Project. Vegetation communities present within the Project site are not unique to the landscape of the ecoregion, and their removal will not have an effect on the limited wildlife species that use them.

Temporary

Any impacts considered to have reversible effects on biological resources can be viewed as temporary. Examples of temporary impacts would be the generation of fugitive dust during construction and removal of vegetation for underground pipeline trenching activities followed by revegetation of the affected area. During the construction and operation of the Project, management plans will be in place, in compliance with Colorado state and Saguache County regulations (as applicable), to limit noise, dust, air emissions, soil compaction and water runoff that may decrease water quality, and introduction of noxious weeds.

Focused biological resources surveys, consultation with the CDOW and USFWS, Project planning, design and permitting, and implementation of appropriate mitigation measures will ensure that potential impacts to biotic resources are either avoided and/or minimized to the maximum extent feasible.

The US Fish and Wildlife Service (USFWS) has jurisdiction over impacts to avian species, even when those impacts are on private land, through enforcement of the Migratory Bird Treaty Act (MBTA). The Project Proponent will work in good faith with USFWS to develop an Avian and Bat Protection Plan (ABPP) prior to the commencement of construction. The ABPP will focus on adaptive management techniques, which entail adjusting management strategies as specific impacts increase or decrease. The ABPP will detail the ongoing monitoring and mitigation plan. Techniques for managing avian and bat impacts may incorporate several elements, including:

- Evaporation ponds would be constructed with interior side slopes of at least 3:1 to discourage birds wading into the ponds.
- Pond hydrology (i.e., water volume and chemical concentrations) would also be actively managed to minimize potential wildlife impacts associated with ingestion of pond water.
- Textured liner installed at corners of evaporation ponds to allow fallen bats and birds to crawl out of the water.
- Anti-perching devices installed around the perimeter of each evaporation pond would discourage their use by avian and bat species.
- Visual deterrents mimicking avian and terrestrial predators can discourage avian and bat species from utilizing the site.
- A gas-fired noise cannon may frighten them away from the ponds, used intermittently to prevent acclimation.
- Netting: after all other adaptive management techniques are exhausted, if it is determined that impacts from the evaporation ponds remain unacceptable, as a last and final resort netting can be installed on one or more of the ponds. The ponds would initially be designed with adequate spacing for the installation of net support structures and cable tie down so the netting can be installed, while allowing the ponds to function as a means of evaporation. (The Applicant's experience developing other ABPP's has indicated that nets can cause higher avian mortality by tangling birds in the nets.)

As needed, Project design features and mitigation measures could also include the following:

- Prohibiting off-road travel in the limited areas of remaining native vegetation during construction and operation to the extent possible. Such areas will be marked prior to initiation of construction and appropriate parking areas will be designated.

- Training of site workers and contractors will include topics such as environmental awareness to heighten awareness of sensitive resources. This education program will be incorporated into construction safety meetings and introduced at Project orientation.
- A trash and litter control program will be developed for the Project to reduce the possibility of wildlife ingesting or becoming entangled in foreign matter. In addition, trash control will reduce predator attraction and consequent increased predation, and will serve to increase overall pride in the area and foster environmental awareness.
- Restoration of disturbed rights-of-way and other temporary disturbance areas in native habitat will follow recommended procedures including ripping, seeding, and mulching, as appropriate. Seed mixtures will include native shrubs and other species of utility as wildlife habitat. This measure will provide mitigation for temporarily disturbed areas and will restore habitat for use by wildlife.

Visual Resources

Viewshed Map

Figure 25 provides a map of the Project viewshed area, as well as a representation of how the solar tower might look from 0.75 to 10 miles away.

Tower Height

As shown in Figure 7, the two Project towers will be approximately 656 feet in height, including the tower receiver and crane structure. While no specific variation from this figure is currently expected, further refinements to the technology may entail a total height up to 10% lower or higher than 656 feet. Saguache County Solar Guidelines: 8.3.3.2 (Article IV) limits solar power tower installations to 40 feet in height. Such facilities could be approved exceptionally, however, if the applicant can successfully demonstrate that (1) the installation can fit into the surrounding landscape of the Project site, or (2) no effective and feasible alternative exists that fulfills the energy generation goals of the facility. The Project has been carefully optimized to achieve the high performance. The tower height is needed for the full functionality of the generation facility, in order to reduce the levelized cost of electricity (LCOE) to the greatest extent possible and to enable the cost-effective use of molten salt energy storage. As a result, no effective and feasible alternative exists that fulfills the economic and energy generation goals of the facility.

Visual Simulations

A rendering of the Project from six viewing points is shown in Figures 26 through 31. Views from Crestone (Figure 26 at 20 miles away) and from the Great Sand Dunes (Figure 29 at 27 miles away) show the towers as points on the horizon. The nearest viewing point is along the eastern site fenceline (see Figure 31), which represents the closest possible observation of a tower from outside the Property boundary.

Night Simulations

Figures 32 through 34 show three views of the Project during night conditions. Night lighting of the Project includes the FAA required lighting of the solar towers and plant facility lighting. Project lighting details are

provided in Exhibit O. The simulation methodology and an explanation of the limitations inherent in the simulation of night conditions is provided in Exhibit P.

Glint and Glare

A glint and glare study report is provided in Exhibit Q. The purpose of this report is to provide both quantitative and qualitative data on potential glint and glare associated with the operation of the solar plant. All potential sources, which include the central receiver, the individual heliostats, and the heliostat field were evaluated. The results of the evaluation indicate that glare, rather than glint, would primarily be exhibited at the plant. Glare, also known as diffused reflection, is characterized as a continuous source of brightness relative to ambient lighting. With the receiver, the glare is a combination of reflected diffused sunlight as well as the thermal radiance due to its operating temperature, although the thermal component has little effect on glare perceived by the human eye. The receiver will appear white and slightly yellow with intensity diminishing proportional with the square of distance away from the receiver.

For conservatism, glare from the receiver tower was studied at the fenceline of the heliostat field. In actuality, observers will typically view the facility from farther away, no closer than the Property Boundary. The impact of glare will be reduced for observers at greater distances from the receiver. Glare was studied at solar noon; at other times of day, when sunlight is less strong, the effect will be less. Glare will be significantly less or completely eliminated during periods of cloud cover. Atmospheric attenuation due to dust and moisture was not considered; both of those will reduce glint and glare impacts.

