

UC BERKELEY HILL CAMPUS WORKING PAPER



Strawberry Canyon c.1870

A STUDY IN SUPPORT OF THE 2020 LONG RANGE DEVELOPMENT PLAN
DECEMBER 2002

The purpose of Working Papers is to document findings, identify concepts for further consideration and investigation, and inspire creative thinking. They do not represent decisions made nor policies adopted by the University.

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- Professor Robert P. Lin, Director

Staff to the Committee:

- Kerry O'Banion, Project Director 2020 LRDP
-

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■ INTRODUCTION

PURPOSE The campus is now preparing an update of its Long Range Development Plan, to guide capital investment at UC Berkeley through the year 2020. The Hill Campus - the campus lands east of the Stadium, Greek Theater and Bowles/Stern/Foothill - is a critical element of this update. The LRDP and its Environmental Impact Report will seek to establish a land use framework for the Hill Campus that reflects an optimal balance of program requirements and environmental stewardship.

Toward this end, a study committee for the Hill Campus was formed in spring 2002 to identify those program requirements and recommend how they might best be accommodated. The objectives for the study committee were to:

- Assess the value of the Hill Campus for instruction, field research, recreation and other potential uses - including habitat and resource conservation - and define the areas of greatest value for each use.
- Identify the needs of current Hill Campus programs, and anticipated changes through 2020.
- Identify known and potential demands of other users through 2020.
- Define a set of principles for development of the Hill Campus through 2020, including land use, protective measures for sensitive/valuable areas, and key capital investments and management practices required to support these principles.

SCOPE The university owns roughly 1000 acres of land in the hills east of Memorial Stadium, the Greek Theater, and the Bowles/Stern/Foothill student residences, as shown in figure 1. Roughly 200 acres of this land are now utilized and managed by the university-operated Lawrence Berkeley National Laboratory under its own separate jurisdiction.

The 200 acre LBNL site shown in figure 1 includes the 70 acre expansion agreed upon by the campus and LBNL in March 1996 to improve fire management.¹ These 70 acres shall continue to be managed under the land use policies of the campus Long Range Development Plan until the LBNL LRDP update is adopted by the regents, at which point the LBNL LRDP shall become the guiding document.

While the balance of this working paper does not address land use within LBNL, its director of strategic development is an active member of the study committee, and the findings of the committee are congruent with LBNL policies and plans. The term 'Hill Campus' in the balance of this working paper refers to the roughly 800 campus managed acres lying east of Memorial Stadium, the Greek Theater, and the Bowles/Stern/Foothill student residences (figure 1).

■ RELATED PLANS

1990-2005 LRDP

The current 1990 LRDP states the objective for the Hill Campus is:

... to administer most of the area as a conservation land resource with limited areas designated for development ... Major portions of the area are proposed to continue to be managed as an environmental teaching resource, such as the Ecological Study Area and Faunal Refuge Area ... the area is also proposed to continue to be used and managed as a recreation resource ... The area is suitable for research uses that ... require or are compatible with a natural or semi-natural environment ... research activities [without] wet laboratory facilities or ... high service requirements are suitable for the area ... a site is [also] reserved for future faculty housing adjacent to existing residential areas near roads and services.²

The 1990 LRDP divides the Hill Campus into land use zones (figure 2), although one of the zones, the Natural Areas, is defined merely as 'remaining undeveloped lands' without further explanation. The 1990 LRDP proposes several land management initiatives:

- Expansion of the Ecological Study Area.
- Expansion of the Botanical Garden.
- Reservation of Claremont Canyon as an undeveloped area pending future study.
- Designation of several reserve sites for future development.

The reserve sites include a faculty housing site at the intersection of Centennial and Grizzly Peak, as well as five potential sites for future research facilities: the former Poultry Husbandry site, the current Field Station for Behavioral Research site, sites north of Space Sciences Laboratory and east of the Mathematical Sciences Research Institute, and Chaparral Hill. The latter is suggested in the 1990 LRDP as the future site of a relocated FSBR: the current FSBR site would then be redeveloped with a new research facility.

The 1990 LRDP also proposed several specific capital projects in the Hill Campus, described further in CURRENT LAND USE, below:

- Various improvements to Strawberry Canyon Recreation Area to accommodate men's and women's athletics as well as recreational sports.
- Additions to the Lawrence Hall of Science, Space Sciences Laboratory and the Mathematical Sciences Research Institute.
- Replacement of several existing structures at the Botanical Garden.
- New parking lots at the Upper Hill Terraces and two other sites along Centennial Drive.

2002 STRATEGIC ACADEMIC PLAN

All campus plans at UC Berkeley share the underlying principle that our land use and capital investment strategy should align with and promote the goals of the academic enterprise, as articulated in the Strategic Academic Plan.³ While all of its principles bear on the future of the Hill Campus, two are particularly relevant to its future physical development:

MAINTAIN CONTIGUITY. The breadth and quality of our academic programs are the equal of any university in the world, but UC Berkeley is more than the sum of its parts. A great research university also requires a dynamic intellectual community, one that provides exposure to a wide range of cultures and perspectives, and generates the interactions that lead to new insight and discovery. For such a community to thrive requires a campus organized and designed to foster those interactions.

Although the academic structure of the campus reflects the traditional disciplines defined over a century ago, they are no longer insular and self-contained. Because the potential for interaction is everywhere, and because we cannot predict where productive synergies may emerge in the future, our first principle of physical organization must be to retain and reinforce the contiguity of the academic enterprise on and around the core campus. The Academic Plan recommends the campus:

- Accommodate future academic growth on the core campus and adjacent blocks.
- Reserve core campus space for functions that serve and/or involve students.
- Reserve adjacent blocks for research and service units requiring core campus proximity.

As examined later in this document, the critical interactions for all Hill Campus programs are primarily with the core campus, rather than with each other. However, all of those programs report significant problems in sustaining those critical interactions, due to their physical distance from the core campus, and to the difficulty of providing adequate transit, services and infrastructure to the Hill campus given the constraints of distance, poor access and rugged terrain.

INVEST IN HOUSING. Our best student and faculty candidates increasingly cite the scarcity of good, reasonably priced housing as a primary factor in their decisions whether or not to come to Berkeley. Of those who do, many find themselves living miles from campus, where the length of the commute itself becomes a disincentive to spending time on campus. This trend is destructive to intellectual community and the cultural life of the campus, and we must strive to reverse it. The Academic Plan recommends the campus:

- Provide two years of university housing to entering freshmen who desire it, and one year to entering transfers who desire it.
- Provide one year of university housing to entering graduate students who desire it.
- Provide up to 3 years of university housing to new untenured ladder faculty who desire it.
- Partner with private and not for profit developers to continue to expand and improve the rental housing stock available to the campus community.

As examined later in this document, housing - particularly for faculty and visiting scholars - is one land use that may be suitable for limited expansion in the Hill Campus, due both to its physical flexibility and to its more easily met transit and service demands compared to large scale research facilities.

■ CONTEXT

The vast majority of the campus-managed Hill Campus acreage, roughly 85%, lies within the City of Oakland, while the westernmost 10% lies within the City of Berkeley, and the easternmost 5% within unincorporated Contra Costa County. The western third of the site abuts low-density private residential areas to the north and south, while the eastern two-thirds of the site abuts the largely undeveloped lands of the East Bay Regional Park District and the East Bay Municipal Utility District.

The most dramatic physical feature of the Hill Campus is Strawberry Canyon, a watershed of roughly one square mile drained by the south fork of Strawberry Creek. This water supply helped convince the trustees of the College of California to acquire the ranch lands along the creek in 1868 as the site for their new campus. At the time, the hills above the campus were a mix of grassland, oak savannah and open chaparral. It was not until speculators in the next decade planted eucalyptus, in a failed scheme to grow and harvest them for commercial use, that the hills began to acquire their present, largely forested look.

