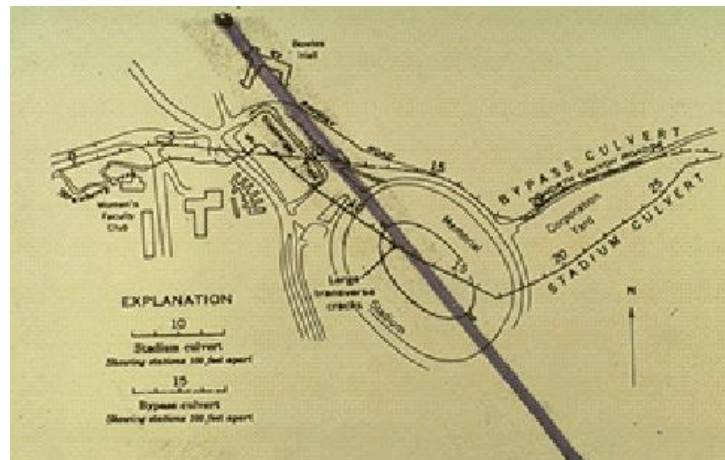


University of California, Berkeley Strawberry Creek Geology- 2006 Status Report



March 2008
Office of Environment, Health & Safety
University Hall, 3rd Floor
Berkeley, CA 94720

Strawberry Creek Geology - 2006 Status Report, March 2008
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1.0 University of California, Berkeley Strawberry Creek Management

Strawberry Creek is a small urban creek draining the western slope of the East Bay Hills in the San Francisco Bay estuary watershed (see maps below). It is a major landscape feature of the University of California, Berkeley, and it was one of the main reasons the site was chosen in 1860 as the location for the campus. The 1163 acre (1.8 sq. mile) watershed draining the campus and upstream headwaters, is approximately 40% urbanized (residential, commercial and institutional), with the remainder consisting of undeveloped, largely natural wildlands.

Urban creeks are increasingly valued for the aesthetic, recreational and wildlife benefits they bring to a city. Strawberry Creek has been the focal point of educational activities for years. More than 3,000 university students, and many elementary and high school students from surrounding communities, use Strawberry Creek each year as an outdoor laboratory for subjects as diverse as environmental studies, biodiversity restoration, landscape design, engineering, environmental art and poetry.

The greater Strawberry Creek ecosystem, consisting of neighboring watersheds, Tilden Regional Park to the east and tidal mudflats and salt marsh at the Berkeley Marina outfall, provides important habitat for plants and wildlife in the largely urban San Francisco metropolitan area. As a source of nutrients and fresh water, Strawberry Creek supports the fisheries of the San Francisco Bay, and continued pollution prevention and restoration in the watershed contribute to the health of the fisheries.

Urban creeks also provide storm water drainage and serve as a flood control system to prevent damage to the urban environment through which they flow. Historically the creek provided sanitary sewer drainage. These uses led to historic erosion, habitat loss and water pollution. By 1987, water quality and ecosystems were degraded and the creek was considered a public health risk due to chronic sewage pollution from deteriorated sewers.

In response to campus and community concerns over the deteriorated environmental quality of Strawberry Creek, the campus Office of Environment, Health and Safety (EH&S) sponsored a comprehensive study of the creek. The results of the study completed by Robert Charbonneau were published in December 1987 as the "Strawberry Creek Management Plan" (1987 Strawberry Creek Management Plan). Implementation of the 1987 Strawberry Creek Management Plan significantly improved water quality in Strawberry Creek, as evidenced by the successful reintroduction of locally native fish

species to the creek in 1989 – the first resident fish population in the creek in approximately 100 years.

This status report provides a summary of Strawberry Creek geology including addition figures not included in the 1987 Strawberry Creek Management Plan. This is one of a series of technical reports being issued by the EH&S to commemorate the twentieth anniversary of the restoration program.

