

4.2 AIR QUALITY

This section provides an assessment of the potential impacts of the proposed project on air quality. Information is taken from the LBNL 2006 LRDP EIR and LBNL 2006 LRDP, with additional sources used where stated.

A. Regulatory Setting

1. State Plans and Policies

a. California Clean Air Act

California adopted clean air legislation in 1988 to achieve and maintain acceptable ambient air quality standards. The State Clean Air Act followed the federal Clean Air Act of 1970, which established maximum concentration criteria standards for six ambient air pollutants – ozone (smog), carbon monoxide, nitrogen dioxide, sulfur dioxide, particulate matter, and lead.

The California Air Resources Board (CARB) is responsible for implementing the State's clean air legislation. The CARB is charged with establishing and reviewing the State ambient air quality standards, compiling the California State Implementation Plan (SIP) and securing its approval from the EPA, and identifying Toxic Air Contaminants (TACs). The CARB also regulates mobile emissions sources in California, such as construction equipment, trucks, and automobiles, and oversees the activities of air quality management districts, which are organized at the county or regional level.

b. California Vehicle Code Regulations

The California Vehicle Code (CVC), Section 23114, seeks to limit particulate emissions (dust) from vehicles that transport aggregate materials by requiring that loads of aggregate materials be covered or that loads have a 6-inch free-board (i.e. materials loaded less than 6 inches from the container rim).

2. Regional Plans and Policies

The Bay Area Air Quality Management District (BAAQMD) is the regional agency with regulatory authority over stationary emission sources in the Bay Area, while the CARB has regulatory authority over mobile sources. The

BAAQMD has the primary responsibility of ensuring that the State and federal ambient air quality standards are met in the Bay Area.

The BAAQMD is responsible for regulating stationary emissions sources at industrial and commercial facilities within the Bay Area Air Basin and for preparing the air quality plans that are required under the federal and State clean air acts.

The BAAQMD exercises permit authority over stationary sources through its *Rules and Regulations*. Both federal and State plans rely heavily upon stationary source control measures set forth in these *Rules and Regulations*. For the proposed project, the main BAAQMD rule that would apply would be District Regulation 11, Rule 2: Hazardous Materials-Asbestos Demolition, Renovation and Manufacturing, which regulates demolition and removal of any potential asbestos-containing building materials.

The *Bay Area 2005 Ozone Strategy* has been prepared by the BAAQMD, in cooperation with the Metropolitan Transportation Commission (MTC) and the Association of Bay Area Governments (ABAG). The Ozone Strategy is required under the air quality plans to address national and State air quality requirements for ozone and describes how the Bay Area will meet these requirements. The strategy includes a re-designation request and a maintenance plan, as well as a triennial revision to the Bay Area strategy to attain the California state 1-hour ozone standard. The strategy also includes stationary source measures to be implemented by a variety of public bodies, including the MTC, local governments, and transit agencies, whose missions include protecting the public's health and the environment.¹ The BAAQMD is currently preparing the *2009 Clean Air Plan* to update the *Bay Area 2005 Ozone Strategy*.

Ozone conditions in the Bay Area have improved significantly over the years. Ozone levels – as measured by peak concentrations and the number of days

¹ BAAQMD, 2006, *Bay Area 2005 Ozone Strategy*, Vol. 1.

over the State one-hour ozone standard – have declined substantially as a result of aggressive programs implemented by the BAAQMD; the MTC; and other regional, State, and federal partners.

3. Local Plans and Policies

The Seismic Phase 2 project involves DOE facilities at LBNL operated by the University of California. The plan that is applicable to the proposed project is the LBNL 2006 LRDP. Principles and strategies contained in the 2006 LRDP that address air quality are summarized below.

The University of California, under Article IX, Section 9 of the California Constitution, is exempt from local land use regulation, including General Plans and zoning. UC nevertheless seeks to cooperate with local jurisdictions to reduce any physical consequences of potential land use conflicts to the extent feasible. Because the western part of the LBNL site is within the Berkeley city limit, and the eastern part is within the Oakland city limit, this section also summarizes policies contained in both the Berkeley and Oakland general plans related to air quality.

a. LBNL 2006 Long Range Development Plan

i. Principles and Strategies

The LBNL 2006 LRDP provides strategies intended to minimize potential adverse environmental impacts that could result from implementation of the LBNL 2006 LRDP. The strategies set forth in the LBNL 2006 LRDP applicable to air quality include the following:

- ◆ Continue to use sustainable practices in selection of plant materials and maintenance procedures.
- ◆ Site and design new facilities in accordance with University of California Presidential Policy for Green Building Design.
- ◆ Promote use of bicycles by providing additional bicycle storage racks, and shower facilities.
- ◆ Maintain or reduce the percentage of parking spaces relative to the adjusted daily population.

- ◆ Site and design new facilities in accordance with University of California Presidential Policy for Green Building Design to reduce energy, water and material consumption and provide improved occupant health, comfort and productivity.

b. Design Guidelines

The LBNL Design Guidelines were developed in parallel with the LBNL 2006 LRDP and provide specific guidelines for site planning, landscape and building design as new projects are developed. Specific design guidelines relevant to air quality include those listed below because they would encourage pedestrian travel on the main hill site:

- ◆ Create new Commons Spaces (central, campus-like collegial spaces creating a focal point and gathering space in each research cluster) in clusters that currently lack them.
- ◆ Stimulate pedestrian activity and interaction in the Commons Spaces.
- ◆ Create as high a density and critical mass around Commons Spaces as possible.
- ◆ Design pathway layouts that support pedestrian flow and encourage casual interaction.

c. LBNL 2006 LRDP Mitigation Measures

A series of mitigation measures is included within the LBNL 2006 LRDP EIR. Although this analysis does not tier from that EIR, several of the mitigation measures adopted as part of the 2006 LRDP apply to the proposed project and are included in the Seismic Phase 2 project description. The following air quality mitigation measures apply to and are a part of the proposed project:

LRDP Mitigation Measure AQ-1a: BAAQMD's approach to dust abatement calls for "basic" control measures that should be implemented at all construction sites, "enhanced" control measures that should be implemented at construction sites greater than four acres in area, and "optional" control measures that should be implemented on a case-by-case

basis at construction sites that are large in area or are located near sensitive receptors, or that, for any other reason, may warrant additional emissions reductions (BAAQMD, 1999).

During construction of individual projects proposed under the LRDP, LBNL shall require construction contractors to implement the appropriate level of mitigation (as detailed below), based on the size of the construction area, to maintain project construction-related impacts at acceptable levels; this would reduce the potential impact to a less-than-significant level.

Elements of the “basic” dust control program for project components that disturb less than one acre shall include the following at a minimum:

- ◆ Water all active construction areas at least twice daily. Watering should be sufficient to prevent airborne dust from leaving the site. Increased watering frequency may be necessary whenever wind speeds exceed 15 miles per hour. Reclaimed water should be used whenever possible.
- ◆ Cover all trucks hauling soil, sand, and other loose materials or require all trucks to maintain at least 2 feet of freeboard (i.e. the minimum required space between the top of the load and the top of the trailer).
- ◆ Pave, apply water three times daily (or as sufficient to prevent dust from leaving the site), or apply (non-toxic) soil stabilizers on all unpaved access roads, parking areas, and staging areas at construction sites.
- ◆ Sweep daily or as appropriate (with water sweepers using reclaimed water if possible) all paved access roads, parking areas and staging areas at construction sites.
- ◆ Sweep streets daily or as appropriate (with water sweepers using reclaimed water if possible) if visible soil material is carried onto adjacent public streets.

Elements of the “enhanced” dust abatement program for project components that disturb four or more acres shall include all of the “basic” measures in addition to the following measures:

- ◆ Hydroseed or apply (non-toxic) soil stabilizers to inactive construction areas (previously graded areas inactive for ten days or more).
- ◆ Enclose, cover, water twice daily (or as sufficient to prevent dust from leaving the site), or apply (non-toxic) soil stabilizers to exposed stockpiles (dirt, sand, etc.).
- ◆ Limit traffic speeds on unpaved roads to 15 miles per hour.
- ◆ Install sandbags or other erosion control measures to prevent silt runoff to public roadways.
- ◆ Replant vegetation in disturbed areas as quickly as possible.

Elements of the “optional” control measures are strongly encouraged at construction sites that are large in area or located near sensitive receptors, or that for any other reason may warrant additional emissions reductions:

- ◆ Install wheel washers for all exiting trucks, or wash off tires or tracks of all trucks and equipment leaving the site.
- ◆ Install wind breaks, or plant trees/vegetative wind breaks at windward side(s) of construction areas.
- ◆ Suspend excavation and grading activity when winds (instantaneous gusts) exceed 25 miles per hour.
- ◆ Limit the area subject to excavation, grading, and other construction activity at any one time.
- ◆ Pave all roadways, driveways, sidewalks, etc. as soon as possible. In addition, building pads should be laid as soon as possible after grading unless seeding or soil binders are used.
- ◆ Designate a person or persons to monitor the dust control program and to order increased watering, as necessary, to prevent transport of

dust off-site. Their duties shall include holidays and weekend periods when work may not be in progress. The names and telephone numbers of such persons shall be provided to BAAQMD prior to the start of construction.

LRDP Mitigation Measure AQ-1b: To mitigate equipment exhaust emissions, LBNL shall require its construction contractors to comply with the following measures:

- ◆ Construction equipment shall be properly tuned and maintained in accordance with manufacturers' specifications.
- ◆ Best management construction practices shall be used to avoid unnecessary emissions (e.g. trucks and vehicles in loading and unloading queues would turn their engines off when not in use).
- ◆ Any stationary motor sources such as generators and compressors located within 100 feet of a sensitive receptor shall be equipped with a supplementary exhaust pollution control system as required by BAAQMD and the California Air Resources Board.
- ◆ Incorporate use of low-NO_x emitting, low-particulate emitting, or alternatively fueled construction equipment into the construction equipment fleet where feasible, especially when operating near sensitive receptors.
- ◆ Reduce construction-worker trips with ride-sharing or alternative modes of transportation.

LRDP Mitigation Measure TRANS-1d: LBNL shall develop and implement a new Transportation Demand Management (TDM) Program to replace its existing TDM program. This enhanced TDM Program has been drafted in consultation with the City of Berkeley, and is proposed to be adopted by LBNL following The Regents' consideration of the 2006 LRDP. The new draft proposed TDM Program is attached to the LBNL 2006 LRDP EIR as Appendix G. The proposed TDM Program includes several implementation phases tied to the addition of parking to

LBNL. The final provisions of the TDM Program may be revised as it is finally adopted but will include a TDM coordinator and transportation committee, an annual inventory of parking spaces and a gate count, a study of more aggressive TDM measures, investigation of a possible parking fee, investigation of sharing services with UC Berkeley and an alternative fuels program. The TDM program shall also include funding of a study to reevaluate the feasibility of mitigation at the Hearst and Gayley/LaLoma intersection. The new draft proposed TDM Program also includes a requirement that LBNL conduct an additional traffic study to reevaluate traffic impacts on the earliest to occur of 10 years following the certification of this EIR (July 2007) or the time at which LBNL formally proposes a project that will bring total development of parking spaces pursuant to the 2006 LRDP to or above 375 additional parking spaces.

d. City of Berkeley General Plan

The Environmental Management Element of the City of Berkeley General Plan adopted on April 23, 2002 contains the following objectives and policies related to air quality:

- ◆ Objective 3. Reduce emissions and improve air quality.
- ◆ Policy EM-18: Regional Air Quality Action. Continue working with the Bay Area Air Quality Management District and other regional agencies to:
 1. Improve air quality through pollution prevention methods.
 2. Ensure enforcement of air emission standards.
 3. Reduce local and regional traffic (the single largest source of air pollution in the city) and promote public transit.
 4. Promote regional air pollution prevention plans for business and industry.
 5. Locate parking appropriately and provide adequate signage to reduce unnecessary “circling” and searching for parking.

- ◆ Policy EM-19: 15% Emission Reduction: Global Warming Plan. Make efforts to reduce local emissions by 15% by the year 2010. (Also see Transportation Policy T-19.)
- ◆ Policy EM-20: City of Berkeley Fleet. The City should exceed Federal and State standards for all City fleet vehicles and use all means practical to reduce emissions of criteria pollutants and greenhouse gases. (Also see Transportation Policy T-11.)
- ◆ Policy EM-21: Alternative Fuels. Work with the University of California, the Berkeley Unified School District, and other agencies to establish natural gas fueling and electric vehicle recharging stations accessible to the public.
- ◆ Policy EM-22: Public Awareness. Increase public awareness of air quality problems, rules, and solutions through use of City publications and networks

In addition, the following policies in the Berkeley General Plan Transportation Element are applicable to the LBNL 2006 LRDP:

- ◆ Policy T-10: Trip Reduction. To reduce automobile traffic and congestion and increase transit use and alternative modes in Berkeley, support, and when appropriate require, programs to encourage Berkeley citizens and commuters to reduce automobile trips, such as:
 3. Carpooling and provision of carpool parking and other necessary facilities.
 4. Telecommuting programs.
 8. Programs to encourage neighborhood-level initiatives to reduce traffic by encouraging residents to combine trips, carpool, telecommute, reduce the number of cars owned, shop locally, and use alternative modes.
- ◆ Policy T-12: Education and Enforcement. Support, and when possible require, education and enforcement programs to encourage carpooling

and alternatives to single-occupant automobile use, reduce speeding, and increase pedestrian, bicyclist, and automobile safety.

- ◆ Policy T-13: Work with other agencies and institutions, such as the University of California, the Berkeley Unified School District, Lawrence Berkeley Laboratory, Vista Community College, the Alameda County Court, and neighboring cities to promote Eco-Pass and to pursue other efforts to reduce automobile trips. (Also see Land Use Policy LU-39.):
- ◆ Policy T-19: Air Quality Impacts. Continue to encourage innovative technologies and programs such as clean-fuel, electric, and low-emission cars that reduce the air quality impacts of the automobile.
- ◆ Policy T-20: Policy T-20 Neighborhood Protection and Traffic Calming. Take actions to prevent traffic and parking generated by residential, commercial, industrial or institutional activities from being detrimental to residential areas.

In addition, the Berkeley General Plan Transportation Element contains the following policies related to air quality:

- ◆ Policy LU-9: Non-Residential Traffic. Minimize or eliminate traffic impacts on residential areas from institutional and commercial uses through careful land use decisions. (Also see Transportation Policies T-20 and T-23.)
- ◆ Policy LU-10: Parking. Protect residential areas from institutional and commercial parking impacts by encouraging use of alternative modes of transportation and strictly enforcing residential parking permit regulations. (Also see Transportation Policies T-31 and T-34.)
- ◆ Policy LU-11: Pedestrian- and Bicycle-Friendly Neighborhoods. Ensure that neighborhoods are pedestrian- and bicycle-friendly with well-maintained streets, street trees, sidewalks, and pathways.

e. City of Oakland General Plan

The Open Space, Conservation and Recreation (OSCAR) Element of the City of Oakland General Plan was adopted in 1996. OSCAR Element policies that pertain to air quality include the following:

- ◆ Policy CO-12.1. Promote land use patterns and densities which help improve regional air quality conditions by: (a) minimizing dependence on single passenger autos; (b) promoting projects which minimize quick auto starts and stops, such as live-work development, and office development with ground-floor retail space; (c) separating land uses which are sensitive to pollution from the sources of air pollution; and (d) supporting telecommuting, flexible work hours, and behavioral changes which reduce the percentage of people in Oakland who must drive to work on a daily basis.
- ◆ Policy CO-12.3. Expand existing transportation systems management and transportation demand management strategies which reduce congestion, vehicle idling, and travel in single-passenger autos.
- ◆ Policy CO-12.4. Require that development projects be designed in a manner which reduces potential adverse air quality impacts. This may include: (a) the use of vegetation and landscaping to absorb [*Sic*] carbon monoxide [probably carbon dioxide] and to buffer sensitive receptors; (b) the use of low-polluting energy sources and energy conservation measures; (c) designs which encourage transit use and facilitate bicycle pedestrian travel.
- ◆ Policy CO-12.5. Require new industry to use best available control technology to remove pollutants, including filtering, washing, or electrostatic treatment of emissions.
- ◆ Policy CO-12.6. Require construction, demolition and grading practices which minimize dust emissions. These practices are currently required by the City and include: (a) avoiding earth moving and other major dust-generating activities on windy days; (b) sprinkling unpaved construction areas within water during excavation, using reclaimed water where feasible; (c) covering stockpiled sand, soil, and other particulates with a tarp

to avoid blowing dust; (d) covering trucks hauling dirt and debris to reduce spills; (e) operating construction and earth-moving equipment, including trucks, to minimize exhaust emissions.

- ◆ Policy CO-12.7. Coordinate local air quality planning efforts with other agencies, including adjoining cities and counties, and the public agencies responsible for monitoring and improving air quality. Continue to work with the BAAQMD and the California Air Resources Board in enforcing the provisions of the State and Federal Clean Air Acts, including the monitoring of air pollutants on a regular and on-going basis.

B. Existing Setting

Air quality at LBNL is considered typical of urban areas in the East Bay due to its location in the Berkeley-Oakland area. The existing air quality setting is based on quantitative data from local and regional monitoring stations. Particulate matter, ozone, and carbon monoxide are regarded as the air pollutants of greatest concern. Ground level ozone in conjunction with suspended particulate matter in the atmosphere leads to hazy conditions generally termed “smog.” Ozone and ozone precursors are the pollutants of greatest concern in the Bay Area.

1. Particulate Matter

Particulate matter (PM) is divided into two class sizes PM₁₀ and PM_{2.5}. PM₁₀ is the category for particles less than 10 and greater than 2.5 microns in diameter. PM_{2.5} is the category of particles less than 2.5 microns in diameter. At LBNL, PM₁₀ sources include dust suspended by motor vehicles and particles from residential fireplaces (more prevalent in winter), and secondary particulate formation that occurs in winter due to a variety of emissions sources. Although particulates are found naturally in the air, most particulate matter occurring in the Bay Area is emitted either directly or indirectly by motor vehicles, industry, construction, agricultural activities, and wind erosion of disturbed areas. Most PM_{2.5} is comprised of combustion products such as smoke and particulates that form in the atmosphere through secondary reac-

tions of other gaseous air pollutants. A large percentage of the highest PM₁₀ and PM_{2.5} levels measured in the Bay Area are associated with secondary particulate formation during the winter. For this reason, particulate matter is a regional air pollutant. Extensive research reviewed by CARB indicates that exposure to outdoor PM₁₀ and PM_{2.5} levels exceeding current ambient air quality standards is associated with increased risk of hospitalization for lung and heart-related respiratory illnesses, including emergency room visits for asthma. PM exposure is also associated with increased risk of premature deaths, especially in the elderly and people with pre-existing cardiopulmonary disease. In children, studies have shown associations between PM exposure and reduced lung function and increased respiratory symptoms and illnesses.

2. Ozone

Ozone, or O₃ is formed by a reaction of sunlight and heat by reactive organic gases (ROG) and by nitrogen oxides (NO_x). Construction equipment, building emission sources (such as heaters), and motor vehicles are typical sources of ozone precursors at LBNL. Exposure to levels of O₃ above current ambient air quality standards can lead to human health effects such as lung inflammation and tissue damage and other lung-related impairments. Ozone exposure is also associated with symptoms such as coughing, chest tightness, shortness of breath, and the worsening of asthma symptoms. The greatest risk for harmful health effects is to outdoor workers, athletes, children, and others who spend greater amounts of time outdoors during smoggy periods.

3. Carbon Monoxide

Carbon monoxide, or CO, is emitted almost exclusively from the incomplete combustion of fossil fuels. Automobile exhaust and residential wood burning in fireplaces and woodstoves emit most of the CO in the Bay Area. CO, a colorless and odorless gas, interferes with the transfer of oxygen to the brain. It can cause dizziness and fatigue, and can impair central nervous system functions.

a. Local and Basin-Wide PM₁₀, PM_{2.5}, Ozone, and Carbon Monoxide Measurements

PM₁₀ levels measured at the San Pablo monitoring station (the nearest monitoring station that measures PM₁₀) indicate that there were two measurement days in 2007 with levels of PM₁₀ greater than the State standards. In 2007, the Bay Area as a whole had four measurements days where PM₁₀ levels exceeded the State standards. The Bay Area is designated as nonattainment for the State PM₁₀ and PM_{2.5} standard and was recently designated nonattainment for the new national PM_{2.5} standard.² Recent monitoring data indicates the PM_{2.5} standard was exceeded on two measurements days in Berkeley in 2008. Analysis of recent data from Oakland indicates that the PM_{2.5} standards were not exceeded in 2008. However, data for previous years are not available. In 2007, the Bay Area as a whole exceeded the PM_{2.5} standard on 14 measurement days.

The BAAQMD began monitoring ozone in Berkeley in 2007. Data from 2008, reported by CARB, represents the only complete year of monitoring. Ozone levels in Berkeley did not exceed State or federal standard in 2008. Monitoring that began in Oakland also shows no exceedances of standards in 2008. A 5-year data set for San Pablo (from 2004-08) shows no exceedances of the standards for ozone. During the last five years, the State 1-hour standard was exceeded somewhere in the Bay Area on 4 to 18 days, while the 8-hour standard was exceeded on 9 to 22 days. The federal 8-hour standard was exceeded on 2 to 17 days. Data representing the ozone concentrations and number of days that ozone measurements exceeded the State and federal standards for the whole San Francisco Bay Area is presented in Table 4.2-1. Analysis of the data indicates that State and federal thresholds for ozone were exceeded on several days during the last five years.

The San Francisco Bay Area Air Basin is currently designated nonattainment for the State ozone standards and the federal 8-hour ozone standard, although

² Attainment or nonattainment is based on whether or not national standards have been achieved.

TABLE 4.2-1 **SUMMARY OF OZONE DATA FOR THE SAN FRANCISCO BAY AREA AIR BASIN, 2004-08**

Year	Number of Days Standard Exceeded ^a			Ozone Concentrations in ppm ^b	
	State 1-Hour	State 8-Hour	Federal 8-Hour	Maximum 1-Hour	Maximum 8-Hour
2008	9	20	12	0.14	0.110
2007	4	9	2	0.12	0.091
2006	18	22	17	0.13	0.105
2005	9	9	5	0.12	0.090
2004	7	13	7	0.11	0.084

^a Based on current 2008 ambient air quality standards.

^b ppm- parts per million.

Source: CARB. Accessed online, <http://www.arb.ca.gov/aqd/aqdpag.htm>.

ozone levels measured at monitoring stations in or near Berkeley have not exceeded either standard in recent years. Most Bay Area counties experience ozone exceedances during the period from April through October.

The highest carbon monoxide concentration measured in the Bay Area during the past five years was an 8-hour average of 3.4 ppm. Carbon monoxide monitoring in Berkeley in 2008 was 1.7 ppm for an 8-hour average period. These levels are well below State and federal standards. As a result, the entire Bay Area Air Basin is considered to be in attainment of the standard. The Bay Area is designated as either attainment or unclassified with respect to all other pollutants.

Also relevant to local carbon monoxide emissions is the LBNL Transportation Demand Management (TDM) Program. Pursuant to LRDP EIR Mitigation Measure TRANS-1d, LBNL has developed and is implementing a TDM Program which seeks to reduce total vehicle trips to and within LBNL and to maintain growth in demand for parking spaces on the main hill campus be-

low 375 additional spaces in the period from 2006 through 2016. To achieve these goals, the TDM program employs a variety of strategies, including promoting increased use of the LBNL Shuttle Service, the Guaranteed Ride Home program, Pretax Transportation Program Incentives, and Carpooling/Vanpooling as well as encouraging telecommuting and the use of flex time where feasible.

C. CEQA Significance Criteria

The impact of the proposed project on air quality would be considered significant if it would exceed the following standards of significance, in accordance with Appendix G of the *CEQA Guidelines* and the UC CEQA Handbook:³

1. Conflict with or obstruct implementation of the applicable air quality plan,
2. Violate any air quality standard or contribute substantially to an existing or projected air quality violation,
3. Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors),
4. Expose sensitive receptors to substantial pollutant concentrations, or
5. Create objectionable odors affecting a substantial number of people.

³ The UC CEQA Handbook also states that an applicable LRDP or program EIR Standard of Significance should be used in a situation where a campus may have identified an air quality standard that is different from State standards. LBNL as a campus has not set any air quality standards, so this provision does not apply.

The BAAQMD released its most recent public review draft of revised CEQA thresholds for evaluation of air quality impacts in December 2009.⁴ This new guidance is in the final review process and has not yet been formally adopted. Based on discussions with the BAAQMD,⁵ it was determined appropriate to use the proposed CEQA thresholds for evaluation of this project's impacts on air quality. In general, the proposed thresholds are the same or more stringent than thresholds provided in existing BAAQMD guidance, but there are also numerous new proposed quantitative thresholds for criteria pollutants that did not previously have quantitative thresholds. In addition, the use of age sensitivity factors (ASFs) in calculating the life-time excess cancer risk (LECR) that was adopted by BAAQMD on January 6, 2010⁶, produces much larger estimates of risk to the maximally exposed individual (MEI) than if these factors had not been used.

Proposed thresholds of significance are provided separately for both construction-related activities and project operations. Table 4-2.2 provides the relevant proposed BAAQMD CEQA thresholds for construction-related activities associated with the proposed project. Table 4-2.3 provides the relevant BAAQMD-recommended CEQA thresholds for proposed project operations.

The proposed BAAQMD CEQA guidelines also provide human health risk and hazard thresholds of significance for cumulative impacts. Table 4-2.4 summarizes these thresholds.

⁴ California Environmental Quality Act – Guidelines Update, California Environmental Quality Act Guidelines Update, Bay Area Air Quality Management District, December 7, 2009.

⁵ Phone conversations between Brian Bateman and Scott Lutz with BAAQMD and Brian Patterson of Golder Associates Inc. on November 23, 2009.

⁶ Phone conversation between Scott Lutz with BAAQMD and Brian Patterson of Golder Associates Inc. on January 7, 2010 indicating that revisions to BAAQMD Regulation 2, Rule 5, and guidance for New Source Review of Toxic Air Contaminants requiring the use of age sensitivity factors where appropriate were adopted on January 6, 2010.

TABLE 4.2-2 **PROPOSED BAAQMD CEQA THRESHOLDS OF SIGNIFICANCE FOR CONSTRUCTION-RELATED ACTIVITIES**

Pollutant/Parameter	Proposed Threshold of Significance
Reactive Organic Gas (ROG) Emissions	54 lbs/day
Nitrogen Oxide (NO _x) Emissions	54 lbs/day
Particulate Matter (10 micron) (PM ₁₀) Emissions	82 lbs/day
Particulate Matter (2.5 micron) (PM _{2.5}) Emissions	54 lbs/day
Fugitive Dust	Best Management Practices
Lifetime Excess Cancer Risk	10-in-a-million
Non-Cancer Hazard	1.0
PM _{2.5} Annual Average Ambient Concentration	0.3 µg/m ³

Source: BAAQMD, December 7, 2009, California Environmental Quality Act Guidelines Update. Proposed Thresholds of Significance.

In the December 7, 2009 version of the proposed guidelines, alternative thresholds were proposed for consideration for “Impacted Communities” that were more stringent than those listed in the tables. Impacted Communities are defined based on data compiled by the BAAQMD under the Community Air Risk Evaluation program. However, based on the data used to determine the locations of Impacted Communities, the proposed project would not fall within such an area.

Therefore, to the extent that they were applicable to the assessment being made, the proposed thresholds of significance provided in Tables 4.2-2 through 4.2-4 were used to assess the potential significance of air quality impacts associated with the proposed project.

TABLE 4.2-3 **PROPOSED BAAQMD CEQA THRESHOLDS OF SIGNIFICANCE FOR PROJECT OPERATIONS**

Pollutant/Parameter	Proposed Threshold of Significance
Reactive Organic Gas (ROG) Emissions	54 lbs/day; 10 tons/yr
Nitrogen Oxide (NO _x) Emissions	54 lbs/day; 10 tons/yr
Particulate Matter (10 micron) (PM ₁₀) Emissions	82 lbs/day; 15 tons/yr
Particulate Matter (2.5 micron) (PM _{2.5}) Emissions	54 lbs/day; 10 tons/yr
Fugitive Dust	54 lbs/day; 10 tons/yr
Carbon Monoxide (CO) Ambient Concentration	9.0 ppm (8-hr); 20.0 ppm (1-hr)
Lifetime Excess Cancer Risk	10-in-a-million ^a
Non-Cancer Hazard	1.0 ^a
PM _{2.5} Annual Average Ambient Concentration	0.3 µg/m ³ ^a
Odors	Screening Level distance or complaint history

^a Or compliance with a Qualified Community Risk Reduction Plan adopted by the local jurisdiction with enforceable measures to reduce the community risk.

Note: Greenhouse gas thresholds are described in Section 4.6 Greenhouse Gas Emissions.

Source: BAAQMD, December 7, 2009, California Environmental Quality Act Guidelines Update. Proposed Thresholds of Significance.

D. Potential Project Impacts

SP2 Impact AQ-1: The proposed project would not conflict with or obstruct implementation of the applicable air quality plan. (*Less than Significant*)

a. Construction/Demolition

Emissions from construction/demolition activities would be temporary and mitigated by a series of control measures that are part of the project description (see LRDP Mitigation Measures AQ-1a and 1b) and are consistent with

TABLE 4.2-4 **PROPOSED BAAQMD CEQA THRESHOLDS OF SIGNIFICANCE FOR CUMULATIVE IMPACTS**

Pollutant/Parameter	Proposed Threshold of Significance ^a
Lifetime Excess Cancer Risk	100-in-a-million ^b
Non-Cancer Hazard	1.0 ^b
PM _{2.5} Annual Average Ambient Concentration	0.8 µg/m ³ ^b

^a Thresholds applicable to construction-related activities or operations.

^b Or compliance with a Qualified Local Community Risk Reduction Plan (for operations).

Source: BAAQMD, December 7, 2009, California Environmental Quality Act Guidelines Update. Proposed Thresholds of Significance.

the BAAQMD guidelines for control of construction-phase emissions. Furthermore, as shown in SP2 Impact AQ-2, the construction emissions would not exceed BAAQMD proposed emission thresholds for significant impacts. These activities would, therefore, not conflict with or obstruct implementation of an air quality plan and there would be a *less-than-significant* impact.

b. GPL Operation

A critical factor related to compliance with the air quality plan is whether the proposed project is consistent with the population and job growth assumptions included in the Bay Area 2005 Ozone Strategy.

The proposed project involves provision of replacement space. Employees would transfer within LBNL and from another site in the City of Berkeley. Janitorial staff would not be expected to increase as a result of the proposed project. It is possible that, on average, 100 employees might have to travel slightly greater distances to work at LBNL because they are more likely to live in the residential areas nearer Potter Street and farther from the LBNL hill campus. However, many of them already make frequent visits to the hill campus, so the change in working location would make very little difference to the overall vehicle miles travelled.

As a result, the proposed project would not trigger a substantial increase in vehicle miles traveled or result in unanticipated job growth, which could otherwise conflict with or obstruct implementation of the Bay Area 2005 Ozone Strategy.

Furthermore, as discussed in response to other criteria within this section, the construction and operation of the proposed project would not significantly impact air quality through other means (e.g. through emissions of pollutants in excess of ambient air quality standards or BAAQMD significance thresholds). As a result, the proposed project would not conflict with regional clean air plan efforts and would result in a *less-than-significant* impact.

SP2 Impact AQ-2: The proposed project would not violate any air quality standard or contribute substantially to an existing or projected air quality violation. (*Less than Significant*)

a. Construction/Demolition

Project construction and demolition activities are estimated to occur over a period of approximately four years and seven months. During this period, air emissions would occur from the following activities:

- ◆ Demolition of existing buildings (fugitive dust and off-road equipment exhaust).
- ◆ Site grading (fugitive dust and off-road equipment exhaust).
- ◆ Building construction and seismic strengthening (fugitive dust and off-road equipment exhaust).
- ◆ Hauling of equipment, supplies, demolition debris, and construction materials to/from off-site locations (on-road truck exhaust).
- ◆ Construction/demolition worker commuting (on-road passenger vehicle exhaust).

These activities would generate PM₁₀ and PM_{2.5} emissions in the form of fugitive dust, as well as ROG, NO_x, PM₁₀, PM_{2.5}, CO, and SO₂ from internal

combustion engine exhaust. These activities would also generate emissions of toxic air contaminants (TACs) and CO₂ from internal combustion engine exhaust. Potential impacts from TACs are addressed under SP2 Impact AQ-4 (TACs), and potential impacts from CO₂ in Section 4.6 Greenhouse Gas Emissions (CO₂).

i. Criteria Pollutants with Emissions-Based Significance Thresholds

Emissions of criteria pollutants listed above that could affect compliance with ambient air quality standards were quantified for on-site, off-road construction/demolition equipment activity using the URBEMIS 2007 emissions model (version 9.2.4). Buildings to be demolished were included as separate phases and equipment activity levels were based on the building footprint and the height of the building. Equipment activity levels for GPL construction were based on total square footage of the building. Default equipment assumptions for the number, size, and daily operating hours, were included in the model.

The construction contractor hired for the proposed project would be required to follow the mitigation measures outlined in the LBNL 2006 LRDP EIR discussed in Section A.3.c above. Of these, LRDP Mitigation Measure AQ-1a would ensure that dust would be kept to a minimum around the construction site, and on and around construction vehicles. LRDP Mitigation Measure AQ-1b would ensure that exhaust emissions were minimized. These measures would ensure that the proposed project would comply with feasible construction control measures identified in the BAAQMD CEQA Guidelines to minimize construction impacts on air quality. Therefore, certain emission reduction measures, such as watering up to three times daily if required, were assumed in the URBEMIS modeling. Technical details of the URBEMIS emissions estimates are provided in Appendix B.

Emissions of criteria pollutants from on-road trucks hauling equipment, supplies, demolition debris, and construction materials to/from off-site locations were estimated based on emission factors derived from the EMFAC 2007 (version 2.3) emissions model. Emission factors were derived in units of

grams per mile travelled, and total vehicle miles travelled were determined based on the estimated maximum number of daily or annual truck trips and an assumed average round trip distance of 15 miles. Technical details of the EMFAC emissions estimates are provided in Appendix B.

Maximum daily criteria pollutant emissions estimated for construction/demolition activities associated with the proposed project are summarized in Table 4.2-5.

All estimated maximum daily emissions associated with proposed project construction/demolition activities are calculated to be below the recommended daily BAAQMD significance thresholds and there would be a *less-than-significant* impact.

ii. Carbon Monoxide (CO)

Carbon monoxide is the localized air pollutant of concern from projects that generate traffic. Although construction/demolition activities associated with the proposed project would generate some additional truck traffic, truck trip volume associated with these activities would be limited to a maximum of 49 additional roundtrips per day. Truck numbers would be monitored and controlled to ensure this level would not be exceeded.

Currently, the highest carbon monoxide concentrations measured in the Bay Area are well below the ambient air quality standards. These include measurements from urbanized monitoring stations in San Francisco, San Jose and Vallejo. The project area has much lower traffic conditions compared to other areas within the Bay Area with heavier traffic that are in compliance with ambient CO standards.

University Avenue is the highest-traffic-volume roadway in Berkeley likely to be affected by the additional truck traffic associated with proposed project construction/demolition activities (and therefore the most likely to experience an increase in ambient CO concentrations). An additional 49 truck

TABLE 4.2-5 **SUMMARY OF MAXIMUM DAILY CONSTRUCTION/DEMOLITION CRITERIA POLLUTANT EMISSIONS**

Pollutant	Off-Road Equipment (lb/day)	On-Road Trucks (lb/day)	Total (lb/day)	Significance Threshold (lb/day)
ROG	5.3	0.3	5.6	54
NO _x	41.2	4.2	45.4	54
PM ₁₀	14.2	0.1	14.3	82
PM _{2.5}	4.6	0.1	4.7	54
CO	27.0	1.2	28.2	None
SO ₂	0.01	0.005	0.02	None

Source: Golder Associates, January 2010.

round trips per day represents an increase in total traffic volume on University Avenue of less than 0.4 percent. Even if the trucks are conservatively assigned a weighting factor of 2.5 (i.e. one truck equals 2.5 automobiles),⁷ this represents an increase of only about 1 percent, which is not enough to affect potential compliance with the CO ambient air quality standards.

In addition, a study of cumulative truck trips for reasonably foreseeable construction projects at LBNL indicates that the associated increased traffic volumes would be less than the City of Berkeley significance criteria for transportation projects (see Section 4.12, Transportation and Traffic).⁸ These criteria are used to determine if traffic generated by a proposed project would result in a significant impact on the roadway network, which would be an indicator of the potential for additional congestion, and therefore increased ambient pollutant concentrations.

⁷ Suggested by transportation consultants Fehr & Peers.

⁸ *LBNL Construction Projects – Cumulative Truck Impact Analysis*, Fehr & Peers Transportation Consultants, Walnut Creek, California May 22, 2009. See Appendix D.

Therefore, the proposed project impacts to ambient CO concentrations would be *less than significant*.

iii. Sulfur Dioxide

Although no SO₂ emission significance thresholds have been published by the BAAQMD, SO₂ emissions associated with proposed project construction/demolition activities, as shown in Table 4.2-5, would be trivial and would not cause, or contribute to, an exceedence of an ambient air quality standard. Therefore, the proposed project impacts to ambient SO₂ concentrations would be *less than significant*.

iv. Particulate Matter Less than 2.5 Microns in Diameter (PM_{2.5}) Concentrations

One additional quantitative assessment was made for construction/demolition activity emissions based on the new proposed BAAQMD significance thresholds. This pertains to the maximum estimated PM_{2.5} concentration resulting from these activities. Using dispersion modeling methodologies similar to those described in the LBNL 2006 LRDP EIR, the U.S. EPA AERMOD dispersion model and meteorological data collected on the LBNL site were used to estimate maximum annual PM_{2.5} concentrations. The assessment included PM_{2.5} emissions from off-road equipment activity, including both fugitive dust emissions and tailpipe exhaust, and a separate analysis to assess PM_{2.5} tailpipe emissions from off-site on-road truck travel associated with construction/demolition activities. The technical details of this modeling are provided in Appendix B.

Using these methods, the maximum estimated PM_{2.5} concentration in ambient air shown in Table 4.2-6 was determined. The maximum estimated PM_{2.5} concentration from project construction activities would be below the levels considered significant per BAAQMD draft CEQA guidance.

Based on the assessment above, impacts to ambient PM_{2.5} concentrations resulting from activities associated with proposed project construction/demolition would be *less than significant*.

TABLE 4.2-6 **MAXIMUM ESTIMATED ANNUAL PM_{2.5} CONCENTRATION IN AMBIENT AIR FROM CONSTRUCTION/DEMOLITION EMISSIONS**

Pollutant	Assessment	Maximum Ambient Concentration	Significance Threshold
PM _{2.5}	On-Site, Off-Road Equipment Emissions	0.15 µg/m ³	0.3 µg/m ³
PM _{2.5}	Off-Site, On-Road Truck Emissions	0.005 µg/m ³	0.3 µg/m ³

Source: Golder Associates, January 2010.

In summary, construction/demolition activities associated with the proposed project would be generally short-term (estimated to occur over four years and seven months) and would often have emissions much less than the maximum emissions provided in Table 4.2-5 and Table 4.2-6, above. Even so, maximum daily emissions are much less than the BAAQMD significance thresholds. Based on the assessment above, with incorporation of the LBNL 2006 LRDP EIR mitigation measures, impacts on air quality resulting from activities associated with proposed project construction/demolition would be *less than significant*.

b. GPL Operation

GPL operations are assumed to occur indefinitely after completion of construction/demolition activities. Air emissions would occur during GPL operations from the following sources:

- ◆ Laboratory fume hood roof exhaust vents
- ◆ Natural gas-fueled building heaters/boilers
- ◆ Maintenance/testing operation of a backup diesel generator
- ◆ Employee commuting.

Natural gas combustion, diesel generator operation, and employee passenger vehicles would result in emissions of ROG, NO_x, PM₁₀, PM_{2.5}, CO, and SO₂. These activities would also generate emissions of TACs and CO₂. TACs will

be emitted from the laboratory fume hood roof exhaust vents. Potential impacts from these pollutants are addressed under SP2 Impact AQ-4 (TACs) and in Section 4.6, Greenhouse Gas Emissions (CO₂).

i. Criteria Pollutants with Emissions-Based Significance Thresholds

Criteria pollutant emissions from natural gas combustion and diesel generator operation were estimated based on U.S. EPA AP-42 emission factors. Maximum daily natural gas combustion was based on the maximum total heat input rating for the proposed equipment of 3.3 million British thermal units per hour, and maximum annual usage was based on estimated annual natural gas usage of 6,000 therms. Maximum daily generator operation was based on two hours per day (historical maximum for other generators at LBNL) and 50 hours per year (a conservative maximum based on historical records of existing generators).

Criteria pollutant emissions for employee commuting were estimated using the URBEMIS 2007 emissions model. The default assumptions in the model were used based on the square footage of the GPL building assuming use as an educational institution. Technical details for these emissions estimates are provided in Appendix B.

Although the proposed GPL would replace uses at other buildings that would be demolished and many of the employees who would occupy the GPL already travel to the LBNL site, all of these emissions were conservatively considered as new for this air quality assessment.

Maximum daily and annual criteria pollutant emissions estimated for proposed project operations are summarized in Table 4.2-7.

All estimated maximum daily and annual emissions associated with proposed project operations are below the BAAQMD significance thresholds and there would be a *less-than-significant* impact.

TABLE 4.2-7 **SUMMARY OF MAXIMUM DAILY CRITERIA POLLUTANT EMISSIONS FROM PROJECT OPERATIONS**

Pollutant	Maximum Daily Emissions (lbs/day)	BAAQMD Significance Threshold (lbs/day)	Maximum Annual Emissions (ton/yr)	Significance Threshold (ton/yr)
ROG	2.0	54	0.3	10
NO _x	17.1	54	0.4	10
PM ₁₀	3.2	82	0.5	15
PM _{2.5}	1.2	54	0.1	10
CO	22.5	None	2.8	None
SO ₂	1.4	None	0.02	None

Source: Golder Associates, January 2010.

ii. Carbon Monoxide (CO)

Carbon monoxide is the localized air pollutant of concern for projects that generate traffic. As noted in the discussion about CO impacts from construction/demolition activities above, the highest carbon monoxide concentrations measured in the Bay Area are well below the ambient air quality standards. The project area has much lower traffic conditions compared to other areas within the Bay Area that are in compliance with ambient CO standards.

University Avenue is the highest-traffic-volume roadway in Berkeley likely to be affected by the additional vehicle traffic associated with proposed project operations (and therefore the most likely to experience an increase in ambient CO concentrations). However, even in the most extreme case with all relocated GPL staff using University Avenue, project operations would not increase traffic volumes on University Avenue by more than 100 vehicle round trips per day. An additional 100 passenger vehicle roundtrips per day represents an increase in total traffic volume on University Avenue of only about 0.8 percent, which is not enough to affect potential compliance with the CO

ambient air quality standards. Therefore, the proposed project impacts to ambient CO concentrations would be *less than significant*.

iii. Sulfur Dioxide

Although no SO₂ emission significance thresholds have been published by the BAAQMD, SO₂ emissions associated with proposed project operations would be very small and would not cause, or contribute to, an exceedence of an ambient air quality standard.

Based on the assessment above, impacts on air quality resulting from proposed project operations would be *less than significant*.

iv. Particulate Matter Less than 2.5 Microns Diameter (PM_{2.5}) Concentrations

One additional quantitative assessment was made for proposed project operations emissions based on the new proposed BAAQMD significance thresholds. This pertains to the maximum estimated PM_{2.5} concentration resulting from project operations. Using dispersion modeling methodologies similar to those described in the LBNL 2006 LRDP EIR, the U.S. EPA AERMOD dispersion model and meteorological data collected on the LBNL site were used to estimate maximum annual PM_{2.5} concentrations. The assessment included PM_{2.5} emissions from natural gas combustion in the boilers/heaters and operation of the diesel generator. The technical details of this modeling are provided in Appendix B.

Using these methods, the maximum PM_{2.5} concentration in ambient air shown in Table 4.2-8 was estimated. The maximum estimated PM_{2.5} concentration from project operations would be below the levels considered significant per BAAQMD draft CEQA guidance.

Based on the assessment above, impacts to ambient PM_{2.5} concentrations resulting from activities associated with proposed project operation would be *less than significant*.

TABLE 4.2-8 **MAXIMUM ESTIMATED PM_{2.5} CONCENTRATION IN AMBIENT AIR FROM PROJECT OPERATIONS**

Pollutant	Maximum Ambient Concentration	Significance Threshold
PM _{2.5}	0.0008 µg/m ³	0.3 µg/m ³

Source: Golder Associates, January 2010.

SP2 Impact AQ-3: The proposed project would not result in a cumulatively considerable net increase of any criteria pollutant for which the proposed project region is non-attainment under an applicable federal or State ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors). (*Less than Significant*)

a. Construction/Demolition

As discussed in the section above addressing SP2 Impact AQ-1, the proposed project would be consistent with the requirements of the Bay Area 2005 Ozone Strategy, and would be part of the expected growth under that plan. The Bay Area was recently determined to be non-attainment with the federal PM_{2.5} standard. A State implementation plan is not currently in place, but may be developed in the future.

In addition, the proposed BAAQMD significance thresholds for construction activities are specific to the Bay Area airshed in which the proposed project is located. Therefore, they account for the fact that the airshed is non-attainment for PM₁₀ (State)/PM_{2.5} (State and federal) and ozone (State and federal). Because the emissions of PM₁₀, PM_{2.5}, and ROG/NO_x (ozone precursors) associated with proposed project construction/demolition activities are much less than the significance thresholds for these pollutants, a *less-than-significant impact* would occur.

b. GPL Operation

As discussed for construction/demolition activities above, the proposed project is located in an area that is non-attainment for PM₁₀/PM_{2.5} and ozone, and is covered by the Bay Area 2005 Ozone Strategy. There is no State plan for particulate matter. The proposed project would not be inconsistent with the requirements of the Bay Area 2005 Ozone Strategy, and will be part of the expected growth under that plan.

In addition, the proposed BAAQMD significance thresholds for project operations are specific to the Bay Area airshed in which the project is located. Therefore, they account for the fact that the airshed is non-attainment for PM₁₀ (state)/PM_{2.5} (state and federal) and ozone (state and federal). Because the emissions of PM₁₀/PM_{2.5} and ROG/NO_x (ozone precursors) associated with proposed project operations are much less than the significance thresholds for these pollutants, a *less-than-significant impact* would occur.

SP2 Impact AQ-4: The proposed project would not expose sensitive receptors to substantial pollutant concentrations. (*Less than Significant*)

Sensitive receptors are those segments of the public most susceptible to respiratory distress and they include asthmatics, the very young, the elderly, people weak from other illness or disease, or persons engaged in strenuous work or exercise.

Sensitive receptors that could potentially be affected by substantial pollutant concentrations might include LBNL staff and visitors who currently access and occupy buildings adjacent to proposed project, and off-site grade schools, medical facilities, or retirement homes. In addition, all residences located outside of the LBNL property boundary were assumed to potentially include sensitive receptors.

The assessments discussed below were based on the very conservative assumption that sensitive receptors with occupational worker exposure parameters could be located anywhere on the LBNL facility property, and sensitive re-

ceptors with residential exposure parameters could be located anywhere outside of the LBNL facility property boundary.

a. Construction/Demolition

The 2008 hazardous materials survey identified lead, asbestos, and other hazardous materials within the buildings to be demolished and measures are in place to ensure they are removed safely during the demolition process.⁹ In addition, Buildings 25/25B and 55, have been used, and were still used until recently, as chemical laboratories. This work has involved the use of radioactive substances.

Evaluation for the potential for remnant radioactivity in these buildings has taken place and a plan is in place for a demolition sequence to include testing of previously inaccessible spaces.¹⁰ Demolition work would not commence until the space has been fully evaluated and any required decontamination has been completed. More information on procedures to ensure that remnant hazardous or radiological chemicals are not released to the air during demolition is included in Section 4.7, Hazards and Hazardous Materials.

Measures used to reduce construction-related dust have been described under the evaluation of SP2 Impact AQ-2 above. UC LBNL would monitor the air during demolition and construction to ensure that these safeguards to prevent airborne release of hazardous or radiological chemicals are successful. These measures would ensure that the risk of airborne contamination from demolition was at a level of *less than significant*. Therefore, potential emissions of TACs from fugitive dust generated by construction/demolition activities were not quantitatively evaluated in this assessment.

⁹ Winzler & Kelly, 2008, *Hazardous Materials Survey, Seismic Upgrade Phase II, Buildings 25, 55, 71 Trailers (C, D, F J, K, P), 85 Penthouse, and Dog Kennels, Lawrence Berkeley National Laboratory.*

¹⁰ LBNL, 2008. *Radiation Evaluation Report for Seismic Life-Safety, Modernization, and Replacement of General Purpose Buildings, Phase 2.*

A quantitative risk assessment was conducted to determine maximum potential LECR and chronic health hazard resulting from TAC emissions from construction/demolition equipment. The primary TAC emitted from these activities is diesel particulate matter (DPM) and guidance from the California Office of Environmental Health Hazard Assessment (OEHHA) indicates that for diesel internal combustion sources, only the health effects from DPM typically need be considered, as opposed to assessing health impacts from the individual chemical components of diesel exhaust.¹¹ Because OEHHA does not provide an acute reference concentration for DPM, acute impacts from DPM emissions can not be assessed.

Separate assessments were made for both on-site, off-road equipment activities and off-site, on-road truck travel associated with construction/demolition activities. Impacts from on-site, off-road equipment activities were assessed at both on-site Worker receptor locations and off-site Resident receptor locations. Because the off-site, on-road emissions would be very localized near the roadways travelled (and emissions would therefore also occur off-site), and the off-site Resident exposure assumptions would result in higher predicted health impacts compared to on-site Worker receptor exposure assumptions, these emissions were only assessed at off-site receptor locations.

On-site, off-road equipment DPM emission rates were taken as the PM₁₀ Exhaust emissions estimates in the URBEMIS 2007 emissions modeling discussed above under SP2 Impact AQ-2.

Dispersion modeling methodologies similar to those described in the LBNL 2006 LRDP EIR, the U.S. EPA AERMOD dispersion model and meteorological data collected on the LBNL site were used to estimate maximum annual DPM concentrations. Exposure assumptions for both on-site Worker

¹¹ California Environmental Protection Agency and Office of Environmental Health Hazard Assessment, 2003. *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments – Appendix D.*

receptors and off-site Resident receptors consistent with OEHHA¹² and BAAQMD¹³ guidance were used to estimate LECR and chronic hazard for the hypothetical maximally exposed individual (MEI).

For the LECR estimated for off-site Resident receptors, draft BAAQMD guidance for the use of ASFs was implemented.¹⁴ Because construction/demolition emissions are limited in duration (three years and nine months), the ASFs were applied assuming an ASF factor of ten for the first 2.25 years of exposure (starting from third trimester) and an ASF factor of three for the last 1.50 years of exposure. This results in an overall weighted ASF adjustment factor of 7.20 over the exposure period. Because workers are assumed to be over the age of fifteen, ASFs were not applied to on-site Worker LECR. This issue is discussed in more detail in Appendix B.

Based on these quantitative assessments, the LECR and chronic hazard result provided in Table 4.2-9 were estimated for on-site, off-road equipment DPM emissions. All estimated MEI results are below the BAAQMD significance thresholds.

Off-site, on-road truck DPM emission rates were taken as the PM₁₀ exhaust emissions estimates in the EMFAC 2007 emissions modeling discussed under SP2 Impact AQ-2.

¹² California Environmental Protection Agency and Office of Environmental Health Hazard Assessment, 2003. *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments – Appendix D.*

¹³ BAAQMD Air Toxics NSR Program Health Risk Screening Analysis (HRSA) Guidance – Draft, December 2009, http://www.baaqmd.gov/~media/Files/Planning%20and%20Research/Public%20Hearings/2009/0205_RFC_102109/0205_hsraguide_111309.ashx, accessed on December 10, 2009.

¹⁴ BAAQMD Air Toxics NSR Program Health Risk Screening Analysis (HRSA) Guidance – Draft, December 2009, http://www.baaqmd.gov/~media/Files/Planning%20and%20Research/Public%20Hearings/2009/0205_RFC_102109/0205_hsraguide_111309.ashx, accessed on December 10, 2009.

TABLE 4.2-9 **MEI LECR AND CHRONIC HAZARD ESTIMATES FOR ON-SITE, OFF-ROAD CONSTRUCTION/DEMOLITION EQUIPMENT DPM EMISSIONS**

Assessment	MEI Result	Significance Threshold
On-Site LECR	7-in-a-million	10-in-a-million
On-Site Chronic Hazard	0.08	1.0
Off-Site LECR	8-in-a-million	10-in-a-million
Off-Site Chronic Hazard	0.01	1.0

Source: Golder Associates, January 2010.

Again, dispersion modeling methods using the U.S. EPA AERMOD dispersion model and meteorological data collected on-site were used to estimate maximum DPM concentrations along off-site roadways that the trucks were assumed to travel (including portions of Hearst Avenue, Oxford Street, and University Avenue).

Based on these quantitative assessments, the LECR and chronic hazard results provided in Table 4.2-10 were estimated for off-site, on-road truck DPM emissions.

All estimated MEI results are below the available BAAQMD significance thresholds. Technical details of the LECR and chronic hazard assessments discussed above are provided in Appendix B.

Based on the assessments described above, the potential impacts to sensitive receptors from construction/demolition activity TAC emissions would be *less than significant*.

TABLE 4.2-10 **MEI LECR AND CHRONIC HAZARD ESTIMATES FOR OFF-SITE, ON-ROAD CONSTRUCTION/DEMOLITION TRUCK TRAFFIC DPM EMISSIONS**

Assessment	MEI Result	Significance Threshold
Off-Site LECR	0.6-in-a-million	10-in-a-million
Off-Site Chronic Hazard	0.001	1.0

Source: Golder Associates, January 2010.

b. GPL Operation

i. *Chronic Hazards*

A quantitative risk assessment was conducted to determine maximum potential LECR and chronic health hazard resulting from TAC emissions from proposed project operations. TAC emissions from project emission sources were quantified as follows:

- ◆ **GPL building laboratory fume hood roof vents:** Emissions were estimated using TAC emission factors developed for the LBNL 2006 LRDP EIR. These emission factors were developed in units of pounds per square foot of laboratory space for LBNL buildings. The emission factors were then multiplied by the square feet of laboratory space planned for the GPL building (16,250 square feet).
- ◆ **Natural gas boilers/heaters:** TAC emissions were estimated using emission factors from the U.S. EPA AP-42 document and the California Air Toxics Emission Factors (CATEF) database.
- ◆ **Diesel generator:** TAC emissions were estimated using emission factors from the CATEF database and other California emission factor resources.

Impacts from GPL building operations were assessed at both on-site Worker receptor locations and off-site Resident receptor locations.

Using dispersion modeling methodologies similar to those described in the LBNL 2006 LRDP EIR, the U.S. EPA AERMOD dispersion model and meteorological data collected on the LBNL site were used to estimate maximum annual TAC concentrations. Exposure assumptions for both on-site Worker receptors and off-site Resident receptors consistent with OEHHA¹⁵ and BAAQMD¹⁶ guidance were used to estimate LECR and chronic hazard for the hypothetical MEI.

For the LECR estimated for off-site Resident receptors, the draft BAAQMD guidance for the use of ASFs noted in the discussion of estimating LECR for construction/demolition activities above was implemented. However, in this case, because emissions would occur over the theoretical lifetime of the receptors, the overall result is that Resident LECR values should be multiplied by a factor of 1.7 to account for the ASFs. This was therefore done for the off-site Resident MEI result from the HARP model.

Based on these quantitative assessments, the LECR and chronic hazard results provided in Table 4.2-11 were estimated for GPL building TAC emissions. All estimated MEI results are below the available BAAQMD significance thresholds.

ii. Acute Hazards

The acute hazards from TACs were assessed only for emissions emanating from the laboratory fume hood exhaust vents, but not from combustion sources (such as the boilers/heaters and diesel generator).¹⁷ The rationale for this approach is that in general boilers, heaters and diesel generators produce

¹⁵ California Environmental Protection Agency and Office of Environmental Health Hazard Assessment, 2003. *The Air Toxics Hot Spots Program Guidance Manual for Preparation of Health Risk Assessments – Appendix D.*

¹⁶ BAAQMD Air Toxics NSR Program Health Risk Screening Analysis (HRSA) Guidance – Draft, December 2009, http://www.baaqmd.gov/~media/Files/Planning%20and%20Research/Public%20Hearings/2009/0205_RFC_102109/0205_hsrguide_111309.ashx, accessed on December 10, 2009.

¹⁷ This approach was also used in the LBNL 2006 LRDP EIR.

TABLE 4.2-11 **MEI LECR AND CHRONIC HAZARD ESTIMATES FOR GPL BUILDING OPERATIONS**

Assessment	MEI Result	Significance Threshold
On-Site LECR	0.5-in-a-million	10-in-a-million
On-Site Chronic Hazard	0.003	1.0
Off-Site LECR	0.2-in-a-million	10-in-a-million
Off-Site Chronic Hazard	0.001	1.0

Source: Golder Associates, January 2010.

TAC emissions that would exceed significance criteria for chronic effects and LECR at far lower levels than would cause them to exceed the significance criteria for acute effects. However laboratory fume hood vents could emit a more diverse variety of individual chemicals where the acute health effects might dominate the chronic health effects.

Maximum annual average TAC emission rates for the laboratory fume hood exhaust stacks were multiplied by a ratio of hourly to annual average chemical usage for research laboratories determined from a previous study to obtain maximum hourly emission rates for dispersion modeling.¹⁸

Again using the U.S. EPA AEROD dispersion model and meteorological data collected on-site, maximum ambient concentrations (over both on-site and off-site receptor grid locations) were estimated. These results were compared to acute reference concentrations published by OEHHA to determine hazard quotients for each TAC emitted (the hazard quotient is the ratio of the maximum estimated ambient concentration to the acute reference concentration). The results of this assessment are provided in Table 4.2-12.

¹⁸ *Central Campus Human Health Risk Assessment*, prepared by URS Corporation for the University of California at Berkeley, June 28, 2000.

TABLE 4.2-12 **MAXIMUM ACUTE HAZARD QUOTIENT VALUES FOR GPL LABORATORY FUME HOOD TAC EMISSIONS**

Pollutant	MEI 1-Hour Concentration ($\mu\text{g}/\text{m}^3$)	Maximum Hazard Quotient	Significance Threshold
1,3-Butadiene	0.004	^a	1.0
Acetaldehyde	0.026	0.0001	1.0
Acrolein	0.009	0.004	1.0
Acrylonitrile	0.007	^a	1.0
Benzene	0.19	0.0001	1.0
Boron Trifluoride	0.016	^a	1.0
Carbon Tetrachloride	0.14	0.0001	1.0
Chlorine	0.13	0.001	1.0
Chloroform	1.1	0.01	1.0
Crotonaldehyde	0.001	^a	1.0
Ethylene Dichloride	0.13	^a	1.0
Formaldehyde	0.13	0.002	1.0
HCl	1.2	0.001	1.0
Hydrazine	0.002	^a	1.0
Vinyl Chloride	0.09	0.000001	1.0
Vinylidene Chloride	0.006	^a	1.0

^a No hazard quotient calculated because OEHHA does not publish an acute reference concentration.

Source: Golder Associates, January 2010.

In this case, the hazard quotients for individual TACs were not added because maximum short-term emissions of two or more chemicals would not be expected to occur contemporaneously during laboratory use. All estimated MEI results are below the available BAAQMD significance thresholds. Tech-

nical details of the LECR and chronic/acute hazard assessments discussed above are provided in Appendix B. Based on the assessments described above, the potential impacts to sensitive receptors from GPL operations would be *less than significant*.

SP2 Impact AQ-5: The proposed project would not create objectionable odors affecting a substantial number of people. (*Less than Significant*)

a. Construction and Demolition

During construction/demolition activities, none of the work activities is expected to produce localized odors that could affect nearby workers. Emissions result from fugitive dust and diesel exhaust. Although diesel exhaust can have a detectable odor, the relatively few individual pieces of equipment required for these activities are not expected to produce objectionable odors outside of the project worksite.

b. Operation

During operation, the proposed project may release small quantities of odorous compounds from various laboratory activities; however these emission sources would not be concentrated in areas where visitors or employees would congregate. Emission vents would be placed on the top of the GPL building. LBNL provides an extensive buffer between the laboratory operations and the closest residences. As a result, there is no history of confirmed odor complaints associated with the past laboratory operations and there is no reason to expect that GPL laboratory emissions would result in higher ground level concentrations of odorous compounds relative to existing laboratories at the LBNL facility. The proposed GPL would include modern laboratory facilities that efficiently filter odors to a negligible level.

Therefore, the proposed project would not cause objectionable odors. As a result, a *less-than-significant* impact would occur during both construction and operation of the project.

E. Cumulative Impacts

SP2 Cumulative Impact AQ-1: Implementation of the proposed project, in conjunction with development planned under the LBNL 2006 LRDP and other potential contributing projects, would not contribute to cumulative emissions of toxic air contaminants that result in an excess cancer risk exceeding 100-in-one-million. (*Less than Significant*)

The LBNL 2006 LRDP EIR evaluated the cumulative LECR that would result from TACs associated with LBNL development under the LBNL 2006 LRDP up to Year 2025, and determined that the LECR would be in excess of 10-in-one-million, which was the significance threshold for cumulative LECR utilized in the LRDP EIR. This threshold was conservatively utilized at the time for assessing cumulative LECR from TAC emissions based on BAAQMD guidance that included a project-specific significance threshold for LECR on 10-in-a-million. BAAQMD guidance did not provide a significance threshold for assessing cumulative LECR.

BAAQMD has now proposed, and released in several iterations of proposed guidelines that are scheduled to be adopted in April, 2010, a significance threshold of 100-in-a-million (for either construction or operation) for assessing cumulative LECR. Based on discussions with the BAAQMD, that significance threshold is used for the purpose of analysis in this EIR.¹⁹

1. Cumulative Operations Impact

As demonstrated above, the maximum LECR impacts from proposed project operations would be relatively small (0.5-in-a-million within the LBNL facility property boundary and 0.2-in-a-million outside of the boundary). The LBNL 2006 LRDP EIR estimated maximum LECR impacts from all projects occurring over the LRDP period out to 2025 to be 22-in-a-million. Although the proposed project is part of the growth projected under the 2006 LRDP and is therefore already accounted for in the LBNL site-wide LECR assess-

¹⁹ Phone conversations between Brian Bateman and Scott Lutz with BAAQMD and Brian Patterson of Golder Associates Inc. on November 23, 2009.

ment, conservatively adding the maximum LECR for the proposed project (0.5-in-a-million) to the maximum cumulative LECR from the LRDP analysis (22-in-a-million) would provide a result of no more than 23-in-a-million. This is much less than the proposed BAAQMD significance threshold of 100-in-a-million. Based on these estimates, the cumulative LECR from project operations would be *less than significant*.

2. Cumulative Construction/Demolition Impact

Cumulative air quality impacts from construction/demolition activities associated with projects occurring over the time period of the proposed project were explicitly evaluated consistent with the BAAQMD proposed CEQA guidelines. Consistent with the form of the proposed BAAQMD cumulative significance thresholds, this included:

- ◆ Cumulative LECR and chronic hazard impact to off-site sensitive receptors from truck traffic associated with LBNL and UCB construction/demolition activities over the project period.
- ◆ Cumulative LECR and chronic hazard impact to on- and off-site sensitive receptors from on-site, off-road equipment emissions associated with LBNL and UCB construction/demolition activities over the project period.
- ◆ Cumulative PM_{2.5} impact to off-site ambient air from truck traffic associated with LBNL and UCB construction/demolition activities over the project period.
- ◆ Cumulative PM_{2.5} impact to off-site ambient air from on-site, off-road equipment emissions associated with LBNL and UCB construction/demolition activities over the project period.

For this assessment, DPM and PM_{2.5} emissions from trucks and off-road equipment associated with all identified construction and demolition projects occurring over the proposed project time period were estimated using methods and models identical to those used to estimate DPM and PM_{2.5} emissions from these sources for the proposed project as described above under SP2 Impact AQ-4. Identical dispersion modeling methods were then used to esti-

mate maximum average DPM concentrations at potential sensitive receptor locations on- and off-site, and maximum average PM_{2.5} concentrations in ambient air (defined as any off-site location).

LECR and chronic hazard for the hypothetical MEI were calculated using the same methods used to estimate these impacts resulting from on-road truck and off-road equipment emissions from the proposed project only as discussed under SP2 Impact AQ-4. These results are provided in Tables 4.2-13 and 4.2-14. Technical details of the LECR and chronic hazard estimates are provided in Appendix B.

Maximum cumulative PM_{2.5} concentrations in ambient air (i.e. any off-site location) were also determined using dispersion modeling methods identical to those used to determine PM_{2.5} impacts from the proposed project. These results are provided in Table 4.2-15.

Based on these estimates, the cumulative LECR, chronic hazard, and PM_{2.5} impacts would be *less than significant*.

TABLE 4.2-13 **CUMULATIVE MEI LECR AND CHRONIC HAZARD ESTIMATES FOR ON-SITE, OFF-ROAD CONSTRUCTION/DEMOLITION EQUIPMENT DPM EMISSIONS**

Assessment	MEI Result	Significance Threshold
Cumulative On-Site LECR	15-in-a-million	100-in-a-million
Cumulative On-Site Chronic Hazard	0.3	1.0
Cumulative Off-Site LECR	25-in-a-million	100-in-a-million
Cumulative Off-Site Chronic Hazard	0.06	1.0

Source: Golder Associates, January 2010.

TABLE 4.2-14 **CUMULATIVE MEI LECR AND CHRONIC HAZARD ESTIMATES FOR CONSTRUCTION/DEMOLITION TRUCK TRAFFIC**

Assessment	MEI Result	Significance Threshold
Cumulative Off-Site LECR	9-in-a-million	100-in-a-million
Cumulative Off-Site Chronic Hazard	0.02	1.0

Source: Golder Associates, January 2010.

TABLE 4.2-15 **CUMULATIVE MAXIMUM ESTIMATED ANNUAL PM_{2.5} CONCENTRATION IN AMBIENT AIR FROM CONSTRUCTION/DEMOLITION EMISSIONS**

Pollutant	Assessment	Maximum Ambient Concentration	Significance Threshold
PM _{2.5}	On-Site, Off-Road Equipment Emissions	0.31 µg/m ³	0.8 µg/m ³
PM _{2.5}	Off-Site, On-Road Truck Emissions	0.07 µg/m ³	0.8 µg/m ³

Source: Golder Associates, January 2010.

4.3 BIOLOGICAL RESOURCES

This section includes an assessment of the potential impacts of the proposed project on biological resources. Information is taken from the LBNL 2006 LRDP and EIR and field work conducted in March 2009 by Wildlife Research Associates (WRA), with additional sources used where stated. Biological resources include all plants and animals on the LBNL site and their respective habitats.

A. *Regulatory Setting*

1. **Federal Regulations and Policies**

The primary federal agency responsible for managing biological fish and wildlife resources in the area of LBNL is the U.S. Fish and Wildlife Service (USFWS).¹ The mission of the USFWS is to conserve, protect, and enhance the nation's fish and wildlife and their habitats. The USFWS is responsible for administering the federal Endangered Species Act and the Migratory Bird Treaty Act and Bald Eagle Protection Act.

a. **Federal Endangered Species Act**

Under the Federal Endangered Species Act (FESA), the Secretary of the Interior and the Secretary of Commerce have joint authority to list a species as threatened or endangered (16 United States Code [USC] 1533[c]). Pursuant to the requirements of the FESA, an agency reviewing a proposed project within its jurisdiction must determine whether any federally-listed or proposed species may be present in the project region, and whether the proposed project would result in a "take" of such species.² The "take" provision of the FESA

¹ The National Marine Fisheries Service (NMFS) also has responsibility for fisheries resources, but has no jurisdiction over upland areas where there is no stream access for anadromous fish, such as LBNL.

² "Take," as applied in Section 9 of the FESA, means to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect or to attempt to engage in any such conduct." "Harass" is further defined by the USFWS (50 C.F.R. § 17.3) as an intentional or negligent act or omission that creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns

applies to actions that would result in injury, death, or harassment of a single member of a species protected under the Act. In addition, the agency is required to determine whether the proposed project is likely to jeopardize the continued existence of any species proposed to be listed under the FESA, or result in the destruction or adverse modification of critical habitat for such species (16 USC 1536[3][4]). Substantial, adverse project-related impacts to FESA-listed species or their habitats would be considered significant in this EIR.

Proposed species are granted limited protection under the Act and must be addressed in Biological Assessments (under Section 7 of the Act); proposed species otherwise have no protection from “take” under federal law, unless they are emergency-listed species.³ Candidate species are afforded no protection under the Act. However, the USFWS recommends that candidate species and species proposed for listing also be considered in informal consultation during a project’s environmental review.

b. Migratory Bird Treaty Act and Bald Eagle Protection Act

The federal Migratory Bird Treaty Act (MBTA) (16 USC, Section 703, Supplement I, 1989) prohibits killing, possessing, or trading in migratory birds, except in accordance with regulations prescribed by the Secretary of the Interior. The Act encompasses whole birds, parts of birds, and bird nests and eggs.⁴

which include, but are not limited to, breeding, feeding, and sheltering. “Harm” is defined as “an act which actually kills or injures wildlife.” This may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering.

³ Note, however, that protection from “take” begins at this stage under California law.

⁴ The Act covers hundreds of birds, including varieties of loon, grebe, albatross, booby, pelican, cormorant, heron, stork, swan, goose, duck, vulture, eagle, hawk, falcon, fail, plover, avocet, sandpiper, phalarope, gull, tern, murre, puffin, dove, cuckoo, roadrunner, owl, swift, hummingbird, kingfisher, woodpecker, swallow, jay,

The federal Bald Eagle Protection Act prohibits people within the United States (or other places subject to U.S. jurisdiction) from “possessing, selling, purchasing, offering to sell, transporting, exporting or importing any bald eagle or any golden eagle, alive or dead, or any part, nest or egg thereof.”

c. Clean Water Act

The Federal Water Pollution Control Act of 1972, often referred to as the Clean Water Act, is the nation’s primary law for regulating discharges of pollutants into waters of the United States. The objective of the Clean Water Act is to restore and maintain the chemical, physical, and biological integrity of the nation’s waters. The regulations adopted pursuant to the Act deal extensively with the permitting of actions in waters of the United States, including wetlands. Wetlands are ecologically productive habitats that support a rich variety of both plant and animal life. The importance of wetlands has increased due to their value as recharge areas and filters for water supplies and their widespread filling and destruction to enable urban and agricultural development. The Act’s statutory sections and implementing regulations provide more specific protection for riparian and wetland habitats than any other federal law. The U.S. Environmental Protection Agency (EPA) has primary authority under the Clean Water Act to set standards for water quality and for effluents, but the U.S. Army Corps of Engineers (Corps) has primary responsibility for permitting the discharge of dredge or fill materials into streams, rivers, and wetlands.

d. Draft Recovery Plan for Chaparral and Scrub Community Species

Under the FESA, the USFWS must prepare a recovery plan for listed species. A recovery plan details the actions needed to foster self-sustaining wild populations of listed species so they no longer need protection under the FESA. The USFWS published the *Draft Recovery Plan for Chaparral and Scrub Community Species East of San Francisco Bay, California* (“Recovery Plan”) in November 2002. This draft plan is habitat-based and covers six species of plants and animals that occur primarily in chaparral and scrub habitats of the

magpie, crow, wren, thrush, mockingbird, vireo, warbler, cardinal, sparrow, blackbird, finch and many others.

East Bay. Potential habitat for two of the six species, the Alameda whipsnake and the Berkeley kangaroo rat, occurs at LBNL. While this draft plan has not yet been adopted, it may be adopted in its current or modified form during the time period covered by the LBNL 2006 LRDP. UC Berkeley is identified as a major stakeholder in the recovery process. Should the plan be formally adopted, UC LBNL would be subject to the plan's requirements during any federal permitting process. LBNL lands that were previously designated as part of a critical habitat unit for the Alameda whipsnake are now designated as part of Recovery Unit 6 for the species. The major threats to Alameda whipsnake in this recovery unit are wildfires, presence of non-native plants and animals, and loss of habitat and habitat fragmentation due to urban development.⁵ Elements of the recovery strategy for Unit 6 that may be relevant to LBNL include:

- ◆ Conservation of existing open space;
- ◆ Control of encroachment of invasive non-native plant species, such as eucalyptus and French broom; and
- ◆ Conduct of fuel management programs in such a way as to enhance or restore habitat for the whipsnake (e.g., reintroducing or mimicking natural disturbance regimes).

