1.1 INTRODUCTION

Stirling Energy Systems, Inc. (SES) is seeking approval to construct and operate the proposed SES Solar One (Solar One or Project) and its ancillary facilities. The main objective of this concentrating solar power Project is to provide clean, renewable, solar-powered electricity to Southern California Edison (SCE). The electricity from the Project will assist SCE and the state of California meet the mandates of the California Renewables Portfolio Standard (RPS) Program and the California Global Warming Solutions Act.

California law requires each utility in the state to purchase at least 20 percent of its electricity from renewable resources by 2010. Through a competitive process, Southern California Edison (SCE) selected Solar One to help meet its renewable power obligations. SCE and SES entered into a 20-year Power Purchase Agreement (PPA) for 500 megawatts (MW) with options to expand up to 850MW of concentrating solar power. This power will be delivered into the SCE system at the SCE Pisgah Substation. The California Public Utilities Commission approved the PPA on October 24, 2005.

SES intends to develop an electric generating facility with a nominal capacity of 850MW using concentrating solar power. The Project will be constructed on an approximate 8,230-acre site located in San Bernardino County, California (see Figure 1-1 and Figure 1-2). The Project Site is approximately 37 miles east of Barstow, 17 miles east of Newberry Springs, 57 miles northeast of Victorville, and approximately 115 miles east of Los Angeles (straight line distances). The Project will be an important deployment of large-scale solar technology in a commercial energy setting. It will generate power using solar power generation equipment produced by an optimized, high-volume manufacturing design and infrastructure. Most of the power from the Project will be generated at peak times, when the demand for electricity is greatest.

The Applicant of SES Solar One (SES Solar Three, LLC and SES Solar Six, LLC[1]) is a private enterprise that is a wholly owned subsidiary of SES. In mid-2008, NTR plc (NTR) obtained a controlling stake in the company. NTR is an international developer and operator of renewable energy and sustainable waste management businesses in the United States, the United Kingdom, Ireland, and Continental Europe. The unique combination of the Applicant's technical expertise and NTR's track record in developing large-scale renewable energy and infrastructure projects provides a strong platform from which to realize the Project. This partnership will allow SES to develop additional solar projects in other states and countries.

[1] In the early part of 2007 Stirling Energy Systems, Inc. (SES) submitted to the Bureau of Land Management (BLM) various Standard Form 299 (SF-299), Application for Transportation and Utility Systems and Facilities on Federal Land pursuant to 43 CFR 2804.12 for several large scale concentrating solar projects within the Bartsow Field Office of the BLM. Two of these applications were for SES Solar Three, LLC and SES Solar Six, LLC. The eastern portion of the Solar Six Project Area, which included the Pisgah Area of Critical Environmental Concern, was subsequently withdrawn from further consideration. However, reduction of this land area prevented development of an 850 megawatt (MW) solar field and additional land (from Solar Three, LLC) was required. The remaining portion of Solar Six, LLC and all of Solar Three, LLC were combined to acquire enough land area to develop an 850MW concentrating solar field. For the purposes of this filing, Solar Three, LLC and Solar Six, LLC are to be considered the Applicant for reasons previously stated. However, the name of the proposed project is the Solar One Project.

1.2 APPROVAL PROCESS

This Application for Certification (AFC) has been prepared according to the current California Energy Commission (CEC) power plant siting regulations including requirements of the California Environmental Quality Act (CEQA). Because the majority of the Project is located on public land administered by the Bureau of Land Management (BLM) California Desert District (CDD) and federal approval of the Project is required, this document is also being submitted to the BLM for review. Consequently, the AFC also contains information required by the BLM to make their decision in compliance with the National Environmental Policy Act of 1969 (NEPA).

This AFC contains:

- a discussion of the purpose and need for the Project,
- a detailed description of the Project,
- an assessment of the anticipated Project effects on the existing environment,
- a discussion of the Project's compliance with applicable laws, ordinances, regulations, and standards (LORS), and
- a discussion of Project alternatives including alternative sites and their associated environmental concerns.