Individual heliostats may exhibit glint during transient conditions when the viewing angle at a higher elevation momentarily intercepts the heliostat's reflective plane. At ground level outside the perimeter, an observer looking at the heliostat field is unlikely to see glint or glare from individual heliostats because of inherit design and operational constraints (i.e., the mirrors are pointed towards the receiver inside the facility.) To an elevated observer at distance, a section of the heliostat field may appear brighter during operation, while the remaining field will exhibit a reflection of the sky.

Noise

See Section 13-304(2)(a)(viii), Base Area Noise Conditions, for a discussion of noise impacts and Exhibit H.

13-304(2)(e)(iv)(2) Surface and Subsurface Drainage

The Project site is within the Rio Grande River Basin watershed. Surface water flows into the San Luis Valley from the surrounding mountains, although it generally percolates into the ground or is diverted through irrigation canals, and the only surface water to leave the valley is via the Rio Grande River, which is 20 miles south of the Project site. The Rio Grande River forms in the San Juan Mountains and flows eastward towards the center of the valley, and then southward towards New Mexico, and subsequently forms a border between Texas and Mexico before flowing into the Gulf of Mexico.

The surface water is a major source of water for irrigation, so a system of canals and laterals has been established with an aggregate length exceeding 150 miles. More than 70 percent of the surface water inflow is sourced from snowmelt (between April and June), with the remaining water sourced from

precipitation through the remainder of the year (July to March). There are several irrigation canals on the Property: the Gibson Ditch, North Lateral, and North Central Lateral (Figure 34). The irrigation canals may require limited rerouting, with consideration given to surrounding users of the canals. The Proponent has been in contact with the San Luis Valley Irrigation District with respect to its canals through the Project site.

Russell Creek, north of the Project site, which is downstream of Russell Lakes (containing Davey Lake, Trites Lake, Island Lake), flows to the Mishak Lakes area and then merges with Werner Arroyo Creek, La Garita Creek, and Saguache Creek and all flow into the San Luis Creek to the northeast of the Project site (at an approximate elevation of 7,545 feet amsl). There is intermittent flow from the San Luis Creek, through a series of small lakes (approximately 15 miles east of the Project site) down to Bachelor Lake and San Luis Lakes at an elevation of 7,515 feet amsl. Flooding of the Project site from the San Luis Creek is not expected.

The surface water runoff from the Project site that is not infiltrated to groundwater will follow natural contours to the northeast towards the San Luis Creek region, which is classified as a freshwater emergent wetland area on the USFWS National Wetland Inventory (see Figures 23 and 24).

Stormwater flows may be mitigated on the Project site to ensure there is no impact to downstream properties due to the development. The CDPHE is responsible for administering the State's stormwater management plan, which is mirrored after the federal NPDES program, requiring that stormwater be treated to the maximum extent practicable. The Proponent will obtain permit coverage under Colorado's NPDES program for construction and operation of the Project.

An investigation into the site-specific characteristics that affect the design of the storm drainage and surface water quality design was performed for the site. A copy of this report, Site Characteristics Investigation for the Grading and Drainage Design, is included as Exhibit R. This report notes the Project can be constructed at the selected site, and that storm drainage detention will be an appropriate means for both water quantity and quality mitigation.

Stormwater runoff from onsite will be directed towards a retention/detention basin to ensure the site runoff is controlled in large storm events (historical flows will be maintained). Given the very gradual slope of the site (less than 0.2 percent), raising the perimeter loop road (which encapsulates the heliostat field) on the northeast side of the Project (downgradient side of the Project) will afford an excellent opportunity for detainment of stormwater discharges from the site. This elevated road can be designed with drainage culverts that allow the pre-development stormwater drainage patterns, in both quality and quantity, to be maintained under post-development conditions.

The power block, which contains a majority of the industrial processes, and therefore the majority of potential pollutants, will be surrounded by an internal roadway to provide containment and ensure that there is no interaction with stormwater discharges from the Project. Structural and non-structural BMPs will be implemented to prevent degradation of state waters below pre-development conditions.

Additionally, offsite surface water will be diverted around the site to maintain the existing drainage patterns. This diversion will ensure that the water quality of offsite water is unchanged from pre-development conditions.

As described above, surface water falling within the Project site will be controlled from both a quantity and quality perspective, which will serve to achieve the following objectives:

- Allow for stormwater quality treatment of the onsite flows within the heliostat field
- Control stormwater quantity by means of a detention basin(s) to ensure there is no increase in post-developed flows discharging from the site, minimizing the impact on downstream drainage features
- Protect the Project site infrastructure from concentrated flows stemming from large rain events, which have the potential to damage the heliostats via scour of the foundations
- Allow natural groundwater recharge of the offsite stormwater to occur independent from the altered flow conditions of the onsite water

13-304(2)(e)(iv)(3) Socio-Economic Impacts

As demonstrated in this application, the Project will have a positive impact to the socio-economic environment of Saguache County. Each 100 MW phase of the Project will contribute revenue directly to the local economy via increased annual property tax revenues of approximately $424,000 and increased employment opportunities during construction and operation. Many construction workers are expected to be sourced from the local population. Imported construction workers are expected to seek local living accommodations, as well as food and other services, during the construction period. The Project will contribute revenue indirectly to the local economy via an increase in demand for local goods and services during construction. The provision of employment opportunities for local and County residents will assist in mitigating the impacts of the Project.

In order to facilitate hiring opportunities for local and County residents, the Project Applicant will conduct public meetings and/or career fairs in the town of Center to provide information about employment opportunities relating to the Project as follows: (1) at least twice during the first six months of construction during ramp-up of the workforce, and (2) at least twice during the recruitment process for permanent plant operations staff. The Project Applicant will also continue to consult with the Trinidad State Junior College, the Center Consolidated School District, and the Sangre de Cristo School District to assist with the design of a curriculum to train potential employees for the Project.

The Project will draw temporary construction workers into the area, but the region appears to have sufficient temporary housing available, and the ability to expand housing opportunities, to serve this new demand. The operating workforce associated with this solar facility is small and likely to be drawn largely from the existing workforce.