Strawberry Creek Watershed Facts

Strawberry Creek Watershed total area = 1,977 acres (CH2M Hill, 1994)

Length of Strawberry Creek = ~ 5 miles

Watershed area under jurisdiction of UC Berkeley = ~ 800 acres

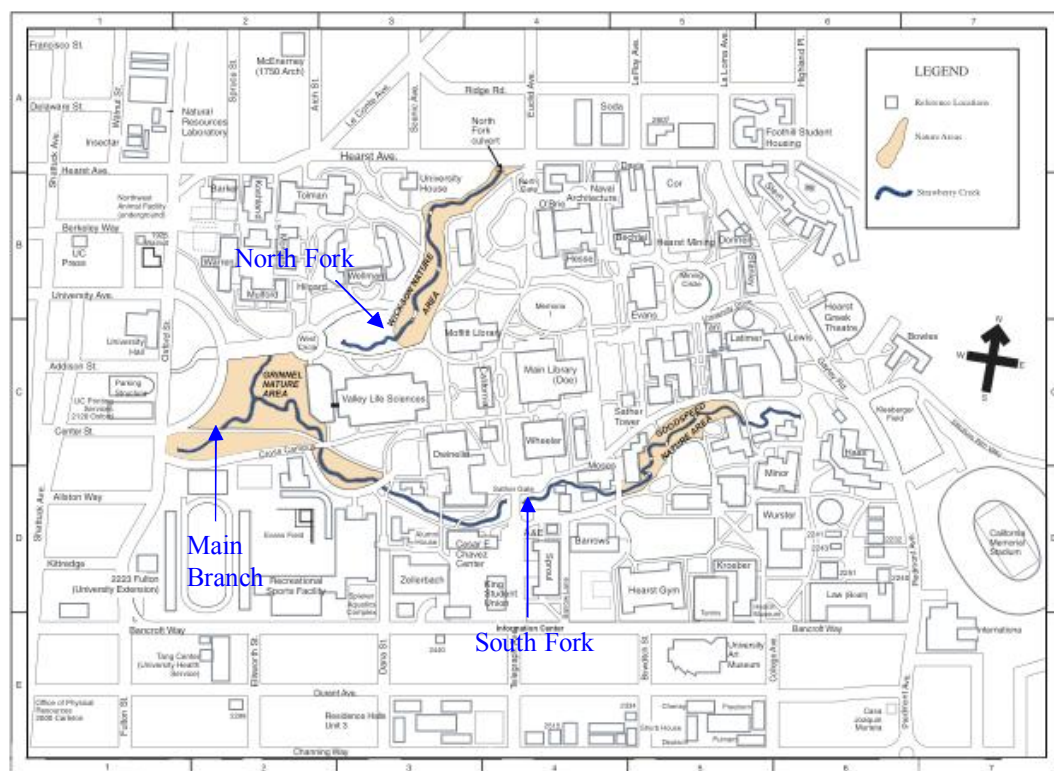
Watershed under jurisdiction of Lawrence Berkeley National Laboratory = 202 acres