This AFC was prepared based on the Memorandum of Understanding (MOU) developed between the CEC and the BLM (see Appendix A, Memorandum of Understanding). The MOU sets out the relative roles, responsibilities, and procedures CEC and BLM staff will follow when conducting their respective environmental reviews of the Project. The Applicant will conduct the construction and operation of the Project in accordance with all applicable LORS.

1.3 PROJECT DESCRIPTION

The Project will utilize the SunCatcher technology, a proprietary solar dish Stirling system developed by SES. This technology is innovative, technically proven, non-polluting, and cost-effective in large utility-scale deployment. Each SunCatcher consists of an approximate 38-foot high by 40-foot wide solar concentrator dish that supports an array of curved glass mirror facets (see Photographs 1-1, Suncatcher System, and 1-2, Power Conversion Unit). The mirrors collect and focus solar energy onto the heat exchanger of a Power Conversion Unit (PCU). The PCU converts the solar thermal energy into 25 kilowatts of electricity. Each SunCatcher operates independently, tracks the sun automatically, and generates grid-quality electricity. The SunCatcher holds one of the world's records for its efficiency (31.25 percent) in commercial conversion of sunlight into grid-quality electricity. SES has been developing and operating the technology since 1996, most recently at the National Solar Thermal Test Facility, located at Sandia National Laboratories in Albuquerque, New Mexico. (See Appendix B, Solar Stirling Engine, for more information on the SunCatcher's Stirling Engine.)

Construction of the Project is expected to begin in mid to late 2010 and will take approximately four years for completion of the full 850 megawatts. However, renewable power from the Project will come online much earlier. As groups of SunCatchers are constructed, their renewable power will immediately be supplied to the grid. After completion, the Project will operate approximately 3,500 hours per year and is expected to have an overall availability of approximately 99 percent.

The Applicant intends to develop the nominal 850MW project in two phases. The 500MW Phase I of the Project will consist of approximately 20,000 SunCatcher dishes located on approximately 5,838 acres. The 350MW Phase II of the Project will consist of approximately 14,000 SunCatcher dishes located on approximately 2,392 acres. All of the power will be transmitted to the SCE Pisgah Substation located near the southeastern corner of the site.

In order for the full 850MW project to be completed, SCE will have to expand the SCE Pisgah Substation to accommodate a 500kV switchyard, two initial 500/230kV transformers (ultimate design for four) and other ancillary facilities and to provide additional transmission capacity to the SCE Pisgah Substation. The additional transmission capacity is to be provided by removing and replacing the existing 65-mile Lugo-Pisgah 220kV No. 2 Transmission Line with a new 500 kV transmission line and looping the existing Eldorado-Lugo 500kV in and out of the new Pisgah 500kV Switchyard. New right-of-way into the Lugo Substation will be required west of the Mojave River because the existing right-of-way is constrained on both sides (home development) and insufficient room exists to support both the new Lugo-Pisgah 500kV transmission line and the remaining Lugo-Pisgah 220kV No. 1 Transmission Line.

Optional studies performed by SCE and California Independent System Operator (CAISO) indicate that some initial electrical generation (up to approximately 275MW) can be handled by the remaining Lugo-Pisgah No.1 220kV transmission line while the upgrades are being completed provided that the Pisgah Substation is expanded and that redundant telecommunication is provided to support a Special Protection System (SPS). According to SCE, construction of these upgrades may not be fully completed until 2015 based on longer than expected permitting timelines. Consequently, the two phases of the Project will allow a portion of power to be generated and transmitted during the interim period assuming permits for the Pisgah Substation expansion and required telecommunication facilities (combination of microwave, fiber-optic cable, and possible replacement of overhead ground wire on existing facilities) are provided as there is no physical space at the existing substation to connect the new Solar One generation tie-line and reliability problems exist that need to be mitigated by tripping the Project with an SPS.

