Final Environmental Assessment for Construction and Operation of The Molecular Foundry

At
Ernest Orlando Lawrence Berkeley National Laboratory
Berkeley, California

For the U. S. Department of Energy
Office of Science
Office of Basic Energy Sciences (SC-10)

DOE/EA-1441

February 2003

PREFACE

The National Environmental Policy Act of 1969 (NEPA) requires that Federal agencies consider the environmental consequences of their proposed actions before decisions are made. In complying with NEPA, the U.S. Department of Energy follows the Council on Environmental Quality (CEQ) regulations (40 Code of Federal Regulations [CFR] 1500 through 1508) and Department of Energy's (DOE) own NEPA implementing procedures (10 CFR 1021). The purpose of an Environmental Assessment (EA) is to provide Federal decision-makers with sufficient evidence and analysis to determine whether to prepare an Environmental Impact Statement (EIS) or issue a Finding of No Significant Impact (FONSI). This EA has been prepared to assess the environmental consequences resulting from the construction and operation of the proposed Molecular Foundry facility within the boundaries of the Lawrence Berkeley National Laboratory (LBNL).

The objectives of this EA are to (1) describe the underlying purpose and need for DOE action; (2) describe the Proposed Action and identify and describe any reasonable alternatives that satisfy the purpose and need for DOE action; (3) describe baseline environmental conditions at LBNL; (4) analyze the potential indirect, direct, and cumulative impacts to the existing environment from implementation of the Proposed Action and other reasonable alternatives; and (5) compare the impacts of the Proposed Action with the No Action Alternative and other reasonable alternatives.

CHAPTER 1.0

EXECUTIVE SUMMARY

Lawrence Berkeley National Laboratory (LBNL) proposes to build a six-story, approximately 86,500 gross square foot (gsf) Molecular Foundry building; and an adjacent 8,000 gsf, partly below-grade Central Utility Plant building (for a combined 94,500 gsf), to be funded and operated by the U.S. Department of Energy's Office of Basic Energy Sciences. The buildings would be located on an approximately 2½-acre site in the southeastern portion of the LBNL facility in the Oakland-Berkeley hills (see Figures 1 and 2). The site is on mostly undeveloped slopes between Building 72, which is the National Center for Electron Microscopy (NCEM), and Building 66, which is the Surface Science and Catalysis Laboratory (SSCL).

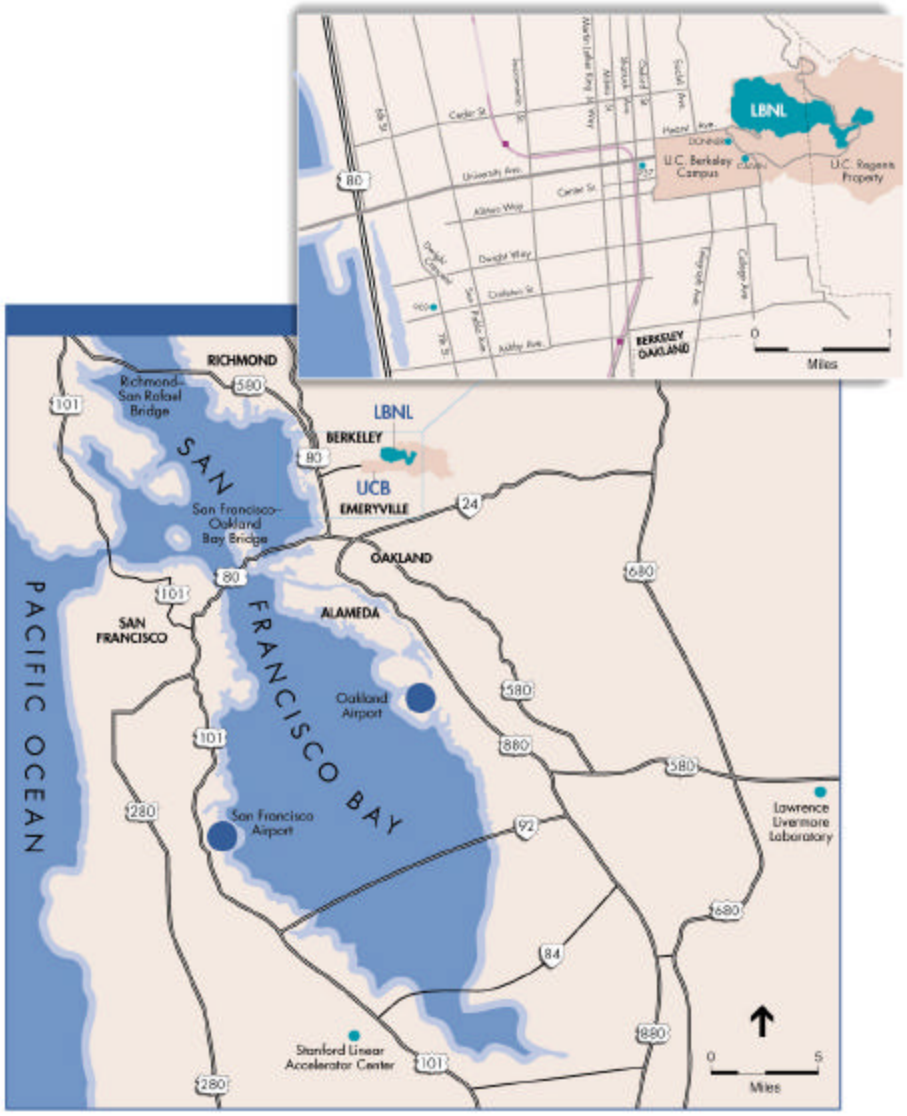
The Molecular Foundry building would include laboratories, offices, and conference and seminar rooms; the Central Utility Plant would also serve as the foundation for 16 surface parking spaces. A new plaza and pedestrian bridges would connect or provide ready access between the proposed Molecular Foundry building and adjacent scientific buildings. The Proposed Action would extend Lee Road approximately 350 feet, and widen a portion of the road to accommodate two-way traffic.

The Molecular Foundry would be staffed and/or used by an estimated 137 persons, of whom an estimated 59 would be staff persons, 36 would be students, and 42 would be visitors (i.e., visiting scientists) to the Center. The Proposed Action would require removal of an existing paved 18-space parking lot and retaining walls, as well as excavation into an undeveloped hillside. Approximately two-dozen mature trees would be removed along with approximately one-dozen saplings. The Proposed Action would replant or replace trees, generally in-kind and in or around the site. LBNL anticipates it would reuse all soil excavated for the Molecular Foundry to construct the new Lee Road extension and widen the existing roadway. This Proposed Action would be a resource for the Department of Energy's participation in the National Nanotechnology Initiative (NNI). Nanotechnology is the design, fabrication, characterization, and use of materials, devices, and systems through the control of matter at the nanometer-length scale.[1] Nanoscience will develop the understanding of building blocks at the nanometer-length scale and the methods by which they are assembled into multi-component devices.

Alternatives to the Proposed Action include a reduced size building configuration, location of the building on a different on-site location, and a No Action alternative. Several off-site alternatives were considered but were not found to reasonably meet the purpose and need for the Proposed Action. Of the reasonable alternatives analyzed, the Proposed Action is found to best meet DOE's purpose and need for action.

---

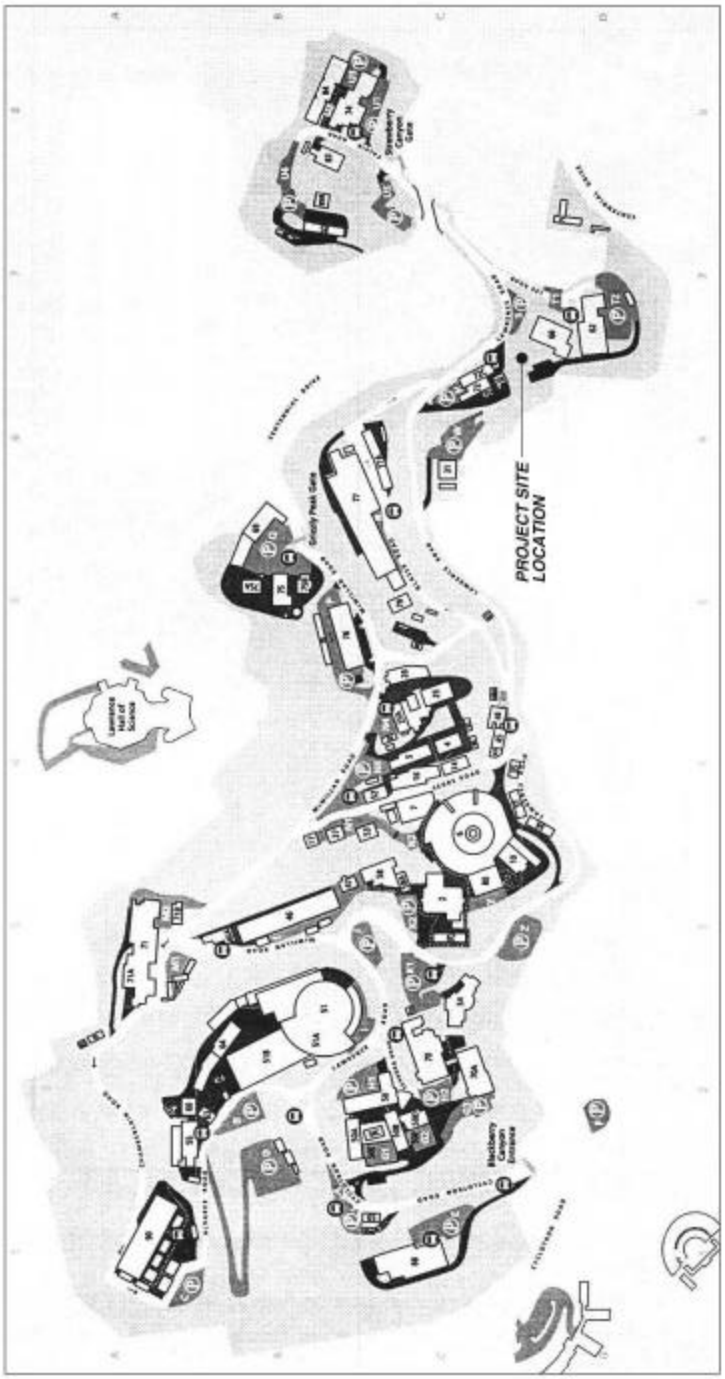
[1] The term "nanometer" describes a length of one-billionth of a meter.



SOURCE: Lawrence Berkeley National Laboratory (2002)

LBNL Molecular Foundry / 202211 ■

Figure 1
Regional Location Map



SOURCE: Lawrence Berkeley National Laboratory (2002)

LBNL Molecular Foundry / 202211

Figure 2
Lawrence Berkeley National Laboratory, Berkeley, CA
Site Location Map

Although the Proposed Action would take place on a partially developed site that is generally surrounded by existing buildings and roads, the site is near to designated Critical Habitat of the Federally-listed Alameda Whipsnake. To minimize any potential but unexpected impact to the Alameda whipsnake, several mitigation measures are proposed (see below). In addition, the Proposed Action would result in minor increases in stormwater runoff, air pollutant emissions, visual quality impacts, noise impacts, and the potential to disturb unanticipated archaeological resources. It would produce marginal increases in traffic and parking demand, as well as incremental demand increases for water, energy, wastewater treatment, waste disposal, and public services.

The following impact is found to be potentially significant without mitigation in this Environmental Assessment:

Impact:

Although the site is not located in USFWS-designated critical habitat, due to the potential for Alameda whipsnake movement into the project area, mitigation measures would be implemented to ensure that whipsnakes are protected to the greatest extent possible during project construction

Mitigation Measures:

- Prior to the initiation of excavation, construction, or vehicle operation, the project area shall be surveyed by a designated monitor, trained in Alameda whipsnake identification and ecology by a qualified biologist, to ensure that no Alameda whipsnakes are present. This survey shall not be intended to be a protocol-level survey, but rather one designed to verify that no snakes are actually on site.

- All on-site workers shall attend an Alameda whipsnake information session conducted by the designated monitor. This session shall cover identification of the species and procedures to be followed if an individual is found on site.

- All lay-down and deposition areas shall be inspected each morning by a designated monitor to ensure that Alameda whipsnakes are not present. All construction activities that take place on the ground shall be performed in daylight hours. Vehicle speed on site shall not exceed 15 miles per hour. Construction materials, soil, construction debris, or other material shall be deposited only on areas where vegetation has been mowed and any snakes present would be readily visible.

- The site is subject to annual vegetation management involving the close-cropping of all grasses and ground cover on the project area; this management shall be done prior to initiation of construction. Re-mowing shall be done if grass or other vegetation on the project site becomes high enough to conceal whipsnakes during the construction period.

Significance After Mitigation: Less than significant.

NEPA PROCESS

A Draft Environmental Assessment was circulated for Agency and public review and comment on December 10, 2002; comments were requested to be received by January 13, 2003.

As part of the public notification process, only one individual or organization commented on the draft, regarding water service, wastewater, and water conservation. The EA has been revised to clarify the source and distribution of LBNL's water service and to address adequacy of wastewater system capacity (see Section 4.3.10). Section 3.1.4 has been revised to clarify requirements for irrigation and selection of water-conserving plants.

Additional refinements and clarifications have been made to the Final EA. Please refer to Appendix E (page E-1) for a detailed account of changes from the Draft EA. None of these additions, changes, or refinements represents the introduction of substantial new information that would indicate a new or significant impact or that would change the conclusions drawn from this analysis.

TABLE OF CONTENTS

ENVIRONMENTAL ASSESSMENT FOR CONSTRUCTION AND OPERATION OF THE MOLECULAR FOUNDRY AT LAWRENCE BERKELEY NATIONAL LABORATORY, BERKELEY, CALIFORNIA

		Page
1.0	**EXECUTIVE SUMMARY**	**ii**
2.0	**PURPOSE AND NEED**	**1**
3.0	**DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES**	**4**
	3.1 Proposed Action	4
	3.2 No Action Alternative	24
	3.3 Different Building Configuration Alternative	24
	3.4 Alternate Building Site (On-Site) Alternative	24
	3.5 Alternatives Considered But Eliminated from Further Analysis	25
4.0	**AFFECTED ENVIRONMENT**	**26**
	4.1 Regional and Local Setting	26
	4.2 Environmental Resources Not Affected	26
	4.3 Environmental Resources Potentially Affected	27
	4.3.1 Geology, Soils, and Seismicity	27
	4.3.2 Hydrology and Water Quality	28
	4.3.3 Biological Resources	29
	4.3.4 Historic and Archaeological Resources	29
	4.3.5 Visual Quality	30
	4.3.6 Traffic and Circulation	33
	4.3.7 Air Quality	34
	4.3.8 Noise	37
	4.3.9 Public Services	39
	4.3.10 Public Utilities	40
	4.3.11 Energy	40
	4.3.12 Hazards and Human Health	41

5.0 ENVIRONMENTAL CONSEQUENCES 43

5.1. Environmental Consequences of the Proposed Action 43
5.1.1 Geology, Soils, and Seismicity 43
5.1.2 Hydrology and Water Quality 45
5.1.3 Biological Resources 46
5.1.4 Historic and Archaeological Resources 49
5.1.5 Visual Quality 50
5.1.6 Traffic and Circulation 52
5.1.7 Air Quality 54
5.1.8 Noise 58
5.1.9 Public Services 59
5.1.10 Public Utilities 60
5.1.11 Energy 61
5.1.12 Hazards and Human Health 62
5.2 Analysis of Abnormal Events and Accident Scenarios 63
5.3 Environmental Consequences of the Proposed Alternatives 64

6.0 CUMULATIVE IMPACTS 66

6.1 Projects in Vicinity of Proposed Action 66
6.2 Cumulative Impact Areas 67

7.0 REFERENCES 74

8.0 PERSONS AND AGENCIES CONSULTED 77

9.0 GLOSSARY 78

10.0 APPENDICES 81

A. Standard (Required) LBNL Project Features A-1
B. Land Use Analysis B-1
C. Socioeconomic Analysis C-1
D. Environmental Justice Analysis D-1
E. Revisions to this Environmental Assessment E-1

LIST OF FIGURES

1 LBNL Location iii
2 Proposed Action Site Location iv
3 Existing Site with Existing Utilities 7
4 Molecular Foundry Footprints with proposed Utilities 8
5 Area of Disturbance for Construction 9
6 Molecular Foundry Site Plan 10
7 Molecular Foundry Elevations 11
8 Molecular Foundry Floor Plans 12
9 Molecular Foundry Floor Plans 13
10 Molecular Foundry Floor Plans 14
11.A Project Site Photograph—Easterly View 31
11.B Project Site Photograph—Strawberry Canyon from Site 31

LIST OF FIGURES (Continued)

11.C	Project Site Photograph—Building 72	32
11.D	Project Site Photograph—Buildings 62 and 66	32
11.E	Project Site Photograph—Long Range Westerly View	35

LIST OF TABLES

1	Anticipated Molecular Foundry Staff	5
2	Molecular Foundry Building Summary	16
3	Typical Commercial Construction Noise Levels	39
4	Forecast Construction Noise Measurement Data	58
5	Summary of Action Alternatives	71

CHAPTER 2.0

PURPOSE AND NEED

The Proposed Action would help implement DOE's participation in the National Nanotechnology Initiative by locating a nanoscale research facility in a collaborative National Laboratory environment that integrates users and researchers from diverse scientific disciplines, and that is in close proximity to a synchrotron radiation source (LBNL's Advanced Light Source, or "ALS") and electron microscopy facilities (National Center for Electron Microscopy).

The NNI proposes significant increases in the national investment in nanotechnology to ensure that the United States maintains and exploits its competitive position in this rapidly developing field. The proposed Molecular Foundry would be consistent with the recommendation of the Interagency Working Group on Nanoscale Science, Engineering, and Technology (IWGN) of the National Science and Technology Council (NSTC), which urges that the DOE make nanoscale research facilities part of its contribution to the NNI.

European nations and Japan are already heavily committed to nanoscale science, which promises to revolutionize technology in the 21st century. An example of this commitment is the planned $300 million center for microtechnology and nanotechnology to be located near Grenoble, France. Grenoble is a major research center that is already home to the European Synchrotron Radiation Facility (ESRF) and the Institut Laue-Langevin (ILL) neutron source. This choice of sites reflects the importance of pairing nanotechnology centers with synchrotron radiation – a fact also recognized by the IWGN. The LBNL's proposed Molecular Foundry would also be consistent with the mission of the Office of Science: "To advance basic research and the instruments of science that are the foundations for DOE's applied missions, a base for U.S. technology innovation, and a source of remarkable insights into our physical and biological world and the nature of matter and energy." LBNL's proposed Molecular Foundry would provide a unique opportunity for a major advance in carrying out that mission.

The nanoscale research facilities envisioned by DOE would have unique scientific and engineering capabilities that combine state-of-the-art nanofabrication equipment with advanced nanocharacterization tools, theory, and computation. They will form a cornerstone of the nation's nanotechnology revolution, shedding light on the full spectrum of nanomaterials and providing an invaluable resource for universities and industry. In summary, nanoscale research facilities, and the Molecular Foundry in particular, would:

- Advance fundamental understanding and control of materials at the nanoscale dimension.

- Create an environment that would support multidisciplinary, multi-investigator research having a scope and complexity far beyond the traditional scale of the individual investigator or small group efforts.
- Establish the foundation for developing nanotechnologies important to DOE.
- Furnish users from the entire nation, and in fact the world, from government labs, universities, and industry with state-of-the-art equipment, and optimize use of existing LBNL national user facilities that harness electrons and photons for materials characterization.
- Provide a formal mechanism for short-term and long-term collaborations and partnerships among DOE laboratory, academic, and industrial researchers.
- Produce training opportunities for graduate students and postdoctoral associates in interdisciplinary nanoscale science, engineering, and technology research.

The Molecular Foundry would integrate researchers from various fields, including materials science, chemistry, biology, and computational science, to work and conduct research collaboratively. A few examples of the types of products and innovations hoped for with this sort of collaborative nanoscience and technology at the proposed Molecular Foundry include:

- Inexpensive and accessible terabyte-scale computer memories for personal computers and electronic devices;
- Quantum computers capable of making advances in complex, enormous tasks such as cryptography and climate modeling;
- Compact, ultra-sensitive, broad-spectrum chemical and biological sensors for homeland security protection of the food and water supply, and for diagnosis of disease;
- Remote sensing devices;
- High-efficiency machine lubricants for increased efficiency and performance;
- light-weight, durable materials;
- Low-cost, high-efficiency photovoltaic cells for increased energy self-sufficiency;
- Ultrahigh selectivity catalysts for energy-efficient, low-waste production of products for industry and consumer use;
- Biologically based devices and energy transduction systems for increased efficiency;
- Nanoscale (and thereby highly selective, effective, and safer) drug delivery agents, biomedical and microsurgical devices;
- Efficient, durable displays for electronic devices;
- New instruments to image and manipulate atoms, molecules, and small particles for miniaturization of devices and instruments;

- Faster, more compact computer chips.

The proposed Molecular Foundry laboratories would be designed and constructed to facilitate research activities in a wide variety of fields required for progress in this new area of science. These labs would support a broad research effort focusing on "hard" nanometer-sized materials (e.g., rigid, static, structural elements such as nanocrystals, tubes and lithographically patterned structures) as well as "soft" nanometer-sized materials (e.g., flexible, dynamic, organic materials such as polymers, dendrimers, DNA, proteins and whole cells).

The Molecular Foundry would house facilities for research in six areas: 1) nanofabrication, 2) inorganic nanostructures, 3) organic, polymer/biopolymer synthesis, 4) biological nanostructures, 5) theory, and 6) imaging and manipulation. These facilities would be equipped with state-of-the-art instruments and would be staffed by full-time scientists and technicians. The facilities would function as user facilities, available to scientists from universities, industry, and government laboratories whose research proposals have been peer-reviewed by a study panel. This combination of equipment, collaborative staff and disciplines would allow users a highly interdisciplinary approach.

CHAPTER 3.0

DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

3.1 PROPOSED ACTION

Lawrence Berkeley National Laboratory proposes to construct the Molecular Foundry, a six-story laboratory building of approximately 86,500 gross square feet and a utility building of about 8,000 gross square feet, in the southeast corner of the LBNL site. It would be used for the interdisciplinary exploration and study of nanosciences, and would be a national use facility open to visiting scientists. Construction would take place between January 2004 and February 2006.

3.1.1 OPERATIONS

STAFFING

Approximately 137 staff and students would occupy the Molecular Foundry. Staff includes directors; scientific, technical and administrative personnel; and visiting scientists. LBNL estimates that approximately 24 of the future Molecular Foundry staff are currently employed within the LBNL site; these would contribute to filling the projected 59 new staff positions. In addition, 42 visiting scientists would occupy the Molecular Foundry building along with an estimated 36 students and post-doctoral fellows using the laboratories.

It is assumed that the estimated 24 current LBNL staff who would join the Molecular Foundry from existing positions at LBNL would create vacancies that would most likely be filled within one year of their leaving. For that reason, with the exception of the six Directors, all 137 staff positions are considered in the analysis for impacts. The six Directors would not be replaced and would likely retain their office and lab spaces in their current LBNL locations, as well as in the new buildings.

3.1.2 BUILDING DESIGN

The Molecular Foundry facility would consist of two buildings: a six-story 86,500-gsf Molecular Foundry, and 8,000-gsf Central Utility Plant (see Figure 6) for a total approximate building area of 94,500 gsf. The Molecular Foundry would include both buildings and other proposed site improvements, and would include wet and dry laboratories, laboratory support facilities, equipment rooms, conference/seminar rooms, and offices. In addition, “specialty” rooms

TABLE 1
ANTICIPATED MOLECULAR FOUNDRY STAFF

Category	Molecular Foundry Staffing Levels[1]
Directors	6
Scientific Staff	25
Technical Staff	18
Administrative Staff	10
Visiting Scientists	42
Students / Post Docs	36
Totals	137

[1] Numbers are estimates and may be approximate.

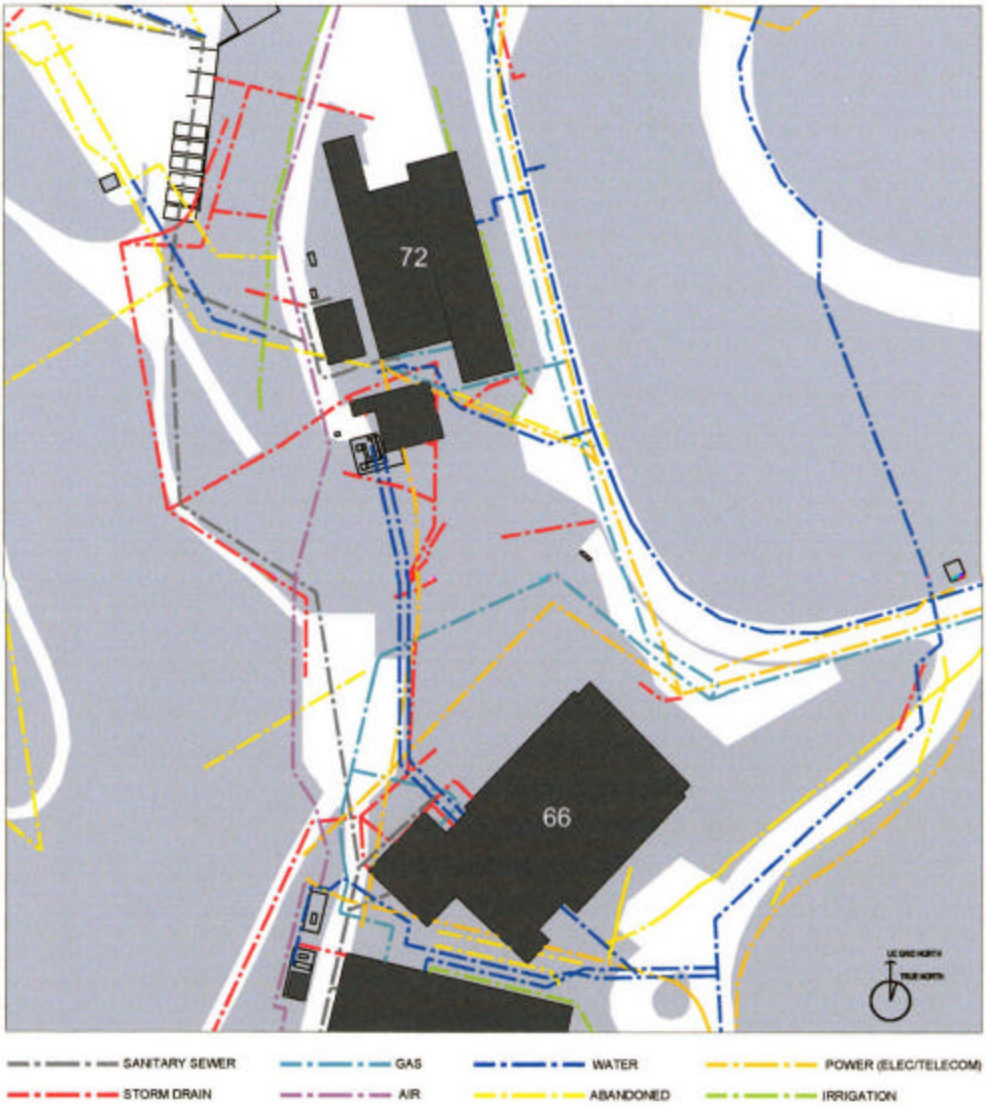
SOURCE: Lawrence Berkeley National Laboratory (2002)

consisting of controlled temperature rooms, low vibration rooms and "clean" rooms would be provided. Figures 4, 5, 6, and 7 provide a cross-section and floor plans for the proposed Molecular Foundry building.