The Berkeley kangaroo rat is presumed to be extinct in the Oakland-Berkeley hills.⁶ However, the recovery plan recommends that, if and when surveys are carried out in the plan area for Alameda whipsnake or other species that may occur in chaparral or scrub communities, habitat assessment for the kangaroo rat be included as well. If appropriate habitat with burrows and scat are present, then trapping surveys should be conducted to identify species using the burrows.⁷

⁵ U.S. Fish and Wildlife Service, November, 2002, *Draft Recover Plan for Chaparral and Scrub Community Species East of San Francisco Bay*, page II-69.

⁶ U.S. Fish and Wildlife Service, November, 2002, *Draft Recover Plan for Chaparral and Scrub Community Species East of San Francisco Bay*, page I-5.

⁷ U.S. Fish and Wildlife Service, November, 2002, *Draft Recover Plan for Chaparral and Scrub Community Species East of San Francisco Bay*, page II-7

2. State Regulations and Policies

The California Department of Fish and Game (CDFG) is the primary State agency responsible for managing biological resources. The mandate of the CDFG is to manage California's diverse fish, wildlife, and plant resources, and the habitats upon which they depend, for their ecological values and for their use and enjoyment by the public. In particular, the CDFG is required under various State statutes to conserve species through listing, habitat acquisition and protection, review of local land use planning, multi-species conservation planning, stewardship, recovery, research, and education. The CDFG is responsible for administering the California Endangered Species Act, the California Native Plant Protection Act, and the Fish and Game Code.

a. California Endangered Species Act

Under the California Endangered Species Act (CESA), the CDFG has the responsibility for maintaining a list of threatened and endangered species (California Fish and Game Code Section 2070). The CDFG also maintains a list of "candidate species," which are species formally under review for addition to either the list of endangered species or the list of threatened species. In addition, the CDFG maintains lists of "species of special concern," which serve as watch lists. Pursuant to the requirements of the CESA, an agency reviewing a proposed project within its jurisdiction must determine whether any State-listed endangered or threatened species could be present on the project site and determine whether the proposed project could have a potentially significant impact on such species. In addition, the CDFG encourages informal consultation on any proposed project that may affect a candidate species. Project-related impacts to species on the CESA endangered or threatened lists would be considered significant in this EIR. Impacts to "species of concern" would be considered significant if the species met the criteria set forth under CEQA Guidelines Section 15380, or if the species were also protected under any of the other statutes or policies discussed in this section.

b. California Native Plant Protection Act

State listing of plant species began in 1977 with the passage of the California Native Plant Protection Act (NPPA), which directed the CDFG to carry out

the legislature’s intent to “preserve, protect, and enhance endangered plants in this State.” The NPPA gave the California Fish and Game Commission the power to designate native plants as endangered or rare and to require permits for collecting, transporting, or selling such plants. The CESA expanded upon the original NPPA and enhanced legal protection for plants. The CESA established threatened and endangered species categories, and grandfathered all rare animals—but not rare plants—into the act as threatened species. Thus, there are three listing categories for plants in California: rare, threatened, and endangered.

c. California Fish and Game Code

The California Fish and Game Code provides a variety of protections for species that are not federally- or State-listed as threatened, endangered, or of special concern.

- ◆ Section 3503 protects all breeding native bird species in California by prohibiting the take,⁸ possession, or needless destruction of nests and eggs of any bird, with the exception of non-native English sparrows and European starlings (Section 3801).
- ◆ Section 3503.5 protects all birds of prey (in the orders Falconiformes and Strigiformes) by prohibiting the take, possession, or killing of raptors and owls, their nests, and their eggs.
- ◆ Section 3513 of the code prohibits the take or possession of migratory non-game birds as designated in the Migratory Bird Treaty Act or any parts of such birds except in accordance with regulations prescribed by the Secretary of the Interior.
- ◆ Section 3800 of the code prohibits the taking of non-game birds, which are defined as birds occurring naturally in California that are not game birds or fully protected species.

⁸ “Take” in this context is defined in Section 86 of the California Fish and Game Code as to “hunt, pursue, catch, capture, or kill, or to attempt to hunt, pursue, catch, capture, or kill.”

- ◆ Section 3511 (birds), Section 5050 (reptiles and amphibians), and Section 4700 (mammals) designate certain wildlife species as fully protected in California.
- ◆ Section 4150 of the code prohibits the take of non-game mammals, which are defined as mammals occurring naturally in California that are not game mammals or fully protected species.

3. Local Plans and Policies

The Seismic Phase 2 project involves DOE facilities at LBNL operated by the University of California. The plans and policies that are applicable to the proposed project are the LBNL 2006 LRDP and the UC policies. Principles and strategies contained in these plans and policies that address biological resources are summarized below.

The University of California, under Article IX, Section 9 of the California Constitution, is exempt from local land use regulation, including General Plans and zoning. UC nevertheless seeks to cooperate with local jurisdictions to reduce any physical consequences of potential land use conflicts to the extent feasible. Because the western part of the LBNL site is within the Berkeley city limits, and the eastern part is within the Oakland city limits, this section also summarizes policies contained in both the Berkeley and Oakland General Plans, as well as other City of Berkeley and City of Oakland documents relevant to biological resources.

a. LBNL 2006 Long Range Development Plan

i. *Principles and Strategies*

Development strategies provided by the LBNL 2006 LRDP are intended to minimize potential environmental impacts that could result from implementation of the LBNL 2006 LRDP. Development strategies set forth in the LBNL 2006 LRDP applicable to the proposed project include the following:

- ◆ Protect and enhance the site's natural and visual resources, including native habitats, riparian areas, and mature tree stands by focusing future development primarily within the already developed areas of the site.

- ◆ Continue to use sustainable practices in selection of plant materials and maintenance procedures.
- ◆ Utilize native, drought-tolerant plant materials to reduce water consumption; focus shade trees and ornamental plantings at special outdoor use areas.

b. LBNL 2006 LRDP EIR Mitigation Measures

A series of mitigation measures is included within the LBNL 2006 LRDP EIR. Although this analysis does not tier from that EIR, several of the mitigation measures adopted as part of the 2006 LRDP apply to the proposed project and are included in the Seismic Phase 2 project description. The following biological resources mitigation measures apply to and are a part of the proposed project:

LRDP Mitigation Measure BIO-3: Direct disturbance, including tree and shrub removal or nest destruction by any other means, or indirect disturbance (e.g. noise, increased human activity in area) of active nests of raptors and other special-status bird species (as listed in Table IV.C-1) within or in the vicinity of the proposed footprint of a future development project shall be avoided in accordance with the following procedures for Pre-Construction Special-Status Avian Surveys and Subsequent Actions. No more than two weeks in advance of any tree or shrub removal or demolition or construction activity involving particularly noisy or intrusive activities (such as concrete breaking) that will commence during the breeding season (February 1 through July 31), a qualified wildlife biologist shall conduct pre-construction surveys of all potential special-status bird nesting habitat in the vicinity of the planned activity and, depending on the survey findings, the following actions shall be taken to avoid potential adverse effects on special-status nesting birds:

1. Pre-construction surveys are not required for demolition or construction activities scheduled to occur during the non-breeding season (August 1 through January 31).

2. If pre-construction surveys indicate that no nests of special-status birds are present or that nests are inactive or potential habitat is unoccupied, no further mitigation is required.
3. If active nests of special-status birds are found during the surveys, a no-disturbance buffer zone will be created around active nests during the breeding season or until a qualified biologist determines that all young have fledged. The size of the buffer zones and types of construction activities restricted within them will be determined through consultation with the CDFG, taking into account factors such as the following:
 - Noise and human disturbance levels at the project site and the nesting site at the time of the survey and the noise and disturbance expected during the construction activity;
 - Distance and amount of vegetation or other screening between the project site and the nest; and
 - Sensitivity of individual nesting species and behaviors of the nesting birds.
4. Noisy demolition or construction activities as described above (or activities producing similar substantial increases in noise and activity levels in the vicinity) commencing during the non-breeding season and continuing into the breeding season do not require surveys (as it is assumed that any breeding birds taking up nests would be acclimated to project-related activities already under way). However, if trees and shrubs are to be removed during the breeding season, the trees and shrubs will be surveyed for nests prior to their removal, according to the survey and protective action guidelines 3a through 3c, above.
5. Nests initiated during demolition or construction activities would be presumed to be unaffected by the activity, and a buffer zone around such nests would not be necessary.
6. Destruction of active nests of special-status birds and overt interference with nesting activities of special-status birds shall be prohibited.

7. The noise control procedures for maximum noise, equipment, and operations identified in Section IV.I, Noise, of the 2006 LBNL LRDP EIR shall be implemented.

LRDP Mitigation Measure BIO-4: Project implementation under the LBNL 2006 LRDP shall avoid disturbance to the maternity roosts of special-status bats during the breeding season in accordance with the following procedures for Pre-Construction Special-Status Bat Surveys and Subsequent Actions. No more than two weeks in advance of any demolition or construction activity involving concrete breaking or similarly noisy or intrusive activities, that would commence during the pup-rearing season (April 15 through August 31), or winter hibernacula season (October 15 through March 1, depending on weather conditions) a qualified bat biologist, acceptable to the CDFG, shall conduct pre-demolition surveys of all potential special-status bat breeding habitat in the vicinity of the planned activity. Depending on the survey findings, the following actions shall be taken to avoid potential adverse effects on breeding special-status bats:

1. If active roosts are identified during pre-construction surveys, a no disturbance buffer will be created by the qualified bat biologist, in consultation with the CDFG, around active roosts during the breeding season. The size of the buffer will take into account factors such as the following:
 - Noise and human disturbance levels at the project site and the roost site at the time of the survey and the noise and disturbance expected during the construction activity;
 - Distance and amount of vegetation or other screening between the project site and the roost; and
 - Sensitivity of individual nesting species and the behaviors of the bats.

2. If pre-construction surveys indicate that no roosts of special-status bats are present, or that roosts are inactive or potential habitat is unoccupied, no further mitigation is required.
3. Pre-construction surveys are not required for demolition or construction activities scheduled to occur during the non-breeding and winter hibernacula season (September 1 through October 15, and March 1 through April 15).
4. Noisy demolition or construction activities as described above (or activities producing similar substantial increases in noise and activity levels in the vicinity) commencing during the non-breeding season and continuing into the breeding season do not require surveys (as it is assumed that any bats taking up roosts would be acclimated to project-related activities already under way). However, if trees are to be removed during the breeding season, the trees would be surveyed for roosts prior to their removal, according to the survey and protective action guidelines 1a through 1c, above.
5. Bat roosts initiated during demolition or construction activities are presumed to be unaffected by the activity, and a buffer is not necessary.
6. Destruction of roosts of special-status bats and overt interference with roosting activities of special-status bats shall be prohibited.
7. The noise control procedures for maximum noise, equipment, and operations identified in Section IV.I, Noise, of this EIR shall be implemented.

LRDP Mitigation Measure BIO-5a: With the approval of the USFWS on a case-by-case basis, relocate any snake encountered during construction that is at risk of harassment; cease construction activity until the snake is moved to suitable refugium. Alternatively, submit a general protocol for relocation to the USFWS for approval prior to project implementation.

LRDP Mitigation Measure BIO-5b: Conduct focused pre-construction surveys for the Alameda whipsnake at all project sites within or directly adjacent to areas mapped as having high potential for whipsnake occurrence. Project sites within high potential areas shall be fenced to exclude snakes prior to project implementation. This would not include ongoing and non-site specific activities such as fuel management.

Methods for pre-construction surveys, burrow excavation, and site fencing shall be developed prior to implementation of any project located within or adjacent to areas mapped as having high potential for whipsnake occurrence. Such methods would be developed in consultation or with approval of USFWS for any development taking place in USFWS officially designated Alameda whipsnake critical habitat. Pre-construction surveys of such project sites shall be carried out by a permitted biologist familiar with whipsnake identification and ecology.⁹ These are not intended to be protocol-level surveys but designed to clear an area so that individual whipsnakes are not present within a given area prior to initiation of construction. At sites where the project footprint would not be contained entirely within an existing developed area footprint and natural vegetated areas would be disturbed any existing animal burrows shall be carefully hand-excavated to ensure that there are no whipsnakes within the project footprint. Any whipsnakes found during these surveys shall be relocated according to the Alameda Whipsnake Relocation Plan. Snakes of any other species found during these surveys shall also be relocated out of the project area. Once the site is cleared it shall then be fenced in such a way as to exclude snakes for the duration of the project. Fencing shall be maintained intact throughout the duration of the project.

LRDP Mitigation Measure BIO-5c: (1) A full-time designated monitor shall be employed at project sites that are within or directly adjacent to

⁹ Swaim, K., Swaim Biological, Inc., 2002, *Results of surveys for special status reptiles at the Site 300 facilities of Lawrence Livermore National Laboratory*.

areas designated as having high potential for whipsnake occurrence, or (2) Daily site surveys for Alameda whipsnake shall be carried out by a designated monitor at construction sites within or adjacent to areas designated as having moderate potential for whipsnake occurrence.

Each morning, prior to initiating excavation, construction, or vehicle operation at sites identified as having moderate potential for whipsnake occurrence, the project area of applicable construction sites shall be surveyed by a designated monitor trained in Alameda whipsnake identification to ensure that no Alameda whipsnakes are present. This survey is not intended to be a protocol-level survey. All laydown and deposition areas, as well as other areas that might conceal or shelter snakes or other animals, shall be inspected each morning by the designated monitor to ensure that Alameda whipsnakes are not present. At sites in high potential areas the monitor shall remain on-site during construction hours. At sites in moderate potential areas the monitor shall remain on-call during construction hours in the event that a snake is found on-site. The designated monitor shall have the authority to halt construction activities in the event that a whipsnake is found within the construction footprint until such time as threatening activities can be eliminated in the vicinity of the snake and it can be removed from the site by a biologist permitted to handle Alameda whipsnakes. The USFWS shall be notified within 24 hours of any such event.

LRDP Mitigation Measure BIO-5d: Alameda whipsnake awareness and relevant environmental sensitivity training for each worker shall be conducted by the designated monitor prior to commencement of on-site activities. All on-site workers at applicable construction sites shall attend an Alameda whipsnake information session conducted by the designated monitor prior to beginning work. This session shall cover identification of the species and procedures to be followed if an individual is found on-site, as well as basic site rules meant to protect biological resources, such as speed limits and daily trash pickup.

LRDP Mitigation Measure BIO-5e: Hours of operation and speed limits shall be instituted and posted.

All construction activities that take place on the ground (as opposed to within buildings) at applicable construction sites shall be performed during daylight hours, or with suitable lighting so that snakes can be seen. Vehicle speed on the construction site shall not exceed 5 miles per hour.

LRDP Mitigation Measure BIO-5f: Site vegetation management shall take place prior to tree removal, grading, excavation, or other construction activities. Construction materials, soil, construction debris, or other material shall be deposited only on areas where vegetation has been mowed.

Areas where development is proposed under the LBNL 2006 LRDP are subject to annual vegetation management involving the close-cropping of all grasses and ground covers; this management activity would be performed prior to initiating project-specific construction. Areas would be re-mowed if grass or other vegetation on the project site becomes high enough to conceal whipsnakes during the construction period. In areas not subject to annual vegetation management, dense vegetation would be removed prior to the onset of grading or the use of any heavy machinery, using goats, manual brush cutters, or a combination thereof.

c. UC Berkeley Management Plan for Strawberry and Claremont Canyons
In 1979, the University Committee on Conservation and Environmental Quality prepared the *Management Plan for Strawberry and Claremont Canyons*.¹⁰ To date, six of the technical sections had been updated and the process is continuing. This plan details guidelines for the management of vegetation and wildlife, fuel levels, watercourses, recreation, and land use in the Strawberry and Claremont Canyon areas and provides vegetation and fuel man-

¹⁰ U.C. Berkeley Committee on Conservation and Environmental Quality, prepared by J. McBride, 1978, revised by R.A. Beatty, 1979, *Management Plan for Strawberry and Claremont Canyons*.

agement prescriptions. Guidelines for activities relevant to the proposed project include the following:

- ◆ The Strawberry Canyon area should be managed to promote those natural succession processes that will result in a mosaic of native vegetation types.
- ◆ Planting of native species should be carried out with stock propagated from local materials.
- ◆ Herbicides should not be used to remove unwanted vegetation.
- ◆ Further increases in impervious surfaces throughout Strawberry Canyon should be minimized.
- ◆ Culverts should be cleaned at the end of each summer and inspected and cleaned after each rainstorm throughout the rainy season.
- ◆ Road cuts and fill areas should be inspected for erosion and seeded with appropriate species if erosion is present.

d. UC Berkeley Strawberry Creek Management Plan

In 1987, the Strawberry Creek Management Plan was prepared under the supervision of the University of California at Berkeley Office of Environmental Health and Safety (EH&S). The Plan evaluates the water quality of the creek, identifies point and non-point sources of pollution and develops creek and watershed mitigation strategies. It is intended to serve as a resource document for future evaluation and management decisions and to provide an overview of historical data. Guidelines relevant to activities under the proposed project include the following:

- ◆ Soils of the hill area surrounding Strawberry Creek are generally heavy clay soils that have high runoff and erosion potential.¹¹ Numerous landslide and colluvial bodies are also located in Strawberry Canyon. Erodibility of these soils is primarily a function of vegetative cover and there-

¹¹ U.C. Berkeley Office of Environmental Health and Safety, prepared by Robert B. Charbonneau, 1987, *Strawberry Creek Management Plan*.

fore activities resulting in the removal of vegetation should be avoided during the rainy season to allow time for revegetation before heavy rainfall occurs.

e. Berkeley General Plan

City of Berkeley General Plan policies pertaining to natural resources include the following:

- ◆ Policy EM-27: Creeks and Watershed Management. Whenever feasible, daylight creeks by removing culverts, underground pipes, and obstructions to fish and animal migrations.
- ◆ Policy EM-28: Natural Habitat. Restore and protect valuable, significant, or unique natural habitat areas.
- ◆ Policy EM-30: Native Plants. Use native tree and plant species to enhance ecological richness.
- ◆ Policy EM-31: Landscaping. Encourage drought-resistant, rodent-resistant, and fire-resistant plants to reduce water use, prevent soil erosion, improve habitat, reduce fire danger, and minimize degradation of natural resources.
- ◆ Policy EM-32: Inter-jurisdictional Coordination. Encourage efforts by neighboring jurisdictions and agencies, such as the East Bay Regional Parks District, University of California, Berkeley, and the Lawrence Berkeley National Laboratory, to restore historic coastal grasslands in the hill area to provide natural habitat and reduce fire danger in the area.

f. City of Berkeley Coast Live Oak Removal Ordinance

The Berkeley City Council adopted ordinances declaring a moratorium on the removal of coast live oak trees within the city (Ordinance No. 6321-N.S., as amended by Ordinance No. 6462-N.S and Ordinance No. 6550-N.S.). These ordinances prohibit the removal of any single-stem coast live oak with a circumference of 18 inches or greater, as measured at a distance of 4 feet above ground level, and the removal of any multi-stemmed coast live oak with an aggregate circumference of 26 inches or greater. Exceptions may be

made if the tree poses a danger to people and/or property and the only reasonable solution is tree removal.

g. Oakland General Plan

The Open Space, Conservation, and Recreation (OSCAR) Element of the City of Oakland General Plan, adopted in 1996, contains the following policies relevant to biological resources:

- ◆ Policy CO-7.1: Protect native plant communities, especially oak woodlands, redwood forests, native perennial grasslands, and riparian woodlands, from the potential adverse impacts of development. Manage development in a way which prevents or mitigates adverse impacts to these communities.
- ◆ Policy CO-7.3: Make every effort to maintain the wooded or forested character of tree-covered lots when development occurs on such lots.
- ◆ Policy CO-7.4: Discourage the removal of large trees on already developed sites unless removal is required for biological, public safety, or public works reasons.
- ◆ Policy CO-9.1: Protect rare, endangered, and threatened species by conserving and enhancing their habitat and requiring mitigation of potential adverse impacts when development occurs within habitat areas.
- ◆ Policy CO-11.1: Protect wildlife from the hazards of urbanization, including loss of habitat and predation by domestic animals.

The following policy is from the Land Use and Transportation Element:

- ◆ Policy W3.3: Native plant communities, wildlife habitats, and sensitive habitats should be protected and enhanced.

B. Existing Setting/Affected Environment

Demolition of the Building 25/25B and construction and staging of the GPL would occur in areas of hardscape. However the site is immediately adjacent

to an irrigated grove of redwood trees and there are undeveloped slopes across the parking lot (which is also the proposed staging area).

Two trees to the southwest of Building 25 would probably be removed as part of the proposed project in order to realign the driveway. One is a 25-foot high Coast live oak and the other a 30-foot Dawn redwood. A second Coast live oak on the east side of Building 25 might have to be removed to allow for the construction of a storm drain associated with the GPL. The two Coast live oak trees have circumferences of 26 inches (tree southeast of Building 25) and 33 inches (tree southwest of Building 25) respectively. Although LBNL is not subject to the City of Berkeley Tree Ordinance, if the trees were removed, there would be replanting in keeping with LBNL policies.

Building 55 is in an area of LBNL that has been modified to accommodate buildings in the steep terrain. The proposed staging area is in a parking lot. Some exotic, ornamental shrubs on the south and west side of the building would be removed to provide access for the demolition.

Building 55 was built on an infilled ravine that used to be called the North Fork of Blackberry Creek. The water from that drainage now runs through a 30 inch pipe under the building. During the rainy season an inlet just behind Building 55A and approximately 150 feet from Building 55 allows water to flow into the pipe. The demolition work is not expected to affect the culverted creek and is located too far from the inlet to cause water quality problems to the inflowing water.

Building 71 trailers (71C, D, F, J, K, and P) are on an asphalt parking lot as would be the staging areas. Although no trees would be removed by the proposed action, there are oak trees (*Quercus* sp.) that may be disturbed during the demolition.

Building 85/85A would have seismic upgrades which entail installing a below-grade system of pier foundations and tiebacks system to stabilize the building and some strengthening work to the interior structure.

1. Vegetation

Of the approximately 131 acres of undeveloped lands within the LBNL site, 67 acres comprise of grassland, including both annual grassland and mixed grassland. Mixed grassland is found in small patches along steep slopes throughout the LBNL site, and includes a mix of non-native annual and native perennial grasses and herbaceous species, including purple needlegrass (*Nasella pulchra*), blue wild-rye (*Elymus glaucus*), mugwort (*Artemisia douglasiana*), cudweed (*Gnaphalium* sp.), yarrow (*Achillea millefolium*), Pacific sanicle (*Sanicula crassicaulis*), and hedge nettle (*Stachys ajugoides* ssp. *ajugoides*). Mixed grassland occurs on the south side of Building 25 and on the north side of Building 55.

A total of 12 acres of the LBNL site is comprised of non-native eucalyptus stands with an understory vegetation that is typically sparse and consists primarily of non-native weedy species, including Italian thistle (*Carduus pycnocephalus*), bristly ox-tongue (*Picris echioides*), and a variety of grasses, including wild oat (*Avena* sp.), and zorro grass (*Vulpia myuros*). Associated with the proposed project at Building 25 is a line of non-native blue gum (*Eucalyptus globulus*) trees along the southern boundary. Eucalyptus trees also occur on the north side of Building 55.

Landscape trees of redwood (*Sequoia sempervirens*) with irrigated turf as an understory occurs along the western side of the proposed project site at Building 25.

Coast live oak woodland comprises approximately nine acres on the LBNL site. This vegetation type ranges in cover from sparse to dense canopy, with coast live oak (*Quercus agrifolia*) the only tree species present. Where oaks are widely spaced, annual or mixed grasslands occur in the understory. This community occurs adjacent to Building 55 on the hillside to the north and

west and across the road on the south side; and adjacent to the Building 71 trailers on the south side. While there may be some minor disturbances to the oaks during demolition activities, neither project component is anticipated to significantly impact these trees.

2. Wetlands and Water Resources

Most of the drainages within LBNL are ephemeral or intermittent, except for the north forks of Strawberry Creek and Chicken Creek, which, for most of their lengths through LBNL, have been filled and culverted. In total there are 13 water features present at LBNL that are potentially jurisdictional under Section 404 of the Clean Water Act, 33 U.S.C. §§1251, et seq. These include reaches of the North Fork of Strawberry Creek, Chicken Creek and the headwater tributaries to these creeks, as well several headwater tributaries to the south fork of Strawberry Creek. However, none of these drainages occur on or near the project site, and would not be discussed further in this section.

3. Common Wildlife Species

Common wildlife species occurring on the LBNL site inhabit the region of the Berkeley Hills. Common species occurring throughout the LBNL site and therefore potentially using habitats in and around the proposed project, such as the grove of redwood trees, individual coast live oak trees, and other buildings include the California mule deer (*Odocoileus hemionus*), California towhee (*Pipilo crissalis*), chestnut backed chickadee (*Poecile rufescens*), western scrub jay (*Aphelocoma californica*), Steller's jay (*Cyanocitta stelleri*), dark-eyed junco (*Junco hyemalis*), and Anna's hummingbird (*Calypte anna*), among others. The close proximity of the redwood trees and oak trees to human habitation, i.e., landscaping practices and walkways beneath the trees, reduces the likelihood for nesting raptors, but does not preclude nesting passerines.

The grasslands located adjacent to the project area may provide foraging and dispersal habitat for western fence lizard (*Sceloporus occidentalis*), northern alligator lizard (*Elgaria coerulea*), and California slender salamander (*Batrachoseps attenuatus*), as well as birds, including mourning dove (*Zenaida*

macroura) and golden-crowned sparrow. Mammals such as Botta's pocket gopher (*Thomomys bottae*) may also be found.

Anthropogenic structures within the LBNL site may support wildlife species accustomed to human presence, such as nesting birds and roosting bats. Bats typically select anthropogenic structures to provide day roosts that protect them from light, wind, and predators, and in many cases, as a safe location to rear young. Small colonies of bats roosting in structures may go unnoticed for years, or, at the opposite extreme, bat activity or colony size may be so great that evidence of bat use is obvious. Structures selected for night roosting between foraging bouts are often less protected and more open, for example, sheds, carports, etc. Some buildings may satisfy roost requirements for both day and night-roosting activity; however others may be used for only one or the other. Within the proposed project area, Buildings 25 and 25B have corrugated Transite siding, composition roofs, and wood extension buildings along one side and have the potential to provide roost habitat for a number of colonial bat species that occur in the area, including pallid bat (*Antrozous pallidus*), Yuma bat (*Myotis yumanensis*), and Brazilian free-tailed bat (*Tadarida brasiliensis*). Building 55 has concrete walls and a flat gravel roof and the modular trailers 71C, D, F, J, K and P, are metal-sided with metal roofs and both Building 55 and the Building 71 trailers provide potential bat roosts.

4. Special Status Biological Resources

Several special status species were observed during field studies completed as part of the LBNL 2006 LRDP EIR. Other special status species have a moderate potential to occur in the vicinity of LBNL. These species are: Lee's micro-blind harvestman, San Francisco lacewing, Alameda whipsnake, Cooper's hawk, Sharp-shinned hawk, red-tailed hawk, American kestrel, great horned owl, olive-sided flycatcher, Pacific-slope flycatcher, Allen's hummingbird, Bewick's wren, California thrasher, pallid bat, long-eared myotis, fringed myotis, big-scale balsamroot, Diablo helianthella, large-flowered leptosiphon, Oregon meconella, and robust monardella.

A project-specific habitat survey of the buildings to be demolished was completed by WRA in March 2009. Results of the field work are included in this report and include an assessment for potential for occurrence of special status communities, special status plant and animal species.

a. Special status Communities

Two special status communities, Northern Maritime Chaparral and Serpentine Bunchgrass, are reported in the general vicinity of the project area;¹² however, neither one occurs on the site. No wetlands or waters of the U.S. occur within the proposed project area. Therefore no impacts would occur to these special status communities.

b. Special status Plant Species

The CDFG has also compiled a list of "Special Plants,"¹³ which include California Special Concern species. These designations are given to those plant species whose vegetation communities are seriously threatened. Although these species may be abundant elsewhere, they are considered to be at some risk of extinction in California. Special status plant species include those listed as Endangered, Threatened, Rare or Candidates for listing by the USFWS (2009), the CDFG (2009a), and the CNPS.¹⁴

A total of 21 special status plant species were evaluated for their potential to occur on the site. No special-status plants were observed during the floristic surveys conducted on March 5 and April 9, 2009, which included the project sites and the staging areas. None were observed within the LBNL property during floristic surveys conducted between 1992 and 2003.

¹² California Natural Diversity Database (CNDDDB), 2009, *Reported occurrences for the 7.5-minute topographic quadrangles*.

¹³ California Department of Fish and Game (CDFG), 2009, *State and Federally Listed Endangered, Threatened, and Rare Plants of California*.

¹⁴ Tibor, D.P. 2001, *Inventory of Rare and Endangered Vascular Plants of California*. California Native Plant Society, Sacramento, California, Special Publication No. 1, sixth ed.

c. Special status Animal Species

Special status animal species include those listed by the USFWS (2009) and the CDFG (2009c, 2009d). The USFWS officially lists species as either Threatened or Endangered, and as candidates for listing.

A total of 35 special status animal species were evaluated for their potential to occur within the study area. Based on the extended time frame of the proposed project, no focused surveys were conducted for any of the wildlife species. A full list of these species is presented in Appendix A of the WRA survey report. Those species that have a low to moderate potential to occur on the project site, or are prominent in today's regulatory environment, are discussed below.

i. *Alameda Whipsnake*

Alameda whipsnake may use a variety of habitat types and features with home ranges typically centered on areas of scrub habitats with open to partially open canopy, on south-, southeast-, east-, and southwest-facing slopes. Recent surveys and studies undertaken elsewhere in the region have shown that Alameda whipsnake can be found in a wider variety of habitats than previously thought,¹⁵ including, in open grasslands with very little scrub present, in coastal scrub with dense canopy cover, and in patches of scrub less than half an acre in size. These recent findings suggest the possibility that whipsnakes could inhabit, or disperse through, areas of the LBNL site where coastal scrub habitat occurs in a mosaic with other habitat types such as grassland or woodland.

In 2008, Alameda whipsnake was detected north of the project site at the LBNL¹⁶ less than 0.5 mile west, showing that some of the open space lands of the LBNL area are used by Alameda whipsnake. However, the proposed pro-

¹⁵ Alvarez, J., M. Shea and A. Murphy, 2005, A compilation of observations of Alameda whipsnakes outside of typical habitat, *Transactions of the Western Section of the Wildlife Society*, 41: pages 21 to 25.

¹⁶ California Natural Diversity Database (CNDDDB), 2009, *Reported occurrences for the 7.5-minute topographic quadrangles*.

ject is located within hardscape and does not provide habitat for whipsnake. The location of Building 25, between McMillan Road and Lawrence Road, reduces the likelihood that Alameda whipsnake will use the grasslands located south of the site, even for dispersal. The landscaped area with irrigated turf surrounded by buildings and roadways also reduces the likelihood that Alameda whipsnake uses the site, even for dispersal. The grasslands located north of Building 85 and south of Building 71 trailers are also reduced in suitability based on their internal locations within the development of LBNL.

ii. Nesting Birds

Several passerine (perching birds) species observed on site, such as California towhee and scrub jays, nest in stick nests, while others, such as the white-breasted nuthatch and chestnut-backed chickadee, nest in tree cavities, and others such as black phoebe, nest on structures. Occupancy of these different types of nests varies per year, based on the environmental conditions surrounding the nests. Raptors (birds of prey), such as red-shouldered hawks (*Buteo lineatus*), are more site faithful and will use a nest year after year. As construction is not scheduled until 2011, no focused surveys for nesting passerines or raptors were conducted to determine nest occupancy.

iii. Roosting Bats

The main buildings for demolition were surveyed for potential roosting habitat for special status bats. Buildings 25/25B, 55, and trailers 71C, D, F, J, K and P did not show any evidence of bat roosting activity at the time; however all contain potentially suitable openings that could permit bats to begin occupying one or more of the structures prior to demolition. Results of the field work are summarized in Table 4.3-1 below.

iv. Dusky-footed Woodrat (Neotoma fuscipes)

This species is nocturnal and active year round in forest habitats of moderate canopy and moderate to dense understory and in chaparral communities. Nests are located in a stick house, and are constructed of shredded grass, leaves, and other miscellaneous materials (e.g. bird feathers). Based on the

TABLE 4.3-1 **BUILDING DESCRIPTIONS AND POTENTIAL FOR ROOSTING BATS**

Building Number	Potential Roost Habitat	Potential for Occurrence
25/25B	Various door gaps, siding, roof overlaps	No evidence of past or present use by bats was observed
55	Small openings above right side door	No evidence of past or present use by bats was observed
71C, D, F, J, K and P trailers	Openings in end walls at air conditioning attachments	No evidence of past or present use by bats was observed

lack of canopy cover and duff layers to create their nests and refugia, this species is not expected to occur in the landscaped trees located to the west of the Building 25. The individual oak trees located near Building 71 trailers and Building 55 do not provide the canopy cover necessary for this species. Therefore, the proposed project construction would not impact this species.

C. CEQA Significance Criteria

The impact of the proposed project on biological resources would be considered significant if it would exceed the following standards of significance, in accordance with Appendix G of the *CEQA Guidelines* and the UC CEQA Handbook:

1. Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service.
2. Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies,

regulations or by the California Department of Fish and Game or US Fish and Wildlife Service.

3. Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means.
4. Interfere substantially with the movement of any native resident or migratory fish or wildlife species, or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites.
5. Conflict with any local applicable policies protecting biological resources.
6. Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other applicable habitat conservation plan.

D. Potential Project Impacts

This section discusses potential impacts to biological resources resulting from the proposed project construction and subsequent operations.

SP2 Impact BIO-1: The proposed project would not result in a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species. (*Less than Significant*)

One special-status reptile and two groups of special-status wildlife species, nesting birds and roosting bats, may be impacted by the proposed project, based on the location of the project and the structures involved. As noted above, no special status plants were observed within LBNL property during floristic surveys conducted between 1992 and 2003 or in 2009.

a. Demolition of Building 25/25B and GPL Construction and Operation

i. *Alameda Whipsnake*

As discussed above, demolition of Building 25/25B and GPL construction and operation would occur in an area of hardscape which does not provide habitat for the Alameda whipsnake. Construction of the GPL, however, would require installation of a replacement storm drain and the 125 foot-long drain would run from the southeastern corner of the new building east through the neighboring hillside to a connection point on Segre Road. To install the drain, trenches would be dug through the hillside. The hillside does not represent original topography but is a road cut associated with Segre Road. Although the area is grassland, according to the LBNL 2006 LRDP EIR, the hillside does not represent habitat for the Alameda whipsnake, or other candidate, sensitive, or special status species. Therefore, impacts to the Alameda whipsnake from the demolition of Building 25/25B and the construction and operation of the GPL would be *less than significant*.

ii. *Passerines and Raptors*

The Building 25/25B site is located near a grove of landscape sequoia and redwood trees to the west and undeveloped mixed grasslands to the south that may support any of the above mentioned bird species. The close proximity of the redwood trees to human habitation, i.e., landscaping practices and walkways beneath the trees, reduces the likelihood for nesting raptors, but does not preclude nesting passerines. Bird species not protected under CESA or FESA, such as some passerines (including mourning dove and scrub jays) are protected under the Fish and Game Code 3503 and the MBTA, and some raptors (including American kestrel) are protected under Fish and Game Code 3503.5 and the MBTA. These aforementioned avian species may potentially be impacted by the disturbance adjacent to or removal of potential nesting habitat in the trees within the project area. Disturbance during the nesting season (February 15 through August 15) may result in the potential nest abandonment and mortality of young, which is considered a “take” of an individual. Implementation of LRDP Mitigation Measure BIO-3, which is incorporated into the proposed project, would prevent take of nesting birds. As a result, the impact would be *less than significant*.

iii. Roosting Bats

Bats are protected under DFG Code 4150. Although no evidence of occupancy was detected during earlier surveys, Building 25/25B contains potentially suitable openings that could permit bats to begin occupying one or more of the structures prior to demolition. Implementation of LRDP Mitigation Measure BIO-4, which is incorporated into the proposed project, would prevent take of individuals. As a result, the impact would be *less than significant*.

iv. Dusky-footed Woodrat

The Dusky-footed woodrat (*Neotoma fuscipes*), a special status animal, is not expected to use the line of eucalyptus trees along the southern portion of the proposed GPL site or the landscaped trees located to the west of the Building 25 due to lack of canopy cover and duff layers. Therefore, impacts to the Dusky-footed woodrat from the demolition of Building 25/25B and the construction and operation of the GPL would be *less than significant*.

b. Demolition of Building 55 and Building 71 Trailers

i. Alameda Whipsnake

As noted above, demolition of Building 55 and the Building 71 trailers would occur in areas of hardscape which do not provide habitat for the Alameda whipsnake. Although Building 71 Trailers are located to the south of an area with moderate potential for Alameda whipsnake habitat as identified in the 2006 LRDP EIR, it is unlikely that the whipsnake would use the project area even for dispersal because it is separated from the area of identified habitat by buildings and roadways. Additionally, the suitability of the grasslands south of the trailers as habitat for the whipsnake is reduced because of the internal location of the grasslands within the overall LBNL development. LRDP Mitigation Measures BIO-5a to f, listed above and incorporated as part of the project, also provide measures to prevent take of individual whipsnake. Impacts from the demolition of Building 55 and Building 71 trailers to the Alameda whipsnake would therefore be *less than significant*.

ii. Passerines and Raptors

Building 55 is in an area of LBNL that has been modified to accommodate buildings in the steep terrain. The staging area is in a parking lot. Some ornamental shrubs would be removed by the proposed project, and there are surrounding trees that may contain birds and other wildlife that could potentially be disturbed during construction. The implementation of LRDP Mitigation Measure BIO-3, which is incorporated into the proposed project, would ensure that measures would be in place to minimize or prevent disturbance. Impacts from the demolition of Building 55 and Building 71 trailers to passerines and raptors would therefore be *less than significant*.

iii. Roosting Bats

No evidence of past or present use by bats was observed on any portion of the exterior of Building 55, and based on the design and construction of the building, it is extremely unlikely that this building provides suitable bat roosting habitat. No evidence of past or present use by bats was observed on any portion of the Building 71 trailer exteriors. Nevertheless, implementation of LRDP Mitigation Measure BIO-4, which is incorporated into the proposed project, would ensure that measures would be in place to prevent any potential disturbance to bats. Impacts from the demolition of Building 55 and Building 71 trailers to roosting bats would therefore be *less than significant*.

iv. Dusky-Footed Woodrat

The individual oak trees located at Building 55 and Building 71 trailers sites do not provide the canopy cover necessary for this species. Impacts from the demolition of Building 55 and Building 71 trailers to the Dusky-footed woodrat would therefore be *less than significant*.

c. Building 85/85A Seismic Strengthening

i. Alameda Whipsnake

As noted above, seismic strengthening of Building 85/85A would occur in areas of hardscape which do not provide habitat for the Alameda whipsnake. The work would take place primarily indoors and underground. Although located to the south of an area with moderate potential for Alameda

whipsnake habitat as identified in the 2006 LRDP EIR, it is unlikely that the whipsnake would use the project area even for dispersal because it is separated from the area of identified habitat by buildings and roadways. Additionally, the suitability of the grasslands north of Building 85 as habitat for the whipsnake is reduced because of the internal location of the grasslands within the overall LBNL development. LRDP Mitigation Measures BIO-5a to f, listed above and incorporated as part of the project, also provide measures to prevent take of individual whipsnake. Impacts to the Alameda whipsnake from Building 85/85A seismic strengthening would therefore be *less than significant*.

ii. Passerines and Raptors

As noted above, seismic strengthening work on Building 85/85A would take place primarily indoors and underground. There would be *no impact* from Building 85/85A seismic strengthening to passerines or raptors.

iii. Roosting Bats

Although no evidence of occupancy was detected during earlier surveys, Building 85/85A contains potentially suitable openings that could permit bats to begin occupying the structure prior to commencement of seismic strengthening. However, implementation of LRDP Mitigation Measure BIO-4, which is incorporated into the proposed project, would prevent take of individuals. As a result, the impact from Building 85/85A seismic strengthening to roosting bats would be *less than significant*.

iv. Dusky-footed Woodrat

The Dusky-footed woodrat is not expected to be present in the vicinity of Building 85/85A due to lack of canopy cover and duff layers. Therefore, Building 85/85A seismic strengthening activities would have *no impact* on this species.

SP2 Impact BIO-2: The proposed project would not have a substantial adverse effect on any riparian habitat or other sensitive natural community. (*No Impact*)

No riparian habitat or other sensitive natural communities occur within the proposed project area. No undeveloped areas would be affected by the proposed project, resulting in *no impact* to sensitive natural communities.

SP2 Impact BIO-3: The proposed project would not have a substantial adverse effect on federally protected wetlands. (*No Impact*)

No undeveloped areas would be affected by the proposed project and there would be *no impact* to federally protected wetlands.

SP2 Impact BIO-4: The proposed project would not interfere substantially with the movement of any native resident or migratory fish or wildlife species, or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites. (*Less than Significant*)

As discussed under SP2 Impacts BIO-1 through 3, the proposed project would not affect any riparian habitat or Section 404 resources, such as streams or creeks. Accordingly, there would be no impact on native resident or migratory fish species.

Similarly, given the nature and location of the various project elements, there is limited potential that the proposed project would interfere with the movement of any migratory wildlife species or affect native wildlife nursery sites. As explained previously under SP2 Impact BIO-1, all project-related work, including site preparation, construction, and demolition, would take place on sites that have already been developed and thereby heavily disturbed.

Movement corridors for common species of wildlife may be temporarily impacted during the construction phase due to increased noise and human activ-

ity, but these corridors could be re-established following construction. As a result, the proposed project's impact on the movement, migratory corridors, or nursery sites of wildlife species would be *less than significant*.

SP2 Impact BIO-5: The proposed project would not conflict with any local applicable policies protecting biological resources. (*No Impact*)

The LBNL 2006 LRDP contains two landscaping design requirements. These are:

- ◆ Continue to use sustainable practices in selection of plant materials and maintenance procedures.
- ◆ Utilize native, drought-tolerant plant materials to reduce water consumption; focus shade trees and ornamental plantings at special outdoor use areas.

As described in the project description, the GPL would be landscaped in conformance with the LRDP requirements.

The proposed project is expected to require removal of two trees west of Building 25 in order to realign the driveway, and a third tree on the hillside southeast of the building to allow for the construction of a new storm drain. The trees are two Coast live oaks and a Dawn redwood. The two Coast live oak trees have circumferences (as measured at a height of 4 feet above the ground) of 26 inches (tree southeast of Building 25) and 33 inches (tree southwest of Building 25). The proposed project is not subject to the City of Berkeley's Tree Ordinance. However, UC LBNL voluntarily plants trees to replace any that need to be removed. Replanting would be done in accordance with LBNL revegetation policies. There are also some ornamental shrubs outside Building 55 that would be removed. These are exotic species and not protected.

As a consequence there would be *no impact* with respect to local plans and policies for protecting biological resources.

SP2 Impact BIO-6: The proposed project would not conflict with the provisions of an adopted habitat conservation plan, natural community conservation plan, or other applicable habitat conservation plan. (*No Impact*)

The proposed project is not located in an area of LBNL that falls under the jurisdiction of a Habitat Conservation Plan or a Natural Community Conservation Plan and there would therefore be *no impact*.

E. Cumulative Impacts

SP2 Cumulative Impact BIO-1: The proposed project in conjunction with other past, present, and reasonably foreseeable projects would not cause impacts associated with biological resources. (*Less than Significant*)

Impacts from the proposed project on biological resources have been shown to be minimal as the project would involve areas of the LBNL site that are already developed and highly disturbed. Three trees would be removed, but in keeping with LBNL policies, these would be replaced. There would therefore be *less-than-significant* cumulative impacts on biological resources.

4.4 CULTURAL RESOURCES

This section includes an assessment of the potential impacts of the proposed project on cultural resources. Information is taken from the LBNL 2006 LRDP EIR and LBNL 2006 LRDP, with additional sources used where stated.

A. *Regulatory Setting*

1. Federal and State Regulations and Policies

a. National Register of Historic Places

The National Register of Historic Places is the nation's master inventory of known historic resources. The National Register is administered by the National Park Service and includes listings of buildings, structures, sites, objects, and districts that possess historic, architectural, engineering, archaeological, or cultural significance at the national, State, or local level. To be considered significant, resources must meet one or more criteria set forth by the Secretary of the Interior for inclusion on the National Register of Historic Places. Among these criteria, a resource must:

- ◆ Be associated with events or have made a significant contribution to the broad patterns of our history;
- ◆ Be associated with lives of persons significant in our past;
- ◆ Embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or possess high artistic values, or represents a significant and distinguishable entity whose components may lack individual distinction; or
- ◆ Have yielded, or may be likely to yield, information important in prehistory or history.

Properties are nominated to the National Register of Historic Places by the State Historic Preservation Officer of the state in which the property is located, by the Federal Preservation Officer for federally owned or controlled property, or by the Tribal Preservation Officer for tribally owned property. Generally, structures, sites, buildings, districts, or objects must be at least 50

years old or “exceptionally important” to be considered eligible for listing in the National Register as significant historic resources.

b. State Office of Historic Preservation

The State Office of Historic Preservation maintains the California Register of Historical Resources, an authoritative listing of the State’s significant historic resources as well as architectural, archaeological, and cultural resources. The California Register includes properties listed in or formally determined eligible for the National Register, pursuant to Section 4851(a) of the Public Resources Code, and lists selected California Registered Historical Landmarks. The State Office of Historic Preservation also maintains the *Directory of Properties in the Historic Property Data File*. Properties on the Property Data File are not protected or regulated. The State Office of Historic Preservation sponsors the California Historical Resources Information System (CHRIS), a statewide system for managing information on the full range of historical resources identified in California. CHRIS is a cooperative partnership among the citizens of California, historic preservation professionals, 11 information centers, and various agencies. CHRIS provides an integrated database that furnishes site-specific archaeological and historical resources information on known resources and surveys to government, institutions, and individuals. CHRIS also supplies a list of qualified consultants. Information for the project area is available through CHRIS’s Northwest Information Center.

2. Local Plans and Policies

The Seismic Phase 2 project involves DOE facilities at LBNL operated by the University of California. The local plan that is applicable to the proposed project is the LBNL 2006 LRDP and the policies applicable to the project are UC policies. LBNL design guidelines and LRDP EIR mitigation measures designed to protect cultural resources are presented below that are applicable to the proposed project.

The University of California, under Article IX, Section 9 of the California Constitution, is exempt from local land regulation, including general plans and zoning. UC nevertheless seeks to cooperate with local jurisdictions to

reduce any physical consequences of potential land use conflicts to the extent feasible. Because the proposed new construction and demolition work is located in the western portion of the LBNL site within the Berkeley City limits, this section lists policies contained in the Berkeley General Plan related to cultural resources. The seismic strengthening work, which is located in the eastern portion of the LBNL site within the City of Oakland limits, would affect the interior and underneath of a building built in 1996, which is not historic. Therefore City of Oakland General Plan policies are not listed below.

a. LBNL 2006 Long Range Development Plan

The LRDP provides the following specific planning and design guidance relevant to cultural resources:

- ◆ Preserve the Hill's rustic landscape through provision of screening landscape elements for large buildings and the integration of buildings into the overall landscape using appropriate materials.
- ◆ There are many interesting historic objects scattered around LBNL. These artifacts are important reminders of the Lab's legacy as well as items of interest which stimulate interaction. Placement of these artifacts at major pedestrian nodes and at prominent locations in each commons is encouraged.

b. LBNL 2006 LRDP EIR Mitigation Measures

A series of mitigation measures is included within the LBNL 2006 LRDP EIR. Although this analysis does not tier from that EIR, several of the mitigation measures adopted as part of the 2006 LRDP apply to the proposed project and are included in the Seismic Phase 2 project description. The following cultural resources mitigation measures apply to and are a part of the proposed project.

LRDP Mitigation Measure CUL-3: If an archaeological artifact is discovered on-site during construction under the proposed LRDP, all activities within a 50-foot radius shall be halted and a qualified archaeologist shall be summoned within 24 hours to inspect the site. If the find is deter-

mined to be significant and to merit formal recording or data collection, adequate time and funding shall be devoted to salvage the material. Any archaeologically important data recovered during monitoring shall be cleaned, catalogued, and analyzed, with the results presented in a report of finding that meets professional standards.

LRDP Mitigation Measure CUL-4: In the event that human skeletal remains are uncovered during construction or ground-breaking activities resulting from implementation of the LBNL 2006 LRDP at the LBNL site, CEQA Guidelines Section 15064.5(e)(1) shall be followed:

- ◆ In the event of the accidental discovery or recognition of any human remains in any location other than a dedicated cemetery, the following steps should be taken:
 - (1) There shall be no further excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent human remains until:
 - (A) The coroner of the county in which the remains are discovered must be contacted to determine that no investigation of the cause of death is required, and
 - (B) If the coroner determines the remains to be Native American: (1) The coroner shall contact the Native American Heritage Commission within 24 hours. (2) The Native American Heritage Commission shall identify the person or persons it believes to be the most likely descended from the deceased Native American. (3) The most likely descendent may make recommendations to the landowner or the person responsible for the excavation work, for means of treating or disposing of, with appropriate dignity, the human remains and any associated grave goods as provided in Public Resources Code Section 5097.98, or
 - (2) Where the following conditions occur, the landowner or his authorized representative shall rebury the Native American human

remains and associated grave goods with appropriate dignity on the property in a location not subject to further subsurface disturbance.

- (A) The Native American Heritage Commission is unable to identify a most likely descendent or the most likely descendent failed to make a recommendation within 24 hours after being notified by the commission;
- (B) The descendant identified fails to make a recommendation;
or
- (C) The landowner or his authorized representative rejects the recommendation of the descendant, and the mediation by the Native American Heritage Commission fails to provide measures acceptable to the landowner.

c. City of Berkeley General Plan

The Urban Design and Preservation Element of the City of Berkeley General Plan contains policies relating to the preservation of cultural resources in the City. These policies include the following:

- ◆ Policy UD-5: Architectural Features. Encourage, and where appropriate require, retention of ornaments and other architecturally interesting features in the course of seismic retrofit and other rehabilitation work.
- ◆ Policy UD-6: Adaptive Reuse. Encourage adaptive reuse of historically or architecturally interesting buildings in cases where the new use would be compatible with the structure itself and the surrounding area.
- ◆ Policy UD-10: The University of California. Strongly support actions by the University to maintain and retrofit its historic buildings, and strongly oppose any University projects that would diminish the historic character of the campus or off-campus historic buildings.
- ◆ Policy UD-36: Information on Heritage. Promote, and encourage others to promote, understanding of Berkeley's built and cultural heritage, the benefits of conserving it, and how to sensitively do that.

B. Existing Setting

Cultural resources are defined as any prehistoric or historic district, site, building, structure or object that is considered important to a culture, subculture or community for a scientific, traditional, religious, or other reason. As part of the environmental analysis for the LBNL 2006 LRDP EIR, all undeveloped land and proposed building locations, including the site of the proposed new GPL and the buildings scheduled for demolition, were examined for potential historical and archaeological resources. Some of that work was based on a separate study in 2003 that surveyed the buildings in the middle of the LBNL site, or Old Town area.¹

Based on the findings of the historic and archaeological resources survey, no historic or prehistoric archaeological resources were encountered in any location within the proposed project site.

1. Archaeological Resources

A records search and coordination effort was conducted with CHRIS to identify archaeological resources at LBNL. It was determined through this research that in light of the existing disturbed nature of the LBNL site that the potential for archaeological resources, including Native American sites, to exist on the LBNL property is considered low to moderate.

2. Historic Architectural Resources

As part of the LBNL 2006 LRDP process, UC LBNL contracted with Pacific Northwest National Laboratory to investigate and report on the potential historical significance of buildings and structures at the LBNL site. Approximately 150 of the Lab's 245 buildings had been investigated by December 2009.

¹ Harvey, D. W., January 2003, *Identification and Evaluation of Old Town Buildings*, Ernest Orlando Lawrence Berkeley National Laboratory.

3. Other Potential Historic Resources

The City of Berkeley's Landmark Preservation Commission has noted the importance of Strawberry Canyon as an important cultural landscape that is important to the city's character and that this landscape should be recognized and preserved.² In addition, in 2008 the Berkeley Architectural Heritage Association (BAHA) was documenting the area as a cultural landscape and historic site.^{3,4}

The National Park Service defines a cultural landscape as "a geographic area including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values."⁵ Of the various project components, only the seismic strengthening of Building 85/85A would take place in Strawberry Canyon. This work will be mainly underground or within an existing building and would not affect Strawberry Canyon. As described in Section 4.1 Aesthetics, the site of the new GPL is not generally visible from locations in Strawberry Canyon with the exception of limited, far-away glimpses from the Jordan Fire Trail.

C. CEQA Significance Criteria

The impact of the proposed project on cultural resources would be considered significant if it would exceed the following standards of significance, in accordance with Appendix G of the *CEQA Guidelines* and the UC CEQA Handbook:

² City of Berkeley, March 20, 2006, *Response to Comments on LBNL LRDP Draft EIR*.

³ Journal of Berkeley Architectural Heritage Association, September 2008.

⁴ Sierra Club Yodeler, November-December 2007.

⁵ National Park Service, Preservation Brief 36, *Protecting Cultural Landscapes: Planning, Treatment and Management of Historic Landscapes*. (<http://www.nps.gov/history/hps/tps/briefs/brief36.htm>.)

1. Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5.
2. Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5.
3. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.
4. Disturb any human remains, including those interred outside of formal cemeteries.

D. Potential Project Impacts

This section discusses impacts to cultural resources resulting from the proposed project demolition and construction.

SP2 Impact CUL-1: The proposed project would not cause a substantial adverse change in the significance of a historical resource as defined in §15064.5. (*Less than Significant*)

a. Building 25/25B

Building 25 was built in 1947, designed by architect Joseph S. Gould, also the designer of the LBNL cyclotron.⁶ It is a complex of industrial and scientific laboratories, office, and storage facilities. It was the former home of a 150-ton synchrotron, an early particle accelerator designed by Nobel Prize laureate Dr. Edwin McMillan, that operated in the 1940s and 50s. The synchrotron was shut down in 1960 and, together with its accessory systems, was shipped to the Smithsonian Institution's Museum of History and Technology in Washington D.C. Building 25 is a steel frame construction with concrete cladding, bolted metal plank siding, and corrugated metal rollup doors. Inside, there are concrete floors and corrugated metal, non-insulated walls in the shops with sheet-rocked office walls.

⁶ Harvey, D. W., January 2003, *Identification and Evaluation of Old Town Buildings*, Ernest Orlando Lawrence Berkeley National Laboratory.

A 2003 survey report concluded that, although Building 25 (and connected Building 25A) was associated with historical events of significance, because of the removal of the synchrotron and components, it had not retained the integrity of those physical features necessary to convey its significance in the historic context. It was therefore found not eligible for listing in the National Register under Criterion A. In addition, although it was designed by Joseph S. Gould, a prominent San Francisco architect, the design of Building 25 did not “embody the distinctive characteristics of a type, period, or method of construction...or represent the work of a master, ...or possess high artistic values.” It was therefore found not eligible for listing under Criterion C. Information about Building 25 was sent to the State Historic Preservation Officer who confirmed that Building 25 was not eligible for listing.⁷

b. Building 55

Building 55 was constructed and continually modified in phases starting in 1950 and ending the mid 1980s. The original building was unremarkable from an architectural standpoint, and it does not retain the architectural integrity of its earlier design due to the continual modifications over the decades. It has been used predominantly by the Life Sciences Division, and is not directly associated with significant scientists or scientific discoveries. Accordingly, it does not meet NRHP or CRHR eligibility criteria.

c. Building 71 Trailers

The Building 71 trailers are temporary, portable trailer buildings that were emplaced to provide ancillary office and administrative space for the Accelerator and Fusion Research Division (AFRD). They housed mainly support personnel and are all less than 50 years old. As such they do not meet NRHP or CRHR eligibility criteria.

⁷ Janet M. Neville, State Historic Preservation Officer, April 27, 2004, *Letter Re: Identification and Evaluation of Old Town Buildings, Ernest Orlando Lawrence Berkeley National Laboratory, Berkeley, Alameda County.*

DOE has confirmed that Building 55 and the 71 trailers are not eligible for listing in the National Register of Historic Places, based on the application of the Criteria for Evaluation identified in the National Historic Preservation Act (NHPA).^{8,9} California State Historical Resources Commission (SHRC) criteria mirror those of the NHPA and as such these buildings are also not eligible for listing in the California Register of Historical Resources (CRHR).

d. Building 85/85A Seismic Strengthening

The Building 85/85A seismic strengthening work is either underground or restricted to the interior of Building 85, which was built in 1996. These alterations would have only a minor effect on a building that could not be considered historic.

In conclusion, none of the buildings scheduled for demolition is historically significant and therefore the proposed project would result in a *less-than-significant* impact on historic resources.

SP2 Impact CUL-2: The proposed project would not cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5. (*Less than Significant*)

In conjunction with the preparation of the LBNL 2006 LRDP EIR, on-site field surveys and archival research at the Northwest Information Center were completed. It was determined through this research that the potential for archaeological sites to exist on the LBNL property is considered low to moderate.¹⁰ In addition, all of the areas where construction would take place for the proposed project have already been disturbed through the construction of

⁸ Abbott, Kim. Environmental Programs Manager, DOE Berkeley Site Office. Determination of Ineligibility for Building 55 and Building 71 in the National Register of Historic Places. December 10, 2009.

⁹ Trailer 71D was mistakenly omitted from this list. However, as it is similar to C, F, J, K, and P that were included, the same conclusions also apply.

¹⁰ LBNL, 2006, *Long-Range Development Plan Environmental Impact Report*, page IV.D-16.

buildings or parking areas, which further reduces the potential for a first-time encounter of an archaeological resource.

In the unlikely event that archaeological artifacts are discovered during construction (including grading, excavation, and other earthmoving activities), LRDP Mitigation Measure CUL-3 incorporated into the proposed project (taken from Section 15064.5(c) of the CEQA Guidelines) would be implemented. Under the procedure, any archaeologically important data discovered would be cleaned, catalogued, and analyzed, with the results presented in a report of finding that meets professional standards. With implementation of this procedure as part of the proposed project, the potential impact would be *less than significant*. Beyond building construction, the operation of the proposed project would result in *no impact* on archaeological resources.

SP2 Impact CUL-3: The proposed project would not directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. (*Less than Significant*)

During the course of development at LBNL, extensive excavation for buildings and infrastructure did not reveal the presence of unique paleontological or geologic resource.¹¹ As a result, the potential to encounter a unique paleontological or geologic resource during demolition, construction or operation of the proposed project is low. The impact would be *less than significant*.

SP2 Impact CUL-4: The proposed project would not disturb any human remains, including those interred outside of formal cemeteries. (*Less than Significant*)

There is no known evidence of prehistoric habitation at LBNL, nor any indication that the site has been used for burial purposes in the recent or distant past. Moreover, all construction activities related to the proposed project would take place on previously developed sites and thus, it is unlikely that

¹¹ LBNL 2006, *Long-Range Development Plan Environmental Impact Report*, page IV.D-10-11.

human remains would be encountered.¹² However, in the unlikely event that human remains are discovered during construction (including grading, excavation, and other earthmoving activities), LRDP Mitigation Measure CUL-4, which is part of the project description, would be implemented, and construction would be halted until the coroner had been notified and the appropriate actions taken to move and re-bury the remains. Potential impacts would therefore be *less than significant*.

E. Cumulative Impacts

SP2 Cumulative Impact CULT-1: The proposed project in conjunction with other past, present, and reasonably foreseeable projects would not cause impacts associated with cultural resources. (*Less than Significant*)

None of the buildings that would be demolished or modified under the proposed project is historically significant or eligible for listing on the National Register. Therefore, the proposed project would not have cumulative impacts on cultural resources in combination with other past, present and reasonably foreseeable projects. There would be *less-than-significant* cumulative impacts.

¹² LBNL, 2006, *Long-Range Development Plan Environmental Impact Report*, page IV.D-18.

4.5 GEOLOGY AND SOILS

This section includes an assessment of the potential impacts of the proposed project on geology and soils. Information is taken from the LBNL 2006 LRDP EIR and LBNL 2006 LRDP for the site in general. Building 25 subsurface conditions are described in Lettis and Associates (2009).¹ The Building 85/85A area is described in Geo/Resource (1994),² Alan Kropp & Associates (2006a),³ Alan Kropp & Associates (2006b),⁴ Alan Kropp & Associates (2007),⁵ Lettis & Associates (2008),⁶ and the RMW Architecture & Interiors, Conceptual Design Report (2008).⁷

A. Regulatory Setting

1. State Regulations and Policies

a. Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act (formerly the Alquist-Priolo Special Studies Zones Act), signed into law in December 1972 (and amended several times in subsequent years), requires the delineation of zones along active faults in California. The zones vary in width, but average about

¹ Lettis and Associates, August 2009, *Palaeolandslide Investigation Building 25, Lawrence Berkeley National Laboratory, Berkeley, California.*

² Geo/Resource Consultants, Inc., March 1994, *Fault Investigation, Building 85 Hazardous Waste Handling Facility.*

³ Alan Kropp and Associates, January 4, 2006, *Geotechnical Investigation Report, Animal Care Facility, Lawrence Berkeley National Laboratory, Berkeley, California.*

⁴ Alan Kropp and Associates, Inc., July 31, 2006, *Summary Report, Initial Landslide Study, Building 85, Lawrence Berkeley National Laboratory, Berkeley California.*

⁵ Alan Kropp & Associates, April 27, 2007, *Letter Report on Conceptual-Level Study of the Mitigation of a Landslide in the East Canyon Area of LBNL.*

⁶ Lettis & Associates, November 19, 2008, *Surface-fault Rupture Hazard Investigation of the Wildcat Fault, Proposed General Purpose Lab.*

⁷ RMW Architecture & Interiors, July 2008, *100% Conceptual Design Report, Seismic Life-Safety, Modernization, and Replacement of General Purpose Buildings, Phase 2.*

one-quarter-mile wide.⁸ An active fault is defined as one that has ruptured the ground surface within the past approximately 11,000 years (the Holocene Epoch). The purpose of the Act is to regulate development on or near active fault traces to reduce the hazard of fault rupture and to prohibit the location of most structures for human occupancy across these traces. Cities and counties must regulate certain development projects within the zones, which includes withholding permits until geologic investigations demonstrate that development sites are not threatened by future surface displacement.⁹ Surface fault rupture is not necessarily restricted to areas within an Alquist-Priolo Zone, as designated under the Alquist-Priolo Act.

b. Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act was developed 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. Before a development permit is granted for a site within a Seismic Hazard Zone, a geotechnical investigation of the site must be conducted and appropriate mitigation measures incorporated into the project design. Geotechnical investigations conducted within Seismic Hazard Zones must incorporate standards specified by California Geological Survey (CGS) Special Publication 117, *Guidelines for Evaluating and Mitigating Seismic Hazards*.¹⁰ The CGS has designated much of the LBNL site as a Seismic Hazard Zone for earthquake-induced landslides.

⁸ California Geological Survey, Alquist-Priolo Fault Zones web page, <http://www.consrv.ca.gov/cgs/rghm/ap/index.htm>, accessed on March 2, 2009.

⁹ Hart, E.W., *Fault-Rupture hazard Zones in California: Alquist-Priolo Earthquake Fault Zoning Act of 1972 with Index to Earthquake Fault Zones*.

¹⁰ Geological Survey (formerly California Division of Mines and Geology), 1990, revised and updated 1997, Special Publication 42.

c. California Building Code

The California Building Code is another name for the body of regulations known as the California Code of Regulations (CCR), Title 24, Part 2, which is a portion of the California Building Standards Code. Title 24 is assigned to the California Building Standards Commission, which, by law, is responsible for coordinating all building standards. Under State law, all building standards must be centralized in Title 24 or they are not enforceable.

The 2007 California Building Code includes necessary California amendments that include criteria for seismic design. A significant proportion of the text within the California Building Code has been tailored for California earthquake conditions. The California Building Code requires extensive geotechnical analysis and engineering for grading, foundations, retaining walls, and structures, with the nature and degree of analysis and engineering differentiated by a structure's occupancy and physical location as defined by its longitude and latitude.

2. Local Plans and Policies

The Seismic Phase 2 project involves DOE facilities at LBNL operated by the University of California. The project is therefore subject to only UC plans and policies. The 2006 LRDP is the applicable plan for the proposed project. Applicable principles and strategies in the 2006 LRDP and the UC Policy related to seismic safety are summarized below.

The University of California, under Article IX, Section 9 of the California Constitution, is exempt from local land use regulation, including general plans and zoning. UC nevertheless seeks to cooperate with local jurisdictions to reduce any physical consequences of potential land use conflicts to the extent feasible. Because the western part of the LBNL site is within the Berkeley city limit, and the eastern part is within the Oakland city limit, this section also summarizes policies contained in both the Berkeley and Oakland General Plans related to geology and soils.

a. University of California Seismic Safety Policy

On January 17, 1995, the University of California adopted and updated the Policy on Seismic Safety, which established University policy “to acquire, build, maintain, and rehabilitate buildings and other facilities which provide an acceptable level of earthquake safety.” The policy applies to the LBNL site. The level of safety is also defined in the following University policy:

- ◆ *New Buildings and Other Facilities.* The design of new buildings shall, at a minimum, comply with the current provisions of the California Building Code, or local seismic requirements, whichever are more stringent. Provisions shall also be made for adequate anchoring of nonstructural building elements. No new University structures may be constructed on the trace of a known active fault. All plans shall be reviewed by a consultant structural engineer who must, prior to release of funds, certify that the structure complies with the University Policy on Seismic Safety.

b. LBNL 2006 Long Range Development Plan

i. *Principles and Strategies*

Development strategies set forth in the LBNL 2006 LRDP applicable to geology and soils include the following:

- ◆ Minimize impervious surfaces to reduce storm water run-off and provide landscape elements and planting to stabilize slopes, reduce erosion, and sedimentation.

c. Design Guidelines

The LBNL Design Guidelines provide the following specific planning and design guidance relevant to geologic resources:

- ◆ Minimize impacts of disturbed slopes.
- ◆ Reduce the amount of impermeable surfaces at the Lab.

d. LBNL 2006 LRDP EIR Mitigation Measures

A series of mitigation measures is included within the LBNL 2006 LRDP EIR. Although this analysis does not tier from that EIR, several of the mitigation measures adopted as part of the 2006 LRDP apply to the proposed project and are included in the Seismic Phase 2 project description. The follow-

ing geology and soils mitigation measures apply to and are a part of the proposed project:

LRDP Mitigation Measure GEO-1: Seismic emergency response and evacuation plans shall be prepared for each new project at LBNL that is developed pursuant to the 2006 LRDP. These plans shall incorporate potential inaccessibility of the Blackberry Canyon entrance and identify alternative ingress and egress routes for emergency vehicles and facility employees in the event of roadway failure from surface fault rupture.

LRDP Mitigation Measure GEO-2: A site-specific, design-level geotechnical investigation shall occur during the design phase of each LBNL building project, and prior to approval of new building construction within the LBNL hill site. This investigation shall be conducted by a licensed geotechnical engineer and include a seismic evaluation of potential maximum ground motion at the site. Geotechnical investigations for sites within either a Seismic Hazard Zone for landslides or an area of historic landslide activity at LBNL, as depicted on EIR Figures IV.E-2 and IV.E-3, or newly recognized areas of slope instability at the inception of project planning, shall incorporate a landslide analysis in accordance with CGS Publication 117. Geotechnical recommendations shall subsequently be incorporated into building design.

Earthquakes and groundshaking in the Bay Area are unavoidable and may occur at some time during the period covered by the LRDP. Although some structural damage is typically not avoidable, building codes and local construction requirements have been established to protect against building collapse and to minimize injury during a seismic event. Considering that the future individual buildings would be constructed in conformance with the California Building Code, LBNL requirements, federal regulations and guidelines, and LRDP Mitigation Measure GEO-2, the risks of injury and structural damage from groundshaking and earthquake-induced landsliding would be reduced and the impacts, therefore, would be considered less than significant.

Furthermore, as described in the Project Description, some of the buildings constructed pursuant to the LRDP would be occupied by staff relocated from other, older LBNL facilities, some of which were constructed in accordance with less stringent building code requirements than those that would apply to future construction. As of 2003, 14 percent of LBNL buildings were over 60 years old. Many of these buildings were constructed as temporary structures that were never replaced. The LRDP specifically proposes the demolition of 30 outdated buildings that together include approximately 250,000 square feet. In this regard, implementation of the LRDP would result in a beneficial seismic safety impact.

LRDP Mitigation Measure GEO-3a: Construction under the LRDP shall be required to use construction best management practices and standards to control and reduce erosion. These measures could include, but are not limited to, restricting grading to the dry season, protecting all finished graded slopes from erosion using such techniques as erosion control matting and hydroseeding, or other suitable measures.

LRDP Mitigation Measure GEO-3b: Revegetation of areas disturbed by construction activities, including slope stabilization sites, using native shrubs, trees, and grasses, shall be included as part of all new projects.

e. Berkeley General Plan

Berkeley General Plan policies pertaining to geology and soils include the following:

◆ Policy S-14 Land Use Regulation

Require appropriate mitigation in new development, redevelopment/reuse, or other applications.

Actions:

- A. When appropriate, utilize the environmental review process to ensure avoidance of hazards and/or mitigation of hazard-induced risk.
- B. Require soil investigation and/or geotechnical reports in conjunction with development/redevelopment on sites within designated hazard

zones such as areas with high potential for soil erosion, landslide, fault rupture, liquefaction, and other soil-related constraints.

- C. Place structural design conditions on new development to ensure that recommendations of the geotechnical/soils investigation are implemented.
- D. Encourage owners to evaluate their buildings' vulnerability to earthquake hazards, fire, landslides, and floods, and to take appropriate action to minimize the risk.

◆ Policy S-15 Construction Standards

Maintain construction standards that minimize risks to human lives and property from environmental and human-caused hazards for both new and existing buildings.

Actions:

- A. Periodically update and adopt the California Building Standards Code with local amendments to incorporate the latest knowledge and design standards to protect people and property against known fire, flood, landslide, and seismic risks in both structural and non-structural building and site components.
- B. Ensure proper design and construction of hazard-resistant structures through careful plan review/approval and thorough and consistent construction inspection.

◆ Policy S-18 Public Information

Establish public information programs to inform the public about seismic hazards and the potential hazards from vulnerable buildings.

f. Oakland General Plan

The Open Space, Conservation and Recreation Element contains the following policies that pertain to geology and soils:

- ◆ Policy OS-1.3: Relate New Development to Slope. Limit intensive urban development to areas where the predominant slope is less than 15 percent. Design development on slopes between 15 and 30 percent to minimize alteration of natural landforms. Strongly discourage development

on slopes greater than 30 percent. To the extent permitted by law, when land is subdivided into two or more lots, retain areas with slopes over 30 percent as private, public, or common open space.

- ◆ Policy CO-2.1: Slide Hazards. Encourage development practices which minimize the risk of landsliding.
- ◆ Policy CO-2.2: Unstable Geologic Features. Retain geologic features known to be unstable, including serpentine rock, areas of known landsliding, and fault lines, as open space. Where feasible, allow such lands to be used for low-intensity recreational uses.
- ◆ Policy CO-2.4: Hillside Cuts and Fills. Minimize hillside cuts and fills and the removal of desirable vegetation. Limit large-scale grading to those areas where it is essential to development. Where hillside grading does occur, reshape the terrain in smooth, naturally appearing contours rather than flat, terraced benches. Immediately replant and reseed graded areas to reduce soil loss.

In addition, the 1974 Environmental Hazards Element of the General Plan contains the following policies related to geology and soils:

- ◆ Avoid construction on “known faults or land subject to landslides, erosion, or flooding” (Geologic Hazards Policy 1).
- ◆ Discourage development on slopes greater than 30 percent (Geologic Hazards Policy 3).
- ◆ Utilize lands subject to severe seismic and geologic hazards for low intensity park and recreational activities or open space” (Seismic Hazards Policy 2).
- ◆ Not locate public facilities for human occupancy in fault zone areas unless all other available sites are infeasible” (Seismic Hazards Policy 3).