A number of large scale renewable power producers are pursuing projects within the region and the associated upgrades to the existing SCE Pisgah Substation and transmission lines will benefit these projects. Completion of detailed environmental analysis in a timely manner is of critical concern to meet not only Solar One's development schedule, but also for SCE to meet its mandated RPS goals. Therefore SES has begun environmental analysis of potentially required investigations and has included the completed analysis within this AFC. See Appendix EE, Summary Environmental Report for the Proposed Lugo-Pisgah 500kV Transmission and Substation Upgrades.

Temporary access for construction of the Project will be provided from an existing road that comes off Interstate 40 (I-40) east of the SCE Pisgah Substation. The road transects a BLM Area of Critical Environmental Concern (ACEC) and will require some level of improvement. Long-term permanent access would be developed in the form of a bridge via the Hector Road interchange north of I-40 spanning the Burlington Northern Santa Fe (BNSF) railway. Equipment may be transported to the Project Site during construction by road and by rail (on the north side of the BNSF railway and east of Hector Road).

Water would be provided via a groundwater well proposed on a portion of the BLM Rights-of-Way (ROW) located north of the Main Services Complex and transported through an underground pipeline. The expected average water consumption for the Proposed Project during construction is approximately 50 acre-feet per year during the approximately four-year construction period. Under normal operation (inclusive of mirror cleaning, dust control, and potable water usage), water required will be approximately 36.2 acre-feet per year. Table 1-1, Estimates of Typical Water Use per Megawatt Produced, compares water use per megawatt of power produced for Solar One relative to other types of power producers.

Table 1-1

Estimates of Typical Water Use per Megawatt Produced

Project	afy/MW
SES Solar One (36.2afy: 850MW)[a]	0.04afy/MW
Carrizo Energy Solar Farm (21.8afy: 177MW) [b]	0.12afy/MW
Ivanpah Solar Electric Generating System (100afy:400MW)[c]	0.25afy/MW
Victorville 2 Solar Hybrid (3,500afy:570MW)[d]	6.14afy/MW
Niland Power Plant (21afy:93MW)[e]	0.23afy/MW
Desert Rock Energy Coal-fired Power Plant (4,500afy:1500MW)[f]	3.00afy/MW

Sources:

[a]Stirling Energy Systems, Inc., 2008.

[b]California Energy Commission. Carrizo Energy Solar Farm.

[c]California Energy Commission. Ivanpah Solar Electric Generating System

[d]California Energy Commission. Victorville 2 Solar Hybrid Power Project.

[e]California Energy Commission. Niland Power Plant.

[f]Desert Rock Energy Project. www.desertrockenergy.com

Notes:

ayf = Acre-feet per year

MW = megawatt

1.4 ALTERNATIVES

The Applicant evaluated a range of potential alternatives to the Proposed Project. The site selection for the Project was based on a detailed evaluation of the key criteria required for a large-scale, concentrating solar power project of its type. Input was obtained on alternative locations through discussions with the CEC, the CAISO, and the BLM. The key criteria as discussed in Section Four – Alternatives are:

- **Solarity:** The site needed to be located in an area with long hours of sunlight (low cloudiness). Ideally, insolation levels (the rate of delivery of direct solar radiation per unit of horizontal surface) would be at least 7 kilowatt-hours per square meter per day. Solar intensity was the most important screening criteria from a perspective of selecting general regions in California for development of the Project.
- **Topography:** The site needed to be relatively flat (site grade up to 5 percent). Topography, combined with wind speed, represents the second most critical site selection criteria for a project of this nature.
- **Wind Speed:** Less than 2 percent of the time, a wind speed of more than 35 miles per hour should not be exceeded.
- **Land Area:** Sufficient land area to accommodate a minimum number of acres of solar generation.
- **Site Control:** The land needed to be available for sale or use (e.g., lease or use of an ROW). If private land, the landowner must be willing to negotiate a long-term option agreement so that site control does not require a large capital investment until the license is obtained.
- **Proximity to Infrastructure:** The site needed to be located in close proximity to high-voltage CAISO transmission lines with adequate capacity. Ideally, the site should be located within 10 miles of existing transmission lines and should have an adequate water supply.
- **Accessibility:** A site with ease of access (e.g., close proximity to access roads and railways) is preferred.
- **Environmental Sensitivity:** The site had to be located outside of environmentally excluded areas (such as state and national parks, areas of critical environmental concern) should have few or no environmentally sensitive resources (particularly biological and cultural resources) and should allow development with minimal environmental impacts.
- **Jurisdictional Issues:** The Project should be consistent with existing LORS.
- **Land Cost:** The site should be located on property currently available at a reasonable cost.

