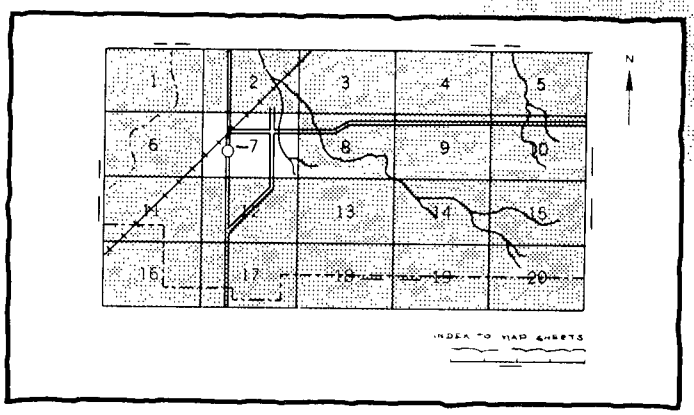
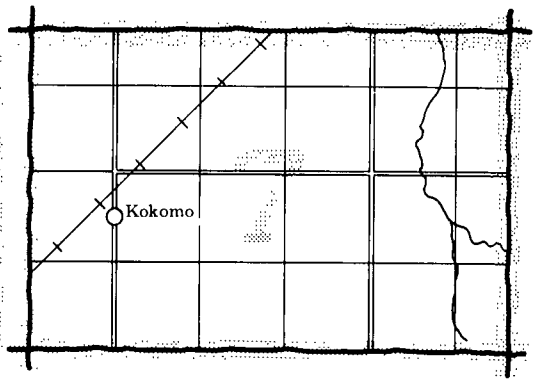
SOIL SURVEY OF Santa Cruz County, California

U. S. Department of Agriculture
Soil Conservation Service
in cooperation with
University of California, Agricultural Experiment Station

HOW TO USE

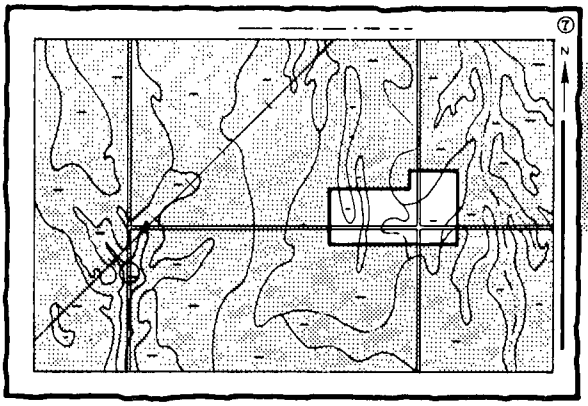
1. Locate your area of interest on the "Index to Map Sheets" (the last page of this publication).

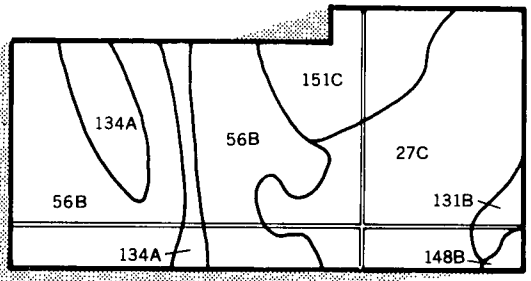




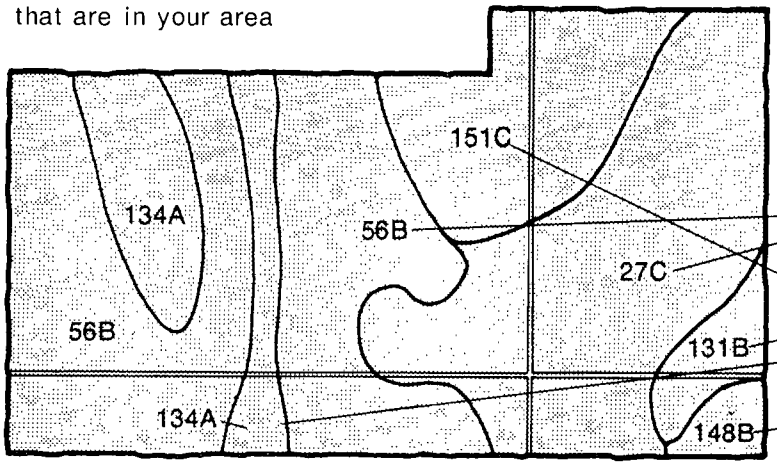
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.





4. List the map unit symbols that are in your area

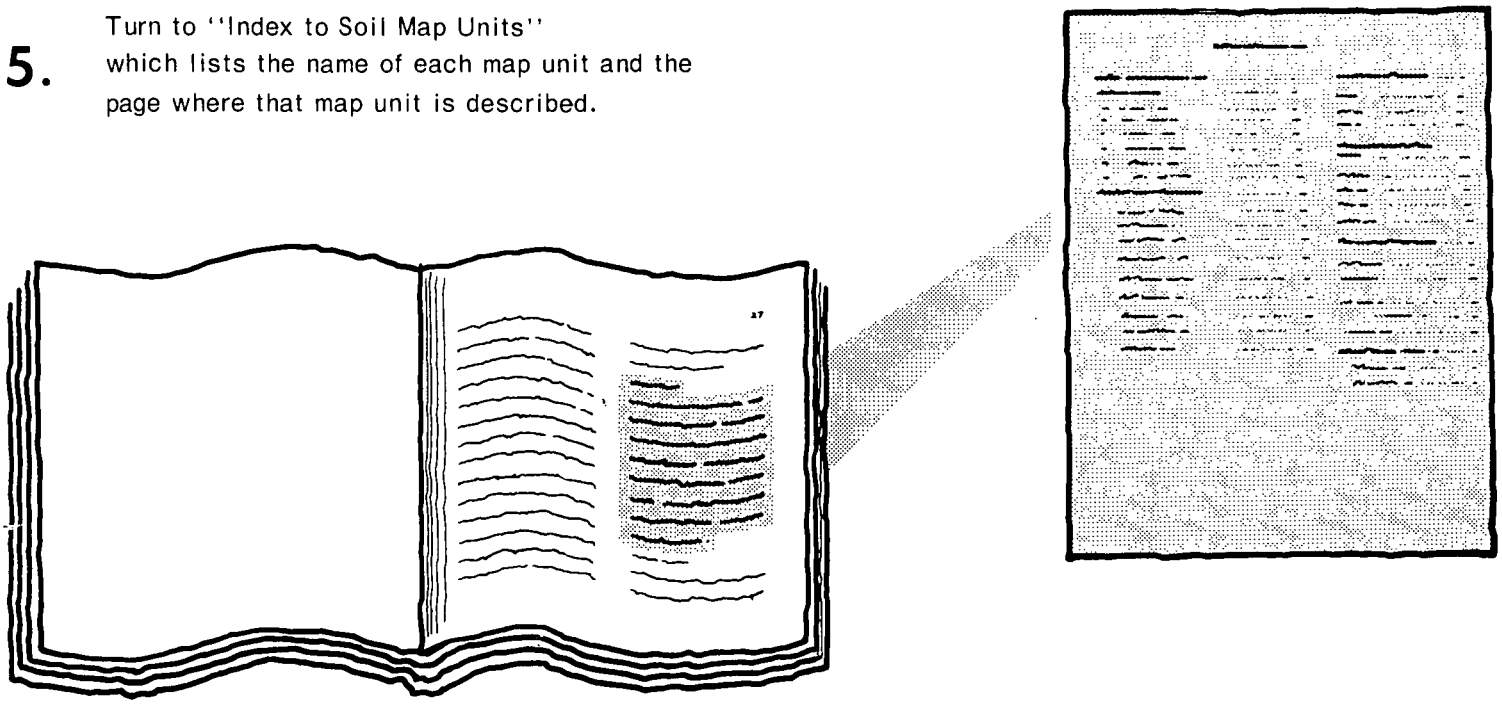


Symbols

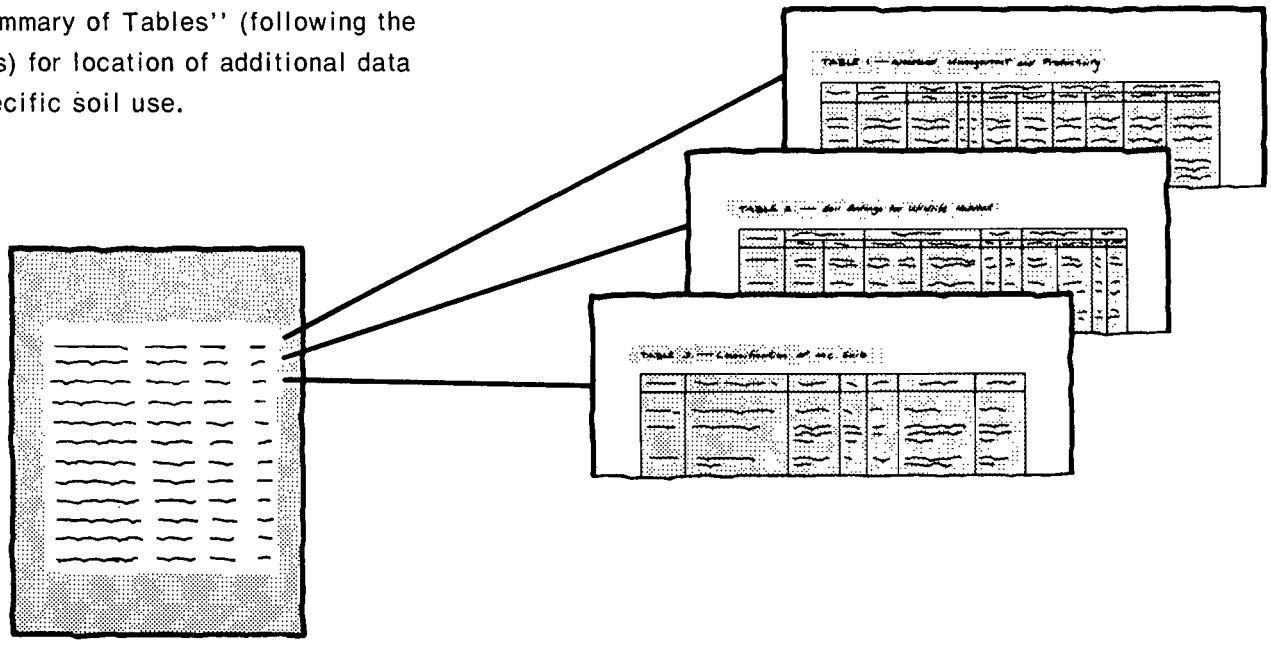
27C
56B
131B
134A
148B
151C

THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; for specialists in wildlife management, waste disposal, or pollution control.

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in the period 1970-76. Soil names and descriptions were approved in 1976. Unless otherwise indicated, statements in the publication refer to conditions in the survey area in 1976. This survey was made cooperatively by the Soil Conservation Service, the University of California Agricultural Experiment Station, and the County of Santa Cruz, Environmental Health Services Agency. It is part of the technical assistance furnished to the Redwood and part of the Pajaro Resource Conservation Districts.