B. Existing Setting

1. Geologic Setting

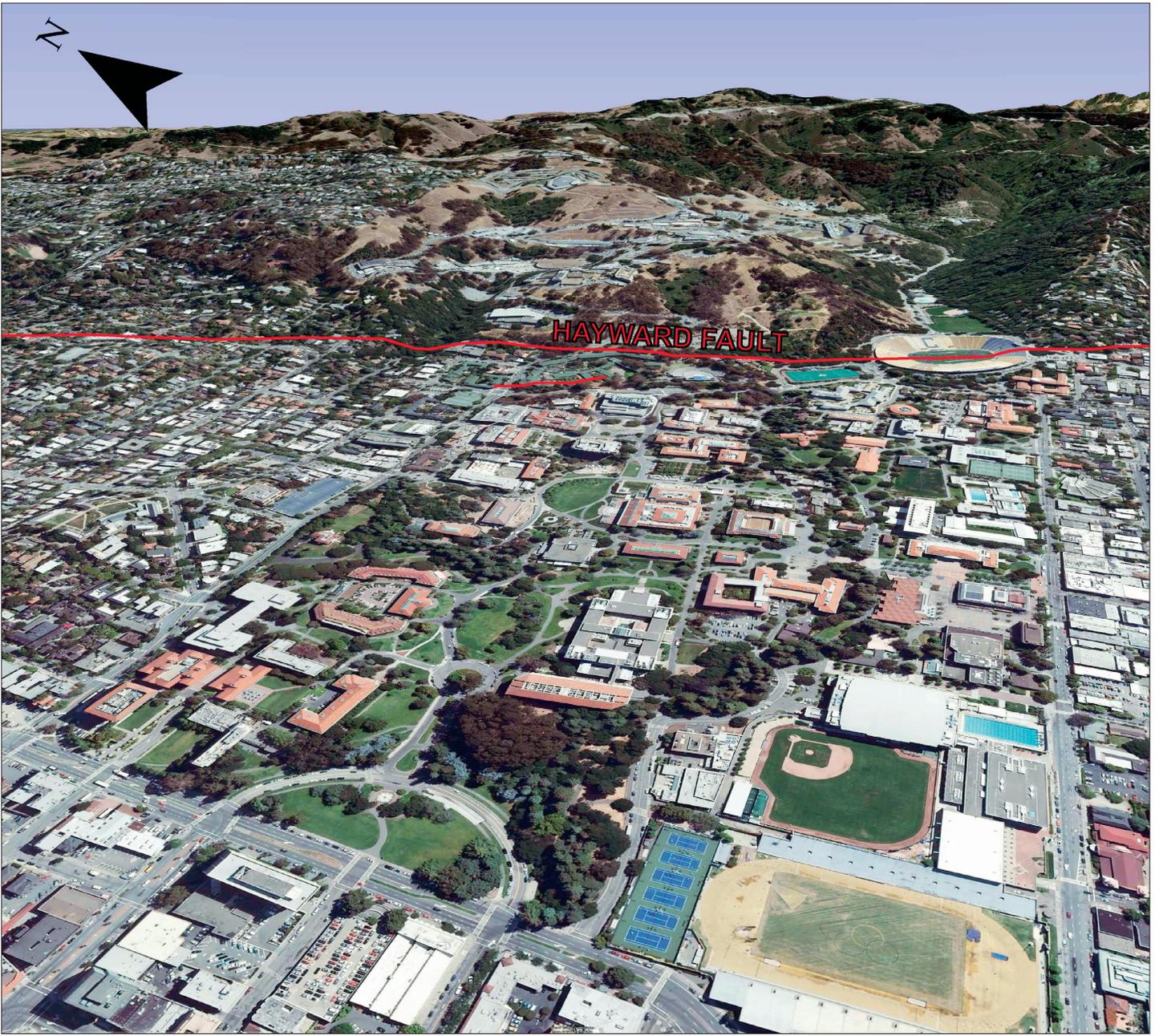
The LBNL site lies within the central area of the geologic region known as the Coast Ranges Geomorphic Province. The region is characterized by northwest-running mountains and ridges composed of sedimentary rock. The LBNL site is located on the west side of the northwest-trending Berkeley Hills, which has a complex bedrock geology and includes a variety of moderately to highly deformed (faulted and folded) sedimentary, volcanic, and metamorphic rock units dating from Late Jurassic to Cretaceous (135 to 150 million years old) to Tertiary (66.5 to 1.6 million years old). These rocks are overlain by unconsolidated to semi-consolidated Quaternary colluvium, debris-flow deposits, landslide deposits, and artificial fill.

2. Seismicity and Known Faults

The San Francisco Bay Area contains several active and potentially active faults. It is considered a region of high seismic activity. The Working Group on California Earthquake Probabilities has concluded that there is a 62 percent probability of at least one magnitude 6.7 or greater earthquake occurring in the Bay Area before 2032.

The northwest trending Hayward fault traverses the western edge of the LBNL site as shown in Figure 4.5-1. The San Andreas Fault Zone, the longest in the State, is located approximately 19 miles southwest of the site. Both faults have experienced movement in the last 150 years. At LBNL, groundshaking resulting from an earthquake generated by the Hayward fault is anticipated to be violent to very violent. In addition, strong ground shaking can be expected at the site as a result of moderate to major earthquakes generated on other faults in the region such as the Concord-Green Valley fault (14 miles northeast of the site), the Calaveras fault (18 miles southeast of the site), the Healdsburg-Rodgers Creek fault (23 miles north of the site), as well as the San Andreas fault.¹¹

¹¹ LBNL, 2006, *Long-Range Development Plan Draft Environmental Impact Report*, page IV.E-5.



Source: URS

FIGURE 4.5-1
LOCATION OF HAYWARD FAULT AND PROXIMITY TO LBNL

The western edge of LBNL is located within an Alquist-Priolo Earthquake Fault Zone (Alquist-Priolo zone) for the northern segment of the Hayward fault, as designated under the Alquist-Priolo Earthquake Fault Zoning Act. The eastern limit of the Alquist-Priolo zone passes through LBNL near the Blackberry Canyon entrance.

A linear feature, called the East Canyon Feature, runs through the Building 85 complex. This is shown on Figure 4.5-2 (taken from Lettis & Associates, 2008). The figure shows the linear feature overlain by two landslide deposits to the north.¹² Stratigraphic relationships shown in the figures from Alan Kropp & Associates, 2006a and 2006b showed the landslides clearly overlying an almost vertical East Canyon fault, north of Building 85.

Some authors have concluded that the East Canyon Feature is a fault, and probably a branch of the Wildcat fault that forms the western margin of the canyon and also runs through the Building 74 SE parking lot. The Wildcat Fault has not displayed evidence of fault activity during the Holocene (11,000 years to the present) and is not classified as active under the Alquist-Priolo Act. The oldest deposits that overlie Wildcat Fault and constrain its age in the Building 74 vicinity are Late Pleistocene.¹³ The landslides in the Building 85 area are thought to be of Quaternary age (which is younger than about 1.6 million years) but it is not known if they have moved as coherent units with the Holocene period (in the last 11,000 years). Alan Kropp & Associates (2006b) found no evidence that they have moved since the late 1880s.

The landslides now considered to underlie part of Building 85 and all of Building 85A were not known when Building 85 was built in 1996 and were not revealed by geotechnical surveys carried out in 1994 to determine the

¹² According to the figure, reproduced as Figure 4.5-2, the fault cross-cuts the older of the landslides to the east.

¹³ Lettis & Associates, November 19, 2008, *Surface-fault Rupture Hazard Investigation of the Wildcat Fault. Proposed General Purpose Lab.*

presence of active faults in the vicinity.¹⁴ Landslides were first suspected in the Building 85 area in 2004 when they were discovered at the adjacent Building 86 (Animal Care Facility) site, during pre-construction geotechnical surveys, including analysis of historical photographs taken prior to the development of LBNL.¹⁵ As their discovery had possible ramifications for Building 85, additional work was commissioned for the Building 85 area to investigate this in more detail.¹⁶ This involved additional trenching in August 2005 to establish the western margins of the landslides. Two reports (Alan Kropp & Associates 2006a and 2006b) showed two landslides of Holocene age directly underlying Building 85 (Figure 4.5-2).^{17,18} A follow-up report (Alan Kropp & Associates 2007) made recommendations to prevent the landslides from moving beneath Buildings 85 and 85A. These involved the installation of a system of drilled piers and tiebacks and have formed the basis of the design that would be carried out as part of the proposed project for seismic strengthening of the Building 85 complex.

3. Soils

The term “soil” refers to unconsolidated materials formed from bedrock or other parent material. The majority of soils on the LBNL site are characterized as Xerorthens-Millsholm complex, 30 to 50 percent slope. These are well-drained soils that are highly susceptible to erosion, although runoff is minimized on the LBNL site by heavy vegetation. The southern portion of

¹⁴ Geo/Resource Consultants, Inc., March 1994, *Fault Investigation, Building 85 Hazardous Waste Handling Facility*.

¹⁵ Alan Kropp and Associates, January 4, 2006, *Geotechnical Investigation Report, Animal Care Facility, Lawrence Berkeley National Laboratory, Berkeley, California*.

¹⁶ Alan Kropp and Associates, Inc., July 31, 2006, *Summary Report. Initial Landslide Study, Building 85, Lawrence Berkeley National Laboratory, Berkeley California*.

¹⁷ Alan Kropp and Associates, January 4, 2006, *Geotechnical Investigation Report, Animal Care Facility, Lawrence Berkeley National Laboratory, Berkeley, California*.

¹⁸ Alan Kropp and Associates, Inc., July 31, 2006, *Summary Report. Initial Landslide Study, Building 85, Lawrence Berkeley National Laboratory, Berkeley California*.

LBNL is underlain by Altamont Clay, 30 to 50 percent slope. This deep, well-drained soil has high erosion potential. The southwest corner of LBNL is underlain by Maymen Loam, 30 to 75 percent slope. This shallow, fine-grained soil is very susceptible to erosion. Finally, the eastern portion of the site is partially underlain by the shallow, erosive Maymen-Los Gatos complex, 30 to 75 percent slope. Maymen-Los Gatos complex is highly susceptible to erosion.

C. CEQA Significance Criteria

The impact of the proposed project related to geology and soils would be considered significant if it would exceed the following standards of significance, in accordance with Appendix G of the *CEQA Guidelines* and the UC CEQA Handbook:

1. a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death, involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault.
- b) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death, involving strong seismic ground shaking.
- c) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death, involving seismic-related ground failure, including liquefaction.
- d) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death, involving landslides.
2. Result in substantial soil erosion or the loss of topsoil.
3. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.

4. Be located on expansive soil, as defined in Table 18-1-B of the California Building Code (2001), creating substantial risks to life or property.
5. Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of wastewater.

D. Potential Project Impacts

This section discusses potential impacts to geology and soils resources resulting from proposed project construction and subsequent site operations.

SP2 Impact GEO-1a: The proposed project would not expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death due to rupture of a known earthquake fault. (*Less than Significant*)

The western edge of LBNL is located within an Alquist-Priolo Earthquake Fault Zone (Alquist-Priolo Zone) for the northern segment of the Hayward fault (Figure 4.5-1). The eastern limit of the Alquist-Priolo Zone passes through LBNL near the Blackberry Canyon entrance. The Building 25/25B and GPL site is located approximately 0.4 mile and Building 85 is 0.7 mile from the surface trace of the Hayward fault.

a. Building 25 Demolition and GPL Construction and Operation

Building 25 does not overlie any known faults. The risk from fault rupture at the GPL site would therefore be *less than significant*.

b. Buildings 55 and 71 Trailer Demolition

Building 71 trailers and Building 55 are to be demolished and thus would not expose people or structures to potential adverse impacts from fault rupture. There would be *no impact* from this component of the work.

c. Building 85/85A Seismic Strengthening

A linear feature that has sometimes been referred to as the East Canyon fault runs a few feet to the west of Building 85, through the yard between Building 85 and some chemical tanks, through the corner of Building 85A and through the retaining wall. This feature is discontinuous because it is largely overlain by recent landslides.¹⁹ The geology of the area is shown on Figure 4.5-2. The feature is likely to be a fault – although it is conceivable that it is an original depositional surface. If a fault, it is probably connected to the Wildcat fault that also runs under Building 74. However, the Wildcat fault is recognized as being inactive in the Building 74 area.²⁰ Furthermore, there is no evidence of recent movement along this discontinuity in the Building 85 area.²¹

The proposed project does not involve the construction of new buildings in the area of Building 85/85A. The proposed project is designed specifically to mitigate the possible movement of the landslides that underlie the buildings. Therefore the proposed project would facilitate the continued use of Building 85/85A as the LBNL site's hazardous waste handling facility. However, the proposed project would not expose the existing facility to a hazard related to fault rupture as there is no evidence of recent movement along the discontinuity in the Building 85 area. As a result, a *less-than-significant* impact due to surface fault rupture would occur from the proposed project.

SP2 Impact GEO-1b: The proposed project would not expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking. (*Less than Significant*)

¹⁹ Lettis & Associates, November 19, 2008, *Surface Fault Rupture Hazard Investigation of the Wildcat Fault. Proposed General Purpose Lab.*

²⁰ Lettis & Associates, November 19, 2008, *Surface Fault Rupture Hazard Investigation of the Wildcat Fault. Proposed General Purpose Lab.*

²¹ Geo/Resource Consultants, March 1994, *Fault Investigation, Building 85 Hazardous Waste Handling Facility.*

The proposed project site is located in a region that is prone to seismic events. The Hayward fault borders the western edge of the LBNL site and moderate to major earthquakes generated on this fault could be expected to cause violent to very violent ground shaking at the site. Several other major faults in the area could cause strong ground shaking. The intensity of shaking at the proposed project site would depend on the distance between the site and the earthquake epicenter, the magnitude of the earthquake, and the response of the underlying soil and bedrock. It is reasonable to assume that throughout the lifetime of the buildings, Building 85/85A and the GPL would be subjected to at least one moderate to severe earthquake that could produce potentially damaging ground shaking at the site.

Likely maximum ground accelerations during an earthquake have been quantified for most of types of subsurface at LBNL. For the UC Berkeley campus and LBNL, this information has been combined with the probability of earthquakes of a certain magnitude occurring within a certain number of years to make a set of probabilistic seismic hazard analyses.²² These calculations are used to ensure that new buildings are designed, and existing ones strengthened, to resist likely earthquakes.

LRDP Mitigation Measure GEO-2 stipulates that a geotechnical investigation shall be carried out for all new building construction, including a seismic evaluation of potential maximum ground motion at the site. In January 2010 additional supplemental geotechnical reports for the Building 25/25B and Building 85 area were in draft form and in the process of being finalized. The calculations of maximum ground motion have been an integral part of the GPL design and Building 85 seismic strengthening work.

In accordance with Section 1.3 (A) (Codes) of the LBNL Facilities Master Specifications, General Requirements, and with implementation of LRDP Mitigation Measure GEO-2, improvements to Building 85/85A and construc-

²² URS Corporation, March 9, 2009, *Updated Probabilistic Seismic Hazard Evaluation and Development of Seismic Design Ground Motions for the University of California, Berkeley and Lawrence Berkeley National Laboratory*.

tion of the GPL would comply with the provisions of the most current version of the CBC. The CBC requires varying levels of geotechnical analysis and engineering provisions for grading, foundations, retaining walls, according to different seismic zones. Berkeley, CA is subject to the most stringent seismic design requirements.²³

Compliance with the 2007 CBC geotechnical parameters would ensure that potential impacts caused by strong seismic ground shaking during construction or operation are *less than significant*.

SP2 Impact GEO-1c: The proposed project would not expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction. (*Less than Significant*)

According to the California Geologic Survey (CGS), no areas within the LBNL main hill site have been identified as a Seismic Hazard Zone for liquefaction. Localized liquefaction hazards may be present at LBNL in areas underlain by shallow groundwater and poorly engineered fill or alluvial materials. However, the thin soil profile on hillside areas and the existence of bedrock very close to the ground surface minimize potential liquefaction hazards at the site.²⁴

Consequently, the project would not expose people or structures to potential adverse effects from seismic-related ground failure during construction and operation and the impact would be *less than significant*.

SP2 Impact GEO-1d: The proposed project would not expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving landslides. (*Less than Significant*)

²³ LBNL, 2006, *Long-Range Development Plan Draft Environmental Impact Report*, page IV.E-16.

²⁴ LBNL 2006 LRDP EIR, Geology and Soils Chapter, page IV.E-14.

LBNL has undertaken studies to map unstable slopes within the site that are prone to sliding. Landslide hazard areas within the LBNL boundary have been assigned a high, medium, and low risk. In addition, LBNL has mapped areas where hillsides and historic landslides were repaired and stabilized. Most of the mapped landslides or potential landslides at LBNL are located within earthquake-induced landslide hazard zones.²⁵

a. Building 25 Demolition and GPL Construction and Operation

Building 25 is considered by several consultants to have been built on a paleo-landslide²⁶ that separates a block of the Moraga Formation from the underlying Orinda Formation; other consultants have concluded that the contact between these two geologic units is depositional. The most recent and most detailed study of this issue by Lettis and Associates (2009) included new trenching.²⁷ Lettis and Associates (2009) concluded that the evidence was equivocal as to whether a paleo-landslide existed beneath Building 25 or not. However, if the landslide does exist, it is geologically stable and has not moved in thousands of years. Lettis & Associates concluded that the site was suitable for redevelopment and recommended the following should take place:

- ◆ Prior to the final design of new major structures, additional site-specific geotechnical and/or geologic investigations should be performed to assess the soil and bedrock conditions, minor slope instabilities, site grading and loading, strong ground shaking and surface fault rupture potential and recommendations presented in those reports should be followed.
- ◆ As the trenches were not backfilled to engineering design specifications, any proposed buildings or structures that intersect the trenches should include removal and re-compaction of the trench backfill.

²⁵ LBNL 2006 LRDP EIR, Geology and Soils Chapter, page IV.E-7.

²⁶ Parsons, September 2000, *RCRA Facility Investigation Report*.

²⁷ Lettis and Associates, August 2009, *Palaeo-landslide Investigation Building 25, Lawrence Berkeley National Laboratory, Berkeley, California*.

Preparation of a site-specific geotechnical report is part of this project as required by LRDP Mitigation Measure GEO-2. It would be standard engineering practice to remove and re-compact any encountered trench backfill. These recommendations are therefore part of the project description.

Therefore based on the consultants' recommendation that the site is suitable for redevelopment because any landslide, if it existed, has not moved in recent times, there would be a *less-than-significant* impact from landslides due to seismic activity from the construction of the GPL at the Building 25 site.

b. Building 55 and Building 71 Trailer Demolition

Buildings 55 and Building 71 trailers would be demolished and would not be susceptible to landslides and therefore do not require further analysis. There would be *no impact* from this component of the work.

c. Building 85/85A Seismic Strengthening

Building 85/85A is now known to be located on two landslides.^{28,29} The landslides are considered stable except possibly in response to an earthquake, when they could be mobilized.³⁰ The proposed project addresses the seismic strengthening of the existing building which is designed to mitigate the risk to the building of mobilization of the landslides in an earthquake. As explained in the project description, a system of sub-grade tie-backs and piers would be installed below Building 85/85A to anchor the building and slide into bedrock and to provide enhanced stability during a seismic event. Additional

²⁸ Alan Kropp and Associates, Inc., July 31, 2006, *Summary Report, Initial Landslide Study, Building 85, Lawrence Berkeley National Laboratory, Berkeley California.*

²⁹ Alan Kropp and Associates, Inc., July 31, 2006, *Summary Report, Initial Landslide Study, Building 85, Lawrence Berkeley National Laboratory, Berkeley California.*

³⁰ RMW Architecture & Interiors, July 2008, *100% Conceptual Design Report, Seismic Life-Safety, Modernization, and Replacement of General Purpose Buildings, Phase 2.*

work would be carried out inside the building to provide enhanced support for the structure.

Seismic strengthening of Building 85/85A would be carried out to resist the ground accelerations that could be expected in an earthquake of a magnitude such as could be expected to be encountered every 475 years. The calculations of accelerations and their probabilities are those now used for all UC Berkeley and LBNL buildings.³¹

Design of the underground system and the internal building strengthening is subject to peer review by consultants appointed by LBNL. The seismic safety rating of Building 85/85A would be “good” after completion of the improvements. There would therefore be a *beneficial* impact from this component of the proposed project.

Overall, there would be a *less-than-significant* impact related to seismically-triggered landslides.

SP2 Impact GEO-2: The proposed project would not result in substantial soil erosion or the loss of topsoil. (*Less than Significant*)

During construction activities it is possible that soil erosion or the loss of topsoil could occur, particularly during demolition and pre-construction site preparation (i.e., grading). The LBNL 2006 LRDP EIR discusses LBNL standard practice for preventing soil erosion or loss of top soil as a result of construction activities. All activity would follow the Association of Bay Area Governments’ 1995 *Manual of Standards for Erosion and Sediment Control Measures* and the 2003 California Stormwater Quality Association Stormwater Best Management Practice Handbook for Construction. In addition, as a standard part of contract specifications, disturbed areas would be landscaped and re-seeded at the earliest practical time during construction so that ground

³¹ URS Corporation, March 9, 2009, *Updated Probabilistic Seismic Hazard Evaluation and Development of Seismic Design Ground Motions for the University of California, Berkeley and Lawrence Berkeley National Laboratory*.

cover would be well-established by the next rainy season as required under LRDP Mitigation Measures GEO-3a and GEO-3b.

As explained in Section 4.7 Hydrology and Water Quality, measures to prevent erosion would also be addressed in a project-specific Storm Water Pollution Prevention Plan (SWPPP), in compliance with NPDES Industrial and Construction General Permits. The SWPPP, which would be required as part of project approval, would identify a series of Best Management Practices (BMPs) that would serve to mitigate the potentially significant impacts associated with erosion, such as sedimentation of receiving water bodies. BMPs could include, but may not be limited to, spraying water and placing berms on disturbed areas and covering soil stock piles of loose soil with tarps. If construction activity were to occur prior to July 2010, the existing Construction General Permit (SWRCB Water Quality Order 99-08-DWQ) would apply. If construction activity were to occur after July 1, 2010, a new Construction General Permit (Order No. 2009-0009-DWQ, NPDES No. CAR000002) would be in effect. The new Construction General Permit includes numerous requirements not included in the previous Construction General Permit, including a Rain Event Action Plan, more minimum BMPs, and requirements for the SWPPP that were previously only suggested by guidance. It is also an LBNL standard construction and design requirement that the post-project flow approximates the pre-project flow.³² As a consequence of these measures, which are part of the project description, there would be a *less-than-significant* impact from erosion and loss of top soil.

SP2 Impact GEO-3: The proposed project components would not be located on geologic units or soils that are unstable, or that would become unstable as a result of the proposed project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse. (*Less than Significant*)

³² LBNL, 2006, *Long-Range Development Plan Final Environmental Impact Report*, Appendix A, Revised EIR Hydrology and Water Quality Section (IV.G).

The geological stability of the new GPL site at Building 25 was discussed under SP2 Impact GEO-1d, above, where it was concluded that the site did not present significant risks to redevelopment due to the underlying geological structure.

The component of the project that relates to Building 85/85A is limited to seismic strengthening of an already existing building. The proposed project would decrease any existing risk of instability due to mobilization of underlying landslide deposits as a result of earthquakes. This is described under SP2 Impact GEO-1c, above. There would therefore be a *less-than-significant* impact due to construction on unstable geological units.

SP2 Impact GEO-4: The proposed project components would not be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property. (*Less than Significant*)

The Altamont clay in the soils that underlie many areas in the southern portion of the LBNL site, including Building 85/85A, is expansive and subject to shrink-swell potential, depending on variations in moisture levels.³³ However, if expansive soils are present in the Building 85/85A area, the original below-grade, building foundation type (i.e., drilled piers) reduces risks associated with expansive soils. The proposed upgrades include a below-grade system of pier foundations and tiebacks to stabilize Building 85/85A, which has no impact on risks associated with expansive soils. The proposed upgrades also include out-of-plane bracing for third floor girders which also has no impact on risks associated with expansive soils. The Building 85/85A original construction mitigated risks associated with unstable soils to a *less-than-significant* level.

According to the LBNL 2006 LRDP EIR, soil in all areas but the southern part of the LBNL site does not contain a high enough clay content for it to be

³³ LBNL, 2007, *Long-Range Development Plan Environmental Impact Report*, page IV.E-10.

expansive. Therefore the GPL would not be constructed in an area of expansive soils. Overall, there would be a *less-than-significant* impact.

SP2 Impact GEO-5: The proposed project would not have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of wastewater. (*Less than Significant*)

The proposed project does not include installation of temporary or permanent septic tank systems or alternative waste disposal systems, and as such there would be *no impact* from the proposed project.

E. Cumulative Impacts

SP2 Cumulative Impact GEO-1: The proposed project in conjunction with other past, present, and reasonably foreseeable projects would not cause impacts associated with geology and soils. (*Less than Significant*)

The proposed project, in combination with the other cumulative projects listed in Section 4.0, would potentially expose a greater number of people to risk associated with regional seismic events due to the growth in population of the LBNL site. However, adherence to State requirements such as the California Building Code would ensure seismic safety to the maximum extent feasible and reduce potential cumulative impacts related to seismic safety to a *less-than-significant* level.

Standard practices that apply to all LBNL projects would reduce soil erosion and top soil loss from construction and operation to a less-than-significant level. As a result, the cumulative impacts related to soil erosion would be *less-than-significant*.

4.6 GREENHOUSE GAS EMISSIONS

This section examines the potential climate change impacts from greenhouse gas emissions associated with the LBNL Seismic Phase 2 Project. In this section, “emissions” refers to annual emissions in metric tons of carbon dioxide-equivalent units.

A. *Environmental Setting*

This section provides general background information on greenhouse gases (GHGs) and the environmental impacts of climate change.

1. Greenhouse Gases

GHGs are gases emitted by human activities that trap heat in the atmosphere and regulate the earth’s temperature. This phenomenon, known as the Greenhouse Effect, is responsible for maintaining a habitable climate. While the emission of GHGs in general, and CO₂ in particular, into the atmosphere is not of itself an adverse environmental effect, the increased concentrations of GHGs in the atmosphere and the associated changes in global climate, represent adverse environmental effects.

The most common GHGs are carbon dioxide and water vapor, but the gases that are widely seen as the principal contributors to human-induced global climate change are: carbon dioxide (CO₂), nitrous oxide (N₂O), methane (CH₄), chlorofluorocarbons (CFCs), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulfur hexafluoride (SF₆).¹ GHGs are released into the earth’s atmosphere through a variety of human activities:

- ◆ Carbon dioxide and nitrous oxide are byproducts of fossil fuel combustion.

¹ In October 2009, the Governor signed Senate Bill 104, which added a seventh gas, nitrogen trifluoride, to the list of greenhouse gases to be regulated under AB 32. Nitrogen trifluoride is primarily used in the manufacture of several consumer items, including photovoltaic solar panels, microprocessors, and LCD television screens.

- ◆ Nitrous oxide is also associated with agricultural operations such as fertilization of crops.
- ◆ Methane is commonly created by off-gassing from agricultural practices (e.g. keeping livestock) and landfill operations.
- ◆ Chlorofluorocarbons were widely used as refrigerants, propellants and cleaning solvents until banned by international treaty.
- ◆ Hydrofluorocarbons are now used as a substitute for chlorofluorocarbons in refrigeration and cooling.
- ◆ Perfluorocarbons and sulfur hexafluoride emissions are common by-products of industries such as aluminum production and semi-conductor manufacturing.

Each GHG has its own potency and effect on the earth's energy balance. This is expressed in terms of a global warming potential (GWP), with carbon dioxide being assigned a value of 1 and sulfur hexafluoride being many orders of magnitude stronger with a GWP of 23,900. In GHG emission inventories, the weight of each gas is multiplied by its GWP and is measured in units of carbon dioxide equivalents (CO₂e).

2. Environmental Effects of Greenhouse Gases and Climate Change

According to recent projections from the California Climate Change Center, temperatures in California are expected to rise between 3.0°F and 10.5°F by the end of the century.² This warming trend will likely have an adverse effect on naturally-occurring resources within California. Increased precipitation and sea level rise could increase coastal flooding, saltwater intrusion (a particular concern in the low-lying Sacramento–San Joaquin Delta, where potable water delivery pumps could be threatened), and degradation of wetlands. Mass migration and loss of plant and animal species could also occur. Potential effects of global climate change that could adversely affect human health include more extreme heat waves and heat-related stress; an increase in cli-

² California Climate Change Center, 2006, *Our Changing Climate, Assessing the Risks to California*, page 3.

mate-sensitive diseases; more frequent and intense natural disasters such as flooding, hurricanes and drought; and increased levels of air pollution.

To date, the primary impact of global climate change has been a rise in the average global tropospheric temperature of 0.2°C per decade, determined from meteorological measurements worldwide between 1990 and 2005.³ Climate change modeling using 2000 emission rates shows that further warming could occur, which would cause additional changes in the global climate system during the 21st century.

Potential long-term impacts to the environment of California that could result from continued global warming include, but are not limited to:

- ◆ Increasing temperatures by the end of the century by as much as 8 to 10.4 degrees Fahrenheit (°F) under the higher emission scenarios, resulting in a 25 to 35 percent increase in the number of days ozone pollution standards are exceeded in most urban areas;
- ◆ Increased electricity demand, particularly in the hot summer months;
- ◆ Decline of the Sierra snowpack, which accounts for a significant amount of the stored surface water in California, by 70 percent to 90 percent over the next 100 years;⁴
- ◆ Decline in spring stream flow by as much as 30 percent, causing severe water shortages;
- ◆ The loss of sea ice and mountain snow pack, resulting in higher sea levels and higher sea surface evaporation rates with a corresponding increase in tropospheric water vapor due to the atmosphere's ability to hold more water vapor at higher temperatures;

³ The troposphere is the zone of the atmosphere characterized by water vapor, weather, winds, and decreasing temperature with increasing altitude.

⁴ California Climate Change Center, 2006, *Our Changing Climate, Assessing the Risks to California*, page 6.

- ◆ Rise in global average sea level primarily due to thermal expansion and melting of glaciers and ice caps in the Greenland and Antarctic ice sheets;
- ◆ Changes in weather, such as widespread changes in precipitation, ocean salinity and wind patterns, and increased incidence of extreme weather, including droughts, heavy precipitation, heat waves, extreme cold and the intensity of tropical cyclones;
- ◆ Impacts to agricultural production due to increased temperatures, reduced water supply and increased threats from pests and pathogens;⁵
- ◆ High potential for erosion of California's coastlines and seawater intrusion into the Delta and levee systems; and
- ◆ Increased wildfire risk resulting from dry vegetation and extended droughts.

B. Regulatory Setting

This section summarizes key federal, State, regional and local statutes, and regulations and policies pertaining to climate change. Global climate change resulting from GHG emissions is an emerging environmental concern discussed at the international, national and statewide levels. At each level, agencies are considering strategies to control emissions of gases that contribute to global warming.

1. Federal Laws and Regulations

On September 22, 2009, the United States Environmental Protection Agency (U.S. EPA) signed a final rule requiring reporting of greenhouse gas emissions from named categories of stationary sources. No federal rules requiring reductions of GHGs have been promulgated yet.

⁵ California Climate Change Center, 2006, *Our Changing Climate, Assessing the Risks to California*, page 9.

However, President Obama announced on May 20, 2009 that he intends to adopt new fuel economy standards to increase fuel economy and reduce GHGs. The new standards are expected to reduce GHG emissions by approximately 900 million tons over the life of the program. On September 15, 2009, the White House unveiled a specific suite of fuel economy standards intended to go into effect once the U.S. EPA finalized its endangerment finding for GHG emissions.

On December 7, 2009, U.S. EPA Administrator Lisa Jackson signed a finding that GHGs in the atmosphere endanger public health and welfare. This sets the stage for implementation of the vehicle fuel economy standards, as well as granting the U.S. EPA the authority to implement other GHG regulatory programs for a variety of emission sources (e.g., cap and trade programs, new source review programs, etc.).

In addition, the United States participates in the United Nations Framework Convention on Climate Change (UNFCCC). While the United States signed the Kyoto Protocol, which would have required reductions in GHGs, Congress never ratified the protocol. The federal government chose voluntary and incentive-based programs to reduce emissions and has established programs to promote climate technology and science. For example, in 2002, the United States announced a strategy to reduce the GHG intensity of the American economy by 18 percent over a 10-year period from 2002 to 2012.

2. State Laws and Regulations

Through several laws and regulations, the State of California has indicated that it is concerned about GHG emissions and their effect on global climate. The State recognizes that “there appears to be a close relationship between the concentration of GHGs in the atmosphere and global temperatures” and that “the evidence for climate change is overwhelming.”

a. State of California Executive Order S-3-05 (2005)

In June 2005, Governor Arnold Schwarzenegger signed Executive Order S-3-05, which established the following aggressive emissions reduction goals: by

2010, GHG emissions must be reduced to 2000 levels; by 2020, GHG emissions must be reduced to 1990 levels; and by 2050, GHG emissions must be reduced to 80 percent below 1990 levels. The Executive Order identified the California Environmental Protection Agency (Cal/EPA) as the lead coordinating State agency for establishing climate change emission reduction targets in California. A “Climate Action Team,” a multi-agency group of State agencies, was set up to implement Executive Order S-3-05. GHG emission reduction strategies and measures to reduce global warming were identified by the California Climate Action Team in 2006.

b. Assembly Bill 32, California Global Warming Solutions Act (2006)

In 2006, Governor Arnold Schwarzenegger signed Assembly Bill (AB) 32, the Global Warming Solutions Act, into legislation. The Act requires that California cap its GHG emissions at 1990 levels by 2020. This legislation requires the California Air Resources Board (CARB) to establish a program for statewide GHG emissions reporting and monitoring/enforcement of that program. CARB is also required to adopt rules and regulations to achieve the maximum technologically feasible and cost-effective GHG emission reductions.

Many of the measures to reduce GHG emissions from transportation will come from CARB. AB 1493, the Pavley Bill, directed CARB to adopt regulations to reduce emissions from new passenger vehicles. CARB’s AB 32 Early Action Plan, released in 2007, included a strengthening of the Pavley regulation for 2017 and included a commitment to develop a low carbon fuel standard (LCFS). Current projections indicate that with implementation of a strengthened Pavley regulation, including LCFS, California will still fall short of the 1990 level targets for transportation emission reductions. On April 23, 2009, CARB adopted a new regulation to implement the Governor’s LCFS. The regulation calls for GHG emissions from California’s transportation fuels to be reduced by 10 percent by 2020.

CARB is also targeting other sources of emissions. The main measures to reduce GHG emissions are contained in the AB 32 Scoping Plan (Plan),

which CARB approved on December 11, 2008. This plan includes a range of GHG reduction actions. Central to the Plan is a cap and trade program covering 85 percent of the State's emissions. This program will be developed in conjunction with the Western Climate Initiative, comprised of seven states and three Canadian provinces, to create a regional carbon market. The Plan also proposes that utilities produce a third of the State's energy from renewable sources such as wind, solar and geothermal, and proposes to expand and strengthen existing energy efficiency programs and building and appliance standards. The Plan also includes full implementation of the Pavley standards to provide a wide range of less polluting and more efficient cars and trucks to consumers, who will save on fuel costs. CARB is working to implement the Scoping Plan, and has already adopted a number of actions and measures required by the Plan. The majority of this implementation phase must be completed by the end of 2010.

c. Senate Bill 97, Modification to the Public Resources Code (2007)

Pursuant to Senate Bill (SB) 97, the Governor's Office of Planning and Research (OPR) is in the process of developing CEQA Guidelines addressing GHGs. OPR is required to "prepare, develop, and transmit" the guidelines to the Resources Agency on or before July 1, 2009. In June 2008, OPR first released a Technical Advisory on CEQA Amendments, *CEQA and Climate Change: Addressing Climate Change through California Environmental Quality Act (CEQA) Review*. OPR released a draft of the proposed CEQA Guidelines Amendments on January 8, 2009, and transmitted the finalized CEQA Amendments to the Resources Agency on April 13, 2009 for rulemaking and adoption by January 1, 2010. The final amendments were adopted by the Natural Resources Agency on December 30, 2009, and have been transmitted to the Office of Administrative Law for inclusion in the California Code of Regulations. OPR's CEQA Amendments Section 15064.4 provides that lead agencies should "make a good faith effort, based on available information to describe, calculate, or estimate" GHG emissions and notes that an agency may identify emissions either by selecting a "model or methodology" to quantify the emissions or relying on "qualitative or other performance based standards."

d. Senate Bill 375, California's Regional Transportation and Land Use Planning Efforts (2008)

Recently, California enacted legislation (SB 375) to expand the efforts of AB 32 by controlling indirect GHG emissions caused by urban sprawl. SB 375 develops emissions-reduction goals applicable to regional planning activities. SB 375 provides incentives for local governments and developers to implement new, conscientiously-planned growth patterns. This includes incentives for creating attractive, walkable and sustainable communities and revitalizing existing communities. The legislation also allows developers to bypass certain environmental reviews under CEQA if they build projects consistent with the new sustainable community strategies. Development of more alternative transportation options that would reduce vehicle trips and miles traveled, along with traffic congestion, would be encouraged. SB 375 enhances CARB's ability to reach the AB 32 goals by directing the agency to develop regional GHG emission reduction targets for 2020 and 2035 to be met by the transportation sector. SB 375 directs CARB to work with metropolitan planning organizations (e.g. ABAG and MTC) to align their regional transportation, housing, and land use plans to reduce vehicle miles traveled and demonstrate the region's ability to attain its GHG reduction targets.

Per SB 375, the Board appointed a Regional Targets Advisory Committee (RTAC) on January 23, 2009 to provide recommendations on factors to be considered and methodologies to be used in CARB's target setting process by September 30, 2009. The RTAC submitted its recommendations to CARB in a final report on September 29, 2009. CARB must now propose draft targets by June 30, 2010, and adopt final targets by September 30, 2010.

3. Regional and City Regulations

a. Bay Area Air Quality Management District

In 2005, the Bay Area Air Quality Management District (BAAQMD) initiated a Climate Protection Program that integrates climate protection activities into existing District programs and functions. Current BAAQMD climate action activities include grant programs, commenting on CEQA documents, regulations, inventory development, and outreach. BAAQMD

awarded a total of \$3 million to 53 local agencies to prepare climate protection programs aimed at reducing GHG emissions in the Bay Area. In addition, the District has prepared elementary school teaching curricula.

The BAAQMD proposed a regional GHG emission inventory in 2002 and updated it in 2007. The inventory provides an overview of GHG emission sources in the Bay Area, including a breakdown by county and emission sector. The inventory allows District staff and others to identify emission sectors where potential GHG and criteria pollutant emission reductions can be achieved.

In 2008, the BAAQMD adopted a fee program that applies to permitted stationary sources. These fees are used to fund the District's climate protection programs, while providing an incentive for sources to reduce their emissions.

BAAQMD is in the process of devising numerical thresholds for GHG emissions against which a project's emissions can be evaluated for CEQA analysis. The District's goal is to ensure that new development contributes feasible reductions to meet the goals of new and changing legislation and regulations. The Air District Board of Directors (Board) held public hearings on November 18 and December 2, 2009, to receive comments on staff's Proposed Thresholds of Significance. On January 6, 2010, the BAAQMD Board voted to defer further consideration of the proposed thresholds until April to allow for further consultation with various stakeholders.

The proposed thresholds include numerical thresholds for operational-related impacts at the project and plan level (summarized later in this section). BAAQMD does not recommend numerical thresholds for construction-related GHG emissions.

b. Alameda County

In June 2007, the Alameda County Board of Supervisors unanimously approved Resolution-2006-204, which established the County Climate Change Leadership Strategy to achieve the GHG reduction targets set forth in State of

California Executive Order S-3-05. In line with Executive Order S-3-05, the County aims to reduce emissions to 1990 levels by 2020 and to 80 percent below 1990 levels by 2050.

To achieve these emissions reduction targets, the County is currently preparing a Climate Action Plan (CAP) according to the five-step model developed by the nonprofit organization ICLEI-Local Governments for Sustainability. This model includes the following steps:

- ◆ Conduct a greenhouse gas emissions analysis
- ◆ Establish an emissions reduction target
- ◆ Develop a local action plan to reduce emissions
- ◆ Implement the local action plan
- ◆ Monitor progress and report on results

The County has conducted an emissions inventory for its government operations and unincorporated areas, and will reevaluate its GHG emissions in 2010 to monitor its progress toward the reduction targets set forth in Resolution 2006-204.

4. Local Plans and Policies

The Seismic Phase 2 project involves DOE facilities at LBNL operated by the University of California. The plans and policies that are applicable to the proposed project are plans developed by the University for the LBNL site and UC policies that apply to all UC facilities.

The University of California, under Article IX, Section 9 of the California Constitution, is exempt from local land use regulation, including general plans and zoning. UC nevertheless seeks to cooperate with local jurisdictions to reduce any physical consequences of potential land use conflicts to the extent feasible. Because the western part of the LBNL site is within the Berkeley city limits, and the eastern part is within the Oakland city limits, this section also summarizes programs and policies, adopted by the cities of Berkeley and Oakland to address climate change..

a. UC Policy on Sustainable Practices

The proposed project would implement GHG emission reduction strategies through compliance with the UC Policy on Sustainable Practices, one of the most comprehensive and far-reaching institutional sustainability commitments in the nation. Emission reduction strategies instituted under this policy include practices related to green building design, clean energy, climate protection, transportation, operations, recycling and waste management, and environmentally preferable procurement. UC LBNL is planning to prepare a CAP in the coming months.

b. LBNL 2006 Long Range Development Plan

i. Principles and Strategies

The LBNL 2006 LRDP proposes four fundamental principles that form the basis for the development strategies provided for each element of the LRDP. The two principles most applicable to energy use in new development are to “Preserve and enhance the environmental qualities of the site as a model of resource conservation and environmental stewardship” and to “Build a safe, efficient, cost-effective scientific infrastructure capable of long-term support of evolving scientific missions.”

Development strategies provided by the LBNL 2006 LRDP are intended to minimize potential environmental impacts that could result from implementation of the LBNL 2006 LRDP. Development strategies set forth in the LBNL 2006 LRDP that are applicable to global warming include the following:

- ◆ Site and design new facilities in accordance with University of California Presidential Policy for Green Building Design to reduce energy, water, and material consumption and provide improved occupant health, comfort, and productivity.
- ◆ Exhibit the best practices of modern sustainable development in new projects as a way to foster a greater appreciation of sustainable practices at the Laboratory.
- ◆ Design infrastructure improvements to embody sustainable practices.

The LBNL 2006 LRDP also contains numerous provisions that will substantially lessen the contribution of the LBNL site to global climate change. New buildings at LBNL will outperform the required provisions of the California Energy Code by at least 20 percent, which will help to reduce both energy demand and contribution to regional GHG emissions. UC LBNL will also strive to procure at least 20 percent of its electricity needs from renewable resources by 2017. To address vehicle-related emissions, UC LBNL encourages the use of transit and alternative transportation modes through programs such as the LBNL Transportation Demand Management (TDM) Program.

c. LBNL 2006 LRDP EIR Mitigation Measures

A series of mitigation measures is included within the LBNL 2006 LRDP EIR. Although this analysis does not tier from that EIR, several of the mitigation measures adopted as part of the 2006 LRDP apply to the proposed project and are included in the Seismic Phase 2 project description. The following GHG mitigation measures apply to and are a part of the proposed project. These measures include LRDP Mitigation Measure TRANS-1d to develop and implement a TDM Program to reduce daily vehicle trips to the LBNL site.

d. City of Berkeley Climate Action Plan

The Plan identifies four categories, or target sectors, of City activity for emission reduction actions: (1) Sustainable Transportation & Land Use, (2) Building Energy Use, (3) Waste Reduction & Recycling, and (4) Community Outreach & Empowerment. For each category, detailed strategies for emissions reductions are included. In addition, the Plan discusses implementation strategies at the local government level, as well as for individual residents.

e. City of Berkeley General Plan

The Berkeley General Plan policies pertaining to global warming include the following, from the Environmental Management Element:

- ◆ Objective 3. Reduce emissions and improve air quality.

- ◆ Policy EM-18: Regional Air Quality Action. Continue working with the Bay Area Air Quality Management District and other regional agencies to:
 1. Improve air quality through pollution prevention methods.
 2. Ensure enforcement of air emission standards.
 3. Reduce local and regional traffic (the single largest source of air pollution in the city) and promote public transit.
 4. Promote regional air pollution prevention plans for business and industry.
 5. Locate parking appropriately and provide adequate signage to reduce unnecessary “circling” and searching for parking.
- ◆ Policy EM-19: 15% Emission Reduction: Global Warming Plan. Make efforts to reduce local emissions by 15% by the year 2010.

f. City of Oakland General Plan

Oakland General Plan policies pertaining to global warming include the following, from the Open Space, Conservation and Recreation (OSCAR) Element of the Plan:

- ◆ Policy CO-12.1. Promote land use patterns and densities which help improve regional air quality conditions by: (a) minimizing dependence on single passenger autos; (b) promoting projects which minimize quick auto starts and stops, such as live-work development, and office development with ground-floor retail space; (c) separating land uses which are sensitive to pollution from the sources of air pollution; and (d) supporting telecommuting, flexible work hours, and behavioral changes which reduce the percentage of people in Oakland who must drive to work on a daily basis.
- ◆ Policy CO-12.4. Require that development projects be designed in a manner which reduces potential adverse air quality impacts. This may include: (a) the use of vegetation and landscaping to absorb [Sic] carbon monoxide [probably carbon dioxide] and to buffer sensitive receptors; (b)

the use of low-polluting energy sources and energy conservation measures; (c) designs which encourage transit use and facilitate bicycle pedestrian travel.

- ◆ Policy CO-12.6. Require construction, demolition and grading practices which minimize dust emissions. These practices are currently required by the City and include: (a) avoiding earth moving and other major dust-generating activities on windy days; (b) sprinkling unpaved construction areas within water during excavation, using reclaimed water where feasible; (c) covering stockpiled sand, soil, and other particulates with a tarp to avoid blowing dust; (d) covering trucks hauling dirt and debris to reduce spills; (e) operating construction and earth-moving equipment, including trucks, to minimize exhaust emissions.
- ◆ Policy CO-12.7. Coordinate local air quality planning efforts with other agencies, including adjoining cities and counties, and the public agencies responsible for monitoring and improving air quality. Continue to work with BAAQMD and the California Air Resources Board in enforcing the provisions of the State and Federal Clean Air Acts, including the monitoring of air pollutants on a regular and on-going basis.

C. Existing Setting

An emissions inventory is a well-recognized and useful tool for understanding climate change impacts. An emissions inventory identifies and quantifies the primary human-generated sources and sinks of GHGs and, thereby, accounts for the amount of GHGs emitted to or removed from the atmosphere over a specific period of time by a particular source. This section summarizes the latest information on global, national, State, regional, and county GHG emission inventories.

1. Global Inventory

According to the United Nations Framework Convention on Climate Change, worldwide GHG emissions in 2004 were 30 billion tons of CO₂e per

year (including both ongoing emissions from industrial and agricultural sources, but excluding emissions from land-use changes).⁶

2. National Inventory

As part of its commitments to UNFCCC, the US EPA has developed an inventory of anthropogenic emissions by sources and removals by sinks of all GHGs. This inventory is periodically updated with the latest inventory report published in 2009. In 2004, the United States emitted about 8 billion tons of CO₂e, or about 25 tons per person per year.⁷ It is estimated that the United States contributes up to 35 percent of the world's CO₂ equivalent emissions. The EPA reports that total US emissions have risen by 17 percent from 1990 to 2007.⁸ A 1.1 percent decrease in emissions was noted from 2005 to 2006, which is reported as attributable to: (1) climate conditions, (2) reduced use of petroleum products for transportation, and (3) increased use of natural gas over other fuel sources. The inventory noted that the transportation sector emits about 33 percent of CO₂ emissions, with 60 percent of those emissions coming from personal automobile use. Residential uses, primarily from energy use, accounted for 20 percent of CO₂ emissions. After the decrease from 2005 to 2006, emissions from fuel combustion grew from 2006 to 2007.⁹

⁶ United Nations Framework Convention on Climate Change (UNFCCC), May 2, 2007, *Sum of Annex I and Non-Annex I Countries Without Counting Land-Use, Land-Use Change and Forestry (LULUCF). Predefined Queries: GHG total without LULUCF (Annex I Parties)*, Bonn, Germany. (unfccc.int/ghg_emissions_data/predefined_queries/items/3814.php.)

⁷ US Environmental Protection Agency (EPA), 2008, *The US Greenhouse Gas Emissions and Sinks: Fast Facts*. (www.epa.gov/climatechange/emissions/downloads/2008_GHG_Fast_Facts.pdf.)

⁸ US EPA, 2009, *2009 US Greenhouse Gas Inventory Report*, Chapter 2: Trends in Greenhouse Gas Emissions. (<http://www.epa.gov/climatechange/emissions/downloads09/trendsGhGEmissions.pdf>.)

⁹ US EPA, 2009, *2009 US Greenhouse Gas Inventory Report*, Chapter 2: Trends in Greenhouse Gas Emissions. (<http://www.epa.gov/climatechange/emissions/downloads09/trendsGhGEmissions.pdf>.)

As a part of the EPA's responsibility to develop and update an inventory of national GHG emissions and sinks, EPA compared trends of other US data. Over the period between 1990 and 2006, GHG emissions increased at a rate of about 0.9 percent per year. Population growth was slightly higher at 1.1 percent, while energy and fossil fuel consumption were more closely related at 1.0 percent. Gross Domestic Product and energy generation grew at much higher rates.

3. State of California Inventory

California GHG or CO₂e emissions were estimated at 484 million tons of CO₂e, which is about six percent of the emissions from the entire United States. Transportation is the largest source of GHG emissions in California, contributing about 40 percent of the total emissions. Electricity generation is second, at over 20 percent, but California also imports electricity during the summer, which brings energy sources up to about 25 percent. Industrial activities account for about 20 percent of the State's emissions. On a per-person basis, GHG emissions are lower in California than in most other states; however, California is a populous state and the second largest emitter of GHGs in the United States and one of the largest emitters in the world.¹⁰

Under a "business as usual" scenario, GHG emissions in California are estimated to increase to approximately 600 million tons of CO₂e by 2020. CARB staff has estimated the 1990 statewide emissions level to be 427 million tons of CO₂e, therefore requiring a reduction of almost 30 percent in emissions by 2020 to meet the AB 32 goal.

4. Bay Area Inventory

BAAQMD estimated GHG emissions for the Bay Area at 102.7 million tons of CO₂e in 2007. The inventory is broken down by county, and Alameda County emissions are third highest in the Bay Area, at 17.3 percent. In Alameda County, transportation accounts for about 59 percent of the emissions.

¹⁰ California Air Resources Board, March 2009, *California Greenhouse Gas Inventory 2000-2006 by IPCC Category*. (<http://www.arb.ca.gov/cc/inventory/data/data.htm>, accessed September 3, 2009.)

However, these emissions include those from shipping, aircraft, and trains. On-road vehicles account for about 38 percent of Alameda County's 17.73 MM CO_{2e} emissions. About 30 percent of the entire Bay Area inventory is attributable to on-road vehicles.¹¹

5. Unincorporated Alameda County Inventory

Alameda County recently inventoried its 2005 GHG emissions, for both government operations and the unincorporated county, using ICLEI software and methodology. Table 4.6-1 describes the total results per sector for unincorporated county emissions.

As shown in Table 4.6-1, the transportation sector accounted for 50.6 percent of unincorporated Alameda County's GHG emissions, at 351,264 tons of CO_{2e}. Residential emissions are the next largest sector, accounting for approximately one quarter (25.9 percent) of community emissions for the unincorporated county.

6. City of Berkeley Inventory

ICLEI conducted the City of Berkeley Baseline Greenhouse Gas Emissions Inventory Report using 2005 as a baseline year. Table 4.6-2 shows the City of Berkeley's emissions by sector. In 2005, Berkeley released approximately 576,000 tons of CO_{2e} in total. The transportation sector emitted the largest amount, 265,544 tons of CO_{2e} or 47 percent of the City's total emissions. Of the City's total emissions, the Residential sector emitted 26 percent (152,599 tons of CO_{2e}) and the Commercial/Industrial sector emitted 27 percent (157,746 tons of CO_{2e}).

¹¹ Bay Area Air Quality and Management District, November 2006, *Source Inventory of Bay Area Greenhouse Gas Emissions*. (<http://www.baaqmd.gov/Divisions/Planning-and-Research/Planning-Programs-and-Initiatives/Climate-Protection-Program/~ /media/1BBC7CE2B8CE4DE5B9BC9C76525C484E.ashx>.)

TABLE 4.6-1 **UNINCORPORATED ALAMEDA COUNTY COMMUNITY EMISSIONS INVENTORY, 2005**

Sector	Emissions in Tons of CO ₂ e	Percent of Total Emissions
Residential	179,864	25.9%
Commercial/Industrial	132,768	19.1%
Transportation	351,264	50.6%
Waste	30,419	4.4%
Total	694,315	100.0%

Source: Alameda County, November 2008, Interim Year Greenhouse Gas Emissions Analysis.

TABLE 4.6-2 **CITY OF BERKELEY COMMUNITY EMISSIONS INVENTORY, 2005**

Sector	Emissions in Tons of CO ₂ e	Percent of Total Emissions
Residential	152,599	26%
Commercial/Industrial	157,746	27%
Transportation	265,544	47%
Total	575,889	100%

Source: City of Berkeley, June 2009, *Berkeley Climate Action Plan*, page 10.

7. City of Oakland Inventory

Similarly to other inventories, the City of Oakland's emission inventory was also conducted by ICLEI using 2005 as a baseline year. Table 4.6-3 shows the City of Oakland's emissions by sector.

In 2005, Oakland released approximately 2,250,000 tons of CO₂e. The transportation sector released the largest amount, approximately 1,140,000 tons of CO₂e or 47 percent of total emissions. The Commercial/Industrial sector

TABLE 4.6-3 **CITY OF OAKLAND COMMUNITY EMISSIONS INVENTORY, 2005**

Sector	Emissions in Tons of CO ₂ e	Percent of Total Emissions
Residential	580,710	24%
Commercial/Industrial	709,199	29%
Transportation	1,138,767	47%
Total	2,248,667	100%

Source: City of Oakland, December 2006, *Baseline Greenhouse Gas Emissions Inventory*, page 7.

released the second largest amount, approximately 709,000 tons of CO₂e or 29 percent of total emissions.

D. CEQA Significance Criteria

Although CEQA requires an analysis of the impacts of GHGs emitted by the project, there are no significance thresholds currently adopted by any State or local agencies other than the South Coast Air Quality Management District (interim threshold adopted) and the San Joaquin Valley Air Pollution Control District (recommended thresholds adopted). Various influential agencies and groups, including the California Air Pollution Control Officers Association and County of San Diego have released guidance on significance thresholds.

The BAAQMD recently released draft guidelines and thresholds. On December 7, 2009, BAAQMD released a revised draft of the proposed updates to the BAAQMD CEQA Guidelines.¹² This draft included proposed significance

¹² BAAQMD, 2009, California Environmental Quality Act Guidelines Update, Proposed Thresholds of Significance, December 7, 2009, <http://www.baaqmd.gov/~media/Files/Planning%20and%20Research/CEQA/Proposed%20Thresholds%20of%20Significance%20Dec%207%202009.ashx>, accessed on December 9, 2009.

thresholds for operational-related GHG emissions. There were no recommended numerical thresholds for construction-related impacts. This revised draft is now scheduled to be heard by the BAAQMD board of directors in April.

Because they provide a quantitative threshold for assessing GHG impacts, the BAAQMD-recommended GHG emission thresholds were used for purposes of assessing the potential significance of GHG emissions from proposed project operations. These proposed thresholds are as follows:

GHGs – Projects other than Stationary Sources

- ◆ Compliance with Qualified Climate Action Plan (or similar adopted policies, ordinances, and programs) that includes enforceable measures consistent with AB 32 goals or Executive Order S-03-05 targets; or
- ◆ Threshold of 1,100 metric tons (MT) of CO_{2e}/yr; or
- ◆ 4.6 MT CO_{2e}/Service Population/yr (mixed use).

GHGs – Stationary Sources

- ◆ 10,000 MT CO_{2e}/yr

As global climate change is a global phenomenon, it is discussed below in the cumulative impacts section.

E. Cumulative Impacts

SP2 Cumulative Impact GHG-1: The proposed project would not emit GHG gases in amounts above the proposed BAAQMD thresholds. (*Less than Significant*)

GHG emissions from construction/demolition activities would occur from internal combustion engine exhaust associated with off-road construction equipment, exhaust from on-road trucks associated with the proposed project,

and construction worker commute vehicle travel. Emissions of CO₂, the primary GHG emitted from these sources, were estimated using the same methods and models detailed in Section 4.2 of this EIR for criteria pollutant emissions.

GHG emissions from proposed project operations would occur from stationary and non-stationary sources. “Stationary” sources are defined as those sources that would be covered under the facility operating permit, and “non-stationary” sources are defined as all other sources of GHG emissions associated with the operation of the buildings being evaluated.

Stationary source emissions would include emissions from natural gas combustion in the boilers/heaters, and internal combustion engine exhaust associated with the backup diesel generator. Non-stationary source emissions would include emissions from on-road employee passenger vehicles, electricity used in the proposed GPL, and emissions from energy used in water and wastewater conveyance.

Emissions of CO₂, the primary GHG emitted from these sources, were estimated for on-site sources using the same methods and models detailed in Section 4.2 for criteria pollutant emissions. CO₂ emissions resulting from use of electricity generated off-site were estimated using a region-specific emission factor of 878.71 pounds of CO₂ per megawatt-hour provided by the Climate Registry.¹³

Overall, the proposed project would, through demolition and new construction, replace a series of older buildings with a single modern, scientific laboratory with associated office space, of equivalent square footage. In addition, the proposed GPL would be energy efficient and designed with the goal of achieving a Gold LEED rating and, consequently, more energy conserving than the facilities it would replace. Traffic generation would be very similar, slightly higher, since the GPL would involve relocation of 100 personnel

¹³ Climate Registry General Reporting Protocol (Ver. 1.1, May 2008) for the WECC California subregion.

from the Potter Street site in west Berkeley that is closer to residential neighborhoods. However, many of these employees already travel to the LBNL hill site to collaborate with other researchers located there.

Emissions from energy usage in water and wastewater conveyance associated with the proposed GPL are not included in the calculations below because there would be no net difference from the situation before and after the project. The cessation of activities in Buildings 25/25B, 55 and 71 trailers, and transfer of Potter Street activities to the LBNL main hill site would result in no net increase in utility usage overall. Even considering only activities at the LBNL main hill site, the addition of approximately 100 personnel to a population of approximately 4,000 represents an increase in population of less than 3 percent and this would not greatly affect water and wastewater usage or the energy used in their conveyance.

An assessment of GHG emissions was performed based on the total CO₂ emissions associated with project sources from building energy use and transportation, as well as a comparison to the CO₂ emission reductions anticipated due to the demolition of existing buildings.

Because usage of the buildings to be demolished has declined over the last several years in anticipation of the Seismic Phase 2 project, CO₂ emission estimates were performed for the buildings to be demolished as part of the project for calendar year 2004 (representative of operation of these buildings before partial shutdown) and for calendar year 2008 (the most recent full calendar year of reduced operations).

Emissions of CO₂ from project construction/demolition and project operations are summarized in Table 4.6-4, along with estimated emissions for 2004 and 2008 operation of the buildings to be demolished as part of this project. Technical details of the methods used to estimate these CO₂ emissions are provided in Appendix B.

TABLE 4.6-4 **SUMMARY OF PROJECT AND BASELINE ESTIMATED GREENHOUSE GAS EMISSIONS (METRIC TONS OF CO₂)**

Source	2004	2008	Proposed Project	Net Increase over 2008
Construction/Demolition	N/A	N/A	214	214
Operation (non-stationary)	1,386 ^b	1,195 ^b	2,096 ^a	901
Operation (stationary)	N/A	57 ^c	46	-11

^a Includes off-site CO₂ emissions from electricity usage of 4,700 MW-hrs/year by the GPL.

^b Estimated CO₂ emissions resulting from operation of Buildings 25/25B; 55; and 71C, D, F, J, K, and P (to be demolished) based on natural gas and electricity usage. Energy usage includes operation of Buildings 26 and 71 trailer G because these were not metered separately. Also includes historical electricity usage (2008 usage for 2004 and 2008 estimates) from Potter Street location operations at this site would be transferring to the main LBNL Hill site.

^c Estimated based on fiscal year 2009 data.

Source: Golder Associates, January 2010.

The BAAQMD has not proposed a significance threshold for GHG emissions from construction activities; however, as shown in Table 4.6-4 above, total annual CO₂ emissions from project construction/demolition activities are small relative to the non-stationary significance threshold for operations, and would only be temporary, so these emissions would be considered to be *less than significant*.

In order to evaluate the net increase in GHG emissions due to project operations, displaced GHG emissions were subtracted from project GHG emissions. The increase or decrease in emissions is shown in the last column in Table 4.6-4. For stationary sources, a net decrease in GHG emissions was estimated (versus a proposed significance threshold of 10,000 MT of CO_{2e}/yr).

For non-stationary sources, Table 4.6-5 summarizes the estimated net increases in GHG emissions compared to either 2004 or 2008 baseline emissions. As the table shows, the net new emissions would not exceed the significance threshold.

TABLE 4.6-5 **SUMMARY OF ESTIMATED NET CARBON DIOXIDE EMISSIONS INCREASES**

Scenario	Maximum Annual Emissions Increase in Metric Tons of CO ₂	Proposed BAAQMD CEQA Significance Threshold
Non-Stationary Sources (2004 baseline year)	710 ^a	1,100 MT of CO _{2e} /yr ^b
Non-Stationary Sources (2008 baseline year)	901 ^a	1,100 MT of CO _{2e} /yr ^b

^a Equal to the CO₂ emissions from the non-stationary component of project operations minus the CO₂ emissions from the non-stationary component of either the 2004 or 2008 baseline operations.

^b Or compliance with a Qualified Climate Action Plan, or 4.6 metric tons CO₂/service population/yr (mixed use). A Qualified Climate Action Plan is one that is consistent with all of the AB 32 Scoping Plan measures and goals.

Therefore, total CO₂ emissions increases from project operations, for both stationary and non-stationary sources are less than the respective proposed BAAQMD significance thresholds, so these emissions would be considered to be *less than significant*.

4.7 HAZARDS AND HAZARDOUS MATERIALS

This section includes an assessment of potential hazards and hazardous materials impacts of the proposed project. The analysis is based on information contained in the LBNL 2006 LRDP and EIR and environmental investigation documents prepared for the LBNL Environmental Restoration Program (ERP). Products as diverse as gasoline, paint, solvents, household cleaning products, refrigerants, and radioactive substances are categorized as hazardous materials. The California Health and Safety Code defines a hazardous material as, "...any material that, because of its quantity, concentration, or physical or chemical characteristics, poses a significant present or potential hazard to human health and safety, or to the environment. Hazardous materials include, but are not limited to, hazardous substances, hazardous waste, radioactive materials, and any material which a handler or the administering agency has a reasonable basis for believing that it would be injurious to the health and safety of persons or harmful to the environment if released into the workplace or the environment" (California Health and Safety Code Section 25501).

A. Regulatory Setting

Facilities at LBNL are subject to environmental, health, and safety regulations applicable to the transportation, use, management, and disposal of hazardous materials and wastes. This section provides an overview of the regulatory setting for health and safety at LBNL and describes current LBNL health and safety policies and procedures.

1. Federal and State Regulations and Policies

The primary federal agencies with responsibility for hazardous materials management include the U.S. Environmental Protection Agency (EPA), U.S. Department of Labor Occupational Safety and Health Administration (OSHA), U.S. Department of Transportation (DOT), and U.S. Department of Energy (DOE). In many cases, California State law mirrors, or is more restrictive than, federal law, and enforcement of these federal laws has been delegated to the State or a local agency. However, DOE regulations for Health and Safety are codified in the Code of Federal Regulations and super-

sede those for both California and federal OSHA at LBNL. In addition, a number of State requirements for hazardous materials management apply legally at LBNL; UC LBNL meets some other requirements voluntarily.

In January 1996, the California EPA adopted regulations implementing a Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (Unified Program). The program has six elements: hazardous waste generators and hazardous waste on-site treatment, underground storage tanks, aboveground storage tanks, hazardous materials release response plans and inventories, risk management and prevention programs, and Unified Fire Code hazardous materials management plans and inventories.

The local agency responsible for implementation of the Unified Program is called the Certified Unified Program Agency (CUPA). Because the LBNL main site is located within the city limits of the City of Berkeley and the City of Oakland, both cities are designated CUPAs for the LBNL. In order to streamline their oversight of CUPA regulations at LBNL, Berkeley and Oakland have entered into a Memorandum of Understanding that has established the City of Berkeley as the lead agency for all CUPA activities (other than emergency release reporting).

The following areas related to hazard and hazardous materials are regulated by different sets of plans and policies:

a. Hazardous Materials Management

Federal and State laws require detailed planning to ensure that hazardous materials are properly handled, used, stored, and disposed of. The Federal Emergency Planning and Community Right-to-Know Act (EPCRA), enacted as Title III of the Superfund Amendments and Reauthorization Act (SARA), requires facilities handling in excess of designated threshold quantities of hazardous materials to provide hazardous materials, hazardous waste, and emission information to public agencies, and to prepare emergency response plans for accidents or other unauthorized releases of designated threshold quantities of hazardous materials. More stringent emergency response handling is re-

quired for facilities handling designated “extremely hazardous substances.” Hazardous materials present in exempt quantities or under the direct supervision of a technically qualified individual are exempt from EPCRA reporting, inventory, and emergency planning requirements.¹ In California, the requirements of SARA Title III are incorporated into the State’s Hazardous Materials Release Response Plans and Inventory Law,² administered by the City of Berkeley through its CUPA program. This law requires any “business” that handles hazardous materials above certain thresholds to prepare a Hazardous Materials Business Plan, which must include details of the facility and business conducted at the site, an inventory of hazardous materials handled or stored on-site, an emergency response plan, and a safety and emergency response training program for new employees with annual refresher courses.

The federal Toxic Substances Control Act (TSCA) also establishes reporting requirements for polychlorinated biphenyls (PCBs). No PCB-containing transformers or capacitors that exceed TSCA reporting thresholds are present at LBNL.

b. Hazardous Waste Handling

The federal Resource Conservation and Recovery Act of 1976 (RCRA) created a major new federal hazardous waste “cradle-to-grave” regulatory program administered by the EPA. Under RCRA, the EPA regulates the generation, treatment, and disposal of hazardous waste, and the investigation and remediation of hazardous waste sites. Individual states may apply to the EPA for authorization to implement their own hazardous waste programs in lieu of RCRA, as long as the State program is at least as stringent as federal RCRA

¹ LBNL has always been below reporting thresholds for Toxic Release Inventory (TRI) reporting under EPCRA. Toxic chemicals used in laboratories are exempt from TRI reporting when used under the supervision of a technically qualified individual. The laboratory activity exemption is intended to reduce the chemical tracking burden by exempting laboratories from tracking small or diffuse quantities of listed TRI chemicals used for experimental purposes.

² California Health and Safety Code, Section 25500.

requirements. California has been authorized by EPA to implement and enforce its own hazardous waste program in lieu of the federal program, with certain exceptions.

In California, the Department of Toxic Substances Control (DTSC) regulates the generation, transportation, treatment, storage, and disposal of hazardous waste, and the investigation and remediation of hazardous waste sites. Routine hazardous waste generator oversight is performed by the City of Berkeley through its CUPA program.

UC LBNL manages and treats hazardous wastes in Building 85/85A, which is the Lab site's hazardous waste handling facility (HWHF) that operates under a permit issued by DTSC. On November 1 2002, UC LBNL submitted a hazardous waste permit renewal application for the facility. The permit was approved in July 2007.

UC LBNL has one additional hazardous waste permit to operate six fixed treatment units (FTUs). The FTUs are operated independently of the HWHF, and the City of Berkeley administers the FTU permitting program under its CUPA program authority. The treatment units are for: metals precipitation and acid neutralization; acid neutralization alone; and for oil and water separation. They are located at six locations on the LBNL site: Buildings 2, 25B, 67, 70A/70F, 76, and 77. As described in Chapter 3, Project Description, Building 25B is proposed for demolition as part of the project.

c. Hazardous Materials Transportation

The DOT regulates the transportation of hazardous materials between states and foreign countries. DOT regulations are contained in the Code of Federal Regulations (CFR) Title 49 (49 CFR). The State of California has adopted DOT regulations for the intrastate movement of hazardous materials.

The California Highway Patrol (CHP) and the California Department of Transportation (Caltrans) have primary responsibility for enforcing these laws and regulations in the project vicinity. The CHP enforces hazardous

material and hazardous waste labeling and packing regulations to prevent leakage and spills of material in transit and to provide detailed information to cleanup crews in the event of an accident. Caltrans provides emergency response teams that can respond quickly in the event of a spill.

d. Medical Waste

The storage, treatment, transportation, and disposal of medical waste are regulated under the California Medical Waste Management Act (MWMA; Sections 117600 et seq. of the California Health and Safety Code). Medical waste includes biohazardous waste (e.g., blood and blood contaminated materials) and “sharps” waste (e.g., needles) produced in research relevant to the diagnosis, treatment, or immunization of human beings or animals or in the production of biological products used in medicine. Within the statutory framework of the MWMA, the Medical Waste Management Program of the California Department of Public Health (CDPH) ensures the proper handling and disposal of medical waste by permitting and inspecting medical waste generators, off-site treatment facilities, and transfer stations throughout the State. The CDPH also oversees all medical waste transporters.

e. Occupational Safety

Occupational safety standards exist in federal and State laws to minimize worker safety risks from both physical and chemical hazards in the workplace. OSHA is generally responsible for assuring worker safety in the workplace. However, at DOE facilities such as LBNL, the occupational worker safety program is administered by the DOE pursuant to the authority provided by the Atomic Energy Act over health and safety at its facilities. Beginning in 2007, the DOE began enforcing its own Health and Safety Program regulation (10 CFR 851), which includes requirements set forth in the OSHA regulations. The DOE enforces OSHA requirements in accordance with a Memorandum of Agreement with OSHA.

OSHA regulations at 29 CFR 1910 and 1926 contain requirements concerning the use of hazardous materials in the workplace and during construction that mandate employee safety training, safety equipment, accident and illness pre-

vention programs, hazardous substance exposure warnings, emergency action and fire prevention plan preparation, and a hazard communication program. These regulations also require preparation of emergency action plans (escape and evacuation procedures, rescue and medical duties, alarm systems, and training in emergency evacuation).

The federal OSHA regulations include special provisions for hazard communication to employees in research laboratories, including training in chemical work practices. Specifically, more detailed training and monitoring is required for the use of carcinogens, ethylene oxide, lead, asbestos, and certain other chemicals listed in 29 CFR. Emergency equipment and supplies, such as fire extinguishers, safety showers, and eye washes, must also be provided and maintained in accessible places.

The OSHA regulations also include extensive, detailed requirements for worker protection applicable to any activity that could disturb lead- or asbestos-containing materials, including maintenance, renovation, and demolition.

f. Radioactive Materials

Pursuant to the federal Atomic Energy Act, the DOE regulates the storage and use of sources of ionizing radiation (radioactive material and radiation-producing equipment) at DOE contractor-managed sites, including LBNL. Radiation protection regulations require control of sources of ionizing radiation and radioactive material and protection against radiation exposure. DOE regulations concerning occupational radiation exposure are prescribed in 10 CFR 835, Occupational Radiation Protection. These regulations specify appropriate worker safety precautions and worker health monitoring programs. Radiation protection requirements for the public and the environment are prescribed in DOE Order 5400.5, "Radiation Protection of the Public and the Environment."

The use of radioactive materials at LBNL is also subject to EPA radioactive air emission regulations in 40 CFR Part 61, Subpart H, National Emission Standards for Hazardous Airborne Pollutants other than Radon from DOE

Facilities (NESHAP). Under this regulation, all potential emission sources are controlled and assessed, and the assessments are reported annually to the DOE and EPA. In addition, all use of radioactive materials at LBNL is conducted in accordance with an internal authorization process approved by the DOE. Emissions of radioactive material to the environment are monitored as described by the LBNL Environmental Monitoring Plan, which ensures that all Laboratory activities operate within regulatory requirements.³

The DOE also regulates radioactive waste and the radioactive portion of mixed waste pursuant to the Atomic Energy Act and DOE Order 435.1, Radioactive Waste Management. Radioactive and mixed wastes are routinely generated from LBNL research activities involving radioisotopes. Mixed waste is also subject to California hazardous waste regulations and is staged at LBNL in mixed waste satellite accumulation areas inside radioactive material areas and subsequently transported to the LBNL HWHF for storage and management.

In 2000, the DOE established a moratorium on the release of volumetrically⁴ contaminated metals from radiological areas⁵ at DOE facilities, and temporarily suspended the unrestricted release of scrap metal for recycling from such areas. The moratorium remains in place pending the preparation of a programmatic environmental impact statement by the DOE. UC LBNL applies the moratorium to former radiological areas at accelerators (e.g., at the accelerator that was formerly operational at Building 71), where metals may have become activated by exposure to radiation beams.