Central Campus, Oxford to Gayley (base of Hill Campus) = ~ 165 acres

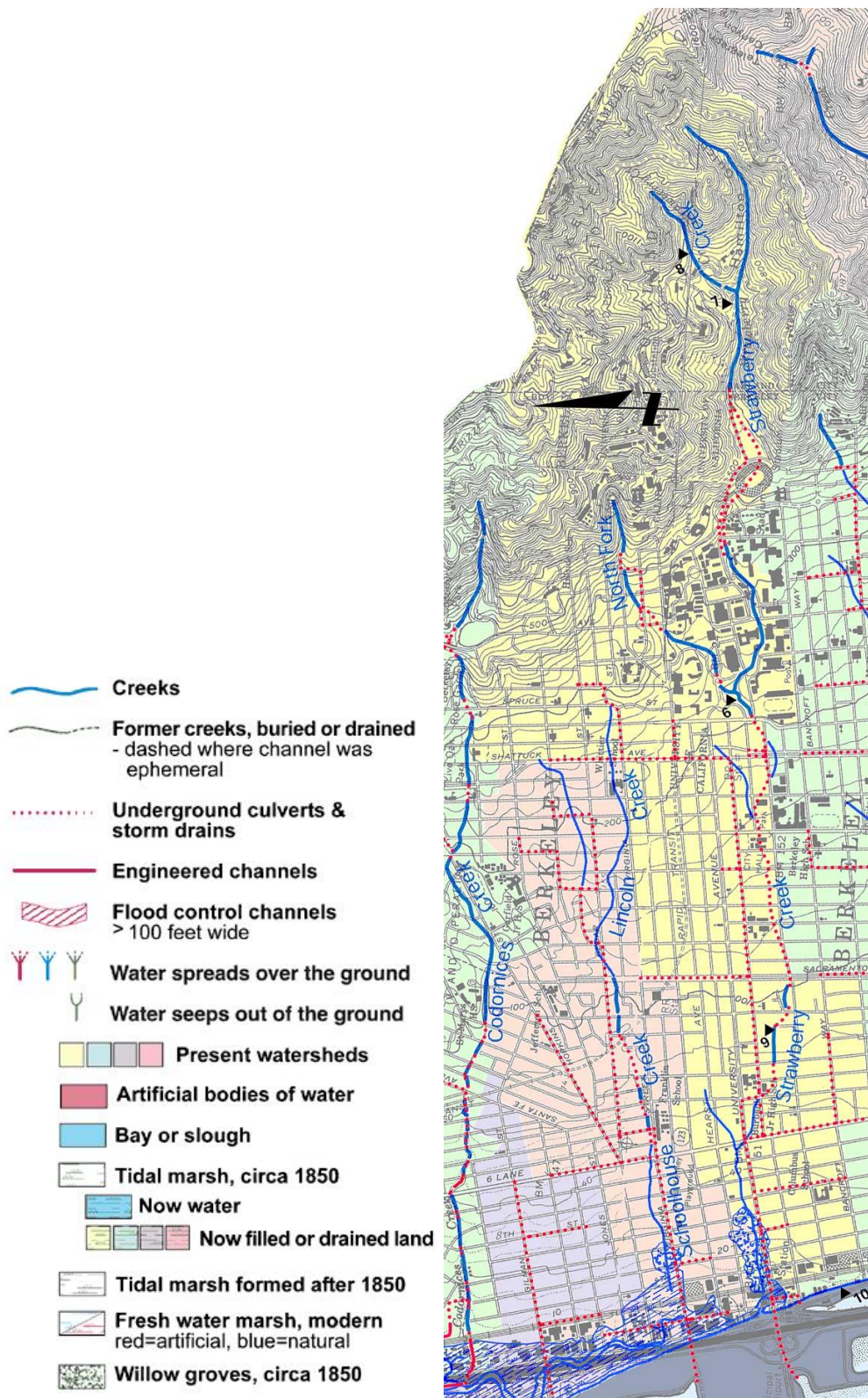
Change in elevation between headwaters and mouth (SF Bay) = 1,760 feet

Change in elevation from Grizzly Peak (1, 1760 ft) to Oxford St. (200 ft) = 1,560 ft

Strawberry Creek on University of California Campus Park



Strawberry Creek and Natural Areas on UC Berkeley Central Campus Park



Strawberry Creek Watershed. *Courtesy of the Oakland Museum, www.museumca.org.*

1.1 Geology and Strawberry Creek

Strawberry Creek's geomorphology is closely tied to the geology of the region. Its flow likely was a major contributor to the form of Strawberry Canyon, from which it originates and through which it still flows freely. The creek's geomorphology is also, likewise, dictated by the topography through which it flows. In the hilly areas of the watershed, such as the Canyon, its slope is quite steep and straight and its channel mostly bedrock. It follows a "step-pool" sequence, which is the result of water plunging down and eating away bedrock for thousands of years. In mid-watershed, such as on campus, the creek has been heavily channelized, but the bed naturally consists of large gravel and sand which form spawning habitat for resident fish. The slope decreases here and bends (meanders) begin to form, lengthening the channel and creating ideal fish habitat. About half a mile from the mouth, the creek would historically have begun to meander widely as it entered the intertidal zone, winding through tidal marsh until it ended in the Bay. Because the water slows down in this lower watershed area due to the diminished slope, lessening gravitational pull on the water, the water drops its sediment load, forming a creekbed of silt and sand and adding sediment to existing meanders. The entirety of the creek in this area is channelized and culverted beneath city streets and freeways and no longer follows its original course. These three sections form distinct ecological communities of their own, each dependent on the shape and behavior of the creek for the processes of daily life and each supporting certain species which find its conditions most favorable.