Laboratory suites, totaling approximately 28,500 assignable square feet (sf), would provide the Molecular Foundry with wet and dry laboratories, scientific support equipment space, and shared workstations for laboratory technicians. Private offices and workstation areas also would be provided for employees, visitors, and students. The Molecular Foundry would house facilities for research in six areas (see Figure 7). Figures 8, 9, and 10 provide proposed floor plans. The first floor, concrete slab-on-grade, would accommodate isolated, vibration-controlled, mass dampening equipment foundations for the Imaging and Characterization Laboratory. All laboratories would be constructed as semi-clean room space, with controls to maintain the pressure in the labs with respect to adjacent vestibules. The laboratory spaces would also be constructed to easily adapt to changing research needs for size, layout, temperature and pressure control, cleanliness, and utilities. The Foundry would include 48 fume hoods associated with its proposed laboratories. All fume hoods would exhaust to the roof and would meet all applicable vertical velocity and stack height requirements. The expected useful life of the building would be 50 years.

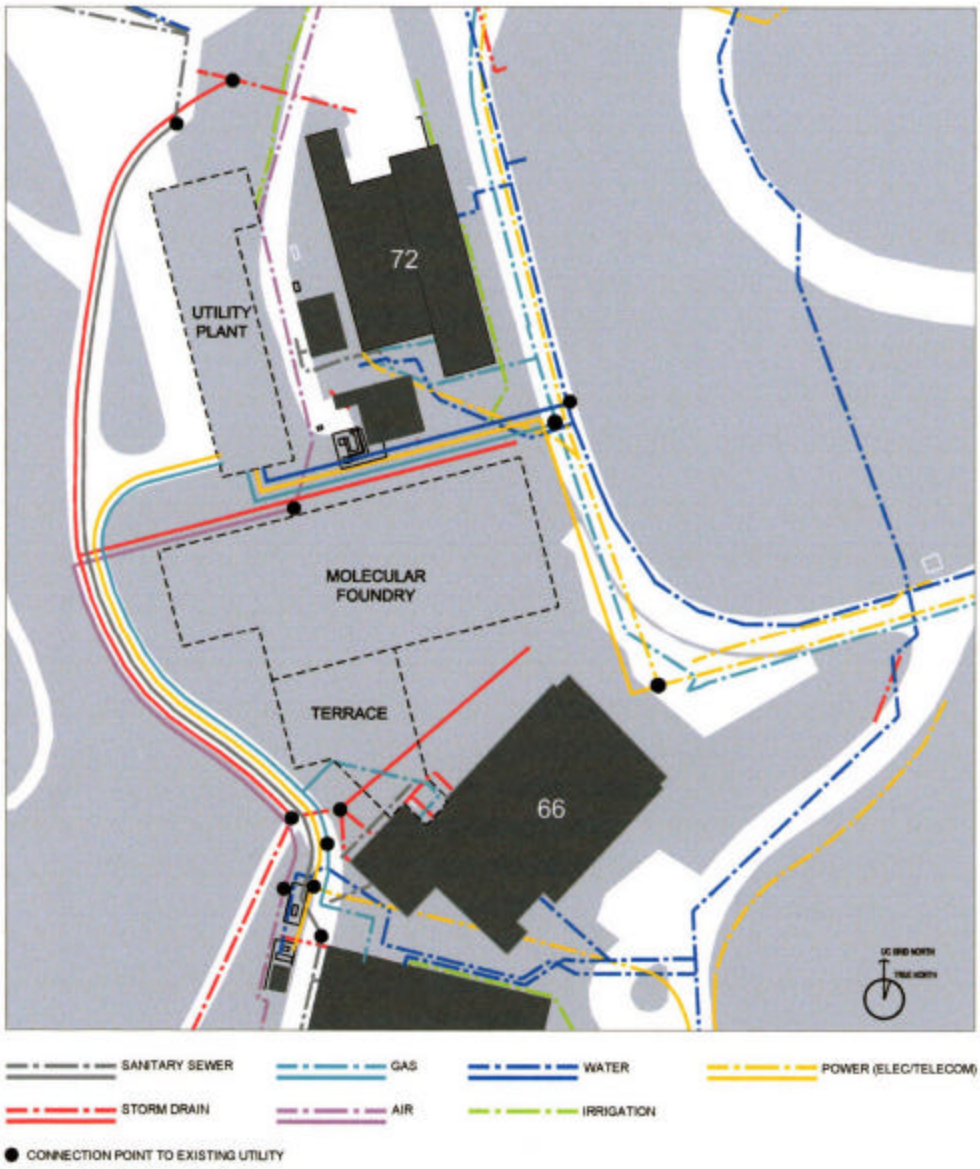
One of LBNL's goals is to incorporate cost-effective sustainable design principles into all LBNL construction. The Molecular Foundry's environmental impact would be minimized through its proposed building materials; waste minimization; energy and atmospheric impact minimization; water use efficiency; and environmental quality. As part of the Proposed Action, LBNL prepared a Conceptual Design Report that includes a complete list of the sustainable building design features that would be considered during design. The structural design would account for all loads to which the structure may be subject, including dead, live, wind, and seismic. The design would comply with the requirements of the California Building Code (CBC) and LBNL's "Lateral Force Design Criteria."

(This page left intentionally blank)



SOURCE: Lawrence Berkeley National Laboratory (2002)

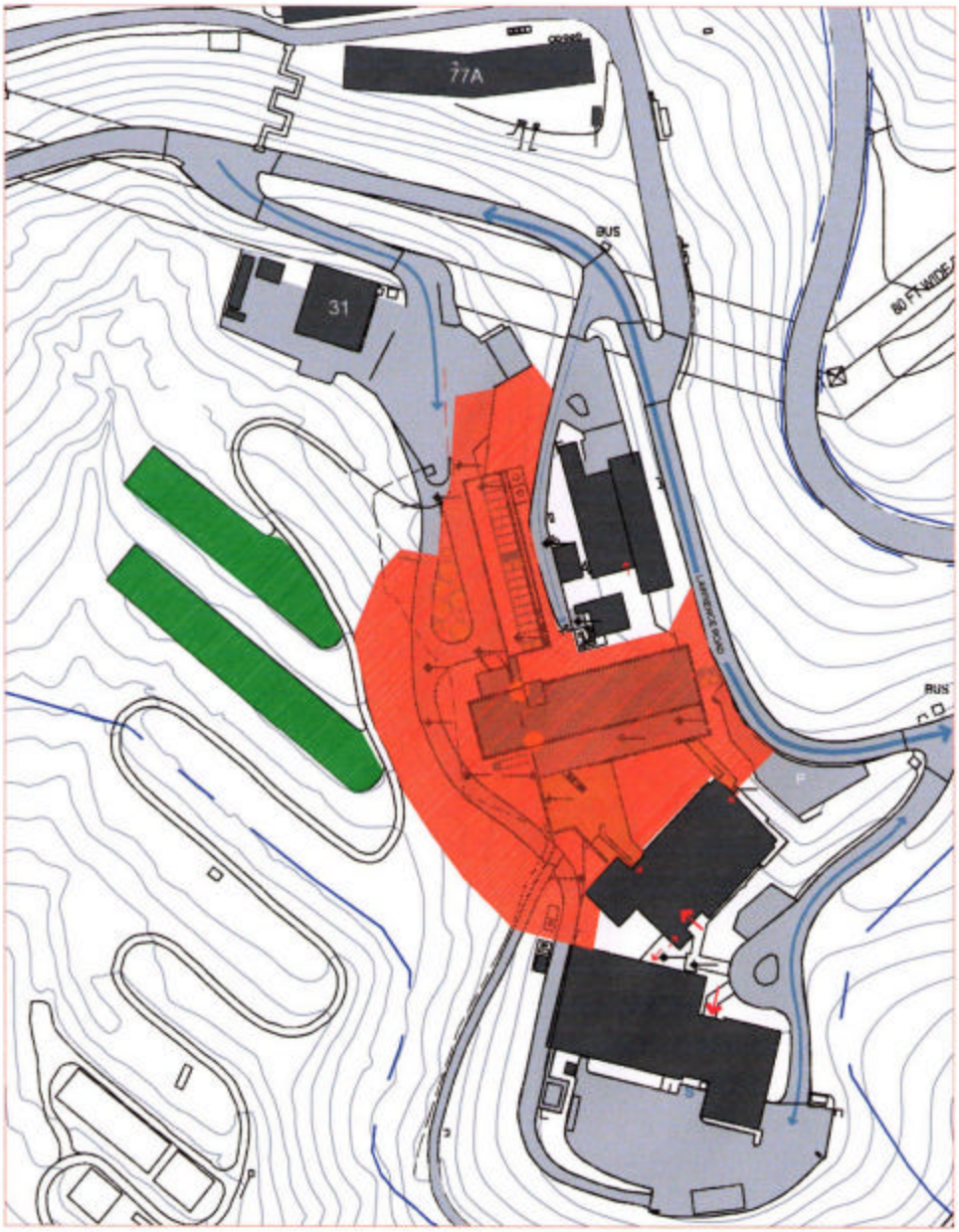
Figure 3
Existing Project Site
with Existing Utilities



SOURCE: Lawrence Berkeley National Laboratory (2002)

LBNL Molecular Foundry / 202211 ■

Figure 4
Proposed Molecular Foundry Footprint
and Proposed Utilities

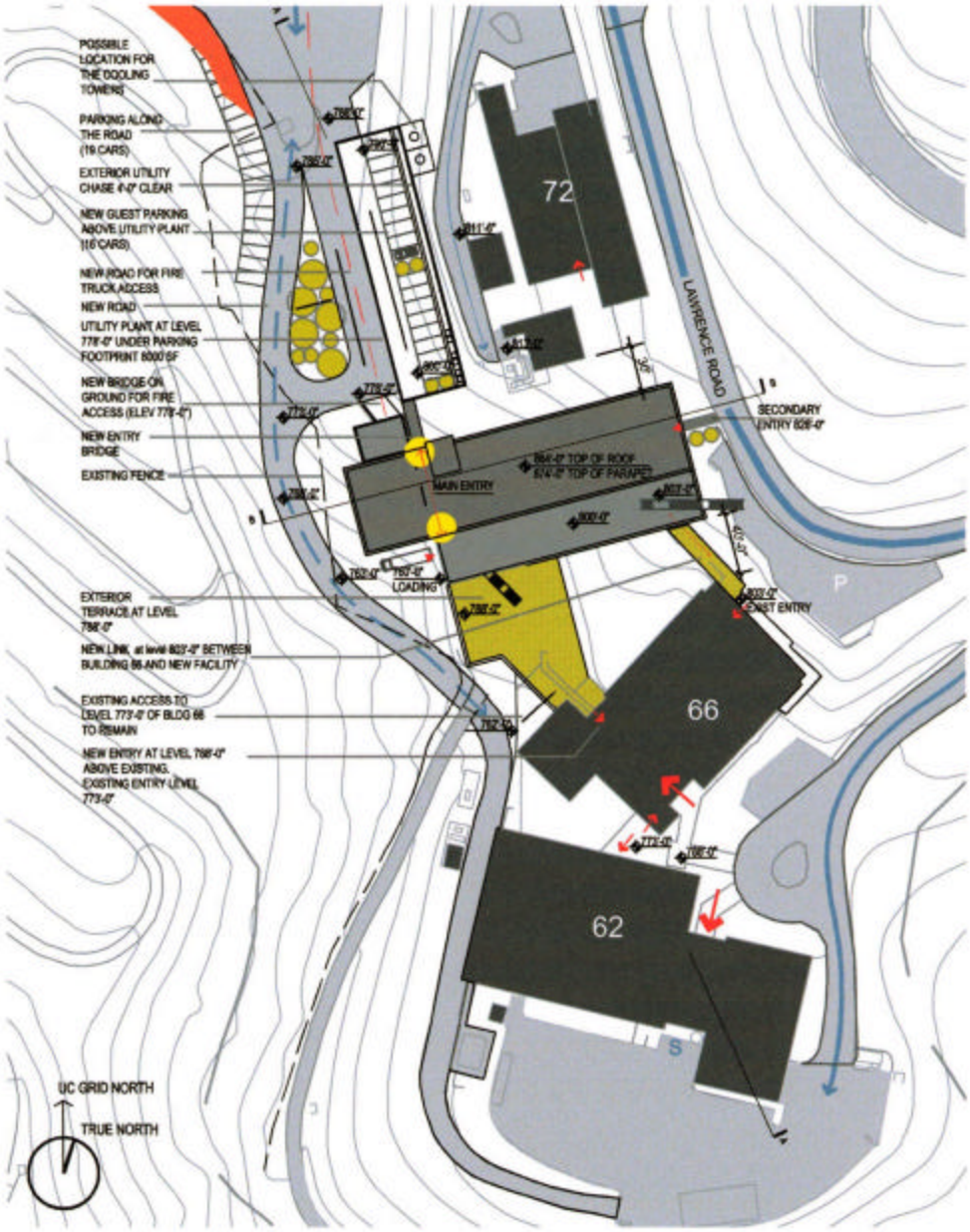


SOURCE: Lawrence Berkeley National Laboratory (2002)

LBNL Molecular Foundry / 202211 ■

Figure 5

Area of Disturbance for Construction of the Molecular Foundry

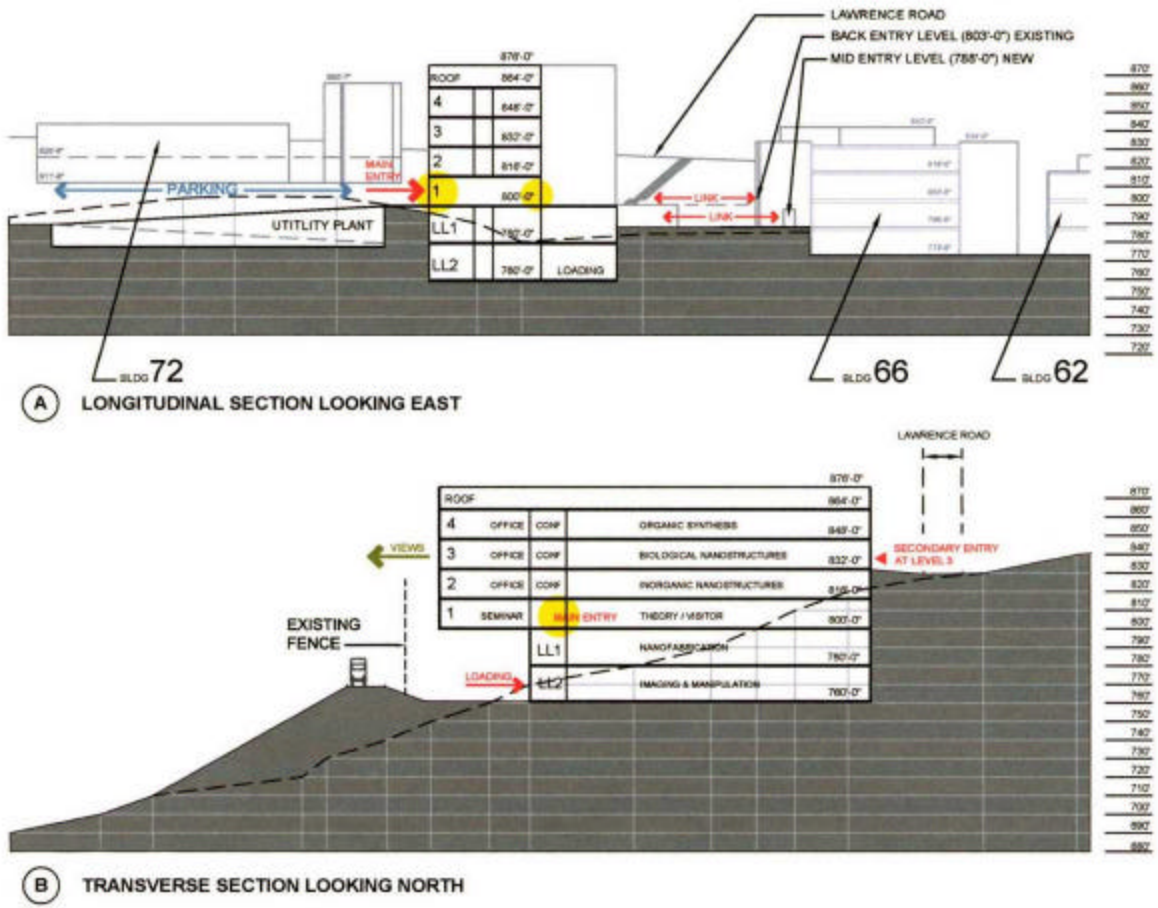


SOURCE: Lawrence Berkeley National Laboratory (2002)

LBNL Molecular Foundry / 202211 ■

Figure 6

Molecular Foundry Site Plan

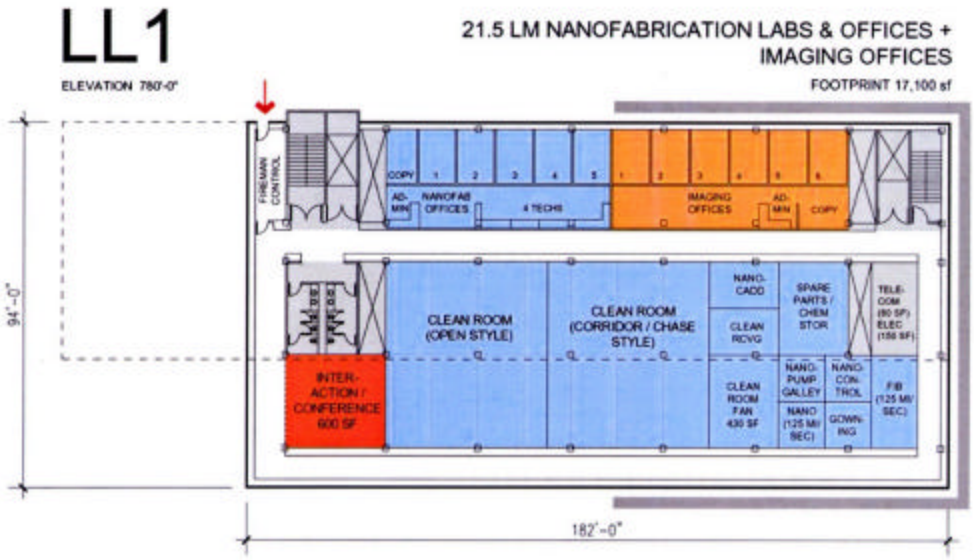


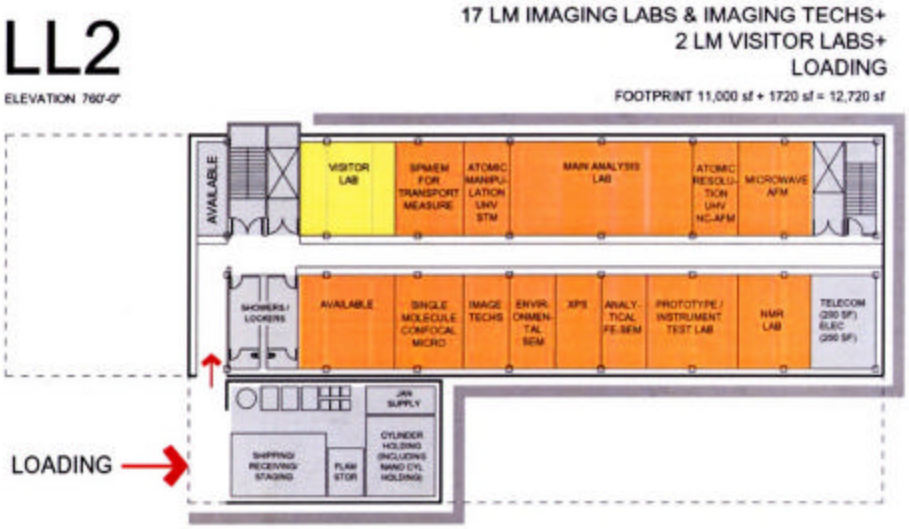
SOURCE: Lawrence Berkeley National Laboratory (2002)

LBNL Molecular Foundry / 202211 ■

Figure 7

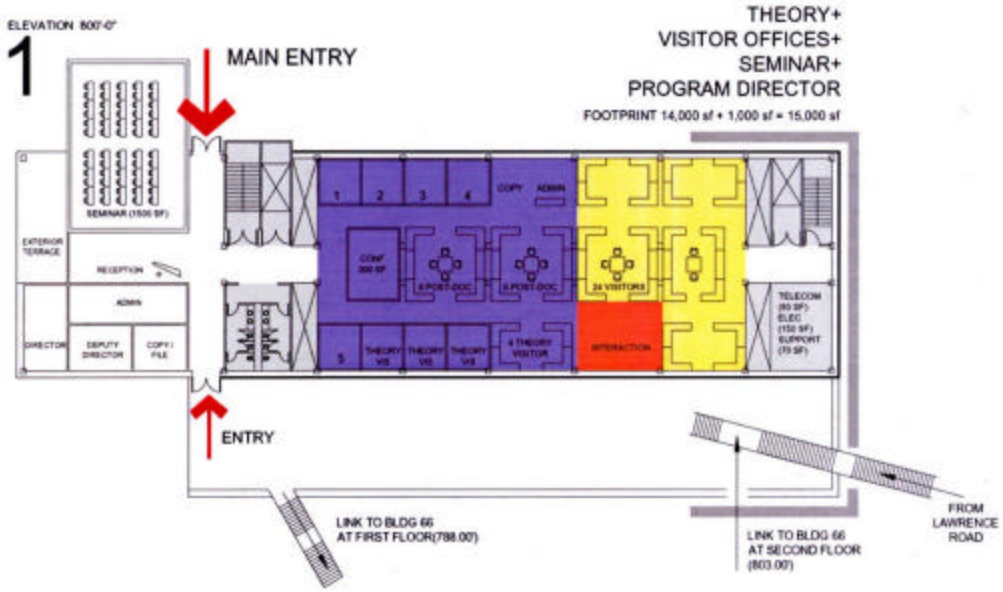
Molecular Foundry Elevations

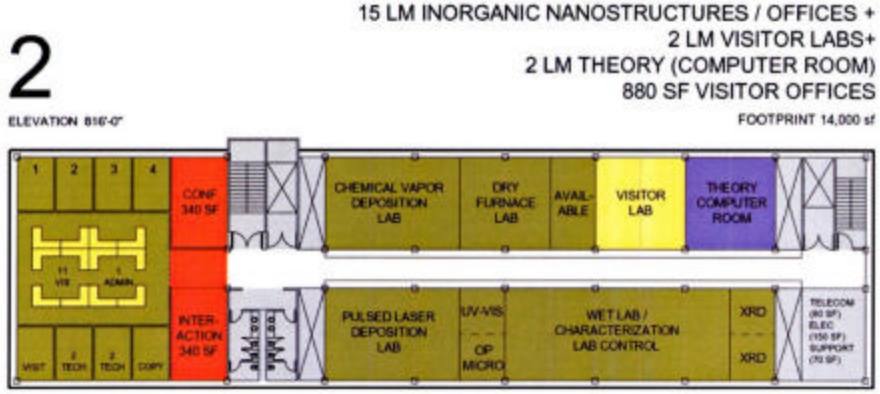




SOURCE: Lawrence Berkeley National Laboratory (2002)

Figure 8
Floor Plans of Nanofabrication and Imaging Labs and Offices

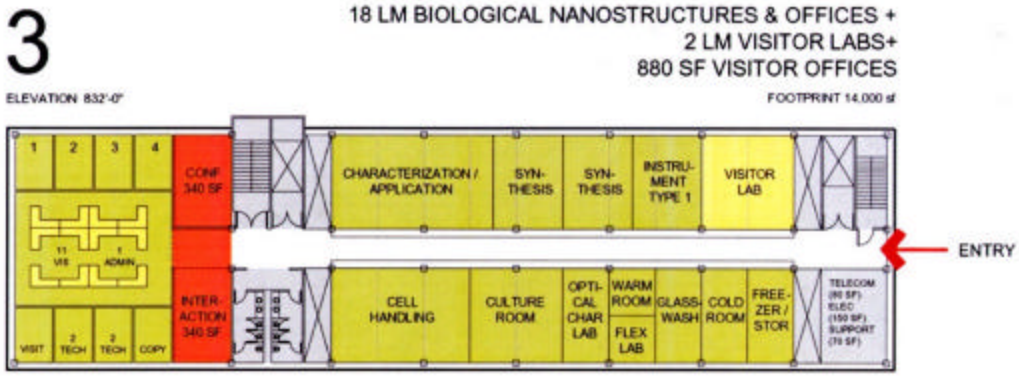


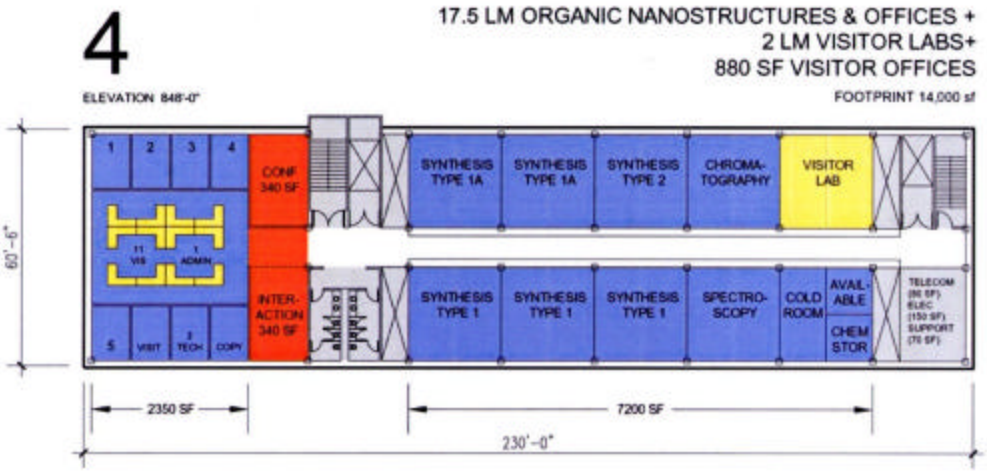


SOURCE: Lawrence Berkeley National Laboratory (2002)

Figure 9

Floor Plans of Theory Offices and Inorganic Nanostructures and Offices





SOURCE: Lawrence Berkeley National Laboratory (2002)

LBNL Molecular Foundry / 202211 ■

Figure 10

Floor Plans of Biological and Organic Nanostructures and Offices

The exterior skin of the building would be a non-reflective material that would minimize glare and exterior maintenance. The building roof would be a single sheet co-polymer roofing membrane system with heat reflective coating to reduce solar gain. Metallic screens would be located on the roof to conceal rooftop mechanical exhaust equipment.

