

PMC-ND

(1.08.09.13)

**U.S. DEPARTMENT OF ENERGY
OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY
NEPA DETERMINATION**

**RECIPIENT:** Silicon Ranch Corporation**STATE:** TN

PROJECT TITLE: Integrated PV System Design and Management Platform for the Co-Optimization of Regenerative Cattle Grazing and PV Solar Generation

Funding Opportunity Announcement Number	Procurement Instrument Number	NEPA Control Number	CID Number
DE-FOA-0002243	DE-EE0009373	GFO-0009373-001	

Based on my review of the information concerning the proposed action, as NEPA Compliance Officer (authorized under DOE Policy 451.1), I have made the following determination:

CX, EA, EIS APPENDIX AND NUMBER:

Description:

- A9 Information gathering, analysis, and dissemination** Information gathering (including, but not limited to, literature surveys, inventories, site visits, and audits), data analysis (including, but not limited to, computer modeling), document preparation (including, but not limited to, conceptual design, feasibility studies, and analytical energy supply and demand studies), and information dissemination (including, but not limited to, document publication and distribution, and classroom training and informational programs), but not including site characterization or environmental monitoring. (See also B3.1 of appendix B to this subpart.)
- A11 Technical advice and assistance to organizations** Technical advice and planning assistance to international, national, state, and local organizations.
- B3.1 Site characterization and environmental monitoring** Site characterization and environmental monitoring (including, but not limited to, siting, construction, modification, operation, and dismantlement and removal or otherwise proper closure (such as of a well) of characterization and monitoring devices, and siting, construction, and associated operation of a small-scale laboratory building or renovation of a room in an existing building for sample analysis). Such activities would be designed in conformance with applicable requirements and use best management practices to limit the potential effects of any resultant ground disturbance. Covered activities include, but are not limited to, site characterization and environmental monitoring under CERCLA and RCRA. (This class of actions excludes activities in aquatic environments. See B3.16 of this appendix for such activities.) Specific activities include, but are not limited to: (a) Geological, geophysical (such as gravity, magnetic, electrical, seismic, radar, and temperature gradient), geochemical, and engineering surveys and mapping, and the establishment of survey marks. Seismic techniques would not include large-scale reflection or refraction testing; (b) Installation and operation of field instruments (such as stream-gauging stations or flow-measuring devices, telemetry systems, geochemical monitoring tools, and geophysical exploration tools); (c) Drilling of wells for sampling or monitoring of groundwater or the vadose (unsaturated) zone, well logging, and installation of water-level recording devices in wells; (d) Aquifer and underground reservoir response testing; (e) Installation and operation of ambient air monitoring equipment; (f) Sampling and characterization of water, soil, rock, or contaminants (such as drilling using truck- or mobile-scale equipment, and modification, use, and plugging of boreholes); (g) Sampling and characterization of water effluents, air emissions, or solid waste streams; (h) Installation and operation of meteorological towers and associated activities (such as assessment of potential wind energy resources); (i) Sampling of flora or fauna; and (j) Archeological, historic, and cultural resource identification in compliance with 36 CFR part 800 and 43 CFR part 7.
- B3.6 Small-scale research and development, laboratory operations, and pilot projects** Siting, construction, modification, operation, and decommissioning of facilities for smallscale research and development projects; conventional laboratory operations (such as preparation of chemical standards and sample analysis); and small-scale pilot projects (generally less than 2 years) frequently conducted to verify a concept before demonstration actions, provided that construction or modification would be within or contiguous to a previously disturbed or developed area (where active utilities and currently used roads are readily accessible). Not included in this category are demonstration actions, meaning actions that are undertaken at a scale to show whether a technology would be viable on a larger scale and suitable for commercial deployment.
- B3.8 Outdoor terrestrial** Outdoor terrestrial ecological and environmental research in a small area (generally less than 5 acres), including, but not limited to, siting, construction, and operation of a smallscale laboratory building or

ecological and environmental research renovation of a room in an existing building for associated analysis. Such activities would be designed in conformance with applicable requirements and use best management practices to limit the potential effects of any resultant ground disturbance.

Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide federal funding to Silicon Ranch Corporation to expand and accelerate the development of dual-use solar energy projects that combine energy generation and agricultural production. The project would develop commercial and demonstration-scale energy and financial models for a CattleTracker, an optimized system to co-locate photovoltaic (PV) energy production and regeneratively-grazed cattle. Ultimately, the recipient would field test the integration of cattle grazing alongside an operating solar array and develop associated ecosystem service measurements and methods. The project would be completed over three Budget Periods (BPs) with a Go/No-Go decision point between each BP. The field test site for BP 3 (Tasks 14-18) is yet to be determined, therefore this NEPA review applies only to BP 1 and BP 2 (Tasks 1-13). BP 3 will be subject to further NEPA review when the test site had been identified and sufficient information is available to complete a meaningful review.

Proposed project activities would include computer modeling, soil and plant sampling, installation of ecosystem monitoring equipment, stakeholder engagement, and field testing of cattle grazing integration and associated ecosystem service measurements and methods. Silicon Ranch Corporation would oversee the project. Silicon Ranch corporate offices would be used for program management, technical and financial analysis, carbon protocol development, stakeholder engagement, and workshops. Ecosystem data collection instrumentation and field sampling would take place at Silicon Ranch's Bancroft Station in Blakely, GA to help validate computer models. Sub-recipients would be White Oak Pastures, National Renewable Energy Laboratory (NREL), and Colorado State University. At White Oak Pastures in Bluffton, GA, livestock-PV interactions would be evaluated using a mock-up temporary structure that resembles a row of PV modules in a solar plant. NREL would conduct project management, financial modeling, and publication scoping. Colorado State University would perform ecosystem service experimental design and analysis of experiment results, ecosystem biogeochemical model development and various refinement tasks, and carbon protocol development support.

The mobile, non-generating mock-up PV system would be installed and tested in White Oak's pasture setting and introduced to cattle in a controlled yet similar environment to that of the outdoor test lab. The mock-up PV system would be used to measure animal behavior and to evaluate various configurations to inform the ultimate design of the outdoor test lab, including optimal pile height and tracking angles to allow for safe and effective cattle grazing under PV modules while meeting energy generation targets. Ecological impacts would be observed over approximately eight grazing events, during which various multi-species land management strategies would take place, including sheep grazing, sheep grazing with pastured poultry production, and conventional mowing. Grazing events would occur four to six weeks apart to allow for vegetation recovery.

Ecosystem measurement instruments would be installed and tested for functionality and accuracy under various configurations at the outdoor test lab at Silicon Ranch Bancroft Station (104 MWac operating solar power plant). Soil and biomass sampling would assess baseline ecosystem measurements. Data collected would relate to plant biomass and soil properties such as density, texture, pH, and aggregation as well as how the PV installation affects fluxes of carbon dioxide, soil heat flux, soil moisture and temperature, and net radiation. Above-ground plant biomass samples would be taken to record changes in primary productivity due to the shading and altered microclimate under the modules.

Additional activities during this portion of the project would focus on the development of an ecosystem biogeochemical model to estimate carbon, nitrogen, and water dynamics of utility scale solar energy projects; a carbon credit protocol for use in existing carbon registries; the CattleTracker system energy and financial model; and on-site training workshops.

All required permits and agreements (including power purchase agreements, lease agreements, and service agreements) would be obtained prior to initiating related activities.

The U.S. Department of Agriculture Natural Resource Conservation Services Web Soil Survey database shows that both Silicon Ranch and White Oak sites contain prime farmland. As there will be no change to the use of land at these sites, DOE has determined the proposed project will have no effect on prime farmland.

The U.S. Fish and Wildlife Service's Information for Planning and Consultation database (iPaC) shows two reptiles (Eastern Indigo Snake, Gopher Tortoise), an amphibian (Reticulated Flatwoods Salamander), and four flowering

plants (Georgia Rockcress, Pondberry, American Chaffseed, Relict Trillium) as endangered or threatened species that have the potential to be in or around the project areas. There are also five migratory birds listed (American Kestrel, Bald Eagle, Common Ground-dove, Dunlin, Red-headed Woodpecker). Because Bancroft Station is an operating solar power plant and White Oak Pastures is an actively used livestock pasture, it is unlikely that any of the species of concern would be present in the project areas. Additionally, the proposed project sites are outside of critical habitat of all listed species. Accordingly, DOE has determined the proposed project would have no effect on federally threatened or endangered species. Further, DOE does not anticipate adverse impacts to migratory bird species.

