



U.S. Department of Energy Categorical Exclusion Determination Form

Proposed Action Title: NERSC Facility Upgrade 2 and NERSC-10 HPC Installation and Operation (LB-CX-23-02)

Program or Field Office: Bay Area Site Office, Lawrence Berkeley National Laboratory (LBNL)

Location(s) (City/County/State): Berkeley, California

Proposed Action Description: The US Department of Energy (DOE) proposes to upgrade Bldg. 59 (“Shyh Wang Hall,” formerly “CRT”) at the Lawrence Berkeley National Laboratory (LBNL, or Berkeley Lab) (see Figure 1) and install and operate a new high-performance computing (HPC) system identified as NERSC-10. The purpose of the building upgrade (“NERSC Facility Upgrade 2”) is to accommodate NERSC-10 and potential future generations of high-performance computing system(s) while reducing reliance upon potable water for facility cooling. The purpose of new generations of high-performance computing systems like NERSC- 10 is to meet the continually evolving needs of the NERSC user community and to further advance NERSC’s mission of accelerating scientific discovery. Together, the NERSC Facility Upgrade 2 and the NERSC-10 Installation and Operation project components would comprise the proposed Federal Action, or “the Project.”

The NERSC Facility Upgrade 2 scope would modernize and upgrade the building electrical and cooling systems, as shown in the table below. The upgrade would be necessary to simultaneously operate the proposed new NERSC-10 and existing NERSC-9 (Perlmutter) high-performance computing systems¹ while optimizing use of electricity and substantially reducing water consumption. Installing and operating NERSC-10 would support LBNL’s National Energy Research Scientific Computing Center (NERSC) program, which is the DOE Office of Science’s production computing facility. At full operation, the proposed NERSC-10 system would target a 2- to 3-times increase of NERSC computing capacity over NERSC-9 (Perlmutter).

BUILDING 59	Approved Capacity ⁱⁱ	Current Capacity	Proposed Change	Total Proposed Capacity
Power (electrical)	27.5 MW	25 MW	+ 7.5 MW Capacity	32.5 MW
Cooling Water ⁱ	55.0 MGY	55.5 MGY	+ 0 MGY	55.5 MGY
HPC Cooling Towers (CT)	7 CTs	7 CTs	+ 0 CTs	7 CTs
Bldg. Cooling Towers (CT)	0 CTs	0 CTs	+ 4 CTs	4 CTs
Air Cooled Heat Exchangers	0 Fan Bays	0 Fan Bays	+ 9 Fan Bays	9 Fan Bays
Tower Water Pumping	5 Pumps	5 Pumps	+ 0 Pumps	5 Pumps
Cooling Water Pumping	5 Pumps	5 Pumps	+ 0 Pumps	5 Pumps
Chillers	0 Chillers	0 Chillers	+ 3 Scroll Chillers	3 Scroll Chillers
Chilled Water Pumping	0 Pumps	0 Pumps	+ 3 Pumps	3 Pumps
Air Handling Units	7 AHUs	7 AHUs	+ 0 AHUs	7 AHUs
Electrical Substations	10 Subs	10 Subs	+ 3 Subs	13 Subs

ⁱ Actual water usage is expected to be reduced as compared with current operations through addition of air-cooled heat exchangers and is expected to be substantially below capacity shown here.

ⁱⁱ NERSC-9 Categorical Exclusion determination, LB-CX-16-01 (4/8/2016)

Electrical work scope includes installation of a new medium-voltage sectionalizing switch to accommodate additional power. This would be located on a new ~2,000-square-foot concrete pad (Switch Pad) southeast and adjacent to Building 59 (see Figure 2). Interior electrical improvements would include three secondary unit substations. Two units would be dedicated to increased HPC electrical

¹ Building 59 was constructed to accommodate simultaneous operation of at least two HPC systems. This allows the current generation HPC system to continue to operate while the next generation is installed and seamlessly phased into operation. NERSC-8 was fully operating during the NERSC-9 HPC system installation. NERSC-9 has been operational as of November 2022.

capacity. The other unit would support an increase in capacity for the mechanical plant and provide system redundancy. Feeder lines would connect the substations to existing wall panels and new equipment.