³ LBNL, 2006, *Long-Range Development Plan Environmental Impact Report*, page IV.F-14.

⁴ Volumetric contamination is radioactive contamination that resides in or throughout the volume of an item. This contrasts with surface contamination, which is radioactive contamination that resides on or near the surface of an item.

⁵ A radiological area is an area designated under 10 CFR 835, for which the DOE requires specific measures to be taken, such as access control and monitoring, to protect DOE workers from radiological hazards. A radiological area may or may not contain radioactive materials.

g. Biosafety Standards

Federal (9 CFR 121, 29 CFR 1910.1030, 42 CFR 73) and State (Title 8 CCR, Section 5193) laws establish standards for working with biohazardous materials. A hazardous biological material is any potentially harmful biological material (including infectious agents, oncogenic viruses, and recombinant DNA) or any material contaminated with a potentially harmful biological material. The U.S. Public Health Service, the National Institutes of Health, and the Centers for Disease Control and Prevention operate under the U.S. Department of Health and Human Services. These agencies establish standards for working with biohazardous materials.

h. Emergency Response

The Federal Emergency Planning and Community Right-to-Know Act of 1986 requires detailed planning to ensure that hazardous materials are properly handled, used, stored, and disposed of to prevent or minimize adverse effects to human health or the environment in the event such materials are accidentally released. California has developed an emergency response plan to coordinate emergency services provided by federal, State, and local government and private agencies. Responding to hazardous materials incidents is one part of this plan. The plan is administered by the State Office of Emergency Services, which coordinates the responses of other agencies, which for the project area include the California EPA, the CHP, the Department of Fish and Game, the San Francisco Bay RWQCB, and the Alameda County Fire Department. The on-site fire department at LBNL provides first response capabilities, if needed, for hazardous materials emergencies.

i. Hazardous Materials Commonly Encountered in Buildings

Hazardous materials are commonly found in building materials that may be affected during demolition activities, such as those included in the proposed project. Buildings constructed more than 30 years ago, such as those proposed to be demolished as part of the proposed project, may contain asbestos-containing building materials, fluorescent lighting ballasts containing PCBs, and/or lead-based paint. Laws and regulations, described below, are designed

to ensure that these materials are handled properly and do not pose a risk to construction workers and the nearby public during demolition activities.

i. Asbestos

Federal and State laws and regulations (such as OSHA's 19 CFR Parts 1910.1001 and 1926.1101, EPA's NESHAP regulations at 40 CFR 763.61 Subpart M and other asbestos regulations at 40 CFR, California Code of Regulations Title 8, Section 5208, as well as the BAAQMD's Regulation 11, Rule 2) apply to building materials containing asbestos. Inhalation of airborne fibers is the primary mode of asbestos entry into the body, making friable (easily crumbled) materials the greatest health threat. These regulations prohibit emissions of asbestos from asbestos-related manufacturing, demolition, or construction activities; require medical examinations and monitoring of employees engaged in activities that could disturb asbestos; specify precautions and safe work practices that must be followed to minimize the potential for release of asbestos fibers; and require notice to federal and local governmental agencies prior to beginning renovation or demolition that could disturb asbestos.

ii. Polychlorinated Biphenyls

Polychlorinated Biphenyls (PCBs) are organic oils that were formerly placed in many types of electrical equipment, including fluorescent lighting ballasts. Exposure to PCBs may cause various health effects, and PCBs are highly persistent in the environment. Fluorescent lighting tubes and ballasts, computer displays, and several other common items containing hazardous materials are regulated as "universal wastes" by the State of California. Universal waste regulations allow common, low-hazard wastes to be managed under less stringent requirements than other hazardous wastes.

iii. Lead

OSHA regulates worker exposure during construction activities that involve paint that contains lead. 29 CFR Part 1926.62 covers construction work where employees may be exposed to lead during such activities as demolition, removal, surface preparation for repainting, renovation, clean-up, and routine

maintenance. The OSHA-specified compliance includes, among other things, respiratory protection, protective clothing, housekeeping, special high-efficiency filtered vacuums, hygiene facilities, medical surveillance, and training.

j. Aboveground and Underground Storage Tanks

The State Water Resources Control Board (SWRCB) administers the petroleum Aboveground Storage Tank (AST) program. The SWRCB also administers the Underground Storage Tank (UST) program in California. The City of Berkeley Toxics Management Division enforces applicable regulations for ASTs and USTs, which include permitting and inspection requirements.

2. Local Plans and Policies

The Seismic Life-Safety Phase 2 project involves DOE facilities at LBNL operated by the University of California. The plan that is applicable to the proposed project is the LBNL 2006 LRDP. Principles and strategies contained in the 2006 LRDP that address Hazards and Hazardous Materials are summarized below.

The University of California, under Article IX, Section 9 of the California Constitution, is exempt from local land regulation, including general plans and zoning. However, UC seeks to cooperate with local jurisdictions to reduce any physical consequences of potential land use conflicts to the extent feasible. Because the western part of the LBNL site is within the Berkeley city limits, and the eastern part is within the Oakland city limits, policies contained in the Berkeley and Oakland general plans related to hazardous materials are listed below.

a. LBNL Hazardous Materials Plans and Policies

UC LBNL has developed an Integrated Safety Management (ISM) system that establishes environment, safety, and health policies and procedures to ensure all work is performed safely and in a manner that strives for the highest degree of protection for employees, participating guests, visitors, the public, and the environment, commensurate with the nature and scale of the work.

In addition, UC LBNL has developed an Environmental Management System (EMS) to implement sound environmental stewardship practices that protect the air, water, land, and other environmental resources potentially affected by facility operations. The EMS is integrated into the LBNL ISM processes. DOE Order 450.1, *Environmental Protection Program*, established the requirement for an EMS, including that it be integrated with a facility's ISM. The LBNL EMS program is described in the LBNL Performance-Based EMS Plan (PUB-3180).

The LBNL Environment, Health, and Safety (EH&S) Division has primary responsibility for developing compliance strategies for federal, State, and local environmental laws and regulations, and for developing related LBNL policies and procedures. In conformance with applicable laws and regulations, the EH&S Division establishes procedures for storage, handling, use, and disposal of hazardous and radioactive materials and medical wastes. The EH&S Division also oversees the monitoring and remediation of soil and groundwater affected by historic hazardous material use at LBNL, and ensures regulatory compliance. In compliance with the operating permit from DTSC, the EH&S Division produces an annual hazardous waste report for DTSC that incorporates treatment and disposal information for all hazardous waste activities, and an annual report of waste generation and pollution prevention progress for the DOE that details waste minimization efforts undertaken at the facility.⁶

b. LBNL 2006 Long Range Development Plan

Development strategies presented in the LBNL 2006 LRDP are intended to minimize potential environmental impacts that could result from implementation of the LBNL 2006 LRDP. Development strategies set forth in the plan, applicable to hazards and human health, include the following:

⁶ LBNL, 2006, *Long-Range Development Plan Environmental Impact Report*, page IV.F-17.

- ◆ Develop all new landscape improvements in accordance with the LBNL vegetation management program to minimize the threat of wildland fire damage to facilities and personnel.

c. LBNL 2006 LRDP EIR Mitigation Measures

A series of mitigation measures is included within the LBNL 2006 LRDP EIR. Although this analysis does not tier from that EIR, several of the mitigation measures adopted as part of the 2006 LRDP apply to the proposed project and are included in the Seismic Phase 2 project description. The following hazards and hazardous materials mitigation measures apply to and are a part of the proposed project:

LRDP Mitigation Measure HAZ-3a: LBNL shall continue to prepare an annual self-assessment summary report and a Site Environmental Report that summarize EH&S program performance and identify any areas where LBNL is not in compliance with environmental laws and regulations governing hazardous materials, and worker safety, emergency response, and environmental protection.

An EH&S assessment of LBNL activities is performed annually, and these results are reported annually in the LBNL Self-Assessment Report.

In addition, LBNL prepares an annual Site Environmental Report that describes the environmental activities noted above. Implementation of this measure would ensure that the information in the LBNL Self-Assessment and Site Environmental Reports continues to be collected, reviewed, and provided.

LRDP Mitigation Measure HAZ-3b: Prior to shipping hazardous materials to a hazardous waste treatment, storage, or disposal facility, LBNL shall confirm that the facility is licensed to receive the type of waste LBNL is proposing to ship.

LBNL is required by DOE Order 435.1 to verify that the receiving facility has all appropriate licenses and that the waste meets all waste acceptance criteria of the receiving facility.

LRDP Mitigation Measure HAZ-3c: LBNL shall require hazardous waste haulers to provide evidence that they are appropriately licensed to transport the type of wastes being shipped from LBNL.

Shipping procedures at LBNL require all transporters of hazardous, radioactive, and mixed waste to provide evidence that they are appropriately licensed.

LRDP Mitigation Measure HAZ-3d: LBNL shall continue its waste minimization programs and strive to identify new and innovative methods to minimize hazardous waste generated by LBNL activities.

Each LBNL Division is required to identify and implement new waste minimization activities each year. The waste minimization program at LBNL reduced hazardous waste by 72 percent during the period 1993-2004.

LRDP Mitigation Measure HAZ-3e: In addition to implementing the numerous employee communication and training requirements included in regulatory programs, LBNL shall undertake the following additional measures as ongoing reminders to workers of health and safety requirements:

- ◆ Continue to post phone numbers of LBNL EH&S subject matter experts on the EH&S website.
- ◆ Continue to post Emergency Response and Evacuation Plans in all LBNL buildings.
- ◆ Continue to post sinks, in areas where hazardous materials are handled, with signs reminding users that hazardous materials and wastes cannot be poured down the drain.

- ◆ Continue 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.

LRDP Mitigation Measure HAZ-3f: LBNL shall update its emergency preparedness and response program on an annual basis and shall provide copies of this program to local emergency response agencies and to members of the public upon request.

d. Berkeley General Plan

Berkeley General Plan policies pertaining to hazards and hazardous materials include the following:

- ◆ Policy EM-13: Hazardous Materials Disclosure. Continue to require the disclosure of hazardous materials usage and encourage businesses using such materials to prepare and implement a plan to reduce the use of hazardous materials and the generation of hazardous wastes.
- ◆ Policy EM-14: Hazardous Materials Regulation. Control and regulate the use, storage, and transportation of toxic, explosive, and other hazardous and extremely hazardous material to prevent unauthorized and accidental discharges.

Actions

- A) Regularly inspect businesses using, storing, transporting, or generating hazardous materials or wastes to ensure compliance with federal, State, and local regulations.
 - B) Require facility operators to write and implement contingency plans in preparation for emergency situations and accidental releases. Additionally, require facilities to train their employees on how to activate the contingency plans.
- ◆ Policy EM-15: Environmental Investigation. When reviewing applications for new development in areas historically used for industrial uses, require environmental investigation as necessary to ensure that soils, groundwater, and buildings affected by hazardous material releases from

prior land uses would not have the potential to affect the environment or the health and safety of future property owners, users, or construction workers.

- ◆ Policy EM-16: Risk Reduction. Work with owners of vulnerable structures with significant quantities of hazardous material to mitigate potential risks.
- ◆ Policy EM-17: Warning Systems. Establish a way to warn residents of a release of toxic material or other health hazard, such as sirens and/or radio broadcasts.
- ◆ Policy EM-31: Landscaping. Encourage drought-resistant, rodent-resistant, and fire-resistant plants to reduce water use, prevent erosion of soils, improve habitat, lessen fire danger, and minimize degradation of resources.
- ◆ Policy S-23: Property Maintenance. Reduce fire hazard risks in existing developed areas by ensuring that private property is maintained to minimize vulnerability to fire hazards.

e. Oakland General Plan

The Open Space, Conservation and Recreation (OSCAR) Element, adopted in 1996, addresses the management of open land, natural resources, and parks in Oakland. The following policies are related to hazards and hazardous materials:

- ◆ Policy CO-1.2: Soil Contamination Hazards. Minimize hazards associated with soil contamination through the appropriate storage and disposal of toxic substances, monitoring of dredging activities, and cleanup of contaminated sites. In this regard, require soil testing for development of any site (or dedication of any parkland or community garden) where contamination is suspected due to prior activities on the site.
- ◆ Policy CO-5.2: Improvements to Groundwater Quality. Support efforts to improve groundwater quality, including the use of non-toxic herbicides and fertilizers, the enforcement of anti-litter laws, the cleanup of

sites contaminated by toxics, and ongoing monitoring by the Alameda County Flood Control and Water Conservation District.

B. Existing Setting

1. Current Use and Management of Hazardous Materials at the Project Site

With the exception of the Building 71 trailers, which are used for offices, all of the project site areas have, or have had in the recent past, hazardous materials use. Building 55 contains laboratories that use, store, and generate small quantities of hazardous materials. Building 25/25B has been used as a chemical laboratory until recently. Building 25B will remain in use as a chemical treatment unit until such time that the proposed project is approved by The Regents. Hazardous wastes from the individual labs at those buildings and the rest of LBNL are consolidated at Building 85, the Hazardous Waste Handling Facility (HWHF).

The Building 85 area contains a hazardous waste handling facility, associated yard area, six hazardous waste handling sheds, a flammable solvents consolidation shed, a flammable/combustible liquid storage shed, a mixed waste storage shed, a storage shed, and a diesel generator with a 56-gallon diesel AST (used as a day tank) and a 2,500-gallon diesel UST.

Building 85 has three floors. The first floor of Building 85 houses radioactive waste activities, including waste handling, storage, compaction, solidification, and decontamination. The first floor also contains a dry/clean waste storage area and one of two mechanical storage rooms. The second floor contains the chemical waste preparation and storage areas and administrative offices. The third floor houses HVAC equipment and the second mechanical equipment room.

Building 85 was constructed in 1996 in accordance with requirements in the Uniform Building Code, Uniform Fire Code, hazardous materials laws and regulations, and accepted industrial waste management practices. These in-

clude the use of curbs, trenches, and sumps for hazardous material containment, the use of coated floors, backup emergency power supply, and pollution abatement equipment, monitors, and alarms to minimize the release of hazardous or radioactive substances to the environment. All radioactive wastes at Building 85 are handled, stored, and treated in accordance with DOE requirements. All hazardous wastes are handled, stored, and treated in accordance with the facility's RCRA Part B Permit. Mixed wastes are handled, stored, and treated in accordance with both DOE requirements and the Part B permit.

2. Chemical Contamination at the Project Site from Historical Hazardous Materials Uses

In 1988, UC LBNL began a rigorous evaluation of potential historical releases of contaminants to the environment as part of an investigation under RCRA, which was required by its Part B hazardous waste facility permit. This process revealed contamination in soil and groundwater due to past site activities. A number of interim corrective measures were undertaken during the 1990s to clean up soil and groundwater that posed an imminent threat to human health or the environment. The remaining contamination that exceeded the DTSC required site cleanup levels was addressed in a Corrective Measures Implementation (CMI) Work Plan, which was approved by DTSC in March 2006. In July 2007, DTSC determined that UC LBNL had implemented the approved remedies for the remaining identified soil contamination and that the approved remedies for groundwater had been constructed and were operating successfully.⁷

Although all identified areas of soil contamination have been cleaned up to levels consistent with LBNL operations (designated as institutional land use) and acceptable to the regulatory oversight agencies, residual contamination below this level remains in the soil at a number of locations. In addition,

⁷ Department of Toxic Substances Control, 2009, Envirostor database, http://www.envirostor.dtsc.ca.gov/public/profile_report.asp?global_id=80001259, accessed February 6, 2009.

there may be previously undiscovered contamination that may be encountered during building demolition and earthmoving activities.

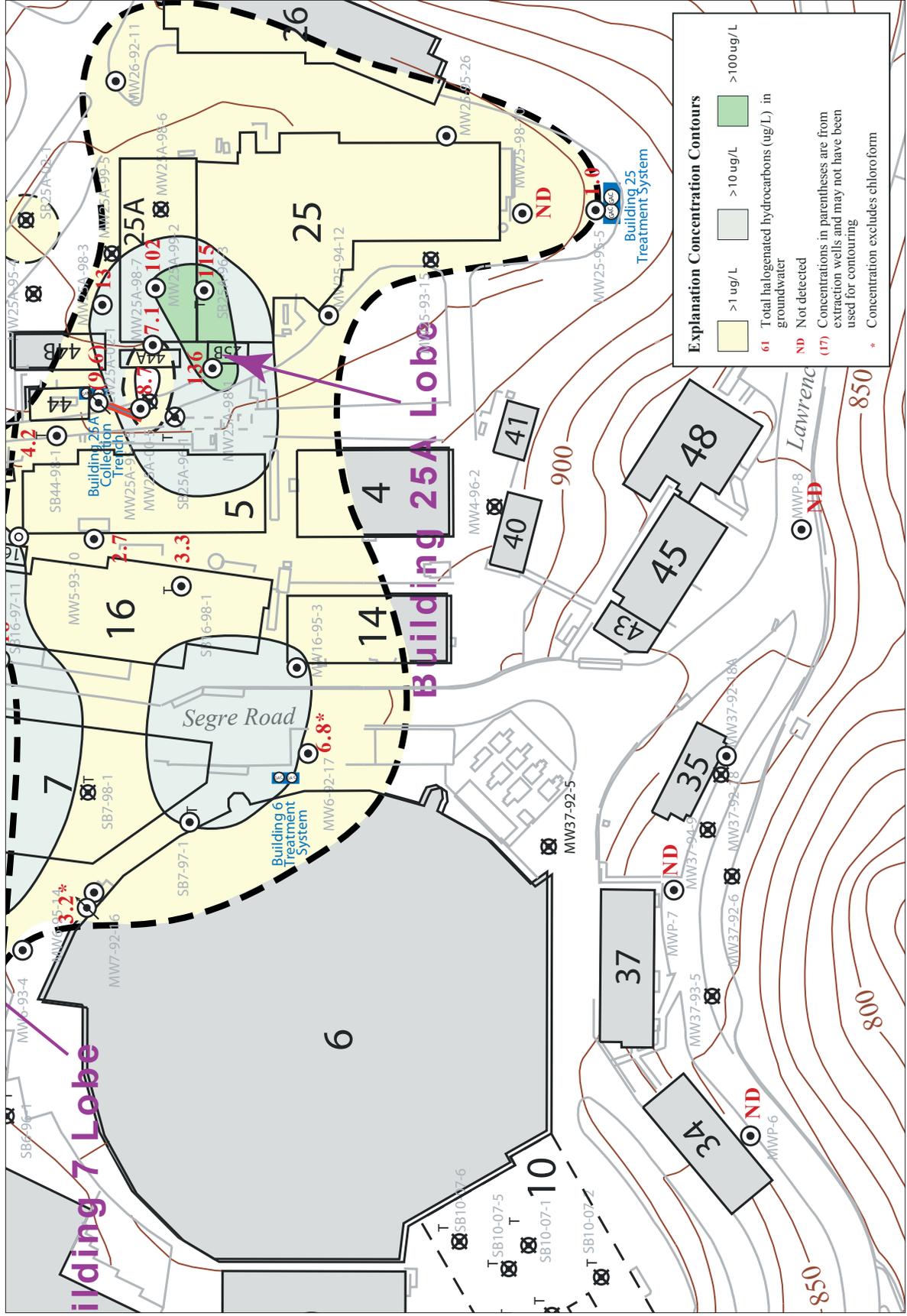
The interim corrective measures and operation of the approved remedies have resulted in significant reductions in the concentrations of the chemicals of concern in the groundwater; however, concentrations still remain above maximum contaminant levels (MCLs) for drinking water in most areas of groundwater contamination. It should be noted that the groundwater at LBNL is not used for domestic, irrigation, or industrial purposes; drinking water is supplied by the East Bay Municipal Utility District (EBMUD).

a. Building 25/25B Demolition and GPL Construction

Building 25 overlies the Building 25A lobe of the Old Town Groundwater Solvent Plume (Figure 4.7-1). The Building 25A lobe encompasses two subplumes of groundwater contamination, containing different suites of volatile organic compounds (VOCs), which are likely derived from different sources. The main Building 25A subplume extends westwards from the area between Building 25 and Building 25A. The Building 25 subplume extends from east of Building 25A to south of Building 25.

The principal constituents of the Building 25A subplume are halogenated VOCs that were used as cleaning solvents, including trichloroethylene (TCE) and its degradation products (e.g., 1,1-DCE [dichloroethene] and cis-1,2-DCE). The source area of the contamination appears to be contaminated soil beneath Building 25 and/or Building 25A near the walkway between the buildings. This area has been inaccessible for remediation, but would become accessible when the buildings are torn down. The corrective measure for the contaminated groundwater, which is currently being operated by UC LBNL, consists of an *in-situ* soil flushing (groundwater infiltration bed and extraction trench) and groundwater treatment system located west of Building 44A.

In-situ soil flushing has resulted in reductions in the concentrations of VOCs detected in most wells monitoring the subplume, with the exception of two wells located in the source area. The most recent sampling report (Fiscal Year



Source: LBNL ERP 2009; Quarterly Progress Report Second Quarter Fiscal Year 2009 (January 1 to March 31, 2009) for the Ernest Orlando Lawrence Berkeley National Laboratory Hazardous Waste Facility Permit, August 2009

FIGURE 4.7-1

BUILDING 25A LOBE OF THE OLD TOWN GROUNDWATER PLUME

2009, Third Quarter), noted that several VOCs were detected at concentrations above MCLs in wells near the presumed source area, including TCE at a concentration of 296 $\mu\text{g/L}$.⁸ Concentrations of all VOCs detected were well below risk-based groundwater cleanup levels, the DTSC-approved cleanup level for the Building 25A subplume. The risk-based cleanup levels were developed to address potential risk to site workers, including indoor workers and construction workers.

The principal constituents of the Building 25 subplume are halogenated VOCs that were used as cleaning solvents, including tetrachloroethylene (PCE), TCE, and carbon tetrachloride. Concentrations of all VOCs in the groundwater south and east of Building 25 are currently less than MCLs for drinking water.

In addition to the likely presence of VOC contamination in the soil in the area between Building 25 and Building 25A, elevated concentrations of metals are present in the soil beneath rooms 132, 140, 145, and 150 of Building 25. The metals include chromium, hexavalent chromium, cobalt, copper, silver, vanadium, and zinc. The source of the contamination was likely plating shop spills that were rinsed into the floor drains.

b. Building 55 and Building 71 Trailers Demolition

No soil or groundwater contamination has been identified in the Building 55 area.

Low concentrations of VOCs are present in the groundwater in the area proposed for Building 71 trailer demolition, including TCE, chloroform, and Freon-113. Detected concentrations have been well below MCLs for drinking water. Low concentrations of the halogenated VOC 1,2-dichloroethane (DCA) have been detected in the soil. The maximum detected concentration of 1,2-DCA is well below the Regional Water Quality Control Board (Water

⁸ LBNL ERP, November 2009, *Quarterly Progress Report Third Quarter Fiscal Year 2009 (April 1 to June 30, 2009) for the Ernest Orlando Lawrence Berkeley National Laboratory Hazardous Waste Facility Permit*.

Board) Environmental Screening Level (ESL) that would be a concern for construction workers.

Low levels of curium-244 (Cm-244) are also present in the soil in the area around Building 71, including the area proposed for Building 71 trailer demolition. The source of the curium-244 was the failure of an experiment inside Building 71 that occurred in July 1959. From 1993 to 1996, LBNL collected shallow soil samples in the Building 71 area to assess the magnitude and extent of the curium-244 contamination in the soil. The maximum curium-244 activity detected (2.6 pCi/g) was well below the United States EPA Preliminary Remediation Goal (PRG) for residential land use of 3.7 pCi/g. The maximum concentration of curium-244 detected in the trailer demolition area was 0.42 pCi/g. The EPA PRG is currently 6.7 pCi/g for residential land use and 38 pCi/g for outdoor workers.

c. Building 85/85A Seismic Strengthening

Building 85/85A was built in 1996 in a previously-undeveloped portion of LBNL. Building 85 staff has confirmed that there have been no spills at the facility.⁹

In 1996, a preoperational survey of the facility was conducted that included the collection and analysis of samples of soil, groundwater, air, sediment, stormwater, and sanitary sewer discharges.¹⁰ Low concentrations of tritium and petroleum hydrocarbons were detected in some soil samples. The source of the tritium was past emissions from the former National Tritium Labeling Facility (NTLF), which ceased operations in December 2001. Recent sampling has determined that the tritium is no longer present in the soil in the Building 85/85A area at detectable concentrations. The concentrations of petroleum hydrocarbons detected are well below Water Board ESLs that would be a concern for construction workers.

⁹ Pauer, Ron. EH&S, LBNL. Personal email communication with DC&E staff, October 14, 2009.

¹⁰ The EnviroSystems Group, October 1996, *Baseline Report for Preoperational Monitoring of Hazardous Waste Handling Facility - B85*.

Four groundwater monitoring wells were installed in the Building 85 area as part of the preoperational survey for the new hazardous waste handling facility. The only contaminants determined to be present in the groundwater were low concentrations of diesel range organics in approximately 10 percent of the samples. The maximum concentration detected was well below the Water Board ESL for drinking water. The source of the diesel range organics was likely soil or groundwater contamination originating from the nearby former Building 74 diesel tank.

3. Wildland Fires

According to the California Department of Forestry and Fire Protection (CDF) Natural Hazard Disclosure Map Images and Data for Alameda County, Building 85 and the proposed GPL are not located in an area that has a substantially high potential for wildland fires.¹¹ However, the LBNL site does contain various types of vegetation and mature trees that could burn during a wildland fire event. UC LBNL maintains a vegetation management program that guides selection of plants for post-construction management to reduce the risk of fires. There is a fire station on-site at LBNL (Alameda County Station 19) in Building 48, which is less than 0.5 mile away from Building 85 and south of the proposed GPL site. At least four firefighters are on duty at all times. There is an automatic aid agreement between UC LBNL and the City of Berkeley for reciprocal aid when the Station 19 fire engine is responding to another call. In addition, Alameda County Fire Department has a mutual aid agreement with other agencies that can be called on in the event of a major fire.

UC LBNL participates in the East Bay Hills Vegetation Management Consortium (VMC), an inter-agency regional planning group formed in the aftermath of the 1991 Oakland Hills fire. In 1994, UC LBNL published a Wildland Fire Evacuation/Relocation Plan. The plan, which would apply to the proposed project, is based on a wildland fire scenario that would require rapid

¹¹ California Department of Forestry and Fire Protection, *Natural Hazard Disclosure Map Images and Data for Alameda County*, <http://www.fire.ca.gov/ab6/nhd01.pdf>, accessed March 12, 2008.

mobilization of resources, quick decision making and well-coordinated execution by emergency responders during a wildland fire.¹² Furthermore, fire management would be considered in the selection of plant stock for post-construction landscaping as per the LBNL vegetation management program.¹³ The chances of uncontrolled wildland fires at LBNL have been reduced to a very low level by these measures.

C. CEQA Significance Criteria

The impact of the proposed project related to hazards and hazardous materials would be considered significant if it would exceed the following standards of significance, in accordance with Appendix G of the *CEQA Guidelines* and the UC CEQA Handbook:

1. Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials.
2. Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment.
3. Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school.
4. Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment.
5. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public

¹² *Supplemental EIR Addendum for the Proposed Extension of the Contract between the US DOE and the UC Regents for Operation and Management of LBNL*, http://rfplbnl.sc.doe.gov/docs/pdf/lbnl_1997_seir.pdf, page IV-H-1, accessed April 3, 2008.

¹³ LBNL, 2006, *Long-Range Development Plan Environmental Impact Report*, page IV.F-8.

use airport, result in a safety hazard for people residing or working in the project area?

6. For a project within the vicinity of a private airstrip, result in a safety hazard for people residing or working in the project area.
7. Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan.
8. Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands.

D. Potential Project Impacts

This section discusses impacts associated with hazards and hazardous materials resulting from the proposed project and subsequent site operations.

SP2 Impact HAZ-1: The proposed project would not create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials. (*Less than Significant*)

Operation of the GPL is the only project component that would involve the new routine storage, use, and disposal of hazardous materials.¹⁴ Hazardous materials associated with future operation of the GPL would be similar to those associated with existing research done elsewhere at LBNL. The most common types would include formaldehyde, toluene, chloroform, and acrylamide.¹⁵ Small amounts of radioactive chemicals would be used by the researchers in the building. Storage and handling of such materials on-site would comply with the most current set of applicable laws and regulations as

¹⁴ Building 85, although it involves these activities is an existing operation. Only the seismic strengthening of Building 85/85A is a component of the proposed project.

¹⁵ Connelly, Robert. LBNL. Personal email correspondence, August 8, 2008.

identified in Section B of this chapter, Regulatory Setting. Residual chemicals would be disposed of off-site after use. The LBNL EH&S Division maintains and oversees procedures for storage, handling, use, and disposal of hazardous materials. These procedures are compliant with State and federal regulations and designed to minimize health and safety risks to individuals such as those who would occupy the GPL on an ongoing basis. UC LBNL also maintains a Hazardous Materials Business Plan, which identifies the hazardous materials stored in each LBNL building in volumes that either meet or exceed the State's minimum reporting requirements. This plan also summarizes procedures for emergency response and training.¹⁶

Demolition of Building 25/25B, Building 55, and Building 71 trailers and the seismic strengthening of Building 85/85A would not result in any routine transport, use, or disposal of hazardous materials. The one-time disposal of demolition debris is addressed in Section 4.13 Utilities, under Waste Management.

LRDP Mitigation Measure HAZ-3a requires annual preparation of a self-assessment summary report and a Site Environmental Report to aid in the compliance with environmental laws and regulations governing hazardous materials, and worker safety, emergency response, and environmental protection.

Existing laws, regulations, LRDP EIR mitigation measures, and LBNL standard operating procedures required by law and included as part of the proposed project would ensure that any potential impacts from the routine transport, use, and disposal of hazardous materials would be *less than significant*.

SP2 Impact HAZ-2: The proposed project would not create a significant hazard to the public or the environment through reasonably foreseeable

¹⁶ LBNL, 2006, *Long-Range Development Plan Environmental Impact Report*, page IV.F-19.

upset and accident conditions involving the release of hazardous materials into the environment. (*Less than Significant*)

Demolition of aging LBNL buildings has the potential to result in the release of airborne asbestos, lead, and other substances. These materials are known to have adverse health effects that could directly impact individuals involved in the demolition process, as well as uninvolved LBNL employees, in open areas near demolition sites.

A survey to identify hazardous materials was conducted in 2008 in Buildings 25/25B, 55, and 71 trailers.¹⁷ The survey identified asbestos-containing materials in thermal pipe insulation, sheetrock, floor tile, transite interior and exterior panels, acoustical ceiling tile, sink undercoating material, and roofing materials in Building 25; in carpet and other flooring materials, ventilation systems, and roofing materials in Building 55; and floor tiles and window caulking in the Building 71 trailers. Lead-based paint was identified on interior surfaces in Buildings 25 and 55. Other hazardous materials noted during the survey included fluorescent light fixtures with presumed PCB ballasts and lighting tubes, coolant gases, mercury thermostats, hydraulic fluid for elevators in Building 55, and an electrical trench with metal debris in Building 25.

To address the hazardous materials issues identified during the survey, as well as other safety issues, a Hazard Analysis Report (HAR) was prepared for the proposed project in 2009.¹⁸ The HAR, prepared in accordance with DOE and UC LBNL guidelines, describes hazards that may be encountered during project construction and operation and outlines policies and procedures to address those hazards. For the proposed project, the construction contractors

¹⁷ Winzler & Kelly, October 2008, *Hazardous Materials Survey, Seismic Upgrade Phase II, Buildings 25, 55, 71 Trailers (C, D, F J, K, P), 85 Penthouse, and Dog Kennels, Lawrence Berkeley National Laboratory.*

¹⁸ LBNL, July 2009, *Hazard Analysis Report for Seismic Life-Safety, Modernization, and Replacement of General Purpose Buildings, Phase 2, Project Number 09-SC072, Lead Program Office: Office of Safety, Security, and Infrastructure, Office of Science, DOE.*

must develop and implement a comprehensive site-specific Injury and Illness Prevention Plan including exposure prevention measures. The contractor must also implement an Asbestos Compliance Work Plan, Lead Compliance Work Plan, Silica Exposure Controls, and the LBNL Radiation Protection Program. A site-specific Soil Management Plan would be prepared in accordance with the LBNL Capital Project Procedures Manual. The construction must also comply with LBNL Penetration Permit procedures and state and federal worker safety regulations.

Project construction would be required to comply with the LBNL Radiological Work Permit Program. In Buildings 25 and 55, where radiological materials have historically been used, whenever construction work exposes previously unexposed surfaces or opens up trenches, ventilation, plumbing, drains, or vacuum lines, the area must be surveyed by a Radiological Control Technician. Radiation testing will be conducted prior to removal of fume hoods, exhaust fans, ducting, vacuum systems, and flooring. UC LBNL EH&S staff will perform a final inspection prior to releasing the space for demolition or construction activity. Project areas found to have building-related chemical, biological, or radiological hazards remaining would be cleaned and decontaminated under the oversight of UC LBNL industrial hygienists and health physicists.

The project manager will ensure that UC LBNL personnel and contractors are informed regarding hazards at the construction site. Regular project site evaluations would be performed during project construction by a safety professional and project engineer to monitor the effectiveness of implemented measures. Specific details for each project component are detailed below.

As described in the Existing Setting section, residual chemical contamination is known to be present in the soil and groundwater in project areas at concentrations below levels that pose a potential risk to site workers, including construction workers. However, previously undiscovered contamination that exceeds these levels could be encountered during demolition activities. The

potential for disturbing this contamination and causing it to spread is described for each project component below.

a. Building 25 Demolition and GPL Construction

i. *Potential Hazardous Materials Releases from Buildings During Demolition*

Building 25 is a complex of industrial and scientific laboratories, offices, and storage facilities and the former home of a particle accelerator, known as the synchrotron.¹⁹ Since the synchrotron was removed in 1960, the building has housed shops and labs that conduct printed circuit, screen-printing, quality assurance, photo fabrication, and microscope and optics repair activities. Given its former uses, hazardous materials may still be present in the building. The 2008 hazardous materials survey identified lead, asbestos, and other hazardous materials within the building. Emissions from demolition activities would be temporary and mitigated by a series of control measures that are part of the project description. The potential for airborne release of contaminated particulates is discussed further in Section 4.2, Air Quality. There would also be air monitoring during the demolition. Demolition work would not commence until each building has been fully evaluated and any required decontamination has been completed. Compliance with measures described in the HAR and applicable laws and regulations would reduce the potential impact from hazardous materials upset related to these demolition activities to a *less-than-significant* level.

ii. *Potential Spread of Groundwater or Soil Contamination from any Past Releases*

Soil and groundwater contamination is present in the Building 25/25B area as described in the LBNL Environmental Restoration Program's Quarterly Progress Reports.²⁰ Exposure of contaminated soil is likely during building demolition. Contact with contaminated groundwater is unlikely due to the depth to groundwater of approximately 15 feet or more. The presence of potential subsurface contamination will be evaluated during the project and remedial

¹⁹ Harvey, D.W., January 2003, *Identification and Evaluation of Old Town Buildings*, Ernest Orlando Lawrence Berkeley National Laboratory.

²⁰ Available online at: <http://www.lbl.gov/ehs/erp/html/documents.shtml>

measures will be taken, if necessary, in accordance with the DTSC-approved RCRA corrective action provisions set forth in the LBNL RCRA Park B hazardous waste facility permit and other applicable environmental laws, regulations, and requirements. As a consequence there would be a *less-than-significant* impact due to potential soil and groundwater contaminant issues at Building 25/25B.

Demolition of Building 25/25B may require the relocation of several groundwater monitoring wells located adjacent to Building 25 by filling in existing wells and drilling new ones. The wells are used to monitor the effectiveness of the corrective measures approved by DTSC (*in-situ* soil flushing) toward achieving the required groundwater cleanup levels for the groundwater contamination at Building 25. Demolition of Building 25 would be beneficial for remediation since it would allow access to the probable source area of the Building 25A lobe for remediation. The groundwater extraction and treatment system is located outside of the construction area, so there would be no impact on the system. Demolition of the Building 25/25B would have a *less-than-significant* impact on the existing groundwater treatment systems that address the contaminated soil and groundwater at the site.

iii. Transport of Hazardous Materials for Building Construction

Construction of the GPL at this site would involve the transport and use of hazardous materials. These materials include, but are not necessarily limited to, engine oils and lubricants, diesel fuels, and adhesives. Transport of these materials within the LBNL property and the handling of them on-site would comply with applicable regulations, and LRDP Mitigation Measures HAZ-3b, HAZ-3c, and HAZ-3d. As such, potential upset from the transportation and use of these hazardous materials during construction would represent a *less-than-significant* impact.

b. Building 55 and Building 71 Trailers Demolition

i. Potential Hazardous Materials Release from Buildings During Demolition

Building 55 has been used as a chemical laboratory and hazardous materials may still be present in the building. The 2008 hazardous materials survey

identified lead, asbestos, and other hazardous materials within the building. Emissions from demolition activities would be temporary and mitigated by a series of control measures that are part of the project description. The potential for airborne release of contaminated particulates is discussed further in Section 4.2, Air Quality. As part of the project description, chemical decontamination would be provided by UC LBNL and there would be monitoring during the demolition. Demolition work would not commence until the building has been fully evaluated and any required decontamination has been completed. Compliance with measures described in the HAR and applicable laws and regulations would reduce the potential impact from hazardous materials upset related to these demolition activities to a *less-than-significant* level.

ii. Potential Spread of Groundwater or Soil Contamination from any Past Releases

Although no soil or groundwater contamination has been identified in the Building 55 area, contamination could be present beneath the building since the building was used as a chemical laboratory. Demolition of Building 55 would involve removing the entire foundation to 3 feet below grade. Because of the shallow depth of excavation, there would be no contact with the underlying groundwater. If no contamination is found under the building, the space will be back-filled with rock and paved with asphalt. If contamination is discovered, it will be addressed in compliance with the DTSC-approved RCRA corrective action provisions in the LBNL RCRA Part B hazardous waste facility permit and other applicable environmental laws, regulations, and requirements.

Demolition of the Building 71 trailers involves removal of the surface structure, which is resting on existing asphalt. The asphalt is not anticipated to be penetrated as a result of this work. There should therefore be no contact with the underlying soil or groundwater.

Due to the safeguards built into the project description and described above, there would be a *less-than-significant* impact due to potential soil and groundwater contaminant issues at Building 55 and Building 71.

c. Building 85/85A Seismic Strengthening

i. *Potential Spread of Hazardous Materials Contamination from Past Releases*

The soil and groundwater around Building 85/85A have been analyzed for potential contaminants, primarily prior to building construction, and no significant contamination has been detected. Since then, according to facility personnel, no spills have occurred.

Sub-grade piers for the seismic strengthening at Building 85/85A would be installed below the building overhang in the lower yard, which receives radioactive and mixed waste. Piles would also be installed on the southeast and northeast sides of Building 85A. Depth to groundwater ranges between approximately 37 and 40 feet below ground surface (bgs) at monitoring well MW 85-96-2, which is south of Building 85; 14 to 16 feet bgs at MW 85-96-1, which is north of Building 85; and 5 to 11 feet bgs at MW 85-95-2, which is east of Building 85A.

As described in the project description, borings for the piers would be approximately 4 to 5 feet wide and 40 to 50 feet deep and are expected to contact groundwater. To minimize the potential for any accidental surface releases entering borings and contaminating groundwater, they would be drilled in dry weather and would be filled as soon as feasible after drilling. The metal piers would be inserted and the holes would be filled with concrete, slowly, to prevent spaces within the structure.

With these safeguards included as part of the project, any impact from the spread of any existing contamination would be *less than significant*.

d. Operation of the GPL

UC LBNL maintains a Hazardous Materials Business Plan, which identifies appropriate procedures for emergency training and response to address the accidental release of hazardous materials. The plan is updated on a regular basis to account for changes in the types, locations, and volumes of hazardous materials used and stored on the main hill site at LBNL. In addition, the on-site fire station, which is located less than 0.5 mile via Lawrence Road from

Building 85 and south of the proposed location of the GPL, would provide first response in the event of a hazardous materials emergency. As a result, operational impacts associated with accidental scenarios relating to hazardous materials would be *less than significant*.

SP2 Impact HAZ-3: The proposed project would not emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school. (*Less than Significant*)

The proposed project site is not located within one-quarter mile of an existing or proposed K-12 school.²¹ Thus, *no impact* would occur during construction, demolition or operation phases.

SP2 Impact HAZ-4: The proposed project would not create a significant hazard to the public or the environment as a result of its location on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5. (*No Impact*)

The proposed project is not located on a site that is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and would not create a significant hazard to the public or the environment as a result. There would therefore be *no impact*.

SP2 Impact HAZ-5: The proposed project is not located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, and would not result in a safety hazard for people residing or working in the project area. (*No impact*)

²¹ *The Thomas Guide Bay Area Metro Street Atlas*, 2005, pages 629 and 630. Jones, Louis. Director of Facilities, Berkeley Unified School District. Personal communication with DC&E staff, March 31, 2008.

There are no public airstrips located in the vicinity of the proposed project site.²² Thus, *no impact* as a result of public airport hazards would occur due to the proposed project.

SP2 Impact HAZ-6: The proposed project is not located within the vicinity of a private airstrip, and would not result in a safety hazard for people residing or working in the project area. (*No impact*)

There are no private airstrips located in the vicinity of the proposed project site.²³ Thus, *no impact* as a result of private airstrip hazards would occur due to the proposed project.

SP2 Impact HAZ-7: The proposed project would not impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan. (*Less than Significant*)

Construction of the proposed project could impair implementation of or physically interfere with an adopted Emergency Response Plan if construction activities fully blocked any roadways or other access ways (i.e., pedestrian pathways). UC LBNL has standard provisions that would confine the area of work and location of support functions (parking) to prevent conflicts with emergency access. Facilities Master Specification 1.04(A) in Section 01020 of the LBNL standard operating procedures requires that an area be set aside for work under each construction contract and shown on contract drawings, and that the contractor confine the work to the immediate area within the construction limits.²⁴ Facilities Master Specification 1.05 (A) requires that parking for contractors and their workers be limited to the construction site limits and as agreed to with the Project Manager.²⁵ Facilities

²² *The Thomas Guide Bay Area Metro Street Atlas*, 2005, pages 629 and 630.

²³ *The Thomas Guide Bay Area Metro Street Atlas*, 2005, pages 629 and 630.

²⁴ *LBNL Facilities Master Specifications*, Division 1 Special Requirements, page 01010-4.

²⁵ *LBNL Facilities Master Specifications*, Division 1 Special Requirements, page 01010-4.

Master Specifications 1.13 (A) and (A)(1) require that the contractor furnish an adequate number of flaggers for all work that may affect the use of roads and that flaggers are posted at the entrance and exit of access roads used for hauling material and at all other areas where normal traffic is subject to disruption.²⁶ LRDP Mitigation Measure HAZ-3f requires an annual update of the LBNL emergency preparedness and response program.

These requirements, which would be included as part of the proposed project, would ensure that construction activities do not have a significant impact on the LBNL Emergency Response Plan. A *less-than-significant* impact would occur.

The GPL is the only proposed project component that could potentially affect emergency access during the operation phase. The GPL would be constructed in a location and manner that would not interfere with emergency access and evacuation routes. As a result, *no impact* to emergency access would occur during the operational phase of the proposed project.

In conclusion, impacts from demolition and construction activities would have a *less-than-significant* impact on the LBNL Emergency Response Plan. There would be *no impact* to emergency access during the proposed project's operational phase.

SP2 Impact HAZ-8: The proposed project would not expose people or structures to a significant risk of loss, injury or death involving wildland fires. (*Less than Significant*)

According to the California Department of Forestry and Fire Protection (CDF) Natural Hazard Disclosure Map Images and Data for Alameda County, Building 85/85A and the proposed location for the GPL are not lo-

²⁶ *LBNL Facilities Master Specifications*, Section 01020, Environment, Safety, and Health General Requirements, page 01-9.

cated in an area that has a substantially high potential for wildland fires.²⁷ However, the LBNL site does contain various types of vegetation and mature trees that could burn during a wildland fire event.

In 1994, UC LBNL published a Wildland Fire Evacuation/Relocation Plan. The plan, which would apply to the proposed project, is based on a wildland fire scenario that would require rapid mobilization of resources, quick decision making and well-coordinated execution by emergency responders during a wildland fire.²⁸ Furthermore, fire management would be considered in the selection of plant stock for post-construction landscaping as per the LBNL vegetation management program.²⁹

Based on information provided by CDF, application of the LBNL Wildland Fire Evacuation/Relocation Plan, the UC LBNL control of vegetative growth around buildings and on the site's perimeters, and strategic selection of plant stock, a *less-than-significant* impact related to wildland fires is anticipated during the operational phase of the proposed project.

E. Cumulative Impacts

SP2 Cumulative Impact HAZ-1: The proposed project in conjunction with other past, present, and reasonably foreseeable projects would not cause impacts associated with hazards and hazardous materials. (*Less than Significant*)

²⁷ California Department of Forestry and Fire Protection, *Natural Hazard Disclosure Map Images and Data for Alameda County*, <http://www.fire.ca.gov/ab6/nhd01.pdf>, accessed March 12, 2008.

²⁸ *Supplemental EIR Addendum for the Proposed Extension of the Contract between the US DOE and the UC Regents for Operation and Management of LBNL*, http://rfplbnl.sc.doe.gov/docs/pdf/lbnl_1997_seir.pdf, page IV-H-1, accessed April 3, 2008.

²⁹ LBNL, 2006, *Long-Range Development Plan Environmental Impact Report*, page IV.F-8.

The project, together with other cumulative projects could expose an increased number of people to hazards, such as potential hazardous materials spills and possible airborne release of hazardous particulates during building demolition. However, these potential project-specific impacts would be less-than-significant through implementation of LBNL standard operating procedures, safeguards incorporated in the project description, and through compliance with local, regional, State and federal regulations, such as those that control the production, use, transport, and disposal of hazardous materials.

Similarly, as the cumulative projects are developed at LBNL, on the UC campus or in nearby communities, local, regional, State, and federal regulations would apply to these developments, thereby reducing the cumulative impacts associated with hazards and hazardous materials to a *less-than-significant* level.

4.8 HYDROLOGY AND WATER QUALITY

This section identifies existing hydrologic and water quality conditions in the project area and analyzes the potential for implementation of the proposed project to affect those resources. Information presented in the discussion and subsequent hydrology and water quality analysis was drawn from site visits, the LBNL 2006 LRDP and EIR, and environmental documents associated with specific LBNL projects. The physical characteristics of the project site and surrounding areas related to hydrology and water quality are discussed.

A. Regulatory Setting

Regulations, plans, and policies exist at federal, State and local levels that address surface water and groundwater quality issues at the project site.

1. Federal Plans and Policies

a. Federal Clean Water Act

The major federal legislation governing the water quality aspects of the proposed project is the Clean Water Act (CWA). The objective of the Clean Water Act is “to restore and maintain the chemical, physical, and biological integrity of the nation’s waters” (Clean Water Act, Section 101(a)). The Clean Water Act requires that point discharges of pollutants to waters of the United States are effectively prohibited, unless the discharge is in compliance with a National Pollutant Discharge Elimination System (NPDES) permit. The U.S. Environmental Protection Agency (EPA) has granted the State of California authority to administer and enforce the State’s NPDES Permit Program. The State Water Resources Control Board (SWRCB) and the Regional Water Quality Control Boards issue both general and individual NPDES permits for certain activities that may result in discharges of pollutants to surface waters (discussed in more detail below). The proposed project would be subject to one or more NPDES permits.

2. State Plans and Policies

a. State Water Resources Control Board and Regional Water Quality Control Board

The Porter-Cologne Water Quality Control Act (Act) established the State Water Resources Control Board (SWRCB) and divided the state into nine regional basins, each with a Regional Water Quality Control Board. The SWRCB is the primary state agency responsible for protecting the quality of the state's surface and groundwater supplies, while the regional boards are responsible for developing and enforcing water quality objectives and implementation plans.

The proposed project area lies within the jurisdiction of the San Francisco Bay Regional Water Quality Control Board (Regional Board), which has adopted the Water Quality Control Plan for the San Francisco Bay Region (Basin Plan) to implement plans, policies, and provisions for water quality management. Beneficial uses of surface waters within the San Francisco Bay Region are described in the Basin Plan and are designated for major surface waters and their tributaries. None of the surface water bodies at LBNL, such as Strawberry Creek, has any designated beneficial uses in the Basin Plan.

The SWRCB has issued two NPDES general permits, described below, that would be relevant to the proposed project.

i. Industrial General Permit

The management of stormwater runoff from industrial sites is regulated in California by the SWRCB under the statewide General Permit for Stormwater Discharges Associated with Industrial Activities (Industrial General Permit). The Industrial General Permit presents the requirements for compliance of certain industries. A wide range of industries is covered under the Industrial General Permit, including mining operations, lumber and wood products facilities, petroleum refining, metal industries, and some agricultural product facilities, such as dairies. LBNL has been complying with the requirements of the General Industrial Permit since 1992. As part of these efforts, LBNL has prepared a site-wide Storm Water Pollution Prevention Plan

(SWPPP) to address operational discharges of pollutants associated with industrial activity (e.g. gasoline dispensing; metal fabrication; transportation, and hazardous waste treatment, storage and disposal). LBNL also conducts annual sampling of stormwater discharges, as required by the Industrial General Permit.

ii. Construction General Permit

Construction activities for projects impacting areas greater than 1 acre are regulated under the NPDES General Permit for Discharges of Storm Water Runoff associated with Construction Activity (Construction General Permit). If the construction activity were to occur prior to July 2010, the existing Construction General Permit (SWRCB Water Quality Order 99-08-DWQ) would apply. Construction projects commenced after July 1, 2010 will be subject to SWRCB Water Quality Order No. 2009-0009-DWQ (NPDES No. CAR000002), which takes effect July 1, 2010. Coverage under a Construction General Permit requires the preparation of a SWPPP (designed to specifically address potential discharges associated with construction) and submittal of a notice of intent (NOI) to comply with the Construction General Permit requirements and conditions. The NOI would be submitted to the Regional Board. The SWPPP must identify erosion and sediment control measures to control stormwater and non-stormwater discharges and hazardous spills to prevent impacts to the beneficial uses of potentially affected waters and wetlands, identify responsible parties, provide a detailed construction timeline, and establish a monitoring and maintenance schedule. The NOI includes site-specific construction activity information and the certification of compliance with the terms of the Construction General Permit. The Construction General Permit establishes that project discharges shall be in conformance with the requirements of the applicable Basin Plan, which is further described below.

3. Local Plans and Policies

The proposed Seismic Phase 2 project involves DOE facilities at LBNL operated by the University of California. The plans and policies that are applicable to the proposed project are UC LBNL's hydrology and water quality

plans as well as relevant strategies in the LBNL 2006 LRDP and mitigation measures in the 2006 LRDP EIR. These plans and policies are presented below.

LBNL is located entirely within Alameda County, with the western part of the LBNL site located within the Berkeley city limits, and the eastern part within the Oakland city limits. The University of California, under Article IX, Section 9 of the California Constitution, is exempt from local land use regulation, including general plans and zoning. However, the University seeks to cooperate with local jurisdictions to reduce any physical consequences of potential land use conflicts to the extent feasible. Therefore, in addition to LBNL and UC plans and policies directly applicable to the proposed project, this section also summarizes County programs and policies and those in the Berkeley and Oakland general plans that relate to hydrology and water quality.

a. LBNL Hydrology and Water Quality Plans and Policies

i. *LBNL Stormwater Pollution Prevention Plan*

As required by the NPDES Industrial General Permit, UC LBNL has prepared and implemented a SWPPP.¹ The purpose of the SWPPP is to identify sources of pollution that could affect the quality of stormwater discharges, and to describe and ensure the implementation of practices to reduce pollutants in the stormwater discharges. Oversight and enforcement of this permit is provided by the Regional Board.

The LBNL SWPPP describes best management practices (BMPs) used to minimize discharges of pollutants to runoff. BMPs have been in place since the first Industrial General Permit was issued by the state in 1992, and are regularly updated.

¹ LBNL Environment, Health and Safety Division, Environmental Services Group, June 2009, *Stormwater Pollution Prevention Plan*, Revision 6. (<http://www.lbl.gov/ehs/esg/Reports/assets/SWPPP2009.pdf>)

The LBNL SWPPP lists potential sources of stormwater contaminants, including a comprehensive list of hazardous substances, chemicals, or other contaminants used throughout the facility. UC LBNL has implemented multiple source controls (such as containment systems for leak and spill control and maintenance of storm drains and streets to remove organic material and dirt) and management controls (such as preventive maintenance of equipment and the development of spill prevention and response programs) in order to minimize stormwater pollutants. Treatment controls (such as oil-water separators and infiltration basins) have in the past generally not been necessary. As required by the Industrial General Permit, UC LBNL collects runoff samples during certain storm events at or near pollutant sources where industrial activities regulated by the General Permit have the potential to be exposed to stormwater. The purposes of the sampling include: 1) verify compliance with the Industrial General Permit; 2) evaluate the effectiveness of the SWPPP and the implemented BMPs; and 3) support future refinements to the sampling plan and SWPPP.²

ii. LBNL Stormwater Management

A master specification incorporating stormwater management among other environmental, health, and safety concerns is part of contract specifications on all construction projects undertaken at the LBNL site. The LBNL stormwater management practices that would be instituted as feasible under the LBNL *Construction Standards and Design Requirements* would include:

- ◆ Stormwater flow management. Management and physical channeling maximize use of the mid-canyon retention basin for both flow originating from development and lands above the site and flow generated within the LBNL site in order to minimize both localized and downstream impacts from storms.
- ◆ General planning. Opportunities to reduce stormwater flow impacts and further improve water quality are integrated into the overall planning of

² West Environmental Services and Technology, January 2, 2009, Lawrence Berkeley National Laboratory, Alameda County, California, *Alternative Storm Water Monitoring Plan*,

the LBNL site. For example, to minimize impervious surface area per vehicle, UC LBNL encourages alternative transportation modes to further reduce parking needs and improve the LBNL Transportation Demand Management performance and shifts parking to lots (as opposed to roadside parking). Parking lots and structures can integrate stormwater treatment systems such as hydrodynamic separators or drain inlet boxes. Most oil/water separators currently located within the site are being replaced.

- ◆ Project siting and design. Evaluation of the quantity and quality of stormwater runoff is integrated into site planning and design so stormwater flows can be effectively managed. Residual increased flows from new impervious surfaces are ameliorated through project-related BMPs and use of the retention/management system.
- ◆ Landscape management. To improve slope stability and reduce erosion, the LBNL landscape management program improves the long-term health of tree stands and encourages native plants.
- ◆ Slope stabilization. Slope stabilization measures such as hydraugers and native vegetation reduce general sediment release and erosion and minimize slumps and resulting erosion and sediment production.
- ◆ Seasonal controls. Seasonal stormwater runoff controls, such as jute netting and fiber rolls, are installed to reduce sediment release and runoff along road edges and in the landscape. These are maintained by UC LBNL.
- ◆ Construction project controls. Active management of construction-related stormwater flows from development sites is a standard part of contract specifications on all construction projects undertaken by UC LBNL. Construction projects employ control measures and are monitored by UC LBNL to manage stormwater flows and potential discharge of pollutants.
- ◆ Elimination of all cross-connections. Labeling of stormwater inlets and minimization of sewer system infiltration have been undertaken to maintain clean stormwater flows.

- ◆ Publicizing program information. The LBNL annual Site Environmental Report is available to the public and provides an overview of recent actions and sampling results. UC LBNL also submits a stormwater annual report to the Regional Board and makes its SWPPP and ASWMP available to the public.
- ◆ Engagement with the community. UC LBNL communicates with the community regarding Strawberry Creek water quality and coordinates with relevant UC Berkeley staff and management personnel on stormwater issues.
- ◆ Pollution prevention. UC LBNL actively promotes pollution prevention and good housekeeping for its Facilities Division operation and maintenance activities, and provides water quality training to Facilities personnel who regularly observe large portions of the site or operate equipment that may potentially discharge liquid. UC LBNL cleans stormwater inlets prior to the winter storm season and utilizes concrete clean-out basins, responds to any spill of oil, gasoline, or hazardous materials, and applies other, similar BMPs on an ongoing basis. An annual general site inspection ensures the effectiveness of these efforts. UC LBNL also maintains a Spill Prevention, Control, and Countermeasure (SPCC) plan that covers petroleum-containing tanks.
- ◆ Oil-water separators. These are used where an extra measure of protection is advisable, and will continue to be deployed where they can be used effectively.
- ◆ Permits. As noted above, UC LBNL obtained a stormwater permit at the inception of the NPDES program in 1992. The LBNL program is based on appropriate BMPs, and plans are periodically updated to reflect evolving knowledge and practices in this field. These measures, which are meant to reduce the quantity and improve the quality of stormwater runoff, consist of:
 - Public education and outreach on stormwater impacts;
 - Public involvement and participation;
 - Illicit discharge detection and elimination;

- Pollution prevention/good housekeeping for facilities operation and maintenance;
- Construction site stormwater runoff control; and
- Post-construction stormwater management in new development and redevelopment.

A complete guide to the LBNL stormwater management measures can be found in the Lab's SWPPP.³

b. LBNL Standard Operating Procedures

The proposed project would incorporate the following LBNL standard operating procedures related to hydrology and water quality:

- ◆ OPER-345: Prohibits discharge of wastewater from washing operations into storm drains.
- ◆ OPER-056 (rev 1): Prior to the release of rainwater catchment from a secondary containment source, an inspection of the system must be performed to verify the liquid is rainwater and not the result of a spill from the tank system, containers, or oil-filled equipment.

c. LBNL 2006 Long Range Development Plan

i. *Principles and Strategies*

The LBNL 2006 LRDP includes fundamental principles that form the basis for the Plan's development strategies. The three principles most applicable to hydrology and water quality as related to new development are to "Preserve and enhance the environmental qualities of the site as a model of resource conservation and environmental stewardship;" "Build a safe, efficient, cost effective scientific infrastructure capable of long-term support of evolving scientific missions;" and "Build a more campus-like research environment."

³ LBNL Environment, Health and Safety Division, Environmental Services Group, June 2009, *Stormwater Pollution Prevention Plan*, Revision 6. (<http://www.lbl.gov/ehs/esg/Reports/assets/SWPPP2009.pdf>.)

Development strategies provided by the LBNL 2006 LRDP are intended to minimize potential environmental impacts that could result from its implementation. Development strategies set forth in the LBNL 2006 LRDP applicable to hydrology and water quality include the following:

- ◆ Protect and enhance the site's natural and visual resources, including native habitats, streams and mature tree stands by focusing future development primarily within the already developed areas of the site.
- ◆ Increase development densities within the most developed areas of the site to preserve open space, and enhance operational efficiencies and access.
- ◆ Site and design new facilities in accordance with University of California energy efficiency and sustainability policies to reduce energy, water, and material consumption and provide improved occupant health, comfort, and productivity.
- ◆ Exhibit the best practices of modern sustainable development in new projects as a way to foster a greater appreciation of sustainable practices at the Laboratory.
- ◆ Reduce the percentage of parking spaces relative to the adjusted daily population.
- ◆ Utilize native, drought-tolerant plant materials to reduce water consumption; focus shade trees and ornamental plantings at special outdoor use areas.
- ◆ Minimize impervious surfaces to reduce stormwater runoff and provide landscape elements and planting to stabilize slopes, reduce erosion and sedimentation.
- ◆ Maintain a safe and reliable utility infrastructure capable of sustaining the Laboratory's scientific endeavors.

ii. Design Guidelines

The LBNL Design Guidelines were developed in parallel with the LBNL 2006 LRDP and were adopted by the Lab following The Regents' consideration of

the LBNL 2006 LRDP. The LBNL Design Guidelines provide specific guidance for site planning, landscape and building design as a means to implement the LRDP's development principles as each new project is developed. Specific design guidelines are organized by a set of design objectives that essentially correspond to the strategies provided in the 2006 LRDP. The LBNL Design Guidelines provide the following specific planning and design guidance relevant to hydrology and water quality:

- ◆ Minimize impacts to disturbed slopes.
- ◆ Minimize further increases in impermeable surfaces at the Lab.
- ◆ Minimize visual and environmental impacts of new parking lots.

d. LBNL 2006 LRDP EIR Mitigation Measures

A series of mitigation measures is included within the LBNL 2006 LRDP EIR. Although this analysis does not tier from that EIR, several of the mitigation measures adopted as part of the 2006 LRDP apply to the proposed project and are included in the Seismic Phase 2 project description.

LBNL 2006 LRDP EIR does not include any mitigation measures focused on hydrology and water quality impacts because all impacts were found to be less than significant. The LBNL site falls within the Strawberry Creek watershed. UC Berkeley is the other large property owner in this watershed. As part of ongoing efforts to coordinate stormwater management efforts within the Strawberry Creek watershed, as well as in response to public comments received as part of the LBNL 2006 LRDP EIR process, UC LBNL expanded its stormwater management practices to reflect the "Continuing Best Practices" outlined in UC Berkeley's 2020 LRDP EIR.⁴ These new measures, which help to clarify certain specific goals to control hydrologic and water quality impacts, are listed below:

- ◆ During the design review process and construction phase, LBNL will verify that the proposed project complies with all applicable requirements and BMPs.

⁴ LBNL, 2006, *Long-Range Development Plan Final Environmental Impact Report*, Appendix A, pages IV.G-16 and 17.

- ◆ LBNL will implement an urban runoff management program containing the BMPs included in the Strawberry Creek Management Plan. LBNL will also continue to comply with its NPDES stormwater permitting requirements by implementing appropriate construction and post construction control measures and BMPs required by project specific SWPPPs. Stormwater Pollution Prevention Plans would be prepared as required by regulation to prevent discharge of pollutants and to minimize sedimentation.
 - ◆ Landscaped areas of development sites will be designed to absorb runoff from rooftops and walkways where feasible. LBNL will ensure that open or porous paving systems be included in project designs wherever feasible, to minimize impervious surfaces and absorb runoff. “Feasibility” is based on site constraints such as topography, slope steepness and stability, soil type and permeability.
 - ◆ To accommodate existing runoff, LBNL will continue to maintain and clean its storm drain system.
 - ◆ Development that encroaches on creek channels and riparian zones will be restricted. Creek channels will be preserved and enhanced, where feasible. An undisturbed buffer zone be maintained between proposed LRDP projects and creek channels.
 - ◆ LBNL will manage runoff into storm drain systems such that the aggregate effect of projects implementing the LRDP is to approximate pre-project runoff volumes.
 - ◆ Any project proposed, with potential to alter drainage patterns, will be accompanied by a hydrologic modification analysis. Such an analysis will then incorporate a plan to prevent increases of flow from the newly developed site, preventing downstream flooding and substantial siltation and erosion.
- e. UC Berkeley Strawberry Creek Management Plan
- In 1987, the UC Berkeley Campus Office of Environmental Health and Safety sponsored a comprehensive study of the Strawberry Creek. The re-

sults of the study were published in December 1987 as the “Strawberry Creek Management Plan.” Implementation of the Strawberry Creek Management Plan significantly improved water quality in Strawberry Creek.⁵ In March, 2008, six technical sections providing status reports of the Strawberry Creek Management Plan were updated and the process for further updates is ongoing. The streams that dissect the LBNL slopes represent about a quarter of the upper Strawberry Creek watershed. The plan contains recommendations on best management practices (BMPs) that should be used throughout the Strawberry Creek watershed to control non-point-source pollution and reduce degradation of water quality, including:

- ◆ Control direct discharges to storm drains. Contractors should not be allowed to wash cement slurry, paint residues, oil or other chemicals into catch basins or storm drains.
- ◆ Evaluate chemical use practices. Use of herbicides and pesticides should be carefully managed and an integrated pest management plan should be implemented.
- ◆ Control littering.
- ◆ Establish public education and information programs.

In addition, the Strawberry Creek Management Plan recommends the use of numerous structural techniques to detain and treat stormwater runoff and erosion control methods (many of which are also required by the NPDES Construction and Industrial General Permits).

f. Alameda Countywide Clean Water Program

In Alameda County, stormwater discharges from 17 participating agencies and cities are regulated by the Alameda Countywide Clean Water Program (ACCWP) under an NPDES permit issued by the Regional Board. The ACCWP prepared and issued a 2001-2008 Stormwater Management Plan intended to reduce the discharge of pollutants in stormwater to the maximum

⁵ U.C. Berkeley, 2009, Strawberry Creek, <http://strawberrycreek.berkeley.edu/creekmgmt/scmgmtplan.html>, accessed on September 8, 2009.

extent practicable and to effectively prohibit unpermitted non-stormwater discharges into municipal storm drain systems and waterways. The current NPDES permit now incorporates descriptions of stormwater management activities and supersedes the 2001-2008 plan.⁶

The Stormwater Management Plan includes a number of management practices and control techniques to reduce the discharge of pollutants in stormwater in Alameda County and addresses municipal government activities, new development controls, and stormwater treatment.

g. City of Berkeley General Plan

Berkeley General Plan policies pertaining to hydrology and water quality include the following:

- ◆ Policy EM-23: Water Quality in Creeks and San Francisco Bay. Take action to improve water quality in creeks and San Francisco Bay.

Actions:

- D) Restore a healthy freshwater supply to creeks and the Bay by eliminating conditions that pollute rainwater, and by reducing impervious surfaces and encouraging use of swales, cisterns, and other devices that increase infiltration of water and replenishment of underground water supplies that nourish creeks.
 - F) Encourage the maintenance and restoration of creeks and wetlands and appropriate planting to cleanse soil, water, and air of toxins.
- ◆ Policy EM-24: Sewers and Storm Sewers. Protect and improve water quality by improving the citywide sewer system.
- E) Ensure that new development pays its fair share of improvements to the storm sewerage system necessary to accommodate increased flows from the development.

⁶ NPDES Permit for Stormwater Discharge: The San Francisco Bay Regional Water Quality Control Board adopted the Municipal Regional Stormwater Permit (MRP) on October 14, 2009.

F) Coordinate storm sewer improvements with creek restoration projects.

◆ Policy EM-25: Groundwater. Protect local groundwater by promoting enforcement of State water quality laws that ensure non-degradation and beneficial use of groundwater.

◆ Policy EM-27: Creeks and Watershed Management. Whenever feasible, daylight creeks by removing culverts, underground pipes, and obstructions to fish and animal migrations.

Actions:

D) Restrict development on or adjacent to existing open creeks. When creeks are culverted, restrict construction over creeks and encourage design solutions that respect or emphasize the existence of the creek under the site.

F) Work in cooperation with adjoining jurisdictions to jointly undertake creek and wetland restoration projects, to improve water quality and wildlife habitat, to allow people to enjoy creeks as part of urban open space.

G) Regulate new development within 30 feet of an exposed streambed as required by the Creeks Ordinance and minimize impacts on water quality and ensure proper handling of stormwater runoff by requiring a careful review of any public or private development or improvement project proposed in water sensitive areas.

H) Consider amending the Creek Ordinance to restrict parking and driveways on top of culverts and within 30 feet of creeks.

◆ Policy S-27: New Development. Use development review to ensure that new development does not contribute to an increase in flood potential.

Actions:

C) Require new development to provide for appropriate levels of on-site retention of stormwater.

- D) Regulate development within 30 feet of an exposed streambed as required by the Preservation and Restoration of Natural Watercourses (Creeks) Ordinance.

h. City of Oakland General Plan

The Open Space, Conservation and Recreation Element of the Oakland General Plan, adopted in 1996, addresses the management of open land, natural resources and parks in Oakland.

Open Space Objective OS-8 is “To conserve open space along Oakland’s creeks, restoring the creeks where feasible and enhancing creek access on public lands.” The following policy is relevant to hydrology and water quality:

- ◆ Policy OS-8.2: Creek Daylighting. Support programs to restore or “daylight” sections of creek that have been culverted or buried in the storm drain system.

Conservation Objective CO-5 is “To minimize the adverse effects of urbanization on Oakland’s groundwater, creeks, lakes and nearshore waters.” The following policies are relevant to hydrology and water quality:

- ◆ Policy CO-5.2: Improvements to Groundwater Quality. Support efforts to improve groundwater quality, including the use of non-toxic herbicides and fertilizers, the enforcement of anti-litter laws, the clean-up of sites contaminated by toxics, and ongoing monitoring by the Alameda County Flood Control and Water Conservation District.
- ◆ Policy CO-5.3: Control of Urban Runoff. Employ a broad range of strategies, compatible with the Alameda Countywide Clean Water Program, to: (a) reduce water pollution associated with stormwater runoff; (b) reduce water pollution associated with hazardous spills, runoff from hazardous material areas, improper disposal of household hazardous wastes, illicit dumping, and marina “live-aboards;” and (c) improve water quality in Lake Merritt to enhance the lake’s aesthetic, recreational, and ecological functions.

Conservation Objective CO-6 is “To protect the ecology and promote the beneficial uses of Oakland’s creeks, lakes, and nearshore waters.” The following policy is relevant to hydrology and water quality:

- ◆ Policy CO-6.1: Creek Management. Protect Oakland’s remaining natural creek segments by retaining creek vegetation, maintaining creek setbacks, and controlling bank erosion. Design future flood control projects to preserve the natural character of creeks and incorporate provisions for public access, including trails, where feasible. Strongly discourage projects that bury creeks or divert them into concrete channels.

B. Existing Setting/Affected Environment

1. Climate

The climate of the San Francisco Bay area is characterized as dry-summer subtropical (often referred to as Mediterranean), with cool wet winters and relatively warmer dry summers. In the vicinity of the project (in the City of Berkeley) the annualized average high temperature for the period of 1893 to 2008 is 64.8° Fahrenheit (F); the average low is 49.3° F. The mean annual rainfall in Berkeley for the same period is approximately 23.3 inches, the majority of which occurs from November through April. Records maintained at the LBNL facility since the 1970s indicate that average annual rainfall at the project site is nearly 30.5 inches per year.⁷ During this period of record (1893 to 2008), annual rainfall in Berkeley has varied from 9.9 inches (1929) to 48.4 inches (1983), with a one-day high of 7.0 inches of precipitation on January 4, 1982.⁸ Analysis of long-term precipitation records indicates that wetter and drier cycles lasting several years are common in the region. In addition, El

⁷ LBNL Environment, Health and Safety Division, Environmental Services Group, June 2009, *Stormwater Pollution Prevention Plan*, Revision 6. (<http://www.lbl.gov/ehs/esg/Reports/assets/SWPPP2009.pdf>.)

⁸ Western Regional Climate Center, 2009, Berkeley, California Station (040693), <http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca0693>, accessed on September 2, 2009.

Niño is expected to last through at least the winter of 2009-2010.⁹ Severe, damaging rainstorms occur in the Bay Area at a frequency of about once every three years.

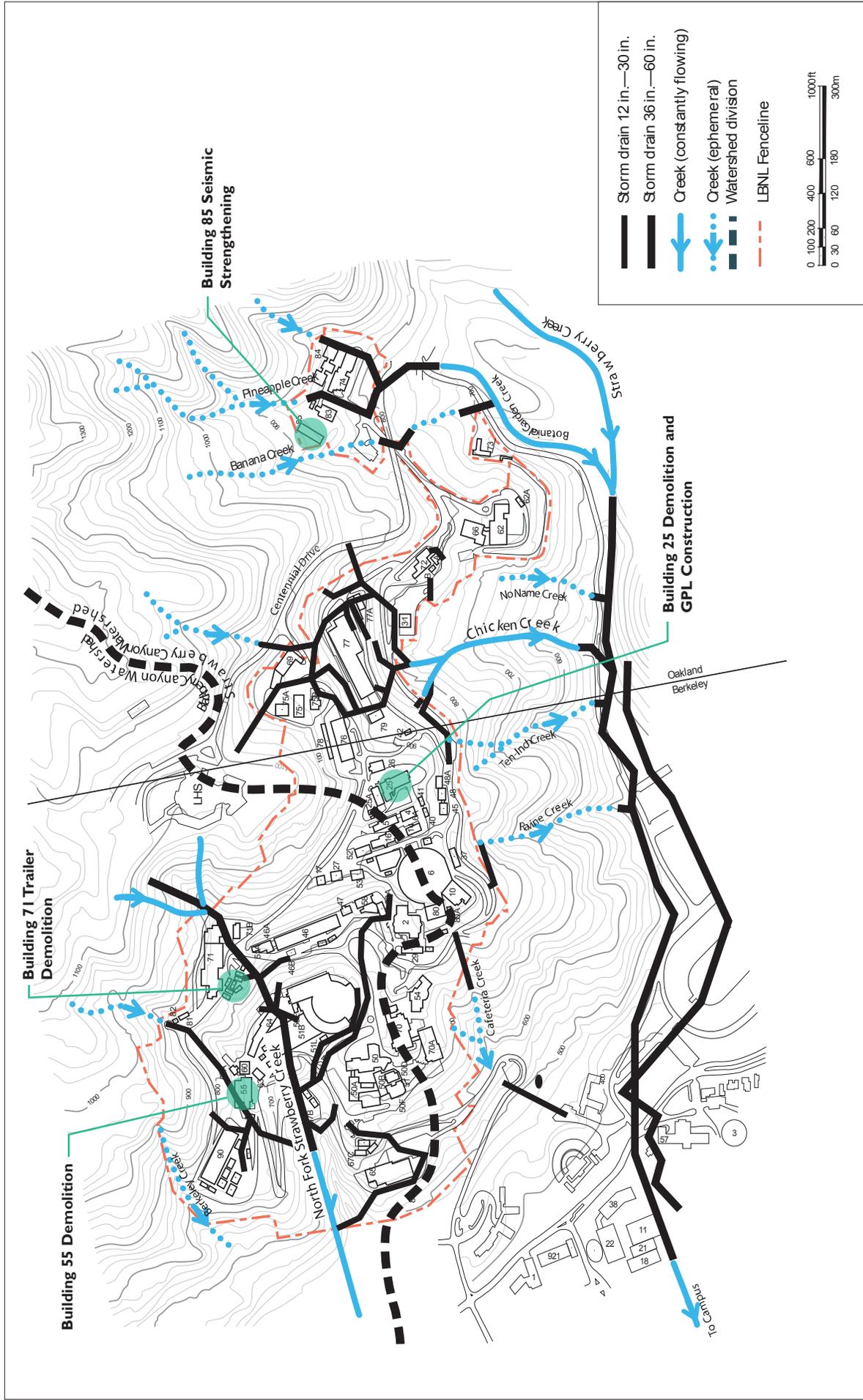
2. Runoff and Drainage

LBNL is located within the Strawberry Creek watershed in an area characterized by three main canyons and related tributaries. A site-wide storm drain system, designed and installed beginning in the 1960s discharges runoff from the northwestern portion of LBNL to the North Fork of Strawberry Creek and the remaining areas in the south and east to the main stem (sometimes referred to as the "South Fork") of Strawberry Creek.