Soil maps in this survey may be copied without permission, but any enlargement of these maps can cause misunderstanding of the detail of mapping and result in erroneous interpretations. Enlarged maps do not show small areas of contrasting soils that could have been shown at a larger mapping scale.

Cover: Strawberries on Elder sandy loam, 2 to 9 percent slopes.

Contents

Issued August 1980

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Summary of Tables

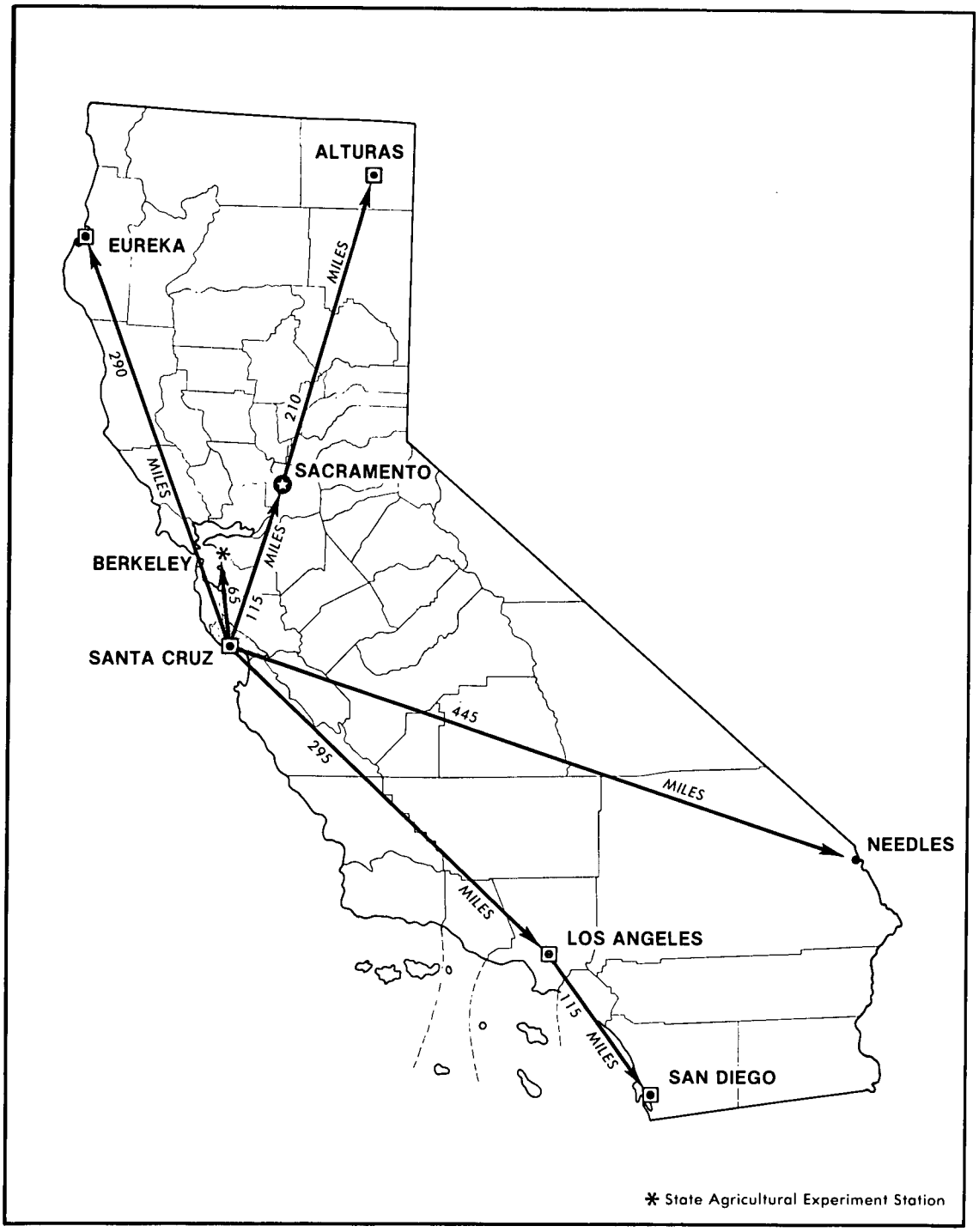
This soil survey contains much information useful in land-planning programs in Santa Cruz County. Of prime importance are the predictions of soil behavior for selected land uses. Also highlighted are limitations or hazards to land uses that are inherent in the soil, improvements needed to overcome these limitations, and the impact that selected land uses will have on the environment.

This soil survey has been prepared for many different users. Farmers, ranchers, foresters, and agronomists can use it to determine the potential of the soil and the management practices required for food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use it to plan land use, select sites for construction, develop soil resources, or identify any special practices that may be needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the soil survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur even within short distances. Soils may be seasonally wet or subject to flooding. They may be shallow to bedrock. They may be too unstable to be used as a foundation for buildings or roads. Very clayey or wet soils are poorly suited to septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map; the location of each kind of soil is shown on detailed soil maps. Each kind of soil in the survey area is described, and much information is given about each soil for specific uses. Additional information or assistance in using this publication can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

This soil survey can be useful in the conservation, development, and productive use of soil, water, and other resources.



Location of Santa Cruz County in California.

SOIL SURVEY OF SANTA CRUZ COUNTY, CALIFORNIA

By Roy H. Bowman and David C. Estrada, Soil Conservation Service

Fieldwork by Charles S. Beutler, Roy H. Bowman, John P. Reganold,

Thor D. Thorson, and Leslie W. Williams, Soil Conservation Service

U. S. Department of Agriculture, Soil Conservation Service,

in cooperation with University of California, Agricultural Experiment Station

SANTA CRUZ COUNTY is in the west-central part of California. It has an area of 280,960 acres. Santa Cruz, the largest city, is the county seat. It has a population of 160,758.

About 75 percent of the county is in the Santa Cruz Mountains. This part of the county consists of hills covered with grass and trees and steep slopes covered with California redwood and Douglas-fir. A narrow marine terrace extends along the Pacific Ocean and Monterey Bay. The Pajaro Valley, in the southeastern part of the county, has rich alluvial soils deposited mainly by the Pajaro River. Elevation of the county ranges from sea level to about 3,000 feet.

Santa Cruz County has a mild climate. The temperature is uniform throughout the county because of the marine influence and the presence of mountains that block the winds from the north and from the hot interior valleys.

Farming and tourism are the main industries.

General nature of the county

This section provides general information about Santa Cruz County. It discusses history and development, natural resources, and climate.

History and development

The part of Santa Cruz County near the present sites of Santa Cruz and Watsonville was explored in 1769 by an expedition led by Don Gaspar de Portola. Father Crespi, a member of the expedition, was the first to discover the redwoods near the present site of Watsonville. Settlers came with the founding of the Santa Cruz Mission in September 1791 (*29*).

Farming was first practiced near the Mission. Wheat, corn, and barley were the principal crops. Surrounding the Mission was a 10-acre fruit orchard consisting mainly of pear and olive trees and a few grapevines. Raising livestock was also important. By 1800 the Mission was exporting breadstuff, hemp, cordage, hides, and tallow.

In 1820 the first land grant was requested from the King of Spain by Don Antonio Maria Castro (*10*). When Mexico gained its independence from Spain, all grants came from Mexico. The early established ranchos were devoted almost exclusively to livestock grazing.

California was acquired by the United States in 1846. The County of Santa Cruz was organized in 1850, and Santa Cruz became the county seat. The population at that time was 643. Most of the people lived in and about the mission at Santa Cruz. In 1940 the population of Santa Cruz County was 45,057, and in 1975 the population was 148,400.

Logging began in 1832. Amesti's Whipsaw Mill, on Corralitos Creek, was the first mill. Numerous new mills were built, and by the turn of the century nearly all of the readily accessible timber had been harvested. About 15 million board feet of timber per year is cut in the area.

In 1851 some farmers settled in the Pajaro Valley. In 1858 Isaac Williams and Judge R. F. Peckham planted the first commercial apple orchard. By 1860 about 50 acres in

the Pajaro Valley was in apple orchards, and by 1910 there were a million trees on 14,000 acres. The combination of poor apple years and new fruit and vegetable crops, however, began to lower the acreage in apple orchards. In 1974, 7,677 acres was in apple orchards.

Farming was greatly stimulated when the railroad came into the Pajaro Valley in 1870(*13*). From 1882 to 1894 many prunes were harvested, but the market for prunes collapsed in 1894. Hops were grown in the Pajaro Valley from 1880 to 1890. In 1896 Watsonville produced nearly 50 percent more sugar beets per acre than any other place in the United States.

Strawberries were first planted commercially in 1865, and they were shipped regularly to San Francisco starting in 1880. By 1900, about 700 acres of strawberries was being grown in the Pajaro Valley. By 1951, strawberries were the third most valuable crop in the valley, with apples and lettuce leading. In 1974, 830 acres was in strawberries.

Lettuce was first planted in the valley in 1914. In 1920, 38 railroad carloads of lettuce left the valley for Chicago, thus opening the long distance market. A total of 33,203 cars of lettuce were shipped from the Salinas-Watsonville area in 1951. In 1974, 4,615 acres was in lettuce.

The fresh-frozen food industry was started in the Pajaro Valley during World War II and has expanded to become a major source of employment. In 1950, fresh-frozen food packers in Watsonville produced 17.5 percent of all frozen foods processed in California. Thirteen plants were operating.

In tracing the history of farming in the Pajaro Valley, the major crops have gone from potatoes and grain to prunes, apples, and hops. Apples, lettuce, and strawberries are now the major crops.

Natural resources

Soil is the most important natural resource in the county. It produces crops for food and timber for construction and firewood. Sand and gravel are available for use in construction. Sand from Scotts Valley and the Wilder Creek area is exported from the county for glass production. In the Davenport area, limestone and shale are quarried and manufactured into cement.

In most of the county, the water supply is adequate for farm and domestic use. The temperate climate and abundance of scenic areas are responsible for the growth of recreation activities such as swimming and picnicking.

Climate

Santa Cruz County has warm summers and mild winters. Mean annual temperature in the county ranges from 54 to 58 degrees F. Near the coast, the difference between the mean daily minimum and maximum temperatures ranges from about 20 to 30 degrees. Inland, the difference is often more than 30 degrees in places such as Corralitos and Scott's Valley and in areas in the San Lorenzo Valley that have a sunny exposure. In the coastal area, the mean daily temperature in July and August is about 50 to 55 degrees minimum and 70 to 75 degrees maximum. In inland areas that have a sunny exposure, the mean maximum daily temperature is often more than 80 degrees because the overcast and fog disperse sooner than near the coast. The mean daily temperature in January is about 35 to 40 degrees minimum and 57 to 62 degrees maximum. The elevated inland areas are about 3 to 5 degrees cooler per 1,000 foot rise above sea level.

