

1.0 SUMMARY

This Environmental Assessment (EA) has been prepared by the U.S. Department of Energy (DOE) in compliance with the National Environmental Policy Act of 1969 (NEPA), 42 USC 4321 et seq., to evaluate the potential environmental consequences associated with the DOE proposal to relocate and consolidate DOE Office of Science (DOE SC) Advanced Scientific Computing Research (ASCR) - funded Lawrence Berkeley National Laboratory (LBNL) programs with other University of California (UC or University) LBNL/UC Berkeley programs focusing on computational and computer science research in a new facility on the LBNL site.

The LBNL site is an approximately 80-hectacre (200-acre) site owned by the Board of Regents of the University of California and located adjacent to the UC Berkeley campus in the Berkeley-Oakland hills. The LBNL site includes research and support buildings and structures, which are primarily part of LBNL, a federally funded research and development center managed and operated by the University of California for the DOE. Throughout this document, the acronym "UC LBNL" is used to identify the University as the entity operating LBNL facilities. In addition, the DOE employees, University of California employees work at the LBNL site.¹ These employees are referred to as UC LBNL employees.

1.1 PROPOSED ACTION

The Proposed Action comprises the following:

- Relocation of the National Energy Research Scientific Computing Center (NERSC) national user facility from its existing location at the Oakland Scientific Facility (OSF), a leased building in downtown Oakland, to a new building on the LBNL site. NERSC provides high-performance computing (HPC) for research sponsored by the DOE SC. The facility houses two supercomputers, a number of additional computing systems, associated data storage systems, and support staff. The Proposed Action would relocate some of the existing HPC systems and data storage systems from the OSF to a new building on the LBNL site. This relocation is necessary because the existing OSF will not have adequate space to accommodate two future supercomputing systems at one time and will not have adequate mechanical space and electrical service capacity to handle the growth in computing facilities that is projected for NERSC.
- Relocation and consolidation of ASCR-funded LBNL programs, which include NERSC and the Computational Research Division (CRD) of LBNL, in the same new building. In addition, the joint UC Berkeley/LBNL Computational Science and Engineering (CSE) program,² a related program that

¹ The LBNL also includes a number of leased properties such as the Potter Street facility in Berkeley and the Oakland Scientific Facility in Oakland. The phrase "LBNL site" is used throughout this EA to refer to the approximately 80-hectacre (200-acre) LBNL site and not other LBNL leased properties.

² CSE is a UC Berkeley and LBNL collaborative program, which is not ASCR funded but includes some UC Berkeley faculty, students and postdoctoral researchers who conduct research funded by ASCR.

is focused on computational and computer science research, would use a small portion of the new building. The relocation and consolidation of NERSC, CRD, and CSE is proposed in order to centralize and co-locate all similar and related functions and programs to improve efficiency and productivity and foster intellectual exchanges. This would involve relocating the offices of CRD staff (about 165 persons) who are currently in the Building 50 complex on the LBNL site, NERSC staff at OSF (about 70 persons), and University of California Berkeley campus (UC Berkeley)/LBNL CSE staff (about 50 persons) into the new building.

- Relocation of LBNL staff from other buildings on the LBNL site into the space that would be vacated by the CRD staff in the Building 50 complex. This would involve moving the offices of approximately 165 persons from their current locations on the LBNL site into the Building 50 complex. This relocation is required to address the current overcrowding in the LBNL buildings. This backfilling of vacated space would not involve any new hires, and therefore the backfilling action would not increase LBNL site's on-site population.

The programs would be relocated into a new three-story building and associated infrastructure that would be constructed at the LBNL site by the University. The new building would be called the Computational Research and Theory (CRT) facility. The University would be responsible for the maintenance and operation of the facility.

The new building to house these relocated programs and computational equipment would be located in close proximity to the UC Berkeley campus in order to foster collaboration between UC Berkeley and UC LBNL CRD and NERSC staff.

The overall purpose of the Proposed Action is to support the DOE SC mission in Computational Research and Theory by operating NERSC as the premier computing user facility for the research community, and by conducting programmatic and applied research and development in computational science, computer science, and applied mathematics.

The project need is for high performance computing space due to the immediate and projected deficiency in high performance computing space at the existing NERSC HPC facility and to remove the constraints to intellectual exchange and collaboration resulting from the dispersed locations of ASCR-funded and other related programs and researchers.