The Applicant has had several meetings with the CEC and the BLM and has performed substantial analysis to identify appropriate site locations. The criteria described above were used to evaluate the suitability of alternative sites for solar power development. Section Four provides a detailed discussion of alternatives considered and subsequently eliminated from detailed study as well as a discussion of alternatives carried forward for further evaluation. This section additionally examines engineering, technological, site, and water alternatives.

1.5 TYPICAL AREAS OF ENVIRONMENTAL INTEREST

The development of the Project may have potential indirect, direct, long-, and short-term adverse and beneficial impacts on environmental, cultural, and human resources as well as cumulative impacts. Some of the beneficial effects would include:

- the production of renewable power,
- greatly reduced greenhouse gas emissions when compared to fossil fuel generators of similar size,
- minimal air emissions,
- minimal use of water, toxic, and hazardous materials,
- creation of new jobs, and
- continued improvement on engineering design to increase efficiencies of solar technologies.

The Project also helps meet local and state targets and requirements for renewable energy and state goals for reduced greenhouse gas emissions. The Applicant acknowledges that the development of a large-scale solar power project has the potential for negative effects because of land requirements. The Applicant will develop the Project so as to avoid, minimize, and/or mitigate potential effects, where feasible. The following discussion summarizes the key areas that were evaluated as part of this AFC.

1.5.1 Air Quality

Overall, the Project will have minor air emissions of regulated air pollutants and greenhouse gases; however, this is a significant improvement relative to the air emissions associated with fossil fuel power generation. During the construction and operation of the Project, air quality will have the potential to be impacted as a result of construction and vehicular activity. However, these air emission effects will be temporary and will be controlled by applying appropriate mitigation measures (e.g., soil stabilizers and water for dust control).

1.5.2 Biological Resources

The biological resources evaluation of the Project involved conducting extensive field and habitat surveys to characterize special-status plants and wildlife. The Project is within a low-elevation desert area consisting primarily of Mojave Desert creosote bush scrub vegetation. The area has several disturbances in the forms of roadways, railroad, and transmission lines, and in some cases the same area has been disturbed several times. The Applicant intends to use proposed mitigation measures to ensure that potential effects to sensitive species and wildlife will be considered negligible.

Given the design of the SunCatcher systems, which will stand on individual pedestals, some vegetation will need to be trimmed and removed during construction for access roads and SunCatcher foundations, though much of the vegetation will be left intact. After construction is completed, some of the cleared areas will be allowed to revegetate so that the long-term effect of the construction will be reduced.

1.5.3 Cultural Resources

Past and present actions within the region have already resulted in effects to cultural resources. These actions have included highway/roadway construction, utility rights-of-way, and off-highway vehicle use. The development of the Project has the potential to result in direct effects to previously undisturbed cultural resources because of earth-moving activity. These potential effects will be minimized through the use of properly designed and implemented mitigation programs.

1.5.4 Land Use

Land use within the area of the Project Site is dominated by open space/public land administered by the BLM and to a lesser extent by recreational, military (regionally at Twenty-Nine Palms), and adjacent designated areas (Pisgah ACEC and Cady Mountain Wilderness Study Area (WSA). A direct potential beneficial effect on these designated land uses (e.g., Cady Mountain WSA) would include restricted access to these areas provided by the Project functioning as a barrier to unauthorized off-road activities. Past and present activities, including off-highway vehicle use, infrastructure development (roads and utilities), and designated land uses, have resulted in changes to land use patterns. As part of this process, the BLM will require the approval of a land use amendment on the California Desert Conservation Area Resource Management Plan (RMP), the issuance of a grant for right-of-way, and a Record of Decision for the Environmental Impact Statement (EIS) associated with this project.