Sediment movement is one of the most important processes that a creek performs. In higher reaches, the creek carves out bedrock, its fast flowing water carrying large amounts of sediment downstream. In the form of large gravel and boulders, this material bumps and rolls its way downstream, carried by the fast, powerful water. The mid-sized gravel sediments drop out in the middle reaches, where they become too heavy for slower water to carry them. Here they become ideal spawning habitat for most kinds of riparian fish such as salmon. These fish evolved to spawn in a certain form of gravel, and so it is very important that this process of gravel creation and deposition continues. Eventually, gravel gets pushed by larger storm flows or rolled into small enough pieces that it is again picked up and moved downstream. This process turns the gravel into sand, which eventually turns into smaller silt particles. These sand and silt particles form the bed of the lower reach of the creek, which form the substrate upon which salt marshes grow. If there were not rich deposits of these sediments continually arriving at the salt marsh, its plants would have no nutrients from which to draw their food. The bedrock at the top of the watershed provides the substrate from which all the communities below derive their life necessities. So geology is actually a very important part of a creek's ecosystem.

Fault Activity

Strawberry Creek is being continually deformed by plate motion, and there is a large bend as the creek crosses the Hayward Fault where the fault bisects Memorial Stadium. Over the course of time, it can be expected that Strawberry Creek's current course will be abandoned and that other streambeds or low spots in the topography will catch the flow

from Strawberry Canyon and Strawberry Creek will carve a new path. The locations of the channels that cross the fault zone - or more accurately, their dislocations - have been used to determine the slip rate of the Hayward Fault, which was found to be on the order of 9 mm/year. (<http://www.seismo.berkeley.edu/seismo/geotour/>)