Runoff from the east side of Building 25/25B drains to the east discharging to Chicken Creek, while the runoff from the west side of the building also drains to the east but discharges to Ten-Inch Creek. Both Chicken and Ten-Inch creeks eventually flow into the main stem of Strawberry Creek, which flows into the San Francisco Bay. Runoff from the Building 85 area drains to the East Canyon Outlet and discharges to the main stem of Strawberry Creek. Runoff from the Building 55 area and the Building 71 trailer area drains to the southwest and eventually discharges to the North Fork of Strawberry Creek (Figure 4.8-1).

UC LBNL manages stormwater flows originating from sources upstream of the site and from within the site through engineering controls and management practices. Examples of engineering design features used to control surface water flow include:

⁹ Climate Prediction Center National Centers for Environmental Prediction, NOAA/National Weather Service, November 2009, El Niño/Southern Oscillation (ENSO) Diagnostic Discussion, http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.html, accessed on December 8, 2009



Source: LBNL Environment, Health, and Safety Division, 2009.
Stormwater Pollution Prevention Plan, June, Page 2-5.

FIGURE 4.8-1
STORM WATER POLLUTION PREVENTION PLAN

- ◆ Primary debris interceptors. Structural steel tubes, evenly spaced and embedded in concrete across drainage channels, which remove heavy, floating items such as logs, limbs, stumps, and brush from storm runoff entering the LBNL site from upstream portions of the drainage. Primary debris interceptors prevent blockage of the storm system entrance and potential flooding; as debris collects on the interceptors, these features also function as local seasonal check dams by storing, slowing, and further dissipating energy of larger storm flows.
- ◆ Secondary debris interceptors. Heavy vertical grids of rebar spaced more closely together than primary debris interceptors to filter out smaller debris, constructed downstream from primary interceptors to further manage flows originating upstream of the site as they enter LBNL. Fiber rolls and similar instruments are typically placed seasonally at the secondary interceptors to help filter out suspended soil particles from runoff and act as smaller check dams, silting pools, and energy dissipaters.
- ◆ Rip-rap. Sharp-edged cobblestone typically placed at all entrances and outfall points in the storm drain system. Rip-rap is frequently cemented together and both dissipates energy and protects slopes and channels.
- ◆ Wing walls and head walls. Concrete walls used where open-channel flow enters a piping system to protect embankment and channel walls from erosion. Steel grates on the inlet structure also filter debris which may have bypassed the primary or secondary debris interceptors.
- ◆ Concrete v-ditches. Channels used in all earthwork projects along the tops of cut slopes and at intermediate benches on the face of the slope. V-ditches intercept surface runoff to keep the slope face from eroding and channeling.
- ◆ Jute mesh. Jute mesh installed on all slopes exposed by construction or grading activities on slopes steeper than 2:1 to prevent erosion until hydroseeding and/or ground cover is well established.¹⁰ Mesh is pinned to

¹⁰ UC LBNL hydroseeds with a mixture of native grasses and forbs (herbaceous flowering plants).

the slope with long metal staples and typically reinforces emerging grasslands. Fiber rolls are staked at regular intervals across the faces of slopes to slow down and filter surface runoff.

- ◆ Down drains. Pipes that convey water down the face of slopes from a collection point at the top of the slope to a lower elevation at a stable outfall point to prevent erosion and damage to the slope face.
- ◆ Impervious, semi-pervious and pervious pavements, curbs, berms, and water dispersal systems. Surfaces that convey and control storm runoff to prevent runoff from eroding otherwise unprotected surfaces or from flowing down unprotected slopes.

3. Flooding

The LBNL site is not located within the 100-year flood hazard zone, as mapped by the Federal Emergency Management Agency (FEMA).¹¹ Based on the distance from the project site to the Bay (approximately three miles) and the elevation of the site (more than 500 feet above mean sea level), coastal hazards, such as tsunamis, extreme high tides, and sea level rise would not be a hazard of concern. The project site is not located in any currently mapped dam failure inundation zones.¹²

4. Groundwater Occurrence

Bedrock geology in the Berkeley Hills is complex and includes a variety of moderately to highly deformed sedimentary, volcanic and metamorphic rock units.¹³ Groundwater depths at LBNL vary from at the ground surface (where springs occur) to approximately 100 feet below ground surface. Historic groundwater usage in the area has been minimal. Most of the usable

¹¹ Federal Emergency Management Agency, August 3, 2009, *Flood Insurance Rate Maps, Panel Nos. 06001C0038G and 06001C0019G*.

¹² Association of Bay Area Governments, 2007, *Interactive ABAG (GIS) Maps Showing Dam Failure Inundation Website*. (<http://www.abag.ca.gov>).

¹³ William Lettis & Associates, August 31, 2009, *Paleo-landslide Investigation, Building 25, Lawrence Berkeley National Laboratory, Berkeley, California*.

groundwater resources were found in local tunnels and springs, although these resources proved unsustainable at high pumping rates.¹⁴

Subsurface hydraugers¹⁵ were installed at LBNL to facilitate hillside drainage and improve slope stability. Groundwater collected in these hydraugers is subsequently directed into the LBNL storm drain system, with the exception of groundwater collected in areas surrounding Buildings 6, 7, 46, and 51, where groundwater quality has been affected by historic chemical releases. Flows from hydraugers in areas surrounding Buildings 6, 7, 46, and 51 are treated and the water is subsequently discharged to the sanitary sewer system.

Groundwater flow through bedrock has a typical fracture flow with a slow recharge and low yield. Additionally, LBNL is not underlain by an easily accessible, high-yield, aquifer system that would be capable of supplying many users.

5. Water Quality

The quality of surface water and groundwater in the vicinity of the proposed project is affected by past and current land uses at the site and within the watershed, and the composition of geologic materials in the vicinity. Stormwater runoff from portions of the site where industrial activities occur is monitored, as required under the Industrial General Permit. During the 2008-2009 rainy season, UC LBNL collected runoff sample from three storm events, including the “first flush” runoff event. Relative to U.S. Environmental Protection Agency benchmark values for stormwater,¹⁶ sampling results indicate

¹⁴ City of Berkeley, 2001, *Draft General Plan EIR*.

¹⁵ Hydraugers are in-hill drainage pipes installed at locations throughout the Lab to draw groundwater out of the hillside and prevent saturation of the soil that otherwise could lead to slumps and landslides.

¹⁶ The Draft Final 2005 Industrial General Permit contains parameter benchmark concentrations for certain constituents that are derived from U.S. EPA’s Multi-Sector General Permit. The benchmarks will take effect when the Draft Final Permit is adopted. The benchmarks are not numeric discharge limits, but are used to assess if site Best Management Practices (BMPs) are effective for reducing concentra-

that both the runoff and runoff samples from the LBNL facility are elevated for nitrate, aluminum, iron, magnesium, zinc, and chemical oxygen demand. Sampling results indicate that, in general, pH, total suspended solids, oil and grease, ammonia, and mercury do not exceed U.S. EPA benchmark values.¹⁷

In addition to NPDES-required stormwater sampling, the UC LBNL Environmental Health and Safety Division conducts quarterly sampling of creeks in and near the facility. Most recently, surface water samples were collected in March 2009 from seven creeks flowing from LBNL and analyzed for volatile organic compounds (VOCs) and metals. Samples from two of the creeks (Chicken and North Fork Strawberry creeks) were also analyzed for tritium. No VOCs or tritium were detected. Barium (100 $\mu\text{g}/\text{L}$ maximum) was detected in all seven creeks, zinc (31 $\mu\text{g}/\text{L}$ maximum) in five creeks, vanadium (11 $\mu\text{g}/\text{L}$ maximum) in two creeks, and arsenic (2.8 $\mu\text{g}/\text{L}$) and selenium (2.5 $\mu\text{g}/\text{L}$) in one creek each. Detected metals concentrations were consistent with previous results and are likely naturally occurring.¹⁸

Most of the available information on groundwater quality is related to subsurface contamination investigations. Discussion of data related to contaminant releases and groundwater quality is included in the Section 4.6 Hazards and Hazardous Materials.

tions of pollutants of concern. The Draft Permit requires that if runoff concentrations are above one or more benchmarks, the discharger must revise its SWPPP to include more effective BMPs, and collect samples from the next two consecutive qualifying storms.

¹⁷ LBNL, June 26, 2009, *Stormwater Discharges Associate with Industrial Activity, 2008/2009 Stormwater Annual Report for Facility WDID #2011002421*.

¹⁸ LBNL Environmental Health and Safety Division, August 2009, *Quarterly Progress Report, Second Quarter Fiscal Year 2009 January 1 to March 31, 2009*, page 11.

C. CEQA Significance Criteria

The impact of the proposed project related to hydrology and water quality would be considered significant if it would exceed the following standards of significance, in accordance with Appendix G of the *CEQA Guidelines* and the UC CEQA Handbook:

1. Violate any water quality standards or waste discharge requirements.
2. Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g. the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted).
3. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site.
4. Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site.
5. Create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff.
6. Otherwise substantially degrade water quality.
7. Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map.
8. Place within a 100-year flood hazard area structures which would impede or redirect flood flows.

9. Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam.
10. Cause inundation by seiche, tsunami, or mudflow.

D. Potential Project Impacts

This section discusses impacts to hydrology and water quality resulting from the proposed project during demolition, construction, and operation phases of the proposed project.

SP2 Impact WQ-1: Project demolition, construction, and operation would not result in increased erosion and sedimentation, the potential release of chemicals to stormwater, or a temporary increase in turbidity or decrease in water quality in surface waterways. (*Less than Significant*)

LBNL is situated in the upland areas of Blackberry and Strawberry Canyons within the Strawberry Creek Watershed. Surface water runoff from the LBNL main hill site is collected in the LBNL storm drain system and subsequently discharged into the North Fork and main stem of Strawberry Creek. Drainage from all proposed project components would mix with runoff from other portion of the LBNL facility prior to being discharged downstream. Project activities, including demolition, construction, and operation, have the potential to affect the quality of stormwater runoff.

a. Demolition and Construction-Period Impacts

During the demolition and construction period, razing buildings, grading and excavation activities would result in exposure of demolition debris and soil to wind and rainfall, potentially causing erosion, carrying sediment and contaminants in storm water runoff. Soil stockpiles and excavated areas would be exposed to runoff and, if not managed properly, the runoff could cause erosion and increased sedimentation and pollutants in stormwater.

The potential for chemical releases is present at most construction sites given the types of materials used, including fuels, oils, paints, and solvents. Once released, these substances could be transported to the site drainage system and eventually Strawberry Creek and the San Francisco Bay via stormwater runoff, wash water, and dust control water, potentially degrading water quality.

Proposed project activities (including excavation, grading, and establishment of staging areas) would disturb more than 1 acre. As required by existing NPDES regulations, projects that disturb more than one acre are required to comply with all the terms of the Construction General Permit, including the preparation a SWPPP designed to reduce potential impacts to surface water quality through the demolition and construction period of the project. In addition, as required by the existing LBNL Soil Management Plan,¹⁹ excavated soil must be managed in a way that would not increase sediment in stormwater runoff. Known or suspected contaminated soil must be placed in covered bins or other sealed containers, or stockpiled and covered with plastic sheeting held in place.

The SWPPP must be maintained on-site and made available to the Regional Board staff upon request. The SWPPP must include specific and detailed BMPs designed to control construction-related pollutants. At a minimum, BMPs shall include practices to minimize the contact of construction materials, equipment, and maintenance supplies (e.g. fuels, lubricants, paints, solvents, adhesives) with stormwater. The SWPPP must specify properly designed centralized storage areas that keep these materials out of the rain.

The SWPPP must specify a monitoring program to be implemented by the construction site supervisor, which must include both dry and wet weather inspections. In addition, in accordance with State Water Resources Control Board Resolution No. 2001-046, monitoring would be required during the construction period for pollutants that may be present in the runoff that are “not visually detectable in runoff.”

¹⁹ LBNL Environmental Restoration Program, September 2006, *Soil Management Plan for the Lawrence Berkeley National Laboratory*.

The BMPs that may be implemented, as feasible, during demolition and construction include, but are not limited to, the following:

- ◆ The covering of excavated material.
- ◆ Installation of silt traps, fencing, and use of filter fabric as measures to control erosion and sedimentation and prevent such materials from entering surface water discharges.
- ◆ Truck and construction equipment maintenance and storage to minimize pollutants.
- ◆ Prohibition of cement truck washout to LBNL drains and surfaces.
- ◆ Oversight throughout construction by LBNL project manager(s) and environmental specialists.

If construction activity were to occur prior to July 2010, the existing Construction General Permit (SWRCB Water Quality Order 99-08-DWQ) would apply. For construction activity occurring after July 1, 2010, a new Construction General Permit (Order No. 2009-0009-DWQ, NPDES No. CAR000002) would be in effect. The new Construction General Permit includes numerous requirements not included in the previous Construction General Permit, including Numeric Action Levels for turbidity and pH, more minimum BMPs, requirements for the SWPPP that were previously only suggested by guidance, effluent monitoring and reporting, receiving water monitoring and reporting, post-construction stormwater performance standards, a Rain Event Action Plan, and annual reporting.

Based on development and implementation of a project-specific SWPPP (as required by existing regulations), the project demolition and construction activities would not result in increased erosion and sedimentation, the potential release of chemicals to stormwater, or a temporary increase in turbidity or decrease in water quality in surface waterways. A *less-than-significant* impact would occur.

b. Operation-Period Impacts

The proposed project would incrementally reduce the density of development by removing more buildings than would be built, although the gross square footage would remain the same. However, there would be no increase or decrease in the amount of impervious surface area at the main hill site because the Building 55 excavation will be filled with drain rock and covered with asphalt preventing rainwater intrusion. Building 71 trailers are already underlain by asphalt and that is not expected to be penetrated by the trailer removal.

Therefore, operational runoff rates and volumes would remain the same under the proposed project and impacts related to discharge of pollutants and hydromodification²⁰ would be comparable to the existing condition. A *less-than-significant* impact would occur.

SP2 Impact WQ-2: The proposed project would not deplete groundwater supplies or interfere with groundwater recharge. (*Less than Significant*)

The proposed project would not use water supplied from groundwater sources at or near the site; it would draw water from the East Bay Municipal Utility District (EBMUD) supply system,²¹ which comes from surface water sources.²² Therefore, the proposed project would not need to pump groundwater and would not contribute to the depletion of an established groundwater source. Further, the project would not increase the area of pervious surfaces within the site, relative to the existing condition, resulting in a similar

²⁰ Hydromodification is defined as the alteration of the hydrologic characteristics of coastal and non-coastal waters, which in turn could cause degradation of water resources. In the case of a stream channel, this is the process whereby a stream bank is eroded by flowing water. This typically results in the suspension of sediments in the water course.

²¹ Stanton, Richard. LBNL Project Manager. Personal communication. March 26, 2008.

²² EBMUD, Water Supply, http://www.ebmud.com/water_&_environment/water_supply/, accessed on December 2, 2009.

amount of precipitation that infiltrates into the subsurface and recharge of underlying groundwater. There would be a *less-than-significant* impact to groundwater supplies during demolition, construction or operational phases of the proposed project.

SP2 Impact WQ-3: The proposed project would not substantially alter drainage patterns of creeks or cause erosion in creeks. (*Less than Significant*)

The existing drainage pattern of the sites affected by construction and demolition activities would be maintained. None of the proposed activities, including demolition, would change the topography of a site so that the drainage pattern would be substantially altered. Furthermore, there are no stream or river courses on the affected sites that would be directly or indirectly altered as a result of the proposed changes.

A SWPPP would be prepared for the proposed project to identify BMPs to manage both stormwater and non-stormwater runoff that reaches nearby receiving waters. Implementation of these BMPs would ensure that erosion and siltation is minimized during and following earthwork activities.

Through use of the BMPs, as required under existing regulations, potential impacts related to erosion and siltation during construction activities would be *less than significant*.

There are no activities that would occur during the operational phase that have the potential to result in substantial erosion or siltation, and therefore operational phase impacts would be *less than significant*.

SP2 Impact WQ-4: The proposed project would not substantially alter drainage patterns that could result in flooding. (*Less than Significant*)

Overall there would be no significant change to drainage patterns as the post-construction topography would closely mirror the pre-construction topography.

Minor changes to the drainage patterns at Building 25/25B would be described by the final project plans and drainage plans. No change in impervious cover would occur as a result of either Building 55 demolition (as the excavation will be paved with asphalt after the building is removed), or from 71 trailer demolition (because they are currently on a paved area, which would remain). There would be minor changes to the subsurface drainage patterns at Building 85/85A because of the presence of impermeable concrete plugs proposed as part of the pile borings. However, these would be largely underneath the impermeable building or yard surface and would have minimal effects on surface drainage.

In conclusion, the demolition, construction or operational phases would not substantially alter drainage patterns and would not result in flooding. The impact would be *less than significant*.

SP2 Impact WQ-5: The proposed project would not result in increased runoff that would exceed the capacity of stormwater drainage systems or provide substantial sources of polluted runoff. (*Less than Significant*)

The new GPL would cover a site that is already developed by the existing Building 25/25B and parking lot and its construction would result in no change in impervious area. Demolition of Building 55 and the Building 71 trailers would also result in no net change. Stabilization of Building 85/85A is restricted to modifications to the interior of the existing building, and subsurface work including insertion of pier foundations and tiebacks. As a result, the project would not result in an increase in the volume, velocity, or pollutant loading of stormwater runoff. A *less-than-significant* impact would occur.

SP2 Impact WQ-6: The proposed project would not substantially degrade water quality. (*Less than Significant*)

Handling, storage, and transportation of hazardous materials can result in releases to the environment and impacts to water quality. Each of the project components and related hazardous materials issues is briefly described below. These issues are described in greater detail in Section 4.6, Hazards and Hazardous Materials.

a. Building 25/25B Demolition and GPL Construction

Building 25 was formerly used as a chemical laboratory (including radiological chemistry) and is located in an area of known soil and groundwater contamination (though the remediation has reduced soil and groundwater contamination to levels below established health risk thresholds). Building 25 has been surveyed for hazardous building materials, and abatement procedures would be implemented, prior to demolition, as necessary. Therefore, Building 25/25B demolition and GPL construction would not degrade water quality and the impact would be *less than significant*.

b. Building 55 and Building 71 Trailers Demolition

Building 55 has been surveyed for hazardous building materials, and abatement procedures would be implemented, as necessary. In addition, the available information indicates that there is no subsurface contamination in the vicinity of Building 55. This will be verified by subsurface sampling in accordance with the Soil Management Plan after the concrete slab beneath Building 55 is removed. Therefore, disturbance of soils related to building demolition would not be expected to release contamination that could affect water quality. Therefore, this demolition would result in a *less-than-significant* impact on water quality.

Prior to demolition, the Building 71 trailers would be surveyed for hazardous building materials, and abatement procedures implemented, as necessary. No ground disturbance would occur during the trailer demolition. This is a *less-than-significant* impact.

c. Building 85/85A Seismic Strengthening

Existing groundwater monitoring data in the vicinity of Building 85/85A indicate that groundwater quality downgradient of the building has not been impacted by chemical releases. As described in the Project Description, any borings drilled for the placement of structural support would be backfilled with concrete, effectively eliminating the potential for development of preferential flowpaths and spread of any future contamination, or undetected present contamination. Therefore, the Building 85/85A improvements would result in a *less-than-significant* impact.

SP2 Impact HYDRO-7: The proposed project would not place housing in a 100-year flood hazard area. (*No impact*)

The proposed project does not include the construction of any housing. As a result, *no impact* would occur.

SP2 Impact HYDRO-8: The proposed project would not place structures in a 100-year flood hazard area. (*No impact*)

None of the proposed project components are within FEMA-mapped 100-year flood hazard areas. As a result, there would be *no impact* during the demolition, construction or operational phases of the proposed project.

SP2 Impact HYDRO-9: The proposed project would not expose people or structure to risks involving flooding related to dam or levee failure. (*Less than Significant*)

The project site is not located in any currently mapped dam failure inundation zones.²³ There are no levees near the project site. Therefore, there would be a *less-than-significant* impact related to dam failure inundation or levee failure during the construction or operation of the proposed project.

²³ Association of Bay Area Governments, 2007, Interactive ABAG (GIS) Maps Showing Dam Failure Inundation Website: <http://www.abag.ca.gov>.

SP2 Impact HYDRO-10: The proposed project would not include components susceptible to damage from seiche, tsunami, or mudflow. (*Less than Significant*)

Based on the distance from the main hill site to the Bay (approximately three miles) and the elevation of the site (more than 500 feet above mean sea level), coastal hazards, such as tsunamis, extreme high tides, and sea level rise would not be a concern for the project. The project would not be subject to flooding hazards related to seiches because there are no large, enclosed bodies of water (e.g. a reservoir) near any of the project components. As a result, there would be *no impact* related to tsunamis and seiches during the construction or operational phase of the proposed project.

A mudflow (often referred to as a mudslide) is a flow of dirt and debris that occurs after intense rainfall or snow melt, volcanic eruptions, earthquakes and severe wildfires. A mudflow is a particular type of landslide. Potential landslide and slope instability hazards are discussed in Section 4.5, Geology and Soils. There would be a *less-than-significant* impact from mudflows as a result of the proposed project.

E. Cumulative Impacts

SP2 Cumulative Impact HYDRO-1: The proposed project in conjunction with other past, present, and reasonably foreseeable projects would not cause impacts associated with hydrology and water quality. (*Less than Significant*)

The geographic scope of potential cumulative hydrology and water quality impacts consists of the project site and surrounding watershed lands. For potential cumulative impacts on hydrology and water quality, only those projects that would include grading, excavation, new exterior construction, and/or intensified land use would be expected to be capable of contributing to cumulative hydrology and water quality impacts. Those projects that would include only modifications to building interiors and a relatively similar

intensity of use are not considered in the cumulative hydrology and water quality analysis.

The LBNL 2006 LRDP EIR found no significant cumulative impacts for hydrology and water quality and all the projects listed in Chapter 4.0 were included in that document. As described above in the project-level impact analysis, none of the potential impacts related to hydrology and water quality were found to be significant.

Through compliance with existing NPDES regulations requiring the proper management of discharges, the project's contribution to any localized cumulative impacts related to degradation of surface water quality would not be cumulatively considerable.

The cumulative projects could alter the topography and increase impervious areas in the watershed, resulting in downstream erosion impacts in local creeks. However, the proposed project would not contribute to this potentially significant cumulative impact because the project would not increase the amount of impermeable surface area on the main hill site. There would therefore be a *less-than-significant* cumulative impact.

4.9 LAND USE AND PLANNING

This section includes an assessment of the potential impacts of the proposed project on land use and planning. Sources consulted include the LBNL 2006 LRDP and EIR, with additional sources used where stated.

A. Regulatory Setting

1. Local Plans and Policies

The Seismic Phase 2 project involves DOE facilities at LBNL operated by the University of California on land owned by the University. The University of California, under Article IX, Section 9 of the California Constitution, is exempt from local land use regulation, including General Plans and zoning. As such, only the LBNL plans and policies from the LBNL 2006 LRDP and EIR described below, are applicable to the proposed project.

LBNL is also surrounded on three sides by UC Berkeley lands, for which UC develops and implements plans and policies. This section therefore also summarizes applicable UC Berkeley plans and policies.

Although exempt from local land use regulations, UC nevertheless seeks to cooperate with local jurisdictions to reduce any physical consequences of potential land use conflicts to the extent feasible. Because the western part of the LBNL site is within the Berkeley city limit, this section also summarizes the policies contained in the Berkeley General Plan related to land use and planning.

a. LBNL 2006 LRDP and EIR

The 2006 LRDP provides decision-making guidance for future projects required for the realization of the scientific vision for LBNL over the next 20 years. Together with the EIR, it provides a general land use plan and development framework to guide the siting of new facilities and infrastructure, as well as the preservation of open space and landscape. Specific components of the 2006 LRDP relevant to the analysis of land use in this EIR include the land use plan, the building height map, projected gross square footage (gsf) of occupied building space, adjusted daily population, the framework strategies,

and the principles outlined in the plan. Each of these is briefly described below:

i. Land Use Plan

The LBNL 2006 LRDP Land Use Plan defines four land use zones designed to strengthen existing functional adjacencies and promote an overall density of development appropriate to an efficient and campus-like research environment. The plan establishes a 121-acre Research and Academic zone encompassing the majority of developable area on the main hill campus. Uses present and envisioned in this zone include scientific research and associated support such as administration, health services, security and fire protection. The Commons Cluster zone, centered around the cafeteria and outdoor gathering area at the heart of the campus, gathers together shared uses such as food services, short-term accommodations, gatherings and meetings, and a mass-transit hub. A Support Services zone provides a centralized location for plant operations and support activities, such as shops, environmental services, corporation yards, central mail distribution and maintenance. The fourth zone is the Perimeter Open Space zone, a 56-acre area including easements where future development would be avoided to the extent feasible.

ii. Building Heights

The LBNL 2006 LRDP includes a Building Heights Map to regulate the visual character of LBNL as viewed from important off-site locations. The Map establishes six height zones, each with its own separate height limit. The majority of the main hill campus falls in a zone where maximum building height is limited to four stories, however in one zone consisting of three small, localized areas a height of up to eight stories is permitted. At the center of the main hill campus is a Special Viewshed zone where maximum building height must not extend into the view plane of the Advanced Light Source Building dome when viewed from the intersection of University Avenue and Milvia Street. The Map also defines No Development and Support Structure Only zones at points around the perimeter of the LBNL campus.

The Design Guidelines, developed in parallel with the 2006 LRDP, regulate massing and other features of the buildings constructed in each of the zones. The issue of GPL visibility is addressed in Section 4.1, Aesthetics.

iii. Gross Square Footage (GSF)

Under the LBNL 2006 LRDP, a net increase of 660,000 gsf of occupied building area is projected at LBNL by 2025.¹ This includes the demolition of 320,000 gsf of space that is unsafe or has exceeded its useful life and the construction of 980,000 gsf of new research and support space. This net increase is projected as the LBNL 2006 LRDP calls for greater investment in large scale equipment and the construction of facilities that would allow the return of existing employees to the main hill campus from leased facilities off-site.

iv. Adjusted Daily Population (ADP)

The term adjusted daily population (ADP) describes the actual population associated with LBNL on workdays. It is calculated as the full-time equivalent (FTE) employees plus 40 percent of the number of registered guests so as to account for travel, vacation, part-time employees and the periodic nature of guest visits to LBNL. Traditionally, population at LBNL has fluctuated in response to national research imperatives and associated budgets. Since 1980, population growth at LBNL has been modest and this trend is expected to continue through 2025. The ADP for LBNL as a whole was 4,515 in 2006 and is expected to rise at a rate of 0.9 percent per year throughout the time-frame of the 2006 LRDP. ADP of the LBNL main hill campus was 3,650 in 2006 and is expected to rise to 4,650 by the year 2025. This represents an annual growth rate of 1.09 percent.

v. Framework Strategies

The 2006 LRDP includes a Development Framework and an Open Space and Open Area Framework for the main hill campus. The Development Framework sets out a rationale for siting and regulating development. It organizes the main hill campus into six research clusters, grouping functions that share

¹ LBNL, 2006. *Long-Range Development Plan Draft Environmental Impact Report, page I-1.*

common needs and interests. A network of pedestrian paths links these clusters to the Central Commons area that serves as the social heart of LBNL. Additionally, each cluster has a cluster commons area of its own. The 2006 LRDP also establishes a Service Cluster, centrally locating facilities and shipping/receiving operations.

The Open Space and Open Area Framework defines four primary types of open space at LBNL: Perimeter Open Space, Developed Open Areas, Cluster Open Areas, and Cluster Commons Open Areas. Each has differing characteristics and a distinct purpose, and together they contribute to the enhancement of the campus-like environment.

vi. Principles and Strategies

The 2006 LRDP seeks to strengthen the existing hillside cluster development pattern and foster the growth of a collaborative, campus-like setting. In support of this long range vision, the 2006 LRDP proposes four fundamental principles:

1. Preserve and enhance the environmental qualities of the site as a model of resource conservation and environmental stewardship.
2. Build a safe, efficient, cost effective scientific infrastructure capable of long-term support of evolving scientific missions.
3. Build a more campus-like research environment.
4. Improve access and connections to enhance scientific and academic collaboration and interaction.

In addition to the above general principles, the 2006 LRDP also outlines the following development strategies specific to future land use and development.

Land Use Strategies

- ◆ Protect and enhance the site's natural and visual resources, including native habitats, streams, and mature tree stands by focusing future development primarily within the already developed areas of the site.

- ◆ Provide flexibility in the identification of land uses and in the siting of future facilities to accommodate the continually evolving scientific endeavor.
- ◆ Configure and consolidate uses to improve operational efficiencies, adjacencies, and ease of access.
- ◆ Minimize the visibility of LBNL development from neighboring areas.

Development Framework Strategies

- ◆ Increase development densities within the most developed areas of the site to preserve open space, enhance operational efficiencies, and improve access.
- ◆ To the extent possible site new projects to replace existing outdated facilities and ensure the best use of limited land resources.
- ◆ To the extent possible site new projects adjacent to existing development where existing utility and access infrastructure may be utilized.
- ◆ Site and design new facilities in accordance with University of California energy efficiency and sustainability policy to reduce energy, water, and material consumption and provide improved occupant health, comfort, and productivity.
- ◆ Exhibit the best practices of modern sustainable development in new projects as a way to foster a greater appreciation of sustainable practices at the Laboratory.

vii. Design Guidelines

The LBNL Design Guidelines were developed in parallel with the 2006 LRDP and provide specific guidance for site planning, landscape, and building design. The guidelines are organized around a set of design objectives that correspond to the strategies provided in the 2006 LRDP. As part of the design review and approval process at LBNL, new projects are evaluated for consistency with the design guidelines.

b. LBNL 2006 LRDP EIR Mitigation Measures

A series of mitigation measures is included within the LBNL 2006 LRDP EIR. Although this analysis does not tier from that EIR, several of the mitigation measures adopted as part of the 2006 LRDP apply to the proposed project and are included in the Seismic Phase 2 project description. The LBNL 2006 LRDP EIR has no mitigation measures for land use.

c. UC Policy on Sustainable Practices

The UC Policy on Sustainable Practices is one of the most comprehensive and far-reaching institutional sustainability commitments in the nation.² It establishes guidelines and goals in a wide array of areas, including Sustainable Transportation, Climate Protection Practices, Sustainable Operations and Maintenance, Waste Reduction and Recycling, Environmentally Preferable Purchasing, Sustainable Foodservice, Clean Energy, and Green Building. LBNL is currently working with the UC Office of the President to coordinate compliance and reporting requirements of the *University of California Policy Guidelines for Sustainable Practices*, issued on September 1, 2009.³ UC LBNL is planning to prepare a Climate Action Plan in the coming months.

d. UC Berkeley 2020 Long Range Development Plan

The UC Berkeley 2020 Long Range Development Plan⁴ presents a strategy for land use and capital investment required to meet the academic goals and objectives of the campus through the year 2020. The Plan does not commit to any specific projects; rather it provides a strategic framework for evaluating projects within its purview. The Plan anticipates that the space demanded by university programs on UC Berkeley owned land may grow by up to 18 per-

² University of California, *UC Policy on Sustainable Practices*, <http://www.universityofcalifornia.edu/sustainability/policy.html>, accessed on November 13, 2009.

³ Blair Horst, LBNL Sustainability Coordinator and Energy Manager, *Re: UC Policy of Sustainable Practices*. Memorandum to File. December 2, 2009.

⁴ UC Berkeley, 2005. *2020 Long Range Development Plan*.

cent, or 2.2 million gsf, not including space for housing and parking. Up to 70,000 gsf of that growth may consist of research laboratories.

The Plan proposes several fundamental principles in support of this long range vision, including the following that pertain specifically to land use and development:

- ◆ Preserve our extraordinary legacy of landscape and architecture, and become a model of wise and sustainable growth;
- ◆ Preserve the character and livability of the city around us, and enhance the economic and cultural synergy of city and university; and
- ◆ Ensure each capital investment represents the optimal use of public resources.

In addition to the above general principles, the UC Berkeley 2020 LRDP also outlines objectives specific to future land use and development.

- ◆ Plan every new project to represent the optional investment of land and capital in the future of the campus;
- ◆ Plan every new project as a model of resource conservation and environmental stewardship;
- ◆ Maintain and enhance the image and experience of the campus, and preserve our historic legacy of landscape and architecture;
- ◆ Plan every new project to respect and enhance the character, livability, and cultural vitality of our city environs; and
- ◆ Maintain the Hill Campus as a natural resource for research, education, and recreation, with focused development on suitable sites.

i. Land Use Zones

The UC Berkeley 2020 LRDP divides the campus into the following land use zones:

- ◆ Campus Park: Serves as the central campus location for both academic and cultural activities and is located entirely within the City of Berkeley.

- ◆ Hill Campus: Contains several campus research buildings, but its primary use is natural open space, spanning portions of both the City of Berkeley and the City of Oakland. Approximately 200 acres fall under jurisdiction of LBNL.
- ◆ City Environs: Entire area not designated as Campus Park or Hill Campus, including Adjacent Block areas, the Housing Zone, and other Berkeley Sites. Most of the area lies within the City of Berkeley, while a very small portion is within the City of Oakland.

Under the 2020 LRDP, each zone has a separate framework which establishes policies for land use and project design. In this way, the University seeks to accommodate new programs while ensuring each project enhances the UCB campus.

The UCB Hill Campus covers an area of approximately 800 acres. Development on the UCB Hill Campus is subject to the policies and goals of the Hill Campus Framework. The Hill Campus is subdivided into an Ecological Study Area (ESA), the Botanical Gardens, and several reserve study areas. Policies in the Hill Campus Framework pertain primarily to the preservation of scenic and natural features, but do not apply to LBNL or the proposed project.

e. City of Berkeley General Plan

The Berkeley General Plan assigns land within the city to one of 12 land use designations. The LBNL site is designated as “Institutional,” which includes institutional, government, educational, recreational, open space, natural habitat, woodlands, and public service uses and facilities, such as the University of California, Bay Area Rapid Transit District, Berkeley Unified School District, and East Bay Municipal Utility District facilities.

The Land Use Element of the Berkeley General Plan contains objectives and policies that guide physical development in the city. The following Berkeley General Plan land use policies pertain to University facilities:

- ◆ Policy LU-38: University Impact on City Tax Revenue. Discourage to the maximum extent possible additional use of land by the University that would result in the removal of property from the tax rolls or a reduction of tax revenue to the City.
- ◆ Policy LU-40: Public Use of University Facilities and Grounds. Continue to support maximum opportunities for citizen use of campus libraries and recreational facilities, the maintenance of the hill lands as open space, and the adoption of University development standards and policies to conserve and enhance present open space resources.
- ◆ Policy LU-41: Public Agency Development. Ensure that all land use plans, development, and expansion by public agencies are consistent with city laws, the city's General Plan and Zoning Ordinance to the extent feasible, and the California Environmental Quality Act.

B. Existing Setting

1. Proposed Project Site and Existing Land Use

LBNL is located approximately three miles east of San Francisco Bay in the eastern hills of Berkeley and Oakland. The hillside LBNL site covers approximately 200 acres. Approximately 95 acres, comprising the western portion of the site, lie within the City of Berkeley. That land is designated "Institutional" or "Open Space" in Berkeley's General Plan and zoned "High Density Residential" (R-5 or R-5H) in the City of Berkeley Municipal Code. Slightly over half of LBNL site is within the North Hills area of the City of Oakland. This acreage is designated either "Institutional" or "Resource Conservation Area" in Oakland's General Plan, and is zoned "Estate Residential."

According to the LBNL 2006 LRDP, the majority of existing land use on the LBNL site is devoted to Research and Academics (57 percent), Perimeter Open Space (32 percent), Support Services (8 percent), and Central Commons (3 percent). Existing building types on the site include four major categories: office space, heavy-duty laboratories, wet and dry laboratories, and other uses.

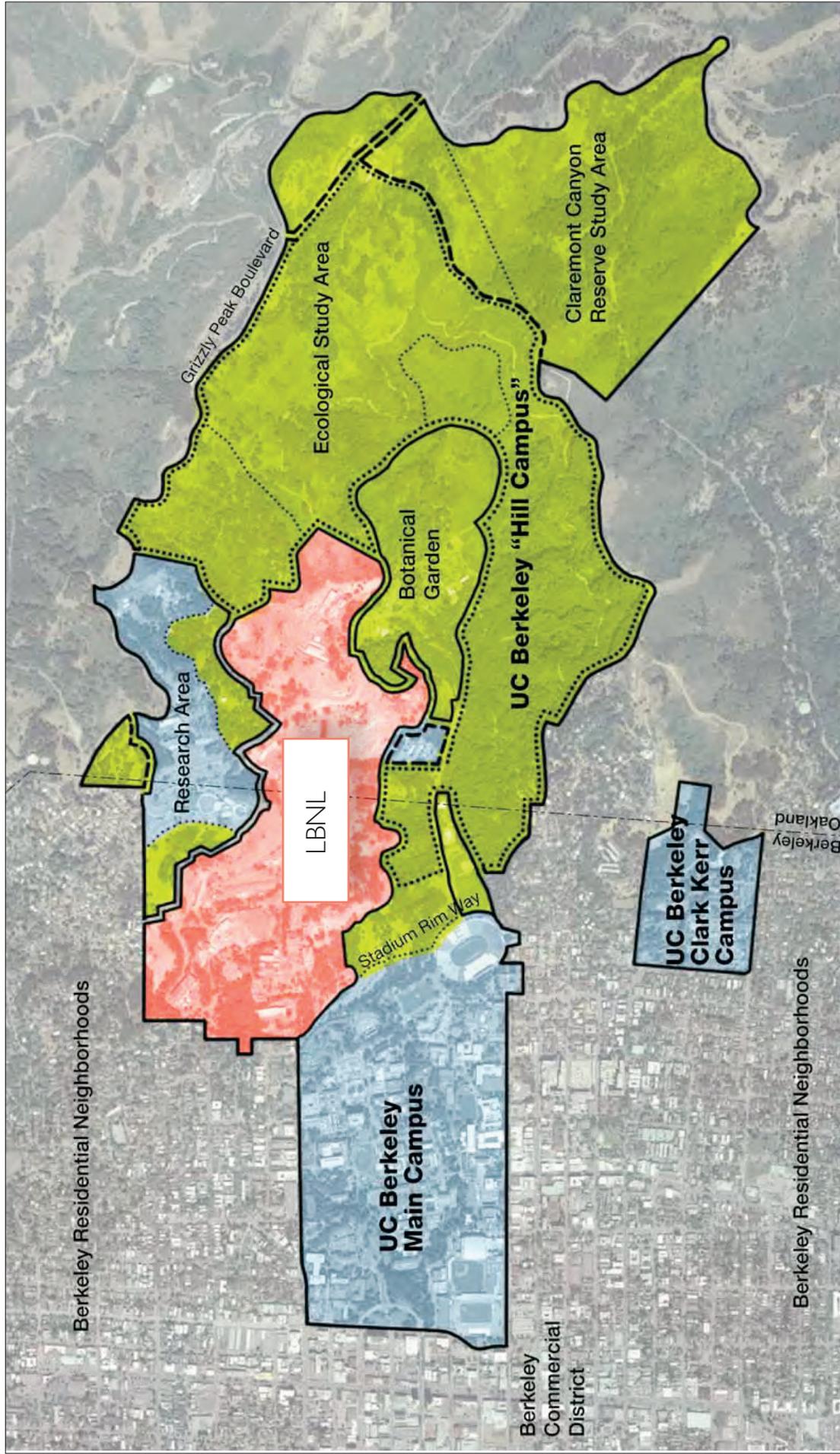
Under the land use classification scheme outlined in the 2006 LRDP, the site proposed for construction of the GPL is located in the Research and Academic zone. Building 55 and Building 71 trailers are also located in the Research and Academic zone. Building 85/85A is in the Support Services zone in the eastern portion of the LBNL main hill campus.

In 2006, LBNL, as a whole, had an ADP of approximately 4,500 people, including 1,400 scientists, 500 administrative staff, and 1,900 technical and support staff. The ADP of the main hill campus was approximately 4,000 people.

2. Surrounding Area

There is both undeveloped and developed land around the LBNL main hill campus, much of which is owned by the University of California. The UC Berkeley main campus is located to the west of LBNL and the proposed project. The majority of land along the ridge to the northeast and southwest of LBNL is undeveloped. Of these undeveloped areas, Hamilton Gulch is located approximately one-quarter mile to the southeast of LBNL and further to the southeast is the Claremont Canyon Regional Preserve (205 acres), which is owned and managed by the East Bay Regional Park District (EBRPD).

Developed land surrounding LBNL contains a mixture of institutional, residential, and commercial uses as shown in Figure 4.9-1. Most notably, the approximately 1,200-acre UC Berkeley campus borders LBNL on three sides. The Lawrence Hall of Science, UC Berkeley Space Sciences Laboratory, and UC Berkeley Mathematical Sciences Research Institute are located on the slopes northeast of the central portion of the LBNL. All of these buildings are a part of the University of California, Berkeley. Finally, the northwest corner of the LBNL abuts low-density residential neighborhoods in the City of Berkeley.



Source: LBNL 2006 LRDP

FIGURE 4.9-1
SURROUNDING LAND USES

C. CEQA Significance Criteria

The impact of the proposed project related to land use and planning would be considered significant if it would exceed the following standards of significance, in accordance with Appendix G of the *CEQA Guidelines* and the UC CEQA Handbook:

1. Physically divide an established community.
2. Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the LRDP, General Plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect.
3. Conflict with any applicable habitat conservation plan or natural community conservation plan.

D. Potential Project Impacts

This section discusses impacts associated with land use and planning resulting from the proposed project.

SP2 Impact LU-1: The proposed project would not physically divide an established community. (*No impact*)

The proposed project would take place primarily on sites that have already been developed or are immediately adjacent to existing buildings and roadways. In the case of building demolition, the removal of structures would serve to increase the amount of open but still accessible space in those areas of LBNL, as opposed to introducing a physical division. The seismic upgrades at Building 85/85A would take place below grade or within an existing building.

The GPL would be constructed on the former location of Building 25/25B. Rather than physically dividing an existing community, its location has been chosen specifically to establish greater continuity between lab/office facilities

and uses in this portion of the LBNL main hill site. As a result, the proposed project would not have any significant impacts in terms of dividing a community and would have the beneficial impact of establishing greater continuity between lab/office facilities and uses in this portion of the LBNL main hill site. There would be *no impact*.

SP2 Impact LU-2: The proposed project would not conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the LRDP, General Plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect. (No Impact)

The proposed project is consistent with the 2006 LRDP and EIR. The proposed project is also consistent with the UC Policy on Sustainable Practices.

The GPL component of the proposed project would be located in the Research and Academic zone established by the LBNL 2006 LRDP and its functions are consistent with this designation. The 2006 LRDP land use designation of Building 85/85A, where seismic strengthening is to take place, would not be affected by the proposed project. The location of the GPL would serve to reinforce the development of research clusters and commons envisaged in the Development Framework of the 2006 LRDP. There would be virtually no net change in gross square footage of occupied building space on the main hill campus as a result of the proposed project.

The relocation of approximately 100 LBNL personnel to the main hill campus would increase population density in a manner consistent with the 2006 LRDP. The ADP of the main hill site would increase by approximately 2.5 percent upon completion of the proposed project. Annualized over the 20 year planning horizon of the LRDP, this equates to 0.15 percent, which is well within the annual growth rate of 1.25 percent projected for the main hill campus in the LRDP.

As discussed above, the GPL facility would be in the Special Viewshed zone established in the 2006 LRDP to regulate the visual character of LBNL as viewed from important off-site locations. The height proposed for the GPL facility is approximately 75 to 80 feet, including the two exhaust stacks which would protrude from the top of the building. When viewed from the intersection of University Avenue and Milvia Street in Berkeley, the GPL is located behind the Advanced Light Source (ALS) Building dome, a building 88 feet in height. Given the relative elevations of the two buildings and the ground on which they stand, the GPL would not be visible behind the ALS Building dome. Therefore, the height proposed for the GPL is consistent with the provisions of the 2006 LRDP.

The proposed GPL facility would be built to LEED Gold standards, which exceeds the target of LEED Silver certification established in the UC Policy on Sustainable Practices. LRDP Mitigation Measure TRANS-1d, which is a part of the proposed project and incorporated into the project description, calls for the expansion of transportation demand management (TDM) programs and projects, in line with the UC Policy. The proposed project is therefore generally consistent with the UC Policy on Sustainable Practices.

As a result, the proposed project would not conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project. There would be *no impact*.

SP2 Impact LU-3: The proposed project would not conflict with any applicable habitat conservation plan or natural community conservation plan. (No Impact)

The proposed project site is not located in an area of LBNL that falls under the jurisdiction of a habitat conservation plan or natural community conser-

vation plan.⁵ Therefore, proposed project would have *no impact* on habitat conservation plans or natural community conservation plans.

E. Cumulative Impacts

SP2 Cumulative Impact LU-1: The proposed project in conjunction with other past, present, and reasonably foreseeable projects would not cause impacts associated with land use and planning. (*No Impact*)

As no impacts have been found for the proposed project, there would be *less-than-significant* cumulative impacts for land use.

⁵ Tatarian, Trish. Wildlife Research Associates. Personal email communication with DC&E staff, March 13, 2009.

LAWRENCE BERKELEY NATIONAL LABORATORY
SEISMIC PHASE 2 PROJECT EIR
LAND USE AND PLANNING

4.10 NOISE

This section includes an assessment of the potential impacts of the proposed project on noise. Information is taken from the LBNL 2006 LRDP and EIR, from field surveys conducted by Illingworth and Rodkin (I&R) in 2006 and 2009, and other references where stated.

Sound is mechanical energy transmitted by pressure waves through a medium such as air. Noise is defined as unwanted sound that interrupts or interferes with normal activity. Sound pressure level is measured in decibels (dB), with zero dB corresponding roughly to the threshold of human hearing, and 120 to 140 dB corresponding to the threshold of pain. The typical human ear is not equally sensitive to all frequencies of the audible sound spectrum. As a consequence, when assessing potential noise impacts, sound is measured using an electronic filter that de-emphasizes the lower frequencies and over-emphasizes the higher frequencies in a manner corresponding to the sensitivity of the human ear. This method of frequency weighting is referred to as A-weighting and is expressed in units of A-weighted decibels, or dBA.

A. Regulatory Setting

1. Local Plans and Policies

The Seismic Phase 2 project involves DOE facilities at LBNL operated by the University of California. The University of California, under Article IX, Section 9 of the California Constitution, is exempt from local land use regulation, including General Plans and zoning. The only plans and policies applicable to the proposed project are contained in the LBNL 2006 LRDP and associated EIR or UC policies that apply to all UC campuses.

Although exempt from local land use regulation, UC nevertheless seeks to cooperate with local jurisdictions to reduce any physical consequences of potential land use conflicts to the extent feasible. Because the western part of the LBNL site is within the Berkeley city limits, and the eastern part is within the Oakland city limits, this section also summarizes policies contained in the Berkeley and Oakland general plans, as well as City of Berkeley and City of Oakland ordinances related to noise.

a. LBNL 2006 LRDP EIR Mitigation Measures

A series of mitigation measures is included within the LBNL 2006 LRDP EIR. Although this analysis does not tier from that EIR, several of the mitigation measures adopted as part of the 2006 LRDP apply to the proposed project and are included in the Seismic Phase 2 project description. The following noise mitigation measures apply to and are a part of the proposed project:

LRDP Mitigation Measure NOISE-1a: To reduce daytime noise impacts due to construction/demolition, LBNL shall require construction/demolition contractors to implement noise reduction measures appropriate for the project being undertaken. Measures that might be implemented could include, but not be limited to, the following:

- ◆ Construction/demolition activities would be limited to a schedule that minimizes disruption to uses surrounding the project site as much as possible. Such activities would be limited to the hours designated in the Berkeley and/or Oakland noise ordinance(s), as applicable to the location of the project. This would eliminate or substantially reduce noise impacts during the more noise-sensitive nighttime hours and on days when construction noise might be more disturbing.

To the maximum extent feasible, equipment and trucks used for project construction shall utilize the best available noise control techniques (e.g. improved mufflers, equipment redesign, use of intake silencers, ducts, engine enclosures and acoustically-attenuating shields or shrouds, wherever feasible). Stationary noise sources shall be located as far from adjacent receptors as possible.

- ◆ At locations where noise may affect neighboring residential uses, LBNL would develop a comprehensive construction noise control specification to implement construction/demolition noise controls, such as noise attenuation barriers, siting of construction laydown and vehicle staging areas, and community outreach, as appropriate to specific projects. The specification would include such information as general provisions, definitions, submittal requirements, construc-

tion limitations, requirements for noise and vibration monitoring and control plans, noise control materials and methods. This document will be modified as appropriate for a particular construction project and included within the construction specification.

LRDP Mitigation Measure NOISE-1b: For each subsequent project pursuant to the LRDP that would involve construction and/or demolition activities, LBNL shall engage a qualified noise consultant to determine whether, based on the location of the site and the activities proposed, construction/demolition noise levels could approach the property line receiving noise standards of the cities of Berkeley or Oakland (as applicable). If the consultant determines that the standards would not be exceeded, no further mitigation is required. If the standards would be reached or exceeded absent further mitigation, one or more of the following additional measures would be required, as determined necessary by the noise consultant:

- ◆ Stationary noise sources shall be muffled and enclosed within temporary sheds, incorporate insulation barriers, or other measures to the extent feasible.
- ◆ Impact tools (e.g., jack hammers, pavement breakers, and rock drills) used for project construction shall be hydraulically or electrically powered wherever possible to avoid noise associated with compressed air exhaust from pneumatically powered tools. However, where use of pneumatic tools is unavoidable, an exhaust muffler on the compressed air exhaust shall be used; this muffler can lower noise levels from the exhaust by up to about 10 dBA. External jackets on the tools themselves shall be used where feasible, and this could achieve a reduction of 5 dBA. Quieter procedures shall be used, such as drills rather than impact equipment, whenever feasible.
- ◆ Noise from idling trucks shall be kept to a minimum. No trucks shall be permitted to idle for more than 10 minutes if waiting within 100 feet of a residential area.

- ◆ If determined necessary by the noise consultant, a set of site specific noise attenuation measures shall be developed before construction begins; possible measures might include erection of temporary noise barriers around the construction site, use of noise control blankets on structures being erected to reduce noise emission from the site, evaluation of the feasibility of noise control at the receivers by temporarily improving the noise reduction capability of adjacent buildings, and monitoring the effectiveness of noise attenuation measures by taking noise measurements.
- ◆ If determined necessary by the noise consultant, at least two weeks prior to the start of excavation, LBNL or its contractor shall provide written notification to all neighbors within 500 feet of the construction site. The notification shall indicate the estimated duration and completion date of the construction, construction hours, and necessary contact information for potential complaints about construction noise (i.e., name, telephone number, and address of party responsible for construction). The notice shall indicate that noise complaints resulting from construction can be directed to the contact person identified in the notice. The name and phone number of the contact person also shall be posted outside the LBNL boundaries.

LRDP Mitigation Measure NOISE-4: Mechanical equipment shall be selected and building designs prepared for all future development projects pursuant to the 2006 LRDP so that noise levels from future building and other facility operations would not exceed the Noise Ordinance limits of the cities of Berkeley or Oakland for commercial areas or residential zones as measured on any commercial or residential property in the area surrounding the future LRDP project. Controls that would typically be incorporated to attain adequate noise reduction would include selection of quiet equipment, sound attenuators on fans, sound attenuator packages for cooling towers and emergency generators, acoustical screen walls, and equipment enclosures.

b. City of Berkeley General Plan

The City of Berkeley's General Plan Environmental Management Element contains guidelines for determining the compatibility of various land uses with different noise environments. Generally, the acceptable 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.). Noise levels over 75 dBA at the boundary with residential areas are, in general, unacceptable. The Environmental Management Element also contains policies and actions aimed at reducing noise levels and incorporating noise considerations into planning decisions.

c. Berkeley Noise Ordinance

The City of Berkeley Community Noise Ordinance lays out a general set of exterior noise standards as well as a set of construction/demolition noise standards. Both sets of standards limit noise levels during the day and night according to the zoning of the area. Areas adjacent to the southwestern portion of LBNL are zoned R-1H, R-2AH, and R-3H and R-5H.¹ Table 4.10-1 summarizes the maximum allowable receiving noise standards in the City of Berkeley.

For construction/demolition noise, with certain exceptions, the Noise Ordinance (Sec. 13.40.070 of the Municipal Code) prohibits operating tools and equipment used in these activities between 7:00 p.m. and 7:00 a.m. on weekdays and 8:00 p.m. and 9:00 a.m. on weekends or holidays such that the sound creates a noise disturbance across a residential or commercial real property line. The Noise Ordinance states that: "where technically and economically feasible," maximum weekday construction noise levels must be controlled so as not to exceed 75 dBA at the nearest properties for mobile equipment (defined as "nonscheduled, intermittent, short-term operation," or less than 10

¹ "H" is a Hillside overlay district designed to protect views and the character of Berkeley's hills, and allows modification of lot sizes and building heights when justified by steep topography, irregular lot size, etc. R-2A districts permit small multiple-family and garden-type apartment structures consistent with adjacent areas and open space requirements.

TABLE 4.10-1 **SUMMARY OF CITY OF BERKELEY MAXIMUM ALLOWABLE RECEIVING NOISE STANDARDS DBA^a**

Zoning District	Daytime 7:00 a.m. to 10:00 p.m.	Nighttime 10:00 p.m. to 7:00 a.m.
General Exterior Noise Standards		
R-1, R-2	55	45
R-3 and above	60	55
Commercial	65	60
Industry	70	70
<hr/>		
	Daytime (Weekdays) 7:00 a.m. to 7:00 p.m.	Weekends and Holidays 9:00 p.m. to 8:00 a.m.
Construction Noise Standards		
<i>Short-Term Mobile (less than 10 days)</i>		
R-1, R-2	75	60
R-3 and above	80	65
Commercial/Industrial	85	70
<i>Longer-Term Stationary (10 days or more)</i>		
R-1, R-2	60	50
R-3 and above	65	55
Commercial/Industrial	70	60

^aNoise level not to be exceeded by more than 30 minutes an hour.

Source: Berkeley Noise Ordinance.

days) and 60 dBA at the nearest properties for stationary equipment (defined as “repetitively scheduled and relatively long-term operation,” or periods of 10 days or more), in R-1 and R-2 zoning districts. In the R-3 district, the permitted noise levels are 5 dBA higher. The noise standards are more restrictive on weekends with levels 10 dBA lower for stationary equipment and 15 dBA lower for mobile equipment.

d. City of Oakland General Plan

The Oakland General Plan contains guidelines for determining the compatibility of various land uses with different noise environments. 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 Noise Element also contains policies regarding noise compatibility, noise control, and community noise exposure.

The City of Oakland also regulates short-term noise through city ordinances, which include a general provision against nuisance noise sources (Planning Code, Section 17.120). 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. Table 4.10-2 presents the maximum allowable receiving noise standards for land uses in Oakland.

e. Oakland Noise Ordinance

The Oakland Noise Ordinance (Oakland Planning Code Sec. 17.120.050) specifies that, for residential receptors, the maximum allowable receiving noise for weekday (Monday through Friday, 7:00 a.m. to 7:00 p.m.) construction activity of greater than 10 days in duration is 65 dBA, while on weekends (9:00 a.m. to 8:00 p.m.) the maximum allowable receiving noise for long-term construction is 55 dBA. For commercial and industrial receptors, the maximum allowable receiving noise for construction activity lasting longer than 10 days is 70 dBA on weekdays and 60 dBA on weekends.

TABLE 4.10-2 CITY OF OAKLAND MAXIMUM ALLOWABLE RECEIVING NOISE STANDARDS, dBA

Cumulative Number of Minutes in Either the Daytime or Nighttime 1-Hour Period ^b	Residential and Civic Uses ^a		
	Daytime 7:00 a.m. to 10:00 p.m.	Nighttime 10:00 p.m. to 7:00 a.m.	Commercial Uses Day or Night
20	60	45	65
10	65	50	70
5	70	55	75
1	75	60	80
0	80	65	85

^a Legal residences, schools and childcare facilities, health care and nursing homes, public open space, or similarly sensitive land uses.

^b The concept of “20 minutes in an hour” is equivalent to the L_{33.3}, which is a noise descriptor identifying the noise level exceeded one-third (33.3 percent) of the time. Likewise, “10 minutes in an hour,” “5 minutes in an hour,” and “1-minute in an hour” are equivalent to the L_{16.7}, L_{8.3}, and L_{1.7}, respectively. L_{max}, or maximum noise level, represents the standard defined in terms of “0 minutes in an hour.”

Source: Oakland Planning Code Sec. 17.120.050.

For construction activity of 10 days or less, the residential receiving standard is 80 dBA on weekdays and 65 dBA on weekends, while the commercial/industrial standards are 85 dBA on weekdays and 70 dBA on weekends. Nighttime construction is subject to the nighttime noise standards in Table 4.10-2.

B. Existing Setting

1. Sensitive Receptors

Some land uses are more sensitive to increases in ambient noise levels than others, due to the type of activities that typically occur at those uses. Residences, hotels, and libraries are more sensitive to noise than commercial and industrial areas.

Sensitive land uses surrounding the LBNL site include residences, parks, student dormitories, and the UC Botanical Garden. LBNL borders residential areas in the City of Berkeley to the west and north. North of the central portion of LBNL, located on the slopes above the site, are the Lawrence Hall of Science, the Space Sciences Laboratory, and the Mathematical Sciences Research Institute, which are all considered sensitive land uses. The UC Botanical Garden is immediately east of the LBNL main hill campus, relatively close to Building 85/85A. Finally, there are several vibration-sensitive laboratories and scientific instruments within other LBNL facilities. Potential vibration effects on these laboratories and instruments would be managed through internal communication and project coordination.

2. Existing Noise Levels and Sources

Within the boundaries of LBNL, the majority of ambient noise is generated by automobile and shuttle bus traffic on the roadway network. Stationary equipment such as heating ventilation, and air-conditioning (HVAC) equipment and pumps, generators, cooling towers and exhaust hoods also contribute to ambient noise levels. Additionally, intermittent high-altitude jet aircraft overflights contribute to ambient noise levels. Measurements reported in the LBNL 2006 LRDP EIR are shown in Table 4.10-3. The average daytime noise level was measured at 54 dBA L_{eq} and noise levels ranged from 45 dBA L_{90} to 71 dBA L_{max} . Measurement sites 1 and 13 characterize the residential neighborhoods in the vicinity of the main hill campus. At site 1, 299 Panoramic Way, which is in the Panoramic Hill neighborhood approximately 0.4 mile from the project site, the measured daytime noise level was 46 dBA L_{eq} and the maximum level was 53 dBA L_{max} . At Site 13, at the end of Canyon Road, which is approximately 0.35-mile from the project site, the

**LAWRENCE BERKELEY NATIONAL LABORATORY
SEISMIC PHASE 2 PROJECT EIR
NOISE**

TABLE 4.10-3 **MEASURED NOISE LEVELS IN THE PROJECT VICINITY**

Site No.	Measurement Location	Noise Level in dBA ^a			
		L _{eq}	L _{max}	L ₁₀	L ₉₀
Based on 15-Minute Noise Measurement Data					
1	299 Panoramic Way	46	53	NM	NM
2	Foothill Student Housing Parking Lot	57	67	58	49
3	Tibetan Nyingma Institute (north side)	48	57	49	46
4	LBNL Building 76	68	81	68	64
5	LBNL Building 85/85A	53	72	51	46
6	LBNL Building 74	64	81	63	59
7	LBNL Buildings 62 and 63	54	71	53	45
8	LBNL Buildings 6 and 7	58	68	60	54
9	LBNL Building 71	60	74	62	46
10	LBNL Buildings 56 and 61	52	61	54	49
11	LBNL Building 65	66	83	70	48
12	LBNL Building 70A	58	73	59	50
13 ^b	End of Canyon Road	58	68	60	53
14 ^b	Hearst Avenue at Highland Place	64	80	55	57

Notes: NM = Not Measured

^a L_{eq} = equivalent steady-state noise level over a 1-hour period produced by the same noise energy as the variable noise levels during that period; L_{max} = instantaneous maximum noise level; L₁₀ = noise level exceeded 10 percent of the time; L₉₀ = noise level exceed 90 percent of the time.

^b Noise measurement reported in UC Berkeley LRDP EIR, Table 4.9-3.

Source: LBNL, 2006, *Long-Range Development Plan Environmental Impact Report*, Table IV-1.3 Measured Noise Levels on Within the Vicinity of the Project Area, page IV-1.7.

average noise level was 58 dBA L_{eq} and noise levels ranged from 53 dBA L_{90} to 68 dBA L_{max} .

Ambient noise levels were monitored by I&R in the Panoramic Hill neighborhood in February 2006 and these are included in Table 4.10-4. Noise measurements were made continuously over several weekdays and a weekend at three different locations in the neighborhood. The 24-hour day/night average noise level typically ranged from about 54 dBA DNL to 57 dBA DNL at each of the three sites over the five-day period. Background ambient noise levels were typically in the range of 45 to 50 dBA L_{90} during the daytime and 40 to 45 dBA L_{90} at night.² Ambient noise levels were monitored by I&R in September 2009 at the common boundary between LBNL and the UC Botanical Garden behind Buildings 74 and 84. The average sound level during the mid-afternoon measurement was 47 dBA L_{eq} . The background level was about 43 dBA L_{90} and maximum noise levels resulting from traffic on Centennial Way ranged from 50 to 58 dBA. Noise levels were also measured between Buildings 25 and Building 4, and between Buildings 25 and Building 26. Average noise levels at both locations during the mid-afternoon measurements were 50 dBA L_{eq} . Background levels were 46 to 47 dBA L_{90} and maximum levels resulting from vehicular traffic ranged from 59 – 61 dBA L_{max} . Jet aircraft overflights were typically in the range of 49 to 53 dBA.

C. CEQA Significance Criteria

The impact of the proposed project related to noise would be considered significant if it would exceed the following standards of significance, in accordance with Appendix G of the *CEQA Guidelines* and the UC CEQA Handbook:

1. Expose persons to or generate noise levels in excess of standards established in any applicable plan or noise ordinance, or applicable standards of other agencies.

² Southeast Campus Integrated projects Draft EIR, 2006.

TABLE 4.10-4 **AMBIENT NOISE LEVELS NEAR PROJECT**

Type of Measurement	February 2006		
	Three Locations Near Panoramic Hill	September 2009 LBNL/Botanical Garden	September 2009 Bldg 25/4 and Bldg 25/26
24-hour day-night average	54 – 57 dBA DNL		
Background ambient noise, daytime	45 – 50 dBA L ₉₀		
Average, mid-afternoon		47 dBA L _{eq}	50 dBA L _{eq}
Background, mid-afternoon		43 dBA L ₉₀	46-47 dBA L ₉₀
Maximum, mid-afternoon		50-58 dBA L _{eq}	59-61 dBA L _{max}
Jet aircraft overflights, mid-afternoon			49-53 dBA
Background ambient noise, nighttime	40 – 45 dBA L ₉₀		

Source: I&R, 2009.

2. Expose persons to or generation of excessive groundborne vibration or groundborne noise levels.
3. Result in a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project.
4. Result in a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.
5. Result in exposure of people residing or working in the project area to excessive noise levels if the project is located within an area covered by an airport land use plan, or where such a plan has not been adopted, within two miles of a public airport or public use airport; or
6. Result in exposure of people residing or working in the project area to excessive noise levels if the project is located in the vicinity of a private airstrip.

D. Potential Project Impacts

This section examines whether the proposed project would result in significant impacts related to noise.

SP2 Impact NOISE-1: The proposed project would not expose persons to, or generate, noise levels in excess of standards established by any applicable plan or noise ordinance, or applicable standards of other agencies. (*Less than Significant*)

As noted earlier, LBNL as a federal facility operated by the University of California on land owned by the University is exempt from local plans and ordinances. However, the University seeks to cooperate with local jurisdictions to reduce any physical consequences of potential land use conflicts to the extent feasible. Accordingly, UC LBNL seeks to adhere to the City of Berkeley Noise Ordinance, the Environmental Management Element of the City of Berkeley General Plan, and the City of Berkeley Municipal Code noise guidelines. LBNL also seeks to adhere to the corresponding City of Oakland General Plan and Noise Ordinance.

As discussed above and shown on Table 4.10-1, the City of Berkeley Noise Ordinance, Section 13.40.070, establishes one set of general external noise standards for operational noise and a separate set of time frames and maximum sound levels for construction and demolition noise. Generally, residential exterior noise limits are established in terms of the median hourly (L50) sound level. The limits are adjusted upward in 5 dB increments for sounds of shorter duration. In residential areas, the L50 limits range from 55 dBA to 60 dBA during the daytime (7:00 a.m. to 10:00 p.m.) and 45 dBA to 55 dBA during the nighttime (10:00 p.m. to 7:00 a.m.).³

For construction and demolition activities, the ordinance prohibits operation of equipment between 7:00 p.m. and 7:00 a.m. on weekdays and between 8:00

³ LBNL, 2006, *Long-Range Development Plan Environmental Impact Report*, page IV.I-4.

p.m. and 9:00 a.m. on weekends and holidays. The ordinance differentiates between maximum sound levels for short-term mobile construction equipment and longer-term stationary equipment, and within residential and Commercial/Industrial land uses. Noise limits range from 60 dBA to 85 dBA for mobile equipment and from 50 dBA to 70 dBA for stationary equipment, for various land uses as shown on Table 4.10-1.

According to the City of Oakland Noise Ordinance, for commercial and industrial receptors, the maximum allowable receiving noise for construction activity greater than 10 days is 70 dBA on weekdays and 60 dBA on weekends.

Project construction and demolition activities would temporarily elevate noise levels at and in the vicinity of the project sites. Project operation would also change ambient noise levels. These changes in noise levels are evaluated below for their potential to significantly affect on-site and off-site sensitive receptors.

Noise from construction activities would result primarily from the operation of equipment. Construction preparation activities, such as excavation, grading, earth moving, and stockpiling operations, result in elevated noise levels. Construction activities, such as foundation work, framing, and finishing operations, would also generate noise. Construction-related noise levels at and near the project site would fluctuate, depending on the particular type, number, and duration of uses of various pieces of construction equipment. Noise levels representative of the various construction phases at 50 feet from the noisiest piece of equipment and 200 feet from the rest of the equipment associated with that phase are shown in Table 4.10-5.

In addition, impulsive noises generated by certain types of construction (such as earth compactors and pile driving) can be particularly annoying. Table 4.10-6, shows typical noise levels produced by various types of construction equipment when the receiver is at a distance of 50 feet. Standard demolition activities employ equipment similar to that used for construction activities

TABLE 4.10-5 **TYPICAL CONSTRUCTION NOISE LEVELS**

Construction Activity	Noise Level (L_{eq}) ^a
Ground Clearing	84
Excavation	89
Foundations	78
Erection	85
Finishing	89

^a Average noise levels correspond to a distance of 50 feet from the noisiest piece of equipment associated with a given phase of construction and 200 feet from the rest of the equipment associated with that phase.

Source: U.S. Environmental Protection Agency, December 1971, *Noise from Construction Equipment and Building Operations, Building Equipment, and Home Appliances*.

and would have similar, but shorter duration, noise impacts. The spatial separation between the proposed project site and the closest sensitive receptor would be a mitigating factor.

a. Building 25/25B Demolition and GPL Construction

Building 25/25B and the proposed location for the GPL is in the Old Town area in the middle of the LBNL site and at least 0.3-mile from a recreation area and the nearest residences, the closest of which are in the Panoramic Hill neighborhood of Strawberry Canyon to the south. Taking into account the distance between the Building 25/25B site and these nearest receptors, the predicted maximum noise levels are 60 dBA L_{eq} at the Strawberry Canyon Recreation Area and 57 dBA L_{eq} at the nearest residences in the Panoramic Hill neighborhood. However, due to the inclusion of LBNL 2006 LRDP EIR Mitigation Measure NOISE-1a, as part of the project description, project construction would be limited to between the hours of 7.00 a.m. and 7.00 p.m. on weekdays, non-holidays. This would avoid the potentially significant

TABLE 4.10-6 **CONSTRUCTION EQUIPMENT 50-FOOT NOISE EMISSION LEVELS**

Equipment Category	L_{max} Level (dBA)	Impact/ Continuous
Arc Welder	73	Continuous
Auger Drill Rig	85	Continuous
Backhoe	80	Continuous
Bar Bender	80	Continuous
Boring Jack Power Unit	80	Continuous
Chain Saw	85	Continuous
Compressor	70	Continuous
Compressor (other)	80	Continuous
Concrete Mixer	85	Continuous
Concrete Pump	82	Continuous
Concrete Saw	90	Continuous
Concrete Vibrator	80	Continuous
Crane	85	Continuous
Dozer	85	Continuous
Excavator	85	Continuous
Front End Loader	80	Continuous
Generator	82	Continuous
Generator (25 KVA or less)	70	Continuous
Gradall	85	Continuous
Grader	85	Continuous
Grinder Saw	85	Continuous
Horizontal Boring Hydro Jack	80	Continuous
Hydra Break Ram	90	Impact
Impact Pile Driver	105	Impact
Insitu Soil Sampling Rig	84	Continuous
Jackhammer	85	Impact
Mounted Impact Hammer (hoe ram)	90	Impact
Paver	85	Continuous
Pneumatic Tools	85	Continuous
Pumps	77	Continuous
Rock Drill	85	Continuous
Scraper	85	Continuous
Slurry Trenching Machine	82	Continuous
Soil Mix Drill Rig	80	Continuous
Street Sweeper	80	Continuous

TABLE 4.10-6 **CONSTRUCTION EQUIPMENT 50-FOOT NOISE EMISSION LEVELS (CONTINUED)**

Equipment Category	L _{max} Level (dBA)	Impact/ Continuous
Tractor	84	Continuous
Truck (dump, delivery)	84	Continuous
Vacuum Excavator Truck (vac-truck)	85	Continuous
Vibratory Compactor	80	Continuous
Vibratory Pile Driver	95	Continuous
All other equipment with engines larger than 5 HP	85	Continuous

Source: National Cooperative Highway Research Program (NCHRP), 1999, Mitigation of Nighttime Construction Noise, Vibrations, and Other Nuisances.

noise impact associated with demolition and construction activities at this site. Projected noise levels would therefore be below the maximum allowable levels set forth in the City of Berkeley Noise Ordinance. This impact would be *less than significant*.

b. GPL Operation

After construction, the GPL would produce some noise through operation of machinery, notably the HVAC system. There would also be some additional vehicle trips to and from the GPL contributing noise in the parking lot around the building and on McMillan Road. The most significant noise sources related to LBNL buildings are cooling towers. Noise levels resulting from representative cooling towers at LBNL were monitored in January 2009. Cooling tower noise is somewhat directional and depends on the orientation with respect to the receivers and the sloping topography. Noise levels ranged from about 65 to 70 dBA at a distance of approximately 50 feet to the side of the towers. Noise from ventilation fans are typically at least 10 dBA lower.