By the turn of the century, a shortage of water had begun to constrain campus growth, so the regents acquired another 260 acres of hill watershed to the east to increase the system capacity. Around the same time, there was also a growing desire to beautify the campus: a campus nursery was established, and nearly 19,000 eucalyptus, pine, cypress and redwood trees were planted in 1913, with thousands more planted in the years to follow.⁴ The campus' hill lands were further augmented in 1951 and 1961 with the acquisitions of 290 and 240 more acres from the East Bay Municipal Utility District.⁵

NATURAL FEATURES

PHYSIOGRAPHY. From a base elevation of roughly 400 feet at its western edge, the Hill Campus rises to nearly 1800 feet at Chaparral Hill at its eastern edge. Slopes range from moderate to steep, but in general the terrain is rugged: few sites within the Hill Campus are suitable for development without extensive site alterations.

The active Hayward fault lies at the western boundary of the Hill Campus: it trends northwest-southeast and runs directly under Memorial Stadium. A second northwest-southeast fault, the Wildcat Fault, traverses the Hill Campus just east of the Botanical Garden: it is not known whether this fault is active or inactive. A third, inactive fault, the Strawberry Fault, runs under the channel of the south fork of Strawberry Creek.

While much of the Hill Campus is undeveloped, some areas within it are prone to landsliding: for example, land slippage occurs in a zone extending from a point upslope of the LBNL Center for Electron Microscopy toward and through the former Poultry Husbandry site.⁶ Existing hydraugers operate to relieve groundwater pressure and reduce land slippage in the vicinity of Space Sciences Laboratory and Mathematical Sciences Research Institute.

The 1997 SAFER evaluation rated 13 Hill Campus buildings 'poor' or 'very poor', of which ten are small one-story structures. Retrofit of the largest 'poor' building, the original facility at SSL, was completed in 2000. The next largest building requiring seismic upgrades is the 8,000 asf Haas Clubhouse.

HYDROLOGY. The Hill Campus lands lie within three watersheds: Strawberry, Blackberry, and Claremont Canyons. A fourth watershed, Derby Canyon, abuts the Hill Campus at its southwest corner. Strawberry Canyon, the upper watershed of the south fork of Strawberry Creek, contains roughly 635 acres of university land. All existing Hill Campus development is located within Strawberry Canyon and Blackberry Canyon, adjacent to the north. The roughly 200 university owned acres in Claremont Canyon, on the other hand, are undeveloped except for dirt roads and trails.

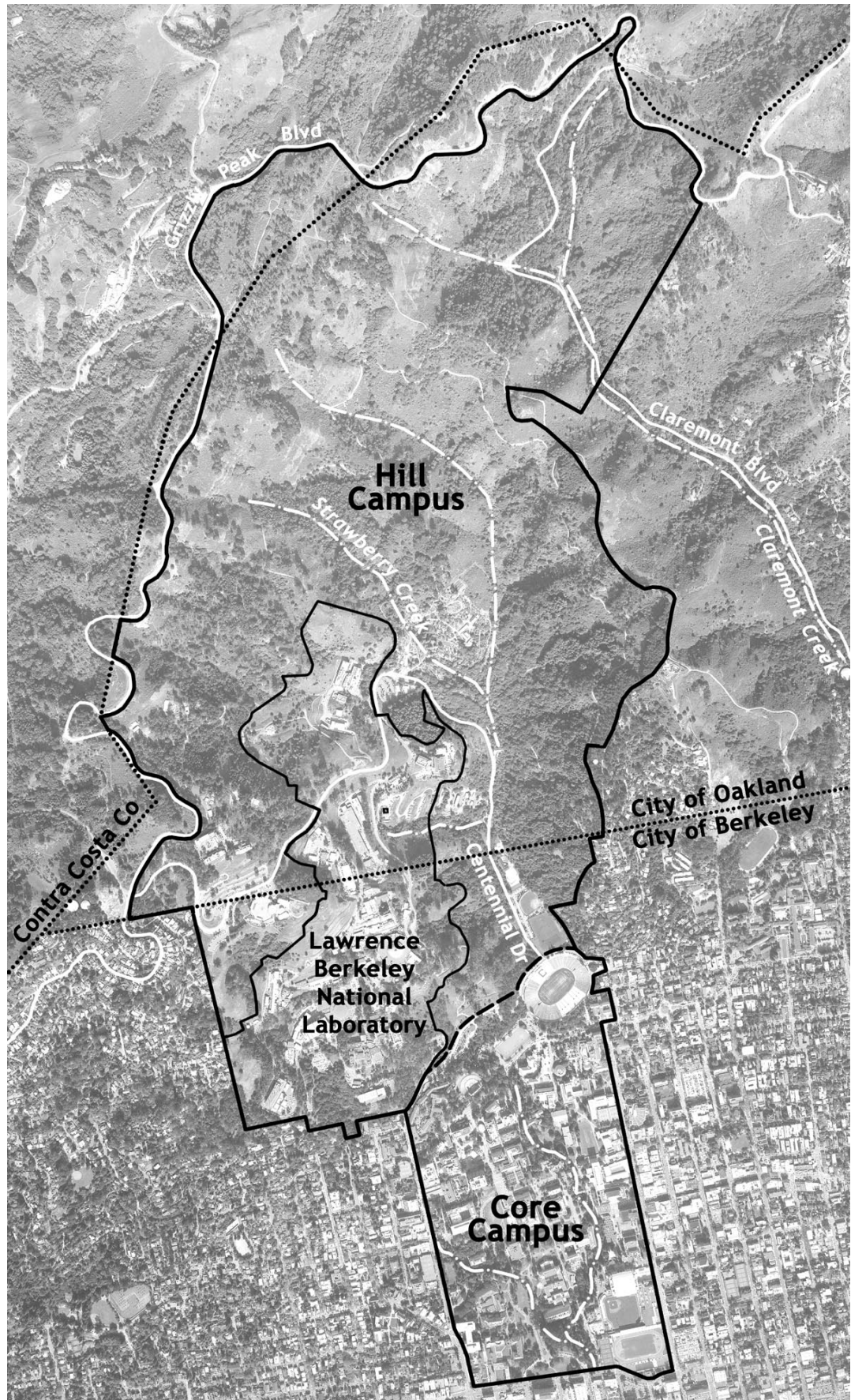


Figure 1. Hill Campus Boundaries

The lower portions of the north and south forks of Strawberry Creek are culverted, as are portions of several of its tributaries. Claremont Creek is open until it enters a culvert several blocks east of the Claremont Hotel. As a result of both culverting and the increase in impervious surfaces in the Hill Campus over the past century, rapid changes in channel flow can occur in response to rains and runoff, exacerbating the natural erosion already resulting from the steep terrain in the upper watersheds.

While there is no comprehensive management plan for campus stream channels, the 1990 Strawberry Creek Management Plan describes a program of improvements to Strawberry Creek, some of which have been implemented. The plan is now being updated, but its scope remains confined to Strawberry Creek and its tributaries.

VEGETATION. The Hill Campus is a mosaic of wet and dry north coastal scrub intermixed with stands of trees: natural oak-bay woodland as well as pine, redwood and eucalyptus plantations. The pattern of vegetation has changed significantly from the original mix of grassland and oak savannah, due not only to the decline of grazing, but also to the human introduction of eucalyptus and conifers as well as invasive perennials such as brooms and euphorbia, and to the fact these introduced species often out-compete natives.