A long growing season is characteristic of the county (fig. 1). The frost-free period throughout the county ranges from 220 to 275 days. It ranges from 220 to 245 days in the mountains and from 245 to 275 days along the coast and in the Pajaro Valley. The average date of the first frost is early in November in the mountains and early in December in the area near Monterey Bay. The average date of the last freezing temperature is around March 1 near Monterey Bay and late in March in the mountains.

Precipitation is light in the lowlands in the southern part of the county to heavy in the mountains. The greatest amount is received in the Santa Cruz and Ben Lomond mountains, where seasonal totals average 60 inches (fig. 2). Mean annual precipitation of about 30 inches is typical of the Santa Cruz area, and 20 to 25 inches is typical of the Watsonville area. In the driest years, 1 year in 20 on the average, the Santa Cruz mountains receive only 30 to 35 inches of precipitation. In the wetter years, precipitation totals more than 90 inches in parts of the Santa Cruz mountains.

Snowfall, generally less than 5 inches, is most often limited to high points in the Santa Cruz Mountains. At lower elevations, snowfall is infrequent and of short duration.

The average relative humidity is fairly high, 70 to 80 percent, during the entire year along the coast and during the winter in the inland areas. In the inland areas, however, the humidity is moderate to low late in summer and early in fall.

Winds are usually light over most of the county. In summer, particularly late in the afternoon, a moderate onshore flow of marine air persists along the coast and through the lower passes of the mountains, especially Chittenden Pass. These winds are mainly from a southerly direction and are strongest at higher elevations. Estimated windspeed is 30 miles per hour every other year on the average, and it is as much as 80 miles per hour once in 50 years.

Annual sunshine is about 2,600 hours per year along the coast and more than 3,000 hours in inland areas. Clouds, fog, or overcast skies prevail during about 30 to 40 percent of the daylight hours throughout the year.

How this survey was made

Soil scientists made this survey to learn what kinds of soil are in the survey area, where they are, and how they can be used. The soil scientists went into the area knowing they likely would locate many soils they already knew something about and perhaps identify some they had never seen before. They observed the steepness, length, and shape of slopes; the size of streams and the general pattern of drainage; the kinds of native plants or crops; the kinds of rock; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material, which has been changed very little by leaching or by the action of plant roots.

The soil scientists recorded the characteristics of the profiles they studied, and they compared those profiles with others in counties nearby and in places more distant. Thus, through correlation, they classified and named the soils according to nationwide, uniform procedures.

After a guide for classifying and naming the soils was worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, roads, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called soil map units. Some map units are made up of one kind of soil, others are made up of two or more kinds of soil, and a few have little or no soil material at all. Map units are discussed in the sections "General soil map for broad land use planning" and "Soil maps for detailed planning."

While a soil survey is in progress, samples of soils are taken as needed for laboratory measurements and for engineering tests. The soils are field tested, and interpretations of their behavior are modified as necessary during the course of the survey. New interpretations are added to meet local needs, mainly through field observations of different kinds of soil in different uses under different levels of management. Also, data are assembled from other sources, such as test results, records, field experience, and information available from state and local specialists. For example, data on crop yields under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soil.

But only part of a soil survey is done when the soils have been named, described, interpreted, and delineated on aerial photographs and when the laboratory data and other data have been assembled. The mass of detailed information then needs to be organized so that it is readily available to different groups of users, among them farmers, managers of rangeland and woodland, engineers, planners, developers and builders, homebuyers, and those seeking recreation.

General soil map for broad land use planning

The general soil map at the back of this publication shows, in color, map units that have a distinct pattern of soils and of relief and drainage. Each map unit is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map provides a broad perspective of the soils and landscapes in the survey area. It provides a basis for comparing the potential of large areas for general kinds of land use. Areas that are, for the most part, suited to certain kinds of farming or to other land uses can be identified on the map. Likewise, areas of soils having properties that are distinctly unfavorable for certain land uses can be located.

Because of its small scale, the map does not show the kind of soil at a specific site. Thus, it is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The kinds of soil in any one map unit differ from place to place in slope, depth, stoniness, drainage, or other characteristics that affect their management.

The 11 map units described in this section have been grouped into 5 general kinds of landscape for broad interpretive purposes. Each of the broad groups and the map units in each group are described in the following pages. The general soil map at the back of this survey does not join in all instances with the general soil maps of adjacent counties. Differences in the maps have resulted from differences in the occurrence of soil patterns and from recent advances in classification.

Soils on alluvial plains and fans and in basinlike areas

The soils in this group are very deep and well drained or poorly drained. They have a surface layer of sandy loam, loam, clay loam, or clay. They formed in alluvium derived mainly from sedimentary rock. The soils are nearly level to strongly sloping. Elevation ranges from about 5 feet along West Beach Road to about 400 feet near Corralitos. The vegetation in areas not cultivated is annual grasses and forbs and a few scattered broadleaf trees and brushy plants.

These soils are used mainly for crops. A few areas are used for housing developments.

Two map units are in this group. They make up about 5 percent of the county.

1. Elder-Conejo

Very deep, nearly level to strongly sloping, well drained sandy loams, loams, and clay loams on alluvial fans and plains

Most areas of this map unit are in the Pajaro Valley. The soils in this unit formed in mixed alluvium. Elevation ranges from 20 to 400 feet. The mean annual precipitation ranges from about 25 to 28 inches, and the mean annual air temperature is 58 degrees F. The frost-free season ranges from 245 to 275 days.

This unit makes up about 4 percent of the survey area. It is about 45 percent Elder soils and 35 percent Conejo soils. The remaining 20 percent is soils of minor extent.

Elder soils typically have a surface layer of dark grayish brown and grayish brown, medium acid and slightly acid sandy loam about 23 inches thick. The underlying material to a depth of 60 inches is mixed brown and dark grayish brown, slightly acid sandy loam and loamy sand.

Conejo soils typically have a surface layer of dark gray, neutral loam about 7 inches thick over dark gray and dark grayish brown, mildly alkaline to moderately alkaline loam and clay loam about 38 inches thick. The underlying material to a depth of 65 inches is grayish brown, moderately alkaline loam.

Of minor extent in this unit are Mocho, San Emigdio Variant, Soquel, Baywood, and Baywood Variant soils; Beaches; and Riverwash. Mocho soils are well drained. Soquel, San Emigdio Variant, and Baywood Variant soils are moderately well drained. Baywood soils are somewhat excessively drained.

This unit is used mainly for irrigated crops such as lettuce, broccoli, cauliflower, strawberries, and bushberries. A few small areas are used for apple orchards and housing developments. These are the most productive soils in the county for farming.

The Elder soils are suitable for building site development and for onsite disposal of sewage if proper design and installation procedures are used. Conejo soils are also suitable as sites for buildings but are limited for onsite sewage disposal by moderately slow permeability.

2. Clear Lake

Very deep, nearly level, poorly drained clays in basinlike areas

This map unit is west of Watsonville. The soils formed in fine, mixed alluvium. Elevation ranges from 5 feet to about 20 feet. The mean annual precipitation is about 25 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

This map unit makes up slightly less than 1 percent of the survey area. It is about 82 percent Clear Lake soils. The remaining 18 percent is soils of minor extent.

Clear Lake soils typically have a surface layer of dark gray, neutral and mildly alkaline clay about 44 inches thick. The underlying material to a depth of 62 inches is grayish brown clay. Through the use of tile drains, diversion ditches, or pumping, the water table has been lowered to a depth of 40 to 60 inches.

Of minor extent in this unit are Conejo and Cropley soils; Dune land; Fluvaquentic Haploxerolls; and Aquic Xerofluvents. Conejo and Cropley soils are very deep and well drained.

This unit is used mainly for irrigated crops such as lettuce, strawberries, and brussels sprouts. A few small areas are used for industrial development. This is one of the most productive areas in the county for farming.

The soils are severely limited for urban development by high shrink-swell potential and low strength. Soil shrinking and swelling can damage building foundations, roads, streets, driveways, and other structures if the structures are not properly designed. This map unit is also unsuited to use as septic tank absorption fields because of slow permeability and the high water table. All sanitary facilities should be connected to community sewers and treatment facilities. Adequate surface drainage is needed if this unit is used for housing developments.

Soils on marine terraces, old alluvial fans, and hills

The soils in this group are deep or very deep and well drained to somewhat poorly drained. They have a surface layer of sandy loam, loam, or clay. They formed in marine deposits, old alluvium, or weathered shale. The soils are nearly level to moderately steep. Elevation ranges from 20 to 900 feet. The vegetation in areas not cultivated is annual grasses and forbs and scattered conifers and broadleaf trees.

The soils in this group are used mainly for crops. A few areas are being developed as homesites.

Two map units are in this group. They make up about 17 percent of the county.

3. Watsonville-Elkhorn-Pinto

Very deep, nearly level to moderately steep, well drained to somewhat poorly drained loams and sandy loams on marine terraces and old alluvial fans

This map unit is mainly on coastal terraces, but a few areas are in Scotts Valley and on the foot slopes of the mountains. The soils in this unit formed in old alluvium or in marine deposits. Elevation ranges from 20 to 900 feet. The mean annual precipitation ranges from 25 to 28 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

This map unit makes up about 16 percent of the survey area. It is about 45 percent Watsonville soils, 25 percent Elkhorn soils, and 12 percent Pinto soils. The remaining 18 percent is soils of minor extent.

Watsonville soils are somewhat poorly drained. They are on coastal terraces. Typically, the surface layer is very dark grayish brown, slightly acid loam about 12 inches thick. The subsurface layer is light gray, slightly acid sandy loam about 6 inches thick. The subsoil is pale brown and mixed light gray and very pale brown, slightly acid clay about 21 inches thick. The substratum to a depth

of 63 inches is mixed light gray, very pale brown, and yellow, slightly acid and medium acid sandy clay loam.

Elkhorn soils are well drained. They are on marine terraces and old alluvial fans. Typically, the surface layer is very dark grayish brown, slightly acid and medium acid sandy loam about 21 inches thick. The subsoil to a depth of 61 inches is pale brown and variegated light gray and very pale brown, neutral sandy clay loam.

Pinto soils are moderately well drained. They are on marine terraces and old alluvial fans. Typically, the surface layer is grayish brown, medium acid loam about 14 inches thick. The subsurface layer is light brownish gray, medium acid loam about 7 inches thick. The subsoil is brownish yellow, light yellowish brown, or very pale brown, medium acid and slightly acid clay loam about 30 inches thick. The substratum to a depth of 65 inches is reddish yellow, strongly acid clay loam.

Of minor extent in this unit are Elder, Baywood, Danville, Diablo, and Soquel soils; Beaches; Riverwash; Fluventic Haploxerolls; and Aquic Xerofluvents. Baywood soils are somewhat excessively drained. Diablo soils are well drained.

This unit is used mainly for irrigated crops such as brussels sprouts, strawberries, bushberries, apple orchards, and some lettuce (fig. 3).