The nearest residences to the GPL would be located approximately 1,800 feet to the north and south. Two outdoor cooling towers are proposed on the south side of the GPL. The noise level from the cooling towers and heating ventilating and air-conditioning systems associated with the GPL is calculated

to be 40 dBA L_{eq} or less at the nearest residences, about equal to the lowest nighttime ambient noise level. The Lawrence Hall of Science, located on the hillside above the GPL, has an outdoor activity area located about 850 feet from the GPL site. The noise level from the cooling towers and heating, ventilating, and air-conditioning systems associated with the GPL is calculated to be 45 to 50 dBA at the most affected location outside the Lawrence Hall of Science, without accounting for reductions in the noise due to shielding from the GPL building itself. Such levels would have no impact on speech or activities and would be indistinguishable from the noise of other equipment and distant traffic. Furthermore, in compliance with LRDP Mitigation Measure NOISE-4 which is incorporated into and made a part of the proposed project description, all mechanical equipment will be selected and building designs prepared so that noise levels from the operation of the GPL would not exceed the Noise Ordinance limits of the cities of Berkeley or Oakland for commercial areas or residential zones as measured on any commercial or residential property in the area surrounding the proposed project. The impact from the noise generated by the operation of the GPL cooling towers and mechanical equipment would be *less than significant*.

The increase in vehicular traffic from operation of the GPL will be minor as the anticipated increase in LBNL hill site population would only be around 100. As described in Section 4.12, Transportation and Traffic, the LBNL Transportation Demand Management program contains strategies that have made, and continue to make, significant reductions to the number of vehicle trips to and from LBNL. With this program in place and continued development of quieter passenger vehicles such as electric and hybrid vehicles, the noise impact from the additional vehicles is considered *less than significant*.

c. Building 55 and Building 71 Trailers Demolition

The proposed project activity that would be closest to residential receptors in the City of Berkeley would be the demolition of the Building 71 trailers and Building 55. Building 55 is about 550 feet from the closest residences on Campus Drive, and the Building 71 trailers are 650 feet away from the closest Campus Drive residences. Taking into account the distance between Building

55 and the nearest residences on Campus Drive, and without considering any excess attenuation due to topographical shielding, molecular absorption, or ground absorption, the predicted maximum noise level is 67 dBA L_{eq} . Projected noise levels are above the 60 dBA maximum allowable levels set forth in the City of Berkeley Noise Ordinance for typical weekday daytime construction. Hourly average noise levels equal to or less than the maximum levels would be expected to occur intermittently throughout the demolition of Building 55. LRDP Mitigation Measure NOISE-1a which would require construction/demolition contractors to implement noise reduction measures appropriate for the project being undertaken, which could include a limited schedule, quiet equipment, and special controls such as a noise attenuation barrier. Noise attenuation barriers in the form of solid barriers or blankets can provide up to approximately 10 dBA of attenuation of noise associated with demolition and construction of buildings. These measures would reduce the maximum noise associated with demolition at Building 55 to levels lower than the 60 dBA maximum allowable levels as set forth in the Berkeley Noise Ordinance.

Demolition of the Building 71 trailers is not anticipated to contribute measurably to demolition noise levels in this area because these are small structures that would be demolished relatively quickly using small equipment. This is a *less-than-significant* impact.

d. Building 85/85A Seismic Strengthening

Building 85/85A, that would be seismically strengthened, is located in the City of Oakland. The facility is about 750 feet away from the UC Botanical Garden, which includes open areas frequented by members of the public and UC Botanical Garden's staff. (Building 25/25B and Building 55 that would each be demolished are about a ½-mile away from the UC Botanical Garden. Because of the distance, noise from activities on these sites would not affect the UC Botanical Garden.)

As discussed above, the City of Oakland Noise Ordinance limits the maximum allowable receiving noise for commercial/industrial receptors⁴ for weekday construction activity lasting longer than 10 days, to 70 dBA. The maximum noise level expected from seismic strengthening activities would result from pneumatic impact tools that generate noise levels ranging from 85 to 90 dBA at 50 feet. Taking into account the distance between Building 85/85A and the UC Botanical Garden, the predicted maximum noise level is 66 dBA. Projected noise levels are below the maximum allowable levels set forth in the City of Oakland Noise Ordinance. This is a *less-than-significant* impact.

e. Construction Truck Traffic

Demolition and construction required for all elements of the proposed project would generate construction-related material truck trips. Construction traffic could use Centennial Drive via the Strawberry Gate, or could enter and exit LBNL via the Blackberry Gate. Construction trucks are expected to use the City-designated truck route consisting of University Avenue, Oxford Street, and Hearst Avenue, to access the lab. Existing noise levels along these City streets range from 69 to 70 dBA L_{dn} along Hearst Avenue and from 70 to 73 dBA L_{dn} along University Avenue. The existing noise level along Centennial Drive is about 65 dBA L_{dn} .

Fehr and Peers Transportation Consultants analyzed anticipated construction truck trips for LBNL in December 2008. These data were updated by LBNL for this EIR. The analysis of truck trips includes all the proposed project components and other reasonably foreseeable projects at LBNL. Assuming a worst case scenario, with all of the truck trips utilizing a single truck route, either the Centennial Drive – Stadium Rim Way – Gayley Road – Hearst Avenue – Oxford Street – University Drive route or the Hearst Avenue – Oxford Street – University Avenue route, the maximum daily level of construction truck trips would cause noise levels to increase by less than 1 dBA

⁴ The Oakland Noise Ordinance has only two categories of receptors: commercial/industrial, and residential. It was considered more appropriate use the commercial/industrial limit than the residential, because the UC Botanical Garden does not include permanent housing.

along the truck routes. The noise of individual truck trips would be distinguishable from other traffic in the same way that existing louder vehicles, including trucks, shuttle busses and city buses are distinguishable from other traffic on the roadway. However, the construction truck trips would not increase average daily noise levels by more than 1 decibel. The impact related to noise from project related construction vehicle trips would be *less than significant*.

Overall, with incorporation of the LRDP mitigation measures into the project description, the proposed project would not expose persons to, or generate, noise levels in excess of standards established by the neighboring jurisdictions in their local noise ordinances. The impact would be *less than significant*.

SP2 Impact NOISE-2: The proposed project would not expose persons to, or generate, excessive groundborne vibration or groundborne noise levels. (*Less than Significant*)

Construction methods that could cause substantial ground-borne vibration or noise include piling driving or blasting. However, neither of these methods would be required during demolition or construction of the proposed project.⁵ While other construction equipment generates vibration, the levels are not normally perceptible beyond the limits of the construction site. As noted in the setting section, there are several vibration-sensitive laboratories and scientific instruments within other LBNL facilities. Potential minimal vibration effects on these laboratories and instruments would be managed through internal communication and project coordination. Furthermore, none of the operational functions of the GPL would result in substantial vibration or transfer of ground-level noise. As a result, a *less-than-significant* impact would occur.

⁵ Stanton, Richard. LBNL Project Manager. Written communication, March 26, 2008.

SP2 Impact NOISE-3: The proposed project would not cause a substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project. (*Less than Significant*)

Operation of the GPL would not generate noise apart from that generated by HVAC and other equipment, and vehicle trips to and from the facility. As discussed in SP2 Impact NOISE-1 above, this is a *less-than-significant* impact.

SP2 Impact NOISE-4: The proposed project would not cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project. (*Less than Significant*)

As explained under SP2 Impact NOISE-1 above, demolition and construction activities would cause substantial noise during the construction period, although with the incorporation of LBNL 2006 LRDP mitigation measures into the project description, the noise levels would be reduced such that there would be a less-than-significant impact on off-site receptors.

Demolition of Building 25/25B, 55, and 71 trailers would however cause a substantial temporary increase in ambient noise levels in the project vicinity and could impact on-site receptors, although none of these are considered sensitive receptors. Workers at LBNL would be most affected by the demolition of these buildings; however, they are generally indoors and therefore protected from some of the noise outside. This impact would be *less than significant*.

SP2 Impact NOISE-5: The proposed project would not result in exposure of people in an area covered by an airport land use plan, or within two miles of a public airport or public use airport, to excessive noise levels. (*No impact*)

The proposed project would not be located within 2 miles of a public airport or within an airport land use plan. As a result, there would be *no impact* in

relation to excessive airport noise during the operational phase of the proposed project.⁶

SP2 Impact NOISE-6: The proposed project would not result in exposure of people in the vicinity of a private airstrip to excessive noise levels. (*No impact*)

The proposed project is not located within the vicinity of a private airstrip.⁷ As a result, the project would not expose people to excessive airport noise and *no impact* during the operational phase would occur.

E. Cumulative Impacts

SP2 Cumulative Impact NOISE-1: The proposed project in conjunction with other past, present, and reasonably foreseeable projects would not cause impacts associated with noise. (*Less than Significant*)

Demolition of Building 25/25B is expected to begin in mid 2010 and be finished in early 2011. Construction of the GPL at the Building 25/25B demolition site is expected to begin shortly afterwards, in late 2011 and be completed by late 2013. Demolition of the five Building 71 trailers would take place in late 2012 to early 2013. Building 85/85A seismic strengthening is expected take place from mid 2011 to mid 2012. The Building 55 demolition would take place from mid 2013 to early 2014. All the Seismic Phase 2 project components are expected to be complete in early 2014.

1. Cumulative Construction Noise

Based on the proposed project construction schedule and the schedules for other projects at LBNL anticipated in the near future listed in Section 4.0, it is

⁶ Google Map, <http://www.google.com/maphp?hl=en&tab=wl&q=>, accessed March 12, 2008.

⁷ Google Map, <http://www.google.com/maphp?hl=en&tab=wl&q=>, accessed March 12, 2008.

anticipated that several other construction projects would be underway at approximately the same time as the proposed Seismic Phase 2 project. Old Town Demolition, which includes demolition of Building 25A is expected to run from mid 2010 to mid 2013. Construction of SERC at the Building 25A site (if the project goes ahead at that location) would probably start in mid to late 2011 in close proximity to the proposed GPL at the Building 25/25B site. The other projects would not cause a cumulative noise impact due to the relatively large distances between them.

The LBNL 2006 LRDP EIR found that there could be a significant and unavoidable impact from construction noise from all the projects that would constitute buildout of the LRDP. The projects that would be of most concern would be mainly those near the LBNL fence and involving 10 days or more of construction. GPL and other projects in Old Town area are not located near the LBNL fence. Overall, with incorporation of the LRDP mitigation measures into the project descriptions, the proposed project in combination with other projects that are planned to occur concurrently would cause a *less-than-significant* cumulative impact due to cumulative construction noise.

2. Cumulative Construction Traffic Noise

Cumulative construction truck traffic was analyzed to determine whether or not it would cause a substantial temporary increase in noise along the major arterials, Hearst Avenue, Oxford Street, and University Avenue, used by the construction trucks. Construction traffic volumes were added together for the construction projects at LBNL, and projects that would be constructed in the same period at UC Berkeley. To demonstrate a worst-case scenario, assuming, all projects are under construction concurrently and all construction truck traffic is travelling along the same arterials, on an average day the noise level is calculated to increase by less than 1 dBA L_{dn} . On a peak day the noise level is calculated to increase about 1 to 2 dBA L_{dn} . The second scenario represents the upper estimate of possible noise effects because peak construction truck traffic for all projects is unlikely to overlap. An increase of less than 3 dBA L_{dn} is not substantial and the cumulative noise impacts from construction truck traffic noise would be *less than significant*.

3. Cumulative Operational Noise

Operational noise from the proposed GPL would not individually make a considerable contribution to community noise levels. Even if SERC were constructed on an adjacent site, these are sufficiently far from off-site sensitive receptors and there would be *no cumulative* impact from operational noise.

LAWRENCE BERKELEY NATIONAL LABORATORY
SEISMIC PHASE 2 PROJECT EIR
NOISE

4.11 PUBLIC SERVICES

This section includes an assessment of the potential impacts of the proposed project on public services. Information was taken from the LBNL 2006 LRDP EIR and LBNL 2006 LRDP, with additional sources used where stated.

A. *Regulatory Setting*

1. Local Plans and Policies

The Seismic Phase 2 project involves DOE facilities at LBNL operated by the University of California. The University of California, under Article IX, Section 9 of the California Constitution, is exempt from local land use regulation, including General Plans and zoning. The only plans and policies applicable to the proposed project are contained in the LBNL 2006 LRDP and associated EIR or UC policies that apply to all UC campus.

Although exempt from local land use regulation, UC nevertheless seeks to cooperate with local jurisdictions to reduce any physical consequences of potential land use conflicts to the extent feasible. Because the western part of the LBNL site is within the Berkeley city limits, and the eastern part is within the Oakland city limits, in addition to UC and LBNL plans and policies, this section also summarizes policies contained in the Berkeley and Oakland general plans related to public services.

a. LBNL Master Emergency Plan and Building Emergency Plans

The LBNL Master Emergency Plan describes how LBNL resources are organized to respond to disasters such as a significant fire or earthquake. In addition, each building has a Building Emergency Plan that describes specific actions and responsibilities for employees assigned to building emergency teams.

b. LBNL 2006 Long Range Development Plan

i. *Principles and Strategies*

Development strategies set forth in the LBNL 2006 LRDP that are applicable to public services and recreation, include the following:

- ◆ Configure and consolidate uses to improve operational efficiencies, adjacencies and ease of access.
- ◆ Increase development densities within the most developed areas of the site to preserve open space, enhance operational efficiencies and access.
- ◆ Develop all new landscape improvements in accordance with the LBNL vegetation management program to minimize the threat of wildland fire damage to facilities and personnel.

c. LBNL 2006 LRDP EIR Mitigation Measures

A series of mitigation measures is included within the LBNL 2006 LRDP EIR. Although this analysis does not tier from that EIR, several of the mitigation measures adopted as part of the 2006 LRDP apply to the proposed project and are included in the Seismic Phase 2 project description. The LBNL 2006 LRDP EIR has no mitigation measures related to public services.

d. City of Berkeley General Plan

The following City of Berkeley General Plan policy is relevant to public services:

- ◆ Policy LU-15: Ensure that neighborhoods are well served by basic goods, a diverse supply of community care, services and facilities, including park, school, child care, and church facilities; fire, police, and refuse collection services; and by existing neighborhood commercial areas.

i. *Fire Protection Services*

The City of Berkeley General Plan policies and actions pertaining to fire protection include:

- ◆ Policy S-21: Fire Preventive Design Standards. Develop and enforce construction and design standards that ensure that new structures incorporate appropriate fire prevention features and meet current fire safety standards.
- ◆ Policy S-22: Fire Fighting Infrastructure. Reduce fire hazard risks in existing developed areas.

- ◆ Policy S-23: Property Maintenance. Reduce fire hazard risks in existing developed areas by ensuring that private property is maintained to minimize vulnerability to fire hazards.
- ◆ Policy S-24: Mutual Aid. Continue to fulfill legal obligations and support mutual aid efforts to coordinate fire suppression within Alameda and Contra Costa Counties, Oakland, the East Bay Regional Park District and the State of California to prevent and suppress major wildland and urban fire destruction.
- ◆ Policy EM-31: Landscaping. Encourage drought-resistant, rodent-resistant, and fire-resistant plants to reduce water use, prevent erosion of soils, improve habitat, lessen fire danger, and minimize degradation of resources.

ii. Police Services

The City of Berkeley General Plan does not identify policies regarding police services.

iii. Schools, Parks and Recreation

The City of Berkeley General Plan policies related to schools, parks, and recreation include:

- ◆ Policy LU-40: Continue to support maximum opportunities for citizen use of libraries and recreational facilities, the maintenance of the hill lands as open space and the adoption of campus development standards and policies to conserve and enhance present open space resources.
- ◆ Policy OS-4: Working with Other Agencies. Work with the Berkeley Unified School District, the University of California, the East Bay Municipal Utility District, and the East Bay Regional Park District (EBRPD) to improve, preserve, maintain, and renovate their open space and recreation facilities.

e. City of Oakland General Plan

The City of Oakland General Plan policies relating to public services include the following:

i. Fire Protection Services

The City of Oakland General Plan policies pertaining to fire protection include:

- ◆ LU Policy N13.1: The development of public facilities and staffing of safety related services, such as fire stations, should be sequenced and timed to provide a balance between land use and population growth and public services at all times. (Land Use and Transportation Element (LUTE))
- ◆ Policy CO-10.2: As determined necessary by the City, require individual property owners and developers in high hazard areas to reduce fire hazards on their properties through a range of preventative measures. Landscaping and site planning in these high hazard areas should minimize future wildfire hazards. (Open Space, Conservation and Recreation Element (OSCAR) Element)

ii. Police Services

The City of Oakland General Plan policy regarding police services includes LU Policy N13.1 (see above).

iii. Schools, Parks, and Recreation

The City of Oakland General Plan does not contain policies regarding schools. The General Plan Open Space, Conservation and Recreation Element (OSCAR) Element policies related to parks and recreation are not considered relevant to this analysis as the proposed project does not involve any new construction or new population in the City of Oakland.

B. Existing Setting

1. Police Service

Police services at LBNL are provided through contracts with the UC Berkeley Police Department (UCPD) and various private security providers. The UCPD handles all investigation, patrol and related enforcement duties for UC LBNL and other University facilities. The UCPD, which includes 77

police officers and operates 24 hours a day, is closely coordinated with the City of Berkeley Police Department.¹ UC LBNL has an annual, renewable contract with UCPD that provides law enforcement, emergency response, limited patrols and criminal investigations, each upon request. Response time for the UCPD to LBNL is less than five minutes.²

UC LBNL maintains an on-site security staff of approximately 14 personnel. Two to three security patrols monitor LBNL each day over separate shifts that provide coverage 24 hours a day. On-site security can respond to incidences at all accessible areas of LBNL within five minutes.³

2. Fire Service

The Alameda County Fire Department staffs Alameda County Station 19 on LBNL grounds. The station is located at Building 48, just off Lawrence Road in the central portion of the site. Station 19 is equipped with one fire engine, one reserve engine, one hazardous materials vehicle and a four-wheel drive vehicle known as “brush patrol unit,” used to fight wildland fires.⁴ Station 19 staff provides LBNL with first response services for both fire and medical emergencies. The standard response time to a fire with two engines and one truck is 10 minutes or less. The standard response time for Station 19 staff responding to a medical emergency at LBNL is 5 minutes or less.⁵

¹ U.C. Berkeley Police Department, http://police.berkeley.edu/about_UCPD/, accessed on March 17, 2009.

² Lunsford, Dan. Security & Emergency Operations Leader, Lawrence Berkeley National Laboratory. Personal communication with DC&E staff, March 17, 2009.

³ Lunsford, Dan. Security & Emergency Operations Leader, Lawrence Berkeley National Laboratory. Personal communication with DC&E staff, March 17, 2009.

⁴ Alameda County Fire Department, <http://www.co.alameda.ca.us/fire/station19.htm>, accessed on March 17, 2009.

⁵ Chen, Shu-Mei. Alameda County Fire Department, Office of Deputy Chief Randy Bradley. Personal communication with DC&E staff, March 18, 2009.

Under an Automatic Aid Agreement with the City of Berkeley, the service area of Station 19 extends to the eastern portion of the UC Berkeley campus and areas of north Berkeley. Between July 2007 and June 2008, Station 19 received approximately 509 calls from LBNL. Thirty-three percent of calls were related to medical emergencies, 5 percent were hazardous materials-related, 2 percent were for fire services, and 13 percent for "other" types of incidences, and 50 percent were false alarms.⁶

The City of Berkeley Fire Department (BFD) has seven fire stations⁷ and a total staff of 125.⁸ The BFD station nearest to LBNL is located in downtown Berkeley, about 1 mile from LBNL. The City of Oakland Fire Department operates 26 fire stations that staff approximately 500 personnel.⁹ The City of Oakland fire station nearest to LBNL is located on Miles Avenue, approximately 3 miles from LBNL.

3. Schools

Approximately 90 percent of LBNL employees live in Alameda and Contra Costa counties. Due to the large number of employees that live in Berkeley and Oakland specifically, public schools in those cities are discussed briefly here.

The Berkeley Unified School District (BUSD) operates 20 schools throughout the city: three early childhood facilities, 11 elementary schools, three middle schools, two high schools, and one adult school.¹⁰ The Oakland Unified

⁶ Chen, Shu-Mei. Alameda County Fire Department, Office of Deputy Chief Randy Bradley. Personal communication with DC&E staff, March 18, 2009.

⁷ City of Berkeley Fire Department, <http://www.ci.berkeley.ca.us/ContentDisplay.aspx?id=4260>, accessed on March 17, 2009.

⁸ City of Berkeley Fire Department, <http://www.ci.berkeley.ca.us/SubUnitHome.aspx?id=11750>, accessed on March 17, 2009.

⁹ City of Oakland Fire Department, <http://www.oaklandnet.com/oakweb/fire/operations/operations.htm>, accessed on March 17, 2009.

¹⁰ Berkeley Unified School District, <http://www.berkeley.net>, accessed on March 17, 2009.

School District (OUSD) operates 68 elementary schools, 19 middle schools, and 27 high schools. It is also responsible for 16 charter schools, five adult education centers, 20 alternative education schools, four special education schools, and 39 childcare centers.¹¹

4. Parks and Recreation

Several local parks and regional open spaces are within close proximity of LBNL. Tilden Park and Claremont Canyon Preserve, two parks managed by the East Bay Regional Park District (EBRPD), border the eastern limits of Berkeley and are used extensively by Berkeley residents. In Oakland, the EBRPD manages multiple open spaces, including Leona Canyon Regional Open Space Preserve, Martin Luther King, Jr. Regional Shoreline Park, Robert Sibley Volcanic Regional Preserve, and Roberts Regional Recreational Area.

C. CEQA Significance Criteria

The impact of the proposed project related to noise would be considered significant if it would exceed the following standards of significance, in accordance with Appendix G of the *CEQA Guidelines* and the UC CEQA Handbook:

Result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:

1. Fire protection
2. Police protection
3. Schools

¹¹ Oakland Unified School District, <http://webportal.ousd.k12.ca.us/Default.aspx>, accessed March 17, 2009.

4. Parks
5. Other public facilities

D. Potential Project Impacts

This section presents an assessment of potential impacts to public services as a result of the proposed project.

SP2 Impact PUB-1: The proposed project would not result in substantial adverse physical impacts related to the delivery of fire protection services. (*Less than Significant*)

The proposed project would demolish several existing buildings and add a new laboratory building to the LBNL campus that would be approximately 43,000 gsf. While the total building space on the LBNL site would not increase as a result of the project, as for any new building, and as required under the California Building Code, the proposed GPL would require fire protection. Sprinklers would be included in all occupied areas within the facility, including the common areas, and one exterior hydrant would be added to the southeast side of the proposed building. While these features would not eliminate the risk of a fire altogether, they would reduce the potential for adverse impacts from fire.

The closest fire station to Building 85/85A and the proposed GPL site is located at Building 48 on the LBNL main hill site, which is approximately one half mile away via the two-lane Lawrence Road. Based on the inclusion of on-site fire prevention features into the proposed project and the close proximity of the fire station, the proposed project would not require new or expanded fire protection services that could result in significant environmental impacts.¹² As a result, a *less-than-significant* impact would occur.

¹² Terra, Bonnie. Fire Marshall, Alameda County Fire Department. Personal communication, September 16, 2009.

SP2 Impact PUB-2: The proposed project would not result in substantial adverse physical impacts related to the delivery of police services. (*Less than Significant*)

The proposed project would result in an increase of 100 staff working on the main hill site and additional workers during demolition and construction. However, these additions are not substantial in relation to the existing LBNL population, which was approximately 4,000 in 2003.¹³ Furthermore, the improved and new facility on the site is not expected to trigger a substantial increase in the demand for police protection or response from UCPD or the on-site security staff. As a result, a *less-than-significant* impact would occur during the proposed project's construction and operational phases.

SP2 Impact PUB-3: The proposed project would not result in any substantial adverse physical impacts related to the delivery of school services. (*No impact*)

New or expanded school facilities could be required if the proposed project introduced school-aged children into existing schools that are at or above classroom capacity. About 100 LBNL staff would transfer from the Potter Street facility in Berkeley to the main hill site, however, as this is only 5 miles away, few, if any, families are likely to relocate as a consequence. The proposed project would therefore not result in an overall population increase in the City of Berkeley and adjacent municipalities, which could otherwise impact school capacity and require new or expanded facilities. As such, *no impact* would occur.

SP2 Impact PUB-4: The proposed project would not result in any substantial adverse physical impacts on parks. (*No impact*)

The proposed project would not result in an increased population in local municipalities. As explained under SP2 Impact PUB-3 above, the proposed

¹³ LBNL, 2006, *Long-Range Development Plan Environmental Impact Report*, page IV.J-13.

project involves the transfer of LBNL staff from the Potter Street facility to the main hill site, but this would not result in people relocating to Berkeley, Oakland, or other cities from outside the region. Thus, the proposed project would not result in an increased demand for new or expanded parks. As a result, *no impact* would occur during the construction or operation of the proposed project.

SP2 Impact PUB-5: The proposed project would not result in substantial adverse physical impacts to other public facilities. (*No impact*)

Because the proposed project would not result in an increase in the population of local municipalities, it would not require the expansion of existing public facilities or the construction of new public facilities. As such, *no impact* would occur.

E. Cumulative Impact

SP2 Cumulative Impact PUB-1: The proposed project in conjunction with other past, present, and reasonably foreseeable projects would not cause impacts associated with public services. (*Less than Significant*)

In combination with reasonably foreseeable development at UC Berkeley's campus and in nearby communities, the proposed project would result in an increased demand for fire protection and police services; however, as discussed below, this cumulative increase would be minimal and the resulting impacts would be *less than significant*.

The 2006 LRDP EIR considered the potential impacts to delivery of fire protection services of planned development at LBNL through 2025, including the proposed project. The document estimated that, cumulatively, development at LBNL could be expected to generate an additional three to five calls per month over existing conditions, the bulk of which could be handled by Alameda County Fire Station 19. Station 19, located on the LBNL main hill campus, currently has a relatively low call volume in comparison to other fire

stations in the surrounding area. Therefore, while planned development would cause a slight increase in call volume, that increase in demand for fire protection services could be accommodated without additional personnel or facilities. Moreover, while development at LBNL and in nearby communities would result in the construction of new structures in areas prone to wildfires, application of relevant building standards and fuel management strategies at LBNL would minimize the potential demand for fire services. As a result, the cumulative impact on delivery of fire protection services would be less than significant.

The 2006 LRDP EIR also considered the potential impacts to the delivery of police services and estimated that buildout of the 2006 LRDP, including the proposed project, could be expected to generate an additional five calls requiring a UCPD response per year. Given the historically low average annual calls (approximately 15 to 25), this increase would not affect the ability of the UCPD or the private security firm to provide police service at LBNL and accordingly no additional personnel or facilities would be required. Additionally, where foreseeable development in nearby communities would result in an impact on demand for police services, local zoning ordinance and General Plan policies require that the municipalities take action to mitigate associated environmental impacts. As a result, the cumulative impact on delivery of police services would be less than significant.

Therefore, the effect of the proposed project in combination with other foreseeable development would not be significant, nor would the proposed project's contribution to any cumulative effects be cumulatively considerable.

LAWRENCE BERKELEY NATIONAL LABORATORY
SEISMIC PHASE 2 PROJECT EIR
PUBLIC SERVICES

4.12 TRANSPORTATION AND TRAFFIC

This section includes an assessment of the potential impacts of the proposed project on transportation and traffic. Information is taken from the LBNL 2006 LRDP EIR and LBNL 2006 LRDP, and the Cumulative Truck Impact Analysis prepared by Fehr & Peers in May 2009 and additional references where noted.

A. *Regulatory Setting*

1. **Local Plans and Policies**

The Seismic Phase 2 project involves DOE facilities at LBNL operated by the University of California. The applicable land use plan for the project is the 2006 LRDP. Relevant strategies from the 2006 LRDP are summarized below, along with 2006 Design Guidelines that accompany the 2006 LRDP.

The University of California, under Article IX, Section 9 of the California Constitution, is exempt from local land use regulation, including General Plans and zoning. UC nevertheless seeks to cooperate with local jurisdictions to reduce any physical consequences of potential land use conflicts to the extent feasible. Because the western part of the LBNL site is within the Berkeley City limit, and the eastern portion is within Oakland City limit, and the proposed project would be located in both portions of the LBNL site, policies contained in the Berkeley General Plan and the Oakland General Plan relevant to traffic and circulation are also summarized below.

a. **LBNL 2006 Long Range Development Plan**

Development strategies in the LBNL 2006 LRDP are intended to minimize potential environmental impacts that could result from implementation of the LBNL 2006 LRDP. Development strategies applicable to the project include the following:

- ◆ Maintain or reduce the percentage of parking spaces relative to the adjusted daily population.
- ◆ Promote use of bicycles by providing additional bicycle storage racks, and shower facilities.

- ◆ Consolidate parking into larger lots and/or parking structures, locate these facilities near Laboratory entrances to reduce traffic within the main site.
- ◆ Remove parking from areas targeted for outdoor social spaces and service areas.

b. LBNL Standard Operating Procedures

The proposed project would incorporate the following standard operating procedures from the Facilities Master Specifications:

- ◆ General Requirements, Section 1.4(A): Calls for construction to be confined to the immediate area within the construction limits.
- ◆ General Requirements, Section 1.5(A): Calls for limited parking for private vehicles and full enforcement of parking regulations by University of California Police.
- ◆ General Requirements, Section 1.5(B): Limits use to certain University roads as designated by the University for transporting of equipment, materials, workers, or other needs related to the work of the proposed project. Ascribes responsibility for repair of damage attributable to contractor use of designated roads to that contractor.
- ◆ General Requirements, Section 1.5(C): Prohibits heavy and slow moving trucking from LBNL (University) from the top of Hearst Avenue or on Centennial Drive between 7:00 AM and 8:30 AM.
- ◆ General Requirements, Section 1.5(D): Permission for access to the site may be revoked for any and all persons who violate the University traffic regulations including speed limits, parking restrictions and directions of the University police. All of the Subcontractor's personnel, operating forces, and delivery personnel shall be made aware of and shall comply at all times with traffic regulations.
- ◆ Environment, Safety, and Health Procedures, Section 1.13 (A): Calls for the posting of traffic flaggers for all work that may affect the use of roads by the University.

- ◆ Environment, Safety, and Health Procedures, Section 1.13(A)(1): Calls for the posting of traffic flaggers at the entrance and exit of access roads used for hauling material and at all other areas where normal traffic is subject to disruption.
- ◆ Environment, Safety, and Health Procedures, Section 1.13(A)(2): Calls for flaggers to be equipped and instructed at Subcontractor's expense in accordance with current "Instructions to Flaggers" of the Department of Transportation, State of California.

c. LBNL 2006 LRDP EIR Mitigation Measures

A series of mitigation measures is included within the LBNL 2006 LRDP EIR. Although this analysis does not tier from that EIR, several of the mitigation measures adopted as part of the 2006 LRDP apply to the proposed project and are included in the Seismic Phase 2 project description. The following transportation and traffic mitigation measures apply to and are a part of the proposed project:

LRDP Mitigation Measure TRANS-1a: LBNL shall work with UC Berkeley and the City of Berkeley to design and install a signal at the Gayley Road/Stadium Rim Way intersection, when a signal warrant analysis shows that the signal is needed. The intersection would meet one-hour signal warrants for peak-hour volume and peak-hour delay under 2025 conditions with implementation of the LBNL 2006 LRDP. LBNL shall contribute funding on a fair-share basis, to be determined in consultation with UC Berkeley and the City of Berkeley, for a periodic (annual or biennial) signal warrant check to allow the City to determine when a signal is warranted, and for installation of the signal. Should the City determine that alternative mitigation strategies may reduce or avoid the significant impact, the Lab shall work with the City and UC Berkeley to identify and implement such alternative feasible measure(s). See also LRDP Mitigation Measure TRANS-1d, development and implementation of a new Transportation Demand Management Program.

With the implementation of this mitigation measure, the intersection of Gayley Road/Stadium Rim Way would operate at an acceptable level of service (LOS B or better under traffic signal control) during both the AM and PM peak hours.

This mitigation measure is proposed to be adopted as part of the LRDP and will be monitored through the LRDP mitigation monitoring and reporting program. It will thus continue to be a binding mitigation commitment of LBNL. Under CEQA case law, however, when the lead agency contributes fair share funding to a mitigation measure that will be carried out by another entity, there must be some evidence of a reasonable plan in place in order for the lead agency to conclude that the adopted mitigation will reduce the impact to a less-than-significant level (*City of Marina v. Board of Trustees of the California State University* (2006) 39 Cal.4th 341). LBNL has discussed this with the City, and based on that consultation, LBNL understands there have been some discussions of improvements at Gayley Road/Stadium Rim Way. Also, the University has retained a consultant to perform studies related to these improvements, but there is not yet a plan in place for the improvements. As such, it cannot be determined at this time that this impact will be mitigated to a less-than-significant level. Accordingly, this impact would still be considered significant and unavoidable, but LBNL would contribute to fair share funding which, if a reasonable plan is implemented, would mitigate these impacts to a less-than-significant level.

LRDP Mitigation Measure TRANS-1b: LBNL shall work with the City of Berkeley to design and install a signal at the Durant Avenue/Piedmont Avenue intersection, when a signal warrant analysis shows that the signal is needed. LBNL shall contribute funding, on a fair-share basis, to be determined in consultation with UC Berkeley and the City of Berkeley, for a periodic (annual or biennial) signal warrant check to allow the City to determine when a signal is warranted, and for installation of the signal. Should the City determine that alternative mitigation strategies may reduce or avoid the significant impact, LBNL shall work with the City and

UC Berkeley to identify and implement such alternative feasible measure(s). See also LRDP Mitigation Measure TRANS-1d, development and implementation of a new Transportation Demand Management Program.

With the implementation of this mitigation measure, the Durant Avenue/Piedmont Avenue intersection would operate at an acceptable level of service (LOS B or better under traffic signal control) during both the AM and PM peak hours.

This mitigation measure is proposed to be adopted as part of the LRDP and will be monitored through the LRDP mitigation monitoring and reporting program. It will thus continue to be a binding mitigation commitment of LBNL. Under CEQA case law, however, when the lead agency contributes fair share funding to a mitigation measure that will be carried out by another entity, there must be some evidence of a reasonable plan in place in order for the lead agency to conclude that the adopted mitigation will reduce the impact to a less-than-significant level (*City of Marina v. Board of Trustees of the California State University* (2006) 39 Cal.4th 341). LBNL has discussed this with the City, and based on that consultation, LBNL understands there have been some discussions of improvements at Gayley Road/Stadium Rim Way. Also, the University has retained a consultant to perform studies related to these improvements, but there is not yet a plan in place for the improvements. As such, it cannot be determined at this time that this impact will be mitigated to a less-than-significant level. Accordingly, this impact would still be considered significant and unavoidable, but LBNL would contribute to fair share funding which, if a reasonable plan is implemented, would mitigate these impacts to a less-than-significant level.

LRDP Mitigation Measure TRANS-1c: LBNL shall fund and conduct a study to evaluate whether there may be feasible mitigation (with design standards acceptable to the City) at the intersection of Hearst Avenue/Gayley Road/La Loma Avenue. This intersection is currently signalized, and physical geometric limitations constrain improvements

within its current right-of-way. All four corners of this intersection are occupied by existing UC Berkeley facilities, including Foothill Student Housing, Cory Hall, and outdoor tennis courts, as well as the Founders' Rock. The level of service analyses herein used conservative assumptions so as to not underestimate potential project impacts. For example, even though the approach widths at this intersection allow drivers to maneuver past other vehicles as they near the intersection, the absence of pavement striping to delineate separate lanes dictated that the analysis conservatively assume all vehicle movements on each approach are made on a single lane. Similarly, without the certainty that standard lane widths (and adequate storage lengths) could be provided, possible improvement measures were not relied on to judge that significant impacts would be mitigated to less-than-significant levels. Judging the success of possible mitigation measures with a conservative standard is reasonable, but in consultation with City of Berkeley staff, LBNL will conduct a further study to reevaluate whether there may be feasible mitigation (with design standards acceptable to the City) at this intersection. That additional study will be conducted by LBNL as part of the TDM program set forth below as Mitigation Measure TRANS-1d. If such mitigation is determined by Berkeley Lab to be feasible, then Berkeley Lab shall contribute funding on a fair share basis, to be determined in consultation with UC Berkeley and the City of Berkeley, for the installation of the improvements.

This mitigation measure will be monitored through the LRDP mitigation monitoring and reporting program. It will thus continue to be a binding mitigation commitment of LBNL. Under CEQA case law, however, when the lead agency contributes fair share funding to a mitigation measure that will be carried out by another entity, there must be some evidence of a reasonable plan in place in order for the lead agency to conclude that the adopted mitigation will reduce the impact to a less-than-significant level (*City of Marina v. Board of Trustees of the California State University* (2006) 39 Cal.4th 341). LBNL will reevaluate its conclusion that there is not feasible mitigation for this intersection, and will retain

and fund a consultant to perform that reevaluation. However, given that LBNL has evaluated all of the potential mitigation that has been suggested and concluded that mitigation is not feasible, and given the absence of a City plan for such improvements, it cannot be determined at this time that this impact will be mitigated to a less-than-significant level. Accordingly, this impact would still be considered significant and unavoidable, but LBNL shall fund the study pursuant to the TDM program, and would contribute to fair share funding which, if feasible mitigation is identified and a plan to proceed with that mitigation is implemented, would mitigate this impact to a less-than-significant level.

LRDP Mitigation Measure TRANS-1d: LBNL shall develop and implement a new Transportation Demand Management (TDM) Program to replace its existing TDM program. This enhanced TDM Program has been drafted in consultation with the City of Berkeley, and is proposed to be adopted by LBNL following The Regents' consideration of the 2006 LRDP. The new draft proposed TDM Program is attached to the LBNL 2006 LRDP EIR as Appendix G. The proposed TDM Program includes several implementation phases tied to the addition of parking to LBNL. The final provisions of the TDM Program may be revised as it is finally adopted but will include a TDM coordinator and transportation committee, an annual inventory of parking spaces and a gate count, a study of more aggressive TDM measures, investigation of a possible parking fee, investigation of sharing services with UC Berkeley and an alternative fuels program. The TDM program shall also include funding of a study to reevaluate the feasibility of mitigation at the Hearst/Gayley/La Loma intersection. The new draft proposed TDM Program also includes a requirement that LBNL conduct an additional traffic study to reevaluate traffic impacts on the earliest to occur of 10 years following the certification of this EIR (July 2007) or the time at which the Lab formally proposes a project that will bring total development of parking spaces pursuant to the 2006 LRDP to or above 375 additional parking spaces.

LRDP Mitigation Measure TRANS-3: LBNL shall develop and maintain a transportation plan designed to ensure that the current balance of transportation modes is maintained. This plan shall include 1) maintaining the same (or lesser) ratio of parking permits and parking spaces to average daily population (ADP), and 2) ensuring that levels of shuttle bus service and provision of bike racks on shuttle buses are sufficient to accommodate projected demand.

LRDP Mitigation Measure TRANS-8: LBNL shall implement Mitigation Measure TRANS-1a (work with UC Berkeley and the City of Berkeley to design and install a signal at the Gayley Road/Stadium Rim Way intersection; LBNL would contribute funding on a fair-share basis, to be determined in consultation with UC Berkeley and the City of Berkeley, to install the signal) and Mitigation Measure TRANS-1b (work with the City of Berkeley to design and install a signal at the Durant Avenue/Piedmont Avenue intersection, when a signal warrant analysis shows that the signal is needed; LBNL would contribute funding on a fair-share basis, to be determined in consultation with UC Berkeley and the City of Berkeley, to install the signal and for monitoring to determine when a signal is warranted).

With the implementation of these mitigation measures, the intersections of Gayley Road/Stadium Rim Way and Durant Avenue/Piedmont Avenue would operate at LOS B or better during both the AM and PM peak hours.

As explained earlier, the intersection of Hearst Avenue/Gayley Road/La Loma Avenue is currently signalized, and physical geometric limitations constrain improvements within its current right-of-way. Without the certainty that standard lane widths (and adequate storage lengths) could be provided, possible improvement measures were not relied on to judge that significant impacts would be mitigated to less-than-significant levels. Judging the success of possible mitigation measures with a conservative standard is reasonable, but in consultation with City of Berkeley staff,

the Lab shall fund and conduct a study to evaluate whether there may be feasible mitigation (with design standards acceptable to the City) at this intersection. That additional study will be conducted by the Lab as part of the TDM program set forth above as Mitigation Measure TRANS-1d. If such mitigation is determined by Berkeley Lab to be feasible, then Berkeley Lab shall contribute funding on a fair share basis, to be determined in consultation with UC Berkeley and the City of Berkeley, for the installation of the improvements.

Additionally, pursuant to the LBNL 2006 LRDP, UC LBNL has formalized the following best management practices for construction-related traffic impacts in the Construction Standards and Design Requirements, Division I (Contractor Specifications):

Best Practice TRANS-6a: Early in construction period planning, LBNL shall meet with the contractor for each construction project to describe and establish best practices for reducing construction period impacts on circulation and parking in the vicinity of the project site.

Best Practice TRANS-6b: For each construction project, LBNL shall require the prime contractor to prepare a Construction Traffic Management Plan that will include, but will not necessarily be limited to, the following elements:

- Proposed truck routes to be used, consistent with the City truck route map.
- Construction hours, including limits on the number of truck trips during the AM and PM peak traffic periods (7:00 – 9:00 AM and 4:00 – 6:00 PM), if conditions demonstrate the need.
- A parking management plan for ensuring that construction worker parking results in minimal disruption to surrounding uses.

Best Practice TRANS-6c: LNBL shall manage project schedules to minimize the overlap of excavation or other heavy truck activity periods that have the potential to combine impacts on traffic loads and street system capacity, to the extent feasible.

d. Berkeley General Plan

The Transportation Element of the Berkeley General Plan contains the following policies related to traffic and circulation:

- ◆ Policy LU-39: University Traffic. Reduce traffic impacts of the University on the citywide transportation system.
- ◆ Transportation Objective 1: Maintain and improve public transportation services throughout the city.
- ◆ Transportation Objective 2: Reduce automobile use and vehicle miles traveled in Berkeley, and the related impacts, by providing and advocating for transportation alternatives and subsidies that facilitate voluntary decisions to drive less.
- ◆ Transportation Objective 6: Create a model bicycle- and pedestrian-friendly city where bicycling and walking are safe, attractive, easy, and convenient forms of transportation and recreation for people of all ages and abilities.
- ◆ Policy T-2: Public Transportation Improvements. Encourage regional and local efforts to maintain and enhance public transportation services and seek additional regional funding for public and alternative transportation improvements.

Action T-2 D: Improve shuttle and transit services by:

1. Increasing shuttle and transit services from Rockridge and the Rockridge BART station to downtown BART and the UCB campus.
3. Promoting express shuttle services to complement local transit service and ensure that Berkeley residents and commuters have information about shuttle services readily available.

5. Encouraging transportation providers to coordinate and consolidate the installation of new jointly used shelters.
- ◆ Policy T-10: Trip Reduction. To reduce automobile traffic and congestion and increase transit use and alternative modes in Berkeley, support, and when appropriate require, programs to encourage Berkeley citizens and commuters to reduce automobile trips, such as:
 2. Participation in the Commuter Check Program.
 3. Carpooling and provision of carpool parking and other necessary facilities.
 4. Telecommuting programs.
- ◆ Policy T-13: Major Public Institutions. Work with other agencies and institutions, such as the University of California, the Berkeley Unified School District, Lawrence Berkeley Laboratory, Vista Community College, the Alameda County Court, and neighboring cities to promote Eco-Pass and to pursue other efforts to reduce automobile trips.

Action T-13A: Encourage other agencies and institutions to match or exceed the City of Berkeley's trip reduction and emission reduction programs for their employees.

Action T-13C: Encourage the University of California:

1. To maintain and improve its facilities and programs that support and encourage pedestrians, bicyclists, and transit riders.
2. To provide bicycle facilities, "all hour" bicycle paths, and timely pavement maintenance.
3. To locate non-student-serving offices and additional staff and student housing at or near BART stations outside Berkeley.

Action T-13H: Encourage the University of California, the Berkeley Unified School District, and other major institutions to cap parking at current levels while seeking to reduce automobile use.

Action T-13I: Encourage institutions to create incentives for their employees and students to live locally.

Action T-13j: Encourage all public and private institutions, including schools, health clubs, recreation centers and other community destinations to organize carpools and shuttles.

- ◆ Policy T-18: Level of Service.¹ When considering transportation impacts under the California Environmental Quality Act, the City shall consider how a plan or project affects all modes of transportation, including transit riders, bicyclists, pedestrians, and motorists, to determine the transportation impacts of a plan or project. Significant beneficial pedestrian, bicycle, or transit impacts, or significant beneficial impacts on air quality, noise, visual quality, or safety in residential areas may offset or mitigate a significant adverse impact on vehicle level of service to a level of insignificance. The number of transit riders, pedestrians, and bicyclists potentially affected will be considered when evaluating a degradation of level of service for motorists.
- ◆ Policy T-28: Emergency Access. Provide for emergency access to all parts of the city and safe evacuation routes.
- ◆ Policy T-37: University of California and Large Employer Parking. Encourage large employers, such as the University of California and Berkeley Unified School District, to allocate existing employee parking on the basis of a) need for a vehicle on the job, b) number of passengers carried, c) disability, and d) lack of alternative public transportation.

Action T-37A: Encourage the University of California to cap its parking supply at current levels, to postpone any plans to expand its existing (year 2000) parking supply and instead encourage transit use and alternative modes of transportation, and better manage and utilize existing parking.

¹ Level of service (LOS) is a qualitative measure describing operational conditions within a traffic stream. Level of service assesses conditions in terms of speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. Six levels of service are defined by letter designations from LOS A to F, with LOS A representing the best operating conditions, and LOS F the worst.

- ◆ Policy T-38: Inter-Jurisdictional Coordination. Establish partnerships with adjacent jurisdictions and agencies, such as the University of California and the Berkeley Unified School District, to reduce parking demand and encourage alternative modes of transportation.
- ◆ Policy T-42: Bicycle Planning. Integrate the consideration of bicycle travel into City planning activities and capital improvement projects, and coordinate with other agencies to improve bicycle facilities and access within and connecting to Berkeley.
- ◆ Policy T-54: Pathways. Develop and improve the public pedestrian pathway system.

e. Oakland General Plan

The following transportation-related policies are contained in the Oakland General Plan Land Use and Transportation Element:

- ◆ Policy T2.5: Linking Transportation and Activities. Link transportation facilities and infrastructure improvements to recreational uses, job centers, commercial nodes, and social services (i.e., hospitals, parks, or community centers).
- ◆ Policy T3.2: Promoting Strategies to Address Congestion. The City should promote and participate in both local and regional strategies to manage traffic supply and demand where unacceptable levels of service exist or are forecast to exist.
- ◆ Policy T3.6: Including Bikeways and Pedestrian Walks. The City should include bikeways and pedestrian walks in the planning of new, reconstructed, or realigned streets, wherever possible.
- ◆ Policy T4.2: Creating Transportation Incentives. Through cooperation with other agencies, the City should create incentives to encourage travelers to use alternative transportation options.
- ◆ Policy D3.2: Incorporating Parking Facilities. New parking facilities for cars and bicycles should be incorporated into the design of any project in a manner that encourages and promote safe pedestrian activity.

Policies in the Open Space, Conservation, and Recreation (OSCAR) Element pertaining to traffic and circulation include the following:

- ◆ Policy CO-12.1: Promote land use patterns and densities which help improve regional air quality conditions by: (a) minimizing dependence on single passenger autos; (b) promoting projects which minimize quick auto starts and stops, such as live-work development, and office development with ground-floor retail space; (c) separating land uses which are sensitive to pollution from the sources of air pollution; and (d) supporting telecommuting, flexible work hours, and behavioral changes which reduce the percentage of people in Oakland who must drive to work on a daily basis.
- ◆ Policy CO-12.3: Expand existing transportation systems management and transportation demand management strategies which reduce congestion, vehicle idling, and travel in single-passenger autos.

B. Existing Setting

1. Regional Access

The LBNL site is approximately 3 miles east of Interstate 80, the nearest major freeway and connection between the San Francisco Bay Area and Sacramento region. Regional access to LBNL is also provided by Interstate 580 and State Routes 24 and 13. LBNL lies 5 miles northeast of the San Francisco-Oakland Bay Bridge.

2. Local Access

Approximately 15 local roadways provide access to LBNL. However, vehicular access generally occurs along two routes leading to the controlled-access security gates of LBNL. These routes include Hearst Avenue and Centennial Drive. Hearst Avenue borders the northern edge of UC Berkeley and becomes Cyclotron Road at the LBNL main Blackberry Canyon Gate. The locations of Building 55 and Building 71 trailers are most easily accessed via the Blackberry Canyon Gate. Centennial Drive runs along the east and south perimeters of LBNL, providing access through Strawberry Canyon and lead-

ing to the Strawberry Canyon and Grizzly Peak Gates. The Strawberry Canyon Gate leads directly to the cluster of buildings that includes Building 85/85A. This gate can accommodate all but the largest construction trucks. Building 25/25B, which would be demolished under the proposed project and replaced with the new GPL facility, is located in the center of the LBNL site and is essentially equidistant from the Blackberry Canyon and Strawberry Canyon Gates. Relative location of LBNL security gates is shown on Figure 3-2 in the Project Description.

UC LBNL operates a shuttle service that provides connections to UC Berkeley destinations, the Downtown Berkeley and Rockridge BART stations, and multiple Alameda County Transit (AC Transit) connections. The shuttle stops at points throughout the LBNL site, including the proposed site for the new GPL. The shuttle service is free for both UC LBNL employees and visitors.²

3. Internal Circulation

Vehicular circulation within LBNL primarily occurs via two east-west roadways and two north-south connectors. Chamberlain Road and McMillan Road constitute the LBNL site's "upper" circulation system, running generally east-west along the northern part of the site. Lawrence Road and Alvarez Road constitute the east-west running "lower" route. Centennial Drive provides access to the site from the south and connects to McMillan Road. Each of these is a two-lane road with one lane in each direction.

4. Pedestrian Circulation

An extensive network of pedestrian paths crisscrosses the LBNL main hill campus. Highly traveled sidewalks and paths link key destinations on the site, and secondary pedestrian routes along service roads and in wooded areas provide important access to individual buildings. Pedestrians may also access the main hill campus from off-site destinations in the surrounding neighbor-

² LBNL, <http://www.lbl.gov/Workplace/Transportation.html#LBL-shuttle>, accessed September 16, 2008.

hoods, either via the main vehicle access gates or by way of a handful of card key-controlled pedestrian gates fed by surrounding trails.

The LBNL 2006 LRDP recognizes that good pedestrian circulation is necessary to foster a campus-like environment at LBNL and to support transportation demand management strategies that aim to reduce vehicle trips. The 2006 LRDP articulates strategies that will build on the existing network and improve pedestrian circulation on the main hill campus. Strategies include developing new routes and enhancing existing ones; improving way-finding with signage and naming of individual buildings and research clusters; and separating pedestrians and vehicles wherever possible for improved safety.³

5. Bicycle Circulation

The LBNL 2006 LRDP encourages bicycle commuting and the use of bicycles for travel within the main hill campus. LBNL shuttle buses are equipped with bicycle racks and bike lanes are provided on the main hill campus where feasible. Under the 2006 LRDP and associated TDM program, additional amenities such as conveniently located storage racks and shower facilities would be provided to further promote cycling at LBNL.

6. Existing Traffic Conditions

Traffic counts conducted as part of the LBNL 2006 LRDP EIR indicated that roughly 5,700 vehicle trips are generated daily by the approximately 4,000 employees at the LBNL main hill campus. During the morning peak hour, approximately 610 vehicle trips were made to and from the site, 540 of which were inbound.⁴ In the afternoon peak hour, 660 vehicle trips were made, 585 of which were outbound.⁵

³ LBNL, 2006, *Long-Range Development Plan*.

⁴ For the purpose of this study AM peak hours are assumed to be from 7:00 to 9:00 AM and PM peak hours from 4:00 to 6:00 PM.

⁵ LBNL, 2006, *Long-Range Development Plan Environmental Impact Report*, page IV.L-6.

In accordance with Alameda County Congestion Management Agency (ACCMA) standards, level of service⁶ monitoring conducted in 2002 indicates that most inter-regional roadways providing access to LBNL operate at LOS E or F during peak hours. This includes proximate segments of Interstate 80 through Berkeley, which are congested (LOS E or F) in both directions during peak commute hours. Oakland portions of eastbound State Route 24 are also congested (LOS F) during the PM peak hour.

Fehr & Peers Transportation Consultants (Fehr & Peers) conducted a level of service analysis of existing traffic conditions for intersections in the vicinity of the proposed project. Data was collected in August 2007 and May 2009. Signalized and all-way stop-controlled intersection delay and level of service were determined based on average control delay per vehicle, according to the Highway Capacity Manual, Special Report 209, Transportation Research Board, 2000. For intersections operating at LOS F, the volume-to-capacity ratio (v/c) was also estimated.⁷

a. Construction Traffic

The City of Berkeley has established designated truck routes to manage the movement of construction vehicles on its streets. The designated truck routes that would be used by construction vehicles associated with LBNL projects, including the proposed project, are shown on Figure 4.12-1.

⁶ Level of service is a qualitative measure describing operational conditions within a traffic stream. Level of service assesses conditions in terms of speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience, and safety. Six levels of service are defined by letter designations from level of service (LOS) A to F, with LOS A representing the best operating conditions, and LOS F the worst.

⁷ Volume to capacity ratio (v/c) is a measure of the level of service or adequacy of roadways, intersections, or transit services, usually expressed during peak periods of travel. The v/c ratio is a comparison of traffic volume to capacity. As used herein, a v/c ratio of 1.0 or greater connotes a congested (LOS E) or failing (LOS F) facility, with long delays.



FIGURE 4.12-1

CITY OF BERKELEY DESIGNATED TRUCK ROUTES

In 2009, Fehr & Peers conducted a study to determine the maximum average daily truck trips that could be generated by various construction projects at LBNL, including the proposed project, without causing a significant impact at key intersections along the designated truck routes through the City of Berkeley.⁸ Fehr & Peers identified four key intersections along the designated truck routes and conducted a level of service analysis of existing traffic conditions based on intersection turning movement counts. The four intersections identified for study are Stadium Rim Way/Gayley Road, Hearst Avenue/Gayley Road/La Loma Avenue, University Avenue/San Pablo Avenue, and University Avenue/Sixth Street. These intersections are shown on Figure 4.12-1.

Table 4.12-1 summarizes traffic conditions at the four study intersections on the designated truck routes. As shown, all four intersections operate at acceptable levels (LOS D or better under City of Berkeley standards) during the AM peak hour. During the PM peak hour, however, three of the four intersections operate at unacceptable levels: the Stadium Rim Way/Gayley Road intersection and University Avenue/Sixth Street intersections operate at LOS E and the University Avenue/San Pablo Avenue intersection operates at LOS F.

On the basis of existing traffic conditions along the dedicated truck routes, the Fehr & Peers report recommended the following maximum allowable daily truck trips to avoid a significant impact to intersection operations, roadway segment operation, and pavement condition:

- ◆ An average of 98 one-way truck trips per day through the Hearst Avenue and University Avenue intersections.
- ◆ An average of 50 one-way truck trips per day through the Stadium Rim Way/Gayley Road intersection.

⁸ Fehr & Peers Transportation Consultants, May 22, 2009, *LBNL Construction Projects – Cumulative Truck Impact Analysis*.

TABLE 4.12-1 **EXISTING TRAFFIC CONDITIONS AT INTERSECTIONS ON THE CITY OF BERKELEY DESIGNATED TRUCK ROUTES (LEVEL OF SERVICE SUMMARY)**

Intersection	Intersection Control	Peak Hour	Delay (seconds)	LOS
University Avenue/ Sixth Street	Signalized	AM	40.0	D
		PM	68.3	E
University Avenue/ San Pablo Avenue	Signalized	AM	43.7	D
		PM	91.3 (v/c=1.00)	F
Stadium Rim Way/ Gayley Road	All-Way Stop- Controlled	AM	29.6	D
		PM	41.1	E
Hearst Avenue/ Gayley Road/ La Loma Avenue	Signalized	AM	22.7	C
		PM	24.1	C

Note: Results in **bold** represent unacceptable levels of service.
 Source: Fehr & Peers Transportation Consultants May 2009.

Table 4.12-2 presents the effect of this controlled truck traffic on study intersections along the truck routes. As shown, in the PM peak period, with the addition of LBNL construction truck traffic (controlled by UC LBNL not to exceed the daily numbers noted above), average delay would increase by 2.6 seconds per vehicle at the Stadium Rim Way/Gayley Road intersection; 2.2 seconds per vehicle at the University Avenue/San Pablo Avenue intersection; and 1.6 seconds per vehicle at the University Avenue/Sixth Street intersection. Therefore by limiting the number of daily construction truck trips, UC LBNL will avoid significant traffic impacts from concurrent construction projects.

UC LBNL has a full-time Site Construction Coordinator to oversee and control all construction activities, including traffic to and from the main hill site. The Site Construction Coordinator is responsible for administering best

TABLE 4.12-2 **NEAR TERM LEVEL OF SERVICE CONDITIONS WITH AND WITHOUT LBNL CONSTRUCTION TRUCK TRAFFIC**

Intersection	Intersection Control	Peak Hour	Background Conditions		Conditions with LBNL Construction Traffic	
			Delay (Seconds)	LOS	Delay (Seconds)	LOS
University Ave./ Sixth St.	Signalized	AM	40.3	D	40.8	D
		PM	69.5	E	71.1	E
University Ave./ San Pablo Ave.	Signalized	AM	43.8	D	44.0	D
		PM	93.1 (v/c=1.00)	F	95.3 (v/c=1.00)	F
Stadium Rim Way/Gayley Rd.	All-Way Stop-Controlled	AM	30.5	D	32.3	D
		PM	42.4	E	44.8	E
Hearst Ave./ Gayley Road/ La Loma Ave.	Signalized	AM	25.8	C	27.1	C
		PM	24.8	C	25.7	C

Note: Results in **bold** represent unacceptable levels of service.

Source: Fehr & Peers Transportation Consultants, May 22, 2009.

management practices and ensuring that construction vehicle traffic does not contribute to a substantial increase in volumes or a degradation in level of service on surrounding roadways. Strategies applied include development and implementation of a traffic control plan for each construction project, as well as the management of concurrent project schedules so as to minimize the overlap of excavation or other heavy truck activity.

b. Operational Traffic

Operational traffic is not limited to the City of Berkeley designated truck routes. Accordingly, Fehr & Peers identified the following study intersections on local roads in the vicinity of LBNL for analysis: Hearst Ave-

nue/Gayley Road/La Loma Avenue, Stadium Rim Way/Gayley Road, Bancroft Way/Piedmont Avenue, and Durant Avenue/Piedmont Avenue.

As shown in Table 4.12-3, two of the four study intersections (Hearst Avenue/Gayley Road/La Loma Avenue, and Durant Avenue/Piedmont Avenue) currently operate at acceptable LOS D or better in both the AM and PM peak hours. A third intersection (Stadium Rim Way/Gayley Road) currently operates at an acceptable level of service in the AM peak hour, but is at an unacceptable LOS E in the PM peak hour. The fourth intersection (Bancroft Way/Piedmont Avenue) operates at LOS D during the AM peak hour and LOS C during the PM peak hour when analyzed using on the 2000 HCM methodology. However, the HCM methodology does not account for the high number of pedestrian crossings observed at this intersection, and when pedestrian crossings are factored into the analysis, the intersection currently operates at LOS F during both AM and PM peak hours.

7. Travel Patterns

Currently, approximately 40 percent of UC LBNL staff use alternative modes of transportation to the single occupancy vehicle, including LBNL shuttle, bicycling, BART and carpooling.⁹ In compliance with LRDP Mitigation Measure TRANS-1d, UC LBNL has developed and is implementing a Transportation Demand Management (TDM) Plan which seeks to reduce total vehicle trips to and within the LBNL site.

C. CEQA Significance Criteria

The impact of the proposed project on traffic would be considered significant if it would exceed the following standards of significance, in accordance with Appendix G of the *CEQA Guidelines* and the UC CEQA Handbook:

⁹ LBNL, 2006, *Long-Range Development Plan Environmental Impact Report*, page IV.L-19.

TABLE 4.12-3 **EXISTING TRAFFIC CONDITIONS AT INTERSECTIONS ON LOCAL ROADS IN THE VICINITY OF LBNL (LEVEL OF SERVICE SUMMARY)**

Intersection	Intersection Control	Peak Hour	Delay (seconds)	LOS
Centennial Drive/ Grizzly Peak Boulevard	All-Way Stop- Controlled	AM	10.2	B
		PM	17.7	C
Stadium Rim Way/ Gayley Road	All-Way Stop- Controlled	AM	29.6	D
		PM	41.1	E
Hearst Avenue/ Gayley Road/ La Loma Avenue	Signalized	AM	22.7	C
		PM	24.1	C
Bancroft Way/ Piedmont Avenue	All-Way Stop- Controlled	AM	> 60 (v/c = 0.930)	F
		PM	> 60 (v/c = 0.825)	F
Durant Avenue/ Piedmont Avenue	All-Way Stop- Controlled	AM	17.4	C
		PM	17.6	C

Note: Results in **bold** represent unacceptable levels of service.

Source: Fehr & Peers Transportation Consultants. August 2007 and May 2009.

1. Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the v/c ratio on roads, or congestion at intersections).
2. Exceed, either individually or cumulatively, a level of service standard established by the county congestion management agency for designated roads or highways.
3. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks.

4. Substantially increase hazards due to a design feature (e.g. sharp curves or dangerous intersections) or incompatible uses (e.g. farm equipment).
5. Result in inadequate emergency access.
6. Result in inadequate parking capacity.¹⁰
7. Conflict with applicable policies, plans, or programs supporting alternative transportation (e.g. bus turnouts, bicycle racks).

The City of Berkeley's *Guidelines for the Development of Transportation Impact Reports* sets out the following criteria for significant traffic-related impacts at signalized intersections. This is used for evaluation of impacts under CEQA criteria 1 and 2, above.

At signalized and all-way stop intersections, a significant impact would occur if:

- ◆ Intersection operations degrade from LOS D to LOS E or worse and there is a two-second or greater increase in delay; or
- ◆ A three-second or greater increase in delay at intersections operating at LOS E without and with the project; or
- ◆ Intersection operations degrade from LOS E to LOS F and there is a three-second or greater increase in delay; or
- ◆ At intersections operating at LOS F without the project, a change in the v/c ratio of 0.01 or greater.

¹⁰ Note: Per the 2009 Preliminary Draft CEQA Guideline Amendments, this threshold is no longer included on the CEQA checklist.

D. Potential Project Impacts

This section identifies potential impacts to transportation and traffic caused by the proposed project.

SP2 Impact TRANS-1: The proposed project would not cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e. result in a substantial increase in either the number of vehicle trips, the volume to capacity (v/c) ratio on roads, or congestion at intersections) or cause an exceedance of the City of Berkeley level of service standards at the study intersections. (*Less than Significant*)

a. Construction and Demolition

Traffic generated during construction and demolition would include a mix of large, mid and light duty trucks, dump trucks and other construction vehicles. This traffic would have a significant impact if it was substantial in relation to the existing traffic load and capacity of the local street system, including the street system within LBNL and caused an exceedance of a level of service standard.

It is expected that the majority of traffic during project construction would enter and exit the LBNL site through the Blackberry Canyon Gate given that it is closest to the location where demolition work would occur and to the proposed site of the GPL. However, since Strawberry Canyon Gate can accommodate all but the largest trucks, and because it provides the most direct access to Building 85/85A, some construction vehicles are likely to enter and exit through the Strawberry Canyon Gate.

As discussed above, the UC LBNL Site Construction Coordinator oversees and controls all construction activities, including traffic. Through the development, implementation and coordination of project-specific traffic control plans as well as the management of concurrent project schedules so as to minimize the overlap of excavation or other heavy truck activity, the Site Construction Coordinator regulates and maintains construction traffic below

the levels noted in Section B, Existing Setting, above. By itself, the proposed project is not expected to generate more than a maximum daily average of 38 one-way truck trips at any time, and in combination with other projects at LBNL the project would not generate a daily average of more than 96 one-way trips even at the peak of construction activities in June-July 2011. Nonetheless, the Site Construction Coordinator will ensure that the total construction truck traffic associated with the proposed project combined with trucks associated with other ongoing construction projects does not exceed the volumes established to avoid a significant traffic impact along the truck route. As shown in Section B above, LBNL construction truck traffic controlled by the Site Construction Coordinator would not result in a significant level of service impact at any of the study intersections. Consequently, a *less-than-significant* impact would occur both from the construction traffic associated with the proposed project and from the project in combination with other reasonably foreseeable LBNL construction projects.

b. Operation

Following completion of the GPL, the proposed project would result in an increase in the number of vehicle trips made to and from LBNL due to the relocation of approximately 100 personnel from the Potter Street facility in Berkeley. As stated in Section B, Existing Conditions, of this chapter, approximately 40 percent of LBNL staff use alternative modes of transportation to the single occupancy vehicle to make trips to and from the main hill site. Among this percentage, the LBNL shuttle, bicycling, BART, and carpooling are the most commonly used modes of travel.¹¹ During the operation phase of the proposed project, it is expected that a similar percentage (40 percent) of the total possible new trips would be made to and from LBNL by similar modes.

Based on calculations from the LBNL 2006 LRDP EIR, 100 new personnel associated with the proposed project would be expected to generate 142 new

¹¹ LBNL, 2006, *Long-Range Development Plan Environmental Impact Report*, page IV.L-19.

one-way trips per day, with 15 trips in AM peak hours, and 17 trips in PM peak hours.¹²

The proposed project would be constructed and operational by 2014. Therefore the effects of the project's operational traffic were evaluated at the four study intersections under 2014 conditions with and without the project. Major projects currently under construction or expected to be completed in the next few years would add to the traffic in the study area. The near-term projects included in this analysis are described below:

- ◆ *Underhill Parking Structure*, recently completed by UC Berkeley, would provide 690 net new parking spaces in the Southside area.¹³
- ◆ *Lower Hearst Parking Structure*, recently completed by UC Berkeley, would provide 100 net new parking spaces in the Northside area.¹⁴
- ◆ *Southeast Campus Integrated Projects (SCIP)* would consolidate existing parking spaces and provide 300 additional parking spaces in the southeast

¹² As documented in the LBNL 2006 LRDP EIR, the approximately 4,000 employees at the LBNL main hill campus generate 5,700 daily trips, 610 AM peak hour trips, and 660 PM peak hour trips. This corresponds to trip generation rate of 1.42 daily trips, 0.15 AM peak hour, and 0.17 PM peak hour trips per employee. The values shown were quantified as follows ($5,700/4,000 = 1.42$), ($610/4,000=0.15$), ($660/4,000=0.17$).

¹³ The Underhill Parking Structure, although operational at the time of EIR preparation, is included in the near-term analysis as a new project because at the time that traffic counts were conducted that are used in this EIR, the parking structure was not fully operational and had only 310 parking spaces. Following construction, the parking structure now provides approximately 1,000 parking spaces. Since the Existing conditions traffic volumes include traffic associated with the 310 parking spaces that were at the parking structure site in 2002, the net new parking spaces are accounted for in the 2014 analysis.

¹⁴ Although the Lower Hearst Parking Structure was operational at the time of EIR preparation, it is included in the near-term analysis as a new project because at the time that traffic counts were conducted that are used in this EIR, the parking structure had 100 fewer spaces. The 100 net new parking spaces in this parking facility are accounted for in the 2014 analysis.

area of the UC Berkeley campus. About 900 parking spaces would be provided at the Maxwell Family Field Parking Structure located at Stadium Rim Way, just east of Gayley Road.

- ◆ *Computational Research and Theory (CRT) Facility Project* and the *SERC* would increase the LBNL population by no more than 300 persons.

Other planned LBNL projects such as the BELLA, Seismic Phase 1, User Support Building, and Old Town demolition would not result in an increase in the daily population at LBNL. Thus, they are not expected to add additional traffic to the roadway network. New trips generated by other UC Berkeley projects such as the NEQSS, Law School Infill, Naval Architecture Restoration and Blum Center, and Warren Hall replacement are included in the trips associated with the two parking structure projects.

Estimated traffic generated by the near-term projects was added to the existing conditions volumes to estimate intersection volumes under near-term No Project conditions. Table 4.12-4 summarizes the near-term No Project conditions weekday peak hour intersection level of service analysis results. As shown in the table, two of the study intersections that currently operate at LOS D or better, would continue to operate at LOS D or better during both AM and PM peak hours under near-term No Project conditions. The all-way stop-controlled Stadium Rim Way/Gayley Road would degrade from LOS D under Existing conditions to LOS F under near-term No Project conditions during both AM and PM peak hours.

The all-way stop-controlled Bancroft Way/Piedmont Avenue would continue to operate at LOS F during both AM and PM peak hours under the near-term No Project conditions primarily due to the high pedestrian volume.¹⁵

¹⁵ As required by the UC Berkeley 2020 LRDP EIR Mitigation Measures TRANS-6a and Trans-7, full signal warrant analysis was completed at the Durant Avenue/Piedmont Avenue and Bancroft Way/Piedmont Avenue intersections based on data collected in April 2007. The study results were submitted to the City of Berkeley in Summer 2007.

TABLE 4.12-4 **LEVEL OF SERVICE CONDITIONS IN 2014 WITH AND WITHOUT PROJECT OPERATIONAL TRAFFIC**

Intersection	Intersection Control	Peak Hour	Near-Term No Project Conditions		Near-Term With Project Conditions	
			Delay (Seconds) ^a	LOS ^a	Delay (Seconds) ^a	LOS ^a
Hearst Avenue/ Gayley Road/ La Loma Avenue	Signalized	AM	28.6	C	29.4	C
		PM	37.5	D	37.6	D
Stadium Rim Way/Gayley Road	All-Way Stop- Controlled	AM	> 60 (v/c = 1.108)	F	> 60 (v/c = 1.108)	F
		PM	> 60 (v/c = 1.196)	F	> 60 (v/c = 1.200)	F
Bancroft Way/ Piedmont Avenue ^b	All-Way Stop- Controlled	AM	> 60 (v/c = 1.127)	F	> 60 (v/c = 1.136)	F
		PM	> 60 (v/c = 0.910)	F	> 60 (v/c = 0.911)	F
Durant Avenue/ Piedmont Avenue	All-Way Stop- Controlled	AM	26.1	D	26.7	D
		PM	20.7	C	20.9	C

^a Signalized and all-way stop-controlled intersection delay and level of service based on average control delay per vehicle for the intersection, and side-street stop-controlled intersection delay and level of service based on average control delay per vehicle for the worst approach, according to the Highway Capacity Manual, Special Report 209, Transportation Research Board, 2000. For intersections operating at LOS F, the v/c is also reported.

^b Based on the 2000 HCM methodology, the intersection would operate at LOS F during the AM peak hour and LOS D during the PM peak hour under near-term No Project and near-term With Project conditions. Based on field observations and measurements, the intersection currently operates at LOS F during both AM and PM peak hours due to the high number of pedestrian crossings, which the 2000 HCM methodology does not account for. Thus, the intersection would continue to operate at LOS F during both AM and PM peak hours under near-term No Project and near-term With Project conditions.

Source: Fehr & Peers Transportation Consultants, 2010.

Table 4.12-4 also summarizes the near-term With Project weekday peak hour intersection level of service analysis results. As shown in the table, all four of the existing study intersections would continue to operate at the same level of service as under near-term No Project conditions.

The Stadium Rim Way/Gayley Road and Bancroft Way/Piedmont Avenue intersections would continue to operate at LOS F during both AM and PM peak hours. However, the proposed project would not increase the intersection v/c ratio by more than 0.01 at these intersections. Thus, the project would not cause a significant impact at these two intersections.

Based on the foregoing analysis, the new trip volumes associated with operation of the proposed project would not be substantial in relation to existing traffic volumes or the capacity of the local street system, and would not result in an exceedance of a level of service standard. The project's operational impact would therefore be *less than significant*.

SP2 Impact TRANS-2: The proposed project would not result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks. (No impact)

The proposed project does not include any activities that could affect air traffic patterns. Thus, *no impact* would occur during its construction or operational phases.

SP2 Impact TRANS-3: The proposed project would not substantially increase hazards due to a design feature (e.g. sharp curves or dangerous intersections) or incompatible uses (e.g. farm equipment). (No impact)

The proposed project does not include any design features that would represent a substantial hazard. The existing driveway to the west of Building 25/25B would be realigned and widened to comply with building codes, and the new GPL facility would not introduce any features with the potential to

adversely affect vehicular, bicycle, and pedestrian safety. Therefore, *no impact* would occur.