An air-cooled heat exchanger array (each unit has six fans) would be located on a new <12,000-square-foot steel platform structure (ACHE Platform) north and adjacent to Building 59. This new system would serve as a “precooler” for HPC exhaust water, which would substantially reduce cooling water consumption despite a planned increase in HPC cooling needs. Current water consumption of ~15 to 20 million gallons per year (MGY) would be expected to drop to ~8 MGY or less. Acoustic and visual screening walls would be placed around the ACHE platform to soften noise and visual effects (see Figure 3). Project changes would not be visible from off-site viewpoints; project operational noise (operation of ACHE fans) would be below established impact thresholds (i.e., the municipal noise ordinance) for the nearest sensitive receptors in the City of Berkeley and UC Berkeley.

Cooling water would be separated into multiple loops to allow more efficient operation of each loop at different water temperatures. Existing rooftop air handlers providing comfort air would be augmented by four new rooftop evaporative cooling towers. Existing mechanical level HPC air handling units would be augmented by three new scroll chillers and chiller pumps inside Bldg. 59 to provide capacity during extremely hot and humid weather and during wildfire smoke events.

The upgrade would be designed to provide tie-in points for potential future capabilities such as a district waste heat loop to promote building heating using process hot waste water and a re-claimed water tie-in at the existing cooling towers to reduce the use of potable water. Potential reclaimed water sources include the LBNL and the UC Berkeley campuses. Implementation of such future capabilities is speculative and beyond the scope of this proposed Action.

The NERSC-10 HPC system is expected to use up to 20 megawatts of power at peak performance and to be mostly liquid-cooled. The new system would occupy the current Cori (NERSC-8) system location, as NERSC-8 is expected to be retired and removed for reuse by the manufacturer in the summer 2023. NERSC-8 removal is independent (and would occur regardless) of this proposed Action.

Project improvements would support a variety of future operational configurations for NERSC. NERSC currently operates two HPC systems in tandem, as it has historically. Under the proposed Action, the NERSC-9 and NERSC-10 systems would operate simultaneously for as long as needed by the program. At such time NERSC-9 were retired, NERSC-10 could operate by itself, or in tandem with a future NERSC- 9 replacement system, or in combination with a number of smaller systems.

The NERSC Facility Upgrade 2 would provide facility power and cooling to meet potential future needs beyond the NERSC-10 operation. A future deployment model is envisioned in which existing system racks would be installed in smaller clusters as opposed to being replaced wholesale with large, full scale new systems.

Construction would proceed in mid-2024 with work continuing through 2026. The NERSC-10 system may be delivered in two phases. Phase one is anticipated for a late 2025 delivery, followed by Phase 2 in late 2026.

Approximately six trees would be removed to accommodate the new exterior air-cooled heat exchangers. An average 35 onsite workers with a peak crew of 50 is expected over the duration of project construction. Work would primarily occur during business hours from Mondays to Fridays; however, a few planned utility outages could result in instances of weekend work. Up to three delivery trucks are expected on a daily basis, the majority of which would be accomplished using light-duty trucks. Occasional heavier transit construction trucks would include soil-hauling and concrete trucks for excavating and constructing the exterior concrete pad and platform. The installation of the switch station and the air-cooled heat exchangers would require long, flat-bed truck deliveries and the use of a heavy lifting crane. Once equipment is placed, it would be integrated using hand-held tools and small-scale lifts. To comply with Federal Energy Independence and Security Act (EISA) section 438 requirements, the proposed Action would install two subsurface stormwater hydromodification tanks with a total capacity of ~16,000 gallons.

Categorical Exclusion(s) Applied:

- B1.4** (Air conditioning systems for existing equipment)
- B1.5** (Existing steam plants and water cooling systems)
- B1.15** (Support buildings)
- B1.21** (Noise abatement)
- B1.31** (Installation and relocation of machinery and equipment)
- B1.33** (Stormwater runoff control)

For the complete DOE National Environmental Policy Act regulations regarding categorical exclusions, including the full text of each categorical exclusion, see Subpart D of [10 CFR Part 1021](#).

Regulatory Requirements in 10 CFR 1021.410(b): (See full text in regulation)

The proposal 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 proposal that may affect the significance of the environmental effects of the proposal.

The proposal 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.

I concur that the above description accurately describes the proposed action.

**LBNL Sr. Site &
Environmental Planner:**



Jeff Philliber

April 17, 2023

Date Determined

**BASO NEPA Program
Manager:**

Jose Roldan

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Jose Roldan

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Date Determined

The above description accurately describes the proposed action, which reflects the requirements of the CX cited above. Therefore, I recommend that the proposed action be categorically excluded from further NEPA review and documentation.