The Watsonville soils are limited for use as homesites mainly by the shrink-swell potential and low strength. These soils are also limited for use as septic tank absorption fields by a perched water table and a very slowly permeable subsoil. The largest expansion of housing and commercial developments has taken place on these soils. Pinto and Elkhorn soils also are limited for use as septic tank absorption fields; Pinto soils have a slowly permeable subsoil, and Elkhorn soils have a moderately slowly permeable subsoil.

4. Diablo-Cropley

Deep and very deep, gently sloping to hilly, well drained clays and silty clays on alluvial fans or hills

This map unit is west of Watsonville. The soils in this unit formed in alluvium and in material derived from sandstone or shale. Elevation ranges from 20 to 250 feet. Mean annual precipitation is 25 inches, and the mean annual air temperature is 58 degrees. The frost-free season ranges from 245 to 275 days.

This map unit makes up slightly less than 1 percent of the survey area. It is about 65 percent Diablo soils and 15 percent Cropley soils. The remaining 20 percent is soils of minor extent.

Diablo soils are deep. They are on hills. Slope ranges from 9 to 30 percent. In a typical profile the surface layer is very dark gray, slightly acid and neutral clay about 30 inches thick. The underlying material is brown and dark olive gray mixed with very dark gray and pale olive, moderately alkaline clay; it is about 29 inches thick. The material below the clay is strongly weathered shale.

Cropley soils are very deep. They are on alluvial fans and benches. Slope ranges from 2 to 9 percent. In a typical profile the surface layer is very dark gray, moderately alkaline silty clay 28 inches thick. The upper part of the underlying material to a depth of 45 inches, is mixed very dark gray and light olive gray, strongly effervescent silty clay. The lower part, to a depth of 60 inches, is mixed olive gray and pale olive, mildly alkaline silty clay loam.

Of minor extent in this unit are Watsonville, Pinto, Clear Lake, and Elkhorn soils and Aquents. These soils are somewhat poorly drained to well drained.

This unit is used mostly for range. A few small areas are used for housing developments.

The soils are limited for use as septic tank absorption fields by slow permeability and for use as homesites by high shrink-swell potential. Community sewage systems are needed. Soil shrinking and swelling can cause damage to building foundations, roads, driveways, and other structures if they are not properly constructed.

Soils on sand dunes, hills, and mountains

The soils in this group are deep or very deep and well drained or somewhat excessively drained. They have a surface layer of coarse sand, loamy sand, or gravelly sandy loam. They formed in eolian deposits or in residuum derived from sandstone, marine deposits, or granitic rock. The soils are gently sloping to very steep. Elevation ranges from about 100 to 1,500 feet. The native vegetation is annual grasses, forbs, and brush at the lower elevations and mainly conifers and broadleaf trees at the higher elevations.

The gently sloping to moderately steep soils are extensively cultivated. The steeper soils are used for recreation, wildlife habitat, or watershed. A few areas of the soils are used as a source of sand and gravel, for waste disposal, and for firewood production.

Two map units are in this group. They make up about 7 percent of the county.

5. Baywood-Pfeiffer

Very deep and deep, gently sloping to steep, well drained and somewhat excessively drained loamy sands and gravelly sandy loams on sand dunes and hills

Most of this map unit is in an area that extends from south of Aptos to Sunset Beach State Park and east to Freedom Boulevard. The soils in this unit formed in eolian deposits, sandstone, or granitic rock. Elevation ranges from 100 to 800 feet. The mean annual precipitation is about 29 inches, and the mean annual temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

This map unit makes up about 5 percent of the survey area. It is about 60 percent Baywood soils and 20 percent Pfeiffer soils. The remaining 20 percent is soils of minor extent.

Baywood soils are very deep and somewhat excessively drained. They formed in eolian deposits. They are on sand dunes. Slope ranges from 2 to 50 percent. In a typical profile the surface layer is brown, slightly acid loamy sand 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand.

Pfeiffer soils are deep and well drained. They formed in residuum derived from granitic rock or sandstone or in marine deposits. These soils are on hills. Slope ranges from 15 to 50 percent. In a typical profile the surface layer is dark grayish brown and brown, slightly acid gravelly sandy loam about 24 inches thick. The subsoil is brown, slightly acid gravelly sandy loam and cobbly sandy loam about 29 inches thick. The substratum is brown, slightly acid gravelly sandy loam about 13 inches thick. Weathered granodiorite is at a depth of 66 inches.

Of minor extent in this unit are Elkhorn, Elder, Pinto, Tierra, and Watsonville soils; Dune land; Beaches, Pits, and Dumps. Elkhorn and Pinto soils are well drained or moderately well drained. Elder soils are well drained.

The gently sloping to hilly areas of Baywood soils are used mainly for strawberries and, to a minor extent, for bushberries, brussels sprouts, and apples. Pfeiffer soils and the steep areas of Baywood soils are used for watershed, recreation, and range.

This map unit is suitable for housing developments and for onsite sewage disposal. The rapid permeability of the Baywood soils limits their use for onsite sewage disposal because of the hazard of contaminating the ground water supply.

6. Zayante

Very deep, moderately sloping to very steep, somewhat excessively drained coarse sands on hills and mountains

This map unit extends from east of Ben Lomond and Felton to Scotts Valley and is about one-half mile south of Cowell Redwood State Park. The soils in this unit formed in material derived from sandstone or in marine deposits. Elevation ranges from about 250 to 1,500 feet. The mean annual precipitation is about 48 inches, and the mean annual air temperature is about 55 degrees F. The frost-free season ranges from 220 to 245 days.

This unit makes up about 2 percent of the survey area. It is about 75 percent Zayante soils. The remaining 25 percent is soils of minor extent.

Zayante soils typically have a surface layer of dark gray, dark grayish brown, and grayish brown, strongly acid and medium acid coarse sand about 30 inches thick. The underlying material to a depth of 60 inches is light brownish gray and very pale brown, medium acid and neutral coarse sand.

Of minor extent in this unit are Nisene, Aptos, Lompico, Felton, and Elkhorn soils and Pit-Dumps complex. Nisene, Aptos, Lompico, and Felton soils are well drained. Elkhorn soils are very deep and are on old alluvial fans.

This unit is used mainly for watershed, recreation, and wildlife habitat. In a few areas it is used for waste disposal and firewood production. There are some gravel and sand pits and borrow pits.

The low available water capacity of these soils limits the kinds of plants that can be grown successfully.

This map unit is suitable for homesite development and onsite sewage disposal, but the rapid permeability of the soils can result in contamination of the ground water supply. High cutbanks tend to cave in.

Soils on mountains and hills dominantly under forest vegetation

The soils in this group are deep or moderately deep and well drained or somewhat excessively drained. They have a surface layer of loam, sandy loam, or stony sandy loam. They formed in residuum derived from sandstone, mudstone, siltstone, shale, or granitic rock. The soils are moderately sloping to very steep. Elevation ranges from about 400 to 3,000 feet. The vegetation is trees, shrubs, and, in open areas, annual grasses. Areas of these soils that have a cover of trees are cooler than those that have a cover of grass.

The soils are used mainly for timber, recreation, wildlife habitat, or watershed. A few areas are used for firewood, Christmas trees, housing developments, nursery plants, and pasture.

Two map units are in this group. They make up about 49 percent of the county.

7. Ben Lomond-Felton-Lompico

Deep and moderately deep, moderately sloping to very steep, well drained loams and sandy loams on mountains

This map unit is in the Santa Cruz Mountains and on the northeast-facing slopes of Ben Lomond Mountain. The soils in this unit formed in residuum derived from sandstone, shale, siltstone, and granitic rock. Elevation ranges from 400 to 3,000 feet. Slope ranges from 5 to 75 percent. The mean annual precipitation is about 48 inches, and the mean annual air temperature is about 55 degrees F. The frost-free season ranges from 220 to 245 days.

This map unit makes up about 28 percent of the survey area. It is about 35 percent Ben Lomond soils, 25 percent Felton soils, and 20 percent Lompico soils. The remaining 20 percent is soils and miscellaneous areas of minor extent. The Lompico soils in this unit are mapped in a complex with Felton soils.

The Ben Lomond soils are deep. Typically, a 2-inch mat of partially decomposed needles and twigs overlies the surface layer. The surface layer is dark grayish brown, slightly acid and neutral sandy loam about 19 inches thick. The subsoil is brown, medium acid sandy loam about 11 inches thick. The substratum is pale brown, medium acid sandy loam about 16 inches thick. Weathered sandstone is at a depth of 46 inches.

Felton soils are deep. In a typical profile the surface layer is dark grayish brown and brown, slightly acid sandy loam about 11 inches thick. The subsoil is brown

and yellowish red, slightly acid and strongly acid sandy clay loam and clay loam about 32 inches thick. The substratum is variegated light brownish gray and light olive brown, strongly acid loam and sandy loam about 20 inches thick. Weathered sandstone is at a depth of 63 inches.

Lompico soils are moderately deep. In a typical profile the surface layer is brown, slightly acid loam about 5 inches thick. The subsoil is brown, strong brown, and yellowish brown, strongly acid and medium acid clay loam, sandy clay loam, and very shaly sandy clay loam 32 inches thick. Highly weathered sandstone is at a depth of 37 inches.

Of minor extent in this unit are Nisene, Sur, Catelli, Bonnydoon, Lompico Variant, Zayante, Madonna, Los Osos, and Aptos soils; Xerorthents; Rock outcrop; and water areas, which include the river and reservoirs; Watsonville, Tierra, and Elkhorn soils, which are along the contact with marine terraces; and Elder and Soquel soils, which are along creek benches and alluvial fans. The minor soils are well drained to excessively drained.

This map unit is used mainly for timber production, recreation, wildlife habitat, and watershed. A few small areas are used for housing developments, apple orchards, pasture, and Christmas tree production.

The moderate shrink-swell potential of the Felton and Lompico soils and the moderate depth to rock of Lompico soils are the main limitations to the use of these soils as homesites. The permeability of the Felton and Lompico soils limits their use as septic tank absorption fields. These limitations can be overcome by proper design and installation procedures.

8. Sur-Catelli-Ben Lomond

Moderately deep and deep, very steep, well drained and somewhat excessively drained stony sandy loams and sandy loams on mountains

This map unit is in the Ben Lomond Mountains. The soils formed in residuum derived from sandstone, mudstone, or granitic rock. Slope ranges from 50 to 75 percent. Elevation ranges from 400 to 3,000 feet. The mean annual precipitation is about 48 inches, and the mean annual air temperature is about 55 degrees F. The frost-free season ranges from 220 to 245 days.

This unit makes up about 21 percent of the survey area. It is about 30 percent Sur soils, 30 percent Catelli soils, and 20 percent Ben Lomond soils. The remaining 20 percent is soils of minor extent. Sur soils in this unit are mapped in a complex with Catelli soils.

Sur soils are moderately deep and somewhat excessively drained. Typically, a 1-inch mat of partially decomposed needles, leaves, and twigs covers the surface layer. The surface layer is brown, neutral and slightly acid stony sandy loam about 18 inches thick. The underlying material is reddish yellow, medium acid very stony sandy loam. Quartz diorite is at a depth of 35 inches.