The action proposed by DOE is to relocate and consolidate ASCR-funded LBNL programs with other LBNL/UC Berkeley programs focusing on computational and computer science research in a new facility on the LBNL site. To satisfy the programmatic and space needs, as stated above, the University would construct a new building on the LBNL site. The construction of the new building would be a consequence of the DOE's Proposed Action. In order to evaluate and disclose the consequences of the Proposed Action, this EA presents not only the environmental effects of the relocation and consolidation of

equipment and personnel but also from the construction, operation, and eventual removal of the building and equipment once the building and equipment reach the end of their useful lives.

The 0.91-hectare (2.25-acre) site proposed for the CRT facility is located in the western portion of the LBNL site, in the eastern hills of the cities of Berkeley and Oakland in Alameda County, California. The project site is flanked on three sides by Buildings 70 and 70A to the east, the Building 50 complex to the north, and Cyclotron Road and the Blackberry Canyon entrance gate to the west. The sloped terrain of the site drops roughly 30 meters (100 feet) from east to west and is vegetated with approximately 75 eucalyptus and a few oak and bay trees. The new three-story building would consist of an approximately 3,000-square-meter (32,000 gross square feet [gsf]) HPC floor with a high ceiling and two additional floors of office space for a total of approximately 12,980 square meters (139,700 gsf). The computer floor would consist of two 10,000-square-foot (sf) column-free spaces flanking a central 12,000-sf space with no more than four columns. The two floors above the HPC floor would provide a variety of general office, computer configuration and support, software support, videoconferencing, meeting, and visualization laboratory spaces.

Building construction would begin in early 2011 and would be completed by fall 2013. The NERSC equipment from OSF would be moved to the new building over a period of six months to a year. CRD and OSF staff would move to the new building immediately upon completion. Backfilling of vacated space in the Building 50 complex would take place over a period of six months to a year.

At the end of the new building's useful life, the building would be vacated and would be either (1) demolished and the site restored to a hillside, or (2) rebuilt to the applicable construction standards. Programs and equipment in the building at that time would be relocated to another appropriate building. If the facility were demolished, it is anticipated that there would be minimal environmental impacts. Prior to demolition, utility systems would be shut off, any potential sources of environmental contamination inside the building would be removed, and the interior contents would be removed and recycled. It is anticipated that there would be no hazardous or radioactive building waste material, conventional demolition methods would be used for demolition, and controls would be implemented to protect the workers and the environment. Prior to demolition of the building, an analysis would be conducted to verify whether environmental impacts would result from building demolition and to assess what level of further NEPA review would be appropriate. NERSC equipment that reaches the end of its useful life would be removed from the site by a licensed subcontractor.

1.2 ALTERNATIVES TO THE PROPOSED ACTION

In addition to the Proposed Action, Alternatives 1 through 4 and the No Action alternative are also evaluated in this EA.

- Alternative 1 proposes to locate the three-story CRT facility on a parking lot to the northeast of Building 54 (Cafeteria) in the western portion of LBNL. Due to the size and shape of the parking lot and the need for an HPC floor with a 3,000 gross-square-meter (32,000-gsf) footprint, the building would be constructed either as a cantilever structure or the HPC floor would be designed to fit the parking lot configuration. The site is a paved parking lot and no natural habitat exists at the site. Approximately 30 trees are present on or adjacent to the parking lot.
- Alternative 2 proposes to locate the three-story CRT facility on the UC Berkeley Richmond Field Station (RFS), approximately 8 kilometers (5 miles) away from the site. All attributes of the project program and population at this alternate location would be the same as that of the Proposed Action. The number of researchers, staff, and visitors that would be accommodated in the facility would remain the same as for the Proposed Action (about 300 persons). However, unlike the Proposed Action, which involves the relocation of about 135 persons to the LBNL site, this alternative involves the relocation of all 300 persons to the RFS site. In addition, while the Proposed Action would provide only four parking spaces (for disabled guests), implementation of Alternative 2 would include 300 parking spaces for all researchers, visitors, and guests of the facility. RFS is also not adequately served by high-speed and high-bandwidth networking nor is the electrical service to RFS adequate to serve the proposed building. This alternative would therefore require installation of DOE Energy Sciences Network (ESnet) infrastructure,³ as well as major improvements to electrical transmission and distribution facilities, including installation of new power lines (using existing electrical poles or spare conduits) and a substation adjacent to the CRT building. In addition to the capital cost of these improvements, the extension of the ESnet infrastructure to RFS would result in an annual operating cost of approximately \$850,000, a cost that would not be incurred under the Proposed Action. Unlike the Proposed Action, construction of the new facility at this site would require minimal grading since the site is flat. The site is a grassy lot that is not developed except for one small building.
- Alternative 3 proposes to relocate the NERSC supercomputers, CRD staff, and UC Berkeley/LBNL CSE staff to a University-owned site on the western edge of the UC Berkeley campus in the City of Berkeley, formerly occupied by the California Department of Health Services (DHS). Several aspects of the alternative such as the programs and total population would be the same as the Proposed Action. However, unlike the Proposed Action, which would relocate about 135 persons to the LBNL site, this alternative would relocate all 300 persons to the DHS site. Similar to the Proposed Action, this alternative would provide no parking spaces for the users of the facility, as adequate parking and transit services are available in the vicinity of this site. With the exception of ESnet infrastructure and adequate electrical supply, which would need to be installed and/or upgraded, all other utilities that exist at the site are adequate to support the demands of the CRT facility. The entire site is developed or disturbed in connection with the former use of the site and no natural vegetation exists on the site.