The Molecular Foundry would also be designed in conformance with requirements for Group "B" and "H-8" research laboratory occupancies as defined by the CBC, Type II Fire Resistive Construction, and with seismic safety and fire safety code requirements. The building would comply with disabled accessibility requirements in accordance with the Americans with Disabilities Act (ADA).

The proposed Central Utility Plant (CUP) building would be oriented along a north/south axis perpendicular to the adjacent Molecular Foundry and would be constructed to accommodate approximately 16 overhead surface parking spaces (i.e., on its roof) (see Figure 7, Longitudinal Section Looking East). This rooftop would also provide pedestrian access to the main entrance of the Molecular Foundry on its first floor. As described in Table 2, the Central Utility Plant building would house the various utility systems needed for the Molecular Foundry, including equipment for heater boilers, chillers and the chilled water pumps, air handling units, fans, an electrical distribution system, and connections to the LBNL existing fire alarm system.

3.1.3 CIRCULATION

As further described below, as part of the Proposed Action, vehicular access to the project site would be accommodated by the extension of Lee Road, which would result in a semi-circular road that loops around the project site. The Proposed Action would therefore be accessible from two locations along Lawrence Road: at the three-way intersection of the proposed new extension of Lee Road, the Building 31 parking lot, and Lawrence Road north of the project site; and at the intersection of Lee Road and Lawrence Road, west of the project site.

In addition to vehicular access, the Proposed Action design addresses three other types of circulation: building occupant / pedestrian traffic circulation, service access, and fire truck / emergency services access. Entrances to the Molecular Foundry building would be located as follows: LL2[2] (bottom floor), loading dock on the south side of the building; LL1 (upper basement floor), on the north side of the building; first floor, main entrance on the north side, secondary main entrance on the south side; and third floor, on the east side. Access to the Central Utility Plant building would be provided on the southwestern corner of the building.

Each floor of the Molecular Foundry building would be organized around a main corridor that would access the labs, offices, meeting rooms, stairs, elevators, and building entrances (see Figures 8, 9, and 10). All foot traffic through the buildings would be routed through these main corridors, stairs and elevators. Outside the building, an exterior, landscaped terrace would span the distance between Building 66 and the proposed Molecular Foundry building, and would facilitate access between the two. (See Figures 6 and 7, Longitudinal Section Looking East.)

[2] The abbreviation "LL" means "lower level" (see Table 1 Figures and 7 and 8).

TABLE 2
MOLECULAR FOUNDRY BUILDING SUMMARY

Building Level	General Function	Square Feet (sq. ft.)	Description of Facilities
4	Organic Nanostructures	13,920 sq. ft.	Visitor offices, administrative offices, conference room, interaction room, visitor lab, chromatography lab, spectrography lab, cold room, synthesis labs
3	Biological Nanostructures	13,920 sq. ft.	Visitor offices, administrative offices, conference room, interaction room, visitor lab, culture room, cell handling, optical characterization lab, warm room, freezer/storage room, cold room, glass wash room, synthesis labs, characterization/ application lab, instrument lab
2	Inorganic Nanostructures	13,920 sq. ft.	Visitor offices, administrative offices, conference room, interaction room, chemical vapor lab, dry furnace lab, visitor lab, dry computer room, pulsed laser deposition lab, wet lab/characterization lab control, flexible space
1	Theory	14,920 sq. ft.	Main entrance, receptionist, seminar room, administrative offices for Program Director and staff, visitor offices, post-doctoral student space. Would also include link to Building 66 at first and second floors, and pedestrian link from Lawrence Road
Lower Level 1	Nanofabrication Labs	17,100 sq. ft.	Interaction and conference room, clean rooms, administrative/staff offices for imaging and nanofab offices, clean rooms, chemical storage, gowning area
Lower Level II	Imaging Labs	12,720 sq. ft.	Atomic manipulation UHV system, SPM/EM for transport measure, visitors labs, main analysis lab, atomic resolution UHV NC-AFM, microwave AFM, showers/lockers, shipping/receiving, flammable storage, cylinder holding, janitorial supply room, prototype/instrument test lab, NMR lab
SUBTOTAL		86,500 sq. ft.	
N/A	Utility Plant	8,000 sq. ft.	HVAC cooling towers, generator, electrical substations, treated water fluid coolers, chemical treatment facilities, water heaters, air intake and exhaust, an office/shop, pumps, treated water system, etc.
TOTAL	(NA)	94,500 sq. ft.	(NA)

SOURCE: Lawrence Berkeley National Laboratory (2002); ESA (2002)

Specifically, a stairway from the terrace to the balcony of the Molecular Foundry building would provide access to the southside main entrance on the first floor. A walkway northeast of the terrace would similarly allow direct access between the Molecular Foundry balcony and Building 66. A stairway northeast of the Molecular Foundry building would provide access to the Lawrence Road parking lot, upslope. A short walkway, connecting to Building 72 to the north, would allow direct pedestrian access from Lawrence Road to the third floor entrance of the building. Access to the northside main entrance would be provided from a pedestrian walkway connecting the Molecular Foundry building to the surface parking lot atop the partially below-grade Central Utility Plant building.

Service entry, delivery, and truck loading would take place at the westside entrance and loading-bay of the Molecular Foundry building on LL2 (the bottom floor of the building). The service yard is screened from view by a retaining wall to the east and by a landscape wall to the north.

Fire truck and emergency service access would be accommodated from Lee Road and adjacent to the Central Utility Plant building parking lot, north of the Molecular Foundry building. This access would also provide sufficient turn-around for emergency vehicles back onto Lee Road. Additional access would be provided further along Lee Road to the west and southwest of the building. Fire and emergency vehicle access to the east of the building would be provided from Lawrence Road.

ROADWAY DESIGN AND PARKING

The Proposed Action includes the extension of Lee Road by approximately 350 linear feet, from the southwest corner of Building 66 in a north/northwest direction to the parking area of Building 31. Lee Road intersects Lawrence Road northeast of Building 66, and follows a southwestern route, running along the eastern side of Buildings 62 and 66, curving around the southern perimeter of Building 62, and then running along the western sides of Buildings 62 and 66 to the project site (see Figure 6). In addition, as part of the Proposed Action, a 160-foot portion of Lee Road, located at the southwest end of Building 62, would be widened from approximately 18 feet to approximately 24 feet to safely accommodate two-way traffic. The proposed extension and widening would use soil excavated for construction of the Molecular Foundry complex.

Construction of the Proposed Action would displace approximately 18 existing parking spaces currently serving the Building 66/62 rear parking lot. Approximately 16 new parking spaces would be provided on the partially-above-grade-level rooftop of the Central Utility Plant building. The CUP building would be constructed with overhead reinforced concrete flat plate spanning from exterior supports spaced atop structural columns to support the parking load. Approximately 35 to 40 additional spaces would be required to serve the Proposed Action and to maintain LBNL's desired parking ratio of 1.7 full-time equivalents (employees) per parking space. Those additional spaces would come from the general LBNL pool of about 2,400 parking spaces.

3.1.4 SITE FEATURES

STORM DRAINAGE

The Proposed Action would add approximately 1.5 acres of impervious surface to the project site, which is less than 0.26 percent of the total watershed area of 585 acres. This would be added to the approximately 20 acres of existing impervious surface in the watershed. About half of this impervious surface is on land managed by LBNL. Surrounding undeveloped areas would remain undeveloped and permeable and would continue to support grassland and tree groves. Roads, walkways and parking areas would be paved with asphalt concrete or Portland cement concrete capable of handling appropriate vehicular and pedestrian traffic; state-of-the-art porous pavement would be considered for use where practical. To the greatest extent possible, existing pervious surfaces would be preserved to minimize the amount of storm runoff. The terrace area would be a combination of paved and planted areas.

The Proposed Action would route surface water runoff into the LBNL storm drain system at points downslope and to the south and southeast of the Proposed Action. The Proposed Action would re-route an existing 12-inch storm sewer line that services this area along the newly constructed sections of Lee Road located south of the project site. This rerouted portion of the storm sewer line would extend approximately 450 feet from the northwestern area of Building 72 to the southwestern area of Building 66. New site storm drainage would collect and discharge in this re-routed 12-inch line.

Where relocation of existing storm drainage facilities is required, measures would be taken to provide controlled diversion of storm water during construction. Specific erosion control measures would be detailed in the site-specific storm water permit for construction activities. Disturbed areas would receive final landscaping and seeding at the earliest practical time during construction so that ground cover would be well established by the next rainy season.

The drainage system would be capable of handling a 25-year storm of 2.5 inches of rain per hour and would be tied into the existing storm sewer at a junction approximately 50 feet south of the project site. Rainwater from the roof and balcony areas would be considered for collection and storage on-site for re-use as non-potable landscape irrigation water, and in other reclaimed water programs. Surface water drainage from the project site would be managed through the existing storm drain system, which discharges to a detention basin formed by a dam in Strawberry Creek.

All storm water discharged from LBNL must conform to LBNL's Storm Water Pollution Prevention Plan (SWPPP) and National Pollutant Discharge Elimination System (NPDES) permit, as required by the Clean Water Act and the State Water Resources Control Board. Oversight and enforcement of LBNL's SWPPP and NPDES permit are performed by the San Francisco Bay Regional Water Quality Control Board and the City of Berkeley.

EARTHWORK

The Proposed Action would require excavation of approximately 32,000 cubic yards of soil to construct the Molecular Foundry building and the Central Utility Plant building, and to otherwise prepare the site for roads and walkways. This fill material would not leave the site, but would be used as engineered fill to construct the new Lee Road extension along the western perimeter of the Molecular Foundry buildings, and for the widening of Lee Road southwest of Building 62.

In all areas where excavations are to be made or fill deposited, the topsoil would first be stripped and stockpiled on-site for dressing finished slopes and for use in landscaped areas. Cut and fill slopes would not be steeper than recommended by registered geotechnical engineers. Edges of cut banks would be rounded to blend into the natural terrain. Because excavations would be in the vicinity of existing buildings, shoring, bracing and underpinning designed by a Professional Engineer would be used to secure excavations. Based on long-term environmental investigations as well as site soil sampling conducted in January 2002, the site appears to be free of contamination or chemicals of potential concern.

LANDSCAPING

The Proposed Action would require the removal of approximately three-dozen trees to accommodate building footprints, roads, grading, and construction activities. These trees include Monterey pine, coastal redwood, coast live oak, and bay trees, most of which are located in the area adjacent to the western and southern faces of Building 72. Fewer than one dozen trees to be removed are downslope from the Building 66 rear parking lot, where trees occur in generally isolated patches. Much larger groves, consisting of up to several hundred trees each, located in the general vicinity, would remain untouched by the Proposed Action, including a large screening grove of Canary Island pines to the west, a grove of screening redwoods to the southwest, a riparian corridor of various trees to the west and southwest, and several contiguous groves of oak, bay, acacia, and eucalyptus trees stretching from south of the project to the northeast.

The Proposed Action would transplant up to ten redwood or similarly sized trees along the western perimeter of Lee Road to provide screening for the Proposed Action. Trees would be positioned to maximize screening benefits. In addition, replacement trees would be planted or transplanted in various locations in and surrounding the project site, particularly in the area between the Lee Road extension and the proposed Central Utility Plant building, which would receive about one dozen trees. All landscaping placed by the Proposed Action would be irrigated as necessary. In addition, as part of the final design process, irrigation would be designed so as to minimize overspray and runoff. Irrigation and landscaping are expected to be consistent with the State Model Water Efficient Landscape Ordinance AB325.

The conceptual landscaping plan for the project site consists of three zones: a “crafted” zone to be located to the south, “natural” zones to the west and east, and a parking zone to the north. The crafted zone would include the elevated terrace space between Building 66 and the Proposed Action, and would incorporate both hard and soft landscaping elements to physically and visually connect and unify the building uses. The natural zone includes the fire-resistant ground cover for

erosion control, as well as decorative plant materials that would be selected based on their indigenous, low-maintenance, and especially water-saving characteristics. Finally, the parking zone, which would also include some planted areas, would be located atop the proposed, below-grade utilities building to minimize the Proposed Action's footprint and any potential disturbance to the existing natural environment. The landscape design would conform to LBNL's vegetation management and design guidelines.

PAVED AREAS

As stated, the Proposed Action would add approximately 1.5 acres of impervious surface to the project site. Surrounding undeveloped areas would remain undeveloped and permeable and would continue to support grassland and tree groves. Roads, walkways, and parking areas would be paved with asphalt concrete or Portland cement concrete capable of handling appropriate vehicular and pedestrian traffic. To the greatest extent possible, existing pervious surfaces would be preserved to minimize the amount of storm runoff. The terrace area would be a combination of paved and planted areas. State-of-the-art porous pavement would be considered for use where practical.

UTILITIES

Utilities Corridor

New water supply, electrical power, and natural gas service would be routed along the north side of the proposed Molecular Foundry building, from points of connection on Lawrence Road along the north of the Foundry building into the south side of the proposed Central Utilities Plant building. Two parallel above-ground treated water lines that currently traverse the project site would be removed and replaced (see Figure 3 and 4).

Water Supply

An existing 12-inch high-pressure cold water (HPCW) main is routed beneath Lawrence Road, along with fire and domestic water service to Building 72. Fire protection and domestic water services for the new building would be supplied via a connection to this existing 12-inch HPCW. New fire hydrants would be placed along the lower site with a connection to the existing 6-inch HPCW at the southwest corner of Building 66. The Proposed Action would install low-flow plumbing fixtures and water-saving appliances; other devices and new technology (e.g., drip irrigation, re-circulating cooling systems, etc.) would be considered or employed where practicable to further water conservation. Water supply would be separated into industrial and domestic cold water systems. The industrial system would serve lab sinks and equipment; the domestic system would serve kitchen, restroom, and drinking fountain functions. Water pressure range would be 35 to 50 pounds per square inch. Engineering and safety features such as backflow preventers would be installed where appropriate and feasible. All new projects at LBNL are subject to EBMUD's Water Service Regulations at the time of application for service.

Storm Water

Existing sub-grade storm water drainage piping that currently crosses the proposed Molecular Foundry footprint (see Figure 3) would be re-routed to the proposed lower access road, extending approximately 450 feet from the lower (western) side of Building 72 to the lower (western) side of Building 66. New proposed site storm drains would collect and discharge into this re-routed line (see Figure 4).

Sanitary Sewer

An existing sub-grade 6-inch sanitary sewer line currently crosses the proposed Molecular Foundry building footprint (see Figure 3). This line would be re-routed to the proposed lower access road, extending approximately 450 feet from the lower (western) side of Building 72 to the lower (western) side of Building 66. Sanitary sewage from the Proposed Action would discharge into this re-routed line (see Figure 4).

Natural Gas

An existing sub-grade 3-inch high-pressure natural gas main currently crosses the proposed Molecular Foundry building footprint (see Figure 3). This line would be re-routed, extending approximately 210 feet between the proposed Molecular Foundry building and Building 72 (see Figure 4).

Compressed Air

An existing sub-grade 3-inch compressed air line currently crosses the proposed Molecular Foundry building footprint (see Figure 3). The line would be re-routed to the lower access road, extending approximately 360 feet from between Building 72 and the Central Utility Plant building to the lower (western) side of Building 66 (see Figure 4).

Treated Water

Existing supply and return treated water piping currently crosses the proposed Molecular Foundry building footprint (see Figure 3). This above-grade piping, which extends from the Building 72 complex to Building 66, would be abandoned and removed. Treated water for Proposed Action operations would be supplied from the proposed Central Utility Plant building (see Figure 4).

The Central Utility Plant would supply chilled water, treated water, heated water, purified water, and de-ionized water to the Molecular Foundry. The chilled water would be produced by two 350-ton centrifugal, water-cooled, variable-speed-drive chillers and two water towers located at the northeast corner of the Central Utility Plant building.

Power

A 12,470-volt electrical power supply would be routed from the existing LBNL SW-A5 substation near the Strawberry Canyon entrance gate along Lawrence Road, approximately

1,000 feet east of the project site. The estimated load for the Molecular Foundry operations would be 3,800 kilovolt-amps (kVA), assuming a 30 percent spare capacity.

A 750-kilowatt diesel generator located within the Central Utility Plant building would supply emergency electrical power. A 3,000-gallon aboveground, double-contained tank would supply fuel storage for 48 hours of generator operation. An authority to construct and a permit to operate from the Bay Area Air Quality Management District would be required before the emergency generator could be placed and used.

Natural gas for laboratory work, water heating, and space heating would be supplied to the Molecular Foundry from the Central Utility Plant by a tie-in on the sub-grade gas main along Lawrence Road. Gas would be supplied at 7-inch water column pressure at approximately four cfg per working outlet. LBNL's standard gas meter, pressure regulator, and automatic seismic shut-off valves would be incorporated into the Proposed Action.

Exhaust

The Molecular Foundry building would include one common system for both fume hoods and general exhaust. The exhaust capacity of the Foundry building is estimated to be approximately 25,000 cubic feet per minute for the four primary fans, and 28,000 cubic feet per minute for four standby fans that would comprise the building exhaust system.

An estimated 48 fume hoods would be installed as part of the Molecular Foundry. The normal chemical fume hoods would be variable air volume hoods. Each fume hood would be equipped with a hood-ventilated air sensor. Flammables and corrosives storage would take place in special cabinets either beneath or adjacent to a fume hood, and cabinet vents would be plumbed to the hood exhaust system.

Fume hood exhausts would be located on the Molecular Foundry building roof. Discharge from the fume hood exhaust would meet all applicable vertical velocity and stack height requirements. Air intakes for the Molecular Foundry would be located in different areas of the roof. Potential air re-entrainment from the proximity of fume hood exhausts and air intakes would be avoided through specific engineering and design—including wind-tunnel modeling, if necessary—during the design phase of the Proposed Action.

Telecommunications

Telecommunications services would be provided from the existing telephone and data communications node located south of Building 62.

3.1.5 CONSTRUCTION

Construction would take place over a 24-month period, beginning in approximately January 2004 and ending in approximately February 2006. Construction staging would likely take place in the adjacent corporation yard, downslope of the project site. The staging area would be primarily on two existing plateaus alongside Chicken Creek Road in the Poultry Husbandry Area. These areas

total approximately one-half acre and are currently and historically used for vehicle parking and construction laydown uses (see Figure 5).

Approximately 32,000 cubic yards would be excavated to construct the Molecular Foundry project: approximately 26,500 cubic yards of material would be excavated to construct the Molecular Foundry building, and approximately 5,500 cubic yards would be excavated to construct the Central Utility Plant building.

Excavated fill material, with the exception of topsoil, would not be stockpiled for extended periods but would be used shortly or immediately after it was excavated. If stockpiling were to occur, however, it would take place within the project site boundaries and would adhere to LBNL's standard construction practices and a project-specific Storm Water Construction Permit and Pollution Prevention Plan, such as watering as necessary to minimize dust, and the covering of stockpiled soil to prevent downstream water quality degradation from run-off.

It is anticipated that some dewatering might be necessary during project excavation and construction; however, it would not be expected to contain any chemicals of special concern given the results of sampling conducted in January 2002.[3] Such water, if encountered, could therefore be discharged as specified in the SWPPP that would have to be in place before project construction could begin. It is expected that the SWPPP would rely on such practices as installation of silt traps, fencing, and the use of filter fabric or other measures to protect surface drains and storm sewers during excavation, construction, and dewatering phases of the Proposed Action. Specific erosion and sedimentation control measures, such as construction entrance stabilization, silt traps, netting on slopes, and covering of dirt piles, would be detailed in the Plan.

The foundation of the Molecular Foundry building would consist of 36-inch-diameter drilled, cast-in-place piers that would be approximately 40 to 45 feet long. The Central Utility Plant building would be constructed on a foundation of spread footings. The Proposed Action would not require pile driving.

The Molecular Foundry Project Office, with support from the LBNL Construction Safety Engineer, would monitor the construction site for compliance with LBNL, DOE, CAL/OSHA and CAL/EPA, federal Occupational Safety and Health Administration (OSHA), and U.S. Environmental Protection Agency (EPA), and with other applicable safety requirements identified in LBNL's Work Smart Standards. Monitoring activities would include validation of the contractor's ISM (Integrated Safety Management) program, apprising the contractor of safety criteria pertaining to the construction project, conducting and documenting frequent periodic inspections to verify contractor safety compliance, and ensuring that the construction contractor was meeting ongoing ES&H submittal requirements.

[3] Lawrence Berkeley National Laboratory and BC Laboratories, Inc., *Environmental Sampling Report: Radiological, Organics, and Metals Sampling and Analysis at the Proposed Molecular Foundry Site*, February 1, 2002.

3.1.6 STANDARD LBNL PROJECT FEATURES

LBNL has identified several environmentally proactive measures in its 1987 Long Range Development Plan (LRDP) Environmental Impact Report (EIR), as amended, that are required in all LBNL projects and development to avoid or minimize potentially significant environmental impacts. These mitigation measures have been adopted as part of the LRDP EIR by The Regents of the University of California, and thus are required of all LBNL activities pursuant to the California Environmental Quality Act (CEQA). Consequently, all such measures relevant to the design, construction, and operation of the proposed Molecular Foundry are included in the Proposed Action description as standard features of all such LBNL projects. These measures are pertinent to such environmental resource areas as geology; hydrology and water quality; biological resources, visual quality; land use; air quality; noise; traffic; and hazards and hazardous materials. Measures relevant to and incorporated into the project description of the Proposed Action are listed in Appendix "A" of this document.

3.2 NO ACTION ALTERNATIVE

LBNL is conducting limited nanoscience research in other parts of LBNL and the UC Berkeley campus. Under the No Action Alternative, this limited nanoscience research would continue under current management practices, and no consolidated and centralized facility dedicated to nanoscience research would be built at the site.

3.3 DIFFERENT BUILDING CONFIGURATION ALTERNATIVE

Under this alternative, a smaller building totaling approximately 30,000 sq. ft. would be constructed at the current Proposed Action site. The smaller building is anticipated by the 1987 LBNL Long-Range Development Plan and would be located in the approximate location of the existing parking lot. The smaller building would rely on existing available utilities connections and would be accessible from the Lee Road extension, which runs along the south and southwest perimeter of the adjacent Building 66. For purposes of this analysis, it is estimated that approximately 50 to 90 staff persons would occupy the smaller building. Less laboratory space would be available to researchers on a per capita basis. Such a building would likely be about three stories high with perhaps one sub-grade floor and a smaller accompanying utility building. It would require less excavation and would occupy a somewhat smaller footprint. Most of the trees in the area slated for removal under the current project would probably still need to be removed for construction and fire safety purposes. Less construction equipment and materials would be necessary.

3.4 ALTERNATE BUILDING SITE (ON-SITE) ALTERNATIVE

Under this alternative, an alternate building site would be used for the proposed Molecular Foundry. This alternate site is located in the LBNL "Old Town" area, in the Light Source Research and Engineering Area, near the ALS Synchrotron. This alternate site would require demolition of some or all of the following buildings: 4, 5, 7, 14 and 16. Because of the nature of

existing buildings and historic use of this site, substantial historic work and soil remediation may have to be conducted to prepare this site for the Proposed Action. In addition, site preparation would involve many additional truck trips to haul demolition debris and to remove excavated material that would not be needed for on-site fill. The proposed Molecular Foundry building would be given a lower profile and consequently a broader footprint to avoid having it tower over the Advanced Light Source building, which is an important aesthetic resource of LBNL from both short- and long-range views.

While other potential building sites for such a project may exist at LBNL, this site is the most feasible on-site alternate location to the Proposed Action. In fact, this site was extensively investigated in the preliminary planning stages of the Proposed Action as the possible location of the Molecular Foundry. It would allow for optimal access to the Advanced Light Source and to central LBNL-site amenities.

3.5 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM FURTHER ANALYSIS

3.5.1 LEASED ON-SITE SPACE

This alternative would house the nanoscience research program and activities in a building financed and built by a "third party" developer (i.e., neither DOE, UC, nor LBNL affiliated) on the LBNL site through a ground lease agreement and then the facility would be subsequently leased back to LBNL. It has been determined that the 30-year lease cost of such a building would be significantly greater than the cost of a new building. As it would be essentially the same building and physical project, there would be no environmental benefits realized by this alternative.

3.5.2 ALTERNATE BUILDING SITE (OFF-SITE)

This alternative would require the acquisition, lease, and/or construction of a facility off the LBNL site to provide for the Molecular Foundry programs and activities. No optimal facilities of the sort appear to both exist and be feasibly available in the immediate area of LBNL – the UC Berkeley campus is itself in need of new, updated laboratory space. Property in the City of Berkeley is relatively expensive and the cost of constructing a building somewhere in Berkeley, Oakland, or Emeryville would be prohibitively expensive and time-consuming and would not likely be buffered from nearby residential uses to the extent the current site is. Putting facilities in a research park in Richmond (or in Oakland, Emeryville, or most of Berkeley's commercial/industrial areas) would be too remote from the LBNL site to realize the benefits of having nearby facilities (e.g., Advanced Light Source, NCEM, etc.), fellow researchers, and LBNL administrative, technical, and facilities support.

CHAPTER 4.0

AFFECTED ENVIRONMENT

4.1 REGIONAL AND LOCAL SETTING

The Proposed Action site is located in the southeastern portion of LBNL in the Oakland-Berkeley hills, within Oakland's city limits, on mostly undeveloped slopes between LBNL Buildings 72 and 66 (see Figures 1, 2, and 3). The site also includes an existing paved parking lot with 18 striped parking spaces and a retaining wall, and an undeveloped downslope area extending from Lawrence Road along the eastern side of Building 31 and the western side of Building 72. With the exception of the parking lot and a pathway along the eastern edge, the project site is covered with grasses and a variety of other plants.