Catelli soils are moderately deep and well drained. Typically, a 3-inch mat of partially decomposed leaves, bark, and twigs covers the surface layer. The surface layer is brown, slightly acid sandy loam 7 inches thick. The subsoil is yellowish brown and light yellowish brown, slightly acid and medium acid sandy loam about 16 inches thick. The substratum is very pale brown, strongly acid sandy loam about 14 inches thick. Weathered sandstone is at a depth of 37 inches.

Ben Lomond soils are deep and well drained. Typically, a 2-inch mat of partially decomposed needles and twigs covers the surface layer. The surface layer is dark grayish brown, slightly acid and neutral sandy loam about 19 inches thick. The subsoil is brown, medium acid sandy loam about 11 inches thick. The substratum is pale brown, medium acid sandy loam about 16 inches thick. Weathered sandstone is at a depth of 46 inches.

Of minor extent in this unit are Lompico, Felton, Aptos, Bonnydoon, Maymen, Maymen Variant, Pfeiffer, and Xerorthents soils, and Rock outcrop. The soils are deep to shallow and well drained or somewhat excessively drained.

This unit is used mainly for watershed, wildlife habitat, recreation, and some timber production. A few selected areas are used as homesites and for firewood.

This map unit is limited for use as homesites by steep slopes and depth to rock.

Soils on mountains and hills dominantly under brush vegetation

The soils in this group are deep to shallow and well drained or somewhat excessively drained. They have a surface layer of loam, stony loam, gravelly sandy loam, or shaly clay loam. They formed in residuum derived from sandstone, shale, siltstone, mudstone, or granitic rock. The soils are moderately sloping to extremely steep. Elevation ranges from about 100 to 3,000 feet. The vegetation is mainly annual grasses and brush, but a few conifers and broadleaf trees grow along drainageways.

The soils in this group are used mainly for watershed, wildlife habitat, and recreation. A few areas are used for range, for firewood production, and as homesites.

Three map units are in this group. They make up about 22 percent of the county.

9. Aptos-Los Osos-Fagan

Moderately deep and deep, moderately sloping to very steep, well drained loams on mountains and hills

This map unit is in the Santa Cruz Mountains and along the coast. The soils in this unit formed in residuum derived from sandstone, shale, siltstone, or mudstone. Elevation ranges from 100 to 2,000 feet. The mean annual precipitation ranges from about 25 to 40 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 270 days.

This unit makes up about 8 percent of the survey area. It is about 45 percent Aptos soils, about 25 percent Los Osos soils, and about 13 percent Fagan soils. The remaining 17 percent is soils of minor extent.

Aptos soils are moderately deep and well drained. They are on mountains and hills. Slopes range from 15 to 75 percent. In a typical profile the surface layer is dark grayish brown and grayish brown, medium acid to slightly acid loam about 18 inches thick. The subsoil is grayish brown, slightly acid clay loam about 6 inches thick. The substratum is grayish brown, slightly acid shaly clay loam about 12 inches thick. Light gray, fractured and weathered shale is at a depth of 36 inches.

Los Osos soils are moderately deep and well drained. They are on mountains and hills. Slope ranges from 5 to 50 percent. In a typical profile the surface layer is dark grayish brown, medium acid loam and sandy loam about 11 inches thick. The upper part of the subsoil is brown, slightly acid sandy clay loam about 8 inches thick. The lower part is brown and pale brown, slightly acid heavy clay loam about 17 inches thick. Weathered sandstone is at a depth of 36 inches.

Fagan soils are deep and well drained. They are on mountains. Slope ranges from 30 to 50 percent. In a typical profile the surface layer is grayish brown, slightly acid and neutral loam about 32 inches thick. The subsoil to a depth of 65 inches is brown, slightly acid and neutral clay loam and clay.

Of minor extent in this unit are Bonnydoon, Tierra, Watsonville, Santa Lucia, and Felton, Lompico, and Ben Lomond soils, and Pits and Dumps. The soils are somewhat excessively drained to moderately well drained.

This map unit is used mainly for range, watershed, and recreation.

The Los Osos and Fagan soils are limited for use as homesites mainly because of the high shrink-swell potential, low strength, slope, and depth to rock. The Aptos soils are limited for this use mainly because of the moderate shrink-swell potential, slope, and depth to rock. Aptos soils are limited for use as septic tank absorption fields because of permeability and slope.

10. Maymen-Hecker

Shallow and deep, moderately steep to very steep, well drained and somewhat excessively drained stony loams and gravelly sandy loams on mountains

This map unit is mainly in the summit area or rift zone in a northwest-southeast trend on the Santa Cruz Mountains. The soils in this unit formed in residuum derived from sandstone, mudstone, shale, or granitic rock. Elevation ranges from 800 to 3,000 feet. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 56 degrees F. The frost-free season ranges from 220 to 245 days.

This map unit makes up about 8 percent of the survey area. It is about 45 percent Maymen soils and about 30 percent Hecker soils. The remaining 25 percent is minor soils.

Maymen soils are shallow and somewhat excessively drained. Slope ranges from 15 to 75 percent. Typically, a 1-inch mat of undecomposed leaves and twigs covers the surface layer. The surface layer is pale brown, slightly acid stony loam about 6 inches thick. The subsoil is pale brown, medium acid shaly heavy loam about 8 inches thick. Fractured shale is at a depth of 14 inches.

Hecker soils are deep and well drained. Slope ranges from 30 to 75 percent. In a typical profile the surface layer is brown and variegated pinkish gray and brown, neutral and medium acid gravelly sandy loam and gravelly loam about 9 inches thick. The upper part of the subsoil is variegated pale brown and light yellowish brown and variegated light brown and pink, medium acid very gravelly sandy loam and gravelly sandy loam about 14 inches thick. The lower part is variegated light brown and pink, medium acid very gravelly heavy loam and very gravelly clay loam about 18 inches thick. Shattered shale is at a depth of 41 inches.

Of minor extent in this unit are Lompico, Felton, Madonna, Aptos, Fagan, Ben Lomond, Sur, and Catelli soils, and Xerorthents and Rock outcrop. Felton, Lompico, Ben Lomond, and Catelli soils are well drained and are mainly along drainageways on northeast-facing slopes of mountains. Aptos and Fagan soils are well drained and are in small areas throughout the unit. Sur soils are excessively drained and are mainly along drainageways on mountains. Xerorthents consist of excessively drained, shallow and very shallow, very steep and extremely steep soils on mountains. Most ridgetops are exposed sandstone, mudstone, or shale.

This map unit is mainly used for watershed, wildlife habitat, and recreation. Some areas are used for firewood production or for range.

This unit is severely limited for use as homesites by the depth to rock, by slope, and by active faults. Much care must be exercised in selecting sites for homes and onsite sewage disposal systems.

11. Maymen-Santa Lucia-Bonnydoon

Shallow to moderately deep, moderately sloping to extremely steep, somewhat excessively drained and well drained stony loams, loams, and shaly clay loams on mountains and hills

This map unit is in the northwestern part of the Santa Cruz Mountains. The soils in this unit formed in residuum derived from sandstone, mudstone, or shale. Elevation ranges from 100 to 2,100 feet. Mean annual precipitation ranges from 30 to 40 inches, and the mean annual air temperature is about 57 degrees F. The frost-free season ranges from 220 to 245 days.

This unit makes up about 6 percent of the survey area. It is about 35 percent Bonnydoon soils, about 25 percent Santa Lucia soils, and about 15 percent Maymen soils. The remaining 25 percent is soils of minor extent.

Maymen soils are shallow and somewhat excessively drained. They are on mountains. Slope ranges from 15 to 75 percent. Typically, a 1-inch mat of undecomposed leaves and twigs is on the surface. The surface layer is pale brown, slightly acid stony loam about 6 inches thick.

The subsoil is pale brown, medium acid shaly heavy loam about 8 inches thick. Fractured shale is at a depth of 14 inches.

Santa Lucia soils are moderately deep and well drained. They are on mountains and hills. Slope ranges from 5 to 75 percent. In a typical profile the surface layer is dark gray or grayish brown, neutral, medium acid and strongly acid shaly clay loam and very shaly clay loam about 38 inches thick. It is underlain by fractured shale.

Bonnydoon soils are shallow and somewhat excessively drained. They are on mountains and hills. Slope ranges from 5 to 85 percent. In a typical profile the surface layer is grayish brown, slightly acid and medium acid loam about 11 inches thick. It is underlain by weathered sandstone.

Of minor extent in this unit are Aptos, Hecker, Ben Lomond, Lompico, Felton, Sur, and Catelli soils, and Xerorthents and Rock outcrop. Aptos soils are moderately deep and well drained and are in small areas throughout the unit. Ben Lomond, Lompico, Felton, Sur, and Catelli soils are deep and moderately deep and well drained to somewhat excessively drained; they are on mountains mainly along drainageways and on north- and northeast-facing slopes. Hecker soils are well drained. Xerorthents are excessively drained, steep to extremely steep, shallow and very shallow; they are on mountain ridgetops. Rock outcrop consists of exposures of sandstone, mudstone, or shale.

This map unit is used mainly for range, watershed, recreation, and wildlife habitat.

This unit is limited for use as homesites and for onsite disposal of sewage by steep and very steep slopes and shallow depth to consolidated rock.

Soil maps for detailed planning

The map units shown on the detailed soil maps at the back of this publication represent the kinds of soil in the survey area. They are described in this section. The descriptions together with the soil maps can be useful in determining the potential of a soil and in managing it for food and fiber production; in planning land use and developing soil resources; and in enhancing, protecting, and preserving the environment. More information for each map unit, or soil, is given in the section "Use and management of the soils."

Preceding the name of each map unit is the symbol that identifies the soil on the detailed soil maps. Each soil description includes general facts about the soil and a brief description of the soil profile. In each description, the principal hazards and limitations are indicated, and the management concerns and practices needed are discussed.

Each description is followed by a capability grouping, a land resource area designation (in parentheses), and a Storie index rating. These are explained in the sections "Capability classes and subclasses," "Land resource areas," and "Storie index rating."

The map units on the detailed soil maps represent an area on the landscape made up mostly of the soil or soils for which the unit is named. Most of the delineations shown on the detailed soil map are phases of soil series.

Soils that have profiles that are almost alike make up a soil series. Except for allowable differences in texture of the surface layer or of the underlying substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement in the profile. A soil series commonly is named for a town or geographic feature near the place where a soil of that series was first observed and mapped.

Soils of one series can differ in texture of the surface layer or in the underlying substratum and in slope, erosion, stoniness, salinity, wetness, or other characteristics that affect their use. On the basis of such differences, a soil series is divided into phases. The name of a soil phase commonly indicates a feature that affects use or management. For example, Watsonville loam, thick surface, 2 to 15 percent slopes, is one of several phases within the Watsonville series.

Some map units are made up of two or more dominant kinds of soil, for example, a soil complex.

A soil complex consists of areas of two or more soils that are so intricately intermingled or so small in size that they cannot be shown separately on the soil map. Each area includes some of each of the two or more dominant soils, and the pattern and proportion are somewhat similar in all areas. Tierra-Watsonville complex, 15 to 30 percent slopes, is an example.