³ ESnet is a high-speed computer-based communication and information-sharing network that serves the scientists working on DOE sponsored research.

- Alternative 4 proposes to lease a portion of a 47,195-gross-square-meter (508,000 gsf) building located at 6701 San Pablo Avenue, in the cities of Berkeley, Emeryville, and Oakland, and make interior tenant improvements to provide the needed office space. With respect to the HPC floor, the building does not have the floor configuration, which is required to install the supercomputers. Therefore, a new floor would be added on top of the existing building. To provide adequate cooling, cooling towers and chillers would also be constructed on top of the building. In addition, the power supply to the building would need to be increased and ESnet infrastructure would need to be installed.

Unlike the Proposed Action, which involves the relocation of about 135 persons to the LBNL site, this alternative involves the relocation of up to 300 persons to the Alternative 4 site. The site has parking spaces for 100 cars inside the building and 300 spaces outside the building, and there is a potential to increase parking from 400 to 1,200 spaces at the site. The facility would not be secured with a fence, though users of the facility would be required to use identification badges to gain access. The entire site is developed with the building so no natural vegetation exists on the site.

- Under Alternative 5, the No Action alternative, the DOE would not relocate the ASCR-funded LBNL programs or provide new facilities for ASCR staff and existing research missions. The existing LBNL facility in Oakland would continue to be utilized and a new building would not be constructed.

1.3 SUMMARY COMPARISON OF PROPOSED ACTION AND ALTERNATIVES

The Proposed Action and each of the alternatives are analyzed for environmental effects specific to the action alone. Cumulative effects are evaluated for the Proposed Action and each alternative with respect to other known, past, present, and reasonably foreseeable actions. The impacts of the Proposed Action and the alternatives are summarized in **Table 1.0-1, Summary Table of Actions and Impacts**. The EA reflects that there would only be minor environmental effects from the Proposed Action by itself, or cumulatively when taken in conjunction with the other projects planned for the time frame of mid-2010 to late 2018.

1.4 NATIONAL ENVIRONMENTAL POLICY ACT AND RELATED PROCEDURES

NEPA, the Council on Environmental Quality NEPA regulations (40 Code of Federal Regulations [CFR] Parts 1500 to 1508), and the DOE's NEPA implementing regulations (10 CFR Part 1021) require that the DOE consider the potential environmental impacts of a proposed action before making a decision. This requirement applies to decisions about whether to relocate and consolidate ASCR-funded LBNL programs at the LBNL site.

In compliance with these requirements, this EA examines the potential environmental impacts of the Proposed Action and alternatives. This EA provides the DOE with the information needed to make an informed decision about whether the relocation and consolidation of ASCR-funded LBNL programs in a

new building at the LBNL site may result in substantial adverse environmental impacts. Based on the Final EA, the DOE will either issue a finding of no significant impact (FONSI), or determine that additional study is needed in the form of a more detailed Environmental Impact Statement.

1.5 RELATIONSHIP BETWEEN THE DOE AND UNIVERSITY OF CALIFORNIA

LBNL is a federally owned facility on land leased from the Board of Regents of the University of California (The Regents). LBNL is managed and operated for the DOE by The Regents pursuant to a management and operating contract as defined in 48 CFR Subpart 17.6. The relationship between the parties is governed by the leases and the management and operating contract.