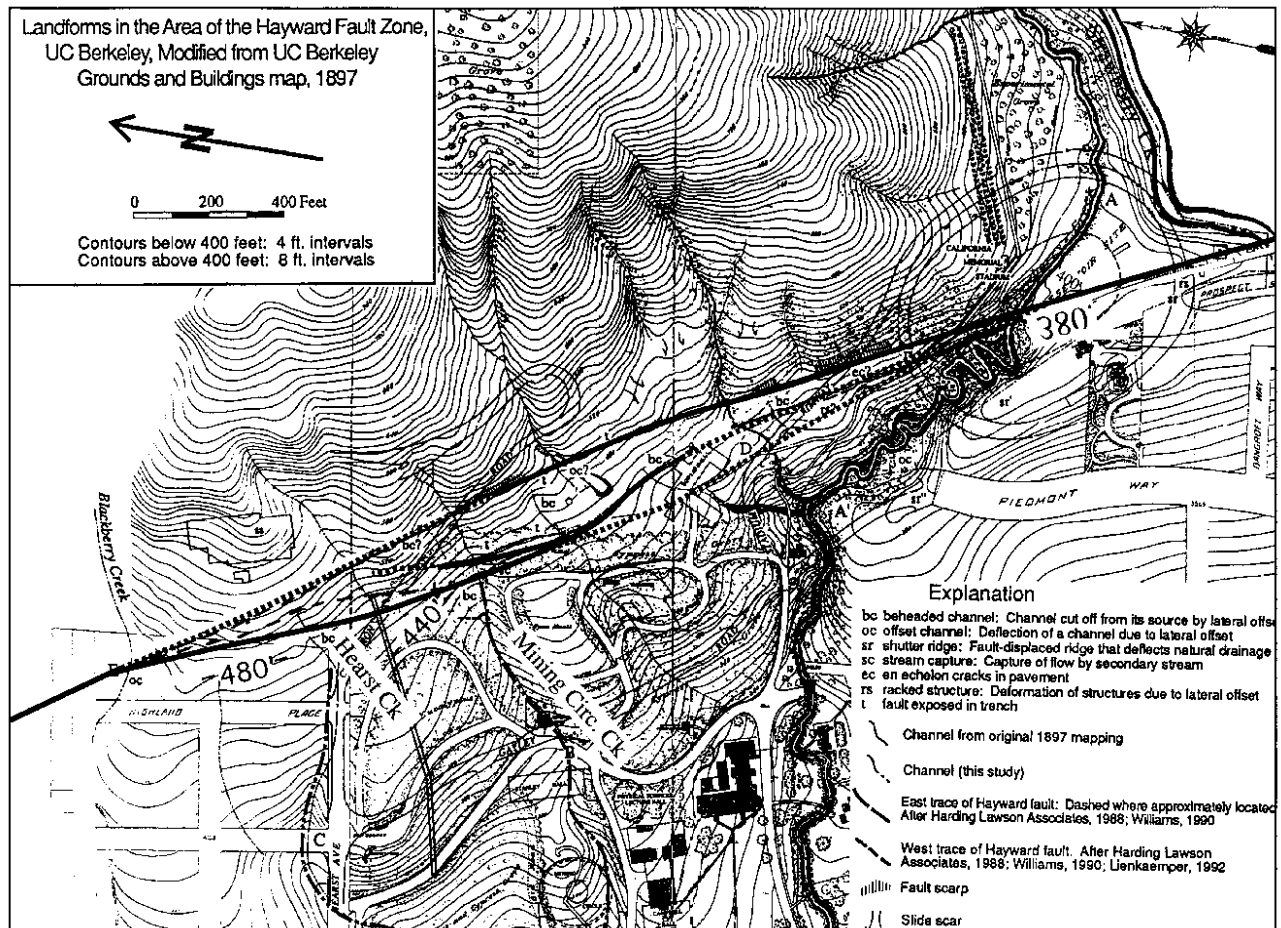


Figure 1. Landforms in the Area of the Hayward Fault Zone

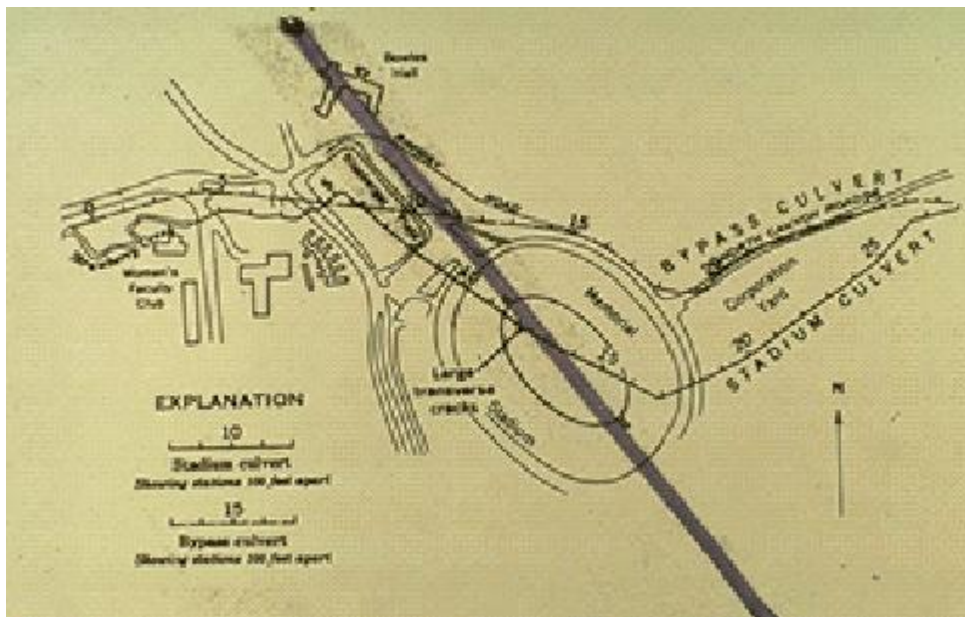


Figure 2. Memorial Stadium Fault Map.

