

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



**RECIPIENT:** New Mexico State University

**STATE:** NM

**PROJECT TITLE :** Carrizo Pumped Storage Hydropower: Seasonal Storage for Fully Decarbonized Grids

**Notice of Funding Opportunity Number**  
DE-FOA-0002802

**Procurement Instrument Number**  
DE-EE0011385

**NEPA Control Number**  
GFO-0011385-001

**CID Number**

**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.

**B3.2 Aviation activities**

Aviation activities for survey, monitoring, or security purposes that comply with Federal Aviation Administration regulations.

**Rationale for determination:**

The U.S. Department of Energy (DOE) is proposing to provide federal funding to New Mexico State University (NMSU) to conduct a holistic study including site characterization for the proposed Carrizo Pumped Storage Hydropower (PSH) project. PSH facilities allow for long-duration storage of intermittent renewable electricity. The study would assess whether Carrizo, as a seasonal duration PSH project, would be feasible at the lowest cost when compared with other sites in the region.

Proposed award activities would include development of a preliminary implementation plan including geotechnical site planning, interconnection planning, and historic and environmental permitting studies, project construction and commission planning, market assessment studies, evaluation of transmission benefits, and evaluation of community benefits, including employment opportunities, renewable energy project potential within the Navajo Nation, and greenhouse gas emission reduction.

This ND applies to Task 0 (all Subtasks), Task 1 Subtasks 1.1-1.4 and 1.7-1.10, and Tasks 2-13 (all Subtasks). This ND does not apply to Subtasks 1.5 and 1.6 (Conduct Drilling, Sampling, and Lab Testing and 3D Model Refinement), as geotechnical drilling locations have not yet been identified. DOE would complete the NEPA review for Subtasks 1.5 and 1.6 when sufficient information is available to conduct a meaningful review.

Desktop studies and data analysis work would be conducted at NMSU (Las Cruces, NM), Baylor University (Waco, TX), Colorado School of Mines (Golden, CO), Columbia University (New York, NY), and Argonne National Laboratory (Lemont, IL). All such work would be conducted in office or computer laboratory environments. Existing university and corporate health and safety standards would be followed.

Field work would occur primarily on Navajo Nation Trust Lands in the Carrizo Mountains, located on the Colorado Plateau in northeastern Arizona (about 20 km southwest of the Four Corners). Field study activities along proposed transmission line routes would extend linearly from the mountain range east to Shiprock, NM. Some survey work may occur on Bureau of Land Management, state-owned, or privately-owned land. The recipient would obtain permission from landowners prior to entering any property. Personnel conducting field work would follow all OSHA and Navajo Nation safety guidelines. There is pre-existing contamination from abandoned uranium mines (AUMs) and waste rock located in the study area. The project team would avoid all contaminated areas during field work using AUM mapping data from the Environmental Protection Agency (EPA).

Task 0 would include finalization of the composition of Stakeholder Advisory Committees to ensure diverse and representative participation from key stakeholders involved in the project. All activities would be intellectual, academic, or analytical in nature.

Task 1 would include evaluation of surface and subsurface geology for location and design of tunnels, dams, river water pipeline, gravel sources, access and construction roads, substation pads, and material and equipment staging areas. Proposed Task 1 subtasks are described below:

Subtask 1.1: Apply for and obtain permits required for geotechnical studies.

Subtask 1.2: Desktop study and preliminary field mapping and testing. During field mapping, intact rock samples would be collected from loose blocks where available. These would be used to conduct unconfined compressive strength tests to assess basic intact rock properties. This task would involve site characterization field work requiring land access and other permits from the Navajo Nation to conduct studies.

Subtask 1.3: Preliminary 3D model development.

Subtask 1.4: Design of Drilling, Sampling and Lab Testing.

Subtask 1.5: Conduct Drilling, Sampling, and Lab Testing. This subtask is not covered under this ND, as drilling locations have not yet been identified.

Subtask 1.6: 3D Model Refinement using information collected from Subtask 1.5. This subtask is not covered under this ND, as drilling locations have not yet been identified.

Subtask 1.7: Desktop study and preliminary field mapping of access and project roads, staging areas, river water pipeline, and substation pads.

Subtask 1.8: 3D location mapping, preliminary engineering, and costing of construction and access roads, staging areas, river water pipeline, and substation pads.