West of the site are a chain-link fence and corporation yard, and further west are the University of California at Berkeley campus, Strawberry Creek, and the Panoramic Hill neighborhood. To the north are LBNL facilities, including the Grizzly Peak substation and undeveloped hillsides, as well as the Lawrence Hall of Science. Further north are residential neighborhoods in the City of Berkeley and the Tilden Regional Park. LBNL facilities including LBNL's Human Genome Laboratory, and the University of California's Botanical Garden lie to the east. University of California-owned lands, regional open space areas, and the Claremont neighborhood of Oakland all lie to the south. The nearest residences are in the Panoramic Hill neighborhood of Berkeley, which is approximately one-third mile south of the project site at its closest point.

The project site is currently accessible from the southwest by Lee Road, which ends southwest of Building 66, and from the Building 66 rear parking lot; to the east from Lawrence Road; and from the north by the Building 31 driveway and parking lot via a dirt road that connects the Building 31 and Building 66 rear parking areas. The site is within LBNL's vegetation control area, and, as a result, grasses and plants are kept at a minimum height during fire season. As another component of the Lab's Vegetation Management Plan, non-native trees are removed within 100 feet of Buildings 62 and 66.

4.2 ENVIRONMENTAL RESOURCES NOT AFFECTED

Floodplains/ Wetlands: The Proposed Action would not take place within a 100-year floodplain or on or in the vicinity of wetlands.

Land Use: The Proposed Action would take place on an area that is bounded by similar scale and use scientific buildings, a roadway, and parking lot, and would be served by existing but reconfigured utility systems. The Proposed Action would not conflict with LBNL planning documents, including its Long Range

Development Plan. The area has been previously identified as a location of a future laboratory building in LBNL planning documents. A brief, supporting analysis of Land Use is included in Appendix "B."

Socioeconomics: Federal funding for the Proposed Action would be from national sources and would not represent a significant commitment of local resources. Employment from the Proposed Action would draw upon local, regional, and international (for visiting scientists) populations and would not be perceptible in any particular employment or housing market. A brief, supporting analysis of population, employment and housing is included in Appendix "C."

Environmental Justice: Due to the low incidence of localized, off-site impacts from the project, as well as to the demographics of populations living nearest the site of the Proposed Action, there would be no disproportionately high or adverse human health or environmental effects on minority or low-income populations from the Proposed Action. A brief, supporting analysis of "Environmental Justice" issues is provided in Appendix "D" of this document.

4.3 ENVIRONMENTAL RESOURCES POTENTIALLY AFFECTED

4.3.1 GEOLOGY, SOILS, AND SEISMICITY

SETTING

The Proposed Action is located in the San Francisco Bay Area, which, due to the presence of the San Andreas Fault System, is a region of significant seismic activity. Recent studies sponsored by the United States Geological Survey (USGS) estimate that there is a 70 percent likelihood of a Richter magnitude 6.7 or higher earthquake occurring in the Bay Area in the next 30 years. The project site could experience a range of ground-shaking effects during an earthquake on one of the active earthquake faults in the San Francisco Bay Area. Excessive groundshaking could also cause secondary ground failures such as seismically-induced landslides, surface rupture, and differential settlement that could expose people to the risk of injury and cause structural damage to buildings. The Hayward fault, one of the major active faults in the San Andreas System, extends along the eastern side of the San Francisco Bay and is located 0.3 miles from the project site. Ground-shaking intensities from a major seismic event on the Hayward fault could generate ground motion approaching or exceeding Peak Ground Acceleration of 0.7g. Ground motion of this type would be characterized by the Modified Mercalli Intensity Scale as violent to very violent (ABAG, 2002).[4] Geotechnical investigations conducted at the project site have estimated

[4] While the magnitude is a measure of the energy released in an earthquake, intensity is a measure of the ground shaking effects at a particular location. Shaking intensity can vary depending on the overall magnitude, distance to the fault, focus of earthquake energy, and type of geologic material. The Modified Mercalli (MM) intensity scale is commonly used to measure earthquake effects due to ground shaking. The MM values for intensity range from I (earthquake not felt) to XII (damage nearly total). MM intensities ranging from IV to X could cause moderate to significant structural damage. ***Acceleration*** is scaled against a value that everyone is familiar with, that is, acceleration due to gravity or the acceleration with which a ball falls if released at rest in a vacuum (1.0g). Acceleration of 1.0g is equivalent to a car traveling 100 meters (328 feet) from rest in 4.5 seconds. Acceleration is expressed by a "g" which is gravity = 980 centimeters per second squared.

peak bedrock accelerations of 0.70g from an earthquake occurring on the Hayward fault,[5] and 0.40g from an earthquake occurring on the San Andreas Fault, located approximately 19 miles southwest of the project site. As a comparison, ground motion during the 1989 Loma Prieta earthquake at the Santa Cruz Mountain epicenter reached 0.64g. Due to its close proximity to the project site, the Hayward fault is likely to generate the most significant levels of groundshaking.

Earthquakes and groundshaking in the Bay Area are unavoidable and are expected to occur at some time during the life of the Proposed Action. Although some structural damage is typically not avoidable, building codes and local construction requirements have been established to protect against building collapse and major injury during a seismic event.

The project site is not within the most recently delineated Alquist-Priolo Earthquake Fault Zone (A-P Zone).[6]

The project site is not located in an area identified by the California Geological Survey (CGS) as being susceptible to liquefaction hazards, and the geotechnical report prepared for the project site does not identify liquefiable soils. Potential liquefaction hazards are therefore considered less than significant.

The project site is located in a CGS-designated Seismic Hazard Zone for earthquake-induced landslides. The Seismic Hazards Mapping Act (SHMA) was enacted in 1990 to protect the public from the effects of strong groundshaking, liquefaction, landslides, or other ground failure, and from other hazards caused by earthquakes. This act requires the State Geologist to delineate various seismic hazard zones and requires cities, counties, and other local permitting agencies to regulate certain development projects within these zones.

4.3.2 HYDROLOGY AND WATER QUALITY

SETTING

The LBNL site is situated in the ridges and drainage areas of Blackberry and Strawberry Canyons in the East Bay Hills within the Strawberry Creek watershed. Runoff from the project site currently drains to “No Name” Creek, which is a tributary of Strawberry Creek. The Proposed Action consists of two buildings, an access road, and associated parking that would result in additional impervious surface area and consequently an increase in surface water runoff from the project site.

The project site is generally characterized by steep slopes underlain by bedrock, with a shallow soil surface. Groundwater flow through bedrock is typically characterized by fracture flow that has slow recharge and low yield, while groundwater flow in the drainages is unconfined flow and

[5] In the near-fault region of the Hayward fault (i.e., less than 2 km from the fault, which includes the project site), an additional seismic “fling” can be expected. This is accounted for in the latest version of the California Building Code.

[6] Alquist-Priolo Zones designate areas most likely to experience fault rupture, although surface fault rupture is not necessarily restricted to those specifically zoned areas.

fluctuates with seasonal precipitation. This area is not underlain by an easily accessible, high-yield, confined aquifer system that is capable of supplying many users. However, this area may represent a portion of the recharge area for the alluvial aquifer underlying the East Bay plain to the west.

4.3.3 BIOLOGICAL RESOURCES

SETTING

The Proposed Action is located in the steep ridges and draws on the western side of the Oakland-Berkeley hills, in the general area of Blackberry and Strawberry canyons and within the Strawberry Canyon watershed. No Name Creek and Chicken Creek, tributaries to Strawberry Creek, are located downslope from the proposed site, and Strawberry Creek itself is approximately 0.1 miles to the southeast at its closest point to the site. Vegetation on and adjacent to the Proposed Action site is primarily non-native annual grassland, and the site is located between existing multi-story buildings to the northwest and southeast.

SPECIAL STATUS WILDLIFE

Review of the California Natural Diversity Database (California Department of Fish and Game, 2002) for the Oakland East, Oakland West, Richmond, and Briones Valley 7.5 minute quadrangles indicate a generally low potential for adverse impacts to legally sensitive animal species. Many of the species on the list are associated with either wetlands or salt-water habitats within these quadrangles, and the non-native grassland characteristic of the site does not provide the required habitat for these particular species.

The Alameda whipsnake (*Masticophis lateralis euryxanthus*; listed as threatened both federally and by the state) is found in shrub communities and adjacent habitats (U.S. Fish and Wildlife Service, 2000). Habitats adjacent to brush communities may be crucial to Alameda whipsnakes, which remain in grassland habitats near shrub areas for up to several weeks at a time (U.S. Fish and Wildlife Service, 2000). Other typical habitat elements for this species include rock outcrops, which provide areas where prey (particularly lizards) may be found and where whipsnakes may find shelter.

There are no Habitat Conservation Plans, Natural Community Conservation Plans, or other approved local, regional, or state habitat conservation plans that apply to the LBNL site.

4.3.4 HISTORIC AND ARCHAEOLOGICAL RESOURCES

SETTING

As part of the environmental analysis for the 1987 LRDP EIR, as amended, (LRDP EIR), all undeveloped land and proposed building locations (including the proposed Molecular Foundry site) were examined for potential historical and archaeological resources. All reasonably accessible parts of the LBNL area were examined. Special attention was given to areas of

relatively flat land or rock outcrops. The steep hillsides were not examined intensively, although transects through accessible areas were made. Based on the findings of the historic and archaeological resources survey, no indications of historic or prehistoric archaeological resources were encountered in any location within the project site.

More recently, an archaeological survey of four parcels (70 acres total), and a recordation and evaluation of four historic structures was conducted for LBNL in September 1999. Portions of the surveyed areas were adjacent to the project site on its eastern and western sides. Based on the results of the survey, with concurrence from the State Historic Preservation Officer (SHPO), no indications of significant historic or prehistoric archaeological resources were encountered. No historic structures exist on the project site as it is currently partially vacant, and used as a parking lot.

4.3.5 VISUAL QUALITY

SETTING

The Proposed Action is located in an area intermittently visible from surrounding short- and long-range viewpoints. The site is adjacent to the easternmost[7] perimeter of the UC Berkeley campus in a scenic area that encompasses the Oakland and Berkeley Hills, and Blackberry and Strawberry Canyons. The hills provide a semi-natural, vegetated open-space backdrop to the project site. Most of the western slopes of these hills are wooded with either native canyon stands of oak and California bay or with introduced plantations of eucalyptus or conifers.

Although adjacent to the Building 66 and 72 complexes and roadways, the proposed, approximately 2½-acre site is currently mostly undeveloped and includes several trees and grassland areas, and an asphalt surface parking area (see Figure 11A) at the central portion of the site. It is these terrain features, most notably the slopes, which comprise the Strawberry Canyon and the surrounding stands of tall trees that provide cover to the Proposed Action site from most potential viewpoints in the surrounding region. The site is located in a portion of Strawberry Canyon that is visible to persons along a short segment of Lawrence Road in the immediate vicinity of the site or further east and uphill of the site along portions of Centennial Drive. The site is also visible from nearby private development along Grizzly Peak Boulevard and the Panoramic Hill residential neighborhood, and from a narrow view corridor through the adjacent UC Berkeley campus that includes a portion of Memorial Stadium's north-facing seats (see Figure 11B).

Nearby and adjacent buildings include the National Center for Microscopy (Building 72) and the Material Sciences building (Building 66), as shown in Figures 11C and 11D, respectively. The buildings in the Materials and Chemical Research Planning Area are designed to take advantage of the long-range Bay views afforded by the Strawberry Canyon view corridor. Existing vantage points on the LBNL site within a quarter mile of the site include locations along north-south axis

[7] This analysis incorporates true compass directions.

11A Easterly view of project site from parking lot

11B Southwesterly view of Strawberry Canyon from project site

SOURCE: Environmental Science Associates

LBNL Molecular Foundry / 202211 ■

Figures 11A & 11B

Site Photographs

11C Northerly view of Building from project site

11D Southerly view of Buildings 66 and 62 from project site

SOURCE: Environmental Science Associates

LBNL Molecular Foundry / 202211

Figures 11C & 11D
Site Photographs

streets such as Lawrence Road, at locations with higher elevations to the east of the site along Centennial Drive, and at traffic turn-outs. Views afforded from these vantage points include long-range views westwards towards the Bay, including historic landmarks such as the Golden Gate Bridge and Alcatraz Island, as well as the urban landscape of the adjacent City of Berkeley and UC Berkeley campus development (see Figure 11E).

4.3.6 TRAFFIC AND CIRCULATION

SETTING

The primary access routes to LBNL are Grizzly Peak Boulevard / Centennial Drive, University Avenue, Hearst Avenue and Piedmont Avenue / Gayley Road. Access to the site is provided by three sentry-controlled gates: Blackberry Canyon (main gate), Strawberry Canyon, and Grizzly Peak. In 1998 approximately 9,100 vehicles passed through these three gates (access and egress) on a typical work day – about 930 and 820 vehicles during the a.m. and p.m. peak hours, respectively.

LBNL operates a free shuttle bus service within the LBNL site, and between LBNL and the UC Berkeley campus and downtown Berkeley (connecting with the Berkeley BART Station and AC Transit bus lines). Another off-site shuttle provides express service to and from the Rockridge BART Station at select commute hours. The principal off-site shuttle operates from 6:30 a.m. to 6:50 p.m., running every ten minutes up until 5:50 p.m., when shuttles run at 20-minute intervals. There is a shuttle bus stop at the project site, currently serving Buildings 72 and 66.

Traffic level of service (LOS) conditions were assessed at the following five key (gateway) intersections for weekday a.m. and p.m. peak traffic hours:

- University Avenue and Shattuck Avenue (southbound) – signalized
- Hearst Avenue and La Loma Avenue / Gayley Road – signalized
- Gayley Road and Stadium Rim Way – all-way stop control
- Piedmont Avenue and Dwight Way – signalized
- Grizzly Peak Road and Centennial Drive – all-way stop control

The LOS concept is a qualitative characterization of traffic conditions associated with varying levels of traffic, based on delay and congestion. Descriptions of conditions range from LOS A (free-flow condition) to LOS F (jammed condition). LOS C or better are generally considered to be satisfactory service levels, while LOS D is minimally acceptable, LOS E is undesirable, and LOS F conditions are unacceptable.

Traffic counts were conducted at each of the study intersections while UC Berkeley was in session. The five study intersections currently operate at LOS B during a.m. and p.m. peak hours, except the All-Way Stop Sign-Controlled intersection of Gayley Road / Stadium Rim Way, which operates at LOS F during both peak hours. The supply of parking spaces at LBNL is limited, and its use is controlled by a permit system (strictly enforced) that allocates available parking spaces to different types of employees and visitors.

4.3.7 AIR QUALITY

SETTING

The project site is located in the City of Oakland, within the boundaries of the San Francisco Bay Area Air Basin (Bay Area). The Bay Area's moderate climate steers storm tracks away from the region for much of the year. Berkeley's proximity to the refreshing onshore breezes stimulated by the Pacific Ocean provides for generally very good air quality at LBNL. However, during the ozone smog season (summer and fall), transport studies have shown that emissions generated in Oakland and Berkeley are often transported to other regions of the Bay Area and beyond (e.g., Central Valley) that are more conducive to the formation of ozone smog. In the winter, reduced solar energy and cooler temperatures diminish ozone smog formation, though increase the likelihood of carbon monoxide formation.

The federal Clean Air Act of 1970 established maximum concentration criteria standards for six ambient air pollutants – ozone (smog), carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter, and lead. Each of these standards was set to meet specific public health and welfare criteria. Individual states were given the option to adopt more stringent state standards for criteria pollutants and to include other pollutants. California has done so with many pollutants through its own clean air act.

The Bay Area Air Quality Management District (BAAQMD) is the regional agency with regulatory authority over stationary sources in the Bay Area, while the California Air Resources Board (CARB) has regulatory authority over mobile sources such as construction equipment, trucks, and automobiles throughout the state. The BAAQMD has the primary responsibility to meet and maintain the state and federal ambient air quality standards in the Bay Area.

Both the state and federal Clean Air Acts require areas to be classified as either *attainment* or *non-attainment* for each criteria pollutant, based on whether or not the state and national standards have been achieved. Therefore, areas in California have two sets of attainment/non-attainment designations: one for the federal standards and one for the state standards. The Bay Area Air Basin is currently designated as nonattainment for state ozone standards and the federal 1-hour ozone standards, although ozone levels measured in the Berkeley and Oakland area do not exceed the standard. Ozone and ozone precursors such as reactive organic compounds and oxides of nitrogen are the pollutants of greatest concern in the Air Basin. The Air Basin is also designated as nonattainment for the state PM-10 standard (particulate matter of 10-micron diameter or less). Urbanized portions of the Bay Area (specifically known as the San Francisco – Oakland – San Jose federal planning area) are designated "maintenance" with respect to the federal carbon monoxide standard. The "maintenance" designation denotes that the area, now "attainment," had once been designated as "nonattainment." The Air Basin is designated as either attainment or unclassified for all other pollutants.

The project site is considered typical of urban areas in the East Bay. PM-10 levels measured in Fremont (the nearest monitoring station in Alameda County that measures PM-10) indicate that the four days in 2001 with the highest levels of PM-10 were January 7 (57.6 micrograms per

11E Long-range westerly view from project site

SOURCE: Environmental Science Associates

LBNL Molecular Foundry / 202211 ■

Figure 11E
Site Photographs

(This page left intentionally blank)

cubic meter), January 1 (54.5), January 19 (43.6), and May 19 (38.1). Ozone levels in the San Francisco Bay Area in 2001 exceeded state 1-hour standards on 15 days, the federal 1-hour standard on 1 day, and the federal 8-hour standard on 7 days.[8] Bay Area counties experience most ozone exceedances during the period from April through October. Construction equipment, building emission sources (such as heaters), and motor vehicles are typical LBNL activities that would emit the ozone precursors reactive organic gas (ROG) and nitrogen oxides (NOx). These emissions may photochemically react in the presence of sunlight and warm temperatures, creating ozone smog. As noted above, because of wind patterns, this transformation occurs some miles distant. Thus, a project's emissions may not have a local impact and may be very small in terms of quantities, but could contribute to existing violations of state and federal ozone standards.

HAZARDOUS AND TOXIC AIR EMISSIONS SOURCES

There are no known facilities within a ¼-mile of the LBNL boundary that use acutely hazardous substances in excess of threshold planning quantities (SARA Title III, Community Right to Know). Consequently there is no significant impact in the area from use of acutely hazardous substances by businesses, including LBNL. "Acutely hazardous material" means any material defined pursuant to subdivision (a) of Section 25532, California Health and Safety Code.

State environmental law requires that air districts create an inventory of facilities with potential to emit specified Toxic Air Contaminants (TAC), and make this information available to the public upon request. The BAAQMD's 2000 Toxic Air Contaminant Control Program Annual Report calculates that the annual excess cancer risk in the Bay Area is about 167 per million people from stationary sources, and about 450 in a million from diesel exhaust. Thus, diesel emissions create about 70% of toxic and cancer-causing emissions found in ambient air. LBNL updates its TAC inventories each year during renewal of operating permits, which is required of all regulated facilities in the Bay Area.

4.3.8 NOISE

SETTING

Noise is usually defined as an unwanted sound. Noise is typically measured in decibels, which is a logarithmic scale for expressing sound pressure-level energy. The *A scale* of noise measurement mathematically adjusts sound pressure levels that approximate the response of the human ear to different frequencies. Noise typically attenuates (diminishes) by about 6 dBA for every doubling of distance from the source. Thus, a noise measured at 90 dBA 50 feet from the source would be about 84 dBA at 100 feet, 78 dBA at 200 feet, 72 dBA at 400 feet, and so forth. Noise standards are addressed in local general plan policies and noise ordinances. A project could expose people to, or generate, noise levels in excess of these standards in two ways. First, a project could expose sensitive receptors to noise by introducing incompatible land uses (e.g., building a helipad next to a school) in an existing noise environment. Second, a project itself

[8] This is an average that summarizes data from all of the monitoring stations in the Bay Area.

could create an increase in ambient noise levels that negatively affect existing nearby sensitive receptors (e.g., putting a petroleum refinery in a residential neighborhood).

The *Oakland Comprehensive Plan* contains guidelines for determining the compatibility of various land uses with different noise environments (City of Oakland, 1974). The Noise Element recognizes that some land uses are more sensitive to ambient noise levels than others, due to the amount of noise exposure (in terms of both exposure duration and insulation from noise) and the types of activities typically involved.

The City of Oakland also regulates short-term noise through city ordinances, which include a general provision against nuisance noise sources (Planning Code, Section17.120). The factors that are considered when determining whether the ordinance is violated include: a) the level, intensity, character, and duration of the noise; b) the level, intensity, and character of the background noise; and c) the time when, and the place and zoning district where, the noise occurred.

The City of Berkeley's General Plan Noise Element also contains guidelines for determining the compatibility of various land uses with different noise environments (City of Berkeley). Generally, the noise level for residential, hotel, and motel uses is 60 dBA or less, while conditionally acceptable noise levels range from over 60 dBA to 75 dBA (may require insulation, etc.), and unacceptable noise levels are over 75 dBA. The City of Berkeley's Community Noise Ordinance sets limits for permissible noise levels during the day and night according to the zoning of the area. If ambient noise exceeds the standard, that ambient noise level becomes the allowable noise levels. For R-1 and R-2 residential areas, the receiving noise level (not to be exceeded by more than thirty minutes any hour) is 55 dBA from 7:00 a.m. to 10:00 p.m., and 45 dBA from 10:00 p.m. to 7:00 a.m. For R-3 uses and above, the receiving noise level (not to be exceeded by more than thirty minutes any hour) is 60 dBA from 7:00 a.m. to 10:00 p.m., and 55 dBA from 10:00 p.m. to 7:00 a.m.

Construction noise levels would fluctuate depending on the particular type, number, and duration of use of various types of construction equipment. Table 3, below, describes typical construction noise levels at 50 feet. The effect of construction noise would depend upon the volume (expressed in dBA) generated, the distance between noise sources and the nearest noise-sensitive uses, and the existing noise levels at those uses. The City of Oakland allows short-term (less than 10 days) construction noise received in residential areas between the hours of 7:00 a.m. and 7:00 p.m. on weekdays to reach levels of 80 dBA (65 dBA on weekends between 9:00 a.m. and 8:00 p.m.), and long-term construction noise (more than 10 days) to reach levels of 65 dBA on weekdays and 55 dBA on weekends. The City of Berkeley also requires that construction be restricted to the hours of 7:00 a.m. to 7:00 p.m. on weekdays, and the hours of 9:00 a.m. to 8:00 p.m. on weekends and holidays. However, the City of Berkeley requires that maximum noise levels should be controlled to not exceed 75 dBA at the nearest properties for mobile equipment and 60 dBA for stationary equipment.

TABLE 3
TYPICAL COMMERCIAL CONSTRUCTION NOISE LEVELS

Phase	(L_{eq})[a]
Ground Clearing	84
Excavation	89
Foundations	78
Erection	85
Exterior Finishing	89
Pile Drilling	90

[a] Estimates correspond to a distance of 50 feet from the noisiest piece of equipment associated with a given phase and 200 feet from the other equipment associated with that phase.

SOURCES: U.S. Environmental Protection Agency, *Noise from Construction Equipment and Operations, Building Equipment, and Home Appliances*, December 1971.
ESA *Richmond Transport Tunnel Study*, (pile drilling data) January 1997.

4.3.9 PUBLIC SERVICES

FIRE AND POLICE PROTECTION

LBNL maintains its own on-site fire protection services through a contract with Alameda County and its own security force. These units are staffed in proportion to LBNL's needs for fire suppression and security protection. Currently, three fire trucks and an ambulance are available on-site at all times. The LBNL security unit is part of the UC Police Services and includes sworn officers and contract protective service officers. Contracted personnel staff the LBNL entry gate kiosks.

SCHOOLS, PARKS AND OTHER PUBLIC FACILITIES

The proposed Molecular Foundry would contain primarily office, teaching, and laboratory spaces within the 86,500-square-foot Molecular Foundry building. The uses proposed for this building and any incremental population increases induced directly and indirectly throughout the region by Proposed Action employment opportunities would not generate the need for additional school, park, and other public facilities.

4.3.10 PUBLIC UTILITIES

SETTING

The LBNL site receives its water from the East Bay Municipal Utility District (EBMUD). The proposed project would be served by EBMUD's Shasta Pressure Zone (PZ), which provides

water service to customers within an elevation range of 900 to 1050 feet, and the Berkeley View PZ, which provides water service to customers within an elevation range of 1,050 to 1,250 feet. The LBNL site receives its water supply via a 12-inch meter in Campus Drive in the Shasta PZ and via a 6-inch meter in Summit Road from the Berkeley View PZ. In addition, Department of Energy (DOE) owns and maintenance two 200,000-gallon storage tanks on site for emergency supply in the event of interruption of EBMUD's service and a third 200,000-gallon emergency tank is under construction in the East Canyon area upslope of the project site. The existing distribution system supplies water for all laboratory uses and has sufficient capacity to meet the flow rate and duration requirements for both daily use and fire protection. Although the project would be expected to increase use by up to approximately 2,500 gallons per day, it would not cause a significant impact as the two existing EBMUD PZs have combined storage capacity of 3.1 million gallons. Wastewater from LBNL is carried via a gravity-flow system through two monitoring stations, one located at Hearst Avenue and the other at Centennial Drive in Strawberry Canyon. The Proposed Action would be served by the Centennial Drive Station, which connects first to the University of California's sewer system, then to the City of Berkeley's public sewer system, and then to a regional wastewater treatment plant located southwest of the I-80/I-580 interchange in Oakland. The facility is owned by EBMUD and serves six East Bay cities and the Stege Sanitary District.

All LBNL sanitary sewage runs through the City of Berkeley's basin No. 17. The City Department of Public Works has confirmed that there is considerable remaining average and peak wet weather capacity in this basin. The proposed project would most likely be directed into subbasin #17-003; this subbasin has more than adequate average and peak wet weather capacity to accommodate the estimated 1,200 gpd sanitary sewage flows from the proposed project.

The main concern with sewer flow in this subbasin and region wide in the EBMUD system is the infiltration and inflow of stormwater into the sanitary sewer system due to the poor condition of aging sewer pipes (known as "infiltration / inflow" or "I/I"). LBNL has aggressively acted to address infiltration / inflow problems in its own system and has made dramatic improvements in recent years. In addition, an aggressive plumbing maintenance and upgrade effort has been undertaken during the past 15 years by LBNL, along with installation of water saving devices and systems, to substantially lower average sewer flows as well. The savings realized by these on-going efforts has reduced both peak wet weather as well as average sewer flows by well over half. Moreover, LBNL's peak wet weather infiltration / inflow rate is less than half of that of the City of Berkeley's and it is approximately only ten-percent of that found in EBMUD's district. LBNL continues to seek ways in which to reduce both water consumption and sewage generation.

