



The Sandstone Solar Energy Project Plants 1-8

SF-299 Application Attachment C



**Submitted to:
BLM Tonopah Field Office
1553 South Main Street
Tonopah, Nevada 89049**

August, 2017

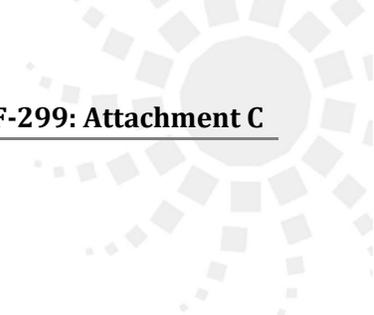


Table of Contents

Introduction..... 3

13. Alternatives..... 3

14. List authorizations and pending applications filed for similar projects which may provide information to the authorizing agency. (Specify number, date, code, or name) 4

15. Provide statement of need for project, including the economic feasibility and items such as: (a) cost of proposal (construction, operation, and maintenance); (b) estimated cost of next best alternative; and (c) expected public benefits 5

16. Describe probable effects on the population in the area, including the social and economic aspects, and the rural lifestyles..... 6

17. Describe likely environmental effects that the proposed project will have on: (a) air quality; (b) visual impact; (c) surface and ground water quality and quantity; (d) the control or structural change on any stream or other body of water; (e) existing noise levels; and (f) the surface of the land, including vegetation, permafrost, soil, and soil stability. 7

18. Describe the probable effects that the proposed project will have on (a) populations of fish, plantlife, wildlife, and marine life, including threatened and endangered species; and (b) marine mammals, including hunting, capturing, collecting, or killing these animals. 9

19. State whether any hazardous material, as defined in this paragraph, will be used, produced, transported or stored on or within the right-of-way or any of the right-of-way facilities, or used in the construction, operation, maintenance or termination of the right-of-way or any of its facilities. 10

20. Name all the Department(s)/Agency(ies) where this application is being filed. 10

Estimated Schedule 11

Introduction

Sandstone Solar Energy, LLC (“SSE”), a wholly owned subsidiary of SolarReserve, LLC (“SR”), has prepared this Attachment C in support of the Sandstone Solar Energy Project (the “Project”), Plants 1 through 8. Attachment C is intended to supplement the SF-299 *Application for Transportation and Utility Systems and Facilities on Federal Lands* (“SF-299 Application”), which will be submitted to the Tonopah Field Office of the Bureau of Land Management (“BLM”).

SSE performed preliminary screening of BLM land in the vicinity of the proposed Project before ultimately selecting the portion of land reflected in the associated SF-299 Application. Many considerations were involved in this land screening process, and ultimately the site was selected because it represents what we believe is optimal land utilization with the lowest negative impacts.

The entire Project will consist of ten (10) solar energy power plants, including two which are not subject to this application. Each solar energy power plant is comprised of integrated molten salt thermal storage, including a heliostat field, receiver tower, molten salt system, steam generation system, steam turbine generator, etc. Additionally, certain components will be shared between multiple plants when possible, such that costs and footprints are lowered.

This Attachment C and the associated SF-299 Application is for eight (8) of the ten planned plants (collectively, “Sandstone Plants 1-8”). The remaining two plants are envisioned to be located within the Millers Solar Energy Zone (“SEZ”) boundaries (collectively, “Sandstone Plants 9 and 10”) and will be subject to a separate SF-299 Application at a later date. Sandstone Plants 1-8 may be constructed in consecutive phases, or built with the other two plants interspersed in the construction sequence. The actual Project construction phasing will be dictated by commercial terms to be determined in the future.

Within 45 days following acceptance of this SF-299 Application, SSE intends to produce a Plan of Development (POD) conforming to the POD template promulgated by the BLM.

13. Alternatives

a) DESCRIBE OTHER REASONABLE ALTERNATIVE ROUTES AND MODES CONSIDERED:

SSE evaluated land proximate to Silver Peak in Esmeralda County, along with land in the vicinity of the Millers SEZ, as well as an expanse of land spanning to both the north and south of the existing Crescent Dunes Solar Energy Project (“CDSEP”), before narrowing the area boundaries and selecting the proposed site.

b) WHY WERE THESE ALTERNATIVES NOT SELECTED:

SSE’s unique technology has exacting siting requirements. This technology requires a large open space of approximately four square miles (per plant) of contiguous land, with minimal slope or topographical undulations, nearby transmission access, access to roads and infrastructure, as well as water availability. It is also imperative that the site have a high solar resource; the parameter of interest is known as Direct Normal Irradiance (“DNI”). SSE is also limited to sites

not already claimed by other developers, or sites with significant mining claims or other encumbrances. The selected site is unique in that it enables the development of eight contiguous SSE plants.