Only scattered patches of the original native grassland remain today. These areas are of scientific interest not only in themselves, but also as the initial stage of the natural succession from grassland to shrubland to woodland. The climax oak-bay woodland supports the most diverse vertebrate fauna of any habitat in California.⁷ While clusters of oak-bay woodland occur throughout the Hill Campus, by far the largest contiguous area covers the north-facing slopes at the west end of Strawberry Canyon.

The mix of scrub and conifer and eucalyptus stands makes the East Bay Hills a regular seasonal fire risk. This risk becomes particularly pronounced during the periodic one- or two-day shifts from the normal northwesterly winds to 'Diablo' winds blowing in from the warm, dry regions to the east. 20th century Diablo wind fires have burned over ten times the acreage of normal wind condition fires, and include the firestorms of 1923 and 1991. The generally steep terrain and poor roads in the Oakland and Berkeley hills present enormous obstacles to fire response, and some areas such as Claremont Canyon, served by only a single road, may be indefensible in Diablo wind conditions.⁸

HABITAT. The entire Hill Campus represents a small portion of the critical habitat for the threatened Alameda Whipsnake. Few whipsnakes have been documented in the Hill Campus, but since 25-30% of its slopes have a south or southwest aspect, they represent potential whipsnake colonization habitats.

Other listed species that may possibly inhabit the Hill Campus lands include Presidio Clarkia, Alameda Manzanita, Harvestman Spider, and the California Red Legged Frog. The Hill Campus is not presently a designated critical habitat for any of these species. However, the California Native Plant Society is presently lobbying state and federal agencies to include Western Leatherwood, a plant found in Claremont Canyon, as a listed species.⁹

CURRENT LAND USE

ECOLOGICAL STUDY AREA. The use of Strawberry and Claremont Canyons for instruction and research related to the natural environment, and their preservation in a primarily natural state, has been a longstanding policy of the campus. The mix of native and introduced trees established a wide variety of flora and fauna, making the Hill Campus a useful resource for field study, and led to the initial designation of a 'primitive area' in the mid 1930s.

The Hill Campus was further recognized as an 'invaluable asset' to instruction and research by a faculty advisory committee, in their 1958 proposal that 'the guiding principle in the development of Strawberry canyon and the Hill Campus should be ... maximum use consistent with conservation of native values.'

This proposal led ultimately to the designation of a 300 acre Ecological Study Area in 1968, and the 1979 preparation of guidelines for maintenance and preservation in the Management Plan for Strawberry and Claremont Canyons.¹⁰ The 1990 LRDP proposed three expansions of the ESA boundary, as well as the designation of a faunal refuge area at the center of the ESA (figure 2).

STRAWBERRY CANYON RECREATION AREA. Formerly the site of the campus' corporation yard, those facilities were removed in 1959 to make way for a recreational complex composed of the Haas Clubhouse, Stern Pool, tennis courts and a turf athletic field. The East Pool was built in 1967 to relieve overcrowding. As proposed in the 1990 LRDP, the tennis courts were removed, and the athletic field and parking lots reconfigured in 1993 to create the present Witter and Levin-Fricke Fields. The administrative offices for the Recreation Area are housed primarily in the Strawberry Canyon Center northeast of the Clubhouse.

BOTANICAL GARDEN. The oldest campus-operated Botanical Garden in the country was established on the core campus in 1891, and moved to its present location in 1926. Ranging in elevation from 600 to 900 feet, the site provides a unique variety of microclimates that accommodate over 13,000 plant species and varieties, organized by geographic origin.

The Garden is located on a 34 acre site, split into north and south sections by Centennial Drive. Strawberry Creek flows through the southern section and is incorporated into the Garden design. The 1990 LRDP proposed expanding the Garden by 40 acres, along with a program of new investments including parking and entry improvements and replacement of several old office and greenhouse structures.

A few of the LRDP proposals have been implemented. A new parking lot was constructed in 1991, some upgrades to buildings and visitor amenities have been completed, the old Acid House was converted in 2001 to a new Plant Conservation Research Center, and a greenhouse dating from 1927 was replaced in 2001 with the new Desert and Rainforest facility.

LAWRENCE HALL OF SCIENCE. Completed in 1968, LHS is managed as an organized research unit, although its primary mission is education and public service. LHS functions as a resource center for bay area schools and residents, through exhibits, displays, and instructional programs, and draws over 300,000 visitors a year.

The building, a four-story structure of 75,000 asf, represents only about 40% of the original master plan for the site. The 1990 LRDP proposed expansions to both the north and south, of 7,000 and 16,000 asf respectively, to enhance program functions and the visitor experience. However, major improvements since the LRDP have been limited to renovations within the existing building and the construction of 360 parking spaces at the upper terrace lot in 1997. The outdoor Bay Exhibit is presently under construction on the south expansion site.

SILVER SPACE SCIENCES LABORATORY. An organized research unit of the campus, SSL is a multi-disciplinary facility, engaged in basic research motivated by the exploration of space and the use of technology developed in space research. The original 29,000 asf facility was completed in 1966. The 1990 LRDP proposed an expansion of 15,000 asf: in fact, SSL nearly doubled in size with the 25,000 asf annex completed in 1998. Seismic and program improvements to the original facility were subsequently completed in 2000: the buttress structures erected to improve seismic performance also offer the potential for modest future expansions of the facility.

MATHEMATICAL SCIENCES RESEARCH INSTITUTE. MSRI is an independent institute that exists to further mathematical research through programs, workshops, postdoctoral training and public outreach and education. Over 1,000 scholars visit MSRI each year, many for substantial periods of time. Although independent, MSRI is housed in facilities leased from the campus. Its current 14,000 asf facility was completed in 1985: a planned expansion of 14,000 asf is now in design.

FIELD STATION FOR BEHAVIORAL RESEARCH. The FSBR, an organized research unit of the campus, was established on its current site in 1961, to conduct research on animal behavior that can not be performed in conventional enclosed labs. The FSBR was designed as nine distinct units, each providing a particular type of experimental setting ranging from open meadows to partly enclosed cages, kennels and runways. Numerous small research and support buildings are distributed over the 18 acre site.

FSBR research requires isolation from other human activity. However, this once-remote site is no longer as isolated since the construction of nearby SSL and MSRI. For this reason, the 1990 LRDP proposed the future relocation of FSBR to Chaparral Hill: the current site could then be redeveloped. No action to date has been taken on this proposal, due the cost of extending adequate infrastructure and transit to Chaparral Hill and, more recently, to its identification as a potential colonization site for the Alameda Whipsnake.¹¹

LAWRENCE BERKELEY NATIONAL LABORATORY. The 200 acre LBNL is by far the largest research enterprise in the hills east of campus. This multidisciplinary research facility is an independent unit of the university, operated under contract to the US Department of Energy. Most of its 80+ buildings are owned by DOE, constructed on university owned land leased to the federal government. LBNL research is also conducted in 20+ buildings on the UC Berkeley campus, particularly Donner and Calvin Labs.

Established in 1931 on the UC Berkeley campus, LBNL was relocated to its current site in 1940 with the construction of the 184 inch cyclotron. LBNL facilities are used by 3500 staff as well as over 2000 guest researchers a year: some 250 scientists also serve as UC Berkeley faculty. LBNL also employs 800 UC Berkeley students, and draws over 3000 visitors a year.

LBNL is presently updating its own Long Range Development Plan, on a schedule roughly congruent with the campus' own LRDP update. While the two institutions are under separate jurisdictions and environmental laws (CEQA for UC Berkeley, NEPA for LBNL), their LRDPs must recognize their potential cumulative environmental impacts. The October 2000 Notice of Preparation indicates LBNL intends to grow by up to 670,000 gsf by 2022.