In 1984, LBNL's allocated sewer flow was approximately 200,000 gallons per day (gpd). Due to historic infiltration / inflow, that amount was much higher during peak wet weather events. In recent years, due to the aforementioned efforts, that average annual sewer flow has been reduced by approximately 100,000 gpd, and by even much greater amounts during wet weather. The proposed Molecular Foundry is expected to generate less than 1,200 gpd of sewage. This incremental amount falls well below what was allocated to LBNL previous to its sewer upgrade projects. It is also consistent with the 1987 LRDP EIR, as amended, which anticipated, analyzed, and found less-than-significant impacts for buildout levels of sanitary sewage at much higher than

current levels, even with inclusion of the proposed project. Moreover, because the sewer lines installed for the Molecular Foundry would be brand new, state-of-the-art, and virtually free of stormwater infiltration, the proposed project would be incremental in both dry and wet weather and would not contribute to the problem of I/I surplus flows during peak wet weather events.

Through the University of California, LBNL currently pays the City of Berkeley for assessed sewer services. In addition, the University has contributed to the City of Berkeley's sewer upgrade program. This program is intended to increase wet weather flow capacity and decrease infiltration / inflow conditions.

Because of LBNL's hillside location a storm-drainage system has been installed that discharges into the North Fork of Strawberry Creek to the north and Strawberry Creek to the south.

Non-hazardous solid waste generated at the project site would be collected by Richmond Sanitary Service and taken to the Richmond Landfill.

4.3.11 ENERGY

SETTING

The LBNL "Ten-Year In-House Energy Management Plan" establishes target goals, and is updated each year. Important components of meeting LBNL goals include a survey and study program to identify cost-effective energy savings measures; a retrofit program to implement the cost-effective projects; and a new buildings program that would ensure that new facilities meet all applicable energy performance standards, including both those developed by the Department of Energy Executive Order 12003 and 10 Code of Federal Regulations Part 436 and those issued by the State of California, Title 24.

Recently, the Grizzly Peak electric substation, which formerly served both LBNL and the UC Berkeley campus, was expanded to incorporate a new and adjacent substation, the Hill Area UC Substation. This new Hill Area substation allowed the UC Berkeley campus to draw dedicated power from it, thus allowing the LBNL exclusive use of the Grizzly Peak substation. Therefore, electric capacity was expanded for both UC Berkeley and LBNL.

4.3.12 HAZARDS AND HUMAN HEALTH

SETTING

LBNL maintains its own Environment, Health, and Safety (EH&S) division to oversee and monitor all LBNL issues dealing with hazards, hazardous materials, and human health and safety. The EH&S Division ensures compliance with all applicable Federal, state, and LBNL-imposed hazard and safety related regulations, laws, and standards. As part of the EH&S Division mission, LBNL has developed a stringent hazardous materials program, which includes personnel training and careful management, handling, and storage policies for hazardous materials. LBNL maintains its own on-site fire department and emergency medical services, along with hazardous

response personnel, which would minimize any risk associated with wildland fires. In 2002, to increase efficiency and efficacy, staffing and operation duties of LBNL's on-site fire department were awarded to Alameda County.

CHAPTER 5.0

ENVIRONMENTAL CONSEQUENCES

5.1 ENVIRONMENTAL CONSQUENCES OF THE PROPOSED ACTION

5.1.1 GEOLOGY, SOILS, AND SEISMICITY

EXCAVATION, GRADING, AND CONSTRUCTION

The SHMA requires the State Geologist to delineate various seismic hazard zones and requires cities, counties, and other local permitting agencies to regulate certain development projects within these zones. Before project approval is granted for a site within a seismic hazard zone, a geotechnical investigation must be conducted and appropriate mitigation measures incorporated into the project design. The CGS Special Publication 117, adopted in 1997 by the State Mining and Geology Board in accordance with the SHMA, constitutes guidelines for evaluating seismic hazards other than surface faulting, and for recommending mitigation measures as required by Public Resources Code Section 2695(a). LBNL is required to comply with the guidelines set by CGS Special Publication 117. Compliance with the requirements of SHMA would reduce the risk of injury and property damage resulting from potential earthquake-induced landslide hazards to a less than significant level.

The design criteria for the Proposed Action would comply with requirements of the 1998 California Building Code, LBNL's Facilities Department Project & Design Management Procedures Manual "Lateral Force Design Criteria," and federal standards. In addition, the seismic design of the project would comply with the latest UC seismic safety policies. The design would exceed the requirements of the California Building Code (CCR Title 24) and comply with the more stringent local building code (LBNL Standard RD 3.22). As part of the Proposed Action, a Conceptual Design Report was prepared that accounts for all loads to which the structure may be subjected, including dead, live, wind, and seismic, and that incorporates recommendations provided in the preliminary geotechnical report prepared for the project site to reduce ground-shaking hazards.

An engineering analysis report and drawings, and relevant grading or construction activities on the project site would be required to address constraints and incorporate recommendations identified in the geotechnical investigations. Considering that the Proposed Action would be constructed in conformance with the California Building Code, LBNL requirements, and federal regulations and guidelines, the risks of injury and structural damage from groundshaking would be reduced and the impacts would be less than significant.

The Proposed Action would require excavation of approximately 32,000 cubic yards of soil to construct the Molecular Foundry building, the Central Utility Plant building, and otherwise to prepare the site for roads and walkways. This fill material would not leave the site, but would be used as engineered fill to construct the new Lee Road extension, along the western perimeter of the Molecular Foundry buildings, and the widening of Lee Road, southwest of Building 62.

During excavation, topsoil would first be stripped and stockpiled for dressing finished slopes and for use in landscaped areas in all areas where excavations are to be made or fill deposited, and edges of cut banks would be rounded to blend into the natural terrain. A site and project-specific erosion control plan would be included as part of the project design process and implemented as a condition for approval. This plan would include measures listed in Appendix "A," including development of a project/site-specific SWPPP. The SWPPP would include, as feasible, the covering of excavated materials, installation of silt traps, fencing, and use of filter fabric as measures to control erosion and sedimentation as required by the California general permit for storm water associated with construction activities. Landscaping would be begun as soon as surface disturbances were finished for each relevant area. Potential soil erosion and topsoil impacts would be less than significant.

Geotechnical borings installed at the project site identified portions of on-site soils as being highly expansive, and provided recommendations to address these hazards. The report describes the site as being underlain by a combination of compacted material used on the site for landslide repair, landslide debris, and colluvial soil (Kleinfelder, January 29, 2002). The report specifically states: "Because some of the on-site soil has a high expansion potential, the geotechnical engineer should approve soil prior to its use as fill material. Fill should be moisture conditioned and compacted to at least 90 percent relative compaction using ASTM D-1557 test procedure." The report also recommends that the soil at subgrade level be evaluated during site excavation to determine its expansion characteristics, and if found to be expansive, this soil should be excavated and replaced with low-expansion materials. These geotechnical recommendations have been incorporated into the Proposed Action Conceptual Design Report. Any potential impacts due to expansive soils would be less than significant with the inclusion of these project features.

OPERATIONS

The Proposed Action design would incorporate foundation recommendations of the project geotechnical evaluation so as to be constructed to applicable California Building Code and LBNL standards. In addition, the Proposed Action would adhere to, where appropriate, guidelines of the CGS Special Publications 117; and incorporate standard LBNL practices (see Appendix "A"), to address any potential liquefaction hazards.

5.1.2 HYDROLOGY AND WATER QUALITY

EXCAVATION, GRADING, AND CONSTRUCTION

Construction-related grading and other activities would be required to comply with the Association of Bay Area Governments' Manual of Standards for Erosion and Sediment Control Measures, and with the State of California's Best Management Practices for Construction Activity Handbook. The site would require a National Pollutant Discharge Elimination System (NPDES) general permit for stormwater associated with construction activity, which includes a project-specific SWPPP. A site and project-specific erosion control plan would be included and implemented during construction to reduce short-term water quality impacts associated with construction. Best Management Practices addressed in this plan would include covering of excavated materials, installation of silt traps, fencing, use of filter fabric, prohibition of cement truck washout to LBNL drains and surfaces, stabilized construction entrances, etc., and oversight throughout construction by LBNL engineers and EH&S specialists. In addition, the plan would require disturbed areas to be landscaped and re-seeded at the earliest practical time during construction so that ground cover would be well-established by the next rainy season.

During construction, measures would be implemented to provide controlled diversion of storm water until the permanent system is intact. Temporary silt traps, sedimentation ponds, and/or diversion structures would be designed and implemented to minimize erosion and siltation during construction. Because portions of the construction work would occur during the rainy season, careful consideration would be given to the sequencing of the construction work in the subcontract construction documents to minimize potential erosion. Provisions would be made to control storm runoff in disturbed areas including pumping, controlled channeling of water, and placement of silt traps to minimize erosion and siltation and maintain slope stability. This would be expanded in the construction specifications that the Architect/Engineering subcontractor develops in coordination with LBNL.

Landscaping would begin as soon as surface disturbances are completed for each relevant area. Most landscaping would take place following completion of earth-moving activities. The construction/grading contractor would hydro-seed the north end of the site during the fall of 2004 so as to minimize the erosion control measures required, but the actual timetable would not be firmly established until a contractor has been retained and a detailed construction plan is developed.

It is anticipated that some dewatering may be necessary during project excavation and construction. Excavation for the site may intersect bedrock containing fracture flow thereby causing surface seeps within the excavation. This is expected to be a temporary condition during construction that would be managed by temporary dewatering systems. If a groundwater seepage condition were to occur, and management of this condition were to become necessary, the Proposed Action could require a subdrain system or other engineered solution to reduce groundwater levels around the building. This, however, would not constitute significant alteration or depletion of a valuable or beneficial groundwater resource.

If dewatering is necessary during excavation and construction, the groundwater seepage would not be expected to contain any chemicals of special concern given the results of sampling conducted in January 2002. Such water, were it encountered, could therefore be discharged to storm drains.

As discussed above, potential on-site erosion associated with construction operations would be minimized to a less than significant level by a site and project-specific erosion control plan that would be included as a part of the project design and would be implemented as a condition of approval for construction.

OPERATIONS

The Proposed Action would not use water supplied from groundwater sources at the site, but from the East Bay Municipal Utility District supply system. Therefore, the Proposed Action would not need to pump groundwater and would not contribute to the depletion of an established groundwater resource.

As part of the Proposed Action, surface water runoff would be re-routed into the LBNL storm drain system and conveyed to an existing detention basin near Centennial Drive in Strawberry Creek that subsequently discharges water further downstream. Storm water generated within the LBNL facility is currently managed in conformance with LBNL's NPDES General Permit for Storm Water Discharges Associated with Industrial Activity, as required by the Clean Water Act and the State Water Resources Control Board. Oversight and enforcement of this permit is provided by the San Francisco Bay Regional Water Quality Control Board. Implementation of the permit requirements is detailed in LBNL's SWPPP and Storm Water Monitoring Plan (SWMP). Since the Proposed Action would be required to comply with LNBL's existing SWPPP and NPDES permit requirements, potential impacts associated with violation of water quality standards from future project site storm water runoff is anticipated to be less than significant.

The project site does not lie within the 100-year flood plain as determined by the Federal Emergency Management Agency (FEMA) flood hazard mapping, and would not include the construction of housing. There are no impounded water bodies upstream from the project site, and therefore flooding associated with failure of a dam or inundation by seiche is not anticipated to affect the Proposed Action. As the Proposed Action site is located approximately 700 feet above mean sea level, potential inundation by tsunami is extremely remote.

5.1.3 BIOLOGICAL RESOURCES

SPECIAL STATUS WILDLIFE

The project site is close to designated critical habitat for the Alameda whipsnake (it is approximately 500 feet north of the nearest critical habitat boundary). After it conducted site visits during the summer of 2000, the U.S. Fish and Wildlife Service (USFWS) determined that the future Proposed Action site and surrounding areas, along with certain other LBNL areas, should be excluded from its final critical habitat listing (U.S. Fish and Wildlife Service, 2000).

Since the Proposed Action site was excluded from the final listing by the USFWS, it is not considered to be critical habitat of the Alameda whipsnake. The closest shrub community to the proposed site is an area of north coastal scrub approximately 1500 feet to the east and separated from it by roads and other development within the LBNL (McGinniss 1996). Alameda whipsnakes can be found well away from shrub communities. However, the habitat value of grasslands on the site is attenuated by the distance from the shrub area, the potential dispersal barrier produced by existing development, and the lack of rock outcrops both on the site and in the surrounding area. On-site grassland habitat value is further reduced by annual vegetation management for fuel reduction purposes, which includes reduction of grass and shrub heights, either with goats or by mechanical means, and removal of non-native trees within 100 feet of existing buildings. Such reduction of vegetative cover further reduces the possibility that whipsnakes would use the area as a dispersal corridor.

Although the site is not located in USFWS-designated critical habitat, due to the potential for Alameda whipsnake movement into the project area, mitigation measures would be prudent to ensure that whipsnakes are protected to the greatest extent possible during project construction. The mitigation measures presented below include avoidance measures developed in informal consultation with USFWS during site surveys for the water tank and fire road realignment components of a previous LBNL project: the Sitewide Water Distribution Upgrade project. The incorporation of these avoidance measures into that project resulted in an informal determination by the USFWS that LBNL's Sitewide Water Distribution Upgrade project would not be likely to adversely affect the Alameda whipsnake or its critical habitat (USFWS 2001; LBNL NEPA/CEQA Program 2001; J. Philliber, pers. com. 2002).

- Prior to the initiation of excavation, construction, or vehicle operation, the project area shall be surveyed by a designated monitor, trained in Alameda whipsnake identification and ecology by a qualified biologist, to ensure that no Alameda whipsnakes are present. This survey shall not be intended to be a protocol-level survey, but rather one designed to verify that no snakes are actually on site.

- All on-site workers shall attend an Alameda whipsnake information session conducted by the designated monitor. This session shall cover identification of the species and procedures to be followed if an individual is found on site.

- All lay-down and deposition areas shall be inspected each morning by a designated monitor to ensure that Alameda whipsnakes are not present. All construction activities that take place on the ground shall be performed in daylight hours. Vehicle speed on site shall not exceed 15 miles per hour. Construction materials, soil, construction debris, or other material shall be deposited only on areas where vegetation has been mowed and any snakes present would be readily visible.

- The site is subject to annual vegetation management involving the close-cropping of all grasses and ground cover on the project area; this management shall be done prior to initiation of construction. Re-mowing shall be done if grass or other vegetation on the project site becomes high enough to conceal whipsnakes during the construction period.

A number of protected butterfly species also potentially occur in the project area. However, since the site is dominated by non-native grassland, with no larval host plants present, suitable habitat does not exist on site for the Bay checkerspot butterfly (*Euphydras editha bayensis*; federally listed as threatened) or the Callipe silverspot butterfly (*Speyeria callippe callippe*; federally listed as endangered). The monarch butterfly (*Danaus plexippus*; a state special status species) roosts in eucalyptus groves; no suitable groves are on or near the site.

The site lies upslope from the Chicken Creek and Strawberry Creek drainages, and it is possible that the California red-legged frog (*Rana aurora draytonii*; federally listed as threatened and a state species of special concern), the western pond turtle (*Clemmys marmorata*, a state species of special concern), and the foothill yellow-legged frog (*Rana boylii*, a state species of special concern) might be present in the general area of the project site. However, the site itself does not provide suitable habitat for these species, and it is unlikely that they would migrate through it, since the site is not located between creek drainages and other suitable habitat. Another amphibian, the California tiger salamander (*Ambystoma californiense*, a state species of special concern) requires seasonal pools for breeding, and the site and its surroundings do not provide suitable habitat. The Berkeley kangaroo rat (*Dipodomys heermani berkeleyensis*, a state special status species) is apparently extinct, and in any event the site provides no habitat since the density of the grassland vegetation is greater than is generally suitable for kangaroo rats.

The project site potentially provides a small amount of foraging habitat for golden eagles (*Aquila chrysaetos*, a state species of special concern) and for the white-tailed kite (*Elanus leucurus*, a state special status species). Although the amount of existing development and activity proposed in the area of the site would lower its value as foraging habitat, the site is relatively small. Consequently, no significant adverse impacts to these species are expected.

SPECIAL STATUS PLANTS

A thorough review and analysis of special status plant species, listed by the CNDDB (2002) and CNPS (2002) databases, as occurring in the Oakland East, Oakland West, Richmond, and Briones Valley USGS 7.5 minute quadrangles, indicates the likelihood of adverse project impacts for most of the species listed is extremely low due to the following reasons:

- suitable habitat for a species either never existed on the site or no longer does due to historical and ongoing disturbance of soils and vegetation;
- a species is not documented within the general vicinity of the project site, i.e., the western side of the Oakland-Berkeley Hills;
- only historical occurrences for a species are documented;
- a species has been extirpated from the quadrangle or county.

There are two special status plants listed in the databases as occurring further downslope from the project site in Strawberry Canyon. The first of these, western leatherwood (*Dirca occidentalis*) was not observed by ESA within the project footprint. This shrub occurs almost exclusively on

north-facing slopes, as an element of coastal scrub or oak woodland communities. The second, robust monardella (*Monardella villosa* ssp. *globosa*), is documented historically from the area. However, this species is generally found in chaparral and no suitable habitat remains within or near the project footprint.

The CNDDB (2002) lists several sensitive natural communities as occurring in the USGS quadrangles searched, including northern maritime chaparral, serpentine bunchgrass, and valley needlegrass grassland. However, none of these communities occur on or in the vicinity of the project site.

Additional runoff generated by the new building would be routed into existing storm drains. Although the Proposed Action is located within 500 feet of Chicken Creek, there would be no adverse effects on the creek or the riparian habitat lining its banks, nor would the Proposed Action result in any significant impacts to the riparian corridor along Strawberry Creek. Standard erosion control measures would be used to ensure that sediment generated by construction would not enter the creeks (see analysis, *Hydrology and Water Quality*).

Therefore, the Proposed Action is not expected to have a substantial adverse effect on any of the special status plant species or natural communities of federal, state, and local concern.

With the inclusion of mitigation measures incorporated as part of this Proposed Action, the Proposed Action would have a less than significant impact on biological resources.

5.1.4 HISTORIC AND ARCHAEOLOGICAL RESOURCES

EXCAVATION, GRADING, AND CONSTRUCTION

Although, according to the 1987 SEIR and a more recent survey conducted in 1999, there are no known paleontological resources in the vicinity of the project site, excavation, grading, and construction activities may create an adverse effect on any unknown archaeological and paleontological resources found on the site.

In the unlikely event of the discovery of archaeological and paleontological artifacts during construction, all activities within a 50-foot radius would be halted and a qualified archaeological/ paleontological monitor would inspect the site within 24 hours. If the find is determined to be significant and merits formal recording or data collection, time and funding would be required to salvage the material. Any archaeologically important data recovered during monitoring would be cleaned, catalogued and analyzed, with the results presented in a report of finding that satisfies professional standards.

Since the Proposed Action is unlikely to contain any archaeological and paleontological resources, it would also be unlikely to encounter human remains in the vicinity of the project site. If human remains should be encountered during construction, work would be halted and procedures described above would be implemented.

OPERATIONS

With the implementation of the above-described mitigation measure during the construction phase of development, it is anticipated that the operations of the proposed Molecular Foundry complex would not have a significant impact on historic and archaeological resources.

5.1.5 VISUAL QUALITY

EXCAVATION, GRADING, AND CONSTRUCTION

Excavation, grading, and construction activities would create a short-term adverse effect on the visual quality of the site and surroundings. These activities would occur during a 6-month time period and would require the removal and fill of about 32,000 cubic yards of soil.

The aesthetic environment during that time would incorporate elements typical to a construction site such as bulldozers, trucks, loaders, and excavators, as well as disturbed hillside land and surfaces.

Severe angular cuts and/or filling which results in an unnatural or engineered appearance would be avoided where feasible. In addition, graded slopes would be feathered and rounded where feasible to provide a natural transition between the graded site and adjacent ungraded areas. Furthermore, grading would be minimized though the use of retaining walls where compatible with proper design.

The Proposed Action would require removal of approximately three dozen trees to accommodate building footprints, roads, grading and construction activities. Trees proposed for removal include Monterey pine, coastal redwood, coast live oak, and bay. The majority of the trees would be removed from the area adjacent to the western and southern faces of Building 72. Fewer than one dozen trees to be removed are downslope from the Building 66 rear parking lot. These trees occur in generally isolated patches. Much larger groves consisting of up to several hundred trees each in the general vicinity would remain untouched by the Proposed Action, including a large screening grove of Canary Island pines to the west, a grove of screening redwoods to the southwest, a riparian corridor of various trees to the west and southwest, and several contiguous groves of oak, bay, acacia, and eucalyptus trees stretching from south of the project to the northeast.

The Proposed Action would transplant up to ten redwood or similarly sized trees along the western perimeter of Lee Road to provide screening for the Proposed Action. Trees would be positioned to maximize screening values. In addition, replacement trees would be planted or transplanted in various locations in and surrounding the project site, particularly in the area between the Lee Road extension and the proposed Central Utility Plant building, which would receive about one-dozen trees. All trees placed by the Proposed Action would be irrigated as necessary. Because the principal screening values and visual character of project-removed trees would be replaced, tree removal for this project would not cause a significant impact.

The Proposed Action would not have a significant adverse effect on the visual quality of the site and surroundings during excavation, grading, and construction activities.

OPERATIONS

With implementation of the Proposed Action, long-range views towards the Bay from a short segment of Lawrence Road adjacent to the site would be blocked, although numerous existing vantage points and view corridors within a quarter mile of the site would remain unaltered by the Proposed Action. In addition, the Proposed Action would alter views of the mostly vacant site from nearby areas, including the hillside residential areas along Grizzly Peak and Panoramic Hill, as well as from the adjacent UC Berkeley campus.

Although many trees would be removed, the East Strawberry Canyon perimeter "buffer zone," consisting of existing and proposed plantings of tall, indigenous tree stands would be maintained to act as a visual buffer between LBNL development and adjacent uses including the UC Berkeley campus, nearby hillside residential areas, Lawrence Hall of Science, and UC Botanical Garden. This would be in keeping with the visual buffer and landscaping directives of the 1987 LRDP. Furthermore, landscape planting areas within and adjacent to the site would be established to "unify the site visually, to relate the site to adjacent vegetation of the Berkeley Hills, and to provide compatibility between buildings and adjacent properties" (1987 LRDP, p.16). The conceptual landscaping plan for the project site consists of three zones: a crafted zone to be located to the south, natural zones to the west and east, and a parking zone to the north. The crafted zone would include an elevated terrace space between Building 66 and the Proposed Action, and would incorporate both hard and soft landscaping elements to connect and unify the building uses. The natural zone includes fire-resistant ground cover for erosion control, as well as decorative plant materials that would be selected based on their indigenous, water-saving, and low-maintenance characteristics. Finally, the parking zone would be located atop the utilities building to minimize the area's footprint and any potential disturbance to the existing natural environment.

As the proposed development would be located between existing buildings of comparable height and massing, and vegetative screening would be incorporated, the change in landscape would not be discernible at a detailed local level, but rather the change would appear as a general increase in development of the LBNL site. The Proposed Action would therefore not have a substantial adverse effect on a scenic vista.

The Proposed Action would result in a visual change to the project site because it would entail the construction of a six-story building (four stories cantilevered atop two basement levels) on a mostly undeveloped portion of the hillside site. Associated roof-top parking would be provided at a proposed nearby, below-grade utilities building. The Proposed Action would be located in an area that is developed with existing science research buildings and associated uses of similar massing and height, and would incorporate buffer zone landscaping, as described above, around the perimeter of the project site for screening purposes. Natural landscaping details include fire-resistant ground cover for erosion control, as well as decorative plant materials that blend with the surrounding wooded hillside. Furthermore, the Proposed Action would implement existing design guidelines, as described in the 1987 LRDP, and would undergo design review by LBNL architects and engineers prior to construction to ensure project conformance with the guidelines. The proposed building would incorporate architectural details that are similar to or that

complement adjacent development; the building exterior materials would incorporate a non-reflective material to minimize glare and exterior maintenance, and the roof would consist of a single-sheet, co-polymer roofing membrane system with heat-reflective coating to reduce solar gain. Metallic screens would be located on the roof to conceal rooftop mechanical exhaust equipment. The current LRDP designates the project site as a "proposed addition," and anticipated that a laboratory building would be constructed there. As the Proposed Action would conform to the current LRDP land use designation, and would incorporate site-sensitive landscaping and design principles into project design, the Proposed Action would not substantially degrade the existing visual quality of the site and its surroundings beyond what was anticipated and analyzed in the LRDP EIR, as amended.

The Proposed Action would be located in a hillside area of the LBNL site that includes several other LBNL buildings that provide existing sources of light and glare, including the adjacent Buildings 72 and 66. The site is also located along local roadways, including Lawrence Road and Lee Road, where street lighting projects light and glare during evening hours. The Proposed Action includes an open-surface parking area atop a proposed, below-grade utilities building and anticipates outdoor lighting for operation purposes. In addition, the Proposed Action would include some fixed exterior lighting, particularly at building entrance points and at the surface parking area, to promote worker safety. The Proposed Action would include a detailed exterior lighting plan that would be reviewed by LBNL's architects and engineers prior to construction. Furthermore, the Proposed Action would be required to utilize non-reflective exterior materials, would adhere to a foot-candle maximum level at night, and would install light caps on all outdoor fixtures to minimize potential light and glare spillover impacts. As these actions would ensure compatibility with surrounding land uses, the Proposed Action would not result in a significant new source of light or glare.

The Proposed Action would therefore not have a significant impact on the visual quality of the site, or the visual quality of areas in the vicinity of the site.

5.1.6 TRAFFIC AND CIRCULATION

EXCAVATION, GRADING, AND CONSTRUCTION

The approximately 24-month construction phase of the Proposed Action would result in temporary increases in traffic volumes on area roadways. This temporary increase is associated with the movement of construction workers and equipment used for excavation and construction of the proposed building and the new roadway extension. Construction-related traffic would cause a temporary and intermittent lessening of the capacities of project area streets because of the slower movements and larger turning radii of construction trucks compared to passenger vehicles. Because construction-generated trips are expected to be spread more or less evenly throughout a construction workday, impacts on peak-hour traffic likely would be limited. In addition, LBNL expects to use materials excavated for the building to construct the new roadway extension. Contractors would implement standard Best Management Practices in order to mitigate any short-term construction-related transportation impacts. Generally, these practices

include implementation of a traffic control plan, such as measures (e.g., advance warning signs, flaggers to direct traffic, and advance notification of interested parties about the location, timing, and duration of construction activity) to maintain safe and efficient traffic flow during the construction period. The effect on traffic conditions would be less than significant.

