

# MERCED COUNTY UNIVERSITY COMMUNITY PLAN POLICY DISCUSSION PAPER

## Environmental Resource Management: Geology and Soils

*For CPAC Discussion: May 10, 2001 Meeting*

### **INTRODUCTION**

This policy discussion paper presents a general outline of soils and geologic issues for inclusion in the Environmental Resources Management element of the Merced County University Community Plan (UCP), and discusses policy options for each issue. The report is presented for discussion purposes only and will be updated and refined based on continuing analysis and stakeholder input.

### **EXISTING CONDITIONS AT THE UCP AREA**

#### *Topography*

The topography of the UCP area can generally be classified as mild to flat sloped terrain. The high point within the UCP area is approximately 245 feet above mean sea level (msl) in the northeast section at the Le Grand Canal. The lowest elevation of 186 feet msl is located at the southwest corner near the intersection of Lake Road and Yosemite Avenue. Slopes in the northern half of the project site are generally steeper than the southern half; however, very few of the slopes at the UCP area exceed 10 percent. Because of the relatively flat character of the UCP area, the UCP area is not prone to landslide conditions.

#### *Soils*

There are many different (up to 37) soil types within the UCP area. Soils vary from gravely soils with very high permeability rates, to tight clay and hardpan with very low rates of permeability. The soils on the southern portion of the UCP area are associated with old alluvial fans and terrace remnants. These soils are medium textured and are characterized by a strongly cemented or indurated hardpan. The northern portion of the UCP area contains soils associated with high terraces, which contain gravelly loams formed from old gravelly alluvium. The soils in this area have a clay pan and a cemented iron-silica hardpan.

Over one-half of the UCP area is covered by three soil types: 1) Redding Gravelly Loam - 26% coverage; 2) Wyman Clay Loam - 16.8 % coverage; and 3) Yokohl Clay Loam - 14.8% coverage. The other parts of the UCP area are intermixed with five predominant soils series, including Redding, Wyman, Yokohl, Coming and Raynor soils. The erosion hazard of the soils located throughout the UCP area is generally "slight to none" or "moderate". Many of these soils have high shrink-swell properties, indicating that they are expansive soils. Additional information regarding soils at the UCP area is found in the Agriculture policy paper.

### *Ground Subsidence*

Ground subsidence is the settling or sinking of land, and is sometimes due to densification (collapse) of subsurface soils during or subsequent to a seismic event, or as a result of groundwater extraction and aquifer volume reduction. Generally, loose, granular soils in areas where there is a deep groundwater table would be most susceptible ground subsidence. Although the UCP area has soft or otherwise compressible soils that settle when loaded or wet, they are generally underlain by a clay hardpan or impermeable layer that significantly reduces the potential of ground subsidence.

### *Liquefaction*

Liquefaction is a phenomenon whereby granular material is transformed from a solid state into a liquid state as a result of an increase in pore-water pressures due to an earthquake. Liquefaction can also occur in low-lying areas that are comprised of unconsolidated, saturated, clay-free sands and silts. The primary factors deciding liquefaction potential of soils are: (1) the level and duration of seismic ground motions; (2) the type and consistency of the soils; and (3) the depth to groundwater. No specific liquefaction hazard areas have been identified in Merced County; however, this potential exists throughout the San Joaquin Valley where unconsolidated sediments and a high water table coincide.

## **EXISTING REGULATORY SETTING**

According to federal, State, and local requirements, construction in the UCP area would be required to comply with, at minimum, the following.

### *California Building Code*

The State of California provides minimum standards for structural design and site development through the California Building Standards Code (California Code of Regulations, Title 24). The California Building Code (CBC) is based on the Uniform Building Code (UBC) used widely throughout United States (generally adopted on a state-by-state or district-by-district basis), and has been modified for California conditions with numerous more detailed and/or more stringent regulations.

The CBC requires that “classification of the soil at each building site shall be determined when required by the building official” and that “the classification shall be based on observation and any necessary test of the materials disclosed by borings or excavations”. In addition, the CBC states, “the soil classification and design-bearing capacity shall be shown on the (building) plans, unless the foundation conforms to Table 18-I-C”. The CBC provides standards including, but not limited to: excavation, grading, and earthwork construction; fills and embankments; expansive soils; foundation investigations; and liquefaction potential and soils strength loss.

Per California law, all development in the UCP area would be required to comply with all provisions of the CBC.