Project activities would involve the grazing management of cattle, soil sampling, and other ecosystem measurement techniques within an operating solar power plant. Cattle management and mechanical and electrical management of the solar plant would take place by trained and qualified staff. Any risks associated with these activities would be mitigated through adherence to established health and safety policies and procedures. Protocols would include employee training, the use of personal protective equipment, monitoring, engineering controls, and internal assessments. All waste products would be disposed of by licensed waste management service providers. Silicon Ranch and its project partners would observe all applicable Federal, state, and local health, safety, and environmental regulations.

DOE does not anticipate adverse impacts to any resources of concern as a result of BP1 and BP2 activities. BP3 will be subject to additional NEPA review by DOE prior to authorizing the expenditure of funds for those activities.

Any work proposed to be conducted at a federal facility may be subject to additional NEPA review by the cognizant federal official and must meet the applicable health and safety requirements of the facility.

NEPA PROVISION

DOE has made a conditional NEPA determination.

The NEPA Determination applies to the following Topic Areas, Budget Periods, and/or tasks:

[Budget Period 1 - all tasks](#)

[Budget Period 2 - all tasks](#)

The NEPA Determination does not apply to the following Topic Area, Budget Periods, and/or tasks:

[Budget Period 3 - all tasks](#)

Notes:

[Solar Energy Technologies Office](#)

[This NEPA determination requires a tailored NEPA provision.](#)

[Review completed by Shaina Aguilar on 8/12/21.](#)

FOR CATEGORICAL EXCLUSION DETERMINATIONS

The proposed action (or the part of the proposal defined in the Rationale above) fits within a class of actions that is listed in Appendix A or B to 10 CFR Part 1021, Subpart D. To fit within the classes of actions listed in 10 CFR Part 1021, Subpart D, Appendix B, a proposal must be one that would not: (1) threaten a violation of applicable statutory, regulatory, or permit requirements for environment, safety, and health, or similar requirements of DOE or Executive Orders; (2) require siting and construction or major expansion of waste storage, disposal, recovery, or treatment facilities (including incinerators), but the proposal may include categorically excluded waste storage, disposal, recovery, or treatment actions or facilities; (3) disturb hazardous substances, pollutants, contaminants, or CERCLA-excluded petroleum and natural gas products that preexist in the environment such that there would be uncontrolled or unpermitted releases; (4) have the potential to cause significant impacts on environmentally sensitive resources, including, but not limited to, those listed in paragraph B(4) of 10 CFR Part 1021, Subpart D, Appendix B; (5) involve genetically engineered organisms, synthetic biology, governmentally designated noxious weeds, or invasive species, unless the proposed activity would be contained or confined in a manner designed and operated to prevent unauthorized release into the environment and conducted in accordance with applicable requirements, such as those listed in paragraph B(5) of 10 CFR Part 1021, Subpart D, Appendix B.

There are no extraordinary circumstances related to the proposed action that may affect the significance of the environmental effects of the proposal.

The proposed action has not been segmented to meet the definition of a categorical exclusion. This proposal is not connected to other actions with potentially significant impacts (40 CFR 1508.25(a)(1)), is not related to other actions with individually insignificant but cumulatively significant impacts (40 CFR 1508.27(b)(7)), and is not precluded by 40 CFR 1506.1 or 10 CFR 1021.211 concerning limitations on actions during preparation of an environmental impact statement.

A portion of the proposed action is categorically excluded from further NEPA review. The NEPA Provision identifies Topic Areas, Budget Periods, tasks, and/or subtasks that are subject to additional NEPA review.

SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.

NEPA Compliance Officer Signature:  _____ Date: 8/13/2021
NEPA Compliance Officer

FIELD OFFICE MANAGER DETERMINATION

- Field Office Manager review not required
- Field Office Manager review required

BASED ON MY REVIEW I CONCUR WITH THE DETERMINATION OF THE NCO :

Field Office Manager's Signature: _____ Date: _____
Field Office Manager