1.5.5 Socioeconomics

The socioeconomic environment within the study area is dominated by small urban centers (e.g., Barstow, Newberry Springs, Victorville), military, and recreational activities. It is expected that a large portion of the construction and operation workforces will come from the vicinity of the Project, with the remainder coming from neighboring areas and states. It is anticipated that the Project will be operated by approximately 180 full-time employees when fully operational. However, during construction, up to approximately 700 construction and building trades personnel will work on-site. The permanent employees associated with the operation of the Project are expected to have a significant beneficial effect on the local economy because of the new jobs created and because of the potential increase in tax revenues resulting from the economic activities of the Project's employees.

1.5.6 Visual Resources

Visual resources in the area of the Project have been affected by past and present actions, including highway/roadway construction, railroad, and utility rights-of-way. The viewshed of the area has been modified with the presence of existing transmission lines, I-40, a railroad, and access roads.

The Project would be clearly visible from I-40 and would have some level of impact on travelers passing through the area. Changes to scenic quality may occur. These changes and effects will be perceived differently by different people. To some people, the Project may detract from the desert environment, but to others the Project may be a point of positive visual interest. As one of the first large-scale projects of its kind in California, the Project has the potential to become a tourist attraction (similar to Palm Springs wind generators along Interstate-10), drawing visitors

from the energy industry, the environmental community, schools, research facilities, and government/political figures who seek direct personal experience of progressive renewable energy solutions. At this particular location given the number of travelers along I-40, some may view this Project as a distinct statement, made by our society, which continues to address issues associated with climate change.

1.6 SUMMARY

The Project will provide the state of California with large-scale, renewable, solar-generated electricity that is generated with minimal air and greenhouse gas emissions. The Project will help both the state of California and SCE meet current and future requirements of the RPS Program as well as AB32 (The Global Warming Solutions Act of 2006) related to greenhouse gas emission reduction goals. This state law requires that the percentage of electricity from renewables will increase from 11 percent to 20 percent by 2010, with the overall goal of 33 percent renewables by 2020 (Executive Order S-14-08). The Applicant acknowledges that the development of large-scale renewable energy project has the potential for both positive and negative effects. As is demonstrated in this AFC, the Applicant has endeavored to avoid unnecessary environmental impact and/or minimize any potential negative effects through the employment of mitigation measures, best management practices, and adaptive management strategies wherever possible.