OPERATIONS

Net new trip generation was estimated based on proposed maximum staff levels and expected work hours (by category of worker), as well as commute travel mode splits, trip distribution pattern, and data pertaining to non-commute trips from data gathered for the LBNL LRDP EIR analysis. As described above, the LBNL shuttle system provides frequent service between downtown Berkeley and the LBNL site, as well as service within the LBNL site, which includes a shuttle bus stop in front of the project site. Given the nature of the work that would be conducted in the proposed building, the scientists (staff and visiting) would generally work irregular hours. For example, on some days, a scientist might work hours analogous to 8:00 a.m. to 5:00 p.m. work days typical of office workers, but on other days that same scientist might work 10:00 a.m. to 7:00 p.m., or might work on a Saturday instead of one of the weekdays. The irregularity of work hours would result in varied peak-hour trips from day to day. Nevertheless, the estimate of project-generated new vehicle trips is based on conservative assumptions so as to not understate potential impacts associated with the Proposed Action.

Two scenarios were prepared – one based on observed temporal distribution of peak-hour commute trips exhibited by similar categories of workers at Buildings 62, 66, 72, 74, and 84, located in proximity to the project site, and the other based on a reasonably higher (conservative) temporal distribution of those trips. The latter scenario yields about 50 percent higher peak-hour vehicle trips than the first scenario. The Proposed Action would generate up to about 30 to 35 net new vehicle trips during the morning and evening peak hours. About half of those trips would pass through the main (Blackberry Canyon) gate; the remaining trips would use the Strawberry Canyon gate, split between Grizzly Peak Road / Centennial Drive and Stadium Rim Way / Centennial Drive.

Under future (2020) conditions, traffic volumes would increase on area roadways, and at study intersections, due to development foreseen by LBNL under its revised LRDP, by the cities of Berkeley and Oakland, and by UC Berkeley. Recent (2001) estimates of increases in roadway and intersection traffic volumes were presented in the University of California at Berkeley's *Northeast Quadrant Science and Safety (NEQSS) Projects* EIR and the City of Berkeley's *General Plan Update EIR*. The study intersections would continue to operate at acceptable levels of service (LOS D or better) during the a.m. and p.m. peak hours, except at the Gayley Road / Stadium Rim Way intersection, where delays within LOS F would increase. As described above, new traffic generated by the Proposed Action would be modest and would be dispersed among roads accessing the entrance gates, and therefore levels of service at the key (gateway) intersections would not change with the addition of project traffic. The contribution of project-generated traffic to LOS F conditions at Gayley/Stadium Rim would be less than significant (i.e., the increase in average vehicle delay caused by the addition of project traffic at the latter

intersection would be less than two seconds during both peak hours).[9] The operation of the Proposed Action therefore would have a less than significant impact on traffic conditions on the area roadway system.

The Proposed Action would neither alter the physical configuration of the existing roadway network serving the area, nor introduce unsafe design features or incompatible uses into the area. The physical and traffic characteristics of area roadways (e.g., traffic signal and stop-sign control, pedestrian crosswalks and crossing signals, and bicycle lanes) would safely accommodate project-generated traffic (both vehicular and non-motorized). The project's effect on safety would be less than significant.

The proposed system of access and egress for the parking area serving the proposed building would adequately accommodate the mix of users, and there would be less than significant impacts associated with project access.

The Proposed Action would displace 18 existing spaces in a surface lot, and provide 16 new spaces on the upper level of the Central Utility Plant / parking facility). The estimated project-generated parking demand would be accommodated through a combination of the 16-space on-site parking supply and the other on-site parking spaces connected to the project building by the LBNL shuttle bus. Because there would be no spillover of parking demand from the project site into adjacent neighborhoods, any parking impact would be internal to the LBNL site, and therefore, the Proposed Action would have a less than significant parking impact.

The Proposed Action would result in a less than significant impact on traffic, circulation, and parking at the project site and in the vicinity.

5.1.7 AIR QUALITY

EXCAVATION, GRADING, AND CONSTRUCTION

The proposed Molecular Foundry buildings and roadway segment would be constructed on a site created by cutting and filling about 32,000 cubic yards of earth and rock. All excavated material would be used on-site, and there would be no trucking of material off-site (balanced cut and fill). Grading would occur from about April to September 2004. Equipment would be standard diesel-powered loaders, excavators, bulldozers, and trucks. No blasting would occur. Any building foundation would be drilled rather than driven. Utility relocation, including trenching, would occur from about February 2004 to February 2006.

[9] Revised traffic volumes projections will be prepared as part of the LBNL LRDP EIR. It should be noted, however, that if the later projections indicate that 2020 volumes will be higher than the volumes presented in the UC Berkeley and City of Berkeley EIRs cited herein, that will mean that the percent contribution to 2020 conditions from the Molecular Foundry project would be smaller than presented in the EA/IS, and therefore the less than significant determination would remain valid.

Trucks would arrive on-site delivering building materials and concrete for foundations. Building construction might involve compressors, pneumatic equipment such as drills and nut drivers, cranes, forklifts, and other equipment. A rotary drill rig, likely powered by diesel engines, would bore holes for pilings as part of the foundation.

Construction activities associated with the Proposed Action would create PM-10 and ozone precursor emissions. However, there are no published construction emission thresholds, and the BAAQMD has accounted for construction emissions in its Clean Air Plan. Implementation of standard LBNL construction practices (see Appendix "A") would reduce the impact of construction-related fugitive dust emissions to a less than significant impact.

OPERATIONS

Project operation would result in emissions primarily from the increase in motor vehicle trips to the site and, to a lesser extent, from other area and on-site stationary sources (such as natural gas combustion for space and water heating, and landscaping). The Proposed Action would create increased electric energy demand from air conditioning and heating equipment. Electricity demand requires more fossil fuel combustion at regional power plants. This would not affect the immediate area but would add incrementally but not measurably to the regional pollutant burden of ozone precursors, particularly oxides of nitrogen. A new diesel emergency generator and an associated 3,000-gallon above-ground fuel tank are proposed as part of the Proposed Action. Emissions associated with this generator would be accounted for and limited by the Permit to Operate that would be required from the BAAQMD. BAAQMD would perform a risk assessment on air emissions from this generator as part of reviewing the permit application to ensure that impacts do not exceed District significance thresholds.

Mobile source emissions would include emissions from trucks and delivery vehicles, and employee commute trips. Approximately 137 new employees and students would use the Molecular Foundry, approximately 95 of whom would be potential new "drivers" to the site.[10] LBNL offers carpooling privileges and shuttle bus services to its employees to reduce driving of personal vehicles. The BAAQMD considers emissions from projects generating fewer than 2,000 trips per day to be less than significant, since this number of trips is not likely to exceed the 80 pounds per day significance threshold established by the District for ROG, NOx, and PM-10. The Proposed Action would generate well below 1,000 trips per day, and is estimated to result in far less than the 80 pounds per day significance threshold established by the BAAQMD.

Project-related emissions would not be expected to conflict with or obstruct implementation of any applicable state or Federal air quality plans, including the Ozone Attainment Plan, the Bay Area 2000 Clean Air Plan, and the Carbon Monoxide Maintenance Plan. In addition, the Proposed Action would not violate any applicable air quality standard or contribute substantially to any existing or projected air quality violations. Furthermore, it would not result in a

[10] Out of 137 Molecular Foundry occupants, 6 would be "directors" currently on staff at LBNL whose current positions would not be replaced; approximately 36 would be UC Berkeley graduate students who would not have driving privileges at LBNL. This would leave about 95 new potential drivers among the Molecular Foundry staff.

cumulatively considerable net increase of ozone and its precursors (i.e., ROG and oxides of Nitrogen), or PM-10.

HAZARDOUS AND TOXIC AIR EMISSIONS

The proposed laboratory would use many types of chemicals, most of which would be kept and used on-site in small quantities. The Laboratory has written procedures to guide personnel in specific methods of storing these chemicals in correct containers and safety cabinets. Individual laboratories would contain fume hoods—for a combined building total of 48 fume hoods--which would be vented to the outside atmosphere at the building rooftop. Discharge from the fume exhaust would meet vertical velocity and stack height requirements. LBNL requires construction of building ventilation systems to minimize criteria air pollutants. Wind analysis would be conducted during project design to ensure that placement of exhaust stacks on the roof would not cause re-entrainment of exhaust into fresh air intake ducts, which would be located on or near the rooftop of the Molecular Foundry building. A Preliminary Hazard Analysis Report is under preparation for the Proposed Action by LBNL and will be completed at the time of final project design.

Two BAAQMD programs evaluate the health risks associated with routine TAC emissions from any activity. First, and most applicable to the Molecular Foundry, BAAQMD's permitting program identifies activities that would exceed risk-based TAC emission thresholds from new or modified sources. The need for an operating permit for laboratory activities would be assessed from more reliable emissions estimates made closer to actual construction of the facility, although it is expected that the Molecular Foundry would qualify for BAAQMD's permit exemption for research laboratories, like the other research activities found at LBNL. The purpose of this permitting process is to ensure that proposed emissions are less-than-significant, and the BAAQMD would impose project conditions, if necessary, to reduce projected emissions until they conform to District significance standards before issuing a permit. Second, BAAQMD's Air Toxics Hot Spots Program updates a facility-wide TAC emissions inventory once each year during the renewal of operating permits. To date, LBNL TAC emissions fall below the thresholds for incorporation into the BAAQMD Toxic Inventory Database.

The Molecular Foundry laboratories would contain small amounts of chemicals similar to those found in other LBNL scientific facilities. These types of chemicals are those typically used in hospitals and medical and research laboratories and pose little environmental risk when used in typical research quantities following accepted research procedures. The completed Hazard Analysis Report will identify in detail the toxic metals that would be used and stored in each laboratory, and the associated types of experiments that would be conducted. These include organic solvents and toxic metals, such as cadmium and arsenic. Chemicals used in laboratories would generally be handled in very small quantities (i.e., probably on the order of up to a few hundred grams) and liquids would tend to be handled in quantities of a few centiliters or less. This is consistent with the nature of the experiments that deal with substances and properties on a micro- and nanoscale. Any quantifiable air quality public health risk from laboratory activities

would be extremely small and well below significance thresholds.[11] In addition, the proposed Molecular Foundry project does not include the use of radioactive materials.

The Proposed Action would not create or substantially contribute to a significant TAC impact. Emissions of TACs are regulated by their projected risk to any individual located outside the LBNL property, regardless of the land use designation (e.g., commercial). The risk from TAC emissions is expected to remain below these BAAQMD thresholds. The buffer areas and University lands that surround LBNL further lower the risk levels at the nearest residential areas, which are approximately one-third mile distance. At that distance, operational TAC emissions from the Proposed Action are expected to be extremely small or immeasurable. According to the BAAQMD, a Proposed Action is expected to have a less-than-significant cumulative TAC impact if it does not pose an individually significant TAC impact and is consistent with the governing general plan. That general plan should provide for appropriate buffer zones to protect sensitive receptors from TAC emissions. The LBNL LRDP does maintain appropriate designated buffer areas between the proposed Molecular Foundry site and the nearest residential areas. The Proposed Action therefore meets the BAAQMD requirements.

Furthermore, the Proposed Action is expected to neither create nor measurably contribute to any local toxic air contaminant "hot spots," as defined by the BAAQMD. "Hot spots," pursuant to California Assembly Bill 2588, are regions, either small or large, where individual or cumulative levels of TACs exceed safety or significance risk thresholds. Annually, LBNL provides information to BAAQMD to help this agency determine the existence of any hot spots in the Bay Area. There are no identified hot spots in the area to which the Proposed Action would measurably contribute.

LBNL's mandatory standards for all projects include those that would assure adequate shipping, treatment, storage and/or disposal of hazardous wastes, continuation of LBNL's waste minimization programs, licensed hazardous waste haulers, implementation of employee communication and training requirements for hazardous wastes, and continued updating of LBNL's emergency preparedness and response programs on an annual basis. Additional discussion is provided in Section 4.14. *Hazards and Human Health*, below.

The Proposed Action would not result in a significant impact to air quality.

5.1.8 NOISE

EXCAVATION, GRADING, AND CONSTRUCTION

To evaluate potential Proposed Action impacts on the nearest noise-sensitive uses, simultaneous noise measurements were taken on the project site and at three residences in the Panoramic Hill

[11] Current estimates indicate that concentrations of TAC emissions from the proposed project would be so low as to be immeasurable or extremely small at the nearest residential neighborhood fenceline. In fact, preliminary screening estimates indicate that the entire expected annual chemical inventory of the proposed Molecular Foundry would be so small that, were it to be emitted at a 100% annual rate (a physically impossible, conservative scenario), the vast majority of these chemicals would be unlikely to even approach BAAQMD regulatory thresholds at the LBNL fenceline.

Neighborhood. Construction noise would typically be generated by large, diesel-powered equipment. Since construction equipment was unavailable, a large commercial tree-limb grinder was used to generate noise at a suitable level. A noise meter was set up 50 feet from the grinder while simultaneous readings were taken at three locations in nearby neighborhoods. A summary of this data is presented in Table 4, below.

TABLE 4
FORECAST CONSTRUCTION NOISE MEASUREMENT DATA (decibels)

Noise Level dB (Average of several measurements)	Project Site	365 Panoramic Way	Project Site	299 Panoramic Way	Project Site	45 Canyon Road
Ambient	54.1	45.0	54.7	45.8	51.5	47.0
Engine Only	82.3	45.8	85.0	50.6	85.9	50.4
Grinding wood	91.6	50.5	N/A	N/A	N/A	N/A

[1] Tests made during dry weather, wind approximately 3-5 mph from west, temp approximately 70 F.
[2] Sites on Panoramic Way are in City of Berkeley, the site on Canyon Road is in the City of Oakland.
[3] "N/A" indicates that accurate measurements could not be obtained at these locations because wood grinding noises were highly variable during short periods of time.

The noisiest phases of construction could create noise at 89 dBA L_{eq} (50 feet). During field measurements, at the nearest residences, about 1,500 feet away, the measured noise levels diminished to about 50 dBA. The large amount of trees and shrubbery in the area between the homes and the project site help create favorable attenuation by absorbing, rather than reflecting, sound energy. These measured values are supported by calculated attenuation. Thus, predicted construction noise levels would not violate the Oakland Noise Ordinance or the City of Berkeley Noise Ordinance. The Proposed Action would therefore not significantly increase the daytime noise environment at nearby sensitive receptors.

OPERATIONS

The Proposed Action could generate noise from motor vehicle trips as well as from stationary sources such as Heating Ventilation Air Conditioning (HVAC) equipment. A change in noise level of less than three dBA is not discernible to the general population; an increase in average noise levels of three dBA is considered barely perceptible, while an increase of five dBA is considered readily perceptible to most people (Caltrans, 1998).

Traffic levels anticipated by the Proposed Action would not result in perceptible project-related noise.

HVAC equipment involves fans and compressors that are designed by the manufacturer to operate quietly and unobtrusively. Since LBNL would install and operate the HVAC equipment in compliance with manufacturer's standards, the noise impact to nearby residents and adjacent land uses would be less than significant.

Much of the equipment at LBNL is very sensitive to groundborne noise or vibration. There are no existing sources of groundborne noise or groundborne vibration at or around the site. The Proposed Action would not introduce any new sources of groundborne noise or vibration.

While the Proposed Action is consistent with the City of Oakland's General Plan Noise Element and Noise Ordinance, and is consistent with the City of Berkeley's Noise Ordinance, the additional measures that would be incorporated as part of the Proposed Action would assure that the Proposed Action would not expose sensitive receptors to excessive noise levels.

5.1.9 PUBLIC SERVICES

EXCAVATION, GRADING, AND CONSTRUCTION

The construction phase of the Proposed Action could affect response times to the project site and its vicinity as a result of any potential temporary construction-related roadway lane closures and detours. The Proposed Action would be supported by a collaborative, multidisciplinary team that would include engineers and project managers, as well as industrial hygiene, environmental protection, design and construction safety, ergonomics, fire protection, and radiation protection professionals from LBNL's EH&S Division. Construction activities would be overseen so as to comply with applicable safety requirements of Berkeley Lab, DOE, CAL/OSHA, and Federal OSHA. All appropriate fire, emergency medical, and police services would be consulted and apprised of every appropriate aspect of project design and construction.

OPERATIONS

The site is already within an area served by adequate fire and police protection services. The current level of staffing for fire protection services and the LBNL security force is adequate to support fire and police protection services for the Proposed Action.

5.1.10 PUBLIC UTILITIES

EXCAVATION, GRADING, AND CONSTRUCTION

Disposal of solid waste generated during construction would be the responsibility of the contractor. Due to the "cut and fill" nature of project grading, the Proposed Action would not create excavation spoils that would need to be hauled and disposed of off-site.

Utility hookups, pipes, and wiring would be accomplished as part of the construction of the Proposed Action. Construction-related impacts related to dust and construction equipment are discussed in the Air Quality and Noise sections of this analysis. Existing utility connections are

located in the vicinity of the project site, generally in existing right-of-ways. Some project connections may result in temporary construction-related delays to traffic along Lawrence and Lee Roads.

OPERATIONS

The Proposed Action is located adjacent to an urban area and is already served by utilities and service systems. It is not anticipated that additional needs created by the Proposed Action would be sufficient to necessitate construction of new or substantially expanded systems.

The existing distribution system would supply water for all laboratory uses and has sufficient capacity to meet the flow rate and duration requirements for both daily use and fire protection. Although the Proposed Action is expected to increase water use by less than approximately 1,500 gallons per day, it would not cause a significant impact because relatively unrestricted water volume is available from EBMUD. Peak water capacity for the Proposed Action would be 325 gallons per minute, although actual usage rates would be far lower.

Any increase at the large capacity wastewater treatment plant would represent an incremental increase to its existing load, and therefore would not be expected to cause a significant impact. The proposed Molecular Foundry would be expected to generate less than 1,200 gallons per day of wastewater, which would flow through new project sewer lines connected to existing sewer lines. Peak wastewater capacity of the building would be 185 gallons per minute, although actual usage rates would be far lower. This would be well within the wastewater volumes projected, mitigated for, and adopted in the 1992 LRDP EIR and 1997 Addendum to the LRDP EIR. It would also not contribute to a substantial LBNL-wide increase in wet weather flows, as LBNL has worked in recent years to substantially reduce its peak wet weather flows and has effectively addressed its previous infiltration/inflow problems.

As part of the proposed action, LBNL will continue to seek to integrate and find opportunities for controlling and/or reducing the amount of infiltration and inflow into the existing sanitary sewer system. Runoff from the project site would be diverted into a detention basin upstream of Strawberry Creek. An existing 12-inch storm drain that crosses the site would be re-routed to the lower access road. There would be some incremental increase of controlled flow from the detention basin into the creek due to an increase in impermeable surface area associated with the Proposed Action. The existing system provides for runoff intensities expected in a 25-year maximum-intensity storm.

Although operations of the new building would create additional waste in proportion to the number of employees stationed there, its volume is not anticipated to be great enough to significantly affect existing facilities. LBNL has a recycling program, which it continues to expand and update.

The Proposed Action would include an on-site 8,000-gsf Central Utility Plant that would house mechanical and electrical equipment to serve the main building. It would contain systems for heating, cooling, and purification of air and water to be used in the Molecular Foundry. In

addition, it would hold a stand-alone diesel-engine generator to provide a source of emergency power. All normal operating electrical power would be supplied by Pacific Gas and Electric Company through the Lab's existing infrastructure and the Grizzly Peak substation.

The Proposed Action would result in additional use of utility services. However, when compared to the overall use of utility services at LBNL, utility usage at the proposed Molecular Foundry would be a proportionally small increase.

5.1.11 ENERGY

EXCAVATION, GRADING, AND CONSTRUCTION

During the construction phase, electrical power would be provided to the construction site through temporary connections to the existing online distribution systems. Existing provisions of utilities, services, and energy at LBNL are expected to be adequate for temporary construction activities. Therefore, any impacts are expected to be less than significant.

OPERATIONS

Important components of meeting LBNL goals include a survey and study program to identify cost-effective energy savings measures; a retrofit program to implement the cost-effective projects; and a new buildings program which would ensure that new facilities meet all applicable energy performance standards, including both those developed by the Department of Energy Executive Order 12003 and 10 Code of Federal Regulations Part 436 and those issued by the State of California, Title 24. In addition, the specific building design of the Molecular Foundry would meet the requirements of 10 CFR 485, "Energy Conservation Voluntary Performance Standards for New Buildings."

Electricity and gas consumption for the proposed Molecular Foundry would be similar to the consumption patterns of Building 2. Gas consumption at Building 2 was 125,000 therms per year, while electricity consumption was 8,580 megawatt-hours per year. Peak load electrical capacity of the Proposed Molecular Foundry building would be approximately 2,900 kVA. Peak load natural gas capacity would be 10,700 CFH (cubic feet per hour), for space and water heating as well as laboratory usage. Actual usage rates would be far below the peak capacity, generally in the 30 percent-of-peak capacity range.

As previously noted, the Grizzly Peak electric substation was recently expanded to incorporate a new and adjacent substation, the Hill Area UC Substation. This new Hill Area substation allowed the UC Berkeley campus to draw its power from it, thus allowing the LBNL exclusive use of the Grizzly Peak substation. Therefore, electric capacity was expanded for both UC Berkeley and LBNL.

No mitigation measures would be required.

5.1.12 HAZARDS AND HUMAN HEALTH

EXCAVATION, GRADING, AND CONSTRUCTION

There is no history of hazardous materials processing, storage, or disposal on the project site. This is consistent with the findings of LBNL's 10-year site-wide environmental investigation activities at Berkeley Lab. A soil sampling and analysis of the Proposed Action site was carried out in January 2002. This investigation involved testing for volatile organic compounds, heavy metals, and radiological contaminants. The results of these analyses indicate that the proposed Molecular Foundry project site is free of chemicals of potential concern. In addition, environmental investigations at the Proposed Action site have not revealed the presence of contaminated soil or groundwater. Demolition of the existing surface parking lot and excavation of the site is therefore not anticipated to result in potential exposure to hazardous materials.

OPERATIONS

The Proposed Action is anticipated to be classified by the Department of Energy as a non-nuclear low-hazard facility. With the exception of the above ground diesel tank for the emergency generator, the Molecular Foundry facility would not include bulk storage (e.g., large quantities beyond what is reasonably needed for short-term use) of flammable or combustible liquids or gases, corrosive, caustic, or otherwise reactive or toxic chemical substances. The Proposed Action would comply with all LBNL hazardous materials policies and programs, in addition to compliance with the Department of Energy Program and Project Management Practices.

Chemicals used at the site would be used in very small amounts, and would therefore not create a hazard to the public. Chemical wastes would be contained and ultimately disposed in accordance with all applicable and appropriate storage, transport, and disposal requirements. Satellite accumulation areas would be used to properly store hazardous waste until transferred to the RCRA-permitted Hazardous Waste Handling Facility. Pursuant to the required project features listed in Appendix "A," the Proposed Action would track its safety and compliance performance in regard to hazardous materials; it would be required to confirm the appropriate licensing of any receiving facility for hazardous waste treatment, storage, or disposal; LBNL would continue its waste minimization programs to reduce the hazardous waste stream; and LBNL would confirm the appropriate licensing of any hazardous waste hauler serving the Proposed Action. Incorporation of these existing LBNL requirements into the Proposed Action would further reduce a less than significant impact.

Although the potential exposure to hazardous materials and hazards is already low, with the incorporation of the LRDP EIR, as amended, mitigation measures, any potential exposure to hazardous materials and hazards would be further reduced.

5.2 ANALYSIS OF ABNORMAL EVENTS AND ACCIDENT SCENARIOS

5.2.1 EXCAVATION, GRADING, AND CONSTRUCTION

Routine accidents and injuries (e.g., slips, trips, and falls) are common occurrences at construction sites and are not considered abnormal events. Nevertheless, worker safety issues are addressed in the "excavation, grading, and construction" discussions throughout this document and would be further minimized by implementation of applicable Federal, state, OSHA, and LBNL regulations and practices, including those identified in Appendix "A" of this document.

Abnormal accidents would include serious equipment malfunction, or major structural or land stability failures due to faulty engineering or construction practices. Again, these issues have been addressed and would not be reasonably foreseeable given the inclusion of various precautionary elements of the project description, including those identified in Appendix "A" of this document.

5.2.2 OPERATIONS

Routine accidents and illnesses (e.g., slips, trips, minor, small quantity chemical spills) are common occurrences in a laboratory environment and are not considered abnormal events. Nevertheless, worker safety and laboratory procedures are addressed in the "operations" discussions throughout this document and would be further minimized by implementation of applicably Federal, state, OSHA, and LBNL regulations and practices, including those identified in Appendix "A" of this document.

Earthquake and/or fire damage to buildings could endanger workers inside or in the vicinity of the Proposed Action structures. Earthquake and fire safety issues are addressed throughout the document and earthquake- and fire-resistant design is a key component of the on-going design of the Proposed Action. The proposed Molecular Foundry building would be constructed to allow safe egress of all occupants during a maximum credible seismic event and/or fire. Earthquake and/or fire damage to buildings could result in emissions of chemicals. However, complete collapse and/or fire inundation of the proposed Molecular Foundry building would not be likely given the Lab's adherence to structural and fire safety codes, its maintenance of an on-site fire department, its on-going vegetation management plan that has significantly reduced wildfire fuel in the surrounding areas, and the soon-to-be-completed construction of a 200,000-gallon emergency water tank uphill from the site in the East Canyon area.

In addition, the proposed Molecular Foundry would not provide bulk storage for chemicals and chemical wastes. Safety cabinets and bracing would prevent the breaking and spillage of toxic and volatile chemicals. Fire, earthquake, and hazardous air emissions issues are addressed in the "operations" discussions throughout this document and would be further minimized by implementation of applicably Federal, state, OSHA, and LBNL regulations and practices, including those identified in Appendix "A" of this document. The proposed Molecular Foundry buildings would not store or use biological materials of high public concern, such as Biosafety level 3 or 4 materials and other biological materials not commonly used in other parts of LBNL.

5.3 ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ALTERNATIVES

5.3.1 NO ACTION

This alternative would adversely affect LBNL's ability to take advantage of funds available for nanoscience research under the National Nanotechnology Initiative, because there is no facility at LBNL that can provide adequate and consolidated space for the variety of disciplines necessary to make the required scientific breakthroughs in this area. There is also no space available for the sophisticated state-of-the-art research equipment for nanoscale research, which requires clean, utility-intensive modern laboratories. Finally, no space is available in close proximity to interrelated research support facilities, such as the NCEM and SSCL.

