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(1.08.09.13)

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



RECIPIENT: NEW MEXICO STATE UNIVERSITY

STATE: NM

PROJECT TITLE : Scalable Low-head Axial-type Venturi-flow Energy Scavenger

<b>Funding Opportunity Announcement Number</b>	<b>Procurement Instrument Number</b>	<b>NEPA Control Number</b>	<b>CID Number</b>
	DE-EE0005411	GFO-0005411-002	GO5411

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

**CX, EA, EIS APPENDIX AND NUMBER:**

## Description:

**B5.24 Drop-in hydroelectric systems** The installation, modification, operation, and removal of commercially available smallscale, drop-in, run-of-the-river hydroelectric systems that would (1) involve no water storage or water diversion from the stream or river channel where the system is installed and (2) not have the potential to cause significant impacts on water quality, temperature, flow, or volume. Covered systems would be located up-gradient of an existing anadromous fish barrier that is not planned for removal and where fish passage retrofit is not planned and where there would not be the potential for significant impacts to threatened or endangered species or other species of concern (as identified in B(4)(ii) of this appendix). Covered actions would involve no major construction or modification of stream or river channels, and the hydroelectric systems would be placed and secured in the channel without the use of heavy equipment. Covered actions would be in accordance with applicable requirements (such as local land use and zoning requirements) in the proposed project area and would incorporate appropriate control technologies and best management practices.

## Rationale for determination:

The U.S. Department of Energy (DOE) is proposing to provide federal funding to New Mexico State University (NMSU) to research, design and develop a low-head/low-flow hydropower technology that would meet DOE Water Power Program goals for a low cost, highly efficient and modular turbine-generator system which would be easy to manufacture, assemble and deploy. To reach these objectives, NMSU is proposing to perform in-depth studies of the turbine dynamics of a venturi-based design for an axial-flow hydropower generating system, and then fabricate two hydropower harvester prototypes for testing and validation.

DOE made a previous NEPA determination (GFO-0005411-001 A9 4/11/2012) for Budget Period 1 activities that included desktop studies, preliminary design, data analysis, and computer modeling. This NEPA determination applies to Budget Period 2 activities which include the design, fabrication and installation of two 10 kW hydropower turbine-generators (HyPER harvester) at an Elephant Butte Irrigation District (EBID) drop structure site.

NMSU would fabricate two, 10 kW, 120/140 V, 50/60 Hz hydropower harvester prototypes for testing and validation in the EBID irrigation canal system. The project site includes a large irrigation canal known as the Westside canal, an irrigation check structure, and a concrete box which serves as a "drywell" for two existing EBID designed and fabricated hydropower turbines. A 60 inch corrugated metal pipe raceway begins at the drywell and continues downstream below grade within the right bank of the canal until it daylight downstream of the Drop 8 structure. The check structure is located immediately upstream of the original Drop 8 drum structure and consists of two radial gates with weir walls on both sides and a concrete walkway.

The equipment within the drywell consists of two EBID designed and fabricated horizontal axial flow turbines of different styles and two different makes of generators, one attached to each turbine. The combination of the structures at the site measures approximately 60 ft. long and 45 ft. wide. The proposed project site, construction, operations, and maintenance activities would all be located within EBID's Right of Way (ROW) and no habitat exists within EBID's ROW at this location. The surrounding area is predominantly farm land.

The two HyPER harvesters are a self-contained unit comprising of three modular elements including the Venturi turbine, a discharge tube and the draft tube. The device measures approximately 7 ft. in height, 14 ft. in length and 5 ft. wide. The generator, enclosed in a watertight submarine-type enclosure, would be supported inside a Venturi-shaped turbine. Power cables from the generator would be connected externally to the appropriate electrical equipment. The rim of the Venturi would fit inside a 54 inch diameter orifice in the Drop 8 structure. The entire assembly would rest on the concrete floor. The harvester would not contribute to the load bearing capacity of the existing structure. The system would be placed and secured in the channel without the use of heavy equipment.

Installation of the turbines would be performed during the season in which the canal contains no water. The turbine would bolt together the existing structure without structure modification. No water would be consumed by the hydro power efforts at this location. Canal flows of irrigation water can reach 400 cubic feet per second (cfs) but would not be consumed or affected by this project.

The Drop 8 site does not involve new water storage or new water diversion from any stream or river. The water that passes through the hydroelectric system is not diverted from the Westside canal. The canal does not support fish or fauna as it is an engineered, regularly maintained, human-made irrigation canal. The irrigation canal heading encourages fish to continue down the Rio Grande River, past the Mesilla Dam rather than down the irrigation canal. Fish have not been known to live in the canals as they become fully dry throughout much of the year and the canals rarely wash back to the river. No endangered species of fish have been documented in the Westside canal therefore an anadromous fish barrier is not necessary.

The Elephant Butte Irrigation System, in conjunction with the Rio Grande Project is considered eligible for inclusion in the National Register of Historic Places. EBID and the New Mexico State Historic Preservation Office (SHPO) have a memorandum of understanding (MOU) in place which categorically excludes actions associated with this project. The HyPER project does not fall under a category needing consultation because no substantial modifications to the system or structure would take place.

The U.S. Fish and Wildlife Service (USFWS) Endangered Species Program website identifies five species in Dona Ana County as threatened or endangered: Yellow-billed Cuckoo, Northern aplomado falcon, Least tern, Sprague's pipit and the Sneed pincushion cactus. Because the project would be located on previously disturbed land at an irrigation drop structure site and is small in scale, DOE has determined the project is not likely to affect the listed species. The proposed scope of work would not have impacts floodplains or wetlands, as these resources are not known to occur at the proposed site.

Based on review of the project information and the above analysis, DOE has determined the installation of two hydropower turbines at an existing irrigation drop site would not have a significant individual or cumulative impact to human health and/or environment. DOE has determined the proposed project is consistent with actions contained in DOE categorical exclusion B5.24 "drop-in hydroelectric system," and is categorically excluded from further NEPA review.

**NEPA PROVISION**

DOE has made a final NEPA determination for this award

Insert the following language in the award:

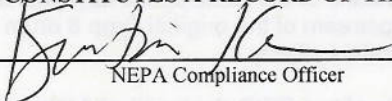
If you intend to make changes to the scope or objective of your project you are required to contact the Project Officer identified in Block 11 of the Notice of Financial Assistance Award before proceeding. You must receive notification of approval from the DOE Contracting Officer prior to commencing with work beyond that currently approved.

Note to Specialist :

Kelly Daigle 10/31/2013

This NEPA determination does not require a tailored NEPA provision.

**SIGNATURE OF THIS MEMORANDUM CONSTITUTES A RECORD OF THIS DECISION.**

NEPA Compliance Officer Signature:   
NEPA Compliance Officer

Date: 11/5/2013

**FIELD OFFICE MANAGER DETERMINATION**

Field Office Manager review required

**NCO REQUESTS THE FIELD OFFICE MANAGER REVIEW FOR THE FOLLOWING REASON:**

- Proposed action fits within a categorical exclusion but involves a high profile or controversial issue that warrants Field Office Manager's attention.
- Proposed action falls within an EA or EIS category and therefore requires Field Office Manager's review and determination.

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