The Project’s construction payroll for each phase, which is expected to be approximately $50-$60 million over a 30-month period, will be a significant stimulant for local retailers and service providers and will provide an important source of new sales tax revenues for local governments.

The Project will not unduly burden any local service provider but will produce substantial property taxes for those entities that serve the Project site. The major tax effect of this Project will be significant new

property taxes to Saguache County, the Center Fire District, and the local school districts, as well as further diversification of local economy and reduced reliance on diminishing water resources as the Project site is removed from agricultural production.

Property Values

The Project's effect on property values is difficult to estimate for a number of reasons. First, there is not a robust set of directly comparable data from a facility of the type being proposed. There is a lack of similar solar thermal projects overall, a lack of similar projects in areas comparable to Saguache County, and a lack of data on the solar photovoltaic projects in construction in the broader San Luis Valley. Second, property values are likely already undergoing change in this area, due to local effects such as changing water regulations, as well as to broader macroeconomic effects like the state of the national economy. Third, in general, it is difficult to conclusively isolate any single factor as the cause of a change in property values. Thus statements about future property values must be considered in the appropriate light.

The Project may have a positive or a negative effect on property values of different types. Types and potential sources of value change are as follows:

1. **Agricultural or vacant land**
    a. Solar energy projects are generally able to pay more for private land than the land's fair value as agricultural or vacant land. The success of this solar project may send a signal to the solar industry that projects in Saguache County are feasible and competitive, encouraging those companies to purchase or lease additional land for additional projects. The increase in demand may thus increase property values.
    b. The Project would remove the agricultural land within its boundaries from production. This would result in significant water savings, reducing the competitive pressure on other agricultural operations in the area for scarce water resources. It may also reduce competition for agricultural products by reducing local supply. This would likely increase property values.
    c. General economic development could increase demand for vacant land for housing, commercial use, or other uses. This increase in demand may increase vacant land property values.

2. **Residential properties**
    a. Nearby home values may be reduced due to the visual impact of the Project. A temporary influx of traffic due to construction may also temporarily reduce the attractiveness of residential properties. The presence of nearby residential property is shown in Figure 16.
    b. Nearby home values may be supported by the addition of new full-time jobs in the area, as people may be motivated to live near their place of work.
    c. Home values elsewhere in Saguache County would likely be supported by the Project; in particular, the influx of long-term employees, the indirect and induced jobs resulting from the Project, and the general economic development of the area would all positively affect home values.

d. The value of rental property and temporary housing, both nearby and in the broader area, will likely be supported by the temporary influx of construction workers.

3. **Commercial properties**
   a. To the extent that commercial properties house services that may be in greater demand as a result of the Project – such as hotels, bars and restaurants, and general stores – as the demand for those services increases, the value of commercial property may increase.

4. **Public property**
   a. To the extent that the Project would improve public roads, the value of those public facilities would increase.
   b. By providing additional tax revenue, the Project may, through its funding, enhance other public facilities throughout Saguache County.

13-304(2)(e)(iv)(4) Transportation

A traffic impact study was performed for the Project and is included in Exhibit B. At peak construction times, 160 to180 truck trips per day might be expected. During peak construction times, construction worker activity could generate 1,150 to 1,200 trips per day given up the approximately 450 workers on the site during the peak six-month construction period. During the peak six month period, construction activity will generate between 1,600 and 1,700 vehicle-trips per day, of which 85 percent will consist of construction worker activity. During peak hours, more than 600 trips per hour are estimated, of which 98 percent will be construction worker commuter activity.

Much of the truck/delivery activity will tend to come from the south, likely via I-25 and into the San Luis Valley via U.S.160 over La Veta Pass. Items such as rock, cement, and water for construction purposes will likely come from within the San Luis Valley and could arrive at the site from any direction. The majority of the truck/delivery activity is estimated to arrive (and depart) from SH 17 south. The SH 17 south leg will also play a major role in serving construction worker activity, with an estimated 35 percent coming from that direction. During the peak construction period, the level of traffic that CR G will serve will increase to 800 to 900 vehicles per day between SH 17 and CR 53, dropping to 600 to 700 vehicles per day just east of U.S.285. Along CR 53, between 500 and 600 vehicles per day are anticipated during the peak construction period.

Given the total peak hour turning movement projections at the state highway intersections, all movements were shown to function at a LOS-B or better. This favorable LOS is due in large part to the relatively low traffic that makes use of these intersections today. In addition to LOS measures, the state highway intersections were also assessed with respect to any need for acceleration or deceleration lanes.

Given these criteria with respect to the peak hour projections, auxiliary lane needs were assessed for each state highway intersection. Findings and recommended mitigation steps, including any lane additions, can be found in Section 13-304(2)(a)(ix)(5), Existing Transportation Network, under the subheading “Transportation Network Effects and Recommended Mitigation.”

13-304(2)(e)(iv)(5) Agricultural Productivity and Agricultural Resources

Saguache County has approximately 287,000 acres in farmland and approximately 242 active farms (USDA 2007). Between 2007 and 2002, the number of acres in active farms has decreased by 40 percent (USDA 2007). The Project site is located on active farmland that is currently irrigated and is used for production of cultivated crops including lettuce, potatoes, alfalfa, and barley. The Project would remove approximately 4,000 acres, thereby reducing the County's total acreage of active farmland and reducing agricultural production of cultivated crops. However, it should be noted that the effect of changing water regulations is already anticipated to remove 10,000 acres or more from production; removal of this Project's land from agriculture will contribute towards that goal, not add to the total.

The management of water resources is a significant concern in the San Luis Valley. The Project will potentially provide benefits to area water resources by taking the irrigated agricultural land out of production and creating new management options for these water rights. It is not anticipated that construction staging areas and construction access will extend beyond the Project site. It is anticipated that transmission line upgrades would be constructed outside the irrigation season, limiting any potential impact on agricultural operations.

13-304(2)(e)(v) Long-Term Effects of the Proposed Site Selection

As described in Section 13-304(2)(e)(iv), Analysis of Effects, the following long-term environmental effects will result from construction of the Project: removal of up to 6,200 acres from agricultural productivity, change in viewshed of the area as identified in Figure 25, and removal of vegetation within the developed portions of the Project site for the duration of the Project.