Further, the site selection process for the Project involved screening sites based on the following:

- Area with minimum area of twenty-thousand (20,000) acres and contiguous in configuration
- Solar resource (DNI)
- Proximity to transmission lines and substations
- Public Land ownership
- Water/Aquifer data
- Topography
- Wind data
- Airport locations
- Highways/roads
- Faults and geotechnical conditions
- Distance from population centers
- Interaction with military bases
- BLM SF-299 applications pending
- Existing mining claims
- Various environmental (biological, cultural, historical) constraints

Based on the above criteria, the proposed Project site was identified. The site is situated on a relatively flat portion of BLM land, covering approximately 20,000 acres. The annual average direct normal solar resource estimate surpasses 7.2 kWh/m²/day. NV Energy's Anaconda Moly Substation is in close proximity to the site. Additionally, the site does not appear to be located in an Area of Critical Environmental Concern (ACEC), and the elevation of the site makes the land unfavorable for protected species such as the desert tortoise.

Ultimately, SSE selected the proposed site because it represented the land with the highest value and the smallest impacts on the existing resources.

c) GIVE EXPLANATION AS TO WHY IT IS NECESSARY TO CROSS FEDERAL LANDS

The Project's technology and configuration requires a large, flat expanse of land which necessitates crossing federal lands inasmuch as a similar expanse of available private land in the region does not exist. Federal lands are the only lands between the suitable site and transmission infrastructure.

14. List authorizations and pending applications filed for similar projects which may provide information to the authorizing agency. (Specify number, date, code, or name)

The Crescent Dunes Solar Energy Project required two Right-of-Way Grants from the BLM. These Grants are as follows:

- ROW Grant for the Project Site No. N-86292 as issued by the Tonopah Field Office on December 21, 2010.
- ROW Grant for Gen-Tie Line No. N-87933 as issued by the Tonopah Field Office on December 21, 2010.

In addition, SolarReserve developed the Quartzsite Solar Energy Project, serial account AZA 34666.

15. Provide statement of need for project, including the economic feasibility and items such as: (a) cost of proposal (construction, operation, and maintenance); (b) estimated cost of next best alternative; and (c) expected public benefits.

a) COST OF PROPOSAL (CONSTRUCTION, OPERATION AND MAINTENANCE)

The total cost of each plant is estimated to be approximately \$500 million, for a combined capital cost of approximately \$4 billion for Sandstone Plants 1-8. In addition, the ongoing maintenance costs will be more than \$80 million annually in salaries and operating costs.

b) ESTIMATED COST OF THE NEXT BEST ALTERNATIVE

If built in another location, the Project would not be able to benefit from the economies of scale resulting from construction of up to 10 plants. These scale economies include enhanced efficiency of construction processes and construction equipment, volume discounts on materials purchased, capital efficiencies from shared facilities (e.g., transmission, water treatment, maintenance warehouse, administration building, etc.), elimination of redundant design and engineering processes, operating efficiencies from combined management and staffing, and fee reductions from coincident financing. In our estimate, the combined effect of suboptimal siting could raise the cost of the electricity generated by more than 30%, which would likely render the Project uncompetitive.

c) EXPECTED PUBLIC BENEFITS

Renewable Portfolio Standard ("RPS") policies require electric utilities to procure a percentage of their electricity from renewable energy resources. The electricity produced by the Project would be available to help Nevada and other states' utilities achieve their RPS requirements. The energy could also be offered to other energy users (e.g., data centers) in order to reduce their carbon footprint.