Most map units include small, scattered areas of soils other than those that appear in the name of the map unit. Some of these soils have properties that differ substantially from those of the dominant soil or soils and thus could significantly affect use and management of the map unit. These soils are described in the description of each map unit. Some of the more unusual or strongly contrasting soils that are included are identified by a special symbol on the soil map.

Most mapped areas include places that have little or no soil material and support little or no vegetation. Such places are called miscellaneous areas; they are delineated on the soil map and given descriptive names. Dune land is an example. Some of these areas are too small to be delineated and are identified by a special symbol on the soil map.

The acreage and proportionate extent of each map unit are given in table 1, and additional information on properties, limitations, capabilities, and potentials for many soil uses is given for each kind of soil in other tables in this survey. (See "Summary of tables.") Many of the terms used in describing soils are defined in the Glossary.

Soil descriptions

100—Aptos loam, warm, 15 to 30 percent slopes. This moderately deep, well drained soil is on hills and mountains. It formed in material weathered from sandstone,

siltstone, or shale. Elevation ranges from 400 to 2,000 feet. The mean annual precipitation is about 35 inches, and the mean annual air temperature is about 59 degrees F. The frost-free season ranges from 245 to 270 days.

Typically, the surface layer is dark grayish brown and grayish brown, medium acid to slightly acid loam about 18 inches thick. The subsoil is grayish brown, slightly acid clay loam about 6 inches thick. The substratum is grayish brown, slightly acid shaly clay loam about 12 inches thick. Below this is light gray, weathered, fractured shale.

Included with this soil in mapping are areas of a soil that is similar to this Aptos soil but has relatively uniform texture throughout the profile and is 20 and 35 percent clay. Also included are areas of Elkhorn sandy loam and small areas of Bonnydoon loam, Los Osos loam, and soils that are similar to this Aptos soil but have slopes of less than 15 percent or more than 30 percent.

Permeability of this Aptos soil is moderate. Available water capacity is 3.5 to 5.0 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of erosion is moderate.

This soil is used mainly for range, wildlife habitat, watershed, and recreation. A few areas are used as homesites.

The native vegetation on this soil should be managed to increase the production of soft chess, wild oats, and blue wildrye. Continuous overgrazing causes the range to deteriorate; the proportion of desirable plants decreases, and the proportion of undesirable plants increases. Control of narrowleaf plantain, mustards, poison-oak, coyotebrush, and California live oak improves the range.

The potential is good for habitat for deer, opossum, rabbit, bobcat, skunk, coyote, gray fox, band-tailed pigeon, quail, dove, meadowlark, hawk, and owl. Small natural brush areas should be maintained as wildlife habitat.

This soil is severely limited for use as homesites by the slope. It is severely limited for use as septic tank absorption fields by slope and depth to rock. Only the part of the site used for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas that are disturbed by cutting and filling. Capability unit IVe-1(15)(4), nonirrigated; Storie index 57.

101—Aptos loam, warm, 30 to 50 percent slopes. This moderately deep, well drained soil is on hills and mountains. The soils formed in material weathered from sandstone, siltstone, and shale. Elevation ranges from 400 to 2,000 feet. The mean annual precipitation is about 35 inches, and the mean annual air temperature is about 59 degrees F. The frost-free season ranges from 245 to 270 days.

Typically, the surface layer is dark grayish brown and grayish brown, medium acid to slightly acid loam about 18 inches thick. The subsoil is grayish brown, slightly acid clay loam about 6 inches thick. The substratum is grayish brown, slightly acid shaly clay loam about 12 inches thick. Below this is light gray, weathered, fractured shale.

Included with this soil in mapping are areas of a soil that is similar to this Aptos soil but has relatively uniform texture throughout the profile and is 20 and 35 percent clay. Also included are areas of Elkhorn sandy loam and small areas of Bonnydoon loam, Los Osos loam, and soils that are similar to this Aptos soil but have slopes of less than 30 percent or more than 50 percent.

Permeability of this Aptos soil is moderate. The available water capacity is 3.5 to 5.0 inches. The effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of erosion is high.

This soil is used mainly for range, watershed, wildlife habitat, and recreation. A few areas are used as homesites.

The natural vegetation on this soil should be managed to increase the production of soft chess, wild oats, blue wildrye, and blueblossom ceanothus. Continuous overgrazing and other poor management practices create a less favorable plant composition and reduce the productivity of the site. Control of undesirable plants, such as narrowleaf plantain, mustard, poison-oak, coyotebrush, and California live oak, increases the production of forage suitable for livestock. Range management practices are needed on some slopes to insure use of forage. The very steep slopes generally are not grazed by livestock.

The potential is good for habitat for deer, opossum, rabbit, bobcat, skunk, coyote, gray fox, quail, dove, meadowlark, hawk, and owl. Small natural brush areas should be maintained to provide food and cover for wildlife.

This soil is severely limited for use as homesites by the slope. It is severely limited for use as septic tank absorption fields by slope and depth to rock. Only the part of the site used for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by bankcutting and filling. Capability subclass VIe(15)(4), nonirrigated; Storie index 29.

102—Aptos loam, warm, 50 to 75 percent slopes. This moderately deep, well drained soil is on hills and mountains. It formed in material weathered from sandstone, siltstone, and shale. Elevation ranges from 400 to 2,000 feet. The mean annual precipitation is about 35 inches, and the mean annual air temperature is about 59 degrees F. The frost-free season ranges from 230 to 270 days.

Typically, the surface layer is dark grayish brown and grayish brown, medium acid to slightly acid loam about 18 inches thick. The subsoil is grayish brown, slightly acid clay loam about 6 inches thick. The substratum is grayish brown, slightly acid shaly clay loam about 12 inches thick. Below this is light gray, weathered, fractured shale.

Included with this soil in mapping are areas of a soil that is similar to this Aptos soil but has relatively uniform texture throughout the profile and is 20 and 35 percent clay. Also included are small areas of Bonnydoon loam, Los Osos loam, and soils that are similar to this Aptos soil but have slopes of less than 50 percent.

Permeability of this Aptos soil is moderate. Available water capacity is 3.5 to 5.0 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of erosion is very high.

This soil is used mainly for range, wildlife habitat, watershed, and recreation.

The native vegetation on this soil should be managed to increase the production of soft chess, wild oats, blue wildrye, and blueblossom ceanothus. Continuous overgrazing and other poor management practices create a less favorable plant composition and reduce the productivity of the site. Control of undesirable plants, such as narrowleaf plantain, mustard, poison-oak, coyotebrush, and California live oak, increases the production of forage suitable for livestock. Range management practices are needed on some slopes to insure uniform use of forage. The very steep slopes generally are not grazed by livestock.

The potential is good for habitat for deer, rabbit, bobcat, coyote, gray fox, quail, dove, meadowlark, hawk, and owl. Small natural brush areas should be maintained to provide food and cover for wildlife.

This soil is severely limited for use as homesites and for septic tank absorption fields by the very steep slope. Homes should be constructed only in the less sloping areas. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability subclass VIIe(15)(5), nonirrigated; Storie index 18.

103—Aquents, flooded. Aquents consist of sandy to clayey sediment and mucky and peaty material that are frequently inundated by tides and runoff water. The areas are along the coast and in narrow valleys near the coast and leading to the lakes in the survey area. Elevation ranges from sea level to about 50 feet. The mean annual precipitation ranges from 20 to 30 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

Included with this unit in mapping are areas of Fluventic Haploxerolls, Aquic Xerofluvents, and organic soils consisting of muck and peat. Small areas of Soquel soils are also included.

Drainage is very poor, and runoff is very slow. There is no hazard of erosion, or the hazard is slight, except when runoff is rapid. Deposition and streambank cutting take place if drainageways are not maintained. Depth to the water table ranges from 10 inches in winter to 40 inches in summer. Effective rooting depth is as much as 60 inches for water-loving plants but is less for water-sensitive plants.

The vegetation is commonly reeds, tules, willows, and, in a few places, pickleweed.

This unit is used mainly for wildlife habitat and recreation. A few areas are used for limited grazing. Some areas can be reclaimed, but the economic and environmental impact of reclamation should be considered. Capability subclass VIw(14), nonirrigated; Storie index not assigned.

104—Baywood loamy sand, 0 to 2 percent slopes. This very deep, somewhat excessively drained soil is in narrow valleys. It formed in eolian deposits. Elevation ranges from 20 to 300 feet. The mean annual precipitation is about 28 inches, and the mean annual air temperature is about 58 degrees F. The average frost-free season ranges from 245 to 275 days.

Typically, the surface layer is brown, slightly acid loamy sand 17 inches thick. The underlying material is brown, slightly acid loamy sand to a depth of 61 inches. In a few areas the surface layer is fine sand.

Included with this soil in mapping are small areas of Elder sandy loam and Elkhorn sandy loam. Also included are areas of a soil that is similar to this Baywood soil but has a light brownish gray and pale brown surface layer; soils that have an intermittent water table and are subject to deposition; and soils that have a compact, mottled substratum that is sandy loam to clay at a depth of more than 48 inches.

Permeability of this Baywood soil is rapid. The available water capacity is 3.5 to 5.0 inches. Effective rooting depth is 60 inches. Surface runoff is slow, and the hazard of erosion is slight. Soil blowing is a hazard where the surface is not protected. This soil is subject to rare flooding.

Most areas of this soil are cultivated. A few areas are being developed as homesites. The main crop is strawberries. Moderately high production of apples, brussels sprouts, and bushberries is attained if management is good.

This soil is well suited to strawberries because drainage is excellent. If the soil is cultivated, fertility can be maintained by using such practices as green manure crops and cover crops, application of animal manure, and fertilization. Organic matter can generally be maintained by using crop residue and applying manure. Strawberries require sprinkler irrigation combined with a level furrow system. Other crops require only sprinkler irrigation.

The potential is fair for habitat for deer, rabbit, squirrel, bobcat, coyote, gray fox, quail, dove, meadowlark, hawk, and owl.

Rapid population growth, especially in the coastal area, has resulted in increased home construction on this soil. This soil is rarely flooded; nevertheless, flooding is a hazard so houses should not be built on this soil. Using this soil as a septic tank filter field can result in the contamination of ground water. Only the part of the site used for construction should be disturbed, and all disturbed areas should be revegetated as soon as possible. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability subclass IIIs(4)(14), irrigated and nonirrigated; Storie index 72.

105—Baywood loamy sand, 2 to 15 percent slopes. This very deep, somewhat excessively drained soil is on sand dunes. It formed in eolian deposits. Elevation ranges from 20 to 800 feet. The mean annual precipitation is about 29 inches, and the mean annual air temperature is about 58 degrees F. The average frost-free season ranges from 245 to 275 days.

Typically, the surface layer is brown, slightly acid loamy sand 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand and sand. In a few areas the surface layer is fine sand.