SP2 Impact TRANS-4: The proposed project would not result in inadequate emergency access. (*No impact*)

The proposed project would not interfere with emergency access to and from LBNL. Emergency vehicles accessing destinations on the LBNL site would continue to use existing emergency routes during construction/demolition and operation of the proposed project. Pursuant to LRDP Mitigation Measure GEO-1, seismic emergency response and evacuation plans shall be prepared for the proposed project, incorporating potential inaccessibility of the Blackberry Canyon entrance and identifying alternative ingress and egress routes for emergency vehicles and facility employees in the event of roadway failure from surface fault rupture. As a result, *no impact* related to emergency access would occur.

SP2 Impact TRANS-5: The proposed project would not result in inadequate parking capacity on the LBNL main hill campus. (*Less than Significant*)

a. Construction and Demolition

Figure 3-11 in the Project Description shows the laydown areas proposed for use during the demolition and construction phase of the project. Laydown areas adjacent to Buildings 25/25B, 55 and 71 trailers would all include parking lots used by occupants and visitors of those buildings. These staging areas would temporarily remove up to 113 surface parking stalls, which would be unavailable to LBNL staff for a period of up to 24 months.

Best Practice TRANS-6b from the LRDP EIR requires that prime construction contractor on every project prepare a Construction Traffic Management Plan which includes a plan for parking. Overseen by the Site Construction Coordinator, these plans minimize the volume of construction traffic on the main hill campus, and clearly identify the number and location of parking

spaces required for construction related vehicles. During the construction phase of the proposed project, priority for parking would be given to construction vehicles, and UC LBNL employees would be encouraged to use the shuttles and to travel to and from the main hill campus by alternative modes of transport, consistent with the Travel Demand Management Plan developed as part of LRDP Mitigation Measure TRANS-1d. UC LBNL is also negotiating with UC Berkeley for temporary use of spaces in UC Berkeley lots which would offset main hill spaces unavailable during the construction phase.¹⁶ Consequently, the temporary removal of 113 parking spaces from the main hill campus during the construction phase of the proposed project would result in a *less-than-significant* impact on parking capacity at LBNL during its construction phase.

b. Operation

The new GPL would not take any of the existing parking spaces from the surface parking lot adjacent to Building 25. However, the new facility would be occupied by an additional 100 personnel, 60 percent of whom could be expected to commute by single occupancy vehicle. A parking capacity study completed by Fehr and Peers in November 2009, found that the lots nearest to the proposed site of the new GPL are 100 percent occupied at peak hour (11:00 AM). While 49 parking spots in Lots N4 and P, closest to the proposed GPL site, would be reserved for future GPL occupants,¹⁷ relocated staff would increase peak parking demand by about 60 vehicles at the current rate of single-occupancy vehicle usage, which would exceed the current capacity of existing lots in the area.

As previously discussed in Section B, UC LBNL has developed and is implementing a Transportation Demand Management (TDM) Program which seeks to reduce total vehicle trips to and within LBNL and to maintain growth in demand for parking spaces on the main hill campus below 375 ad-

¹⁶ Dutton, Les. Site Construction Coordinator, LBNL. Personal communication with DC&E staff, October 21, 2009.

¹⁷ Dutton, Les. Site Construction Coordinator, LBNL. Personal communication with DC&E staff. January 25, 2010.

ditional spaces in the period from 2006 through 2016. To achieve these goals, the TDM program currently employs a variety of strategies, including promoting increased use of the LBNL Shuttle Service, the Guaranteed Ride Home program, Pretax Transportation Program Incentives, and Carpooling/Vanpooling as well as encouraging telecommuting and the use of flex time where feasible. In addition, other potential alternative transportation measures being considered include: development of remote parking with shuttles for employees and construction personnel, as well as subsidizing public transit costs with vouchers, discounted BART tickets and participation in the Alameda County Transit Easy Pass program.

With limited development of additional parking spaces and increased promotion of TDM programs, the demand for 60 additional parking spaces generated by the proposed project would be tempered and accommodated. Therefore, the proposed project would result in a *less-than-significant* impact on parking capacity at LBNL during its operational phase.

SP2 Impact TRANS-6: The proposed project would not conflict with applicable policies, plans, or programs supporting alternative transportation (e.g. bus turnouts, bicycle racks). (*No impact*)

As previously noted, a shuttle stop is located at the entrance to the driveway and the proposed location for the new GPL. The shuttle provides connections for staff and visitors between the LBNL site and various destinations in Berkeley, including the Downtown BART station and AC Transit stops. Bicycle storage and changing rooms would be provided in the new GPL facility, to promote bicycle commuting in support of the TDM Plan.¹⁸

All of the TDM programs and policies described above would be open to personnel in the new GPL facility. As a result, the proposed project would not conflict with policies, plans, or programs to support alternative transportation and *no impact* would occur.

¹⁸ RMW Architects, July 15, 2008, *Conceptual Design Report*.

E. Cumulative Impacts

SP2 Cumulative Impact TRANS-1: The proposed project, in combination with other foreseeable development at LBNL and in the surrounding community, would generate traffic that would cause the level of service standards to be exceeded at the Durant Avenue/Piedmont Avenue, Hearst Avenue/Gayley Road/La Loma Avenue, Gayley Road/Stadium Rim Way, and Bancroft Way/Piedmont Avenue intersections. *(Significant and Unavoidable)*

As discussed above in Impact SP2 TRANS-1, the project would not generate traffic volumes that would significantly impact the levels of service of key intersections in the surrounding communities in the near term. However, in combination with other projects at LBNL and foreseeable development in the surrounding community as projected through 2025, in the long term, the proposed project would result in significant impacts to intersection operations at the Durant Avenue/Piedmont Avenue, Hearst Avenue/Gayley Road/La Loma Avenue, Gayley Road/Stadium Rim Way, and Bancroft Way/Piedmont Avenue intersections in the City of Berkeley.

The cumulative traffic analysis completed for the LBNL 2006 LRDP (hereinafter 2006 LRDP Traffic Study) included an intersection operations analysis under year 2025 conditions, which analyzed the impacts of the buildout of the LBNL 2006 LRDP combined with the buildout of the UC Berkeley 2020 LRDP and general plans of Berkeley and surrounding communities. To evaluate the proposed project's contribution to the previously evaluated long term cumulative traffic impacts, an independent 2025 cumulative impact analysis was conducted for this EIR. Four study intersections were reanalyzed with the more refined information regarding LBNL and UC Berkeley projects than was available when the 2006 LRDP Traffic Study was conducted. Table 4.12-5 presents the results of this updated analysis. It compares intersection level of service under Year 2025 with LRDP buildout conditions as presented in the 2006 LRDP Traffic Study with the results of the updated analysis.

As shown in Table 4-12-5, study intersections would continue to operate at the same level of service under the Updated Year 2025 with LRDP conditions as under the Year 2025 with LRDP conditions presented in the 2006 LRDP Traffic Study. The Hearst Avenue/Gayley Road/La Loma Avenue intersection would operate at LOS E during the AM peak hour and LOS F during the PM peak hour. The Durant Avenue/Piedmont Avenue intersection would operate at LOS E during the AM peak hour and LOS F during the PM peak hour. Both Stadium Rim Way/Gayley Road and Bancroft Way/Piedmont Avenue intersections would operate at LOS F during both AM and PM peak hours.

Based on the thresholds of significance that were used when the 2006 LRDP EIR was prepared, that EIR identified significant cumulative impacts at three of the four intersections listed in Table 4.12-5. The EIR included LRDP Mitigation Measure TRANS-8, which incorporated LRDP Mitigation Measures TRANS-1a through 1d, to address these significant impacts. In conjunction with the approval of the 2006 LRDP, UC LBNL committed to work with the City of Berkeley and UC Berkeley to implement the necessary improvements at the three intersections identified in LRDP Mitigation Measures TRANS-1a through 1c to improve operations. LRDP Mitigation Measure TRANS-1c and TRANS-1d required that UC LBNL undertake a detailed study of the Hearst Avenue/Gayley Road/La Loma Avenue intersection as part of its TDM program, and contribute on a fair share basis to implementation of any feasible mitigation measures identified in the study. The study, carried out in November 2009, proposed several measures which would improve conditions at the intersection, including the addition of a left-hand turn pocket on northbound Gayley Road to westbound Hearst Avenue, the re-striping of the northwest curb crosswalk, the modification of signal phasing, and the reduction of the northeastern curb radius.¹⁹ The collective effect of these measures would improve level of service from LOS F to LOS E at the intersection under cumulative conditions in 2025. However, even though UC LBNL has

¹⁹ McClain, Ryan. Fehr & Peers Transportation Consultants. Hearst Avenue/Gayley Rd/La Loma Avenue Intersection Evaluation. November 11, 2009.

TABLE 4.12-5 **YEAR 2025 CONDITIONS – STUDY INTERSECTION LEVEL OF SERVICE SUMMARY**

Intersection	Control	Peak Hour	Year 2025 with LRDP ^a		Updated Year 2025 with LRDP	
			Delay (Seconds) ^b	LOS ^b	Delay (Seconds) ^b	LOS ^b
Hearst Avenue/Gayley Road/La Loma Avenue	Signalized	AM	68.4	E	76.0	E
		PM	84.1 (v/c = 1.173)	F	85.2 (v/c = 1.184)	F
Stadium Rim Way/Gayley Road	All-Way	AM	> 60 (v/c = 1.262)	F	> 60 (v/c = 1.333)	F
	Stop-Controlled	PM	> 60 (v/c = 1.274)	F	> 60 (v/c = 1.401)	F
Bancroft Way/Piedmont Avenue ^c	All-Way	AM	> 60 (v/c = 1.256)	F	> 60 (v/c = 1.356)	F
	Stop-Controlled	PM	> 60 (v/c = 0.998)	F	> 60 (v/c = 1.009)	F
Durant Avenue/Piedmont Avenue	All-Way	AM	55.9 (v/c = 1.128)	F	> 60 (v/c = 1.201)	F
	Stop-Controlled	PM	36.8	E	37.5	E

Notes: **Bold** indicated an intersection operating at unacceptable LOS E or LOS F.

^aBased on Table IV.L-7 (Revised) in the LBNL LRDP Final EIR (July 2007).

^bSignalized and all-way stop-controlled intersection delay and level of service based on average control delay per vehicle for the intersection, and side-street stop-controlled intersection delay and level of service based on average control delay per vehicle for the worst approach, according to the Highway Capacity Manual, Special Report 209, Transportation Research Board, 2000. For intersections operating at LOS F, the v/c ratio is also reported.

^cBased on the 2000 HCM methodology, the intersection would operate at LOS F during the AM peak hour and LOS E during the PM peak hour under Cumulative conditions. Based on field observations and measurements, the intersection currently operates at LOS F during both AM and PM peak hours due to the high number of pedestrian crossings, which the 2000 HCM methodology does not account for. Thus, the intersection would continue to operate at LOS F during both AM and PM peak hours under Cumulative conditions.

Source: Fehr & Peers, January 2010.

completed this study and has committed to pay its fair share of the cost of the required improvements at the intersections, and this remains a binding mitigation commitment, the impacts are considered significant and unavoidable because there is not yet a reasonable plan for improvements at these intersections that has been adopted by the City, and as such, it cannot be determined at this time whether the impacts would be mitigated to a less-than-significant level. Similarly, although intersection improvements were identified in the 2006 LRDP EIR to address the impacts at Gayley Road/Stadium Rim Way intersection and Durant Avenue/Piedmont Avenue intersection and UC LBNL committed to funding on a fair share basis the necessary improvements, the impact was found to be significant and unavoidable as there was no reasonable plan that had been adopted by the City to improve those intersections. Because that is still the case, therefore the cumulative traffic impacts at all three intersections as evaluated in this EIR would still be *significant and unavoidable*.

The LBNL 2006 LRDP EIR did not find a significant traffic-related impact at the Bancroft Way/Piedmont Avenue intersection; however, the updated analysis shows that in addition to the three intersections discussed above, the intersection of Bancroft Way and Piedmont Avenue would operate at LOS F in 2025 and cumulative traffic added by LBNL growth would cause the v/c ratio to increase by 0.181 in the AM peak period and by 0.032 in the PM peak period, with the AM and PM peak hour v/c increase exceeding the threshold of significance established by the City of Berkeley. Therefore, the cumulative traffic would result in a significant impact at this intersection.

As shown in Table 4.12-6, the proposed project would add small amounts of traffic to each of these four intersections compared to the total growth in traffic volumes between 2010 and 2025, and as shown in Table 4.12-7, the project would not substantially increase the delay or the v/c ratio. However, conservatively the proposed project's contribution to these intersections is considered cumulatively considerable.

LBNL 2006 LRDP EIR Mitigation Measures TRANS 8, and TRANS-1a, 1b, 1c, and 1d apply to and are a part of the proposed project and would address

TABLE 4.12-6 **YEAR 2025 CONDITIONS – SEISMIC PHASE 2 PROJECT CONTRIBUTION TO CUMULATIVE TRIPS**

Intersection	Peak Hour	Total Intersection Volume		Seismic Phase 2 Project Trips	Percent Contribution ^a
		Existing	Cumulative		
Hearst Ave./Gayley Rd./La Loma Ave.	AM	1,440	2,031	15	2.5%
	PM	1,555	2,134	17	2.9%
Stadium Rim Way/Gayley Rd.	AM	1,172	1,872	6	0.9%
	PM	1,293	1,864	3	0.5%
Bancroft Way/Piedmont Ave. ^b	AM	1,151	1,710	6	1.1%
	PM	1,107	1,454	3	0.9%
Durant Ave./Piedmont Ave.	AM	1,078	1,625	6	1.1%
	PM	1,201	1,628	3	0.7%

^a Percent Contribution = Project Trips/(Cumulative Intersection Volume-Existing Intersection Volume)

Source: Fehr & Peers, January 2010.

the project’s contribution to the impacts at Durant Avenue/Piedmont Avenue, Hearst Avenue/Gayley Road/La Loma Avenue, and Gayley Road/Stadium Rim Way intersections but would not reduce the impacts to a less-than-significant level. With respect to the cumulative impact at the Bancroft Way/Piedmont Avenue intersection from all growth at LBNL under the 2006 LRDP including the proposed project, the following mitigation measure is proposed:²⁰

²⁰ This mitigation measure is the same as Mitigation Measure TRANS-1e in the LBNL 2006 LRDP EIR Supplement, presented after Chapter 7 in this volume of the EIR, that is a supplementation of the LBNL 2006 LRDP EIR traffic analysis. This mitigation measure addresses the cumulative traffic impact of the proposed project and the cumulative impact of LBNL growth under the LBNL 2006 LRDP.

TABLE 4.12-7 **YEAR 2025 CONDITIONS – STUDY INTERSECTION LEVEL OF SERVICE SUMMARY**

Intersection	Peak Hour	Updated Year 2025 with LRDP Without Seismic Phase 2		Updated Year 2025 with LRDP With Seismic Phase 2		Project Contribution
		Delay (Seconds)	LOS ^a	Delay (Seconds) ^a	LOS ^a	Delay (Seconds) ^a
Hearst Ave./ Gayley Rd./ La Loma Ave.	AM	74.3	E	76.0	E	1.7
	PM	> 60 (v/c=1.169)	F	> 60 (v/c=1.184)	F	v/c = 0.015
Stadium Rim Way/Gayley Rd.	AM	> 60 (v/c=1.333)	F	> 60 (v/c=1.333)	F	v/c=0
	PM	> 60 (v/c=1.398)	F	> 60 (v/c=1.401)	F	v/c=0.002
Bancroft Way/ Piedmont Ave. ^b	AM	60 (v/c=1.348)	F	> 60 (v/c=1.356)	F	v/c=0.008
	PM	> 60 (v/c=1.008)	F	> 60 (v/c=1.009)	F	v/c=0.001
Durant Ave./ Piedmont Ave.	AM	> 60 (v/c=1.194)	F	> 60 (v/c=1.201)	F	v/c=0.007
	PM	37.0	E	37.5	E	0.5

Note: **bold** indicated an intersection operating at unacceptable LOS E or LOS F.

^a Signalized and all-way stop-controlled intersection delay and level of service based on average control delay per vehicle for the intersection, and side-street stop-controlled intersection delay and level of service based on average control delay per vehicle for the worst approach, according to the Highway Capacity Manual, Special Report 209, Transportation Research Board, 2000. For intersections operating at LOS F, the v/c ratio is also reported.

^b Based on the 2000 HCM methodology, the intersection would operate at LOS F during the AM peak hour and LOS E during the PM peak hour under Cumulative with Helios conditions. Based on field observations and measurements, the intersection currently operates at LOS F during both AM and PM peak hours due to the high number of pedestrian crossings, which the 2000 HCM methodology does not account for. Thus, the intersection would continue to operate at LOS F during both AM and PM peak hours under Cumulative with Helios conditions.

Source: Fehr & Peers, January 2010.

Mitigation Measure TRANS-1e: LBNL will work with the City of Berkeley to design and install a signal at the Bancroft Way/Piedmont Avenue intersection and provide an exclusive left-turn lane and an exclusive through lane on the northbound approach when a signal warrant analysis shows that the signal is needed. LBNL shall contribute funding, on a fair-share basis, to be determined in consultation with UC Berkeley and the City of Berkeley, for a periodic (annual or biennial) signal warrant check to allow the City to determine when a signal is warranted, and for installation of the signal. Should the City determine that alternative mitigation strategies may reduce or avoid the significant impact, LBNL shall work with the City and UC Berkeley to identify and implement such alternative feasible measure(s). See also Mitigation Measure TRANS-1c, development and implementation of a new Transportation Demand Management Program.

With the implementation of this mitigation measure, the Bancroft Way/Piedmont Avenue intersection would operate at an acceptable level of service (LOS B) during both the AM and PM peak hours.

This mitigation measure is proposed to be adopted as part of the LRDP and will be monitored through the LRDP mitigation monitoring and reporting program. It will thus continue to be a binding mitigation commitment of LBNL. Under CEQA case law, however, when the lead agency contributes fair-share funding to a mitigation measure that will be carried out by another entity, there must be some evidence of a reasonable plan in place in order for the lead agency to conclude that the adopted mitigation will reduce the impact to a less-than-significant level (City of Marina v. Board of Trustees of the California State University (2006) 39 Cal.4th 341). The University has discussed this with the City, and based on that consultation, LBNL understands there have been some discussions of improvements at Bancroft Way/Piedmont Avenue intersection. Also, the University has retained a consultant to perform studies related to these improvements, but there is not yet a plan in place for the improvements. As such, it cannot be determined at this time that this

impact will be mitigated to a less-than-significant level. Accordingly, this impact would still be considered significant and unavoidable, but LBNL would contribute to fair-share funding which, if a reasonable plan is implemented, would mitigate these impacts to a less-than-significant level.

Significance after Mitigation: Implementation of the above measure would improve conditions at the intersection to LOS B in both the AM and PM peak hours.²¹ However, there is not yet a reasonable plan for improvements at this intersection, and as such, it cannot be determined at this time whether the impact will in fact be mitigated to a less-than-significant level. Therefore, this cumulative impact is considered *significant and unavoidable*.

²¹ UC Berkeley. 2020 LRDP Final EIR, http://www.cp.berkeley.edu/LRDP_final/section_9.2.pdf, accessed on January 11, 2010.

LAWRENCE BERKELEY NATIONAL LABORATORY
SEISMIC PHASE 2 PROJECT EIR
TRANSPORTATION AND TRAFFIC

4.13 UTILITIES AND SERVICE SYSTEMS

This section includes an assessment of the potential impacts of the proposed project on utilities and service systems. Information is taken from the LBNL 2006 LRDP EIR and LBNL 2006 LRDP, with additional sources used where stated.

A. *Regulatory Setting*

1. State Regulations and Policies

Water supply and distribution planning, solid waste disposal, and energy are regulated at the State level. Regulations relevant to the implementation of development projects are described below.

a. Water Supply and Distribution

Senate Bill (SB) 610, codified as Sections 10910-10915 of the California Public Resources Code, requires local water providers to conduct a water supply assessment for projects proposing over 500 housing units or equivalent usage. The local water suppliers must also prepare an Urban Water Management Plan (UWMP) to guide planning and development in the water supplier's service area.

b. Solid Waste Disposal

The California Integrated Waste Management Act of 1989, or Assembly Bill (AB) 939, established the Integrated Waste Management Board, required the implementation of integrated waste management plans, and also mandated that by January 2000, all local jurisdictions should divert at least 50 percent of all solid waste from landfills.

c. Energy

Buildings constructed after June 30, 1977, must comply with standards identified in Title 24 of the California Code of Regulations. Title 24 requires the inclusion of state-of-the-art energy conservation features in building design and construction, including the incorporation of specific energy-conserving design features, use of non-depletable energy resources, or a demonstration that buildings would comply with a designated energy budget.

2. Local Plans and Policies

The Seismic Phase 2 project involves DOE facilities at LBNL operated by the University of California. The University of California, under Article IX, Section 9 of the California Constitution, is exempt from local land use regulation, including General Plans and zoning. The only plans and policies applicable to the proposed project are contained in the LBNL 2006 LRDP and associated EIR or UC policies that apply to all UC campuses.

Although exempt from local land use regulation, UC nevertheless seeks to cooperate with local jurisdictions to reduce any physical consequences of potential land use conflicts to the extent feasible. Because the western part of the LBNL site is within the Berkeley city limits, and the eastern part is within the Oakland city limits, in addition to UC and LBNL plans and policies, this section also summarizes policies contained in the Berkeley and Oakland general plans related to utilities.

a. UC Policy on Sustainable Practices

The UC Policy on Sustainable Practices is one of the most comprehensive and far-reaching institutional sustainability commitments in the nation.¹ It establishes guidelines and goals in a wide array of areas, including Sustainable Transportation, Climate Protection Practices, Sustainable Operations and Maintenance, Waste Reduction and Recycling, Environmentally Preferable Purchasing, Sustainable Foodservice, Clean Energy, and Green Building.

b. LBNL 2006 Long Range Development Plan

i. Principles and Strategies

The LBNL 2006 LRDP proposes four fundamental principles that form the basis for the development strategies provided for each element of the LRDP. The two principles most applicable to utilities-related aspects of new development are to:

¹ University of California, *UC Policy on Sustainable Practices*, <http://www.universityofcalifornia.edu/sustainability/policy.html>, accessed on November 13, 2009.

- ◆ Preserve and enhance the environmental qualities of the site as a model of resource conservation and environmental stewardship.
- ◆ Build a safe, efficient, cost-effective scientific infrastructure capable of long-term support of evolving scientific missions.

Development strategies provided by the LBNL 2006 LRDP are intended to minimize potential environmental impacts that could result from implementation of the LBNL 2006 LRDP. Development strategies set forth in the LBNL 2006 LRDP that are applicable to utilities include the following:

- ◆ Protect and enhance the site's natural and visual resources, including native habitats, riparian areas, and mature tree stands by focusing future development primarily within the already developed areas of the site.
- ◆ Increase development densities within areas corresponding to existing clusters of development to preserve open space, and enhance operational efficiencies and access.
- ◆ To the extent possible site new projects to replace existing outdated facilities and ensure the best use of limited land resources.
- ◆ To the extent possible, site new projects adjacent to existing development where existing utility and access infrastructure may be utilized.
- ◆ Site and design new facilities in accordance with University of California Presidential Policy for Green Building Design to reduce energy, water, and material consumption and provide improved occupant health, comfort, and productivity.
- ◆ Exhibit the best practices of modern sustainable development in new projects as a way to foster a greater appreciation of sustainable practices at the Laboratory.
- ◆ Utilize native, drought-tolerant plant materials to reduce water consumption; focus shade trees and ornamental plantings at special outdoor use areas.

- ◆ Minimize impervious surfaces to reduce storm water run-off and provide landscape elements and planting to stabilize slopes, and reduce erosion and sedimentation.
- ◆ Maintain a safe and reliable utility infrastructure capable of sustaining the Laboratory's scientific endeavors.
- ◆ Consolidate utility distribution into centralized utility corridors that generally coincide with major roadways.
- ◆ Ensure that utility infrastructure improvements accommodate future facility expansion and alterations in the most cost-effective means possible.
- ◆ Design infrastructure improvements to embody sustainable practices.

ii. Design Guidelines

The LBNL Design Guidelines were developed in parallel with the 2006 LRDP. The LBNL Design Guidelines provide specific guidelines for site planning, landscape and building design as a means to implement the development principles of the 2006 LRDP as each new project is developed. Specific design guidelines are organized by a set of design objectives that essentially correspond to the strategies provided in the 2006 LRDP. The LBNL Design Guidelines provide the following specific planning and design guidance relevant to the utilities-related aspects of new development:

- ◆ Provide appropriate site lighting for safety and security.
- ◆ Create buildings that are flexible, modular, and expandable.

iii. LBNL 2006 LRDP EIR Mitigation Measures

A series of mitigation measures is included within the LBNL 2006 LRDP EIR. Although this analysis does not tier from that EIR, several of the mitigation measures adopted as part of the 2006 LRDP apply to the proposed project and are included in the Seismic Phase 2 project description. The following utilities and service systems mitigation measures apply to and are a part of the proposed project:

LRDP Mitigation Measure UTILS-2: LBNL shall implement programs to ensure that additional wastewater flows from the Lab are directed into

unconstrained sub-basins, as necessary and appropriate. LBNL shall continue to direct the Lab's existing western effluent flows into sub-basin 17-013. In addition, new flows at the Lab shall be directed into either sub-basin 17-013, sub-basin 17-304, unconstrained portions of sub-basin 17-503, or another sub-basin that has adequate capacity. Final design and implementation of these improvements shall be negotiated between the appropriate parties and shall undergo appropriate environmental review and approval. LBNL shall closely coordinate the planning, approval, and implementation of this mitigation with the City of Berkeley and the UC Berkeley, as appropriate.

LRDP Mitigation Measure UTILS-4: LBNL shall develop a plan for maximizing diversion of construction and demolition materials associated with the construction of the proposed project from landfill disposal.

c. City of Berkeley General Plan

The City of Berkeley General Plan policies pertaining to utilities include the following:

i. *Water Supply and Distribution*

- ◆ Policy EM-26: Water Conservation. Promote water conservation through City programs and requirements.

Action:

- B) Consider participation in the East Bay Municipal Utility District's East Bay-shore Recycled Water Project to make recycled water available for irrigation and other non-potable uses.
- ◆ Policy EM-31: Landscaping. Encourage drought-resistant, rodent-resistant, and fire-resistant plants to reduce water use, prevent erosion of soils, improve habitat, lessen fire danger, and minimize degradation of resources.

ii. Wastewater

- ◆ Policy EM-24: Sewers and Storm Sewers. Protect and improve water quality by improving the citywide sewer system.

iii. Stormwater Drainage

- ◆ Policy EM-23 Water Quality in Creeks and San Francisco Bay. Take action to improve water quality in creeks and San Francisco Bay.

Action:

- D) Restore a healthy freshwater supply to creeks and the Bay by eliminating conditions that pollute rainwater, and by reducing impervious surfaces and encouraging use of swales, cisterns, and other devices that increase infiltration of water and replenishment of underground water supplies that nourish creeks.
- E) Ensure that new development pays its fair share of improvements to the storm sewerage system necessary to accommodate increased flows from the development.
- F) Coordinate storm sewer improvements with creek restoration projects.

- ◆ Policy S-27: New Development. Use development review to ensure that new development does not contribute to an increase in flood potential.

Actions:

- C) Require new development to provide for appropriate levels of on-site detention and/or retention of stormwater.
- D) Regulate development within 30 feet of an exposed streambed as required by the Preservation and Restoration of Natural Watercourses (Creeks) Ordinance.

iv. Solid Waste

- ◆ Policy EM-7: Reduced Wastes. Continue to reduce solid and hazardous wastes.

- ◆ Policy EM-8: Building Reuse and Construction Waste. Encourage rehabilitation and reuse of buildings whenever appropriate and feasible in order to reduce waste, conserve resources and energy, and reduce construction costs.
- ◆ Policy EM-10: Materials Recovery and Remanufacturing. Support and encourage serial materials recovery and remanufacturing industries.
- ◆ Policy EM-11: Biodegradable Materials and Green Chemistry. Support efforts to phase out the use of long-lived synthetic compounds, such as pesticides and vehicle anti-freeze, and certain naturally occurring substances which do not biodegrade. Encourage efforts to change manufacturing processes to use biodegradable materials, recycle manufactured products, reuse byproducts, and use “green” products.

v. *Energy*

- ◆ Policy EM-35: Energy-Efficient Design. Promote high-efficiency design and technologies that provide cost-effective methods to conserve energy and use renewable energy sources.
- ◆ Policy EM-36: Energy Conservation. Continue to implement energy conservation requirements for residential and commercial buildings at the time of sale and at time of major improvements.
- ◆ Policy EM-39: Business Energy Conservation. Encourage all businesses to implement energy conservation plans.
- ◆ Policy EM-40: Market Support. Support the market for energy-efficient technologies and services.

d. Oakland General Plan

The City of Oakland General Plan Land Use and Transportation Element was approved in March 1998. Policy language is focused on economic development (industry and commerce policies), transportation and transit-oriented development, downtown, the waterfront, and the neighborhoods, as well as housing. The following policy is applicable to utilities:

- ◆ Policy I/C1.9: Locating Industrial and Commercial Area Infrastructure. Adequate public infrastructure should be located within existing and proposed industrial and commercial areas to retain viable existing uses, improve the marketability of existing vacant or underutilized sites, and encourage future user and development of these areas with activities consistent with the goal of this Plan.

The Open Space, Conservation and Recreation (OSCAR) Element, adopted in 1996, addresses the management of open land, natural resources, and parks in Oakland. The following policies are relevant to utilities.

i. Water Supply and Distribution

- ◆ Policy CO-4.1: Water Conservation. Emphasize water conservation and recycling strategies to meet future demand.
- ◆ Policy CO-4.2: Drought-Tolerant Landscaping. Require the use of drought tolerant plants to the greatest extent possible and encourage the use of irrigation systems which minimize water consumption.
- ◆ Policy CO-4.4: Water-Conscious Development Patterns. Encourage regional development patterns which make environmentally sound use of water resources.

ii. Wastewater

- ◆ Policy CO-5.3: Control of Urban Runoff. Employ a broad range of strategies, compatible with the Alameda Countywide Clean Water Program, to: (a) reduce water pollution associated with stormwater runoff; (b) reduce water pollution associated with hazardous spills, runoff from hazardous material areas, improper disposal of household hazardous wastes, illicit dumping, and marina “live-aboards”; and (c) improve water quality in Lake Merritt to enhance the lake’s aesthetic, recreational, and ecological functions.
- ◆ Action 5.3.11: Improved Sewer Collection and Treatment. Reduce water pollution from sanitary sewer collection and treatment systems, includ-

ing wastewater collection lines and the regional treatment plant. Continue the systemwide improvement program to correct infiltration and inflow problems in the East Bay Municipal Utility District and Oakland sewer systems.

Also applicable are Policy CO-4.1 and Policy I/C1.9, as listed above.

iii. Stormwater Drainage

OSCAR Element policies pertaining to stormwater drainage include Policy CO-5.3, Control of Urban Runoff, above.

iv. Solid Waste

The City of Oakland General Plan does not identify policies regarding solid waste or recycling.

v. Energy

- ◆ Policy CO-13.3: Construction Methods and Materials. Encourage the use of energy-efficient construction and building materials. Encourage site plans for new development which maximize energy efficiency.

B. Existing Setting

1. Stormwater Management

Stormwater from the northern portion of the LBNL site discharges into the north fork of Strawberry Creek, whereas stormwater from the southern portion of LBNL discharges directly into Strawberry Creek. This system, which provides for runoff intensities expected in a 100-year, maximum-intensity storm, is a gravity-fed, east-west running network of drainage conveyances. Water draining onto the site from other locations enters via open drainage channels and combines with runoff from within LBNL. The combined drainage is conveyed across LBNL via underground pipes and then discharged into open drainage channels of Strawberry Creek.

2. Sanitary Wastewater

EBMUD provides sanitary wastewater treatment services to parts of Alameda and Contra Costa Counties including the LBNL site. Wastewater from the LBNL main hill site is conveyed via a gravity flow system to the City of Berkeley's public sewer system and ultimately to the EBMUD regional wastewater treatment facility, located southwest of the Interstate 80 and Interstate 580 interchange in Oakland. Before it enters the City's sewer system, it passes through one of two monitoring stations operated by LBNL, as shown in Figure IV.M-1 of the 2006 LBNL LRDP EIR.² The Hearst Monitoring Station, located on Hearst Avenue, monitors wastewater flowing from the western portion of the site. The Strawberry Monitoring Station, located on Centennial Drive in Strawberry Canyon, monitors effluent from the eastern portion of the LBNL site.

Sanitary sewer discharge monitoring is divided into two major types: regulatory-based and DOE-based.³ Regulatory-based monitoring is generally termed self-monitoring, and is mandated in the wastewater discharge permits granted to Berkeley Lab by the East Bay Municipal Utility District (EBMUD). Samples are analyzed for pH, total suspended solids, and chemical oxygen demand, with additional analyses for volatile organic compounds and metals included required in specific permit situations. Analysis is performed by a state-certified outside contract laboratory. Results are compared against the discharge limits for each parameter given in the permits, and self-monitoring reports are submitted to EBMUD.

DOE-based monitoring concentrates on radiological parameters. This type of monitoring is required by DOE guidance and orders, but also ensures compliance with the radiological limits given in the California Code of Regulations. California regulations now incorporate by reference the applicable federal regulations, thus making the California limits for discharge the same

² LBNL, 2006, *Long-Range Development Plan Environmental Impact Report*, page IV.M-5.

³ Borglin, Ned. Environment, Health & Safety, LBNL. Personal communication with DC&E. January 11, 2010.

as the federal limits. Sanitary sewers are monitored for gross alpha, gross beta, iodine-125, P-32, S-35, and tritium. Gross alpha and gross beta measurements are used as a screening mechanism to determine if specific radionuclide measurements are required. Currently such monitoring is performed by collecting a composite monthly sample which is analyzed by an outside laboratory.

3. Solid Waste

As a government-owned facility operated by the University of California, UC LBNL must comply with waste reduction reporting requirements set by the State, Department of Energy (DOE), and UC LBNL itself. Recycling contractor Richmond Sanitary collects all non-hazardous and non-recyclable solid waste generated at LBNL and transports it to a collection facility in Richmond, California. There, waste is prepared for delivery to the Altamont Landfill in Livermore, California. Recyclable material such as glass, aluminum, paper and landscape materials is collected separately by Richmond Sanitary and transported to its recycling facility in Richmond, for transfer to various recycling vendors.

4. Domestic and Fire Water Supply

LBNL receives its water supply from the EBMUD water supply system. There are two water lines into LBNL from the outside, including a 12-inch diameter pipeline originating at EBMUD's Shasta Reservoir (2-million gallon capacity) and a 6-inch diameter pipeline originating at EBMUD's Berkeley View Reservoir (3-million gallon capacity). Combined flow capacity of the two pipelines is approximately 5,000 gallons per minute (GPM).

To supplement capacity in the event of an interruption to EBMUD's service, the UC LBNL operates and maintains three 200,000-gallon water storage tanks on the LBNL site.

5. Electrical Utilities

Electrical power on-site is purchased from the Western Area Power Administration (WAPA) and delivered via the Pacific Gas and Electric (PG&E)

transmission system to the Grizzly Substation, which is located at LBNL Building 77. Delivery to LBNL is achieved through overhead transmission lines with joint capacity for approximately 100 megawatts. A 12.7-kilovolt underground system with dual primary feeders is responsible for power distribution within LBNL. Multiple emergency power generators start automatically in the event of a power failure and are used to provide emergency power supply to critical LBNL services.

C. CEQA Significance Criteria

The impact of the proposed project related to utilities would be considered significant if it would exceed the following standards of significance, in accordance with Appendix G of the *CEQA Guidelines* and the UC CEQA Handbook:

1. Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board.
2. Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.
3. Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects.
4. Have insufficient water supplies available to serve the project from existing and identified entitlements and resources.
5. Result in a determination by the wastewater treatment provider, which serves or may serve the project that it has inadequate capacity available to serve the project's projected demand in addition to the provider's existing commitments.
6. Not be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs.

7. Not comply with federal, State and local statutes and regulations related to solid waste and recycling.
8. Create other utility and service system impacts.

D. Potential Project Impacts

This section presents an assessment of the adequacy of existing and planned utilities and service systems with respect to the proposed project. The purpose of this analysis is to provide a qualitative assessment of impacts to utilities and service systems resulting from project construction and subsequent site operations. There would be no impacts from the Building 85/85A seismic strengthening portions of the proposed project. The demolition component of the proposed project is relevant only to discussions of disposal of building demolition waste.

SP2 Impact UTIL-1: The proposed project would not exceed applicable RWQCB wastewater treatment requirements. (*Less than Significant*)

Wastewater from the proposed GPL would pass through the Hearst Monitoring Station only.⁴ The standard operating procedure of the monitoring stations, described above, is to monitor the volume of effluent on a continuous basis and take samples at regular intervals to ensure compliance with EBMUD standards for radioactivity and other constituents.

The new GPL facility would generate an annual average of 2,510 gallons per day (GPD) of wastewater, including 613 GPD of process wastewater associated with laboratory activities and 1,897 GPD of personal wastewater generated from consumption and sanitary activities by the population of the GPL.⁵

⁴ Lew, Stan. Director of Architecture, RMW Architects. Personal communication with DC&E. January 4, 2010.

⁵ Yee, John. Gayner Engineers. Personal communication with DC&E. January 11, 2010.

This represents an increase of approximately 916,000 gallons of wastewater per year over existing conditions, or about 6.7 percent of the total annual increase of 13.5 million gallons projected in the 2006 LRDP. This increase in wastewater is therefore well within the envelope projected and analyzed under the 2006 LRDP and EIR.

Accordingly, the proposed project would not exceed RWQCB wastewater treatment requirements and a *less-than-significant* impact would result.

SP2 Impact UTIL-2: The proposed project would not require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects. (*Less than Significant*)

LBNL receives its water supply from the EBMUD water supply systems. As discussed below, EBMUD has confirmed there is sufficient water supply and water treatment capacity to serve the proposed project during construction and operational phases in addition to existing demand.

Existing sewer and water utility lines to Building 25/25B would be re-used to provide water and to handle wastewater generated by the proposed GPL.⁶ Wastewater from Building 25/25B flows into two City of Berkeley's sanitary sewer sub-basins: sub-basin 17-013 and sub-basin 17-503. Sub-basin 17-013 has no capacity constraints; however sub-basin 17-503 is constrained during peak wet weather conditions. This constraint could potentially be exacerbated by the increased volume of wastewater from the new GPL facility, with its larger full-day occupant population and greater gross square footage.

LRDP Mitigation Measure UTILS-2, incorporated as part of the proposed project description, however, was developed to reduce this impact to a less-than-significant level. The measure requires that UC LBNL implement programs to ensure that additional wastewater flows are directed into uncon-

⁶ Lee, Stuart. LBNL. Personal communication with DC&E staff, August 31, 2009.

strained sub-basins. Detailed plans for the GPL indicate that wastewater from the new facility would be diverted to sub-basin 17-013, the capacity of which is not constrained.⁷ This would remove the potential impact that could otherwise be caused by the additional wastewater that would exacerbate an existing constraint within a City of Berkeley sanitary sewer sub-basin. Due to the incorporation of this measure in the design of the project, the proposed project would not require or result in the construction of new wastewater conveyance facilities or the expansion of existing facilities. The impact would therefore be *less than significant*.

SP2 Impact UTIL-3: The propose project would not require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects. (*Less than Significant*)

The proposed project would involve the construction of the new GPL facility at the site of Building 25/25B. A new storm drain line would be required, as the existing line is partially blocked and undersized for the current drainage area around Building 25. The new line would be 125 feet in length, running from the southeastern corner of the new building through a section of previously developed hillside. The new storm drain line is a relatively minor addition to the existing storm drainage infrastructure and would alleviate an existing stormwater drainage constraint. Potential impacts to biological and cultural resources from construction of the new line are discussed in Sections 4.3 and 4.4 of this EIR and are determined to be less than significant. As such the project's impact related to storm drain system improvements would be *less than significant*.

⁷ Lew, Stan. Director of Architecture, RMW Architects. Personal communication with DC&E. January 5, 2010.

SP2 Impact UTIL-4: The proposed project would have sufficient water supplies available to serve the project from existing entitlements and resources, and new or expanded entitlements would not be needed. (*Less than Significant*)

The proposed project would require water during both demolition/construction and operation phases. During site preparation, construction and demolition, water would be required for dust suppression. During operation, water would be required to serve the users of the GPL.

Sufficient water supply from EBMUD exists to serve the proposed project in addition to existing demand. As part of the analysis completed for the LBNL 2006 LRDP EIR, LBNL submitted a request to EBMUD to prepare a water supply assessment (WSA) for implementation of the 2006 LRDP. EBMUD transmitted the WSA to LBNL in November 2004, and confirmed, in November 2006, that buildout of the 2006 LBNL LRDP, which includes the proposed project, is accounted for in EBMUD's water long-term water demand projections through planning horizon year 2020. EBMUD confirmed that implementation of the LBNL 2006 LRDP would not trigger a significant increase in water use beyond what EBMUD projected for its service area.⁸

Furthermore, UC LBNL operates and maintains three 200,000-gallon water storage tanks on the LBNL site for emergency supply in the event of interruption of EBMUD's service.⁹ As a result, the proposed project would result in a *less-than-significant* impact to water supplies during construction and operational phases.

SP2 Impact UTIL-5: The proposed project would not result in a determination by the wastewater treatment provider that it has inadequate capac-

⁸ Kirkpatrick, William. EBMUD. Personal communication with LBNL, February 23, 2006.

⁹ LBNL, 2006, *Long-Range Development Plan Environmental Impact Report*, page IV.M-2.

ity to serve the project's demand in addition to existing commitments.
(*No impact*)

EBMUD provides wastewater treatment services to parts of Alameda and Contra Costa counties along the east shore of the San Francisco Bay, including the project site. As part of the LBNL 2006 LRDP process, EBMUD evaluated the current and future wastewater treatment needs of the main hill site, including the proposed project, and determined that it had adequate capacity to handle the LBNL demand in addition to its existing commitments. Therefore, *no impact* from the proposed project would occur either during construction or operational phases.

SP2 Impact UTIL-6: The proposed project would be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs. (*Less than Significant*)

Solid waste from LBNL is transported to the Altamont Landfill in Livermore, CA, which has a permit for daily disposal of 11,150 tons. Under implementation of the 2006 LBNL LRDP, which includes the proposed project, solid waste generated at LBNL would equate to approximately 0.01 percent of the daily permitted disposal. Altamont updated its use permit in 2005 to accommodate an additional 40 million tons over its lifetime and the facility is expected to remain operational through 2028.¹⁰ Additionally, LRDP Mitigation Measure UTILS-4, incorporated into the proposed project description, requires that UC LBNL develop and implement a plan for maximizing the diversion of construction and demolition materials from landfill disposal. As a result, the proposed project would not generate solid waste that would exceed the receiving landfill capacity, either during its construction or its operation and there would be a *less-than-significant* impact.

¹⁰ CalRecycle, Facility/Site Summary Details: Altamont Landfill & Resource Recovery (01-AA-0009), <http://www.calrecycle.ca.gov/SWFacilities/Directory/01-AA-0009/Detail/>, accessed on January 11, 2010.

SP2 Impact UTIL-7: The proposed project would comply with applicable federal, state and local statutes and regulations related to solid waste. (*No Impact*)

UC LBNL complies with DOE, State of California, UC and LBNL waste minimization reporting requirements. Adherence to these reporting requirements would ensure compliance with federal, State, and local statutes related to solid waste reduction. Thus, *no impact* would occur either during construction or operation of the proposed project.

SP2 Impact UTIL-8: The proposed project would not create other utility and service system impacts. (*No Impact*)

The proposed project would not result in unnecessary consumption of energy during its construction or operation. Construction would comply with Title 24 regulations, including the incorporation of specific energy-conserving design features, use of non-depletable energy resources, and/or a demonstration that buildings would comply with a designated energy budget.

Contractors would work as efficiently as possible with materials and time so as to complete the project on schedule and in budget. This would further minimize waste of energy and resources.

Operations of the proposed project would not result in inefficient energy use. Older, less efficient buildings and trailers would be demolished and the new GPL would function as a modern, multi-program use and energy efficient facility combined laboratory and office spaces. Additionally, it is a project objective that the new GPL building achieves LEED Gold certification. There would therefore be *no impact*.

E. Cumulative Impacts

SP2 Cumulative Impact UTIL-1: The proposed project in conjunction with other past, present, and reasonably foreseeable projects would cause

only *less-than-significant* impacts associated with utilities. (*Less than Significant*)

The proposed project would result in less than significant impacts on utilities and service systems. Nonetheless, in combination with reasonably foreseeable development at LBNL, UC Berkeley, and in nearby communities, the proposed project could potentially have a significant impact on wastewater collection, due to the capacity constraint on City of Berkeley sanitary sewer sub-basin 17-503 during peak wet weather conditions. As discussed above, however, as a part of the project LRDP Mitigation Measure UTILS-2 would be implemented and therefore additional wastewater flows would be diverted to unconstrained sub-basins with adequate capacity; the impact would therefore be less than significant.

In conjunction with the aforementioned foreseeable development, the proposed project could also result in increases in demand for utilities and energy. This cumulative increase in demand, however, would be minimized with the implementation of development strategies laid out in the LBNL 2006 LRDP, all of which require the conservation of energy and water resources. Additionally, the 2006 LRDP evaluated the incremental increase in demand for utilities associated with other foreseeable development and found that existing utility delivery systems could be expected to handle growth anticipated under the 2006 LRDP. Therefore, the effect of the proposed project in combination with other foreseeable development would not be significant, nor would the proposed project's contribution to any cumulative effects be cumulatively considerable.

LAWRENCE BERKELEY NATIONAL LABORATORY
SEISMIC PHASE 2 PROJECT EIR
UTILITIES AND SERVICE SYSTEMS

5 ALTERNATIVES TO THE PROPOSED PROJECT

This section evaluates five feasible alternatives to the proposed project. These are alternatives that, as mandated by CEQA, “would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant impacts of the project.”¹

The alternatives have been selected for overall feasibility, ability to fulfill project objectives and the extent to which each would lessen or avoid environmental impacts. Included among the alternatives is a No Project Alternative, as required by CEQA. The No Project Alternative allows for comparison of the impacts of approving the proposed project with the impacts of the site “remaining in its existing state,”² as if no action was taken.

Included in the discussion of the potential impacts of each alternative is a determination of whether the alternative would achieve the objectives of the project.

The proposed project would demolish three seismically “very poor” and “poor” (University of California Seismic Rating) buildings and six failing trailers and house the displaced occupants and functions elsewhere on the LBNL site. The project would also allow for the consolidation of life science personnel from various locations on and off the LBNL main hill site by replacing approximately 43,000 gross square feet (gsf) of demolished space with a new, approximately 43,000 gsf general purpose laboratory to be constructed on the current Building 25/25B location, in the central portion of the LBNL site. Also, as part of the proposed project, Building 85/85A would be seismically strengthened.

The project objectives are described generally in the *Mission Need* as follows:

- ◆ Remedy high seismic life-safety risks in general-purpose research facilities and lab-wide resource buildings;

¹ CEQA Guidelines Section 15126.6(a).

² CEQA Guidelines Section 15126.6(e)(3)(B).

- ◆ Provide researchers with safe, modern, life science research space that is fully suitable for twenty-first-century science;
- ◆ Provide general-purpose research and institutional space that is upgradeable and that may flexibly meet the high accuracy requirements of DOE's 21st Century missions. High accuracy laboratory space is essential for the continued development of DOE's key program areas;
- ◆ Increase efficiency of LBNL research operations and promote scientific adjacencies by offering modern, cost-effective consolidated space at the Lab's main hill site;
- ◆ Co-locate researchers and graduate students within a cluster of life science research facilities to expand opportunities for instrument sharing and interacting among life scientists engaged in a wide range of research projects;
- ◆ Locate consolidated life science research functions adjacent to the Nanosciences/Molecular Foundry Research cluster to strengthen ties and interaction between these two emerging and related areas of research; and
- ◆ Construct a General Purpose Lab to provide replacement space that complies with DOE policy regarding LEED certification and thereby earns a LEED Gold certification.

A. Alternatives Evaluated in this EIR

1. Building 74 SE Parking Lot Site Alternative

Under this on-site alternative, the Buildings 25/25B, 55, and 71 trailers would still be demolished and Building 85/85A seismically strengthened. A new GPL would still be built, but instead of at the Building 25 demolition site, it would be built at LBNL on a site southeast of Building 74. The site is currently a parking lot with a small shed, Building 74F. Building 74F would be demolished and a two- to three-storey 43,000 gsf GPL would be built at this location, terraced into the hillside. The building footprint would be approximately 15,000 sf. Together with the drive aisle, the total footprint would be 29,505 sf. This would represent development of 8,905 sf of an al-

ready developed area and 20,600 sf of an adjacent undeveloped hillside. Figure 5-1 shows an aerial view of the site, Figure 5-2 a site plan, and Figure 5-3 a visual simulation of the facility as viewed from a vantage point near Centennial Drive. The site is located in close proximity to the UC Botanical Garden and is within the Oakland City limit. The Building 74 SE site is on the Cortese list.

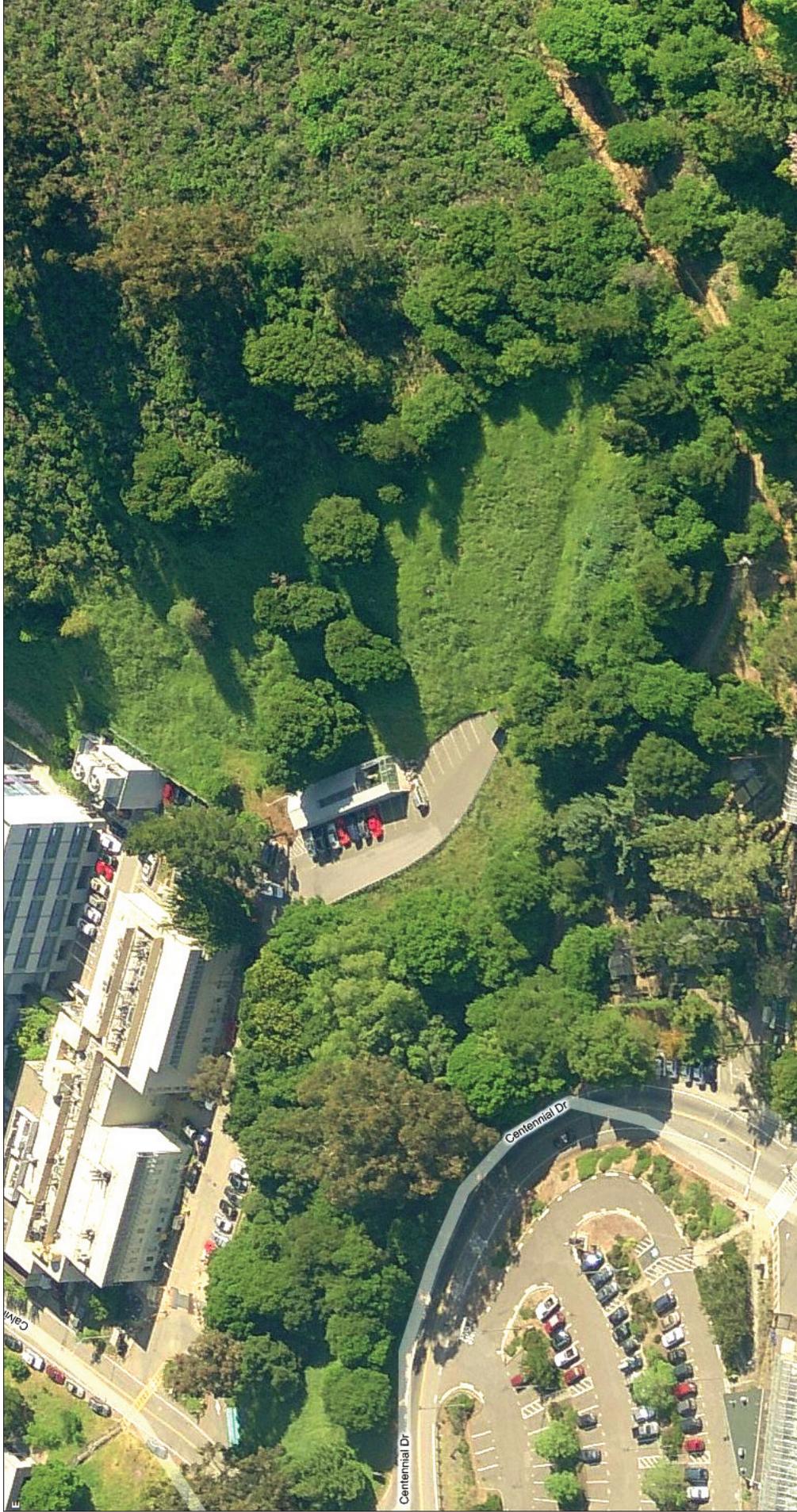
2. Richmond Field Station Alternative

Under this alternative, the Buildings 25/25B, 55 and 71 trailers would still be demolished and Building 85/85A seismically strengthened. A new GPL would still be built, but instead of at a location at LBNL, it would be located at the UC Richmond Field Station (RFS). This facility is a 162-acre teaching and research facility with over 500,000 sf of existing research space located approximately 6 miles (by freeway) northwest of the LBNL site. Figure 5-4 and 5-5 show an aerial view and the location of the Richmond Field Station. The site was formerly used for industrial purposes and there is remnant contamination that has been the subject of environmental investigation and remediation over a number of years.³ If the selected site included contamination, a remediation plan would be required prior to construction of a new building on the site. The identification of any contamination would not necessarily preclude building construction as site remediation would most likely allow for construction of light industrial uses, such as the GPL.

3. Leased Space Off-Site Alternative

Under this alternative, the Buildings 25/25B, 55 and 71 trailers would still be demolished and Building 85/85A seismically strengthened. However, the functions and programs that would otherwise be provided in the GPL would be relocated to the Berkeley West Biocenter (LBNL Building 977) at 717 Potter Street in Berkeley, situated approximately 5 miles from the LBNL site.

³ A description of the Richmond Field Station including past industrial activities and ongoing clean-up can be found online at: <http://rfs.berkeley.edu/about.html#thefacility>.



Source: RMW architecture & interiors

FIGURE 5-1
BUILDING 74 SOUTHEAST PARKING LOT AERIAL VIEW



Source: R/MW architecture & interiors

FIGURE 5-2
BUILDING 74 SOUTHEAST PARKING LOT ALTERNATIVE PLAN

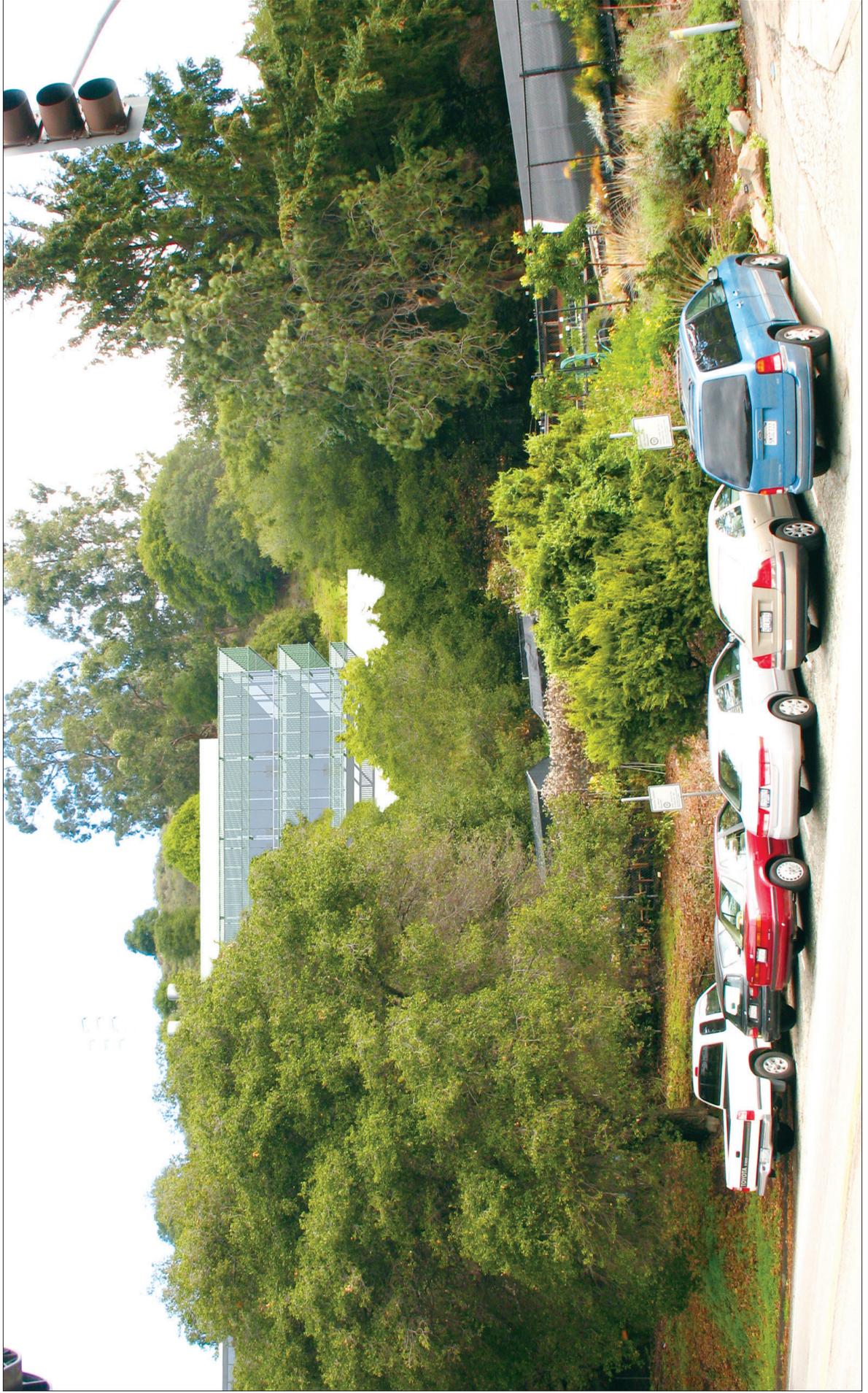


FIGURE 5-3
PROPOSED GPL BUILDING FROM WALKWAY LOOKING NORTHEAST
ACROSS CENTENNIAL DRIVE TO BOTANICAL GARDENS

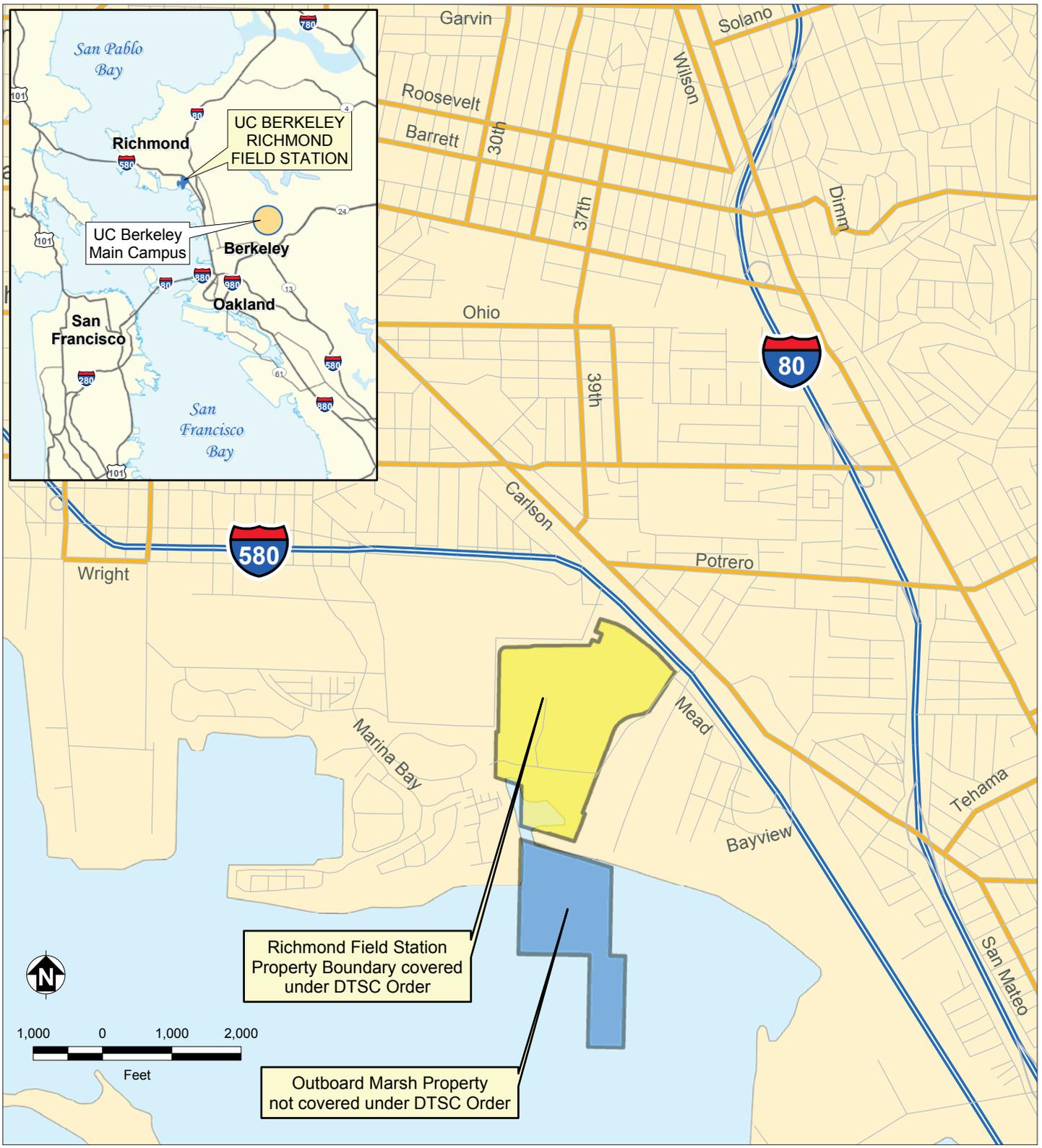


FIGURE 5-4

RICHMOND FIELD STATION SITE LOCATION MAP



FIGURE 5-5

RICHMOND FIELD STATION SITE BOUNDARIES

LBNL currently leases 60,000 gsf at this site.⁴ Additional space would be leased in order to accommodate relocated personnel and operations. Overall there would be an increase in the population of around 30 people at the Potter Street site.

4. Reduced Project Alternative

Under the Reduced Project Alternative, the demolition and construction components of the Seismic Phase 2 Project would not occur. However seismic strengthening of Building 85/85A would still take place. UC LBNL employees and guests would remain in Buildings 55 and 71 trailers that have been designated as seismically “poor” or described as “failing.” As per UC policies on seismic safety, personnel have already been moved from Building 25/25B that was designated as “very poor” and the building would remain vacant. Building 85/85A would remain in its current condition.

Under this alternative, limited capital investment would be needed to continue activities at LBNL. UC LBNL would continue to pay energy and maintenance costs for the older facilities, including costs for necessary upgrades. Overall, there would still be around 100 LBNL personnel in the off-site Potter Street facility.

5. No Project Alternative

Under the No Project Alternative, the demolition, construction components and the seismic strengthening of the Seismic Phase 2 Project would not occur. LBNL employees and guests would remain in Buildings 55 and 71 trailers that have been designated as seismically “poor,” or “failing.” Personnel have already moved from Building 25/25B that was designated as “very poor” and the building would remain vacant. Under this alternative, limited capital investment would be needed to continue activities at LBNL. UC LBNL would continue to pay energy and maintenance costs for the older facilities, including costs for necessary upgrades. UC LBNL personnel would also remain in the off-site Potter Street facility.

⁴ Stanton, Richard. Project Manager, Facilities Division, LBNL. Personal communication with DC&E. December 21, 2009.

B. Alternatives Considered but Not Evaluated in Detail in this EIR

1. Rehabilitation Alternative

Under this alternative, Buildings 25/25B, 55 and 71 trailers identified for demolition in the proposed project would instead be rehabilitated to upgrade overall function, improve seismic safety ratings and mitigate the safety risk to the occupants. Rehabilitation would occur in lieu of construction of the GPL. Under this alternative, the approximately 100 LBNL employees currently located in 36,000 gsf of leased space at the off-site Potter Street facility would remain there. Building 85/85A would still be seismically strengthened.

This alternative was considered infeasible because it is not cost effective and does not meet the project objectives. As space at LBNL is 98 percent occupied, there is no suitable available on-site space to temporarily house displaced building occupants during the rehabilitation period, and off-site temporary replacement space would be inconvenient as well as prohibitively expensive. The cost consideration was documented in a Life Cycle Cost Analysis in July, 2008⁵ and articulated in the Statement of Mission Need in September 2007.⁶

2. Existing Buildings Alternative

Under the On-Site Relocation Alternative, functions and programs housed in buildings identified for demolition would be relocated permanently to existing, seismically stronger buildings at LBNL. As is the case with rehabilitation alternative, the GPL would not be constructed under this alternative. None of the structures identified for demolition under the proposed project would be demolished under this alternative. Building 85/85A would still be seismically strengthened.

⁵ LBNL, July 2008, *Life Cycle Cost Analysis, Seismic Life-Safety, Modernization, and Replacement of General Purpose Buildings, Phase*.

⁶ LBNL, September 2007, *Statement of Mission Need for the Lawrence Berkeley National Laboratory Seismic Life-Safety, Modernization and Replacement of Buildings, Phase 2*.

This project alternative is not evaluated in detail because the amount of available, on-site space is insufficient to house the occupants and operations currently contained within the approximately 43,000 gsf of research space to be demolished. Due to this limitation, the alternative was not carried through the impact analysis.

C. Impact Analysis

The environmental impacts of each alternative carried forward for detailed evaluation are qualitatively compared to the proposed project in the following section. Significant differences in the nature of impacts between each alternative and the proposed project are summarized in Table 5-1.

1. Building 74 SE Parking Lot Site Alternative

a. Analysis of Impacts

This on-site alternative differs from the proposed project primarily in the choice of location for construction of the GPL and the relative difference in impacts is presented in the discussion below. Demolition would take place under either scenario. Under this alternative, the new GPL would still be built, but instead of at the Building 25/25B demolition site, it would be built at LBNL on a site south of Building 74, a portion of which is undeveloped land. All other components of this alternative are equivalent to the proposed project. See Figures 5-1 and 5-2 for views of the alternative at the Building 74 SE Parking Lot Site.

i. Aesthetics

If built at the Building 74 SE Parking Lot Site, the GPL would be adjacent to an area of open space and in very close proximity to the UC Botanical Garden. It would be highly visible from the UC Botanical Garden, some nearby residences in the Panoramic Hill neighborhood, and an adjacent hiking trail, adding to the amount of development in the area, as shown in Figure 5-3. Compared to the proposed project which would result in a less-than-significant impact on visual resources, the selection of this alternative could result in significant visual impacts.

LAWRENCE BERKELEY NATIONAL LABORATORY
 SEISMIC PHASE 2 PROJECT EIR
 ALTERNATIVES TO THE PROPOSED PROJECT

TABLE 5-1 COMPARISON OF IMPACTS FROM PROJECT ALTERNATIVES

Topic	Project at B25/25B Site		Building 74 SE Parking Lot Site Alternative		Richmond Field Station Alternative		Leased Space Off-Site Alternative		Reduced Project Alternative		No Project Alternative	
	Project Impacts	Cumulative Impacts	Project Impacts	Impacts Comparison	Project Impacts	Impacts Comparison	Project Impacts	Impacts Comparison	Project Impacts	Impacts Comparison	Project Impacts	Impacts Comparison
1. Aesthetics	LTS	LTS	SU	>	LTS	=	LTS	<	LTS	<	NI	<
2. Air Quality	LTS	LTS	LTS	>	LTS	=	LTS	<	LTS	<	NI	<
3. Biological Resources	LTS	LTS	LTS	>	LTS	=	LTS	<	LTS	<	NI	<
4. Cultural Resources	LTS	LTS	LTS	=	LTS	=	LTS	<	LTS	<	NI	<
5. Geology and Soils	LTS	LTS	LTS	=	LTS	=	LTS	<	LTS	<	LTS	>
6. Greenhouse Gas Emissions ^a	=	LTS	LTS	=	LTS	>	LTS	>	LTS	<	LTS	<
7. Hazards and Hazardous Materials	LTS	LTS	LTS	=	LTS	=	LTS	=	LTS	<	NI	<
8. Hydrology and Water Quality	LTS	LTS	LTS	>	LTS	=	LTS	<	LTS	<	NI	<
9. Land Use and Planning	LTS	LTS	LTS	=	LTS	=	LTS	=	LTS	<	NI	<
10. Noise	LTS	LTS	SU	>	LTS	=	LTS	<	LTS	<	NI	<
11. Public Services	LTS	LTS	LTS	=	LTS	=	LTS	=	LTS	<	NI	<
12. Transportation and Traffic	LTS	SU	LTS	=	LTS	=	LTS	<	LTS	<	NI	<
13. Utilities and Service Systems	LTS	LTS	LTS	=	LTS	=	LTS	=	LTS	<	NI	<

Notes:

- NI No impact
- LTS Less than significant impact
- SU Significant impact
- < Fewer impacts compared to the proposed project
- = Equivalent to proposed project
- > More impacts compared to the proposed project

^a Comparisons are made at the cumulative level.

ii. Air Quality

The proposed project would have no significant air quality impacts, either temporary or permanent, with the implementation of LBNL 2006 LRDP EIR mitigation measures that are a part of the proposed project and incorporated into the project description. Building the new GPL in the alternative location would also result in less than significant impacts, with implementation of the same measures, however the generation of dust and vehicle emissions from construction activities could be perceived as a nuisance by the sensitive receptors at the UC Botanical Garden. The air quality impacts under this alternative would be slightly greater than those that would result from the proposed project.

iii. Biological Resources

The proposed project would take place almost entirely on developed land and the biological impacts would be essentially restricted to the removal of approximately three trees. In comparison, this alternative entails construction on 20,600 sf of previously undeveloped land some of which is potential habitat for the endangered Alameda whipsnake, and other species. It would also require removal of approximately 46 trees. As with the proposed project, implementation of the LBNL 2006 LRDP EIR mitigation measures as part of the project would also reduce impacts to the level of less than significant. Although this alternative would also have less than significant impacts, the impacts would be greater than those that would result from the proposed project.

iv. Cultural Resources

The proposed project would have less than significant impacts related to cultural resources, and development activity associated with this alternative does not differ significantly from the project as proposed. Therefore, the cultural resources impacts under this alternative would be equivalent to those from the proposed project.

v. Geology and Soils

Considerable geotechnical investigation was performed at the on-site alternative site and it was determined that although it is located in close proximity to

the Wildcat Canyon fault, that fault is known to be inactive, and the site is geologically stable. The alternative and proposed project sites are both less than 0.5 miles from the active Hayward fault. In conclusion, this alternative would also have less than significant impacts and the geology and soils related impacts under this alternative would be equivalent to those that would result from the proposed project. The alternative would not result in new or increased geological hazard impacts.

vi. Greenhouse Gas (GHG) Emissions

Overall, the project would replace a series of buildings with a single modern, scientific laboratory with associated office space. Operation of the GPL would result in fewer GHG emissions than the proposed BAAQMD threshold. There would be little difference between this alternative and the proposed project in terms of vehicle miles travelled (VMT) for personnel to reach the building and no difference in terms of other project attributes. Therefore, this alternative would also result in less than significant impacts related to greenhouse gas emissions. It would be equivalent to the proposed project.

vii. Hazards and Hazardous Materials

Like the proposed project, the on-site alternative GPL building would not be susceptible to wildfire or aviation hazards and would not be expected to interfere with emergency access or evacuation. Although this alternate site is on the Cortese List (due to a former underground storage tank), the City of Berkeley Toxics Management Division has notified UC LBNL that no further action is required for the investigation of the former tank. This alternative would therefore develop land that is largely uncontaminated. In comparison, excavation of the proposed project site at Building 25/25B could potentially encounter soil and groundwater contaminated with low levels of volatile organic compounds (VOCs). However, LBNL standard practices and other measures built into and a part of the project would result in site remediation and protect construction workers from this contamination as well as prevent it from spreading further. In conclusion, this alternative would result in less than significant impacts related to hazards and hazardous materials.