Unlike hydroelectric, geothermal, biomass, and other renewable energy technologies that use limited renewable fuel sources, the Project would use heat from the sun to generate electricity. Unlike wind and photovoltaics, the Project can utilize thermal energy storage to deliver power whenever it is needed, either 24 hours per day or during "peak" demand. The capital cost of storage per megawatt-hour is expected to be far below the cost of batteries for the foreseeable future; while electrochemical batteries may provide cost-effective solutions to certain short-duration issues on the electrical grid, inexpensive long-duration storage (i.e.,

10+ hours) will provide significant societal benefit by enabling the lowest-cost and most reliable operation of a clean electrical grid.

Another public benefit will be the generation of approximately \$480 million in tax revenues through the first 20-years of operation of Sandstone Plants 1-8, plus the payment of funds due under a Right of Way Grant to the BLM. In addition, opportunities for job growth are explained in greater detail below.

16. Describe probable effects on the population in the area, including the social and economic aspects, and the rural lifestyles.

The proposed Project will be located in a sparsely populated area of Nye County, approximately 20 miles northwest of Tonopah. Construction is expected to be a significant positive for the local economy. The principal socioeconomic risk related to construction that would be raised by the Project is housing for any workers that might be relocated temporarily to the area from out of the region.

During construction, approximately 3,000 jobs are anticipated over the 7-year phased construction and commissioning of the Project. It is anticipated that a significant portion of the construction labor will be recruited from Tonopah and surrounding areas, generally within a two-hour commuting distance from the site. This local area encompasses the communities of Silver Peak, Caliente, Hawthorne, Beatty and Goldfield. Larger cities such as Las Vegas, Reno, and Bishop are within four hours' drive of the site, and it is anticipated that workers from these regions would undertake short-term term relocation to meet the interim demand. Furthermore, improvements in Tonopah are currently underway to bolster the local hotel and apartment capacities to accommodate the increased demands for housing. Approximately 80% of the jobs that would be created by the Project can be attributed to Sandstone Plants 1-8.

It is also reasonable to assume that in light of the construction experience at CDSEP, the local area contains sufficient qualified construction labor to meet a significant portion of the needs for the Project. If a number of specialized workers are required to commute further to complete construction of the Project, it is not anticipated to have a significant negative impact relative to socioeconomics; to the contrary, similar to CDSEP, local hotels, stores, restaurants and communities will likely benefit from the influx of expenditures and tax revenues. This was observed in Tonopah as a direct result of the CDSEP.

The Project will have a total operational staff of 350 personnel. The operations crews will be recruited from the local area to the extent possible. A small percentage of operational staff may need to be recruited from a statewide or national pool. It is anticipated that the relocation of a small number of specialized workers would not adversely impact population and housing within Nye County. Some positive impacts relative to socioeconomics may include the introduction of jobs to the area, school impact fees, sales taxes on local expenditures, increased tourism, and a source of clean and renewable energy. Approximately 80% of the operational jobs created by the Project can be attributed to Sandstone Plants 1-8.

It is anticipated that the heavy industrial jobs in construction and operation would be consistent with the rural lifestyle in Tonopah in particular, which has historically been a mining town in a region where the largest employers are mines, and which has embraced the effects of SolarReserve's nearby Crescent Dunes facility.

17. Describe likely environmental effects that the proposed project will have on: (a) air quality; (b) visual impact; (c) surface and ground water quality and quantity; (d) the control or structural change on any stream or other body of water; (e) existing noise levels; and (f) the surface of the land, including vegetation, permafrost, soil, and soil stability.

a) AIR QUALITY:

SSE's technology is emissions-free. It does not require combustion of fuel to maintain thermal storage or provide full electronic generation during low solar periods. The thermodynamic properties of the molten salt, combined with proper insulation of the molten salt storage tanks, eliminate the need for a fossil fuel based heating source. As a result, no adverse air quality impacts are anticipated during operations.

Increased levels of particulate matter can be expected during construction activities such as clearing, grading, and grubbing associated with site preparation; construction of foundations associated with the tower, heliostat field, and ancillary structures; installation of any underground utilities; and creation of access roads, due to soil disturbance. In addition, there will be increased air emissions due to vehicular traffic during site preparation, construction equipment and portable generators, and ongoing maintenance.