Included with this soil in mapping are areas of Elder sandy loam and Elkhorn sandy loam and small areas of

Tierra sandy loam, Watsonville loam, and soils that are similar to this Baywood soil but have slopes of less than 2 percent or more than 15 percent. Also included are small areas of soils that have been subject to rill erosion because of tillage. There are occasional small gullies about 1 foot to 2 feet deep and about 100 feet long in drainageways.

Permeability of this Baywood soil is rapid. Available water capacity is 3.5 to 5.5 inches. Effective rooting depth is 60 inches. Surface runoff is slow to medium, and the hazard of erosion is slight to moderate. Soil blowing is a hazard if the surface is not protected.

Most areas of this soil are cultivated. A few areas are being developed as homesites. The main crop is strawberries. Moderately high production of apples, brussels sprouts, and bushberries is attained if management is good. If this soil is cultivated, soil fertility can be maintained by using green manure crops and cover crops, and applying animal manure and other fertilizers. This soil is well suited to strawberries because drainage is excellent. Level terraces can be used to reduce runoff and erosion on the steeper slopes. The organic matter content can generally be maintained by using crop residue and applying animal manure. Strawberries are irrigated by a sprinkler system in the early part of the growing season and by a contour furrow system in the later stages of growth. A high level of management is required to prevent erosion if contour furrow irrigation is used. All other crops are irrigated by a sprinkler system.

The potential is fair for habitat for deer, rabbit, squirrel, bobcat, coyote, gray fox, quail, dove, meadowlark, hawk, and owl.

Rapid population growth, especially in the coastal area, has resulted in increased construction of homes on this soil. Where slope is more than 8 percent, this soil is moderately limited for use as homesites and as septic tank absorption fields. Because of rapid soil permeability, effluent from septic tank systems can contaminate ground water. Only the part of the site used for construction should be disturbed, and all disturbed areas should be revegetated as soon as possible to reduce the hazard of erosion. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability unit IVe-1(14), irrigated, and capability subclass VIe(14), nonirrigated; Storie index 58.

106—Baywood loamy sand, 15 to 30 percent slopes. This very deep, somewhat excessively drained soil is on sand dunes. It formed in eolian deposits. Elevation ranges from 20 to 800 feet. The mean annual precipitation is about 29 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

Typically, the surface layer is brown, slightly acid loamy sand 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand and sand. In a few areas the surface layer is fine sand.

Included with this soil in mapping are areas of Elkhorn soils; small areas of Elder, Tierra, and Watsonville soils; small areas of soils that are similar to this Baywood soil but have a light brownish gray and pale brown surface layer; and small areas of similar soils that have slopes of less than 15 percent or more than 30 percent. Also included are areas of soils that have been subject to rill erosion because of the tillage practices used. Small gullies about 1 foot to 2 feet deep and about 100 feet long have formed in drainageways but are disguised by constant reshaping and smoothing of the soil surface.

Permeability of this Baywood soil is rapid. The available water capacity is 3.5 to 5.5 inches. Effective rooting depth is 60 inches. Surface runoff is medium, and the hazard of erosion is moderate.

Most areas of this soil are cultivated. A few areas are used as rangeland or are being developed as homesites. The main crop is strawberries.

Moderately high production of apples and brussels sprouts is attained if management is good. Fertility is maintained by use of green manure crops and cover crops, application of animal manure, and fertilization. This soil is well suited to strawberries because drainage is excellent. Cover provided by crops or crop residue minimizes erosion in winter. The organic matter content can generally be maintained by using crop residue and applying animal manure. Strawberries are irrigated by a sprinkler system during the early part of the growing season and by a contour furrow system during the later stages of growth. A high level of management is required to prevent erosion if contour furrow irrigation is used. All other crops are irrigated by a sprinkler system.

If this soil is used for range, the vegetation should be managed to increase the production of soft chess and blue wildrye. If the soil is overgrazed, the range deteriorates; as the proportion of desirable plants decreases, the proportion of undesirable plants increases. Control of poison-oak and California live oak improves the condition of the range. Livestock grazing on this soil increases the hazard of erosion because of hoof damage to the sandy soil. Management practices are needed to control the distribution of grazing and to prevent the removal of too much of the plant cover. Brush management generally should be limited to the removal by hand of undesirable brush species.

The potential is fair for deer, rabbit, squirrel, bobcat, coyote, gray fox, quail, dove, meadowlark, hawk, and owl.

Rapid population growth, especially in the coastal area, has resulted in increased home construction on this soil. Slope imposes severe limitations to use of this soil as homesites and as septic tank absorption fields. Because the soil is rapidly permeable, effluent from absorption fields can contaminate ground water. Only the part of the site used for construction should be disturbed, and all disturbed areas should be revegetated as soon as possible. Steep banks on road cuts or in other disturbed areas erode easily and are subject to sloughing if they are not properly designed (fig. 4). Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability subclasses VIe(14), irrigated, and VIe(14), nonirrigated; Storie index 49.

107—Baywood loamy sand, 30 to 50 percent slopes. This very deep, somewhat excessively drained soil is on sand dunes along the coast and near the base of foothills. It formed in eolian deposits. Elevation ranges from 20 to 800 feet but is dominantly more than 400 feet. The mean annual precipitation is about 30 inches, and the mean annual air temperature is about 58 degrees F. The average frost-free season ranges from 245 to 275 days.

Typically, the surface layer is brown, slightly acid loamy sand 17 inches thick. The underlying material to a depth of 61 inches is brown, slightly acid loamy sand and sand. In a few areas the surface layer is fine sand.

Included with this soil in mapping are areas of Elkhorn soils and small areas of Pfeiffer, Tierra, and Watsonville soils and soils that are similar to this Baywood soil but have a light brownish gray and pale brown surface layer. Also included are a few areas of soils that have slopes of 50 to 60 percent or less than 30 percent.

Permeability of this Baywood soil is rapid. Available water capacity is 3.5 to 5.5 inches. Effective rooting depth is 60 inches. Surface runoff is rapid, and the hazard of erosion is high. Most areas are only slightly eroded, but a few areas have been subject to moderate or severe rill and gully erosion. Soil blowing is a hazard if the surface is not protected.

Most areas of this soil are rangeland. A few areas are being developed as homesites.

The vegetation on this soil should be managed to increase the production of soft chess and blue wildrye. If the soil is overgrazed, the range deteriorates; the proportion of desirable plants decreases, and the proportion of undesirable plants increases. Control of poison-oak, manzanita, and California live oak improves the range. Livestock grazing can increase the hazard of erosion because of hoof damage to the sandy soil. Deferred grazing and other grazing management practices are needed to prevent the removal of too much of the plant cover. Brush management practices generally should be limited to removal by hand of undesirable brush.

The potential is fair for habitat for deer, rabbit, squirrel, bobcat, coyote, gray fox, quail, dove, meadowlark, hawk, and owl.

Rapid population growth, especially in the coastal area, has resulted in increased home construction on this soil. This soil is severely limited by slope for use as homesites and as septic tank absorption fields. Only the part of the site used in construction should be disturbed, and all disturbed areas should be revegetated as soon as possible to reduce the hazard of erosion. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability subclass VIe(14), nonirrigated; Storie index 25.

108—Baywood Variant loamy sand. This very deep, nearly level, moderately well drained soil is mainly on alluvial plains. It formed in sedimentary alluvium. Slope ranges from 0 to 2 percent. Elevation ranges from 20 to 350 feet. The mean annual precipitation is about 25 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

Typically, the surface layer is brown, slightly acid loamy sand about 10 inches thick over brown, yellowish brown, and dark grayish brown, mildly alkaline sand and loamy sand 28 inches thick. Below this is a buried surface layer of black, moderately alkaline clay loam 17 inches thick over brown, neutral sandy loam that extends to a depth of more than 70 inches.

Included with this soil in mapping are areas of Baywood and Elder soils and small areas of Conejo and Soquel soils.

Permeability of this Baywood soil is rapid above the buried layer and slow through the buried layer. Available water capacity is 5.5 to 7.0 inches. Surface runoff is slow, and hazard of erosion is slight. Soil blowing is a hazard in clean-cultivated areas. Depth to a seasonal high water table is 2 to 4 feet. This soil is subject to rare flooding from November to March.

Most areas of this soil are cultivated. The main crops are apples, strawberries, and bushberries. This soil is best suited to shallow rooted crops. A few areas are being developed as homesites.

If this soil is cultivated, cover crops and green-manure crops, fertilization, and crop residue management are needed to maintain tilth and fertility. Most crops must be irrigated. Drainage and irrigation water management are needed to prevent a perched water table. Furrow and sprinkler systems are most commonly used. Surface and subsurface drainage systems are needed in places. The organic matter content generally can be maintained by returning crop residue to the soil. Most crops respond to nitrogen, and some respond to phosphorus and potassium.

The potential is good for habitat for deer, rabbit, squirrel, gopher, mole, bobcat, coyote, quail, dove, hawk, and owl. Because this soil is intensively cultivated, the wildlife population is limited.

Rapid population growth has resulted in increased home construction on this soil. Because of flooding and a perched water table, however, homes should not be built on this soil. Because of the slow permeability of strata below a depth of about 3 feet, septic tank absorption fields can fail. Also, because of the danger of flooding, septic tank systems can cause contamination of surface water. Capability unit IIIs-3(14), irrigated and nonirrigated; Storie index 51.

109—Beaches. Beaches consist of narrow strips between the ocean and the dune lands or coastal cliffs, and they include the beaches at the deltas of rivers and creeks. The highest part of this map unit is subject to wave action only during very high tides. Beaches were formed by marine deposits and are made up of sand, pebbles, and some cobbles and stones. The amount of deposits varies with inland management practices and the seasonal runoff that carries sediment to the beaches. Ocean tides, waves, and currents prevent the finer soil particles from settling on the beaches.

Included with this unit in mapping are very narrow, extremely steep coastal cliffs and small areas of Dune land.

The hazard of erosion by ocean waves, tides, and current is very high. Soil blowing is also a hazard.

This unit is used mainly for recreation and wildlife habitat. Capability subclass VIIw(14), nonirrigated; Storie index 0.

110—Ben Lomond sandy loam, 5 to 15 percent slopes. This deep, well drained soil is on ridgetops, on short side slopes, and in rolling areas in the Santa Cruz and Ben Lomond Mountains. It formed in residuum derived from sandstone or granitic rock. Slopes are convex. Elevation ranges from 400 to 3,000 feet but is dominantly about 2,000 feet. The mean annual precipitation is about 5 inches, and the mean annual air temperature is about 55 degrees F. The frost-free season ranges from 220 to 230 days.

Typically, the soil is covered by a 2-inch mat of partially decomposed needles and twigs. The surface layer is dark grayish brown, slightly acid and neutral sandy loam about 19 inches thick. The subsoil is brown, medium acid sandy loam about 11 inches thick. The substratum is pale brown, medium acid sandy loam about 16 inches thick. Weathered sandstone is at a depth of 46 inches.

Included with this soil in mapping are areas of Catelli and Nisene soils and small areas of Aptos, Felton, Lompico, Sur, and Zayante soils. Also included are small areas of soils that are similar to this Ben Lomond soil but are somewhat poorly drained; soils that are similar but formed in alluvium and are 5 feet to more than 10 feet deep to bedrock; and soils that are similar but have slopes of 15 to 30 percent.