PHYSICAL PLANT STAGING AREA. The upslope areas of the former Poultry Husbandry site are now used by PPCS as a materials storage and vehicle parking site, served by a narrow switchback road. This site was designated in the 1990 LRDP as a reserve site for a future research facility. Because the site remained unused for a long period, PPCS recently began to use it as a staging area, in response to the lack of more suitable sites on the core campus or in its urban environs.¹²

The unauthorized reconstruction of this site by PPCS to accommodate the staging area, including new paved surfaces and concrete retaining walls, is problematic for several reasons. First, the site is in a known zone of land slippage. Second, fenced paved surfaces encroach within 20 feet of Chicken Creek, a perennial tributary to Strawberry Creek. The paved surfaces degrade the riparian habitat by displacing plant cover and by increasing runoff into the creek. Third, the use of the site for storage, as well as the on-site portable toilet, may pose a threat of pollutant spills into the creek, which is regulated by the Regional Water Quality Control Board.¹³

As described in PRINCIPLES, below, the PPCS staging area is not a suitable long-term use of this site, and should be relocated as soon as an alternate location can be obtained.

PARKING. 550 parking spaces controlled by the campus' Parking and Transportation auxiliary are located in the Hill Campus: 364 of these are located in the terrace lots near LHS, 78 at the SSL lot, 74 at the Botanical Garden lot, and 34 on Stadium Rimway. Another 115 spaces are located at Witter Field, and 151 more uncontrolled spaces are scattered throughout the Hill Campus. Many staff in the upper Hill Campus, however, prefer to park for free along Grizzly Peak Boulevard or in the dirt parking lot east of the Boulevard.¹⁴