The hazards and hazardous materials related impacts under this alternative would be equivalent to those that would result from the proposed project.

viii. Hydrology and Water Quality

Like the proposed project, the on-site alternative would not be susceptible to flooding or coastal hazards. However, construction of the on-site alternative at the Building 74 SE Parking Lot site would require extensive excavation and terracing into an existing hill slope, increasing the potential for sedimentation of discharge waters both on and off-site, although this impact would be controlled through compliance with LBNL requirements such as development and implementation of Storm Water Pollution Prevention Plan (SWPPP) and Best Management Practices (BMPs) as part of the project and impacts would remain less than significant. The impacts under this alternative on hydrology and water quality would be equivalent to those that would result from the proposed project.

This alternative would create new impervious area because its developed footprint is larger than the existing impervious area. The alternative would include a detention basin that would be constructed either on-site or in the vicinity to regulate the rate at which stormwater is released from the site. Drainage issues associated with increase in impervious cover could be addressed through building design. However, although these potential impacts of the Building 74 SE Parking Lot alternative would be less than significant through compliance with LBNL requirements that would be implemented as part of the project, this alternative would result in slightly greater impacts with respect to hydrology and water quality compared to the proposed project.

ix. Land Use and Planning

Just as the proposed project would not be associated with significant land use-related impacts, relocating UC LBNL personnel to the GPL at the Building 74 SE Parking Lot Site would neither divide an existing community, nor conflict with an existing land use plan, as the construction of a general purpose laboratory at this site would be consistent with the 2006 LRDP. As the

Building 74 SE Parking Lot Site is located in the Nanosciences/Molecular Foundry Research cluster closer to existing life sciences facilities, there would be greater synergies than would exist for the proposed project at the Building 25 site. In conclusion, this alternative would also result in less than significant impacts. The impacts under this alternative related to land use and planning would be equivalent to those that would result from the proposed project.

x. Noise

Noise from the construction of the proposed project at the Building 25 demolition site would have less potential to affect off-site sensitive receptors than the project if built at the Building 74 SE Parking Lot site. The UC Botanical Garden is, at its closest point, approximately 50 feet from the construction associated with Building 74 SE Parking Lot Site. People affected by the construction and operational noise from the GPL would generally be outside and unable to avoid the noise. Even with implementation of LBNL 2006 LRDP EIR noise mitigation measures as part of the project, it is unlikely that the noise to UC Botanical Garden patrons and employees would be reduced to an acceptable level during the construction period. In conclusion, this alternative could produce significant noise impacts and the noise impacts of this alternative would be greater than those that would result from the proposed project.

xi. Public Services

Construction of the GPL at the Building 74 SE Parking Lot site on the LBNL main hill campus under this alternative would not change the proposed project's less than significant impacts to police or fire services and this alternative's impacts would be equivalent to those of the proposed project.

xii. Transportation and Traffic

Under this alternative, construction traffic and parking demand would be managed by the Site Construction Coordinator as under the proposed project and the project's construction traffic would be controlled so as to avoid substantial adverse effects. However control would be more complex than under the proposed project. The site of the GPL under this alternative would be

closer to the Strawberry Canyon Gate than the Blackberry Canyon Gate. The Strawberry Canyon Gate cannot accommodate the largest construction trucks, and the Stadium Rim Way/Gayley Road intersection leading to and from the Strawberry Gate currently operates at LOS D, just above the threshold for unacceptability established by the City of Berkeley. Given these constraints, much construction related traffic would have to follow a circuitous route through the LBNL campus to the Blackberry Canyon Gate.

This alternative would result in the same significant and unavoidable cumulative impacts at the off-site intersections as the proposed project and would be considered equivalent to the proposed project.

xiii. Utilities and Service Systems

Under this alternative, construction of the GPL on the Building 74 SE Parking Lot site could also exacerbate capacity constraints associated with sanitary sub-basin 17-503. As discussed above, LBNL 2006 LRDP mitigation measures require that LBNL implement programs to ensure that additional wastewater flows are directed into unconstrained sub-basins. Accordingly, additional wastewater flows would be directed into either sub-basin 17-013, sub-basin 17-304, unconstrained portions of sub-basin 17-503, or another sub-basin that has adequate capacity. Redirection of wastewater to unconstrained sub-basins would ensure there is no significant impact under this alternative. However, redirection would be more complex than under the proposed project, as existing infrastructure in the vicinity of the Building 74 site currently drains into constrained sub-basin 17-503.

Construction of the GPL at this location would result in an increase of 20,600 square feet of impervious surface on the LBNL main hill campus, as discussed above. To accommodate additional stormwater runoff from this new impervious surface, construction of three new storm drains and a new detention basin would be required. Work on the storm drains would take place in previously disturbed areas of the site, and collectively the new stormwater infrastructure would effectively meter the flow of runoff leaving the site and enter-

ing downstream water bodies. The resulting effect on stormwater infrastructure would be less than significant.

Overall, implementation of 2006 LRDP mitigation measures required to divert sanitary wastewater would be more complex than under the proposed project. However, the resulting impact would be equivalent.

b. Ability to Meet Project Objectives

This alternative would meet all of the project objectives. It would meet the seismic life-safety objective by replacing the “poor” and “very poor” seismically rated structures and the “failing” trailers with a new GPL, and it would seismically strengthen Building 85/85A. Assuming that the design of the GPL under this alternative would be equivalent to the proposed project, safe, modern, life science research space would be created. Development of the GPL under this alternative would mean that flexible, LEED Gold-certified research and institutional space would be provided, and the efficiency of research operations would be increased, as the clustering of researchers and programs would occur. Finally, life science research functions would be located near the Nanosciences/Molecular Foundry Research cluster under this alternative. As such, researchers would benefit from interactive science.

2. Richmond Field Station Alternative

a. Analysis of Impacts

This alternative differs from the proposed project primarily in the choice of location for construction of the GPL, as demolition of Buildings 55 and 71 trailers and Building 85/85A seismic strengthening would take place under either scenario. The GPL would be built approximately 6 miles (via freeway) northwest of the LBNL main hill site at the Richmond Field Station (RFS) in the City of Richmond on University-owned property. Figures 5-4 and 5-5 show the location of the RFS and an aerial view, respectively.

Construction of a GPL building at RFS by UC LBNL would not be an activity covered by the LBNL 2006 LRDP EIR, and the LRDP EIR mitigation measures would not apply to this alternative. However, UC LBNL would

voluntarily apply the same mitigation measures to this alternative so as to avoid or reduce its environmental impacts. This alternative is evaluated below assuming that appropriate LRDP mitigation measures will be imposed on the alternative by UC LBNL.

i. Aesthetics

Although the visual setting of the RFS on a flat, bayside plain differs from the setting at Building 25/25B at the main LBNL hill site, building form and design at both locations are comparable. Since the GPL at RFS would be constructed among the existing light industrial buildings, the impacts under this alternative would be less than significant and equivalent to those from the proposed project.

ii. Air Quality

a) Construction

Air quality impacts of this alternative from emissions associated with on-site construction equipment and grading would be reduced to a less-than-significant level by the implementation of LBNL 2006 LRDP EIR mitigation measures. Therefore, impacts from on-site construction would be less than significant and equivalent to the impacts of the proposed project.

With respect to the potential impact to human health from diesel emissions generated by the project's construction truck trips, because the RFS is very close to the freeway, construction truck traffic would travel a shorter distance on city streets site. Therefore, while construction trips under the proposed project and RFS site alternative would contribute health risks to residents along the freeway corridors, this alternative would result in lower TAC emissions to sensitive receptors along local streets. The construction truck trips under this alternative would contribute to the existing human health risk at RFS and its vicinity on account of its proximity to the I-580 freeway and other sources of toxic air contaminants in the area. Overall, the impact from construction vehicle TAC emissions would be less than the impact of the proposed project.

b) Operation

As analyzed for the LBNL 2006 LRDP EIR, proportionately more employees live in Berkeley/Albany/Kensington area (33 percent) than in El Cerrito/Richmond/San Pablo (10 percent). Therefore, assuming that employees would not all immediately change their place of residence, location of the GPL at the RFS would likely increase the number of VMT. There would also be decreased opportunities for public transit commuting as compared to access to the LBNL main hill site. However, the number of personnel who would occupy the GPL is not large (around 130) and the air quality impacts due to this additional VMT would be less than significant. Therefore, the impacts would be equivalent to or slightly greater than the impacts of the proposed project.

Under this alternative, no laboratory space or stationary sources of TACs would be added to the LBNL hill site. Therefore, this alternative would not add to the less-than-significant impact due to increased emissions of TACs at the LBNL hill site. However, the laboratory space and stationary sources of TAC emissions would be added at the RFS which would potentially contribute to a significant cumulative impact at the RFS associated with existing on-site TAC sources such as other laboratories, nearby industrial uses, and the adjacent freeway. This alternative could potentially result in an a greater cumulative TAC than the proposed project.

iii. Biological Resources

Under the proposed project, construction of the GPL is proposed on an already disturbed area, although this is adjacent to undeveloped areas and to an irrigated grove of redwood and sequoia trees. Up to three trees would probably be removed. Although the precise location of the GPL at RFS has not been determined at this time, the GPL would likely be located outside of the areas where sensitive biological and wetland resources are present, due to regulatory restrictions and the continued importance of those parts of RFS for teaching and research. The impacts of the RFS alternative would also likely be less than significant and equivalent to the impacts of the proposed project.

iv. Cultural Resources

Construction of the GPL at the RFS would occupy a vacant though disturbed site, similar to the proposed project. The impacts to cultural resources under this alternative would also be less than significant and equivalent to the impacts of the proposed project.

v. Geology and Soils

The RFS site is located approximately 2.2 miles from the Hayward fault and within 1 mile of the Bay on flat-lying alluvium. In comparison, the proposed project site would be within a half mile of the Hayward fault and would take place on more consolidated and older deposits of Tertiary age. Although the effects of locating the building close to the fault could be mitigated by building design, construction of the GPL at this location would still place a greater number of people at risk from seismic hazards than if it were located farther from an active fault. Therefore, the RFS alternative would result in less than significant impacts related to seismic hazard from proximity to an active fault, and the impacts would be reduced compared to the impacts of the proposed project.

The RFS site is located near the Bay margins and the potential for an impact related liquefaction is likely greater at this site compared to the proposed project. Therefore, although this alternative would reduce the project's less than significant impact related to proximity to an active fault, it would have a greater potential impact with respect to liquefaction hazards. Overall, the impacts resulting from this alternative would be equivalent to those of the proposed project.

vi. Greenhouse Gas Emissions

Calculations indicate that operational GHG emissions from the development of the GPL at the RFS would still likely be below the proposed BAAQMD thresholds and impacts would remain less than significant. However, gasoline consumed in vehicle trips to and from the RFS would be greater due to the greater number of vehicle miles traveled and this alternative would therefore

result in slightly greater impacts compared to the impacts of the proposed project.

vii. Hazards and Hazardous Materials

Like the proposed project, the GPL at the RFS would not be susceptible to wildfire or aviation hazards and would not be expected to interfere with emergency access or evacuation.

Excavation of the proposed project site at Building 25/25B could potentially encounter soil and groundwater contaminated with low levels of VOCs. Since the RFS also includes contaminated areas that are undergoing active remediation, construction of the GPL at RFS would require site characterization. If the GPL were to be constructed at the RFS, a Soil Management Plan (SMP) and Groundwater Monitoring and Management Plan (GMMP) would be prepared as required for all excavation at LBNL. These plans would contain descriptions of the sampling and analysis required to evaluate potential risks and to comply with landfill screening criteria. For both the Building 25/25B and RFS locations, LBNL standard practices and other measures that would be implemented as part of the project would protect construction workers from this contamination and also prevent it spreading further. In conclusion, this alternative would also have less than significant impacts to hazards and hazardous materials, which would be equivalent to the proposed project.

viii. Hydrology and Water Quality

Because the precise location for the GPL at the RFS has not been identified, it could be constructed on a redevelopment site or on vacant land. Under either condition, design of the new facility would be in accordance with applicable LBNL standard procedures and NPDES regulations and policies which would ensure that adequate drainage facilities and stormwater controls were provided. In comparison, the Building 25 site at LBNL is already developed and impervious and would not generate new runoff. Consequently, this alternative would also result in less than significant impacts to hydrology and water

quality, that would be slightly greater than or equivalent to the impacts of the proposed project.

ix. Land Use and Planning

Relocation of LBNL personnel to an off-site location would neither divide an existing community, nor conflict with an existing land use plan, as the siting of a new building at RFS would comply with all land use designations that apply to the selected site. As such, this alternative would also result in less than significant impacts, equivalent to the proposed project.

x. Noise

The RFS alternative would also produce temporary noise from the construction activities roughly equivalent to the proposed project. Land uses surrounding RFS are largely industrial; however, there is a residential neighborhood adjacent to the site to the southwest.

a) Demolition and Construction

Voluntary application of the LBNL 2006 LRDP mitigation measures to the RFS would generally reduce noise levels. In addition, if necessary, construction activities would be limited to non-holiday weekdays between the hours of 7 am. and 7 p.m. to reduce the noise affecting adjacent single-family residential neighborhoods and prevent exceedence of Richmond Noise Ordinance standards.

b) Operation

The design of the GPL facility would be similar to that under the proposed project and operational noise would be principally attributable to the cooling towers of the new building, with vehicular traffic generated by the facility and the building HVAC system contributing some noise as well. The precise location of the GPL on the RFS site is not known at this time, however, the building would likely be situated at least 0.25 mile from the Marina Bay residences to the southwest, a distance too far for operational noise from the cooling towers or the HVAC system to have a significant impact. Traffic

associated with the new GPL would access the site from roads to the north and northeast and would not pass near the residential area.

Overall, with the implementation of the LBNL 2006 LRDP EIR mitigation measures, the construction and operational noise impacts of the GPL under this alternative would remain less than significant, equivalent to the proposed project.

xi. Public Services

Under the RFS alternative, the GPL would be in the City of Richmond and would receive fire and police protection from that jurisdiction. The GPL would be built to the latest standards to minimize fire risk and would not create a substantial fire hazard. In comparison to the current average daily population (ADP) of the RFS of around 500,⁷ the addition of around 130 people would neither be substantial or significant in comparison to the overall service requirements of the facility. In conclusion, the RFS alternative would result in less than significant impacts to public services, equivalent to the impacts of the proposed project.

xii. Transportation and Traffic

a) Construction

As discussed above under Air Quality, the RFS is very close to the freeway and construction truck traffic is unlikely to cause significant impacts either at the project or the cumulative level, due to the relatively small number of construction-related truck trips compared to regional traffic patterns and freeway traffic. In this respect, the RFS alternative's construction-related traffic impacts would be less than significant, and therefore equivalent to the impacts of the proposed project.

b) Operation

As proportionately more employees live closer to Berkeley than Richmond, construction of the GPL at the RFS would likely increase the number of

⁷ UC Berkeley, Capital Projects. Initial Study: Richmond Field Station Remediation Project, May 28, 2003.

VMT. There would also be decreased opportunities for commuting by public transit as compared to the LBNL main hill site, resulting in a slight increase in VMT. However, the number of personnel in the GPL would not be large (around 130) in comparison with regional transportation patterns and free-way traffic would not be significantly affected. Impacts under this alternative would therefore be less than significant and would be equivalent to those of the proposed project.

xiii. Utilities and Service Systems

Construction of the GPL at the RFS would share existing utilities with surrounding buildings with similar uses. The impacts would remain less than significant, and thus equivalent to the impacts of the proposed project.

b. Ability to Meet Project Objectives

This alternative would meet the majority of the project objectives. It would meet the seismic life-safety objective by replacing the “poor” and “very poor” seismically rated structures and the “failing” trailers with a new GPL; and it would seismically strengthen Building 85/85A. The design of the GPL would be equivalent to the proposed project, and a safe, modern, LEED Gold-certified life science research space would be created. Because the GPL at RFS would be distant from the LBNL facilities, the RFS alternative would not meet the project objectives as well as the proposed project.

3. Leased Space Off-Site Alternative

a. Analysis of Impacts

As previously discussed, this alternative would include relocation of functions and programs that would be housed in the proposed GPL at the Building 25/25B site to an existing off-site facility situated approximately 5 miles from the LBNL site on Potter Street in Berkeley. Demolition of Buildings 25/25B, 55 and 71 trailers would take place under this alternative as would the Building 85 seismic strengthening. However, this alternative would not result in environmental impacts associated with construction of a new GPL.

i. Aesthetics

Use of an existing building would result in no impacts to visual quality at the site of the leased building. At LBNL, under this alternative the older existing buildings on the main hill campus would still be demolished but a new building would not be built. Overall, this alternative would result in less than significant impacts and the impacts would be reduced compared to the impacts of the proposed project.

ii. Air Quality

a) Construction

With no new construction under this alternative, there would be no impacts from this component of the work, although there would still be impacts due to the demolition and the Building 85/85A seismic strengthening. Overall, this alternative would result in less than significant construction impacts, which would be reduced compared to the impacts of the proposed project. Construction truck trips would also be reduced compared to the proposed project and therefore the less than significant cancer risk impact from TAC emissions associated with truck trips at the cumulative level would be reduced compared to the proposed project.

b) Operation

The South Berkeley location of the leased facility is more accessible to LBNL personnel than the main hill site. The less than significant impacts that would result from this alternative would be reduced compared to the proposed project as VMT would be lower. Emissions of TACs under this alternative would be the same as the proposed project. Under cumulative conditions, TAC emissions associated with LBNL activities at the Potter Street site combined with other light and heavy industrial uses in the vicinity of the building would contribute to cumulative air quality impacts. These impacts are therefore considered equivalent to the proposed project.

iii. Biological Resources

Use of an existing building would avoid the less than significant impact due to construction of the GPL near undeveloped areas and the new storm drain

through the undeveloped hillside. Impacts from the demolition portion of the work would be the same under this alternative as the proposed project and would remain less than significant. Overall, this alternative would result in slightly reduced impacts to biological resources compared to the proposed project.

iv. Cultural Resources

This alternative would result in less ground disturbance than the proposed project as it would avoid construction of the GPL. Impacts to cultural resources could occur during demolition, so this alternative would result in less than significant impacts that would be slightly reduced compared to the proposed project.

v. Geology and Soils

The Leased Space Off-Site Alternative would not involve construction of the GPL and would avoid any impacts associated with construction at the Building 25/25B site. The demolition components of the project and the Building 85/85A seismic strengthening components would still occur. The overall addition of an extra 30 people at Potter Street would place them in a relatively modern building that is in compliance with all building codes currently in force. In comparison to the proposed project that would relocate another 100 people to a new building, at a distance of 0.5 miles from the Hayward Fault, by locating them in a slightly older building 5 miles from the fault under this alternative, the impact would be further reduced. This alternative would result in less than significant impacts related to geology and soils that would be slightly reduced compared to the proposed project.

vi. Greenhouse Gas Emissions

This alternative would not generate GHGs from construction of the GPL, but it would still generate GHGs from the demolition and seismic strengthening components. Operations would probably produce slightly more GHGs than a new LEED Gold certified building. The impacts of this alternative would be less than significant but slightly greater than the impacts of the proposed project.

vii. Hazards and Hazardous Materials

As this alternative includes demolition of Building 25/25B, demolition activities could potentially encounter soil and groundwater contaminated with low levels of VOCs. Impacts of this alternative would be less than significant and equivalent to those of the proposed project.

viii. Hydrology and Water Quality

No new construction would occur under this alternative, and therefore impacts related to construction-period erosion identified under the proposed project would not occur. Less than significant impacts from demolition and seismic strengthening would remain the same. Therefore, the impacts related to hydrology and water quality would remain less than significant and would be slightly reduced compared to those of the proposed project.

ix. Land Use and Planning

Relocation of functions to an existing building would not cause any land use impacts. Compared to the proposed project, these activities would be located farther from the LBNL hill site. The impacts resulting from this alternative related to land use and planning would remain less than significant and would be equivalent to those of the proposed project.

x. Noise

This alternative would still have less than significant noise impacts from project demolition and seismic strengthening. However, the construction noise and additional noise from operation (apart from the traffic) would not occur. Overall, this alternative would result in less than significant impacts, which would be slightly reduced compared to the impacts of the proposed project.

xi. Public Services

The overall addition of 30 additional people to an existing building is not likely to cause significant impacts to public services. Impacts would be less than significant and equivalent to the proposed project.

xii. Transportation and Traffic

Truck traffic from demolition and seismic strengthening would remain, although total construction truck trips would be fewer and impacts would be less than significant. Operational traffic would involve relocation of around 30 employees to South Berkeley in an area that is served by four-lane City streets and this additional traffic is not likely to result in significant impacts. This alternative would avoid the significant and unavoidable cumulative impact from increased operational traffic in the streets around the UC Berkeley campus. Overall, the transportation and traffic impacts under this alternative would be reduced compared to those of the proposed project.

xiii. Utilities and Service Systems

The alternative would use existing utilities and the addition of about 30 people to the Potter Street facility would not cause additional impacts. Similar to the proposed project, the impacts from this alternative would be less than significant.

b. Ability to Meet Project Objectives

This alternative would meet some of the project objectives. It would meet the seismic life-safety objective of removing the “poor” and “very poor” seismically rated structures and the “failing” trailers but would not replace the space with acceptable, reasonably modern life science research space. Existing developed space would be used under this alternative which would not be LEED-certified. The efficiency of research operations would not be optimized as functions would not be located near the Nanosciences/Molecular Foundry Research cluster under this alternative.

4. Reduced Project Alternative

a. Analysis of Impacts

This alternative does not include construction of a new GPL or demolition of the existing buildings but it does include seismic strengthening of Building 85. Under this alternative, no UC LBNL personnel would be relocated to the LBNL main hill site.

i. Aesthetics

There would be no impacts to aesthetics under this alternative as there would be no new construction or demolition. This alternative would result in reduced impacts as compared to the proposed project.

ii. Air Quality

With no new construction or demolition, there would be no impacts from this component of the work, although there would still be impacts due to the Building 85 seismic strengthening. Overall construction impacts would be less than significant and reduced compared to the proposed project's impacts. The operational air quality impacts would be avoided as no new vehicle trips, cooling towers, lab space or HVAC would be added to the LBNL site.

iii. Biological Resources

No construction would avoid the less-than-significant impacts due to construction of the GPL near undeveloped areas and the new storm drain through the undeveloped but previously disturbed hillside. Impacts under this alternative from the seismic strengthening portion of the work would remain less than significant and overall the alternative would result in slightly reduced impacts compared to the proposed project.

iv. Cultural Resources

This alternative would not disturb cultural resources as it would not involve new construction or demolition. This alternative would result in less-than-significant impacts that would be slightly reduced compared to the impacts of the proposed project.

v. Geology and Soils

With the absence of replacement space for the "poor" and "very poor" and "failing" buildings to be demolished, the beneficial aspects of the project are reduced to the seismic strengthening of Building 85. Under this alternative, less-than-significant impacts related to soil erosion would be reduced as new building construction and demolition would not occur; however, seismic hazards would be greater than the proposed project as in the short term UC LBNL personnel would still occupy buildings that are rated "poor" from a

seismic safety viewpoint or described as “failing”. In the long term, UC LBNL personnel would still need to be moved from these buildings. This alternative would also have less-than-significant impacts that would be slightly reduced compared to the impacts of the proposed project

vi. Greenhouse Gas Emissions

With construction work restricted to the seismic strengthening, construction-related greenhouse gas emissions would be reduced, whereas the operational emissions would not increase as predicted for the proposed project. Overall, the impacts of this alternative would be less than significant and reduced compared to the impacts of the proposed project.

vii. Hazards and Hazardous Materials

As this alternative does not include demolition of Building 25/25B, there would be no issues of contact with potential remnant contamination. Impacts from Building 85 seismic strengthening under this alternative would be the same as under the proposed project. Overall the impacts would be less than significant and slightly reduced compared to the impacts of the proposed project.

viii. Hydrology and Water Quality

With construction limited to seismic strengthening, impacts resulting from this alternative related to hydrology and water quality would be less than significant, resulting in a minor improvement compared to the proposed project.

ix. Land Use and Planning

With no relocation of functions, this alternative would have no impacts related to land use and planning and the impacts would be reduced compared to the impacts of the proposed project.

x. Noise

This alternative would still have less-than-significant noise impacts from seismic strengthening, but would avoid construction noise associated with the building of the GPL and the demolition of structures. The impacts would be

less than significant and slightly reduced compared to the impacts of the proposed project.

xi. Public Services

With no relocation of functions, there would be no impacts to public services. This alternative would result in slightly reduced impacts compared to the proposed project.

xii. Transportation and Traffic

Construction trucks from the Building 85/85A seismic strengthening work would result in less-than-significant impacts to city streets. However, with no relocation of functions there would be no additional operational traffic and this alternative would avoid the project's significant and unavoidable cumulative traffic impact. Overall impacts would be less than significant and this alternative would avoid the proposed project's contribution to a significant and unavoidable impact.

xiii. Utilities and Service Systems

With no relocation of functions there would be no impacts to utilities and service systems and this alternative would avoid the proposed project's less-than-significant impact.

b. Ability to Meet Project Objectives

This alternative would meet one of the project objectives. It would improve the seismic life-safety of one component of the project, Building 85/85A. However, it would not replace the "poor" and "very poor" seismically rated structures of Buildings 25/25B, 55 and the "failing" 71 trailers with acceptable, modern life science research space. The efficiency of research operations would not be optimized as functions would not be located near the Nanosciences/Molecular Foundry Research cluster under this alternative.

5. No Project Alternative

a. Analysis of Impacts

Under this alternative, no elements of the proposed project would take place: There would be no GPL construction, no demolition of the existing buildings, and no seismic strengthening of Building 85/85A.

i. Aesthetics

There would be no impacts because this alternative would result in no new construction, demolition, or seismic strengthening.

ii. Air Quality

With no new construction, demolition, or seismic strengthening, there would be no impacts either temporary or ongoing.

iii. Biological Resources

With no new construction, demolition, or seismic strengthening, there would be no impacts either temporary or ongoing. This alternative would avoid the less than significant impacts of the proposed project.

iv. Cultural Resources

With no new construction, demolition, or seismic strengthening, there would be no impacts and this alternative would avoid the less-than-significant impacts of the proposed project.

v. Geology and Soils

The beneficial aspects of the project would not be achieved under this alternative. The alternative maintains the status quo, which keeps LBNL personnel in buildings that have a poor seismic rating exposing them to potential life safety hazards. Building 85 is now known to be located on two ancient landslides. These landslides are considered stable except possibly in response to a severe earthquake, when they could move. Under the No Project Alternative, Building 85 would continue to have risk of potential building damage in severe earthquakes.

Building 85, built in 1996, is currently satisfactorily serving its function as a hazardous waste handling facility at LBNL. HWHF operations cannot be relocated to an existing building on site, as there is no space available that would meet the requirements for this facility. Construction of a new hazardous waste handling facility would be significantly more costly than the proposed project. Without installation of slope stabilization improvements and minor upgrades to the building structure, there would be a continued risk of potential damage to the building in response to a significant earthquake.

In summary, under the no project alternative the current situation would continue and there would be no new impact.

vi. Greenhouse Gas Emissions

Under this alternative, there would be no impacts related to new construction, demolition, or seismic strengthening, as these activities and related greenhouse gas emissions would not occur. There would be a slight reduction in impact compared to the proposed project.

vii. Hazards and Hazardous Materials

Under this alternative, there would be no impacts related to new construction, demolition, or seismic strengthening as they would not occur. Potential hazards from release of hazardous substances from the HWHF due to earthquake damage are avoided due to the secondary containment of all storage containers and by the tertiary containment that is a feature of the entire facility.⁸ The less-than-significant impacts of the proposed project would be avoided.

viii. Hydrology and Water Quality

With no new construction, demolition, or seismic strengthening, there would be no impacts and this alternative would avoid the less than significant impacts of the proposed project on hydrology and water quality.

⁸ Nancy E. Rothermich, LBNL Waste Management Group Leader, Email to Jerry O'Hearn, LBNL FA Capital Projects Department Head. January 21, 2010.

ix. Land Use and Planning

With no relocation of functions, there would be no impacts to land use and planning. This alternative would avoid the less than significant impacts of the proposed project

x. Noise

With no new construction, demolition, or seismic strengthening, there would be no impacts related to noise.

xi. Public Services

With no relocation of functions there would be no impacts related to public services and this alternative would avoid the less than significant impacts of the proposed project related to public services.

xii. Transportation and Traffic

With no new construction, demolition, or seismic strengthening, there would be no impacts to traffic and this alternative would avoid the less-than-significant project impacts and significant and unavoidable cumulative traffic impacts of the proposed project.

xiii. Utilities and Service Systems

With no relocation of functions there would be no impacts and service systems. This alternative would avoid the less-than-significant impacts of the proposed project on utilities and service systems.

b. Ability to Meet Project Objectives

This alternative would not meet any of the project objectives. It would not seismically strengthen Building 85. It would not replace the “poor” and “very poor” seismically rated structures of Buildings 25/25B, 55 and the “failing” 71 trailers with acceptable, modern life science research space. LEED Gold-certified space would not be added to the LBNL site and the efficiency of research operations would not be optimized as functions would not be located near the Nanosciences/Molecular Foundry Research cluster under this alternative.

D. Environmentally Superior Alternative

An EIR is required to identify the environmentally superior alternative from among the range of reasonable and feasible alternatives evaluated. As a rule, this would be the alternative that results in fewer or no potentially significant or significant and unavoidable impacts.

Of the alternatives described above, the Reduced Project Alternative is the environmentally superior alternative as it reduces and avoids the proposed project's significant impacts. However, it fails to meet many important project objectives.

6 CEQA-REQUIRED ASSESSMENT CONCLUSIONS

This chapter provides an overview, as required by CEQA, of the impacts of the proposed project. The topics covered in this chapter include growth inducement, unavoidable significant impacts, impacts found to be not significant, cumulative impacts, and expected significant irreversible changes.

A. *Growth Inducement*

A project is typically considered to be growth-inducing if it fosters economic or population growth. Typical growth inducements include the extension of urban services or transportation infrastructure to a previously underserved area and the removal of major barriers to development. Growth inducement is considered a negative impact only when the projected growth would have adverse effects on the environment.

The proposed project would not result in major upgrades to infrastructure that could serve to induce additional growth, either at LBNL or in the immediate Berkeley/Oakland area. Although a new GPL of around 43,000 gsf would be constructed, this square footage would be offset by the demolition of existing structures with an equivalent amount of building space. Furthermore, the proposed project does not include the extension of roadways or utilities (e.g. water or sanitary sewer lines) into areas that are currently undeveloped.¹ For these reasons, physical development associated with the proposed project would not have the capacity to induce growth.

The removal of approximately 17,700 square feet of building space at the Building 55 and Building 71 trailers sites, as called for in the proposed project, would increase the supply of potentially developable land on the LBNL site. However, the extent of future development of this area is not currently known. Even if there are plans in the future, development of this magnitude would still be well within the realm of the building square footage projected

¹ The 125-foot new storm sewer line from the GPL crosses a currently undeveloped area that is a relatively recent roadcut.

in the LBNL 2006 LRDP, which calls for a net increase of 660,000 feet of new construction over the next 25 years.²

The proposed project would also result in an increase in the number of employees located at the LBNL site, as it includes the transfer of 100 staff members from the off-site Potter Street facility to the LBNL main hill site. This amount of population growth is within the LBNL long-term planning projections, as set forth in the LRDP, which estimate that the total adjusted daily population (permanent employees and guests) would increase from 3,650 in 2003 to 4,650 in 2025; an increase of 1,000 people.³ In addition, these employees are current LBNL staff members, and the Potter Street facility from which they would be transferred is located in the City of Berkeley approximately 5 miles from LBNL. It is likely that transferred employees already reside in the vicinity of LBNL. The project would therefore not foster a substantial increase in population growth in the project vicinity.

B. Unavoidable Significant Impacts

Section 15126.2(b) of the CEQA Guidelines requires that an EIR describe any significant impacts that cannot be reduced to a less than significant level, even with the implementation of feasible mitigation measures. For the proposed project, all impacts would be reduced to a *less-than-significant* level with the exception of the following one impact that was also identified as significant and unavoidable in the LBNL 2006 LRDP EIR.

² Krupnick, Jim, February 14, 2007, *Lawrence Berkeley National Laboratory Planned Growth*, PowerPoint presentation to Berkeley Planning Commission, http://www.lbl.gov/Community/LRDP/pdf/LRDP_LBNL_Planned_Growth.pdf.

³ LBNL, 2006, *Long-Range Development Plan Environmental Impact Report*, page II-6.

SP2 Cumulative Impact TRANS-1: The proposed project, in combination with other foreseeable development at LBNL and in the surrounding community, would generate traffic that would cause the City of Berkeley level of service standards at the Durant Avenue/Piedmont Avenue, Hearst Avenue/Gayley Road, Gayley Road/Stadium Rim Way, and Bancroft Way/Piedmont Avenue intersections to be exceeded. (*Significant and Unavoidable*)

C. Significant, Irreversible Changes

Section 15126.2(c) of the CEQA Guidelines requires a discussion of the extent to which a proposed project would commit nonrenewable resources to uses that future generations would be unable to reverse. The CEQA Guidelines describe three distinct categories of irreversible changes that should be considered.

1. Changes in Land Use which Commit Future Generations

The proposed project would not have irreversible impacts because future options for using the LBNL land would remain possible through future building decommissioning and site restoration. Furthermore, the project would not result in the conversion of any land that has not already been disturbed and developed for LBNL use.

2. Consumption of Natural, Nonrenewable Resources

Analysis of the degree to which a proposed project would consume nonrenewable resources includes assessments of increased energy consumption, consumption of agricultural lands and loss of access to mining reserves. Completion of the proposed project would irretrievably commit nonrenewable resources to proposed building construction, operation, demolition and upgrades. Building materials and energy consumed as part of the project would include, but would not be limited to, nonrenewable and limited resources such as oil, gasoline, lumber, aggregate, water and steel. Increased energy demands would result from construction, lighting, heating and cooling and transportation of people to, from, and within, the site.

As explained in Chapter 4, the proposed project site contains no areas used for agricultural purposes or designated as agricultural land, nor does it contain any significant mineral deposits. As such, the proposed project would not result in irreversible changes related to the consumption of those types of resources.

3. Irreversible Damage from Environmental Accidents

As detailed in Section 4.7, Hazards and Hazardous Materials, of this report, the use, storage, and disposal of hazardous materials are an inherent part of LBNL's existing operations and the proposed project. For example, buildings proposed for demolition contain asbestos and lead; hazardous materials typically associated with a laboratory would be stored in the proposed GPL; buildings that would be demolished and construction work would be undertaken in areas where hazardous chemicals may have previously leaked into the environment.

However, existing hazard plans and LBNL 2006 LRDP EIR mitigation measures that are a part of the proposed project reduce the potential for irreversible damage caused by environmental accidents to a less-than-significant level. These measures include federally-compliant procedures currently instituted by the LBNL Environment, Health, and Safety Division; the LBNL Hazardous Materials Business Plan; and LRDP EIR mitigation measures identified in Section 4.7, Hazards and Hazardous Materials.

D. Impacts Found to be Insignificant

CEQA allows environmental issues for which there is no likelihood of an impact to be "scoped out" during the EIR scoping process. Impacts related to these issues are not covered in an EIR. This section summarizes previous findings based on a screening environmental analysis conducted by UC LBNL regarding the areas of concern which were "scoped out" and were not evaluated in this document.

- ◆ **Agricultural Resources.** The LBNL main hill site does not contain any areas used for agricultural purposes.

- ◆ **Mineral Resources.** The entire LBNL site is a Mineral Resource Zone-1 (MRZ-1), in which no significant mineral deposits are present.
- ◆ **Population and Housing.** Proposed additional staff would not constitute a substantial increase to population on the site, nor would it substantially increase the permanent local population. The proposed project does not include any housing, nor would it demolish any existing housing.
- ◆ **Recreation.** The proposed project would not result in increased usage of recreational facilities to the extent that substantial physical deterioration of such facilities would occur.

LAWRENCE BERKELEY NATIONAL LABORATORY
SEISMIC PHASE 2 PROJECT EIR
CEQA-REQUIRED ASSESSMENT CONCLUSIONS

7 REPORT PREPARATION

This report was prepared by consultants with guidance from lead agency staff, as listed below:

A. Lead Consultant

Design, Community & Environment
1625 Shattuck Avenue, Suite 300
Berkeley, CA 94709
510-848-3815 (phone)
510-848-4315 (fax)
www.dceplanning.com

B. Subconsultants

Air Quality and Greenhouse Gases

Golder & Associates
9 Monroe Parkway, Suite 270
Lake Oswego, OR 97035
(503) 607-1820 (phone)
(503) 607-1825 (fax)

Illingworth & Rodkin, Inc
505 Petaluma Boulevard South
Petaluma, CA 94952
(707) 766-7700 x24 (phone)
(707) 766-7790 (fax)

Biological Resources

Wildlife Research Associates (WRA)
1119 Burbank Ave.
Santa Rosa, CA 95407
(707) 544-6273 (phone)
(707) 544-6317 (fax)

Hazardous Materials and Hydrology
Baseline Environmental Consulting
5900 Hollis Street, Suite D
Emeryville, CA 94608
(510) 420-8686 (phone)
(510) 420-1707 (fax)

Noise
Illingworth & Rodkin, Inc.
505 Petaluma Boulevard South
Petaluma, CA 94952
(707) 766-7700 x 23 (phone)
(707) 766-7790 (fax)

Transportation
Fehr & Peers
100 Pringle Avenue, Ste 600
Walnut Creek, CA 94596
925-930-7100 (phone)
925-933-7090 (fax)

C. EIR Managers and Reviewers

1. UC - LBNL

Jerry O'Hearn - Facilities Capital Projects, Department Head
Jeff Philliber - Environmental Planner
Richard Stanton - Project Manager, Facilities Division
Nancy Ware - Laboratory Counsel

2. UC Office of the President

Mary O'Keefe - Senior Planner
Elisabeth Gunther - University Counsel

D. Persons and Agencies Consulted

1. LBNL/DOE

Kim Abbott, DOE Berkeley Site Office

Ron Pauer, EH&S

Nancy Rothermich, EH&S

Robert Connelly, LBNL

Les Dutton, LBNL

Stuart Lee, LBNL

2. External Agencies

Brian Bateman, BAAQMD

Scott Lutz, BAAQMD

Dan Lunsford, LBNL

Shu-Mei Chen, Alameda County Fire Department

Bonnie Terra, Alameda County Fire Department

Stan Lew, RMW Architects

William Kirkpatrick, EBMUD

LAWRENCE BERKELEY NATIONAL LABORATORY
SEISMIC PHASE 2 PROJECT EIR
REPORT PREPARATION

LBNL 2006 LRDP EIR
SUPPLEMENT



LBNL 2006 LRDP EIR SUPPLEMENT

A. LBNL 2006 LRDP EIR Supplemental Analysis

As noted above, the 2006 LRDP EIR did not find a significant traffic-related impact at the Bancroft Way/Piedmont Avenue intersection on either a project-specific or cumulative basis. Updated analysis prepared by Fehr & Peers, however, indicates that development pursuant to the LBNL 2006 LRDP, when combined with development under the UC Berkeley LRDP as well as surrounding development in Berkeley and nearby communities that could affect this intersection, would contribute to the degradation of service such that this intersection would operate at LOS F in 2025 and that the v/c ratio would increase by 0.181 in the AM peak period and by 0.032 in the PM peak period. The AM and PM peak hour increase exceeds the threshold of significance established by the City of Berkeley.

As such, with implementation of the LBNL 2006 LRDP, combined with development under the UC Berkeley LRDP as well as surrounding development in Berkeley and nearby communities that could affect area intersections, significant deterioration in level of service would occur at four intersections: Hearst Avenue at Gayley Road/La Loma Avenue; Gayley Road at Stadium Rim Way; Durant Avenue at Piedmont Avenue; and Bancroft Way at Piedmont Avenue. With implementation of LRDP Mitigation Measures TRANS-1a, TRANS-1b, TRANS-1c, and TRANS-1d, these impacts are potentially mitigable to a less-than-significant level, but considered significant and unavoidable because there is not yet a plan in place for improvements at these intersections, and because UC LBNL could not implement mitigation measures on its own, as any improvements would be under the jurisdiction of the City of Berkeley. Thus, it cannot be determined at this time that the impact will be mitigated to a less-than-significant level.

In addition, in light of updated analysis, increased traffic generated by the LBNL 2006 LRDP would represent more than five percent of the total traffic at these four intersections under cumulative conditions. The percent increase associated with the LBNL 2006 LRDP would make a considerable contribution to the overall cumulative impact at these four intersections. With implementation of LRDP Mitigation Measure TRANS-8, these impacts are potentially mitigable to a less-than-significant level, but considered significant

and unavoidable because there is not yet a reasonable plan for improvements at these intersections, and because LBNL could not implement mitigation measures on its own, as any improvements would be under the jurisdiction of the City of Berkeley. As such, it cannot be determined at this time whether the impact will be mitigated to a less-than-significant level.

The LBNL 2006 LRDP EIR is hereby amended to include in LRDP Impact TRANS-1 and LRDP Impact TRANS-8 the significant impact at the Bancroft Way/Piedmont Avenue intersection consistent with Fehr & Peers' updated 2025 analysis. The text of the LBNL 2006 LRDP EIR as amended is set forth below in redline and indented.

Accordingly, this EIR evaluates this impact at the Bancroft Way/Piedmont Avenue intersection on a project-specific and cumulative impacts basis. This EIR also supplements the LBNL 2006 LRDP EIR by amending its traffic discussion to include Fehr & Peers' updated analysis and a determination that impacts at Bancroft Way/Piedmont Avenue are *significant and unavoidable* on a project-specific and cumulative basis.

B. Revisions to the LBNL 2006 LRDP EIR

The following pages present the text of Impact TRANS-1 from pages IV.L-28 to IV.L-33 of the LBNL 2006 LRDP Draft EIR as revised by the Final EIR (on pages II-3 through II-7 of the Final EIR). The text of Impact TRANS-1 is followed by the text of Impact TRANS-8 from pages IV.L-43 to IV.L-45 of the LBNL 2006 LRDP Draft EIR as revised by the Final EIR (on pages II-8 and II-9 of the Final EIR). The revisions to the text are shown below in underline and strikethrough and reflect the results of the supplemental analysis of cumulative impacts conducted as part of this project EIR.

Intersection Impacts

Impact TRANS-1: Implementation of the 2006 LRDP would degrade level of service at certain local intersections. (Significant and Unavoidable)

Affected Intersections

With implementation of the 2006 LRDP, significant deterioration in LOS would occur at ~~three~~four intersections:

- Hearst Avenue at Gayley Road/La Loma Avenue (#6; signalized) would be at LOS E during both peak hours without the LRDP; the LRDP would cause the PM peak-hour service level to degrade to LOS F, and would increase traffic by more than 5 percent (i.e., 6.7 percent [AM] and 6.4 percent [PM]) during both peak hours.
- Gayley Road at Stadium Rim Way (#7; all-way-stop-controlled) would be at LOS F during both peak hours without and with the LRDP; the LRDP would increase traffic by more than 5 percent (i.e., 6.2 percent [AM] and 5.1 percent [PM]) during both peak hours.¹
- Durant Avenue at Piedmont Avenue (#8; all-way-stop-controlled) would be at LOS E and LOS D during the AM and PM peak hours, respectively, without the LRDP; the LRDP would cause the peak-hour level of service to degrade one service level, to LOS F in the AM peak hour and to LOS E in the PM peak hour.
- Bancroft Way at Piedmont Avenue (#20; all-way-stop-controlled) would be at LOS F during both peak hours without the LRDP; the LRDP would increase traffic by more than the City of Berkeley's threshold of significance during the AM peak hour.

~~The intersection of Bancroft Way/Gayley Road Piedmont Avenue (#20; all way stop) would be at LOS F in 2025 in both the morning and afternoon peak hours without traffic from LRDP development. Because the LRDP generated increase in traffic volumes would be less than the significance threshold of a 5 percent increase (i.e., 4.3% and 3.4% in the a.m. and p.m. peak hours, respectively) at this intersection, the project would not result in a significant impact.~~

All other study intersections would operate at LOS D or better in 2025 with the addition of traffic generated by development pursuant to the LRDP. Table IV.L-6 shows the results of the analysis of LRDP impacts on LOS at the 20 study intersections. Table IV.L-7 presents a comparison of 2025 LOS with and without the proposed LRDP.

¹ The EIR for the Southeast Campus Integrated Projects (SCIP), published by UC Berkeley in October 2006 (UC Berkeley, 2006), identifies a significant impact due to the Integrated Projects analyzed in that EIR, and identifies installation of a traffic signal as mitigation for that impact. Because this mitigation measure would be implemented prior to construction of the Maxwell Family Field parking structure (one of the Integrated Projects) should the SCIP be implemented, this would avoid the significant impact at this intersection due to the LBNL 2006 LRDP. However, this EIR identifies the significant impact because, for purposes of a conservative analysis, it is not presumed that the SCIP will be approved and implemented.

**TABLE IV.L-6
INTERSECTION LEVEL OF SERVICE – 2025 WITH PROJECT**

Intersection	Control	AM Peak		PM Peak	
		LOS	Delay (seconds)	LOS	Delay (seconds)
1. University Ave. at southbound Shattuck Ave.	Signal	D	39.5	C	23.5
2. Hearst Avenue at Shattuck Ave.	Signal	A	8.3	C	25.6
3. University Avenue at Oxford St.	Signal	D	40.2	C	30.6
4. Hearst Avenue at Oxford St.	Signal	B	11.8	D	50.9
5. Hearst Avenue at Euclid Ave.	Signal	B	18.5	B	18.0
6. Hearst Avenue at Gayley Rd./La Loma Ave.	Signal	E	<u>68.0-76.0</u>	F	<u>>80-85.2</u>
7. Gayley Road at Stadium Rim Way	All-Way Stop	F	<u>>5060</u>	F	<u>>5060</u>
8. Durant Ave. at Piedmont Ave.	All-Way Stop	F	<u>>5060</u>	E	<u>36.8-37.5</u>
9. Dwight Way at Piedmont Ave.	Signal	B	10.9	B	13.6
10. College Avenue at Bancroft Way	Signal	C	17.0	C	15.9
11. Durant Ave. at College Ave.	Signal	B	13.8	B	13.7
12. Telegraph Ave. at Dwight Way	Signal	B	18.3	C	34.3
13. Shattuck Ave. at Bancroft Way	Signal	B	10.6	C	22.3
14. Shattuck Ave. at Durant Way	Signal	B	14.2	C	23.7
15. Grizzly Peak Boulevard at Centennial Drive	All-Way Stop	B	11.4	D	27.3
16. Cyclotron Road at Highland Place	Two-Way Stop	C	16.0	C	16.7
17. Channing Way at Piedmont Ave.	Two-Way Stop	F	47.7	F	>50
18. Panoramic Way at Canyon Rd./Stadium Rim Way	Two-Way Stop	B	10.4	B	12.6
19. Centennial Drive at Stadium Rim Way	All-Way Stop	A	9.8	B	13.1
20. Bancroft Way at Gayley Rd./Piedmont Ave.	All-Way Stop	F	<u>>5060</u>	F	<u>>5060</u>

Bold type indicates significant impact.

LOS = level of service.

Source: Wilbur Smith Associates, 2004.

Impact at Panoramic Way/Canyon Road-Stadium Rim Way Intersection

As noted in the comparison of Tables IV.L-5² and IV.L-7, under LRDP development, traffic would marginally increase peak-hour vehicle delay on the stop-controlled approach at the intersection of Panoramic Way/Canyon Road-Stadium Rim Way (#18; stop-controlled), although the level of service would remain at LOS B in both peak hours. LRDP traffic is estimated to add seven vehicles in the AM peak hour and eight vehicles in the PM peak hour, representing increases of 1.5 percent and 1.3 percent, respectively, over future no-project conditions.

This intersection provides the only vehicular access to the Panoramic Hill residential neighborhood that straddles the Berkeley-Oakland city limits, south of LBNL. The streets that make up this intersection are narrow and winding, with no sidewalks; residents report that cars parked along the streets sometimes obstruct parts of the already limited right-of-way, potentially impeding access for emergency vehicles and other traffic.

Although traffic generated by development that would occur under the 2006 LRDP would increase volumes at this intersection and on roadways serving the intersection – in particular, Canyon Road-Stadium Rim Way – the increase would be so small as to be nearly imperceptible.

² This table is not presented here, but is in the original LBNL 2006 LRDP EIR.

**TABLE IV.L-7
LEVEL OF SERVICE COMPARISON – 2025 WITH AND WITHOUT PROJECT**

Intersection	Existing		2025-No Project		2025 w/Project	
	LOS	Delay	LOS	Delay	LOS	Delay
AM Peak Hour						
1. University Ave. at southbound Shattuck Ave.	B	19.7	D	35.7	D	39.5
2. Hearst Ave. at Shattuck Ave.	A	6.1	A	8.2	A	8.3
3. University Ave. at Oxford St.	C	29.0	D	39.5	D	40.2
4. Hearst Ave. at Oxford St.	A	10.0	B	11.7	B	11.8
5. Hearst Ave. at Euclid Ave.	B	15.4	B	17.1	B	18.5
6. Hearst Ave. at Gayley Rd./La Loma Ave.	C	22.4	E	57.3	E	68.0 76.0
7. Gayley Rd. at Stadium Rim Way	D	26.2	F	>50	F	>5060
8. Durant Ave. at Piedmont Ave.	C	17.4	E	45.5	F	>5060
9. Dwight Way at Piedmont Ave.	A	9.4	B	10.9	B	10.9
10. College Ave. at Bancroft Way	B	11.8	C	16.9	C	17.0
11. Durant Ave. at College Ave.	A	9.2	B	13.4	B	13.8
12. Telegraph Ave. at Dwight Way	B	16.2	B	18.2	B	18.3
13. Shattuck Ave. at Bancroft Way	A	8.6	B	10.6	B	10.6
14. Shattuck Ave. at Durant Way	B	11.3	B	13.9	B	14.2
15. Grizzly Peak Blvd. at Centennial Dr.	B	10.2	B	11.1	B	11.4
16. Cyclotron Rd. at Highland Place	B	12.7	B	14.5	C	16.0
17. Channing Way at Piedmont Ave.	E	38.5	F	>50	F	47.7
18. Panoramic Way at Canyon Rd./Stadium Rim Way	B	10.2	B	10.3	B	10.4
19. Centennial Dr. at Stadium Rim Way	A	9.2	A	9.5	A	9.8
20. Bancroft Way at Gayley Rd./Piedmont Ave.	F	>50	F	>50	F	>5060
PM Peak Hour						
1. University Ave. at southbound Shattuck Ave.	B	18.2	C	21.5	C	23.5
2. Hearst Ave. at Shattuck Ave.	B	14.5	C	23.9	C	25.6
3. University Ave. at Oxford St.	B	18.2	C	29.0	C	30.6
4. Hearst Ave. at Oxford St.	D	52.8	D	50.1	D	50.9
5. Hearst Ave. at Euclid Ave.	B	16.9	B	16.3	B	18.0
6. Hearst Ave. at Gayley Rd./La Loma Ave.	C	24.3	E	57.2	F	>8085.2
7. Gayley Rd. at Stadium Rim Way	D	34.7	F	>50	F	>5060
8. Durant Ave. at Piedmont Ave.	C	17.6	D	34.2	E	36.8 37.5
9. Dwight Way at Piedmont Ave.	B	13.1	B	13.6	B	13.6
10. College Ave. at Bancroft Way	B	12.3	C	15.6	C	15.9
11. Durant Ave. at College Ave.	B	13.4	B	13.6	B	13.7
12. Telegraph Ave. at Dwight Way	C	20.2	C	34.3	C	34.3
13. Shattuck Ave. at Bancroft Way	B	12.7	C	21.8	C	22.3
14. Shattuck Ave. at Durant Way	B	14.0	C	23.4	C	23.7
15. Grizzly Peak Boulevard at Centennial Dr.	C	17.7	C	23.2	D	27.3
16. Cyclotron Rd. at Highland Place	B	12.7	B	13.0	C	16.7
17. Channing Way at Piedmont Ave.	F	>50	F	>50	F	>50
18. Panoramic Way at Canyon Rd./Stadium Rim Way	B	12.1	B	12.5	B	12.6
19. Centennial Dr. at Stadium Rim Way	B	12.2	B	11.9	B	13.1
20. Bancroft Way at Gayley Rd./Piedmont Ave.	F	>50	F	>50	F	>5060

Bold-face type indicates significant impact.

LOS – level of service

Source: Wilbur Smith Associates, 2004.

Existing AM and PM peak-hour volumes counted for this analysis were 387 and 536 vehicles, respectively. Cumulative development by 2025 is forecast to add 67 vehicles in the AM peak hour and 89 vehicles in the PM peak hour. As noted, LRDP traffic would add seven vehicles in the AM peak hour and eight vehicles in the PM peak hour, representing an increase of no more than 1.5 percent over future no-project conditions, and less than 2 percent of existing traffic volumes. The increase in peak-hour traffic due to the 2006 LRDP would amount to no more than one vehicle every 7.5 minutes, which would not be perceptible to most observers. Assuming a typical temporal distribution of traffic, the existing daily volume at this intersection is approximately 5,400 vehicles, and LRDP traffic would add perhaps 100 daily vehicles.

Given that the existing roadways, while narrow, appear to provide at least a minimum level of adequate access to Panoramic Hill, except in instances of illegal parking (an enforcement issue), and given the extremely small increment of project traffic at this intersection, it does not appear that LRDP traffic would result in a significant impact on access (including emergency vehicle access) or traffic safety at this location. None of the other study intersections or Laboratory access roads have a configuration like that at the Panoramic Way/Canyon Road-Stadium Rim Way intersection, and therefore no other locations were identified where emergency vehicle potentially could be of concern.

Mitigation Measure TRANS-1a: LBNL shall work with UC Berkeley and the City of Berkeley to design and install a signal at the Gayley Road/Stadium Rim Way intersection, when a signal warrant analysis shows that the signal is needed. ~~The intersection would meet one hour signal warrants for peak hour volume and peak hour delay under 2025 conditions with implementation of the LBNL 2006 LRDP.~~ LBNL shall contribute funding on a fair-share basis, to be determined in consultation with UC Berkeley and the City of Berkeley, for a periodic (annual or biennial) signal warrant check to allow the City to determine when a signal is warranted, and for installation of the signal. Should the City determine that alternative mitigation strategies may reduce or avoid the significant impact, the Lab shall work with the City and UC Berkeley to identify and implement such alternative feasible measure(s). See also Mitigation Measure TRANS-1c, development and implementation of a new Transportation Demand Management Program.

With the implementation of this mitigation measure, the intersection of Gayley Road/Stadium Rim Way would operate at an acceptable level of service (LOS B or better under traffic signal control) during both the AM and PM peak hours.

This mitigation measure is proposed to be adopted as part of the LRDP and will be monitored through the LRDP mitigation monitoring and reporting program. It will thus continue to be a binding mitigation commitment of LBNL. Under CEQA case law, however, when the lead agency contributes fair-share funding to a mitigation measure that will be carried out by another entity, there must be some evidence of a reasonable plan in place in order for the lead agency to conclude that the adopted mitigation will reduce the impact to a less-than-significant level (*City of Marina v. Board of Trustees of the California State University* (2006) 39 Cal.4th 341). LBNL has discussed this with the City, and based on that consultation, LBNL understands there have been some discussions of improvements at Gayley Road/Stadium Rim Way. Also, the University has retained a consultant to perform studies related to these improvements, but there is not yet a plan in place for the improvements. As such, it cannot be determined at this time that this impact will be mitigated to a less-than-significant level. Accordingly, this impact would still be considered significant and unavoidable, but LBNL would contribute to fair-share funding which, if a reasonable plan is implemented, would mitigate these impacts to a less-than-significant level.

Mitigation Measure TRANS-1b: LBNL shall work with the City of Berkeley to design and install a signal at the Durant Avenue/Piedmont Avenue intersection, when a signal warrant analysis shows that the signal is needed. LBNL shall contribute funding, on a fair-share basis, to be determined in consultation with UC Berkeley and the City of Berkeley, for a periodic (annual or biennial) signal warrant check to allow the City to determine when a signal is warranted, and for installation of the signal. Should the City determine that alternative mitigation strategies may reduce or avoid the significant impact, the Lab shall work with the City and UC Berkeley to identify and implement such alternative feasible measure(s).

See also Mitigation Measure TRANS-1d, development and implementation of a new Transportation Demand Management Program.

With the implementation of this mitigation measure, the Durant Avenue/Piedmont Avenue intersection would operate at an acceptable level of service (LOS B or better under traffic signal control) during both the AM and PM peak hours.

This mitigation measure is proposed to be adopted as part of the LRDP and will be monitored through the LRDP mitigation monitoring and reporting program. It will thus continue to be a binding mitigation commitment of LBNL. Under CEQA case law, however, when the lead agency contributes fair-share funding to a mitigation measure that will be carried out by another entity, there must be some evidence of a reasonable plan in place in order for the lead agency to conclude that the adopted mitigation will reduce the impact to a less-than-significant level (*City of Marina v. Board of Trustees of the California State University* (2006) 39 Cal.4th 341). LBNL has discussed this with the City, and based on that consultation, LBNL understands there have been some discussions of improvements at ~~Gayley Road/Stadium Rim Way~~ Durant Avenue/Piedmont Avenue. Also, the University has retained a consultant to perform studies related to these improvements, but there is not yet a plan in place for the improvements. As such, it cannot be determined at this time that this impact will be mitigated to a less-than-significant level. Accordingly, this impact would still be considered significant and unavoidable, but LBNL would contribute to fair-share funding which, if a reasonable plan is implemented, would mitigate these impacts to a less-than-significant level.

Mitigation Measure TRANS-1c: LBNL shall fund and conduct a study to evaluate whether there may be feasible mitigation (with design standards acceptable to the City) at the intersection of Hearst Avenue at Gayley Road/La Loma Avenue. This intersection is currently signalized, and physical geometric limitations constrain improvements within its current right-of-way. All four corners of this intersection are occupied by existing UC Berkeley facilities, including Foothill Student Housing, Cory Hall, and outdoor tennis courts, as well as the Founders' Rock. The level of service analyses herein used conservative assumptions so as to not underestimate potential project impacts. For example, even though the approach widths at this intersection allow drivers to maneuver past other vehicles as they near the intersection, the absence of pavement striping to delineate separate lanes dictated that the analysis conservatively assume all vehicle movements on each approach are made on a single lane. Similarly, without the certainty that standard lane widths (and adequate storage lengths) could be provided, possible improvement measures were not relied on to judge that significant impacts would be mitigated to less than significant levels. Judging the success of possible mitigation measures with a conservative standard is reasonable, but in consultation with City of Berkeley staff, the Lab will conduct a further study to re evaluate whether there may be feasible mitigation (with design standards acceptable to the City) at this intersection. That additional study will be conducted by LBNL as

part of the TDM program set forth below as Mitigation Measure TRANS-1d. If such mitigation is determined by Berkeley Lab to be feasible, then Berkeley Lab shall contribute funding on a fair-share basis, to be determined in consultation with UC Berkeley and the City of Berkeley, for the installation of the improvements.

This mitigation measure will be monitored through the LRDP mitigation monitoring and reporting program. It will thus continue to be a binding mitigation commitment of LBNL. Under CEQA case law, however, when the lead agency contributes fair-share funding to a mitigation measure that will be carried out by another entity, there must be some evidence of a reasonable plan in place in order for the lead agency to conclude that the adopted mitigation will reduce the impact to a less-than-significant level (*City of Marina v. Board of Trustees of the California State University* (2006) 39 Cal.4th 341). LBNL will reevaluate its conclusion that there is not feasible mitigation for this intersection, and will retain and fund a consultant to perform that re-evaluation. However, given that LBNL has evaluated all of the potential mitigation that has been suggested and concluded that mitigation is not feasible, and given the absence of a City plan for such improvements, it cannot be determined at this time that this impact will be mitigated to a less-than-significant level. Accordingly, this impact would still be considered significant and unavoidable, but LBNL shall fund the study pursuant to the TDM program, and would contribute to fair-share funding which, if feasible mitigation is identified and a plan to proceed with that mitigation is implemented, would mitigate this impact to a less-than-significant level.

Mitigation Measure TRANS-1d: LBNL shall develop and implement a new Transportation Demand Management (TDM) Program to replace its existing TDM program. This enhanced TDM Program has been drafted in consultation with the City of Berkeley, and is proposed to be adopted by the Lab following The Regents' consideration of the 2006 LRDP. The new draft proposed TDM Program is attached to this EIR as Appendix G. The proposed TDM Program includes several implementation phases tied to the addition of parking to LBNL. The final provisions of the TDM Program may be revised as it is finally adopted but will include a TDM coordinator and transportation committee, an annual inventory of parking spaces and a gate count, a study of more aggressive TDM measures, investigation of a possible parking fee, investigation of sharing services with UC Berkeley and an alternative fuels program. The TDM program shall also include funding of a study to reevaluate the feasibility of mitigation at the Hearst and Gayley/LaLoma intersection. The new draft proposed TDM Program also includes a requirement that LBNL conduct an additional traffic study to reevaluate traffic impacts on the earliest to occur of 10 years following the certification of this EIR or the time at which the Lab formally proposes a project that will bring total development of parking spaces pursuant to the 2006 LRDP to or above 375 additional parking spaces.

Mitigation Measure TRANS-1e. LBNL will work with the City of Berkeley to design and install a signal at the Bancroft Way/Piedmont Avenue intersection and provide an exclusive left-turn lane and an exclusive through lane on the northbound approach when a signal warrant analysis shows that the signal is needed. LBNL shall contribute funding, on a fair-share basis, to be determined in consultation with UC Berkeley and the City of Berkeley, for a periodic (annual or biennial) signal warrant check to allow the City to determine when a signal is warranted, and for installation of the signal. Should the City determine that alternative mitigation strategies may reduce or avoid the significant impact, the Lab shall work with the City and UC Berkeley to identify and implement such alternative feasible measure(s). See also Mitigation Measure TRANS-1d, development and implementation of a new Transportation Demand Management Program.

With the implementation of this mitigation measure, the Bancroft Way/Piedmont Avenue intersection would operate at an acceptable LOS B during both the AM and PM peak hours.

This mitigation measure is proposed to be adopted as part of the LRDP and will be monitored through the LRDP mitigation monitoring and reporting program. It will thus continue to be a binding mitigation commitment of LBNL. Under CEQA case law, however, when the lead agency contributes fair-share funding to a mitigation measure that will be carried out by another entity, there must be some evidence of a reasonable plan in place in order for the lead agency to conclude that the adopted mitigation will reduce the impact to a less-than-significant level (*City of Marina v. Board of Trustees of the California State University* (2006) 39 Cal.4th 341). The University has discussed this with the City, and based on that consultation, LBNL understands there have been some discussions of improvements at Bancroft Way/Piedmont Avenue. Also, the University has retained a consultant to perform studies related to these improvements, but there is not yet a plan in place for the improvements. As such, it cannot be determined at this time that this impact will be mitigated to a less-than-significant level. Accordingly, this impact would still be considered significant and unavoidable, but LBNL would contribute to fair-share funding which, if a reasonable plan is implemented, would mitigate these impacts to a less-than-significant level.

Significance after Mitigation: Potentially mitigable to a less-than-significant level at (1) Hearst Avenue/Gayley Road/La Loma Avenue intersection; (2) Gayley Road/Stadium Rim Way; ~~and~~ (3) Durant Avenue/Piedmont Avenue; ~~and~~ (4) Bancroft Way/Piedmont Avenue intersections, but considered significant and unavoidable because there is not yet a plan in place for such improvements at these intersections, and as such, it cannot be determined at this time that the impact will be mitigated to a less-than-significant level.

Project Variant

The project variant would relocate some 350 of the 375 off-site employees to the main hill site. Conservatively assuming that all relocated employees would drive to LBNL, the variant would add about nine percent more LBNL traffic to the streets of Berkeley. However, because nearly two-thirds of the relocated employees are currently located in downtown Berkeley, and because some or all of these employees currently drive to the downtown location, only project study intersections east of Shattuck Avenue would be substantially affected.³ In addition to the significant impact at the three intersections identified above for the LRDP, the project variant might trigger mitigation responsibilities at the added intersection of Bancroft Way at Gayley Road/Piedmont Avenue, since the project variant increase in traffic volumes would be higher than the significance threshold of a 5 percent increase in the AM peak hour. It should be noted that the UC Berkeley LRDP triggers mitigation responsibilities at this intersection, according to the UC Berkeley LRDP EIR.⁴ The specified mitigation (intersection signalization) in the UC Berkeley LRDP EIR is

³ The 225 LBNL employees who work in the downtown facility are currently provided with paid parking, in the interest of equity with their co-workers on the hill site. Information is not available on the current mode split of these workers, but it is assumed that if they move to the hill site, some, if not all, of any currently using transit would want to shift to automobile access due to the lesser convenience of transit service to the hill site. To avoid underestimating impacts, it was assumed for the traffic analysis that all 350 of the displaced employees would drive to their new work location on the hill site.

⁴ Mitigation Measure TRA-7 page 4.12-53 of the UC Berkeley LRDP Draft EIR, call for the University to “work with the City of Berkeley to design and, on a fair share basis, install a signal at the Bancroft Way/Piedmont Avenue intersection, and provide an exclusive left-turn lane and an exclusive through lane on the northbound approach.”

sufficient to also accommodate the traffic generated by the LBNL project variant with acceptable LOS standards.

It is unlikely that all of the relocated employees would drive to the main hill site, because Berkeley Lab controls the number of employees who obtain parking permits for the hill site. Therefore, the above analysis conservatively overestimates potential traffic impacts of the variant.

Individual Future Projects/Illustrative Development Scenario

The Illustrative Development Scenario is a conceptual portrayal of potential development under the 2006 LRDP. Actual overall development that is approved and constructed pursuant to the 2006 LRDP would be less intense than portrayed in the scenario. The scenario was developed before the 2006 LRDP was reduced in scope in response to comments from the City of Berkeley, and thus the scenario includes an overall level of potential development that is greater than is being proposed in the 2006 LRDP. Each of the proposed buildings that is included in the scenario, however, might be constructed pursuant to the 2006 LRDP, and thus the scenario remains an appropriate and conservative basis for the evaluation of traffic impacts. Individual projects identified in the Illustrative Development Scenario would contribute to degrading the LOS at three local intersections. For the reasons stated above with regard to full implementation of the LRDP, even with implementation of Mitigation Measures TRANS-1a through TRANS-1c, this impact would also remain significant and unavoidable.

Impact TRANS-8: Development pursuant to the 2006 LRDP, when combined with development under the UC Berkeley LRDP as well as surrounding development in Berkeley and nearby communities that could affect the study intersections, would contribute to a degradation of level of service at local intersections. (Significant and Unavoidable)

Projects considered under the 2006 LBNL LRDP and the UC Berkeley 2020 LRDP, as well as residential development taking place throughout the proximate LBNL vicinity, would combine to increase traffic volumes at area intersections. Taken together, these projects could result in a significant cumulative impact on traffic conditions. For vehicular traffic, cumulative conditions are the same as the future “with project” conditions, because these conditions already account for future baseline conditions that include all development foreseen under the general plans of each of the jurisdictions as well as the UC Berkeley 2020 LRDP.

As shown in Table 4.12-9, the number of intersections operating at an unacceptable level of service (LOS E or F) would increase from two intersections under existing conditions to five intersections under 2025 cumulative (i.e. “2025 with project”) conditions. Increased traffic generated by the 2006 LRDP would represent more than five percent of the total intersection volumes at three intersections under cumulative conditions, i.e., at Hearst Avenue at Gayley Road/La Loma Avenue, Gayley Road at Stadium Rim Way, ~~and~~ Durant Avenue/Piedmont Avenue, and Bancroft Way at Piedmont Avenue. The percent increase associated with the proposed LBNL LRDP would make a considerable contribution to the overall cumulative impact at these three intersections.

The project’s contribution to transit ridership (except on the Lab’s own shuttle buses) would be so small, as described above under Impact TRANS-2, as to be less than the daily variation in ridership on any given operator’s routes. Therefore, the project could not be seen to contribute considerably to any future cumulative impact on public transit, should such a cumulative effect occur.

The project would not contribute considerably to cumulative impacts on parking or pedestrian and bicycle conditions because the effects of the 2006 LRDP would be limited, in general, to the LBNL hill site itself; that is, impacts of the project would not combine with impacts of other development in regard to these issues.

The EIR for the UC Berkeley Southeast Campus Integrated Projects (SCIP) finds that cumulative transportation impacts would be consistent with the transportation impacts identified in the UC Berkeley 2020 LRDP EIR (UC Berkeley, 2006). Because those impacts are assumed as part of the cumulative development assumptions incorporated into this section, no additional cumulative transportation impacts would result from the LBNL 2006 LRDP in combination with cumulative development.⁵

Mitigation Measure TRANS-8: LBNL shall implement Mitigation Measure TRANS-1a (work with UC Berkeley and the City of Berkeley to design and install a signal at the Gayley Road/Stadium Rim Way intersection; LBNL would contribute funding on a fair-share basis, to be determined in consultation with UC Berkeley and the City of Berkeley, to install the signal); ~~and~~ Mitigation Measure TRANS-1b (work with the City of Berkeley to design and install a signal at the Durant Avenue/Piedmont Avenue intersection); and Mitigation Measure TRANS-1e (work with the City of Berkeley to design and install a signal at the Bancroft Way/Piedmont Avenue intersection when a signal warrant analysis shows that the signal is needed), LBNL would contribute funding on a fair-share basis, to be deter-

⁵ The SCIP EIR identifies a significant cumulative traffic impact at the intersection of Bancroft Way/Piedmont Avenue. The contribution of traffic generated by the LBNL 2006 LRDP to cumulative conditions at this intersection is identified herein as a significant cumulative impact.

mined in consultation with UC Berkeley and the City of Berkeley, to install the signal and for monitoring to determine when a signal is warranted).

With the implementation of these mitigation measures, the intersections of Gayley Road/Stadium Rim Way, ~~and~~ Durant Avenue/Piedmont Avenue, and Bancroft Way/Piedmont Avenue would operate at LOS B or better during both the AM and PM peak hours.

As explained earlier, the intersection of Hearst Avenue at Gayley Road/La Loma Avenue is currently signalized, and physical geometric limitations constrain improvements within its current right-of-way. Without the certainty that standard lane widths (and adequate storage lengths) could be provided, possible improvement measures were not relied on to judge that significant impacts would be mitigated to less-than-significant levels. Judging the success of possible mitigation measures with a conservative standard is reasonable, but in consultation with City of Berkeley staff, the Lab shall fund and conduct a study to evaluate whether there may be feasible mitigation (with design standards acceptable to the City) at this intersection. That additional study will be conducted by LBNL as part of the TDM program set forth above as Mitigation Measure TRANS-1d. If such mitigation is determined by Berkeley Lab to be feasible, then Berkeley Lab shall contribute funding on a fair share basis, to be determined in consultation with UC Berkeley and the City of Berkeley, for the installation of the improvements.

Significance after Mitigation: Traffic impacts were found to be potentially mitigable to less-than-significant levels at (1) Hearst Avenue/Gayley Road/La Loma Avenue intersection, (2) Gayley Road/Stadium Rim Way, ~~and~~ (3) Durant Avenue/Piedmont Avenue, and (4) Bancroft Way/Piedmont Avenue intersections, but considered significant and unavoidable because there is not yet a reasonable plan for improvements at these intersections, and as such, it cannot be determined at this time whether the impact will be mitigated to a less-than-significant level.

Project Variant

The project variant would result in traffic impacts substantially similar to the traffic impacts that would result from the 2006 LRDP development. The cumulative traffic impacts of the project variant would therefore be *significant and unavoidable* as described above.

Individual Future Projects/Illustrative Development Scenario

The Illustrative Development Scenario is a conceptual portrayal of potential development under the 2006 LRDP. Actual overall development that is approved and constructed pursuant to the 2006 LRDP would be less intense than portrayed in the scenario. The scenario was developed before the 2006 LRDP was reduced in scope in response to comments from the City of Berkeley, and thus the scenario includes an overall level of potential development that is greater than is being proposed in the 2006 LRDP. Each of the proposed buildings that is included in the scenario, however, might be constructed pursuant to the 2006 LRDP, and thus the scenario remains an appropriate and conservative basis for the evaluation of cumulative traffic impacts. A future project under the LRDP such as conceptually portrayed in the Illustrative Development Scenario, when combined with other projects under the LRDP and other development as discussed above, would also, for the reasons stated above, result in a cumulative traffic impact that would be significant and unavoidable at the Hearst Avenue/Gayley Road/La Loma Avenue intersection, and potentially mitigable to a less-than-significant level at Gayley Road/Stadium Rim Way, ~~and~~ Durant Avenue/Piedmont Avenue, and Bancroft Way/Piedmont Avenue intersections but considered significant and unavoidable because LBNL could not implement mitigation measures on its own, as these improvements would be under the jurisdiction of the City of Berkeley.