However, the Project is not anticipated to have a significant impact relative to air quality. All anticipated emission sources will be mitigated to the extent possible, and will be appropriately permitted through the regulatory agencies (i.e. NDEP BAPC). For example, construction activities will be conducted pursuant to a Surface Area Disturbance (SAD) permit issued by NDEP.

b) VISUAL IMPACTS:

Key visual elements of Sandstone Plants 1-8 are the eight towers, each of which may stand up to 280 meters (approximately 920 feet) in height, surrounded by a field of mirrors. Each tower is anticipated to be associated with 1,500,000 square meters (approximately 16.1 million square feet) of mirror surface, which can be accomplished with 15,625 "heliostat" mirrors of 96 square meters in size. Each tower will be accompanied by two hot salt thermal storage tanks, solar steam generator and reheater, steam turbine generator, air-cooled condenser, and other power plant equipment. The size of each solar field will be up to approximately 2,000 acres and the heliostats will be arranged in a generally circular field around the tower, with the tower offset slightly south of the center of the circle.

In addition to the heliostat assembly building, power tower, and associated structures, other key visual elements will include temporary construction, administration trailers, and construction equipment.

There are a handful of residences in the Lower Smoky Valley in the vicinity of the Project. Potential sensitive viewers will predominantly include recreational users and travelers along US Highway 95 who will have relatively unimpeded views of the Project due to the flatness of the terrain. However, with the exception of the receiver tower, the ground improvements would be virtually imperceptible from Highway 95, as is the case with CDSEP.

Nighttime lighting will be dark sky compliant; LED lighting and proper shielding will significantly reduce any potential nighttime visual impact. The towers will have FAA-compliant lighting similar to CDSEP.

Additionally, the Project is located near a transmission line corridor that runs through the southern portion of the area. While there may be a need for additional poles and conductors, the overall visual characteristics of the transmission line will be unchanged.

If constructed, the character of the visual environment will change from one of relatively undeveloped desert (with the exception of CDSEP) to industrial power generation. Although the Project poses a potential for visual impacts, such as the receiver towers, current visual quality is low due to lack of distinctive visual features. Overall visual change is predicted to be moderate.

c) SURFACE AND GROUNDWATER QUALITY AND QUANTITY:

Based on the current conceptual design, it is anticipated that the steam turbine generator's condenser will be cooled by a dry cooling system, and will not use evaporative cooling. Water requirements for the Project using an air-cooled condenser are expected to be about 200 acre-feet per year, per plant. This equates to a total consumption of approximately 1,600 acre-feet per year by Sandstone Plants 1-8.

This Project will require water for cooling water make-up, make-up of condensate due to normal relief valve losses and minor spills, and water to wash the heliostats. Heliostat wash water requires the largest water usage. (Heliostat washing is a continuous process that is expected to occur every day to maintain the mirror's reflectivity.)

SSE anticipates being able to draw water required for the Project from subterranean wells, as was done for CDSEP. Based on preliminary information, groundwater and associated water rights are available nearby and the Project anticipates no impact to water quality or quantity.

d) CONTROL OR STRUCTURAL CHANGE ON ANY STREAM OR OTHER BODY OF WATER:

The Project would not cause control or structural changes on any stream or other body of water.

e) EXISTING NOISE LEVELS:

The facility is comprised of eight contiguous plants, whereas each configuration utilizes a single receiver tower surrounded by a field of heliostats in a roughly 2,000-acre footprint, similar to CDSEP. Although some noise will be generated by pumps and motors associated with the molten salt loop, this arrangement minimizes noise impacts as the primary source of noise is generated by the steam turbine power generation facilities located in the center of the Project site, approximately one mile from the nearest Project boundary. In addition, because no sensitive noise receptors have been identified within the immediate Project vicinity, no impacts associated with noise are anticipated.

f) SURFACE OF THE LAND (INCLUDING VEGETATION, PERMAFROST, SOIL AND SOIL STABILITY)

Preliminary site screening indicates no sensitive species in the immediate vicinity of the Project. Loss of approximately 20,000 acres of habitat that is likely to support various species may potentially occur as a result of this Project. To minimize impacts to habitat, presence/absence and exclusion surveys for sensitive and endangered species are envisioned prior to implementation of the Project. Mitigation for loss of habitat may also be required and can include purchase of mitigation lands as well as a population monitoring program for habitats of concern.

Permafrost is not present within the proposed Project area. Vegetation will be permanently impacted during construction and operation of the facility; the applicant will work with BLM staff to develop a post-construction re-vegetation plan or other appropriate mitigation efforts to minimize the long-term disturbance of vegetation and wildlife habitat.