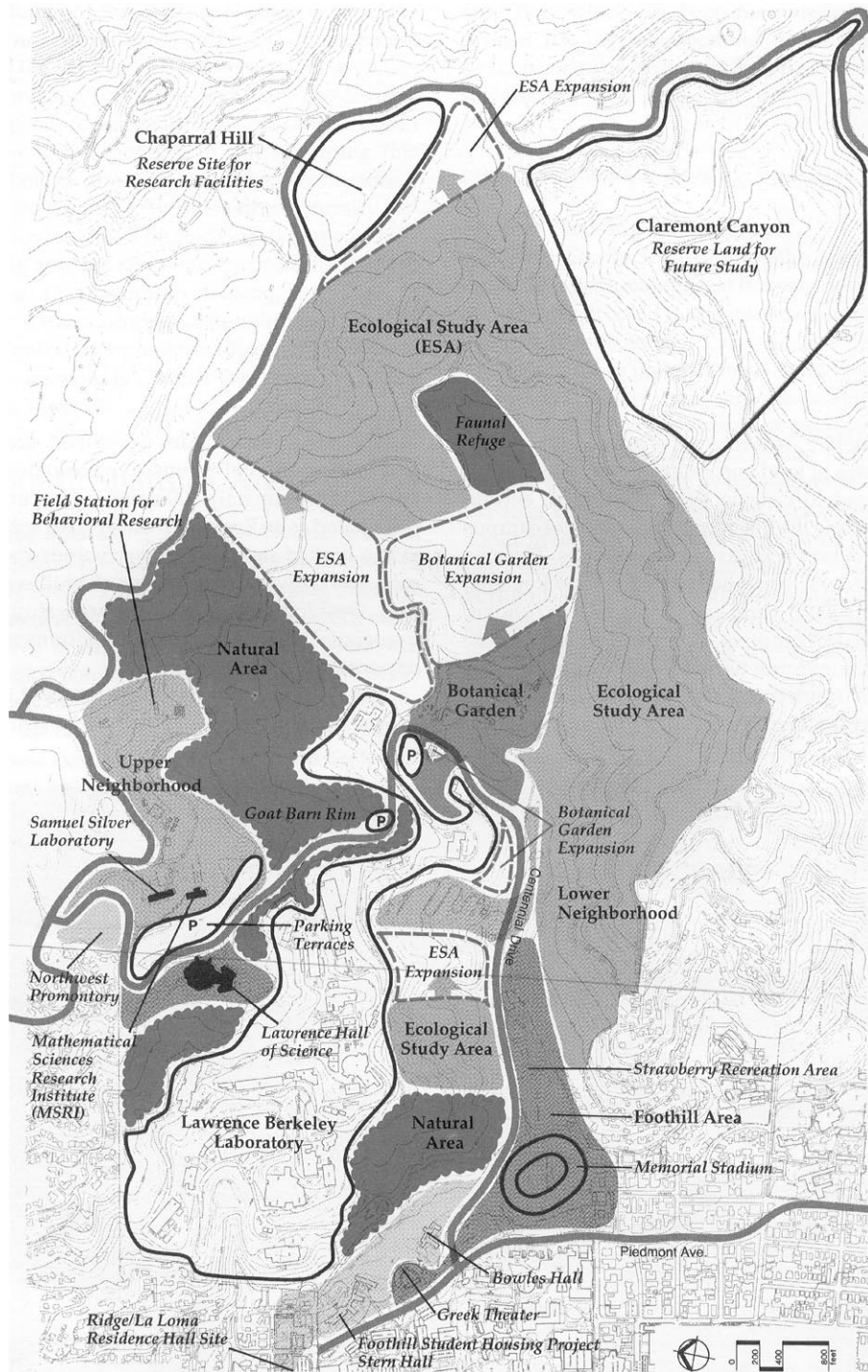


Figure 2. Hill Campus Land Use - 1990 LRDP

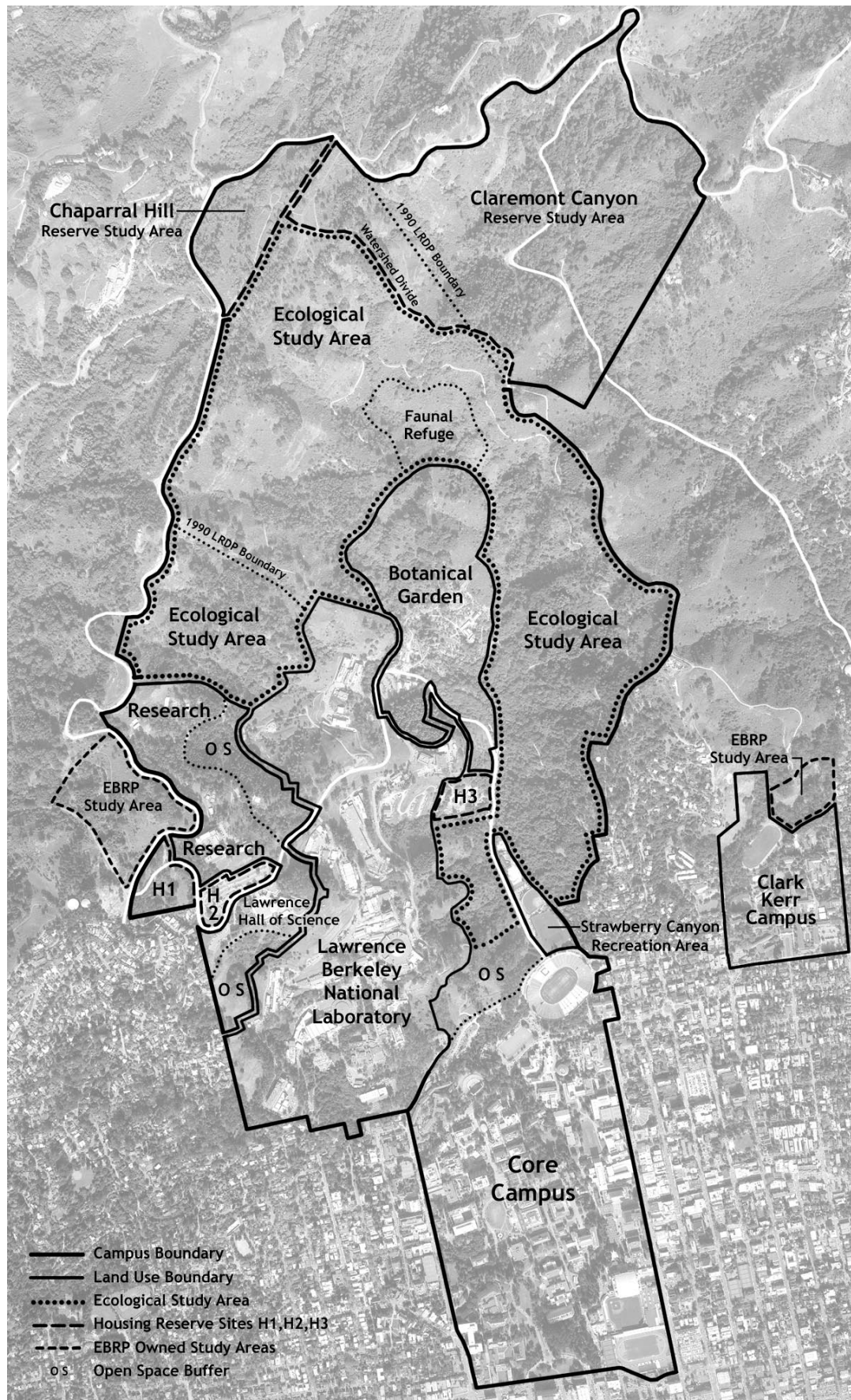


Figure 3. Proposed Hill Campus Land Use - 2020 LRDP

■ PRINCIPLES

ECOLOGICAL STUDY AREA

The purpose of the Ecological Study Area is to preserve the area for instruction and research.¹⁵ Yet while the ESA and other undeveloped areas north of Claremont Canyon do have significant potential value to the university for both instruction and research, this value is largely unrealized due to inadequate management. Because the campus has no formal mechanism for recording and tracking individual research projects in the hills, those projects are often neither informed of one another nor protected from public intrusion and damage.

PROPOSAL 1. The campus should establish a formal management entity for the Ecological Study Area. Such an entity would not only maintain a registry of all instructional and research projects in the ESA, it could also:

- Identify and promote synergy among those projects,
- Track external funding prospects for new research initiatives,
- Implement strategies for protection from invasive plants, animals and humans,
- Implement strategies for improved coexistence of recreation, education, and research, and
- Collaborate with other campus service units to implement management practices that both reduce fire risk and help restore a mosaic of native vegetation.

ACTION 1.1. Incorporate such a management entity into the emerging strategy for the Field Stations. The Vice Chancellor for Research should charge the new committee responsible for Field Station oversight to establish a management entity for the ESA.

However, the campus does not yet have the tools it requires to manage this resource. One critical need is a Geobased Information System (GIS) that provides a comprehensive and regularly updated inventory of its natural and manmade features, and the capability to register and monitor activities ranging from research projects to fire mitigation measures. The GIS could also resolve the longstanding problem of imprecise and incomplete maps and records of the Hill Campus, by providing a central source for integrated geobased information.

ACTION 1.2. Create and maintain a comprehensive campuswide GIS, including the Hill Campus. The GIS would be maintained by the UC Berkeley GIS Center, in collaboration with other campus research units such as the Earth Resources Center and the Center for Assessment of Forest and Environmental Resources. The cost to create a campuswide GIS, including a comprehensive aerial survey, is estimated to be \$180,000-\$200,000; system maintenance and upgrades could be supported through a combination of campus and recharge funds to be determined.

NATURAL AREAS. The 1990 LRDP proposed several expansions to the ESA. It also, however, designated several other areas of the Hill Campus as Natural Areas, but with no further explanation of the distinction. Past studies of the Hill Campus, however, have emphasized the importance of preserving these areas in their natural condition: for example, the 1984 Task Force Report on the Hill Campus states ‘... the intent is to maintain undeveloped areas outside the ESA in their natural state.’¹⁶

The boundary of the largest, easternmost Natural Area was changed by the expansion of the LBNL managed zone. As shown in figure 3, it now consists of a large, roughly square area adjacent to the ESA, plus a narrower tail extending down to Centennial Drive. Inclusion of the larger portion of this Natural Area in the ESA would place it under the protection of ESA management, and enhance the integrity and habitat value of the ESA.

The other Natural Areas, however, are not as suitable for inclusion in the ESA, either because they are largely or entirely separated from the ESA by other zones or, in the case of Charter Hill, because it is intensively used by people at certain times. These areas should continue to be managed by the campus as undeveloped open space, but not subject to the oversight of ESA management.

PROPOSAL 2. The 2020 LRDP should expand the boundary of the ESA to include not only the ESA expansion areas designated in the 1990 LRDP, but also adjacent Natural Areas that would enhance the value of the ESA as an academic resource.

RESERVE SITES The 1990 LRDP designated several ‘reserves’ for future study and possible development. These reserves fall into three categories:

- Claremont Canyon and Chaparral Hill
- Poultry Husbandry and Northwest Promontory
- Field Station for Behavioral Research and Vicinity

The two largest reserve sites are Claremont Canyon and Chaparral Hill, and they are similar in several respects: they are remote from the core campus, they would require substantial infrastructure investment to support research facilities, and no clear demand for more intensive campus use of either site has emerged since the 1990 LRDP. The Poultry Husbandry and Northwest Promontory sites are most suitable for faculty and visitor housing, and are examined further in HOUSING, while the future of the FSBR and vicinity is examined further in RESEARCH, below.

CLAREMONT CANYON. Claremont Canyon, the 200 university-owned acres south of the ridge dividing the Strawberry and Claremont watersheds, does not in general offer the campus any significant academic value beyond what is already available on university-owned land north of the ridge. While it is currently used by students and researchers in the earth sciences, these activities merely require access, not university ownership or management.

Although Claremont Canyon does not have unique value to the campus as an academic resource, it does have significant scenic and recreational value to the entire region as an integral element of the eastbay hills park system, and should remain as open space. The canyon does, on the other hand, represent a liability in terms of both ongoing campus expenditures for maintenance, security and fire hazard mitigation, and potential damage claims due to fires, landslides or other incidents originating on university land.

While previous reports have speculated on the long-term potential of Claremont Canyon as a site for faculty housing,¹⁷ since the firestorm of 1991 this must be viewed as an extremely unlikely scenario, given its steep terrain and poor access. If, therefore, its future is to remain as natural open space, and since it does not offer any unique academic resources to the campus, the campus should reconsider whether continued university management is in fact the best long-term solution.

The western portion of Claremont Canyon is owned and managed by the East Bay Regional Parks District. A transfer of control of the university lands to EBRP could lead to more efficient and effective management of the entire canyon as a scenic and recreational resource, and should be explored.

PROPOSAL 3. The LRDP 2020 should retain the designation of Claremont Canyon as reserve lands for future study.

ACTION 3.1. Initiate staff conversations with EBRP representatives on alternate management futures for Claremont Canyon. EBRP staff have confirmed their interest in pursuing such conversations at the confidential staff level.

However, in exploring such a transfer of control, whether through management or fee ownership, the university should also expect to be compensated by EBRP for the value it receives. The extensive EBRP land holdings may include particular sites which have more use value to the campus than to the district: one such site, located at the intersection of Centennial and Grizzly Peak, may have the potential for conversion to campus recreational or athletic fields: this site is examined further in RECREATION, below. Another site east of Clark Kerr campus, identified by EBRP, may have some potential for recreation and/or housing, although grades are steep.