5.3.2 DIFFERENT BUILDING CONFIGURATION

This alternative would result in a facility that is nearly 70 percent smaller than the proposed building. The smaller building would be less noticeable and would therefore likely have less of a visual impact on the site. The high number of staff and the smaller building would, in combination, however, severely restrict the amount of research that could be conducted at the site, and would restrict the ability of LBNL to meet the goals and objectives of the NNI. (In order to meet the research needs of the building, it would be more densely occupied than the Proposed Action).

This alternative would likely have less of a visual impact on the surrounding natural and built environment than the Proposed Action, because of its reduced size. Net new vehicle trips generated under this alternative would be reduced by approximately one-third to one-half, and the distribution of those trips among the entry gates for LBNL would be correspondingly less than under the Proposed Action. The potential effects on traffic conditions also would be somewhat less than those of the Proposed Action. This alternative would likely have slightly less potential to disturb potential archaeological resources and would remove somewhat fewer trees. Project features identified in Appendix "A" would keep this at a less-than-significant level. Potential effects to biological resources would be slightly reduced but similar, as would noise impacts, air quality impacts, and public services and utilities impacts.

5.3.3 ALTERNATE BUILDING SITE (ON-SITE)

This alternative would require demolition of existing buildings, some of which have been preliminarily identified as historic resources. In addition, contaminated soil has been identified near Building 7, and demolition of older buildings would result in impacts to air quality as a result of probable asbestos and lead originally used in the construction of these buildings. Anticipated visual impacts from implementation of this alternative include impacts to the ALS building (Building 6), which is considered an important visual resource for the Lab. As construction and siting of the proposed building would likely obscure the ALS Building profile, a significant and unavoidable impact could occur under this alternative. Furthermore, National

Historic Preservation Act evaluation would be required of the historical significance of Buildings 4, 5, 7, 14, and 16.

Net new vehicle trips generated under this alternative, and the distribution of those trips among the entry gates of LBNL, would be the same as under the Proposed Action, and therefore, the potential effects on traffic conditions would be identical to the Proposed Action. Additional construction truck trips would be necessary to remove demolition debris and contaminated soil, if any, and to remove excavated soil that would not be used as fill in-place.

There would be no potential impacts to Alameda whipsnake habitat, as the project site is completely developed. This alternative would be consistent with the LRDP except for any potential visual quality effect it might have on the ALS building. Potential effects on noise and public services and utilities would be similar to the Proposed Action.

CHAPTER 6.0

CUMULATIVE IMPACTS

6.1 PROJECTS IN VICINITY OF PROPOSED ACTION

Planned, pending, and/or reasonably foreseeable projects in the area of the Proposed Action include:

- A foreseeable proposal to construct an approximately five-story, 60,000 gsf office building near LBNL's Blackberry Gate entrance ("50X Building"). This project would be a "decompression" building envisioned to provide relief for overcrowded office facilities elsewhere on-site; it would not result in an increase of LBNL's population nor increase traffic impacts. Construction would be anticipated to take place between 2004 and 2006. Should this proposal move forward, an environmental analysis of and decision regarding this project is expected to occur in early 2003.

- A foreseeable proposal to design and implement a new Long Range Development Plan (LRDP) for LBNL; this LRDP would guide LBNL's development for approximately 20 years. The proposed new LRDP is anticipated to identify new population and space growth projections for LBNL, although growth would be projected to occur at approximately the same rate as has been experienced at LBNL during its recent history (approximately 1.3 percent per year). The main differences between the current LRDP and the upcoming proposed new LRDP would be realized during the later phases of the planning period, sometime after 2010. Should this proposal move forward, an environmental analysis of and decision regarding this project is expected to occur in late 2003.

- Development in the surrounding area includes growth and development within the City of Berkeley as envisioned in the 2001 Berkeley General Plan and EIR; within the northeastern portion of the UC Berkeley campus as described in the *Northeast Quadrant Science and Safety Projects and 1990 Long Range Development Plan*, January 2002 (NEQSS Project); and as expected to be projected for the overall UC Berkeley campus in the forthcoming UC Berkeley Long Range Development Plan and EIR. The 2001 City of Berkeley General Plan allows for steady growth and development, but, given a lack of substantial undeveloped space in the City, at a relatively even pace with an emphasis on infill development. Projections include a population increase of approximately 7,000 people (a roughly six percent increase), approximately 3,300 new household units (a roughly eight percent increase), and approximately 3,700 new jobs (a roughly five percent increase) by the year 2020. The NEQSS project would construct approximately 324,400 gsf of buildings (demolition of existing 100,000 gsf, construction of 430,000 gsf) 140 parking spaces and approximately 400 full-time equivalent (FTE) employees to the northeastern quadrant of the UC Berkeley

campus after a construction period projected to last from approximately 2002 to 2005. The forthcoming UC Berkeley LRDP revision and EIR would likely project increases in population and built space by the year 2020.

The UC Berkeley NEQSS project and the forthcoming LRDP revision are scheduled to gradually begin to take effect after 2005, as UC Berkeley has agreed with the City of Berkeley that it will not begin to substantially increase its population prior to that time, and the NEQSS project will not be completed and operational until after 2005.

6.2 CUMULATIVE IMPACT AREAS

Areas where there would be no reasonably foreseeable substantial cumulative impacts include: Geology, Soils, and Seismicity: Historic and Archaeological Resources; Land Use; Socioeconomics; and Environmental Justice.

6.2.1 HYDROLOGY AND WATER QUALITY

The Proposed Action would result in an approximately 1.5-acre loss of permeable surface. The proposed 50X building proposal would likely result in a similar loss of permeable surface; however, these two projects would take place in different watersheds and would represent only an incremental change in each. The proposed City of Berkeley and UC Berkeley projects would generally be in-fill on existing paved surfaces.

6.2.2 BIOLOGICAL RESOURCES:

The Proposed Action and the proposed 50X Building would not likely affect any special status species. However, each project would take place in an area that theoretically could be traversed by a member of the state- and Federally-designated threatened Alameda whipsnake species. On the other hand, neither project would take place in or reduce designated Critical Habitat of the Alameda whipsnake, and the Proposed Action and proposed Building 50X project would employ appropriate whipsnake avoidance measures. Other identified projects would likely take place in currently developed areas.

6.2.3 VISUAL QUALITY

Implementation of the Proposed Action would result in a visual change to the LBNL and surrounding hillside environment. The proposed 50X building would have a similar project-specific result. However, both projects would be visible from limited and mutually exclusive vantage points, and neither would take place in an area that is not currently surrounded by development. None of the other projects identified would noticeably add to a visual quality cumulative impact with the Proposed Action.

6.2.4 TRAFFIC AND CIRCULATION

The most acute increases in NEQSS construction-related traffic would occur between 2002 and 2005. The Proposed Action and the proposed 50X Building project construction would take place between 2004 and 2006. Buildout of the proposed LBNL and UC Berkeley LRDPs would take place mostly after 2006. Most construction-related traffic effects of these projects, then, would be staggered over a period of several years.

Construction traffic generated by the proposed NEQSS and UC Berkeley LRDP development would increase truck and heavy equipment vehicles and staging along Hearst Avenue and Gayley Road, two prime access routes to LBNL's main Blackberry Gate entrance. These routes would be further used by construction-related traffic accessing the LBNL site. Because LBNL would only use those routes for access to Berkeley Lab and not for staging purposes, and because LBNL can accommodate parking of heavy equipment on site and thus would not require daily commuting of heavy construction vehicles, and due to the fact that LBNL currently intends to reuse excavated material on-site (thus sparing truck trips necessary to provide and/or dispose of excavation fill), and because the Propose Action construction would be staged during generally different time periods than the City and UCB Campus projects, LBNL would represent only a minor contribution to construction traffic related impacts on these roadways, and within the levels anticipated and discussed in the 1997 Addendum.

Operational traffic from the Proposed Action would be distributed over a vide commute period (and would not be as concentrated during the peak hour as would be typically expected of office workers, for example) and would be further distributed over LBNL's three entrance gates. The proposed 50X Building project would not add to new traffic burdens at LBNL as it would draw exclusively on existing on-site workers. The proposed NEQSS and other UCB Campus and City projects would be expected to add incrementally to traffic in the area that leads to LBNL's Blackberry Canyon entrance (but not likely the other two entrances), although the Proposed Action would not likely pose a considerable contribution to any peak-hour commute impacts in concert with them.

6.2.5 AIR QUALITY

The Proposed Action would not result in any significant cumulative air quality impacts, nor would it pose any individually significant air impacts. It would be consistent with the LBNL LRDP, and would neither conflict with nor obstruct implementation of the Ozone Attainment Plan, the Bay Area 2000 Clean Air Plan, nor the Carbon Monoxide Maintenance Plan. The Proposed Action would not violate any applicable air quality standard or contribute substantially to any existing or projected air quality violations. It would not result in a cumulatively considerable net increase of any criteria pollutant, including ozone and its precursors (i.e., ROG and oxides of Nitrogen), or PM-10. No construction or operational emissions—either criteria pollutants or toxic air contaminants—would be expected to exceed any regional, state, or federal thresholds of significance. As operational details and estimates are further developed, the Molecular Foundry project would undergo review and permitting processes from BAAQMD for operational emissions and potential emergency diesel generator emissions. The Proposed Action

would implement feasible measures to further reduce construction and operational air impacts of construction and operations and would prohibit significant health risks through its discretionary permitting authority.

The Proposed Action would not create or substantially contribute to a significant TAC impact. Project emissions of TACs are expected to be very low in general and negligible at the distance of the nearest residential areas. Moreover, there are no nearby significant ambient TAC concentrations to which the Proposed Action might cumulatively contribute, and any contribution by the Proposed Action would not be cumulatively considerable in any event.

6.2.6 NOISE

Noise effects from the Proposed Action construction could combine with noise from other construction projects to generate cumulative impacts. However, as described in traffic, above, construction of the projects identified in this section would be staggered over a period of years and there would not be a point at which all projects were fully under construction. In addition, the projects are separated physically and by intervening terrain such that noise impacts from the other projects should not noticeable to the same receptors as noise from construction of the Proposed Action.

6.2.7 PUBLIC SERVICES

LBNL maintains its own primary public services (fire protection, security, health and safety); the proposed 50X project would decompress existing on-site employees and would thus not substantially add to demand for services. Although City and UCB Campus projects would be expected to incrementally increase demand for off-site services over time, Proposed Action-related demand for off-site services would be negligible.

6.2.8 PUBLIC UTILITIES/ENERGY

The Building 50X project, NEQSS, and other City and UCB Campus projects would be expected to increase demand for regional utilities and energy provision. However, these utilities are managed to accommodate region-wide growth and demand increase; these projects would be expected to fit within this long-term planning. Demand for utilities for all projects combined would not represent a substantial increase in demand for regional providers and would thus not be cumulatively significant. LBNL, UC Berkeley, and the City of Berkeley all encourage or mandate water and energy saving devices and practices.

6.2.9 HAZARDS AND HUMAN HEALTH

The Proposed Action would generate relatively small amounts of TAC emissions in the area. The proposed 50X building would not generate TAC emissions, as it would be exclusively an office building and because it would not generate new traffic trips. The proposed NEQSS and UC Berkeley LRDP growth would likely generate TAC emissions. However, because these

projects, when combined, would create or add to any toxic air "hot spots" or other areas of significant impact in the area of effect of the Proposed Action, this would not be a significant impact. Generation of hazardous materials (not air-emissions) would be of relatively small scale and would follow LBNL's strict handling, storage, and disposal procedures. The proposed buildings would be constructed to modern, state-of-the-art fire and earthquake standards.

TABLE 5
SUMMARY OF ACTION ALTERNATIVES

	Proposed Action	No Action	Different Building Configuration	Alternate Building Site (on-site)
PROJECT DESCRIPTION				
Location	Project Site: southeastern area of LBNL.	No impact.	Project Site: southeastern area of LBNL.	LBNL Site: Central "Old Town" Lab area.
Size (approx)	90,000 gsf.	No impact.	30,000 gsf.	90,000 gsf.
Number of Occupants	137	No impact.	50 – 90	137
Number of New Traffic Trips	94 new drivers.	No impact.	34 – 62 new drivers	94 new drivers
PROJECT IMPACTS				
Geology, Soils, and Seismicity	Project built on slopes. (LTS)	No impact.	Similar impact. Project built on slopes (LTS)	Decreased impact. Project would be built on relatively flat area.
Hydrology and Water Quality	Project excavation. Increased impermeable surface. Increased parking. (LTS)	No impact.	Decreased impact. Project excavation. Increased impermeable surface. Increased parking. (LTS)	Decreased impact. No substantial increase in impermeable surface. However, excavation of contaminated soil may be necessary.
Biological Resources	Project built near Alameda whipsnake habitat. Potentially significant. (LTS after Mitigation)	No impact.	Similar impact. Project built near Alameda whipsnake habitat. Potentially significant. (LTS after Mitigation)	No impact. Site is currently developed.
Historic and Archaeological Resources	Project could disturb archaeological resources, though none are expected on this site. (LTS)	No impact.	Similar impact. Project could disturb archaeological resources, though none are expected on this site. (LTS)	Different impact. While archaeological resources could be disturbed, these areas have previously been disturbed by construction.

TABLE 5 (Continued)
SUMMARY OF ACTION ALTERNATIVES

	Proposed Action	No Action	Different Building Configuration	Alternate Building Site (on-site)
Visual Quality	Project would remove trees and introduce new building to hillside. (LTS)	No impact.	Decreased impact. Project would remove fewer trees and smaller building profile would be less noticeable. (LTS)	Different impact. While screening trees wouldn't have to be removed and the project would be centered in a developed area, it could interfere with the appearance and views of the ALS building. (LTS)
Traffic and Circulation	Project would introduce estimated 94 potential new drivers to LBNL site. (LTS)	No impact.	Decreased impact. Project would introduce estimated 34 – 62 potential new drivers to LBNL site. (LTS)	Similar/increased Impact. Project would introduce estimated 94 potential new drivers to LBNL site. "Old Town" site would require additional truck trips to haul away demolition debris and soil (LTS)
Air Quality	Project would create construction dust and exhaust, increase criteria pollutant emissions from commute trips, and introduce new TACs sources from operations. (LTS)	No impact.	Decreased impact. Project would create construction dust and exhaust, increase criteria pollutant emissions from commute trips, and introduce new TACs sources from operations. (LTS)	Similar impact. Project would create construction dust and exhaust, increase criteria pollutant emissions from commute trips, and introduce new TACs sources from operations. (LTS)
Noise	Project would create construction noise. (LTS)	No impact.	Similar impact. Project would create construction noise. (LTS)	Similar impact. Project would create construction noise. (LTS)
Public Services	Project would use police, fire, and emergency medical services. (LTS)	No impact.	Slightly decreased impact. Project would use police, fire, and emergency medical services. (LTS)	Similar impact. Project would use police, fire, and emergency medical services. (LTS)
Public Utilities	Project would use water and would generate waste and wastewater. (LTS)	No impact.	Decreased impact. Project would use water and would generate waste and wastewater. (LTS)	Similar impact. Project would use water and would generate waste and wastewater. (LTS)

TABLE 5 (Continued)
SUMMARY OF ACTION ALTERNATIVES

	Proposed Action	No Action	Different Building Configuration	Alternate Building Site (on-site)
Energy	Project would use electrical, gas, and diesel energy. (LTS)	No impact.	Decreased impact. Project would use electrical, gas, and diesel energy. (LTS)	Similar impact. Project would use electrical, gas, and diesel energy. (LTS)
Hazards and Human Health	Project would use small amounts of hazardous materials. (LTS)	No impact.	Decreased impact. Project would use small amounts of hazardous materials. (LTS)	Similar impact. Project would use small amounts of hazardous materials. (LTS)
Land Use	Project would increase development in area. (LTS)	No impact.	Similar impact. Project would increase development in area. (LTS)	No impact.
Socioeconomics: Population, Employment, and Housing	No Impact.	No impact.	No Impact.	No Impact.
Environmental Justice	None of the above impacts would substantially and disproportionately impact any particular racial or socioeconomic demographic. (LTS)	No impact.	Similar impact. None of the above impacts would substantially and disproportionately impact any particular racial or socioeconomic demographic. (LTS)	Similar Impact. None of the above impacts would substantially and disproportionately impact any particular racial or socioeconomic demographic. (LTS)
Cumulative Impacts	No substantial cumulative contributions. Small or negligible contribution to less-than-significant cumulative impacts.	No impact.	Similar impacts. Slightly decreased contribution to less-than-significant cumulative impacts.	Similar impacts. Small or negligible contribution to less-than-significant cumulative impacts.

NOTES: "gsf" is "gross square feet."
"LTS" is "less-than-significant."

CHAPTER 7.0

REFERENCES

Association of Bay Area Governments (ABAG), *Earthquake Hazards Maps for Berkeley*, 2002.

Bay Area Air Quality Management District, *2000 Toxic Air Contaminant Control Program Annual Report*, http://www.baaqmd.gov/permit/toxics/report.htm, accessed December 2001.

Bay Area Air Quality Management District, Air Plan: http://www.baaqmd.gov/planning/cap/aqp.htm, accessed 2002.

California Air Resource Board, Air Quality Designations, http://www.arb.ca.gov/desig/desig.htm, accessed 2002.

California Air Resource Board, Air Quality Plans, http://www.arb.ca.gov/planning/planning.htm, accessed 2002.

California Building Standards Commission, *California Building Code*, Title 24, Part 2, 1995.

California Department of Conservation, Geological Survey, *Seismic Shaking Hazard Maps of California*, 1999.

California Department of Conservation, Geological Survey, Special Publication 78: *Earthquake Planning Scenario for a Magnitude 7.5 Earthquake on the Hayward Fault*, 1987

California Department of Fish and Game, *California Natural Diversity Database, version 2.1.2*, data request for the Oakland East, Oakland West, Briones Valley, and Richmond 7.5 minute USGS topographic quadrangles, 2002.

California Department of Transportation (Caltrans), *California Scenic Highway Program*, http://www.dot.ca.gov/hq/LandArch/scenic/scpr.htm, accessed March 15, 2002.

California Native Plant Society, 2002, *Electronic Inventory of Rare and Endangered Plants of California, version 1.5.1*, data request for the Oakland East, Oakland West, Briones Valley, and Richmond 7.5 minute USGS topographic quadrangles, 2002.

City of Berkeley: Draft General Plan, *Land Use Element*, July 2001.

City of Berkeley: Draft General Plan, *Urban Design and Preservation Element*, July 2001.

City of Oakland General Plan, *Land Use and Transportation Element*, March 1998.

International Conference of Building Officials, *Uniform Building Code*, ICBO, Whittier, California, 1997.

Lawrence Berkeley National Laboratory, *Draft 2002 Long Range Development Plan*, May 2001.

Lawrence Berkeley National Laboratory, *Draft and Final Supplemental Environmental Impact Report (SEIR) for the Proposed Renewal of the Contract Between the United States Department of Energy and the Regents of the UC for the Operation and Management of the Lawrence Berkeley Laboratory*, SCH No. [19]91093068, prepared by the University of California and Lawrence Berkeley Laboratory, with the assistance of Ira Fink and Associates, Inc., September 1992.

Lawrence Berkeley National Laboratory, *Long Range Development Plan*, PUB-5184, August 1987.

Lawrence Berkeley National Laboratory, *Memorandum to James Krupnick from Iraj Javandel*, February 1, 2002.

Lawrence Berkeley National Laboratory, *Molecular Foundry Draft Preliminary Hazard Analysis Report*, expected completion: Spring 2003.

Lawrence Berkeley National Laboratory, NEPA/CEQA Program, *Project Description for the Proposed Sitewide Water Distribution Upgrade, Phase I* (submitted in support of request for Categorical Exemption), October 2001.

Lawrence Berkeley National Laboratory, *Site Development Plan, DEIR*, December 1986.

Lawrence Berkeley National Laboratory, *Supplemental Environmental Impact Report Addendum for the Proposed Renewal of the Contract Between the United States Department of Energy and the Regents of the UC for the Operation and Management of the Lawrence Berkeley Laboratory*, SCH No. [19]9193068, September 1997.

McGinniss, S.M., *An evaluation of potential habitat sites for the Alameda whipsnake (Masticophis lateralis euryxanthus) within and immediately adjacent to the border of the Lawrence Berkeley National Laboratory*, May 18, 1996.

Peterson, M.D., Bryant, W.A., Cramer, C.H., *Probabilistic Seismic Hazard Assessment for the State of California, California Geological Survey Open-File Report issued jointly with U.S. Geological Survey, CDMG 96-08 and USGS 96-706*, 1996.

Philliber, Jeff, Planner, NEPA/CEQA Program, Lawrence Berkeley National Laboratory, e-mail re: Alameda Whipsnake, August 30, 2002.

Site Visit, March 13, 2002.

Smith Group, *Molecular Foundry Facility Lawrence Berkeley National Laboratory, Design Report*, April 2002.

U.S. Fish and Wildlife Service, *Endangered and threatened wildlife and plants; final determination of critical habitat for the Alameda whipsnake (Masticophis lateralis euryxanthus)*, Federal Register Volume 65, Number 192, October 3, 2000.

U.S. Fish and Wildlife Service, Memorandum regarding Informal Consultation on Lawrence Berkeley National Laboratory's Water Tank and Fire Road Construction Project, Alameda County, California, September 17, 2001.

U.S. Geological Society (USGS) Working Group on California Earthquake Probabilities (WG99), *Earthquake Probabilities in the San Francisco Bay Region: 2000-2030 – A Summary of Findings*, Open-File Report 99-517, 1999.

CHAPTER 8.0

PERSONS AND AGENCIES CONSULTED

Blair, Steve, Civil Engineer, LBNL

Davis, Jason, US Fish and Wildlife Service. While not specifically consulted about this project, Mr. Davis visited the site on two occasions during 2000 and concluded that the Proposed Action site should not be included in the USFWS' determination of Alameda whipsnake Critical Habitat.

Domansky, Larry, Electrical Engineer, LBNL

Dong, Michael, Mechanical Engineer, LBNL

Fisher, Ross, Ph.D., Certified Industrial Hygienist, LBNL

Harkins, Joseph, Molecular Foundry Project Manager, LBNL

Kevin, Dan, Environmental Planner, LBNL

Krupnick, James, Molecular Foundry Project Director, LBNL

Lackner, Regina, Water Quality Program Leader, LBNL

McClure, Rich, Long-Range Planning Coordinator, LBNL

O'Keefe, Mary, Senior Planner, University of California, Office of the President

Philliber, Jeff, Environmental Planning Coordinator, LBNL

Reeves, Antonia, Utilities Analyst, LBNL

Seabury, John, Certified Industrial Hygienist, LBNL

Thorson, Patrick, Air Quality Program Leader, LBNL

CHAPTER 9.0

GLOSSARY

ADA	Americans with Disabilities Act
ARB	California Air Resources Board
BAAQMD	Bay Area Air Quality Management District
BES	Office of Basic Energy Sciences
BMPs	Best Management Practices
CARB	California Air Resources Board
CBC	California Building Code
CDMG	California State Department of Conservation, Division of Mines and Geology
CGS	California Department of Conservation, Geological Survey
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
dB	Decibels
dBA	A-weighted decibels
DOE	U.S. Department of Energy
EBMUD	East Bay Municipal Utility District
EIR	Environmental Impact Report
EPA	U.S. Environmental Protection Agency
ESA	Environmental Science Associates
ESRF	European Synchrotron Radiation Facility
FEMA	Federal Emergency Management Agency
Gsf	Gross Square Feet
HVAC	Heating Ventilation Air Conditioning

ILL	Institut Laue-Langevin
IWGN	Interagency Working Group on Nanoscale Science, Engineering, and Technology
ISM	Integrated Safety Management
Leq	Energy-Equivalent Noise Level
LBL/LBNL	Lawrence Berkeley Laboratory/Lawrence Berkeley National Laboratory
LOS	Level of Service
LRDP	Long Range Development Plan
NCEM	National Center for Electron Microscopy
NEQSS	Northeast Quadrant Science and Safety Projects
NOx	Nitrogen oxide
NNI	National Nanotechnology Initiative
NPDES	National Pollutant Discharge Elimination System
NSRC	Nanoscale Science Research Center
NSTC	National Science and Technology Council
OSHA	Occupational Health and Safety Administration
PHA	Preliminary Hazard Assessment
PM-10	Particulate Matter – 10 microns or smaller
SEIR	Supplemental Environmental Impact Report
SF	Square feet
SHMA	Seismic Hazards Mapping Act
SIP	State Implementation Plan
SSCL	Surface Science and Catalysis Laboratory
SWPPP	Storm Water Pollution Prevention Plan
UBC	Uniform Building Code
UC	University of California
USGS	United States Geological Survey
VOC	Volatile organic compound

CHAPTER 10.0

APPENDICES

APPENDIX A: STANDARD (REQUIRED) LBNL PROJECT FEATURES

APPENDIX B: LAND USE ANALYSIS

APPENDIX C: SOCIOECONOMIC ANALYSIS

APPENDIX D: ENVIRONMENTAL JUSTICE ANALYSIS

APPENDIX E: CHANGES TO THIS ENVIRONMENTAL ASSESSMENT

APPENDIX A

STANDARD (REQUIRED) LBNL PROJECT FEATURES

LBNL has identified several environmentally proactive measures in its 1987 Long Range Development Plan (LRDP) Environmental Impact Report (EIR), as amended, that Berkeley Lab implements in all of its projects and development to avoid or minimize potentially significant environmental impacts. These mitigation measures have been adopted as part of the LRDP EIR by The Regents of the University of California and thus are required of all LBNL activities pursuant to the California Environmental Quality Act (CEQA). Consequently, all such measures relevant to the design, construction, and operation of the proposed Molecular Foundry are included in the project description as standard features of all such LBNL projects. These measures are pertinent to such environmental resource areas as geology; hydrology and water quality; biological resources, visual quality; land use; air quality; noise; traffic; and hazards and hazardous materials. Included among them are those listed below:

- Geologic and soils studies will be undertaken during the design phase of each LBNL building project. Recommendations contained in those studies will be followed to ensure that the effects of landsliding, lurching, and liquefaction potential will not represent a significant adverse impact during a seismic event.

- Excavation and earth moving will be designed for stability, and accomplished during the dry season when feasible. Drainage will be arranged to minimize silting, erosion, and landsliding. Upon completion, all land will be restored, covering exposed earth with planting.

- Foundations for proposed structures will be designed in accordance with geologic and soils engineering recommendations to minimize the long-term possibilities of landslide.

- Excavations will be shored as required by law to preclude minor short-term landslides during construction.

- Revegetation of disturbed areas, including slope stabilization sites, using native shrubs, trees and grasses will be included as part of all new projects.