During operations, approximately 50 full-time jobs will be created with many of these jobs expected to be filled by local workers. Ongoing need for services and supplies will provide secondary economic benefits to the local economy. It is anticipated that the need for ongoing operations and maintenance services will be met by local businesses in Saguache County.

Property tax revenues from the Project will contribute to the County revenue for duration of the Project, which may be 30 years or more.

As discussed in Section 13-304(2)(a)(iv)(1), Public Convenience and Necessity, the Project will contribute 200 MW of solar power generation in the designated ERZ within the San Luis Valley. Through the passage of House Bill 10-1001, Colorado has increased its renewable energy standard to require large utilities to obtain 30 percent of their power from renewable sources by 2020. In-state renewable energy facilities receive extra credit towards the requirements. If the power from this facility is purchased by a large utility, this Project will help Colorado meet its renewable energy standard.

At the end of the Project's economic life, the Project will be decommissioned as described in section 13-304(2)(e)(vii). Many components within a CSP facility can be removed and recycled.

13-304(2)(e)(vi) Justification of the Proposed Site Selection

As described in Section 13-304(2)(a)(iv), Project Need, the San Luis Valley has been designated as an ERZ and the location for the Project site is located within this ERZ. There were six different sites analyzed prior to choosing the Project site. The sites not chosen for Project development were removed from consideration based on several criteria: three of the sites were 4.5 miles away or more from the generation interconnection point, one site had potential wetlands onsite, and one site was too small to accommodate the Project. Additionally, the Project is located within a region of the United States that has high quality solar resources (see Section 13-304(2)(a)(iv)(1), Public Convenience and Necessity). The site that was chosen for the Project is located less than 10 miles north of the San Luis Valley Substation, and is bisected by the existing 230 kV transmission line. The Project will connect to the transmission system via an on-site switchyard, offering a short generation tie transmission line when compared with the other Project sites. The Project Applicant is currently in the process of obtaining an interconnection agreement with the co-owners of the line, Tri-State Generation and Transmission Association, Inc. and Public Service Company of Colorado (PSCo).

The Project proposes to interconnect both 100 MW phases at a new interconnecting switchyard on the Poncha-SLV 230kV transmission line of which both Tri-State and PSCo are joint owners. Because the Poncha-SLV line runs through the Project site and between the proposed plants, each plant will have immediate access to the switchyard using short generator tie lines within the optioned property. Each 100 MW phase has its own interconnection request. Both requests are in the System Impact Study (SIS) phase of PSCO's Large Generator Interconnection Process as regulated by the Federal Energy Regulatory Commission, and the results of each SIS are expected in late 2011.

When compared to the other potential development sites, this site will require a shorter generation interconnection route and has lower potential for wetlands to be present, has a very low likelihood of presence of threatened or endangered species occurrences onsite, and is farther from residential areas. Additionally, the Project Applicant has completed negotiations with the private land owners and is currently in an option agreement with these landowners to purchase their property.

13-304(2)(e)(vii) Minimizing and Mitigating Adverse Impacts

The Project will comply with all applicable local, state, and federal regulations. The Project Applicant will obtain necessary permits and consultation as outlined in Section 13-304(1)(c)(iii), Timetable for Planning, of the Preliminary 1041 Permit Application. The plans to minimize and mitigate adverse impacts to water quality, air quality, natural resources, worker safety, and hazardous materials are described in the following section.

As previously stated, the influx of non-local workers during the construction period has the potential to affect the availability, rental rates, and value of local housing. The Project Applicant has provided information to the County, including the monthly construction workforce in listed in Table 4, Section 13-304(2)(a)(vi)(3)(a), Positions and Salaries Anticipated.

The Project will be subject to the Stormwater Management Plan (SWMP) requirements administered by the CDPHE Water Quality Control Division. The purpose of a SWMP is to identify possible pollutant sources to stormwater and to set out BMPs that, when implemented, will reduce or eliminate any possible water quality impacts.

The Project will comply with all applicable local, state, and federal regulations to minimize air quality effects during construction. An Air Pollution Emission Notice (APEN) will be obtained for the Project, and will address fugitive dust control measures and any other source of emissions. A Dust Control Plan will be implemented to minimize fugitive dust during construction and operations.

The Project Applicant has consulted with the USFWS and CDOW and regarding potential impacts to natural resources. The Project Proponent will work in good faith with USFWS to develop an Avian and Bat Protection Plan prior to the commencement of construction.

In general, most terrestrial wildlife species do not use disturbed agricultural land as their primary habitat. Because they do not currently reside or breed in the agricultural fields that will be used for the Project site, there will be minimal impact on these species. In continued consultation with the CDOW and the USFWS, the Project's planning, design, and permitting and implementation of appropriate mitigation measures will ensure that potential impacts to biotic resources are either avoided and/or minimized to the maximum extent feasible.

Appropriate safety programs will be developed addressing hazardous materials storage and use, emergency response procedures, employee training requirements, hazard recognition, fire safety, first-aid/emergency medical procedures, hazardous materials release containment/control procedures, hazard communications training, personal protective equipment training, and release reporting requirements. These programs include Employee Safety Policy, Fire Response Program, Plant Safety Program, and facility standard operating procedures.

Impacts to the site workers, the public, or the environment due to a minor spill or leak of hazardous materials will be mitigated through an emergency response training program and procedures that will be implemented by Project construction contractors and employees, and also by thoroughly cleaning up minor spills as soon as they occur. Soil contaminated by a spill or leak will be disposed in accordance with applicable state and federal requirements.

In response to the County's inquiry regarding additional land buffer/mitigation around the Project, the Project Applicant has identified residents within 0.25 mile of the Project (see Figure 16). In addition, based on the following reasons, the Project Applicant does not anticipate the need to create an additional buffer around the Project site to mitigate Project impacts:

- Project Applicant currently holds an option to purchase more land than is required to build either one or both proposed facilities. This additional private land will automatically set the Project back from boundaries of the private land.