CHAPARRAL HILL. The roughly 40 acre site at Chaparral Hill is defined by the ridgeline of Strawberry Canyon on the west and Grizzly Peak Boulevard on the east. Due to its relatively gentle slopes, it has been designated as a potential research site in numerous campus studies, including the 1962 and 1990 LRDPs. However, more intensive use of the site is severely constrained by its isolation. Protected natural open space surrounds the site: regional parklands on the north, east and south and the ESA on the west. The site lacks utility infrastructure, and campus shuttle service is unlikely to be feasible due to the distance from campus and the limited population the site could support.

As noted in the 1984 Task Force Report, the only feasible uses of Chaparral Hill are those for which isolation is an advantage. The report suggested 3 options: a conference retreat, faculty housing, and relocation of the FSBR.¹⁸ As examined further under HOUSING, other more promising campus options exist for both faculty housing and conference space, and these should be fully explored before Chaparral Hill is given serious consideration. The relocation of FSBR is examined further in RESEARCH, below.

Another factor in the future use of Chaparral Hill is the recent finding by the campus' consulting herpetologist that the south-facing slopes of the site represent a potential colonization habitat for the Alameda Whipsnake.¹⁹ While some very limited development of the north-facing slopes might be possible, any human activity, particularly construction activity, would be constrained by the need to preserve the integrity of the adjacent habitat.

Because more intensive use of this site is limited by several factors, and because no clear demand presently exists for more intensive use, Chaparral Hill should continue to be designated as reserve lands. Further analysis is required to determine whether the site should be incorporated into the ESA.

PROPOSAL 4. The LRDP 2020 should retain the designation of Chaparral Hill as reserve lands for future study.

RESEARCH & PUBLIC SERVICE

In general, the critical linkages for all Hill Campus programs are with the core campus, rather than with each other. While a larger Hill Campus population might enable some improvement in services and amenities by enlarging the 'market' for them, it could also degrade conditions for those programs that *require* non-urbanized environs: the Ecological Study Area, the Botanical Garden, the Field Station for Behavioral Research, and the Strawberry Canyon Recreation Area.

Moreover, existing Hill Campus programs report significant problems in sustaining those critical linkages with the core campus, due in part to their physical isolation, and in part to the problems this isolation creates for transportation and infrastructure services. Since the trend in research is inexorably toward more interactive and collaborative endeavors, *future investment in new research space at UC Berkeley should, as prescribed in the Strategic Academic Plan, be concentrated at locations on and adjacent to the core campus.*

PROPOSAL 5. The 2020 LRDP should focus new capital investment in Hill Campus research facilities on renovation and new construction to serve existing Hill Campus programs.

BOTANICAL GARDEN. One such candidate for future renovation and expansion is the Botanical Garden, which hopes to triple its student, faculty and public visitors by 2020.²⁰ Expansion of the Garden grounds to the east has been proposed in several previous campus plans, including the 1984 Task Force Report²¹ and the 1990 LRDP, which recommends an expansion of roughly 40 acres.

PROPOSAL 6. The 2020 LRDP should confirm the future expansion of the Botanical Garden as described in the 1990 LRDP, and should accommodate the investments required to meet its objectives for program growth.

ACTION 6.1. Update the 1981 master plan for the Botanical Garden. The new master plan should describe the proposed site expansion, including how its interface with the Faunal Refuge Area is designed and managed, as well as the capital investments in grounds and structures required through 2020. A goal of the new master plan should be to improve the synergy of Botanical Garden and Ecological Study Area programs. The plan should be prepared in collaboration with the ESA management entity described in proposal 1, and the Garden should have an active role in ESA management.

LAWRENCE HALL OF SCIENCE. Although the current facility represents only a portion of the original plan, LHS has no near-term plans for physical expansion. While it projects the number of visitors to double by 2020, it expects to accommodate this growth through internal renovation to increase the amount of usable space.²² Capital investment at LHS, however, is required not only to reduce the nearly \$10 million in deferred maintenance,²³ but also to upgrade the presently inadequate communications infrastructure: the latter is examined further in INFRASTRUCTURE, below.

SILVER SPACE SCIENCES LABORATORY. While some further program growth within the 2020 timeframe is possible,²⁴ the recent completion of the new SSL building and the retrofit of the original building will meet SSL program needs for at least the near term, and there is some capacity for further expansion within the seismic support structures and on land adjacent to the existing facilities.

MATHEMATICAL SCIENCE RESEARCH INSTITUTE. MSRI does not anticipate significant program growth within the 2020 timeframe, and the existing facility plus the expansion now in design should meet future program needs.²⁵

FIELD STATION FOR BEHAVIORAL RESEARCH. Both the 1984 Task Force Report and the 1990 LRDP speculated on the relocation of the FSBR to a more remote site, i.e. Chaparral Hill. This idea seems to be inspired by the FSBR's need for isolation, and the concern this isolation might be compromised by the growth of neighboring research facilities, such as MSRI in 1985 and the SSL annex in 1998.

While the MSRI expansion is now in schematic design, no further expansions to SSL or MSRI are planned at this time. Moreover, as stated in proposal 5, new investment in Hill Campus research facilities through 2020 should focus on existing programs. Therefore, unless new program requirements lead to future expansion proposals by SSL or MSRI, the current level of isolation enjoyed by FSBR should not change significantly in the future, and the substantial investment required to relocate FSBR from its current site is not warranted.

While no new facilities are required at FSBR, several buildings and animal enclosures would benefit from renovation, and the existing communications infrastructure is inadequate: the latter is examined further in INFRASTRUCTURE, below.

PROPOSAL 7. The 2020 LRDP should assume the FSBR remains on its present site, at roughly current levels of activity.

RECREATION

Haas Clubhouse has a poor seismic rating and significant deferred maintenance and, along with the pools, requires renovation or replacement during the 2020 LRDP timeframe. The Strawberry Canyon Recreation Area also shares with several other Hill Campus programs the problem of inadequate communications infrastructure, examined further in INFRASTRUCTURE.

However, the most critical *program* need for Recreation and Athletics is level field space. While the rugged terrain in the Hill Campus generally precludes this use, the EBRP site at Grizzly Peak and Centennial may be able to accommodate one or more regulation size playfields. The potential construction of playfields for campus or shared campus-public use on this site should be pursued if further engineering studies indicate it is feasible.

While campus use of this EBRP owned site might be pursued as part of a larger conversation over the transfer of Claremont Canyon, EBRP may also be receptive to the idea on its own merits: if the campus is able to provide the capital investment to build the playfields, a shared campus-public use arrangement may be acceptable to EBRP, and should be explored.

PROPOSAL 8. The 2020 LRDP should assume Strawberry Canyon Recreation Area remains in its present form, albeit with potential renovation and expansion, or replacement, of the buildings and pools in conjunction with seismic improvements.

ACTION 8.1. Prepare a master plan of the entire Strawberry Canyon complex as a first step in identifying the scope of seismic and other improvements to buildings and pools.

ACTION 8.2. Conduct a technical analysis of the EBRP-owned potential playfields site at Centennial and Grizzly Peak. Capital Projects has completed a topographic survey and initial concept study of this site, which suggest the site may have potential for redevelopment as practice and/or recreational fields, and merits further engineering analysis in terms of both grading and infrastructure requirements.

HOUSING One form of new capital investment that *should* be encouraged in the Hill Campus is faculty housing. The northwest promontory site is one potential location for housing, as proposed in the 1990 LRDP, but other sites should also be explored. Housing is not only a relatively adaptable and nondisruptive land use compared to large research facilities, it would also provide an after-hours presence in the Hill Campus that could improve safety and security. Moreover, a supply of good, reasonably priced faculty housing would provide a significant strategic benefit to the entire campus, including Hill Campus programs.

The study committee has also pointed out a substantial demand for housing for visiting scholars. MSRI alone is visited by over 1000 scholars each year, many for significant periods of time. This demand is not unique to the Hill Campus: many core campus departments also have substantial numbers of visiting scholars.