Figure 1-1: Regional Area

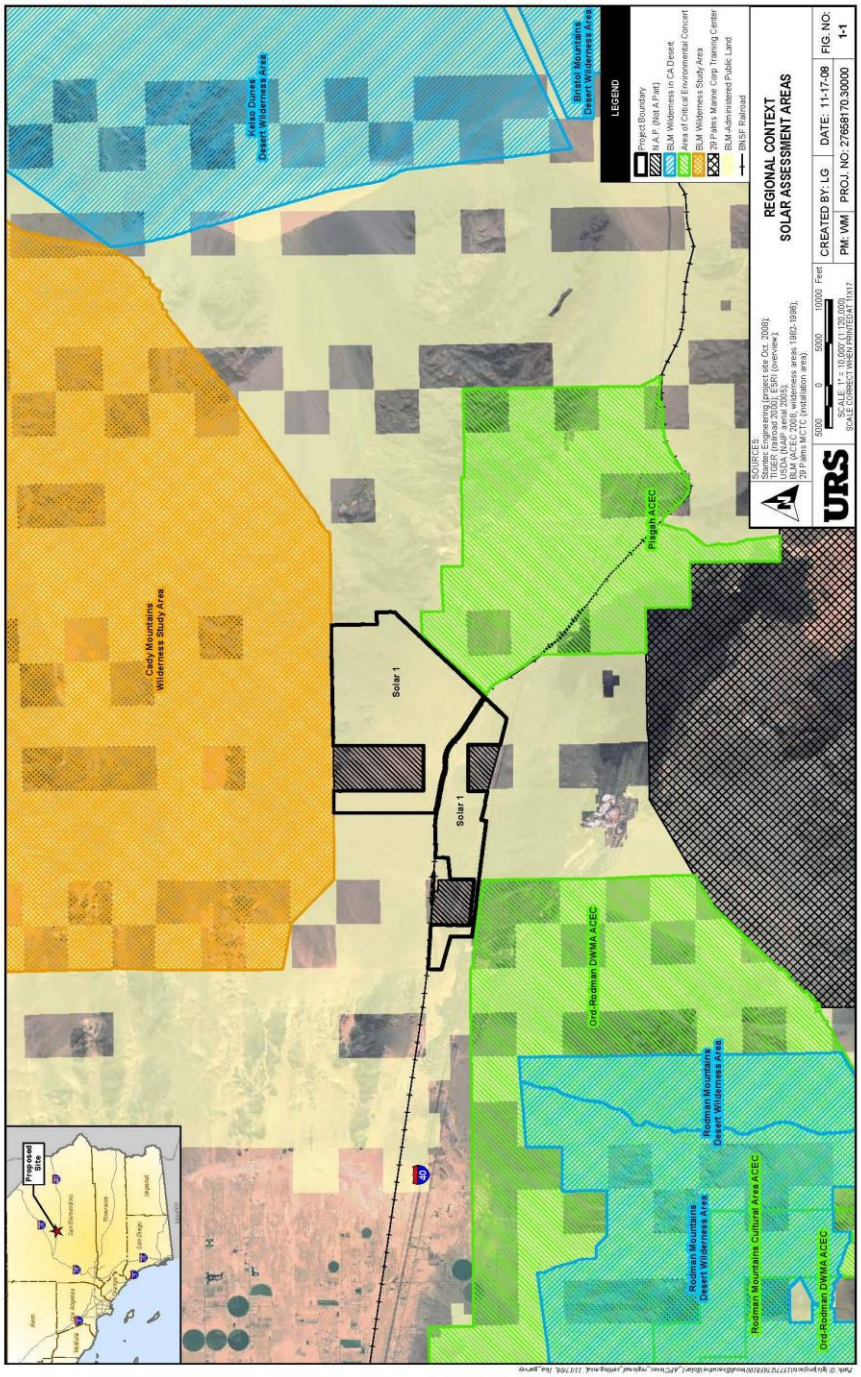
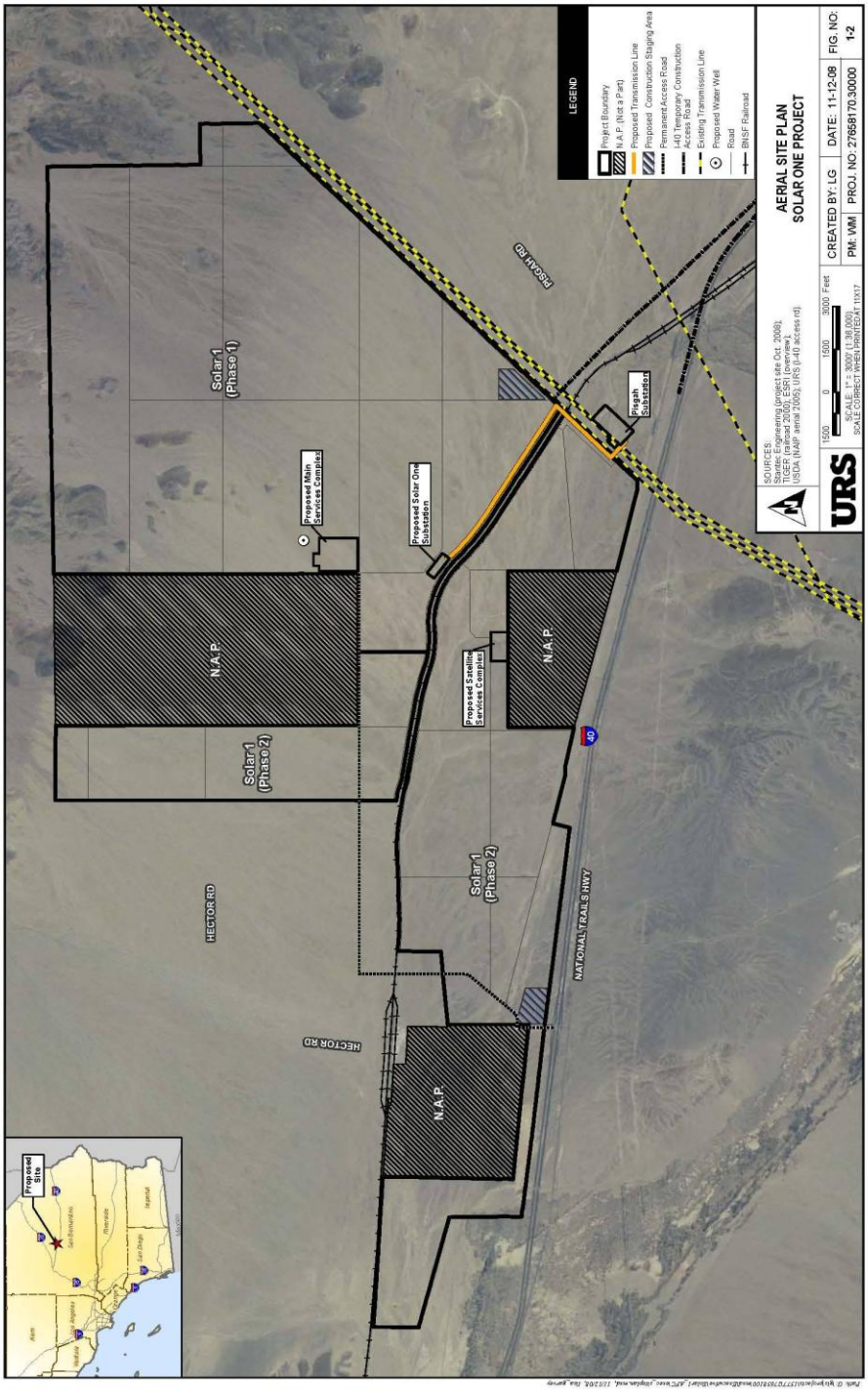
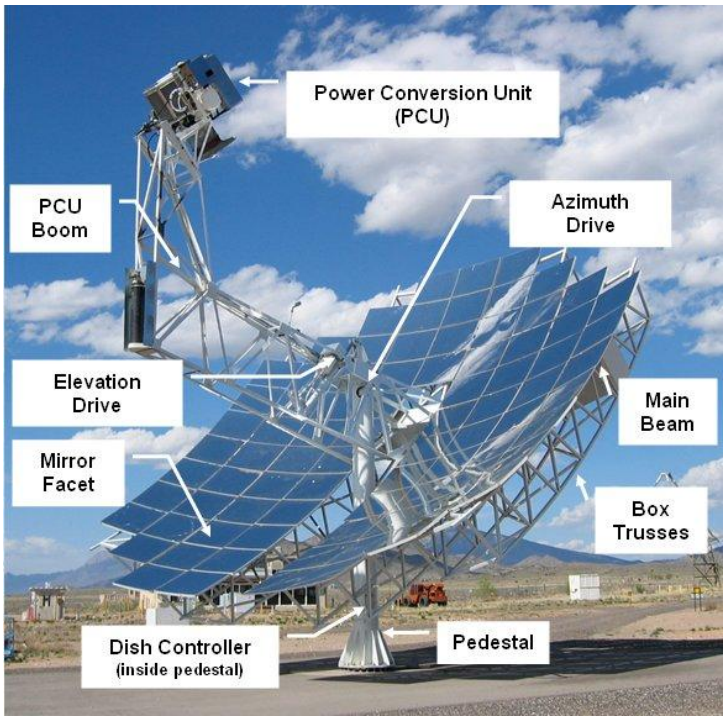


Figure 1-2: Site Plan



Photograph 1-1: SunCatcher System



Photograph 1-2: Power Conversion Unit (i.e., Stirling Engine)