- Each heliostat field will be surrounded by a fence to secure access in and out of the facility. Individuals at the fence line will be able to see the non-reflecting back side of the heliostats and may be able to hear the occasional soft sound of heliostat drive motors.
- The “power block” area where the tower, energy storage tanks, and power generation equipment reside will be set back from the fenceline by over 0.5 miles at the fenceline’s nearest southern point. As defined by the Property border, the nearest public access point is farther – roughly 0.75 miles from the power block. As detailed in the noise summary, Project Applicant does not expect a significant noise impact.
- Project Applicant has provided several accurate visual simulations of the Project, including the receiver tower. The tower size has been engineered and optimized in conjunction with the heliostat field to provide a highly efficient and economical long-term solar energy solution. During daytime energy collection periods, the receiver will be illuminated by the heliostat field. During nighttime, the tower will only be illuminated to the extent needed to comply with Federal Aviation Administration requirements.

Soil Erosion and Water Quality

Construction and industrial operations at the site will be subject to the General Construction Stormwater National Pollution Discharge Elimination System (NPDES) permits, respectively. Compliance with this permit will require preparation and implementation of a construction Stormwater Pollution Prevention Plan (SWPPP) that addresses the following requirements (among others):

- Identification of activities that may pollute stormwater or contribute to erosion or sediment transfer
- Identification of Best Management Practices (BMPs) to control stormwater pollution, including water erosion and wind erosion
- BMP inspection, maintenance, and repair
- Training
- Site inspection and monitoring

Erosion and sedimentation control BMPs will be designed and implemented to meet the requirements of the General Construction Stormwater NPDES permit. The area of soil disturbance for the Project will be kept to a minimum to limit wind and water erosion and enhance successful site rehabilitation/restoration. The areas of soil disturbance will be limited to pipeline alignments, access roads, construction support areas, and the heliostat field, power block, and operational support facilities.

Soil stabilization measures will be used to prevent soil being detached by stormwater runoff or wind erosion. The Project Applicant will employ temporary and permanent BMPs to protect the soil surface by covering or binding soil particles or preventing the concentration of runoff. The Project will incorporate erosion-control measures required by regulatory agency permits and contract documents as well as other measures selected by the engineer. Site-specific BMPs will be identified in the SWPPP, with final selection and design by the engineer, and associated figures to be included in the final active Project SWPPP.

Project design features and or mitigation measures that will aide in the protection of soil resources could include at a minimum:

- Erosion and sedimentation control calculations performed to verify acceptable stormwater velocities, calculate BMP clean out frequencies, and to size rip rap.
- Construction and final drainage designed to promote sheet flow, avoid unnecessary concentration of runoff, and control runoff velocity.
- Stone filters and check dams strategically placed throughout the Site to provide areas for sediment deposition and to promote the sheet flow of stormwater prior to leaving the Site boundary. Where available, native materials (rock and gravel) will be used for the construction of the stone filter and check dams. A stone crusher may be provided onsite to utilize local stone for the production of gravel.
- Diversion berms, culverts, and water bars will be utilized to redirect stormwater.
- Diversion channels will be armored as required to prevent erosion and scouring.
- Flat detention/infiltration ponds and ditches will be used.
- Where possible, maintenance roads will be designed not to disrupt regional flow patterns.
- Silt fences and/or straw waddles will be utilized extensively during each phase of construction to minimize wind and water erosion.
- In areas of temporary disturbance (e.g., pipeline or transmission line alignment, temporary construction support areas), the surface will be recontoured to promote sheet flow and restore and match the original or surrounding drainage function. Native vegetation will be restored to promote healing of the landscape.
- Periodic maintenance conducted as required after major storm events and when the volume of material behind the check dams exceeds 50 percent of the original volume. Stone filters and check dams are not intended to alter drainage patterns but are intended to minimize soil erosion and promote sheet flow.

The stormwater drainage system will be designed to separate the “offsite” flows from “onsite flows.” The offsite flows are considered the flows of stormwater generated from rain that falls outside the developed area of the solar generating facility. The onsite flows are considered the flows of stormwater generated from rain that falls inside the developed area of the solar generating facility.

A collector ditch and dike system, in parallel with the perimeter and access roads, will divert offsite flows around the solar generating facility and discharge these flows to pre-existing locations down slope from the developed area. These offsite flows will then follow the existing drainage patterns.

The grading design for the heliostat field will be geared towards preserving existing grades, such that ultimate conditions and contours generally follow the predevelopment flow patterns. Stormater detention will be incorporated into the grading design to control the release of onsite flows to match pre-development conditions. Ditches will be constructed along road ways to provide a path of travel for water, and to allow infiltration of rainfall.

The power block will be designed to capture all rainfall within the power block, which will be directed to the containment areas adjacent to the onsite salt tanks and allowed to infiltrate. Pipe culverts will be used, as required, where storm channels cross roads.

Spill Prevention, Control, and Countermeasure

Spill Prevention, Control, and Countermeasure (SPCC) Plans will be prepared for construction and operation of the Project site. The plans will include spill prevention and countermeasures procedures to be implemented including (but not limited to) a spill record (if applicable), analysis of potential spills, description of containment facilities, fill and overfill prevention facilities, spill response procedures, personnel training and spill prevention.

The solar facility will require the use of large amounts of nitrate salt ($NaNO_3$ and KNO_3) at the site. To ensure worker safety, the hot and cold molten salt tank areas will be designed such that any release will be contained in a basin. The construction SWPPP will specify procedures to prevent contact between the molten salt and stormwater during processing of the molten salt prior to plant startup. In addition, the processing area will be cleaned to ensure residual salt is removed from surface soil after processing.

Industrial wastewater will consist of a relatively small amount of blowdown from the steam system and RO treatment reject flow. This wastewater will be disposed in evaporation ponds at the Project site.

Domestic wastewater will be treated and disposed at the site using a septic disposal system consisting of septic tanks and leach field permitted with Saguache County.

The Project will produce maintenance and plant wastes typical of a power generation plant. These wastes will be managed in accordance with a Waste Management Plan. Wastes may include oily rags, broken and rusted metal and machine parts, defective or broken solar mirrors and electrical materials, empty containers, and other miscellaneous solid wastes including the typical refuse generated by workers. These materials will be collected by a waste disposal company and disposed at a landfill permitted to receive these wastes. Waste collection and disposal will be in accordance with applicable regulatory requirements to minimize health and safety effects, prevent leaks and spills, and prevent potential contact with stormwater.