The campus conducted a survey of visitor housing needs in late 1997, but this survey focused on conference and other short-term visitors, in the context of a proposed downtown hotel and conference center. While the campus does need such a facility, downtown Berkeley is the best place for it, due to its scale and the access and services it would require.

The longer stays typical of visiting scholars, however, suggest an alternate housing type, more residential in character. This housing type would not involve extensive on-site conference facilities, would have modest service demands, and thus, if properly designed, could be suitable for one or more Hill Campus locations. LBNL has identified a similar need for visitor housing, and has already begun to investigate potential sites: future analyses of visitor housing by UC Berkeley should be conducted in conjunction with LBNL, as suggested in action 9.2.

PROPOSAL 9. Pending further technical analysis, the 2020 LRDP should designate up to 3 sites as reserve sites for faculty and/or visitor housing, as shown in figure 3.

Reserve site H1 is the northwest promontory site designated for housing in the 1990 LRDP, but enlarged to include the area north of Centennial Drive. Reserve site H2 is the current upper terraces parking lots: while further study is required, a mixed-use project that include both the replacement of existing parking and new terraced housing could make far better use of this already extensively altered site. Reserve site H3 is currently utilized by PPCS as a staging area, but due to the steep terrain and the proximity of the creek, this is a poor use of the site, as described above in CURRENT LAND USE.

ACTION 9.1. Conduct a survey of the entire UC Berkeley campus and LBNL to assess the demand for both short-term and long-term visitor housing. The campus survey is being administered by OSR: results are expected by spring 2003.

ACTION 9.2. Based on the survey results, request the campus' Real Estate Advisor to begin the initial steps toward third-party development of faculty and/or visitor housing on reserve sites H1 and H2, with Capital Projects technical support. These efforts should be pursued in collaboration with LBNL.

ACTION 9.3. Identify a long-term solution for those PPCS functions presently located on the Poultry Husbandry site. While PPCS may continue to use this site as an interim facility in the near term, an environmental study of the site should be performed to assess its impact on the water quality and riparian habitat of Chicken Creek, and prescribe mitigations commensurate with this interim use.

TRANSPORTATION

While Hill Campus programs have only limited interactions with one another, they all have strong and critical linkages to the core campus. There is a strong perception among the study committee that transit service to and from the core campus is inadequate, due both to the hours and frequency of service and, for some programs, the configuration of the route.

Except for the first and last runs, the hill shuttle presently originates at the Mining Circle, which is problematic for several Hill Campus constituencies: not only is the BART station located at the west end of campus, but so are the life-science students and faculty who use the Botanical Garden and the Ecological Study Area. Moreover, many study committee members report a need for more frequent service and for extended shuttle hours.

Some initiatives are already underway. First, under the fall schedule for the hill shuttle, headways will be decreased from 30 to 20 minutes during the peak a.m. and p.m. periods (roughly before 9:50 and after 4:50). P&T will assess the effectiveness of this change at the end of the semester. Second, the replacement of the hill bus has been planned for over two years: P&T has arranged to acquire several small (15-20 passenger) buses from AC Transit, but while these were expected this year, now they may not be available until 2003 or later: P&T is investigating a vendor lease as an alternate.

P&T has not received any formal requests for other service enhancements, and therefore have not assessed their potential cost or feasibility. In general, however, it is the policy of P&T to first try to accommodate such requests by adjusting existing shuttle routes and schedules, in ways that do not significantly increase costs. If these adjustments are not adequate to meet the need, the policy is to have the requesting departments cover the cost of further enhancements. P&T has offered to assess the cost of such enhancements, but the first step is to define those enhancements through a survey of Hill Campus programs.

ACTION 10.1. Conduct an opinion survey of Hill Campus programs to identify the transit improvements desired. Capital Projects has completed this survey: a summary of results is presented in the Appendix.

ACTION 10.2. Request Parking & Transportation to prepare a feasibility analysis of enhancements to hill shuttle service, based on the survey results. As part of this analysis, Parking & Transportation should determine if any of the desired service enhancements can be achieved through collaborative efforts with LBNL, which runs its own shuttle service.

INFRASTRUCTURE

Many Hill Campus programs report problems with utility services in general and communications service in particular, in terms of both capacity and reliability. With respect to utility systems (power, natural gas, water, steam, sewer and stormwater), it is more useful to assess these systems campus wide, since their adequacy is a function of system capacity as well as delivery. Such an assessment will be conducted as part of the 2020 LRDP update.

However, the infrastructure concern most often mentioned by far among study committee members is the adequacy of communications systems. While service has very recently been improved in some areas of the Hill Campus, a number of problems remain.

New fiber optic cable was recently run to SSL and to the Botanical Garden. The SSL line provides high bandwidth *system capacity* to the entire north end of the Hill Campus. However, the *conduit capacity* to extend this service to other local users may not presently be available, either because the existing conduit is full or no conduit exists.

This is a particular problem for Lawrence Hall of Science, where network capacity is already inadequate to serve its many educational programs, and for FSBR, which presently has only T1 service through Pac Bell. An engineering study is required to determine the cost and feasibility of extending high bandwidth service from the SSL terminus to LHS, MSRI and FSBR.

While the Botanical Garden has also recently obtained high bandwidth service at its administration building, the Strawberry Canyon Center and Recreation Area have only T1 service over copper cable. The cost of new fiber cable to these buildings from the core campus has been estimated at \$1 million for data service alone: this cost would increase significantly if voice services were improved as well. However, improved service could instead be obtained through ATT by extending fiber cable from the adjacent residential areas to Haas Clubhouse and Strawberry Canyon Center: the cost for service to the Clubhouse has been estimated at roughly \$100,000.²⁶

PROPOSAL 11. The 2020 LRDP update should include a comprehensive analysis of campus infrastructure capacity with respect to future campus growth and program evolution. This analysis should, moreover, reflect the basic principle that the entire campus, including the Hill Campus, should receive the same level of services and infrastructure.

■ NEXT STEPS

The proposals in the previous section will guide the preparation of the 2020 LRDP, which is now underway. However, the previous section also identifies a number of studies and other actions staff need to undertake in order to provide more specific guidance for individual sites or programs. The results of these studies will be forwarded to the study committee for review and comment as they are completed.

The administrative draft of the 2020 LRDP is scheduled to be completed and distributed for internal campus review in late spring 2003: the Hill Campus study committee will be requested to serve as reviewers of the administrative draft.

■ APPENDIX: SUMMARY OF HILL SHUTTLE SURVEY RESULTS

We received 170 responses to our hill shuttle survey. Of the total, 88 came from Space Sciences Laboratory, 51 from Lawrence Hall of Science, 21 from Mathematical Sciences Research Institute, 8 from the Botanical Garden and 2 from Recreational Sports.

To keep things simple, in the summary table below each result is presented as the 'percentage of total respondents who checked this box'. Some of the respondents left questions unanswered, so some of the percentages total less than 100% (or in the case of questions 3 and 4, less than 300%, since for those questions respondents were asked to make 3 selections). More detailed cross-tabular analysis is possible if desired: this summary just presents a brief overview of the survey results.

A number of respondents used the 'other' boxes in questions 3 and 4. While many of these comments are variations on the preset options already in the survey, the 'other' comments do reveal at least one significant concern the present options do not cover, as described below. Also, five respondents noted that, while shuttle headways are 20 minutes at peak am and pm hours, they are 30 minutes during the rest of the day. This was a flaw in the survey design, which refers only to the 20 minute headway, and staff regret any confusion this may have caused the respondents.