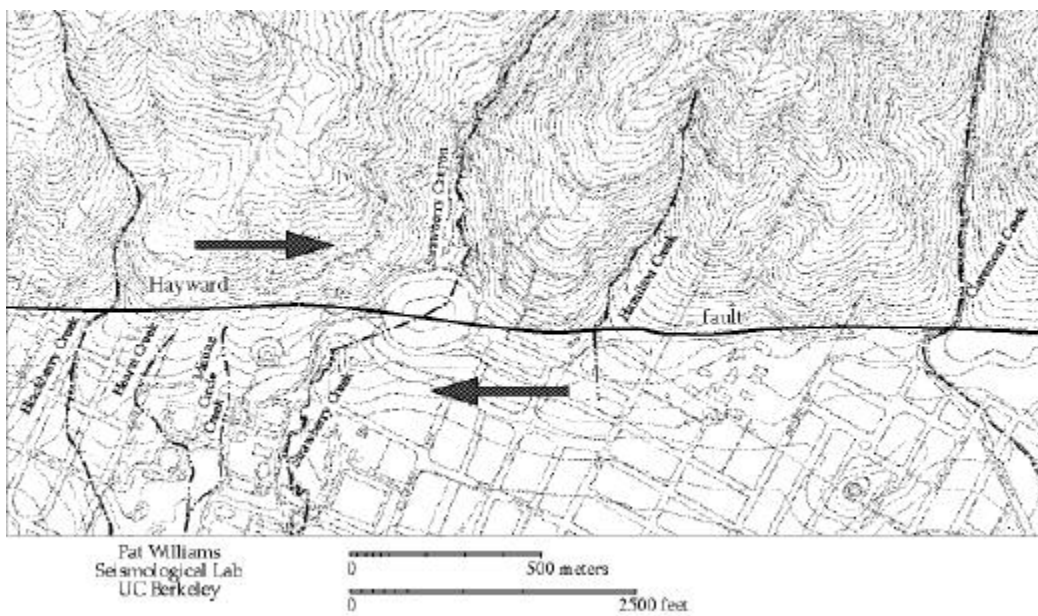


Figure 3. Hayward Strike-Slip Fault at Memorial Stadium.

Following are geologic and soil maps of the Strawberry Creek watershed from the 1987 Strawberry Creek Management Plan.

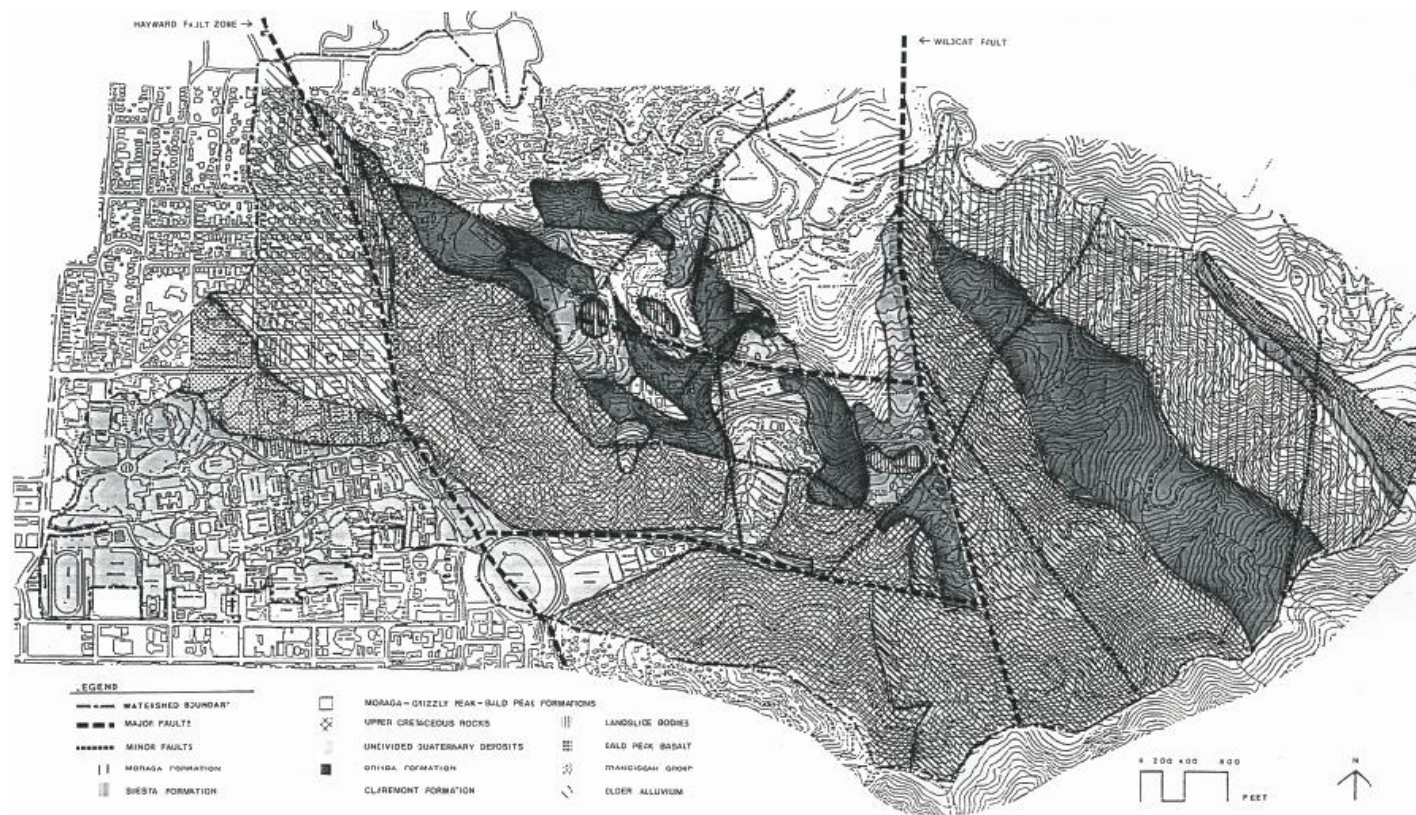


Figure 4. Upper Strawberry Creek Watershed Geology

Strawberry Creek Management Plan Update
Prepared by the UCB Office of EH&S
November, 2001