- Each individual project will continue to be designed and constructed with adequate storm drainage facilities to collect surface water from roofs, sidewalks, parking lots and other surfaces and deliver it into existing channels which have adequate capacity to handle the flow.

- Invasion of opportunistic colonizer trees and shrubs will be controlled. A maintenance program for controlling further establishment of eucalyptus, green wattle acacia, French broom, cotoneaster, and other opportunistic colonizer shrubs and trees in disturbed areas on-site will be undertaken. Herbicides will not be used for this purpose.

- Removal of native trees and shrubs will be minimized. (To the greatest extent possible, the removal of large coast live oak, California bay, and Monterey pine trees will be avoided.).

- Disturbance to the site perimeter buffer zones will be minimized.

- LBNL activity and encroachment in Blackberry Canyon will be minimized.

- Revegetation of disturbed areas, including slope stabilization sites, using native shrubs, trees, and grasses will be included as part of all new projects.

- Buildings will occupy as limited a footprint as feasible. They will incorporate features that enhance flexibility and future versatility.

- Buildings will be planned to blend with their surroundings and be appropriately landscaped. Planned objectives will be for new buildings to retain and enhance long-distance view corridors and not to compromise views from existing homes. New buildings will generally be low-rise construction.

- Any new facilities will not use reflective exterior wall materials or reflective glass, to mitigate the potential impacts of light and glare.

- Buildings proposed for development at LBNL will follow the design guidelines contained in the LBNL LRDP, as amended.

- Discourage single-occupant-vehicle use and encourage the use of other transportation options. LBNL will continue to implement its Transportation System Management (TSM) Program. The specific features of this program include:

  Establishing transportation modal-split goals for LBNL which will result in a reduction in the number and percentage of single-occupant automobiles being driven to and from LBNL;

  Assigning a transportation planner to coordinate the design and implementation of TSM programs;

  Promoting carpools by creating a carpool matching program;

  Providing preferential carpool parking;

  Developing a vanpooling program through funding support of Berkeley TRIPS;

  Permitting staggered (flex-time) work hours;

  Developing an annual monitoring program to evaluate the programs in relation to established goals and identify new elements which should be added to the program;

  Promoting the TSM programs by giving orientation briefings to new employees, providing information aids to be distributed to LBNL employees, organizing an information center, and selling transit tickets on-site at LNBL;

  Reviewing LBNL shuttle service and transit interface facilities; and,

  reviewing bicycle routes and storage facilities for improvements.

- LBNL will conduct bi-annual peak hour traffic counts in and around LBNL. In particular, the bi-annual count will include the Gayley Road corridor between Hearst Avenue and Bancroft/Piedmont.

- If and at such time as the level of service at intersections along the Gayley Road corridor reaches "D," a review of necessary improvements will be conducted with UC Berkeley.

- LBNL will pay for its fair share of allowable and necessary signalization improvements along the Gayley Road corridor proportional to LBNL's share of increases in traffic.

- Details of the Gayley Road corridor improvements, including environmental assessment of the improvements, will be reviewed at the time the thresholds are reached.

- LBNL will continue to implement and monitor the implementation of its Transportation System Management Program.

- Construction contract specifications would require that during construction exposed surfaces would be wetted twice daily or as needed to reduce dust emissions. In addition, contract specifications would require covering of excavated materials.

- LBNL will design building ventilation systems to minimize emission of criteria air pollutants following compliance with all applicable regulatory requirements (e.g., New Source Review). This mitigation measure would not reduce the impact to less than significant levels.

- Projected noise levels will be compared with ambient noise levels and the Berkeley Noise Ordinance limits, or other applicable regulations. Acoustical performance standards would be included in future construction documents. LBNL will continue to design, construct, and operate buildings and building equipment taking into account measures to reduce the potential for excessive noise transmission.

- Noise-generating construction equipment will be located as far as possible from existing buildings. If necessary, windows of laboratories or offices will be temporarily covered to reduce interior noise levels on-site.

- LBNL will prepare an annual self-assessment summary report. The report will summarize environment, health and safety program activities, and identify any areas where LBNL is not in compliance with laws and regulations governing hazardous materials, hazardous waste, hazardous materials transportation, regulated building components, worker safety, emergency response, and remediation activities.

- Prior to shipping any hazardous materials to any hazardous waste treatment, storage, or disposal facility, LBNL will confirm that the facility is licensed to receive the type of waste LBNL is proposing to ship to that facility.

- LBNL will continue its waste minimization programs and strive to identify new and innovative methods to minimize hazardous waste generated by LNBL activities.

- LBNL will require hazardous waste haulers to provide evidence that they are appropriately licensed to transport the type of wastes being shipped from LBNL.

- In addition to implementation of the numerous employee communication and training requirements included in regulatory programs, LBNL will undertake the following additional measures as ongoing reminders to workers of health and safety requirements:

  Posting, in areas where hazardous materials are handled, of phone numbers of LBNL offices which can assist in proper handling procedures and emergency response information.

  Continuing to post "Emergency Response and Evacuation Plans" in all LBNL buildings.

  Continuing to post all sinks in areas where hazardous materials are handled with signs reminding users that hazardous wastes cannot be poured down the drain.

  Continuing to post dumpsters and central trash collection areas where hazardous materials are handled with signs reminding users that hazardous wastes cannot be disposed of as trash.

- LBNL will update its emergency preparedness and response program on an annual basis, and will provide copies of this program to local emergency response agencies and to members of the public upon request.

- Prior to construction of any project that may add significant sewer load to the city sanitary sewer system, LBNL would investigate the potential impact of the project on the city system. LBNL would identify mitigation measures to accommodate the sewer load if the impact investigation indicates that the city system could not accommodate the additional sewage. LBNL will reimburse the City of Berkeley and/or EBMUD for its fair share of allowable and necessary sewer improvement capital costs which are needed to accommodate increased demand and mitigate sewer impacts resulting from implementation of the LBNL LRDP.

APPENDIX B

LAND USE ANALYSIS

SETTING AND IMPACTS

The project site is part of 200 acres owned by the University of California, most of which are leased to the Department of Energy (DOE). This land (and a larger surrounding area belonging to the University) is within the political boundaries of the LBNL site and is within the city limits of Oakland. Because the land is controlled by a state agency (UC) and operated by DOE, it is exempt from local zoning and planning regulations. However, it is the policy of the University and LBNL to cooperate with local agencies in planning matters to the extent feasible. The City of Oakland's General Plan designates the area for institutional use and resource conservation; therefore present and proposed uses are consistent with intended uses according to the Oakland General Plan.

The Long Range Development Plan (LRDP) for LBNL was approved by The Regents of the University of California in 1987. While this Plan and its accompanying EIR anticipate development out to an unspecified year (20XX), the Addendum to the Supplemental site-wide EIR adopted in 1997 analyzes LRDP-related buildout impacts through the Contract extension year of 2007. The LBNL LRDP organized the LBNL site into seven functional planning areas to consolidate related functions, maximize efficiency, and establish well-planned roadways, pedestrian paths and parking to minimize hazards to employees and the public. The project site is located in the Materials and Chemistry Research Area, also referred to as the East Site Materials Sciences Facilities. This plan reserved several site locations for future construction, anticipating a need for "advanced and specialized research facilities for specific programmatic needs." Therefore, construction of the Molecular Foundry on this site would be consistent with the intended implementation of the LBNL LRDP.

The LRDP anticipates that growth on the main LBNL site could increase from approximately 1.59 million gross square feet (gsf) in 1987 to approximately 2.0 million gsf at buildout. There are currently about 233,500 gsf available for development under this projection. The proposed Molecular Foundry building and accompanying Central Utility Plant building total approximately 94,500 gsf, which would leave approximately 140,000 gsf remaining to the proposed buildout anticipated in the 1987 LRDP, and analyzed in the LRDP EIR, as amended.

The LRDP projects that total population growth at LBNL could increase from approximately 2,850 in 1987 to approximately 4,750 at buildout.[12] LBNL is currently about 400 people below the population projection anticipated by the LRDP. The proposed Molecular Foundry would add

[12] Because the portion of the LBNL population identified as being located on the UC Berkeley campus actually circulates regularly between Campus and LBNL main site facilities, aggregate rather than site-specific population figures are used for planning purposes to avoid population undercounting.

approximately 140 staff, students, and visitors to LBNL, approximately 260 persons below the population level proposed in the 1987 LRDP, and analyzed in the LRDP EIR, as amended.

The Proposed Action is consistent with land use designations set forth under the LRDP. The Proposed Action would be constructed in a partially developed "open space" where a new building is anticipated in the LRDP. According to the 1987 LRDP, open space is provided to "enhance the working and research environment, to maintain landscape compatibility, and to take advantage of the mild Bay Area climate and the views. Open areas are to be set aside for employee picnics, outdoor gatherings, and exercise." The Proposed Action would create a large and high-quality outdoor space in the expansive outdoor terrace that would serve as an outdoor meeting and recreational space for occupants of all outdoor buildings in the vicinity. It would include a mixture of paved and planted areas and would be oriented to provide optimal views.

A portion of the proposed Molecular Foundry building would also be in a "buffer zone" area as identified under the LRDP. Buffer zones do not exclude new buildings, but encourage new buildings to be designed to address, enhance and/or uphold special constraints and amenities on such sites. These constraints and amenities pertain to views, hydrology, stability, special vegetation, and building density. Each of these concerns is addressed by the Proposed Action and demonstrates consistency with the values listed in the LRDP. A consistency analysis and statement was conducted for this Proposed Action and is incorporated into this analysis.

The Proposed Action affirms and is consistent with the LRDP Goals and Objectives. The site is adjacent to both utility corridors and traffic/transit corridors. All support services have adequate capacity to serve the new building at this location. The Proposed Action is generally consistent with the LRDP's Design Guidelines. The Proposed Action would be larger than what was initially anticipated for the particular functional planning area—the Materials and Chemical Research Area of LBNL; however, these specific area distribution estimates were identified in the LRDP as being for "general estimating purposes only" and were not intended to restrict or promote particular development levels. Regental approval was based on the aggregate space and population projections presented in the 1987 LRDP and the Proposed Action is entirely within those parameters.

Although not yet completed or approved, an update to the 1987 LRDP is in progress and does not conflict with the Proposed Action. In November 2000, a Notice of Preparation was issued for this forthcoming LRDP and new LRDP EIR. This LRDP would project growth and development at LBNL for approximately the next twenty years; growth in population and in developed space is expected to occur at the same rates as have been occurring at LBNL during the past 15 years—approximately 1.3 percent per year. The Draft LRDP and LRDP EIR are expected to circulate for public review in 2003. The proposed Molecular Foundry Proposed Action would be reflected and accounted for in these new LRDP and LRDP EIR.

APPENDIX C

SOCIOECONOMIC ANALYSIS

SETTING AND IMPACTS SUMMARY

The proposed Molecular Foundry would occupy an undeveloped site, now partially occupied by a paved surface parking lot. The Proposed Action would therefore not displace existing housing or residents. The Proposed Action would extend the existing roadway network adjacent to the project site. However, the new roadway segment would directly serve the project site, which would not include residential uses.

Growth at the LBNL site is controlled by the 1987 LRDP. The LRDP projects that total population growth at LBNL could increase from approximately 2,850 in 1987 to approximately 4,750 at buildout. LBNL is currently approximately 400 people below its population projection. The proposed Molecular Foundry would be occupied by approximately 137 staff, students, and visitors to LBNL.[13] This would result in a remaining balance of approximately 260 persons below the 4,750 growth-projection that is identified in the 1987 LRDP, and analyzed in the LRDP EIR, as amended. Of these 137 staff positions, 6 would be directors who currently work at LBNL and would not be replaced; approximately 36 would be graduate students from the UC Berkeley campus who not would have driving access to LBNL; approximately 42 would be visiting scientists; and 29 would be filled from scientific, technical, and administrative professionals new to the LBNL site. An additional 24 professional positions would be filled by staff already working elsewhere at LBNL.

It is assumed that many of the new employees would already live in the Bay Area. Visitors would be temporary and would therefore be visiting and/or already employed elsewhere in the Bay Area. The Proposed Action would therefore not directly or indirectly induce substantial growth in the area.

[13] This analysis uses 140, instead of 137, to use round numbers and to present a more conservative analysis.

APPENDIX D

ENVIRONMENTAL JUSTICE ANALYSIS

SETTING

The LBNL complex is located in Alameda County, with a large portion located within the Berkeley city limits, and a smaller portion located within the Oakland city limits. The University of California, Berkeley, is adjacent to LBNL, and the nearest residential and commercial neighborhoods are located within the City of Berkeley. The nearest Oakland properties consist of designated open space areas. Unincorporated areas of Contra Costa County lie to the north and east, most of which are also designated open space areas.

Census 2000 revealed that Alameda County's population is approximately 51 percent non-white or more than one race: 15 percent black or African American alone, less than 1 percent American Indian and Alaska Native alone, 20 percent Asian alone, less than 1 percent Native Hawaiian and other Pacific Islander alone, 9 percent "some other race alone," and approximately 6 percent two or more races. In the City of Berkeley, the population is approximately 41 percent non-white or more than one race, and in the City of Oakland, the population is approximately 69 percent non-white or more than one race. Table D.1 below, compares the racial breakdown of Alameda County, Berkeley, Oakland, and census tracts located near LBNL in Berkeley.[14]

Census 2000 also identifies median[15] household incomes and family incomes. Table D.2, below, compares medial household incomes and family incomes in Alameda County, the cities of Berkeley and Oakland, and the residential and commercial census tracts nearest LBNL.

IMPACTS

The project site is located in Alameda County, within Oakland's city limits. Both Alameda County and Oakland have large non-white populations. In Alameda County, however, the largest single racial group is white (48.6%); in Oakland the largest single racial group is black or African American (35.7%). In residential and commercial areas located in the vicinity of LBNL, the single largest racial group is white (63.5% to 88.9%).

---

[14] Census tract 4216 is located northwest of LBNL and includes the neighborhoods north of the UC Berkeley campus; census tract 4227 is southwest of LBNL, and census tracts 4237 and 4238 are in the hilly areas further southwest of LBNL and south of the UC Berkeley campus.

[15] Median income is the "middle" income: one half of all incomes are below the median and one half are above the median.

TABLE D.1
COMPARISON OF SELF-IDENTIFIED RACIAL IDENTITIES (PERCENTAGE) ALAMEDA COUNTY, BERKELEY, OAKLAND, AND CENSUS TRACTS 4216, 4227, 4237 AND 4238

	Percentage of Population						
Race	**Alameda County**	**City of Berkeley**	**City of Oakland**	**Census Tract 4216**	**Census Tract 4227**	**Census Tract 4237**	**Census Tract 4238**
White alone	48.6%	59.2%	31.3%	83.5%	63.5%	70.3%	88.9%
Black or African American alone	14.7%	13.6%	35.7%	1.9%	3.2%	2.6%	1.9%
American Indian and Alaska Native alone	0.6%	0.5%	0.7%	0.0%	0.2%	0.2%	0.3%
Asian alone	20.4%	16.4%	15.2%	9.0%	20.0%	19.4%	6.0%
Native Hawaiian alone and Other Pacific Islander alone	0.6%	0.1%	0.5%	0.2%	0.0%	0.0%	0.0%
Some other race alone	9.0%	4.6%	11.7%	0.2%	4.9%	2.1%	0.5%
Two or more races	6.0%	5.6%	5.0%	5.2%	8.2%	5.3%	2.4%
Total	99.9%*	100.0%	100.1%*	100.0%	100.0%	99.9%*	100.0%

***** Less than 100% due to rounding error.

SOURCE: Census 2000, ESA (2002)

TABLE D.2
COMPARISON OF FAMILY AND HOUSEHOLD MEDIAN INCOMES (1999) ALAMEDA COUNTY, BERKELEY, OAKLAND AND CENSUS TRACTS 4216, 4227, 4237 AND 4238

2000 Income	**Alameda County**	**City of Berkeley**	**City of Oakland**	**Census Tract 4216**	**Census Tract 4227**	**Census Tract 4237**	**Census Tract 4238**
Median Household Income	$55,946	$44,485	$40,055	$95,868	$25,625	$40,660	$105,011
Median Family Income	$65,857	$70,434	$44,384	$125,896	$48,846	$103,628	$149,802

SOURCE: Census 2000, ESA (2002)

Household and family median incomes are lower than County median incomes in both Oakland and in the City of Berkeley's census tract 4237, which has a high student population. Median household incomes alone are lower than the County median household income in Berkeley, Oakland, and City of Berkeley's census tracts 4227 and 4237. Median family incomes are higher than County median incomes for the City of Berkeley overall, as well as for the City of Berkeley census tracts 4216, 4237, and 4238.

As already discussed in Section 4.14, *Hazards and Human Health*, the Proposed Action would not pose a hazard to human health. In addition, the Proposed Action would not result in the elimination of jobs, nor would it result in the removal of persons or housing from the site. Because of the high incomes and the low numbers of non-white residents in residential areas near the project site, the Proposed Action would not have a specific economic, social, or human health effect on minority or low-income populations in these areas.

APPENDIX E

CHANGES TO THIS ENVIRONMENTAL ASSESSMENT

A Draft Environmental Assessment was circulated for Agency and public review and comment on December 10, 2002; comments were requested to be received by January 13, 2003. One commenter, the East Bay Municipal Utility District (EBMUD), responded. Their comments have been addressed in this Final EA, and are reflected in the additions and changes to this document, identified below. A few additional refinements have been made by LBNL. None of these additions, changes, or refinements represents the introduction of substantial new information that would indicate a new or significant impact or that would change the conclusions drawn from this analysis.

(New or added text is in bold)

1. The "Draft" Environmental Assessment is now referred to as the "Final" Environmental Assessment throughout the document. This document is currently dated February 2003.

2. Appendix E—"Changes to this Environmental Assessment," has been added to the table of contents and to this section.

3. Page vi. Text has been added to the Executive Summary to describe the Final EA document.

4. Page 18. To provide additional context, the following text has been added to the discussion of storm drainage:

   This would be added to the approximately 20 acres of existing impervious surface in the watershed. About half of this impervious surface is on land managed by LBNL.

5. Page 19. The following text has been incorporated into the discussion on landscaping:

   All ~~trees~~ **landscaping** placed by the Proposed Action would be irrigated as necessary. **In addition, as part of the final design process, irrigation would be designed so as to minimize overspray and runoff. Irrigation and landscaping are expected to be consistent with the State Model Water Efficient Landscape Ordinance AB325.**

6. Page 20. The following text has been incorporated into the discussion on landscaping:

   The natural zone includes the fire-resistant ground cover for erosion control, as well as decorative plant materials that would be selected based on their indigenous, ~~water-saving, and~~ low-maintenance**, and especially water-saving** characteristics.

7. Page 20. The following text has been incorporated into the discussion on water supply:

   The Proposed Action would install low-flow plumbing fixtures and water-saving appliances**; other devices and new technology (e.g., drip irrigation, re-circulating cooling systems, etc.) would be considered or employed where practicable to further water conservation**. Water supply would be separated into industrial and domestic cold water systems. The industrial system would serve lab sinks and equipment; the domestic system would serve kitchen, restroom, and drinking fountain functions. Water pressure range would be 35 to 50 pounds per square inch. Engineering and safety features such as backflow preventers would be installed where appropriate and feasible. **All new projects at LBNL are subject to EBMUD's Water Service Regulations at the time of application for service.**

8. Page 24: The following text has been deleted from the discussion of the No Action Alternative:

~~Instead, a similar facility would be constructed elsewhere by DOE, the location of which has not been identified and is too speculative to analyze. Such a facility would neither be located at nor affiliated with LBNL.~~

9. Pages 39-40: The following text has been incorporated into the discussion on Public Utilities:

   The LBNL site receives its water from the East Bay Municipal Utility District (EBMUD). The proposed project would be served by EBMUD's Shasta Pressure Zone (PZ), which provides water service to customers within an elevation range of 900 to 1050 feet, and the Berkeley View PZ, which provides water service to customers within an elevation range of 1,050 to 1,250 feet. The LBNL site receives its water supply via a 12-inch meter in Campus Drive in the Shasta PZ and via a 6-inch meter in Summit Road from the Berkeley View PZ. In addition, Department of Energy (DOE) owns and maintenance two 200,000-gallon storage tanks on site for emergency supply in the event of interruption of EBMUD's service and a third 200,000-gallon emergency tank is under construction in the East Canyon area upslope of the project site. The existing distribution system supplies water for all laboratory uses and has sufficient capacity to meet the flow rate and duration requirements for both daily use and fire protection. Although the project would be expected to increase use by up to approximately 2,500 gallons per day, it would not cause a significant impact as the two existing EBMUD PZs have combined storage capacity of 3.1 million gallons. ~~The primary source of its supply is the Shasta Tank, and EBMUD's one-million gallon capacity Berkeley View Tank provides a secondary water supply source. In addition, two 200,000-gallon on-site storage tanks hold an emergency supply in the event of interruption of EBMUD service; a third 200,000-gallon emergency water tank is under construction in the East Canyon Area.~~

10. Pages 40-41: The following text has been incorporated into the discussion on Public Utilities:

All LBNL sanitary sewage runs through the City of Berkeley's basin No. 17. The City Department of Public Works has confirmed that there is conside rable remaining average and peak wet weather capacity in this basin. The proposed project would most likely be directed into subbasin #17-003; this subbasin has more than adequate average and peak wet weather capacity to accommodate the estimated 1,200 gpd sanitary sewage flows from the proposed project.

The main concern with sewer flow in this subbasin and region wide in the EBMUD system is the infiltration and inflow of stormwater into the sanitary sewer system due to the poor condition of aging sewer pipes (known as "infiltration / inflow" or "I/I"). LBNL has aggressively acted to address infiltration / inflow problems in its own system and has made dramatic improvements in recent years. In addition, an aggressive plumbing maintenance and upgrade effort has been undertaken during the past 15 years by LBNL, along with installation of water saving devices and systems, to substantially lower average sewer flows as well. The savings realized by these on-going efforts has reduced both peak wet weather as well as average sewer flows by well over half. Moreover, LBNL's peak wet weather infiltration / inflow rate is less than half of that of the City of Berkeley's and it is approximately only ten-percent of that found in EBMUD's district. LBNL continues to seek ways in which to reduce both water consumption and sewage generation.

In 1984, LBNL's allocated sewer flow was approximately 200,000 gallons per day (gpd). Due to historic infiltration / inflow, that amount was much higher during peak wet weather events. In recent years, due to the aforementioned efforts, that average annual sewer flow has been reduced by approximately 100,000 gpd, and by even much greater amounts during wet weather. The proposed Molecular Foundry is expected to generate less than 1,200 gpd of sewage. This incremental amount falls well below what was allocated to LBNL previous to its sewer upgrade projects. It is also consistent with the 1987 LRDP EIR, as amended, which anticipated, analyzed, and found less-than-significant impacts for buildout levels of sanitary sewage at much higher than current levels, even with inclusion of the proposed project. Moreover, because the sewer lines installed for the Molecular Foundry would be brand new, state-of-the-art, and virtually free of stormwater infiltration, the proposed project would be incremental in both dry and wet weather and would not contribute to the problem of I/I surplus flows during peak wet weather events.

Through the University of California, LBNL currently pays the City of Berkeley for assessed sewer services. In addition, the University has contributed to the City of Berkeley's sewer upgrade program. ~~These improvements~~ This program is intended to increase wet weather flow capacity and decrease infiltration / inflow conditions~~. In 1990, UC agreed to contribute $250,000 per year to the City of Berkeley sewer improvemetns that would mitigate the impact of and accommodate new University projects.~~ L

11. Pages 56-57. The following text has been incorporated into the discussion on air quality impacts:

    Chemicals used in laboratories would generally be handled in very small quantities ~~No solid chemical would exceed more than a few hundred grams~~ (i.e., probably ~~on the~~

~~order of up to a few hundred grams~~ **on the order of up to a few hundred grams**) and ~~no~~ liquid**s** would **tend to be handled in quantities of a few centiliters or less** ~~exceed more than a gallon~~. ~~Also, only a few small gas cylinders containing flammable or toxic substances would be stored on-site.~~ This is consistent with the nature of the experiments that deal with substances and properties on a micro- and nanoscale. ~~Since the amounts of chemicals in the laboratory would be low, there would be no~~ **Any** quantifiable air quality public health risk from laboratory **activities would be extremely small and well below significance thresholds.**(footnote 11) **In addition, the proposed Molecular Foundry project does not include the use of radioactive materials.**

Footnote 11: [1]

Current estimates indicate that ~~fenceline~~ concentrations of TAC emissions from the proposed project would be so low as to be immeasurable **or extremely small at the nearest residential neighborhood fenceline**. In fact, preliminary screening estimates indicate that the entire expected annual chemical inventory of the proposed Molecular Foundry would be so small that, were it to be emitted at a 100% annual rate (a physically impossible, conservative scenario), the vast majority of these chemicals would be unlikely to even approach BAAQMD regulatory thresholds at the LBNL fenceline.

12. Page 57: The following text has been incorporated into the discussion on air quality impacts:

    At that distance, operational TAC emissions from the Proposed Action are expected to be **extremely small or** immeasurable.

13. Page 60: The following text has been changed in the discussion of public utility impacts to reflect a refined calculation for water demand:

    Although the Proposed Action is expected to increase **water** use by **less than** approximately **1,500** ~~7,050~~ gallons per day, it would not cause a significant impact because relatively unrestricted water volume is available from EBMUD.

14. Page 60: The following text has been changed in the discussion of utility impacts:

    The proposed Molecular Foundry would **be expected to generate less than 1,200 gallons per day of wastewater, which would flow through new project sewer lines** connect**ed** to existing sewer lines. Peak wastewater capacity of the building would be 185 gallons per minute, although actual usage rates would be far lower. **This would be well within the wastewater volumes projected, mitigated for, and adopted in the 1992 LRDP EIR and 1997 Addendum to the LRDP EIR. It would also not contribute to a substantial LBNL-wide increase in wet weather flows, as LBNL has worked in recent years to substantially reduce its peak wet weather flows and has effectively addressed its previous infiltration/inflow problems.**

As part of the proposed action, LBNL will continue to seek to integrate and find opportunities for controlling and/or reducing the amount of infiltration and inflow into the existing sanitary sewer system.

15. Page 64: The following text has been deleted from the discussion of the Environmental Consequences of the Proposed Alternatives:

    ~~The No Action alternative would likely result in a site elsewhere, however, not at LBNL. No specific site has been identified. Project impacts would likely be similar to those identified on the LBNL site, although without a specific site, any description of potential environmental effects would be speculative.~~

16. Page 71: The following text has been deleted from the No Action Alternatives column of the Summary of Action Alternatives Table:

    ~~Elsewhere, non-LBNL affiliated~~