The Regents hold themselves accountable for the stewardship of the LBNL site within the State of California. The Regents require and approve the University-defined Long Range Development Plan (LRDP) and require that its approval be consistent with the University's policy that an LRDP undergo review and approval pursuant to the California Environmental Quality Act (CEQA). The Regents certified the 2006 LRDP Environmental Impact Report (EIR) and adopted the 2006 LRDP in July 2007 (LBNL 2006; LBNL 2006).⁴ The 2006 LRDP is now the governing land use plan for the LBNL site.

The CRT facility that would be constructed as a consequence of the Proposed Action would be constructed by the University on University-owned land. The University determined that the CRT facility is an element of the growth projected under the 2006 LRDP, and in compliance with CEQA evaluated the building project for its environmental impacts in an EIR (SCH 2007072106)⁵ that was certified in 2008 (LBNL 2008). Both the CRT EIR and the 2006 LRDP EIR are incorporated by reference in this EA.

In conjunction with the approval of the proposed CRT building project, the University incorporated several environmentally proactive measures from the 2006 LRDP EIR into the proposed building project to avoid or minimize potential environmental impacts.⁶ These standard project features (SPFs) have been adopted as part of the LBNL 2006 LRDP EIR by the Regents of the University of California and are thus required of all UC LBNL activities pursuant to CEQA. The SPFs pertinent to the CRT facility are set forth in **Appendix 1** and are incorporated into and a part of the project description of the Proposed Action and alternatives. The analysis presented in this EA evaluates environmental impacts that would result from project implementation following the application of these SPFs.

⁴ <http://www.lbl.gov/Community/LRDP/index.html>

⁵ <http://berkeleyscience.org/projects/crt/>

⁶ LBNL 2006 Long Range Development Plan Final Environmental Impact Report (SCH No. 2000102046). July 2007.

**Table 1.0-1
Summary Table of Actions and Impacts**

Environmental Topic	Proposed Action and Alternatives					
	Proposed Action	Alternative 1 Cafeteria Parking Lot Site	Alternative 2 RFS Site	Alternative 3 Former DHS Site	Alternative 4 Leased Facility on San Pablo Avenue	Alternative 5 No Action
Geology and Soils	Minor impact related to seismicity, landslides, and erosion ¹	Minor impact related to seismicity and erosion ¹	Minor impact related to seismicity ¹	Minor impact related to seismicity ²	Minor impact related to seismicity ¹	No impact
Water Resources	Minor impact to surface waters as increased site runoff would be controlled by project design	Minor impact to surface waters as increased site runoff would be controlled by project design	Minor impact to surface waters as increased site runoff would be controlled by project design	Minor impact to surface waters as there would be minimal to no increase in site runoff	No impact	No impact
Hazards, Human Health, and Accidents	Minor impact during construction and operation related to hazardous materials and emergency response	Minor impact during construction and operation related to hazardous materials and emergency response	Minor impact during construction and operation related to hazardous materials and emergency response	Minor impact during construction and operation related to hazardous materials and emergency response	Minor impact during construction and operation related to hazardous materials and emergency response	Minor impact during operation related to hazardous materials and emergency response
Biological Resources	Minor impact because construction and operation would have the potential to affect nesting birds and special-status species ¹	Minor impact because construction and operation would have the potential to affect nesting birds and special-status species ¹	Minor impact because construction and operation would have the potential to affect wetland habitat, nesting birds, and sensitive natural communities ¹	No impact	No impact	No impact

Environmental Topic	Proposed Action and Alternatives					
	Proposed Action	Alternative 1 Cafeteria Parking Lot Site	Alternative 2 RFS Site	Alternative 3 Former DHS Site	Alternative 4 Leased Facility on San Pablo Avenue	Alternative 5 No Action
Cultural Resources	Minor impact because there is a low potential to encounter archaeological resources at the Proposed Action site ¹	Minor impact because there is a low potential to encounter archaeological resources at the alternative site ¹	Minor impact because there is a moderate to high potential to encounter archaeological resources at the alternative site ¹	Minor impact because there is a low potential to encounter archaeological resources at the alternative site	Existing building could qualify as an historical resource	No impact
Visual Resources	Minor impact because the building would not be prominently visible from many off-site locations ¹	Minor impact because the building would not be prominently visible from many off-site locations ¹	Minor impact because the building would not be prominently visible from off-site locations	Minor impact because although the new building would be visible to the public, it would replace an existing structure in a highly urbanized area; potential beneficial impact as the alternative would likely improve the visual character of the area ²	Minor impact because the additional story would be visible	No impact
Air Quality	Minor impact because emissions of criteria pollutants and toxic air contaminants would be generated during construction and operation of the facility ¹	Minor impact because emissions of criteria pollutants and toxic air contaminants would be generated during construction and operation of the facility ¹	Minor impact because emissions of criteria pollutants and toxic air contaminants would be generated during construction and operation of the facility ¹	Minor impact because emissions of criteria pollutants and toxic air contaminants would be generated during construction and operation of the facility ²	Minor impact because emissions of criteria pollutants and toxic air contaminants would be generated during construction and operation of the facility ¹	Minor impact because emissions of criteria pollutants and toxic air contaminants would be generated during operation of the facility