Subtask 1.9: Desktop study and preliminary field mapping of gravel sources.

Subtask 1.10: Contamination study. An EPA dataset would be used to map AUM and waste rock locations in the project area. This mapping would allow the project team to avoid all contaminated areas during field work activities.

Task 2 would include evaluation of reservoir and abutment integrity and would involve estimation of reservoir seepage, preliminary dam and spillway design, and dam and spillway cost analysis. All activities would be intellectual, academic, or analytical in nature.

Task 3 would include tunneling and excavation planning and would involve synthesizing information for tunnel and shaft design and construction, developing a design/construction cost estimate for a baseline alignment, and evaluation of alternative alignments. All activities would be intellectual, academic, or analytical in nature.

Task 4 would include characterization of the powerhouse design and would involve a preliminary powerhouse excavation design and cost assessment, preliminary gate controls model simulation and design, and turbine and controls hydraulic characteristics and model simulation. All activities would be intellectual, academic, or analytical in nature.

Task 5 would include environmental permitting and interconnection feasibility studies and would involve environmental analyses of geology and soils, water resources, fish and aquatic resources, wildlife and botanical resources, wetlands, riparian, and littoral habitats, rare, threatened, and endangered species, recreation and land use, aesthetic resources, cultural resources, socioeconomic resources, tribal resources, and the San Juan River basin. This task would involve site characterization field work requiring land access and other permits from the Navajo Nation to conduct studies.

Task 6 would include completion of a transmission benefit study and would involve performing production cost modeling to evaluate benefits to resource utilization, studying transmission system asset lifespan improvement under alleviated power loading, and performing a transmission expansion study to evaluate cost savings on transmission deferral. All activities would be intellectual, academic, or analytical in nature.

Task 7 would include completion of a market assessment study and would involve preparation of market study data, establishing a Western Electricity Coordinating Council economic dispatch model, optimal energy storage bidding, evaluating how different market designs impact revenue potential, and adjusting Carrizo PSH's participation strategies to reduce carbon emissions while minimizing revenue impact. All activities would be intellectual, academic, or analytical in nature.

Task 8 would include conducting a reliability and resilience benefit study and would involve collecting historical weather data, developing an integrated framework of reliability and resilience valuation, resilience valuation modeling, and assessment and quantification of resilience improvement. All activities would be intellectual, academic, or analytical in nature.

Task 9 would include conducting a renewable integration study and would involve establishing a baseline for carbon emission and analyzing Carrizo PSH's potential impacts on greenhouse gas emission and renewable integration. All activities would be intellectual, academic, or analytical in nature.

Task 10 would include studying the San Juan River water supply, usage, and management and would involve identifying regional climate variability and risk of severe and sustained drought, evaluate water quality and potential alternative designs for improvements, and conduct water recreation, industrial, agricultural, aesthetic, and environmental studies to optimize community benefits. This task would involve site characterization field work requiring land access and other permits from the Navajo Nation to conduct studies.

Task 11 would include identifying greenhouse gas emission reduction by Carrizo PSH and would involve conducting a greenhouse gas emission study and a lifecycle assessment study. All activities would be intellectual, academic, or analytical in nature.

Task 12 would include conducting LIDAR drone surveys for reservoir mapping and digital twin creation and would involve site and equipment preparation and planning, data collection, data processing, analysis, and 3D model generation, digital twin creation for reservoir monitoring and analysis, and VR/AR headset visualization and analysis.

The project would involve the use of small unmanned aerial systems (sUAS). The recipient is responsible for ensuring that all activities involving sUAS are compliant with 14 CFR Part 107 or an applicable Certificate of Waiver or Authorization (COA). This includes, but is not limited to, aircraft requirements such as remote pilot-in-command certification, authorities and responsibilities; ensuring the sUAS is in a condition for safe operation; registration; understanding airspace classifications and requirements; and accident reporting (if applicable).

U.S. Fish and Wildlife Service's (USFWS) Information for Planning and Consultation (IPaC) database indicates that the Mexican Spotted Owl (MSO), Southwestern Willow Flycatcher, Yellow-billed Cuckoo, Colorado Pikeminnow, Razorback Sucker, Mesa Verde Cactus, Navajo Sedge, and Zuni Fleabane have the potential to occur within the project boundary. There are no designated critical habitats within the project area.