Based on environmental and engineering considerations, the solar fields will be situated on approximately 16,000 acres within the approximate 20,000 acres identified for Sandstone Plants 1-8. Ground disturbance associated with the initial installation of the Project includes activities such as clearing, grading, and grubbing associated with site preparation; construction of foundations associated with the power tower, heliostat field, and ancillary structures; installation of any underground utilities; and creation of access roads.

18. Describe the probable effects that the proposed project will have on (a) populations of fish, plantlife, wildlife, and marine life, including threatened and endangered species; and (b) marine mammals, including hunting, capturing, collecting, or killing these animals.**a) POPULATIONS OF FISH, PLANTLIFE, WILDLIFE, AND MARINE LIFE, INCLUDING THREATENED AND ENDANGERED SPECIES:**

Because the project site is not located near a body of water, no adverse effects are anticipated on populations of fish, aquatic plantlife, or marine life.

The Project has the potential to impact migratory birds and raptors. A study of the existing bird populations and migratory routes will be completed before Project construction is initiated. The applicant will work with BLM staff and other stakeholders to develop mitigation for the perceived risk to migratory birds, similar to the approach currently being implemented at CDSEP.

b) MARINE MAMMALS, INCLUDING HUNTING, CAPTURING, COLLECTING, OR KILLING THESE ANIMALS:

No adverse effects on marine mammals are anticipated as a result of this Project. The Project is located more than 200 miles from the coast.

19. State whether any hazardous material, as defined in this paragraph, will be used, produced, transported or stored on or within the right-of-way or any of the right-of-way facilities, or used in the construction, operation, maintenance or termination of the right-of-way or any of its facilities.

Hazardous materials will be used during Project construction. The Project anticipates the use of various hazardous materials, including but not limited to gasoline, diesel fuel, motor oil, hydraulic fluid, solvents, cleansers, sealants, welding flux, various lubricants, paint, and paint thinner.

Once construction is complete, the Project will have minimal hazardous and non-hazardous waste located onsite. The molten salt is a combination of Sodium Nitrate (NaNO₃) and Potassium Nitrate (KNO₃) in a ratio of 60 percent NaNO₃ to 40 percent KNO₃. In their solid form, these two salts are traditionally used as elements in fertilizer. Because the salts are only used as a thermal working fluid and are not consumed, they are used continuously for the life of the plant without the need for re-processing. Occasional spills of small quantities of salt from a leaking gasket quickly freeze will be picked up by plant staff and placed into a waste receptacle. Depending upon the rules of the local jurisdiction, this salt can be reused/recycled or disposed of in a landfill.

In addition to small quantities of salt which may leak, the plant directs all flows to an oily waste separator, which is common to many steam power plants. The waste is then removed by vacuum truck to a qualified facility. This fluid may contain lubricants and oils common to the power block. The quantity of this waste should be no different than for a similar steam plant of comparable size.

20. Name all the Department(s)/Agency(ies) where this application is being filed.

Bureau of Land Management, Tonopah Field Station (Tonopah, Nevada).

Estimated Schedule

It is anticipated that construction of Sandstone Plants 1-8 will involve building each of the eight plants in sequence, that construction of each plant will take 24 months, and that the start of each plant's construction will be staggered by six months. Thus the entire construction process for eight plants could occur over a five-and-a-half year period. However, in practice, construction schedules are likely to reflect the timing of financing, which is likely to be influenced by external events such as power contract RFP schedules, so the Project may ultimately be constructed along a less uniform timeline. It is projected that the Project may begin construction as early as 2020, although timing will be sensitive to the permit approval processes as well as to commercial activities.

Operations are likely to be ongoing for a 30-year period. Typical power contracts for renewable facilities are for 20 to 30 years. It is possible that operations will be extended beyond the initial period of the power contract due to new or extended contracts, or that a plant will operate in a spot market for energy without a contract. Nevertheless, the facility will have a 30-year design life. At the end of its useful life, the project will be terminated.

Maintenance will be an ongoing process, with daily Operations and Maintenance (O&M) activities taking place on-site. Major maintenance will be scheduled for multi-day periods every three years, and will likely result in one to three weeks of service.

Planned construction and reclamation techniques are similar to those employed at CDSEP due to the similarity of the technology and the location.