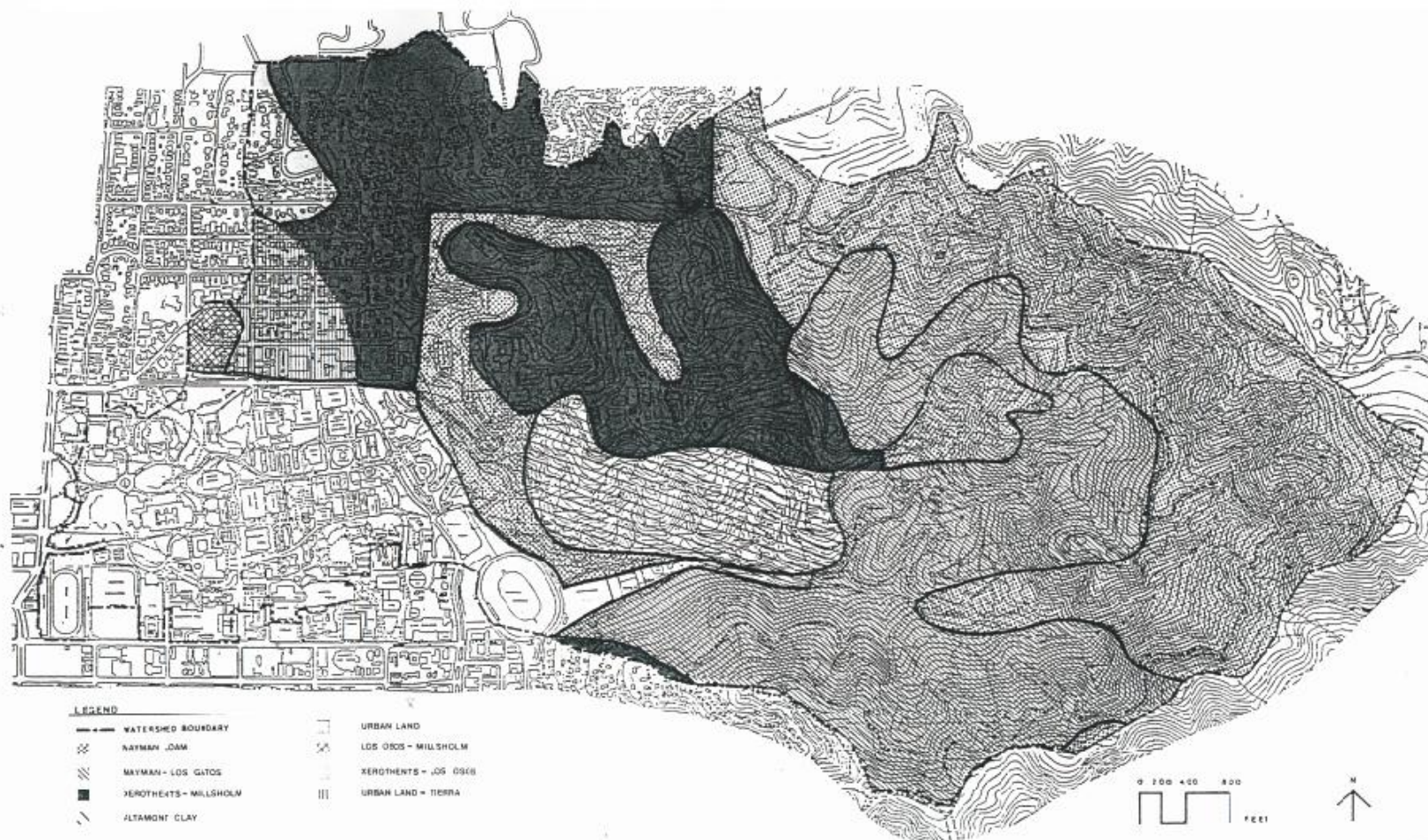


Figure 5. Upper Strawberry Creek Watershed Soils

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