Overview. Perhaps the most significant finding is revealed in the answers to questions 1 and 5. Question 1 asks how often the respondent uses the shuttle now, while question 5 asks how often the respondent would use the shuttle if the service improvements s/he selected in question 4 were implemented. The results suggest shuttle demand may have limited upside potential: whereas 39% of respondents now use the shuttle for at least 3 round trips a week, this number would rise to only 55% if the suggested improvements were implemented. The percentage of respondents who would use the shuttle for at least 5 round trips per week would rise only from 23% to 28%.

Moreover, a clear majority of respondents, 63%, would not be willing to pay any more for shuttle service to fund the improvements they recommend. 24% would be willing to pay \$10 per month, and only 4% would pay \$20 per month. The survey results indicate that service improvements might result in only a modest increase in frequent ridership, while at the same time the campus might encounter resistance to any increase in fares to fund those improvements. On the other hand, only 4% of respondents indicated shuttle fares are too expensive now.

53% of respondents indicated they use the shuttle for trips to campus during the day, while another 16% indicated they use it for campus trips and home-to-work trips in roughly equal amounts. Given the greater use of the shuttle for trips to campus, it is perhaps not surprising that the most popular service improvements were those which are relevant to campus trips as well as to home-to-work trips: namely, extending every shuttle run to downtown Berkeley at 49%, and reducing shuttle headways at 46%. In contrast, extending the shuttle schedule to early morning, late evening and/or weekend hours may have greater importance to home-to-work trips, since the core campus is significantly less active during these times. It is worth noting, however, that weekend service could also be beneficial to visitors, who are not captured in this survey.

With respect to the comments entered in the 'other' boxes in questions 3 and 4, the complaint mentioned most often by far was the long duration of the journey from home to work via public transit, including the shuttle. 12% of all respondents made specific comments about *either* the duration of the multi-mode trip as a whole, *or* more specific comments about the poor linkages of the shuttle to AC, to BART, or to other campus shuttle routes.

Implications. The survey results suggest the most popular service improvements would be to extend all shuttle runs to west campus and to downtown Berkeley, and to reduce headways, particularly the 30 minute headways during mid-day. As the study committee has pointed out, trips by hill workers to the central campus often have west campus destinations, and many of those trips occur during mid-day.

However, the decision on which, if any, service improvements may be feasible for the hill shuttle are a function of cost as well as demand. The extension of shuttle hours, for example, while requested by less respondents than route extension or reduced headways, may also be less costly if they can be implemented merely by increasing driver hours rather than by also purchasing another vehicle.

As a next step, staff recommend the Director of Parking and Transportation review these findings and comment on the most promising areas for further investigation, from the perspective of campus transportation operations as a whole.

Hill Shuttle Survey Results (n=170)

1	How often do you use the campus hill shuttle?		
	Occasionally or less than once a week	60	35%
	1-2 round trips per week	43	25%
	At least 5 round trips per week	39	23%
	3-4 round trips per week	27	16%
2	What do you use the campus hill shuttle for?		
	Travel to and from central campus during the day	90	53%
	Travel to and from home	51	30%
	Both in relatively equal amounts	27	16%
3	If the hill shuttle is not your primary mode of transportation to and from the hills, why not? (select 3)		
	20 minute headways not frequent enough	38	22%
	Must drive due to personal trips before/after work	34	20%
	Shuttle doesn't run early/late enough	27	16%
	No direct service to west campus, have to transfer	23	14%
	Trip to/from campus takes too long	22	13%
	Shuttle doesn't run on Saturday/Sunday	22	13%
	Must drive due to work trips during the day	11	6%
	Prefer to carpool, vanpool or use other alternative	11	6%
	Shuttle fare too expensive	7	4%
	Prefer to drive because it's more pleasant	5	3%
	Prefer to take AC Transit (lines 8 or 65)	3	2%
	Don't feel safe taking/waiting for shuttle	2	1%
	Doesn't go to LBNL	1	1%
	Other	50	29%
4	Would you use the hill shuttle more often if it were changed so (select 3):		
	Every shuttle went to downtown Berkeley	83	49%
	The shuttle ran more frequently than every 20 min	78	46%
	The shuttle ran earlier in the morning (before 7:40 am) and/or later in the evening (after 7:40)	56	33%
	The shuttle ran on Saturday and Sunday	49	29%
	The shuttle was equipped to better accommodate bikes	28	16%
	The shuttle also served LBNL	3	2%
	Other	40	24%
5	If the changes you selected in question 4 were made, how often do you think you would use the shuttle?		
	At least one round trip per day	48	28%
	3-4 round trips per week	46	27%
	1-2 round trips per week	38	22%
	Occasionally or less than once a week	9	5%
	Never	1	1%
6	In order to fund the changes you selected in question 4, how much more would you be willing to pay for shuttle service?		
	No more per month	107	63%
	\$10 more per month	41	24%
	\$20 more per month	7	4%
	\$30 more per month	0	0%
	\$40 more per month	0	0%

Hill Shuttle Survey Results (cont)**7** Please give us your opinion on the rear exterior 5-bike racks
found on some buses:

Convenient to use OR	18	14%
Difficult to use	19	15%
Adequate bike capacity OR	29	22%
Inadequate bike capacity	5	4%
I feel safe loading/unloading my bike OR	19	15%
I feel unsafe loading/unloading my bike	13	10%
The racks are damaging to my bike OR	16	12%
The racks are not damaging to my bike	12	9%

8 Please give us your opinion on the front exterior 2-bike racks
found on some buses:

Convenient to use OR	32	19%
Difficult to use	2	1%
Adequate bike capacity OR	3	2%
Inadequate bike capacity	28	16%
I feel safe loading/unloading my bike OR	27	16%
I feel unsafe loading/unloading my bike	5	3%
The racks are damaging to my bike OR	2	1%
The racks are not damaging to my bike	26	15%

■ ENDNOTES

- 1 UC Berkeley Chancellor Tien and LBNL Director Shank, *Letter of Cooperation Regarding Hill Area Management*, 29 March 1996.
- 2 UC Berkeley Long Range Development Plan 1990-2005, page 31
- 3 UC Berkeley Strategic Academic Plan, <http://spc.vcbf.berkeley.edu/document/AcademicStrategicPlan.pdf>
- 4 History drawn from Helfand, *Campus Guide: University of California, Berkeley*, Princeton Architectural Press 2002 and Mandel, *Working Paper: Hill Area Update*, UC Berkeley Capital Projects July 2002
- 5 EBMUD conveyances of 20 March 1951 and 31 October 1961
- 6 Mandel, page 8
- 7 Bartoleme, *Hill Campus Study Committee Survey*, 13 May 2002
- 8 Mandel, page 28
- 9 Mandel, page 24
- 10 McBride and Beatty, *Management Plan for Strawberry and Claremont Canyons*, UC Berkeley Conservation and Environmental Quality Committee, 1979
- 11 Mandel, page 42
- 12 Mandel, page 38
- 13 Mandel, site inspection
- 14 Mandel, page 87
- 15 Mandel, page 87
- 16 LaPorte et al, *Hill Area Task Force Report: UC Berkeley Campus Space Plan*, April 1984
- 17 LaPorte et al, page 70
- 18 LaPorte et al, page 69
- 19 Mandel, page 49
- 20 Botanical Garden, *Hill Campus Study Committee Survey*, 13 May 2002
- 21 LaPorte et al, page 28
- 22 Carmichael, *Hill Campus Study Committee Survey*, 13 May 2002
- 23 Pacific Partners Consulting Group, *Model Results for UC Berkeley: UC Capital Renewal/Deferred Maintenance Study*, September 2000
- 24 Lin, *Hill Campus Study Committee Survey*, 13 May 2002
- 25 Eisenbud, *Hill Campus Study Committee Survey*, 13 May 2002
- 26 Kim/Kreutzen, UC Communications & Network Services, conversation/e-mail 21 August 2002