Environmental Topic	Proposed Action and Alternatives					
	Proposed Action	Alternative 1 Cafeteria Parking Lot Site	Alternative 2 RFS Site	Alternative 3 Former DHS Site	Alternative 4 Leased Facility on San Pablo Avenue	Alternative 5 No Action
Greenhouse Gases	Minor impact because construction and operation of the facility would generate greenhouse gases (21,810 CO ₂ -equivalent metric tons [MTCO _{2e}] per year) ³	Minor impact because construction and operation of the facility would generate greenhouse gases (21,810 MTCO _{2e} per year)	Minor impact because construction and operation of the facility would generate greenhouse gases (22,343 MTCO _{2e} per year)	Minor impact because construction and operation of the facility would generate greenhouse gases (21,955 MTCO _{2e} per year)	Minor impact because construction and operation of the facility would generate greenhouse gases (22,151 MTCO _{2e} per year)	Minor impact because operation of the facility would generate greenhouse gases (11,325 MTCO _{2e} per year)
Noise	Minor impact because construction and operation of the facility would not substantially increase noise at the nearby sensitive receptors ¹	Minor impact because construction and operation of the facility would not substantially increase noise at the nearby sensitive receptors ¹	Minor impact because construction and operation of the facility would not substantially increase noise at the nearby sensitive receptors.	Nearby residential receptors would experience high noise levels during construction ²	Nearby residential receptors would experience high noise levels during construction	No impact
Transportation and Traffic	Minor impact because construction and operation of the facility would add trips that would not degrade intersection operations	Minor impact because construction and operation of the facility would add trips that would not degrade intersection operations	Minor impact because construction and operation of the facility would add trips that would not degrade intersection operations	Level of service at City of Berkeley intersections would degrade ²	Level of service at City of Berkeley intersections would degrade	No impact
Utilities and Waste Management	Minor impact because operation of the CRT facility would increase demand for utilities ¹	Minor impact because operation of the CRT facility would increase demand for utilities ¹	Minor impact because operation of the CRT facility would increase demand for utilities	Minor impact because operation of the CRT facility would increase demand for utilities	Minor impact because operation of the CRT facility would increase demand for utilities	No impact

Environmental Topic	Proposed Action and Alternatives					
	Proposed Action	Alternative 1 Cafeteria Parking Lot Site	Alternative 2 RFS Site	Alternative 3 Former DHS Site	Alternative 4 Leased Facility on San Pablo Avenue	Alternative 5 No Action
Public Services	No impact	No impact	No impact	No impact	No impact	No impact
Population and Housing, Socioeconomics and Environmental Justice	Minor impact because the Proposed Action would not result in environmental effects or human health risks that could affect minority or low- income populations near the site	Minor impact because the alternative would not result in environmental effects or human health risks that could affect minority or low- income populations near the site	No impact	Minor impact because the alternative would not result in environmental effects or human health risks that could affect minority or low- income populations near the site	Minor impact because the alternative would not result in environmental effects or human health risks that could affect minority or low- income populations near the site	No impact
Construction Traffic Accidents	No impact	No impact	No impact	No impact	No impact	No impact

¹ The Proposed Action includes standard project features (SPFs) required by the LBNL 2006 Long Range Development Plan Environmental Impact Report and compliance with LBNL standard operating procedures, best practices, and standard construction specifications that would reduce or avoid potential effects.

² Alternative 3 includes standard practices required by the UC Berkeley 2020 Long Range Development Plan Environmental Impact Report that would avoid or reduced potential effect.

³ The CO₂ equivalent emissions are commonly expressed as "metric tons of carbon dioxide equivalent (MTCO_{2e})."
The carbon dioxide equivalent for a gas is derived by multiplying the tons of the gas by the associated global warming potential (GWP), such that $MTCO_{2e} = (\text{metric tons of a GHG}) \times (\text{GWP of the GHG})$. For example, the GWP for methane is 21. This means that emissions of one metric tons of methane are equivalent to emissions of 21 metric tons of CO₂.