### *State General Construction Activity Permit*

In accordance with National Pollutant Discharge Elimination System (NPDES) permit regulations to minimize the potential effects of construction runoff on receiving water quality, the State requires that any construction activity affecting five acres or more must obtain a General Construction Activity Permit. Permit applicants are required to prepare a Stormwater Pollution Prevention Plan (SWPPP) and Erosion Control Plan, and implement best management practices (BMPs) to reduce construction effects on receiving water quality by implementing erosion control measures, thereby protecting soil resources, as well as water resources.

### *Merced County General Plan*

The Merced County General Plan contains goals, objectives, and policies that protect residents against unstable soil conditions, in addition to policies that conserve soil resources. Applicable policies related to soils are found in the Safety Chapter and the Open Space/Conservation Chapter of the General Plan.

However, as shown in Policy 2 of the Safety Element's Goal 3, the existing edition (1989) of the Merced County General Plan references the 1970 edition of the UBC; the most recent publication of the UBC is dated 1997.

### *Merced County Building Codes and Regulations*

According to the Merced County Building Codes and Regulations, Merced County Building Ordinance No. 1539 states that federal and State mandated codes and/or regulations shall be followed, in addition to the following Uniform Codes: Uniform Building Code; Uniform Housing Code; Uniform Code for Abatement of Dangerous Buildings; Uniform Mechanical Code; Uniform Plumbing Code; and National Electrical Code.

## **SUGGESTED GOALS AND POLICIES FOR THE PROPOSED UCP**

**Issue:** Ensure that the UCP area complies with, at minimum, the soils investigation and building design requirements of California Building Standards Code (California Code of Regulations, Title 24), and follows a common grading plan that will conserve soils resources and not impact off-site resources.

Soil conditions throughout the UCP area are not consistent. As development in the UCP area continues over time, geologic and soil conditions can change significantly due to an alteration of topography, an increase of impervious surfaces creating new drainage paths, increased groundwater withdrawal or reduced recharge, unknown seismic faults, and the simple presence of additional people and structures. As the site conditions change at the UCP area, development should be required to be designed to meet current geologic conditions and building requirements.

Implementation of the following policy options would ensure that development in the UCP area would meet consistent geotechnical standards and requirements.

- Policy Option 1: Prior to site development at the UCP area, a site-specific soil and geotechnical investigation shall be performed for individual construction projects by a California registered engineering geologist, or an engineer certified to conduct soils and foundation studies, to determine the classification and engineering capabilities and constraints of the soil at each building site. The standards used during the site investigation shall be, at minimum, the California Building Standards Code, and any other applicable professional standards and Uniform Codes.
- Policy Option 2: Require development applications to include, at minimum, a report detailing the types of soil and locations, erosion potential or soil engineering constraints/opportunities, and erosion control options. Mitigation plans must address methods to be used during all phases of site development, implementation, and operation.
- Policy Option 3: As development continues throughout the UCP area, make site-specific soil and geotechnical information available to the public, developers, and consultants.
- Policy Option 4: A “University Community Plan Grading and Geotechnical Investigation Standards Manual” should be created to ensure consistent geotechnical investigations. This manual should be created in concert with Merced County and development standards of the proposed University of California, Merced campus.

### *Advantages*

- The CBC does not specify that a geotechnical investigation “shall” be completed prior to development, only when required by the building official to determine soil classifications. Policy Option 1 would require each development site of the proposed UCP to conduct a site-specific geotechnical investigation prior to development, and Policy Option 2 would require the submittal of a detailed report describing the investigation activities.
- By making soil and geological information available to the public, private individuals can use the information for smaller site construction activities not specifically related to unstable soil or soil engineering constraints.
- A Grading and Geotechnical Investigation Standards Manual will ensure that development projects at the UCP area are consistent with other development projects in Merced County. If the manual can be prepared in concert with development of the UC Merced campus, grading practices and geotechnical investigations throughout Merced County, the UCP area, and the campus area would be consistent.
- The proposed policy options clarify existing and required regulations and policies. The proposed policy options would provide additional safety and conservation measures for soil at the UCP area.

- Merced County in their Building Codes and Regulations, as well as State law in the CBC and the General Construction Activity Permit already implement site development standards, and soil conservation and unstable soil policies are already presented in the Merced County General Plan. Implementation of the above policy options would only clarify and make more stringent the intent of the existing regulations.

*Disadvantages*

- Proposed Policy Options 3 and 4 would require staff and a budget to disseminate information and complete a grading and geotechnical investigation manual.