**BASO NEPA Program
Manager:**

Mary Gross

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Mary Gross

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Date Determined

Based on my review of the proposed action, as NEPA Compliance Officer (as authorized under DOE Order 451.1 B), I have determined that the proposed action fits within the specified class(es) of action, the other regulatory requirements set forth above are met, and the proposed action is hereby categorically excluded from further NEPA review.

**NEPA Compliance
Officer:**

PETER SIEBACH

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Peter Siebach

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Date Determined

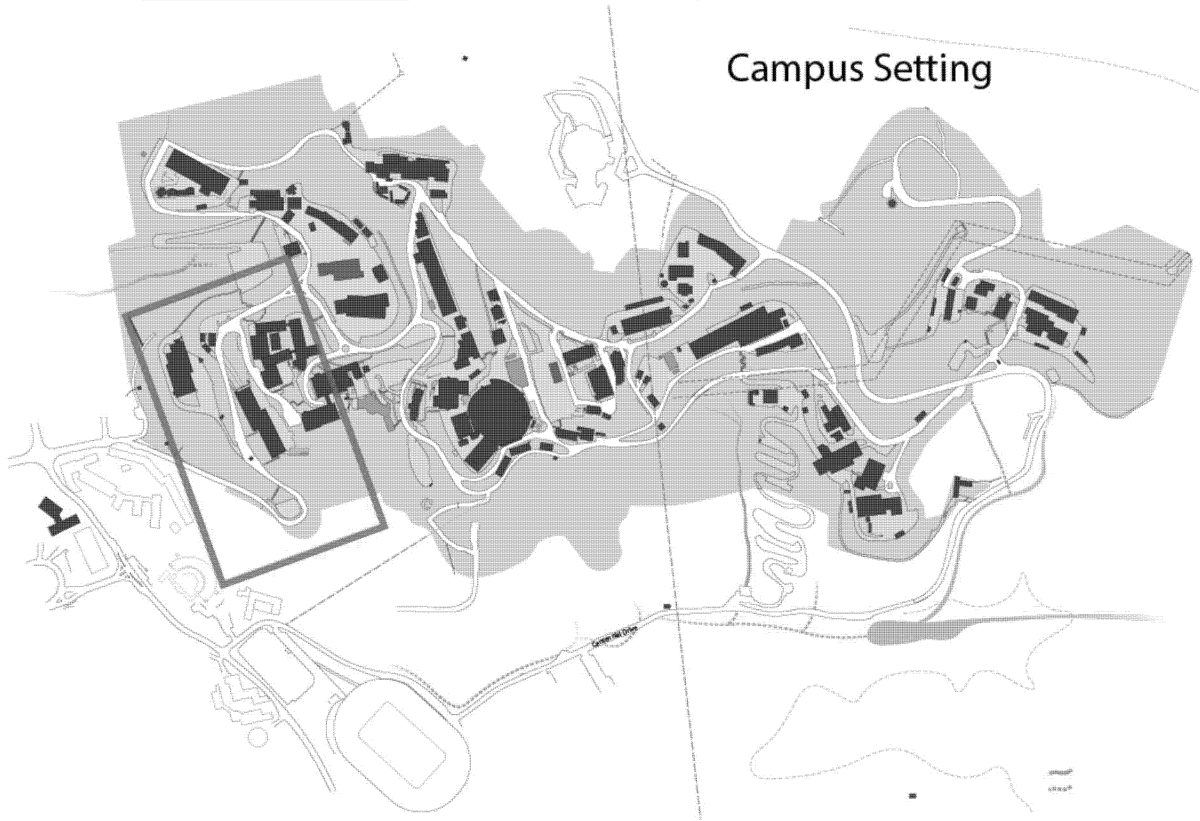
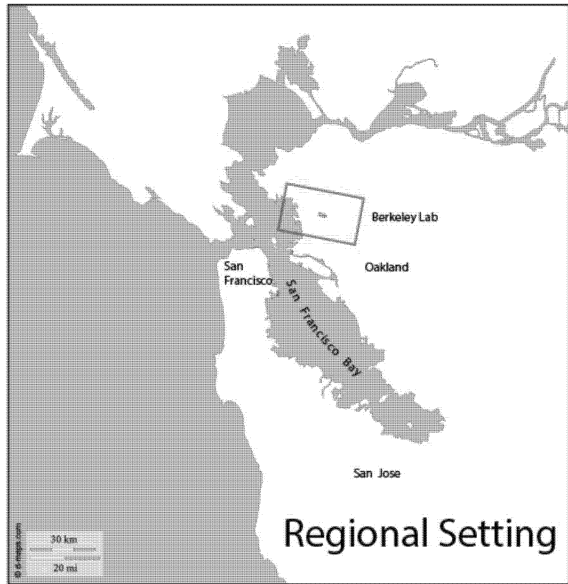