Several methods will be used to properly manage and dispose of hazardous wastes generated by the Project. Waste lubricating oil will be recovered and recycled by a waste oil recycling contractor. Spent lubrication oil filters will be disposed of in a Class I landfill. Workers will be trained to handle hazardous wastes generated at the site.

Chemical cleaning wastes will consist of alkaline and acid cleaning solutions used during pre-operational chemical cleaning of heat exchangers after the units are put into service. These wastes, which can contain elevated metal concentrations, will be temporarily stored onsite in portable tanks and disposed of offsite by a chemical cleaning contractor in accordance with applicable regulatory requirements.

Vegetation

Key considerations for vegetation treatment of the site include the following:

- Soil disturbance in support of construction will increase likelihood of noxious weed introductions. Regular weed monitoring and management during construction will be required. Ongoing maintenance activities at the heliostat locations will also have the potential for ongoing introduction of

weedy species, through soil disturbance and equipment entrance. As a result, ongoing weed management will be required.

- Where temporary access is needed to install facilities, or where site leveling is not required for drainage or access, neither removal of existing vegetation nor grading will occur. Rather, trucks and equipment will drive over and crush any existing vegetation without direct removal. Crushed vegetation is much more likely to show a rapid recovery than sites where vegetation is removed and reseeded, or where soils are more intensively disturbed.
- Revegetation with native species will be implemented to the extent feasible. Areas of temporary disturbance, such as pipeline routes, temporary construction roads and temporary construction support, staging and laydown areas will be re-contoured and revegetated.

Biological Resources

The US Fish and Wildlife Service (USFWS) has jurisdiction over impacts to avian species, even when those impacts are on private land, through enforcement of the Migratory Bird Treaty Act (MBTA). The Project Proponent will work in good faith with USFWS to develop an Avian and Bat Protection Plan (ABPP) prior to the commencement of construction. The ABPP will focus on adaptive management techniques, which entail adjusting management strategies as specific impacts increase or decrease. The ABPP will detail the ongoing monitoring and mitigation plan. Techniques for managing avian and bat impacts may incorporate several elements, including:

- Evaporation ponds would be constructed with interior side slopes of at least 3:1 to discourage birds from wading into the ponds.
- Pond hydrology (i.e., water volume and chemical concentrations) would also be actively managed to minimize potential wildlife impacts associated with ingestion of pond water.
- Textured liner installed at corners of evaporation ponds to allow fallen bats and birds to crawl out of the water.
- Anti-perching devices installed around the perimeter of each evaporation pond would discourage their use by avian and bat species.
- Visual deterrents mimicking avian and terrestrial predators can discourage avian and bat species from utilizing the site.
- A gas-fired noise cannon may frighten them away from the ponds, used intermittently to prevent acclimation.
- Netting: after all other adaptive management techniques are exhausted, if it is determined that impacts from the evaporation ponds remain unacceptable, as a last and final resort netting can be installed on one or more of the ponds. The ponds would initially be designed with adequate spacing for the installation of net support structures and cable tie down so the netting could be installed while allowing the ponds to function as a means of evaporation. (The Applicant's experience developing other ABPP's has indicated that nets can cause higher avian mortality by tangling birds in the nets.)

Other proposed Project design features and mitigation measures to protect biological resources could include the following:

- All construction areas will be minimized by providing taped and flagged boundaries to delineate where surface disturbance will not be allowed to occur. The Project staff will review all site plans and

provide written approval prior to any surface disturbance. Setting and flagging construction area boundaries will limit surface disturbance and habitat impacts only to those areas needed for construction, thereby preventing unnecessary impacts.

- An Environmental Awareness Program will be developed by the Project Applicant to educate employees about sensitive biological resources and to provide background and reasons for restrictions, legalities, and appropriate procedures to be followed. This measure will be implemented prior to construction, and written material and other information will be provided to employees at Project orientation. This information also will be provided to all contractors and subcontractors that will be working at the job site.
- A trash and litter control program will be developed for the Project to reduce the possibility of animals ingesting or becoming entangled in foreign matter. In addition, trash control will reduce predator attraction and consequent increased predation, and will serve to increase overall pride in the area and foster environmental awareness.
- Restoration of disturbed rights-of-way and other temporary disturbance areas in native habitat will follow recommended procedures including ripping, seeding, and mulching, as appropriate. Seed mixtures will include shrubs and other species of utility as wildlife habitat. This measure will provide mitigation for temporarily disturbed areas and will restore habitat for use by wildlife.

Decommissioning and Reclamation

The Project Applicant expects to enter into a long-term agreement for the sale of the Project's electricity, which will likely be a Power Purchase Agreement with an electrical utility company that provides electricity to the public. While a typical term for such a power purchase agreement is 20 years or more, the Applicant expects that the Project will be economically viable and continue to provide power for many more years after that. A minimum economic life of approximately 30-50 years is anticipated after commercial operation of the Project commences, and it is likely that the Project's economic life will be extended beyond that period, whether through use of the existing facilities or through repair, replacement or improvement. The economic life of each separate 100 MW phase of the Project may vary, depending on factors such as market demand for power. Within one year following the termination of the economic life of the Project, the decommissioning activities that are described below will commence.

A plan for decommissioning of the Project would be developed upon completion of Project construction with the intent to achieve the following goals:

- Evaluate reuse alternatives for buildings and infrastructure which may be retained for their benefits or value in redeveloping the site. Internal roads and paved areas will remain intact.

- Dismantlement and removal of all Project facilities from the Project site. Most of the Project facilities will have a substantial salvage value at the end of the Project's economic life, including steel and high value alloys, copper and the nitrate salt itself which does not decay over time and can be recovered for other solar applications or even for fertilizer.

- Removal of major above-ground structures may entail abandonment of certain massive foundations which would be broken up to a suitable depth beneath normal ground level then re-

covered with topsoil. Some underground materials (such as power cable for the heliostats) will be recovered for salvage value.

- Removal of all hazardous materials from the site in accordance with all applicable local, state and federal regulations for offsite disposal or management at properly licensed facilities. Oil-filled transformers and other machinery would be drained, and oil properly handled and disposed of, prior to dismantling or removal. Sedimentation in evaporation ponds would be sampled and characterized, then scraped out and carted to an appropriate solid waste facility for disposal.