A permit from the Navajo Nation Department of Transportation would be obtained prior to conducting drone surveys. Surveys would be conducted only during daylight hours and would not be conducted during the MSO breeding season (March-August). All vehicles operated during drone surveys would remain on existing, well-defined roads to avoid impacting Mesa Verde Cactus in the project area.

DOE consulted with the Navajo Nation Department of Fish and Wildlife regarding drone activities. They indicated that additional raptor species (Golden Eagles, Northern Goshawks, and Ferruginous Hawks) could be encountered in the proposed project area. Impacts to those species would be avoided by following the mitigation measures for the MSO. More detailed information about the presence of Navajo Nation endangered species would be obtained by the recipient through submission of a data request to the Navajo Nation Department of Fish and Wildlife and completion of their biological resource compliance process. Based on the mitigation measures listed above for proposed drone flights and the non-invasive nature of all other proposed project activities, DOE does not anticipate impacts to any federally listed species.

Task 13 would include development of a community benefit plan and would involve inclusion of the Navajo Nation in project development activities through quarterly meetings, analyses of infrastructure upgrade benefits, renewable integration benefits, and environmental benefits for the Navajo Nation, workforce development, including outreach and training modules development for the Navajo Nation, securing office space for education/outreach activities, and website development. All Task 13 activities would be intellectual, academic, or analytical in nature.

Coordination with the Navajo Nation has been ongoing since the initiation of the proposed project. A letter of support was provided by the Navajo Nation President in April 2024. An in-person meeting was held in Window Rock, AZ in August 2024. Information was received from the Navajo EPA and the Navajo Division of Natural Resources, including the Department of Water Resources, the Department of Fish and Wildlife, the Navajo Natural Heritage Program, the Heritage and Historic Preservation Department, and the Navajo Land Department. Field studies would involve Navajo Nation members as appropriate, and collaboration with the Navajo Nation would continue throughout the life of the project. A communication plan would be created to support these coordination efforts.

DOE has considered potential impacts on resources, including those of an ecological, historical, cultural, and socioeconomic nature. DOE does not anticipate adverse impacts on these resources.

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.

EERE is aware of the November 12, 2024, decision in *Marin Audubon Society v. FAA*, No. 23-1067 (D.C. Cir. Nov. 12, 2024). To the extent that a court may conclude that the Council on Environmental Quality (CEQ) regulations implementing NEPA are not judicially enforceable or binding on this agency action, EERE has nonetheless elected to follow those regulations at 40 C.F.R. Parts 1500-1508, in addition to DOE's procedures/regulations implementing NEPA at 10 C.F.R. Part 1021, to meet the agency's obligations under NEPA, 42 U.S.C. §§ 4321 et seq.

## NEPA PROVISION

DOE has made a conditional NEPA determination.

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

Task 0 (all Subtasks)

Task 1 Subtasks 1.1-1.4 and 1.7-1.10

Tasks 2-13 (all Subtasks)

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

Task 1 Subtasks 1.5 and 1.6

Include the following condition in the financial assistance agreement:

Copies of all permits obtained must be provided to the DOE project office prior to commencement of the associated award activities.

The recipient would avoid all contaminated areas during field work using abandoned uranium mine mapping data from the Environmental Protection Agency.

The project would involve the use of small unmanned aerial systems (sUAS). The recipient is responsible for ensuring that all activities involving sUAS are compliant with 14 CFR Part 107 or an applicable Certificate of Waiver or Authorization (COA). This includes, but is not limited to, aircraft requirements such as remote pilot-in-command certification, authorities and responsibilities; ensuring the sUAS is in a condition for safe operation; registration; understanding airspace classifications and requirements; and accident reporting (if applicable).

Drone surveys would be conducted only during daylight hours and would not be conducted during the Mexican Spotted Owl breeding season (March-August).

All vehicles operated during field work activities, including drone surveys, must remain on existing, well-defined roads.

Notes:

Water Power Technologies Office (WPTO)

This NEPA determination requires legal review of the tailored NEPA provision.

NEPA review completed by Melissa Parker, 12/11/24

## 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: \_\_\_\_\_



NEPA Compliance Officer

Date: 12/11/2024

**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: \_\_\_\_\_

Field Office Manager

Date: \_\_\_\_\_