Figure 1: Regional and Campus Setting

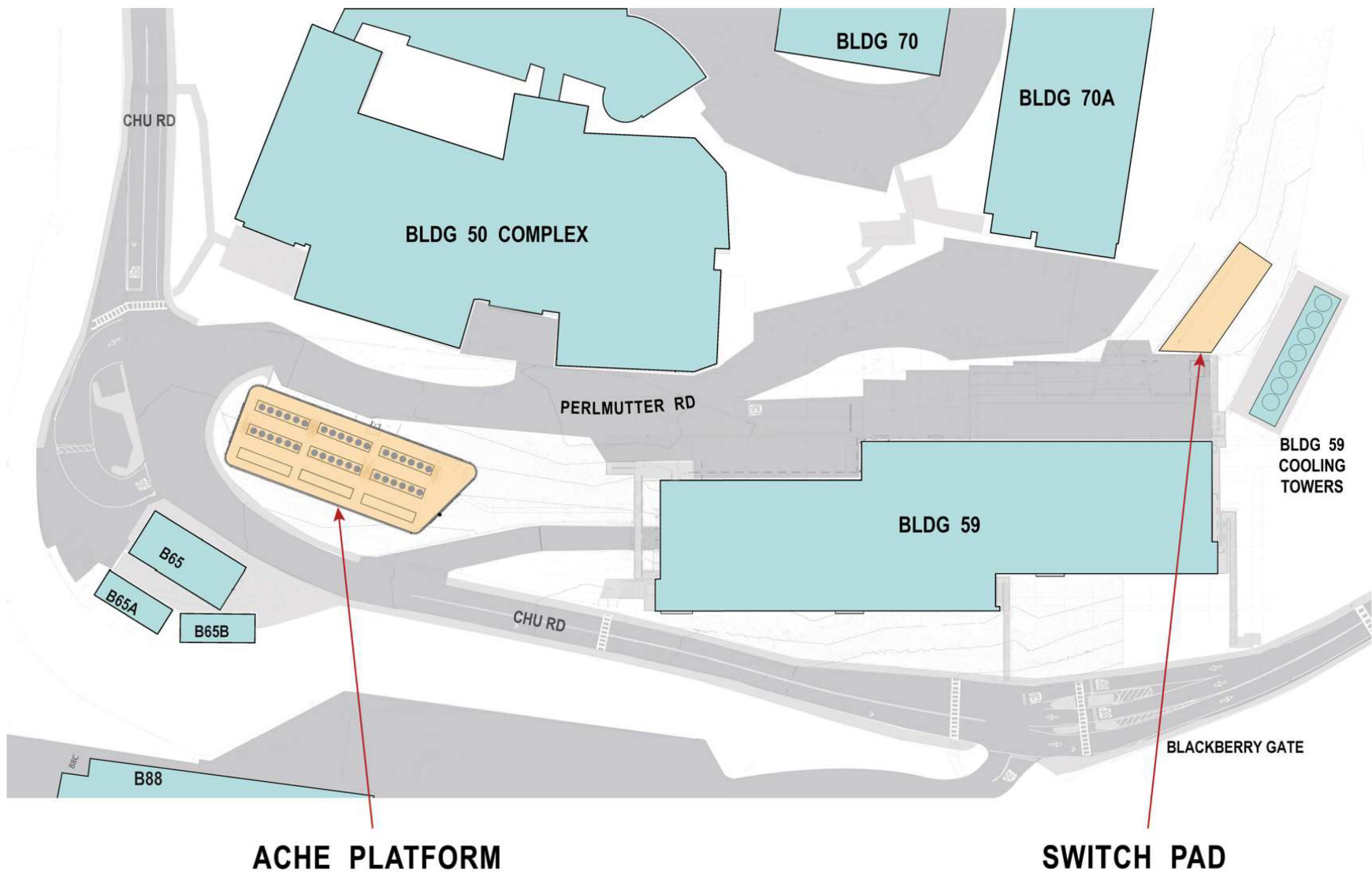


Figure 2: Site Plan and Project Features



Figure 3: ACHE Platform Screening Wall Looking North