- Clean-up or management of soils, as needed, with special attention to retention and evaporation ponds and hazardous materials use and storage areas, to ensure that area water resources are protected and to ensure that the Project site soils meet all applicable local, state and federal regulations.

No decommissioning is anticipated by the Applicant for any high-voltage electrical infrastructure that is not owned by the Applicant, which includes the switchyard proposed to be constructed alongside the existing high-voltage transmission lines. The switchyard will likely be owned by the interconnecting electrical utility. Power lines serving transformers and buildings may remain as necessary to enable their continued use.

Decommissioning activities will be conducted by a properly qualified and duly licensed and bonded demolition contractor. Demolition will involve the use of heavy equipment to dismantle and remove the Project facilities and transport them to the appropriate salvage destinations or disposal facilities. Appropriate measures will be taken during decommissioning to limit the impacts of such activities on adjacent properties and upon off-site facilities such as country roads. These measures will include the following:

- All appropriate local, state and federal permits will be obtained before the commencement of decommissioning activities, and only licensed, bonded and insured contractors will be selected, adhering to a health and safety plan developed specific to the decommissioning plan.

- Appropriate measures will be taken to implement erosion control measures and to control dust during decommissioning activities consistent with best management practices in effect at the time.

- Appropriate measures will be taken to implement noise and nuisance control measures during decommissioning activities.

- Areas of disturbed ground will be regraded to natural contours, and clean topsoil may be applied as necessary. Disturbed areas will be properly managed to control erosion and prevent the growth of noxious weeds. All grading activities will be conducted in accordance with applicable regulations following the issuance of required permits. Re-vegetation would be employed to mitigate potential soil erosion and dust as required.

- Any damage to adjacent roads or properties or to any public roadways will be promptly repaired at the Applicant's (or Applicant's contractors') expense.

13-304(2)(e)(vii)(1) Alternatives Analysis

13-304(2)(e)(vii)(1)(a) Alternative Locations and Routes

As described in Section 13-304(2)(a)(iv)(1), Public Convenience and Necessity, the Project is located in one of the state's best solar resource areas. The Project site is ideally located immediately adjacent to the existing 230kV transmission line and less than 10 miles north of the San Luis Valley Substation; alternative locations would create the need for more new transmission infrastructure and increase the cost of the overall Project. Alternative locations also have the potential to impact key environmental resources such as wetlands and/or wildlife.

13-304(2)(e)(vii)(1)(b) Alternative Types of Facilities

Alternative types of generation facilities will not meet the need of the Project. The Project Applicant is a developer of concentrating solar power (CSP) technology using a tower, heliostats, and molten salt for energy storage. Other types of solar technology cannot achieve the performance of the Applicant's solar technology.

13-304(2)(e)(vii)(1)(c) Use of Existing Rights-of-Way

To the extent practical, existing rights-of-way are already being utilized by the Project, including the use of CR G for access, and prospectively, the use of County Road rights-of-way for the water pipeline. Location of an on-site switchyard is already taking advantage of the existing transmission right-of-way. The Project site, onsite traffic circulation, and construction staging areas will be located on private property and will not encroach into adjacent existing easements or rights-of-way. Access during construction and operation will be via existing public roadways. No additional site entry through adjacent private properties is being proposed as part of this Project.

13-304(2)(e)(vii)(1)(d) Joint Use of Rights-of-Way with Other Utilities

Other than as described above in 13-304(2)(e)(vii)(1)(c), no additional rights-of-way are relevant to this Project.

13-304(2)(e)(vii)(1)(e) Upgrading Existing Facilities

Under the proper conditions, it may be possible to use solar technology to upgrade an existing conventional generator. However, there does not currently exist any electrical generation facility in the San Luis Valley that would be an appropriate candidate for an upgrade. Upgrade of existing generation facilities outside of the San Luis Valley would not serve the Project objectives.

13-304(2)(e)(vii)(2) Analysis of Non-Structural Alternatives

13-304(2)(e)(vii)(2)(a) Conservation of Energy Use

The Governor's Energy Office (GEO) initiated a rebate program on April 19, 2010, to Colorado residents and businesses who install energy efficiency or renewable energy measures in their home or business

(GEO 2010). This program and similar national programs provide financial incentives to consumers to reduce the demand for electricity. No amount of conservation efforts will completely negate the need for electricity, however, so the GEO supports development of renewable energy facilities to harness clean energy resources that are constantly replenished and economically advantageous to the state.

13-304(2)(e)(vii)(2)(b) No Development

Under the no development alternative, the 4,000-acre Project site (and the remainder of the 6,200-acre Propertyt) would remain in agricultural use. The Project-related impacts as described in Section 13-304(2)(e)(iv), Analysis of Effects, would not occur. Conversely, the economic benefits as described in Section 13-304(2)(a)(vi), Employment and Economic Opportunities, would not be realized and the Project would not contribute to Colorado's Renewable Energy Standard as described in Section 13-304(2)(e)(v), Long-Term Effects of the Proposed Site Selection. The no development alternative would neither meet the objectives of the proposed site selection and construction nor the need for the Project.

13-304(2)(e)(vii)(3) Analysis of Management Alternatives

Management alternatives such as scheduling, training programs, facility design, and land trades would not meet the Project objectives of meeting energy demands through development of renewable energy sources.

13-304(2)(e)(vii)(4) Analysis of Air and Water Pollution Control Alternatives

Implementation of air and water pollution controls elsewhere would not meet the Project objectives of meeting energy demands through development of renewable energy sources.

13-304(2)(e)(vii)(5) Analysis of Design Alternatives

The objective of the Project is to provide sustainable, renewable, cost-effective energy, with energy storage for operating flexibility that contributes to the achievement of the renewable portfolio standards.

The Project will deploy CSP technology with integrated thermal storage configuration. This technology is exclusive to the Project Applicant, and therefore other CSP technologies were not considered. Photovoltaic technology has been considered, but was not selected as the primary technology, as this technology does not allow the storage of solar energy and is already widely deployed elsewhere in the San Luis Valley.

The Project did consider cooling technology alternatives. There are two types of cooling technologies, evaporative or "wet cooling", and air or "dry cooling." Some power plants use a combination of the two, which is generally called "hybrid cooling." All thermoelectric power plants require cooling equipment to condense steam back into a liquid state for reuse in the steam cycle. Wet cooling uses a steam surface condenser, cooling tower, and circulating water pumping system to produce a lower temperature through evaporation. Dry cooling uses an Air Cooled Condenser, which forces air over tubes filled with the higher-temperature medium. A common analogy compares wet cooling to perspiration, and compares dry cooling to an automobile's radiator.

Wet cooling consumes water, but is available at a much lower capital cost, and uses significantly less energy to operate. Dry cooling can reduce total water use by up to 90 percent, but it is significantly more expensive to construct and operates with lower energy efficiency. Wet cooling is generally highly desirable in hot areas, where the energy efficiency difference between the two technologies will be more severe: because dry cooling can require so much energy on hot days, the power plant's output must be reduced, which is problematic because hot days typically coincide with peak electrical demand. It should be noted that because the cooling process is "behind the meter" at the solar plant, any energy requirement from cooling would be served by 100 percent solar energy.

It is estimated that wet cooling will consume approximately 1,200 acre-feet of water per year per facility, and dry cooling will consume approximately 150 acre-feet of water per year per facility, for the projects proposed.

Dry cooling has been selected for use at the Saguache Solar Energy Project for the following reasons:

1. **Responsible Water Use.** The Project site currently uses thousands of acre-feet of groundwater every year for agriculture. Water use and maintenance of the aquifer are of particular concern in this area. The San Luis Valley will benefit considerably from this significant water use reduction.
2. **Low Ambient Temperatures.** The climate in the San Luis Valley is particularly conducive to dry cooling, since summer highs are not as severe as other highly productive solar zones (e.g., southern Arizona). The performance penalty for using dry cooling, therefore, is not a significant challenge for this Project.
3. **Plume Elimination.** At low temperatures, wet cooling might produce a visible plume as warm moist air collides with cooler air. Technology exists to mitigate this plume somewhat. Dry cooling produces no such plume, since the warmer air is not humid. Thus dry cooling will completely avoid any potential visual impact from plumes.

Besides cooling water, other uses for water, which will remain regardless of the choice of cooling technology, include steam cycle makeup, quench water for boiler blow down, mirror washing water, and general plant and sanitary uses among others.

Given the high altitude and unique locational attributes of the San Luis Valley, it is anticipated that the Project will experience cold winter conditions and windy spring conditions. The Project Applicant has examined the historical data with regard to cold and wind in the San Luis Valley and has installed a meteorological data gathering system to further validate temperature, wind, and solar intensity data at the Project site. As will be required for successful construction financing of the Project, the Project Applicant will design and engineer the Project to withstand the expected Project conditions while meeting the appropriate building codes. It should be emphasized for the County's understanding that despite any other Project achievements related to permitting or power marketing, construction financing will be obtained only after a due diligence by an independent engineer working on behalf of the lending entities. The system as provided by from Pratt & Whitney Rocketdyne has already been designed for high wind and seismic conditions relative to desert areas, although examples of potential additional design or operational measures may include the following:

- A baseline comparison of Project building material specifications to verify whether they are/are not already compatible with expected site conditions
- Potential design modifications in heliostat material and structure (e.g., glass, pedestal, supports, motors, etc.) to accommodate expected site conditions
- Potential operational modifications in heliostat storage/stowage (e.g., wind speed and modes) to accommodate expected site conditions

13-304(2)(e)(vii)(6) Meeting "Front End" Costs

Front end costs, including permitting, construction, and initial operation; will be met through a variety of funding sources, including direct funding provided by the Project Applicant. The Project Applicant may also use financing, monetized tax credits and payments, and revenues from a power purchase agreement for the electrical output of the Project.

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Figure 1: Project Vicinity Map

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Figure 2: Project Base Area Map

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Figure 3: Process Diagram of CPS Technology

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Figure 4: Preliminary Site Layout

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Figure 5: Conceptual Heliostat Arrangement

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Figure 6: Heliostat—Front and Back Views

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Figure 7: Conceptual Receiver and Tower Elevation

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Figure 8: Preliminary Power Block Design

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Figure 9: Jurisdiction Map

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Figure 10: School District Map

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Figure 11: Ambulance District Map

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Figure 12: Fire Protection District Map

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Figure 13: Colorado Water District Map

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Figure 14: Water Conservation District Map

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Figure 15: Landcover Map

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Figure 16: Parcel and Structures Map

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Figure 17: Topographic Map

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Figure 18: Surface Geology Map

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Figure 19: Soil Type Map

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Figure 20: Soil Shrink/Swell Potential Map

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Figure 21: Elk Habitat Map

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Figure 22: Mule Deer Habitat Map

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Figure 23: Wetlands Vicinity Map

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Figure 24: Wetlands in the Project Site Map

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Figure 25: Viewshed Map

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Figure 26: Visual Simulation 1

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Figure 27: Visual Simulation 2

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Figure 28: Visual Simulation 3

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Figure 29: Visual Simulation 4

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Figure 30: Visual Simulation 5

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Figure 31: Visual Simulation 6

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Figure 32: Nighttime Visual Simulation 1

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Figure 33: Nighttime Visual Simulation 2

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Figure 34: Nighttime Visual Simulation 3

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Exhibit A:
Detailed Preliminary Site Plan

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Exhibit B:
Traffic Impact Study

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Exhibit C:
Socio-Economic Impacts Report

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Exhibit D:
Groundwater Quality Assessment

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Exhibit E:
Groundwater Quality Monitoring Plan

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Exhibit F:
Hazardous Materials Tables

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Exhibit G:
Nitrate Salts Description

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Exhibit H:
Noise Study

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Exhibit I:
FAA Documentation

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Exhibit J:
Geotechnical Feasibility Study

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Exhibit K:
Wetlands Reconnaissance Report

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Exhibit L:
Wildlife Literature Review

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Exhibit M:
Avian Survey Report

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Exhibit N:
Historical Water Use Memo

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Exhibit O:
Lighting Detail Drawings

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Exhibit P:
Night Simulation Methodology

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Exhibit Q:
Glint and Glare Memo Discussion

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Exhibit R:
Site Characteristics Investigation for the Grading and Drainage Design

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