Permeability of this Ben Lomond soil is moderately rapid. Effective rooting depth is 40 to 60 inches. Available water capacity is 4 to 8.5 inches. Runoff is medium, and the hazard of erosion is slight to moderate.

This soil is used mainly for timber production, recreation, wildlife habitat, and watershed. It is also used as homesites and for apple orchards, Christmas tree farms, tree nurseries, and pasture.

This soil is well suited to the production of Douglas-fir. It is capable of producing 12,880 cubic feet, or 65,800 board feet (International rule), of merchantable timber per acre from a fully stocked, even-aged stand of 80-year-old trees.

This soil is suited to apple orchards. Use of minimum tillage and winter cover crops helps to control erosion. The return of crop residue to the soil or the regular addition of other organic matter helps to maintain fertility and increases water infiltration.

Forested areas of this soil provide habitat for band-tailed pigeon, jay, hawk, deer, raccoon, coyote, bobcat, rabbit, squirrel, and mice.

Rapid population growth in the county has resulted in increased home construction on this soil. Because of the slope, this soil is slightly to moderately limited for this use and as septic tank absorption fields. Only the part of the area used for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability unit IIe-1(4), nonirrigated; Storie index 69.

111—Ben Lomond sandy loam, 15 to 50 percent slopes. This deep, well drained soil is on long side slopes. About 80 percent of the soil is hilly, and 20 percent has steep, complex slopes. It formed in residuum derived from sandstone or granitic rock. Elevation ranges from 400 to 3,000 feet. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 55 degrees F. The frost-free season ranges from 220 to 245 days.

Typically, the soil is covered by a 2-inch mat of partially decomposed needles and twigs. The surface layer is dark grayish brown, slightly acid and neutral sandy loam about 19 inches thick. The subsoil is brown, medium acid sandy loam about 11 inches thick. The substratum is pale brown, medium acid sandy loam about 16 inches thick. Weathered sandstone is at a depth of 46 inches.

Included with this soil in mapping are areas of Nisene soils and small areas of Aptos, Felton, Lompico, and Sur soils. Also included are areas of soils that are similar to this Ben Lomond soil but have slopes of less than 15 percent.

Permeability of this Ben Lomond soil is moderately rapid. Effective rooting depth is 40 to 60 inches. Available water capacity is 4.0 to 8.5 inches. Runoff is rapid, and the hazard of erosion is moderate to high.

This soil is used mainly for timber production, recreation, wildlife habitat, and watershed. It is also used as homesites and for firewood production and apple orchards.

This soil is well suited to the production of Douglas-fir. It is capable of producing 12,880 cubic feet, or 65,800 board feet (International rule), of merchantable timber per acre from a fully stocked, even-aged stand of 80-year-old trees.

Use of contour farming, minimum tillage, and winter cover crops helps to control erosion. The return of crop residue or the regular addition of other organic matter helps to maintain fertility and increases water infiltration.

Forested areas provide habitat for band-tailed pigeon, jay, hawk, deer, raccoon, coyote, bobcat, rabbit, squirrel, and mice.

Rapid population growth in the county has resulted in increased construction of homes on this soil. Slope severely limits the use of this soil as homesites and as septic tank absorption fields. Only the part of the site used for construction should be disturbed. Topsoil should be stockpiled and used to reclaim the area disturbed by cutting and filling. Capability subclass VIe(4), nonirrigated; Storie index 111.

112—Ben Lomond sandy loam, 50 to 75 percent slopes. This deep, well drained soil is on long and complex or convex side slopes. The soil formed in residuum derived from sandstone or granitic rock. Some areas extend from ridgetops to streams, but most are near the ridges. Elevation ranges from 400 to 3,000 feet. The mean annual precipitation is about 50 inches, and the mean annual air temperature is about 55 degrees F. The frost-free season ranges from 220 to 245 days.

Typically the soil is covered by a 2-inch mat of partially decomposed needles and twigs. The surface layer is dark grayish brown, slightly acid and neutral sandy loam about 19 inches thick. The subsoil is brown, medium acid sandy loam about 11 inches thick. The substratum is pale brown, medium acid sandy loam about 16 inches thick. Weathered sandstone is at a depth of 46 inches.

Included with this soil in mapping are areas of Catelli, Sur, Felton, and Nisene soils. Also included are small areas of Aptos, Lompico, and Madonna soils and areas of soils that are similar to this Ben Lomond soil but have slopes of 30 to 50 percent.

Permeability of this Ben Lomond soil is moderately rapid. Effective rooting depth is 40 to 60 inches. Available water capacity is 4.0 to 8.5 inches. Runoff is very rapid, and the hazard of erosion is very high.

This soil is used mainly for timber production, recreation, wildlife habitat, and watershed. It is also used for firewood production.

This soil is well suited to the production of Douglas-fir. It is capable of producing 12,880 cubic feet, or 65,800 board feet (International rule), of merchantable timber per acre from a fully stocked, even-aged stand of 80-year-old trees.

Forested areas of this soil provide habitat for band-tailed pigeon, jay, hawk, deer, raccoon, coyote, bobcat, rabbit, squirrel, and mice.

This soil is poorly suited to use as building sites and for onsite sewage disposal because it has very steep slopes. Capability subclass VIIe(4), nonirrigated; Storie index 20.

113—Ben Lomond-Catelli-Sur complex, 30 to 75 percent slopes. This complex is on mountains. Most areas extend from ridgetops to drainageways, but a few areas occupy only small parts of mountainsides. Slopes are long and complex. Elevation ranges from 400 to 3,000 feet. The mean annual precipitation is about 48 inches, and the mean annual air temperature is about 55 degrees F. The frost-free season ranges from 220 to 245 days.

This complex is about 30 percent Ben Lomond sandy loam, 30 percent Catelli sandy loam, and 20 percent Sur stony sandy loam. The Catelli soil makes up as much as 45 percent of the southwesterly slopes of the Ben Lomond and Santa Cruz Mountains. The Sur soil is on some ridges and on some fingers of rock areas that are parallel to the ridges.

Included with these soils in mapping are small areas of Aptos sandy loam, Felton sandy loam, Lompico loam, Maymen stony loam, Nisene loam, Zayante coarse sand, and a soil that is similar to the Catelli soil but is more than 40 inches deep to parent rock. Also included are areas of soils that are similar to the Sur soil but are stony loamy sand and stony sand. Included soils make up about 20 percent of this complex.

The Ben Lomond soil is deep and well drained. It formed in residuum derived from sandstone or quartz diorite. Typically, the soil is covered by a 2-inch mat of partially decomposed needles and twigs. The surface layer is dark grayish brown, slightly acid and neutral sandy loam about 19 inches thick. The subsoil is brown, medium acid sandy loam about 11 inches thick. The substratum is pale brown, medium acid sandy loam about 16 inches thick. Weathered sandstone is at a depth of 46 inches.

Permeability of the Ben Lomond soil is moderately rapid. Effective rooting depth is 40 to 60 inches. Available water capacity is 4.0 to 8.5 inches. Runoff is rapid to very rapid, and the hazard of erosion is high to very high.

The Catelli soil is moderately deep and well drained. It formed in residuum derived from sandstone or granitic rock. Typically, the soil is covered by a 3-inch mat of partially decomposed leaves, bark, and twigs. The surface layer is brown, slightly acid sandy loam about 7 inches thick. The subsoil is yellowish brown and light yellowish brown, slightly acid and medium acid sandy loam about 16 inches thick. The substratum is very pale brown, strongly acid sandy loam about 14 inches thick. Weathered sandstone is at a depth of 37 inches.

Permeability of the Catelli soil is moderately rapid. Effective rooting depth is 20 to 40 inches. Available water capacity is 2 to 5 inches. Runoff is rapid to very rapid, and the hazard of erosion is high to very high.

The Sur soil is moderately deep and somewhat excessively drained. It formed in residuum derived from sandstone, schist, or granitic rock. Typically, the soil is covered by a 1-inch mat of needles, leaves, and twigs. The surface layer is brown, neutral and slightly acid stony sandy loam about 18 inches thick. The underlying material is reddish yellow, medium acid very stony sandy loam. Unweathered granodiorite is at a depth of 35 inches.

Permeability of the Sur soil is moderately rapid. Effective rooting depth is 20 to 40 inches. Available water capacity is 1.0 to 3.5 inches. Runoff is rapid to very rapid, and the hazard of erosion is high to very high.

These soils are used mainly for timber production, recreation, wildlife habitat, and watershed. They are also used for firewood production and as homesites.

The Ben Lomond soil is well suited to the production of redwood and Douglas-fir, the Catelli soil is somewhat well suited, and the Sur soil is somewhat poorly suited. In a few areas the Sur soil supports Ponderosa pine and Coulter pine. The potential production of merchantable timber from a fully stocked, even-aged stand of redwood trees 80 years old is about 13,360 cubic feet, or 70,000 board feet (International rule), on the Ben Lomond soil; about 10,240 cubic feet, or 42,600 board feet (International rule), on the Catelli soil; and about 5,510 cubic feet, or 10,200 board feet (International rule), on the Sur soil. The Ben Lomond soil is better suited to timber production than either the Catelli or Sur soil because it is a deeper soil. This complex is limited for the production of timber mainly by the presence of bedrock at a depth of 20 to 40 inches in the Catelli and Sur soils and by the rock fragment content of 35 percent or more in the Sur soil. The moderate depth and high rock fragment content of these soils limit rooting depth and available water capacity.

This complex provides habitat for band-tailed pigeon, jay, hawk, deer, raccoon, coyote, bobcat, rabbit, squirrel, mice, salamander, tree frog, lizard, and snake.

These soils are poorly suited to building site development and onsite sewage disposal because of their steep and very steep slopes. Capability subclass VIIe(4), nonirrigated; Storie index 20.

114—Ben Lomond-Felton complex, 30 to 50 percent slopes. This complex consists mainly of soils in concave areas near drainageways. Elevation ranges from 400 to 3,000 feet but is dominantly less than 2,000 feet. The mean annual precipitation is about 45 inches, and the mean annual air temperature is about 56 degrees F. The frost-free season ranges from 220 to 245 days.

This complex is about 35 percent Ben Lomond sandy loam and 35 percent Felton sandy loam.

Included with these soils in mapping are areas of Nisene loam, Aptos sandy loam, and Lompico loam. Also included are small areas of Catelli sandy loam, Hecker gravelly sandy loam, and soils that are similar to these Ben Lomond and Felton soils but have slopes of less than 30 percent or more than 50 percent.

The Ben Lomond soil is deep and well drained. It formed in residuum derived from sandstone or granitic rock. Typically, the soil has a 2-inch mat of partially decomposed needles and twigs. The surface layer is dark grayish brown, slightly acid and neutral sandy loam about 19 inches thick. The subsoil is brown, medium acid sandy loam about 11 inches thick. The substratum is pale brown, medium acid sandy loam about 16 inches thick. Weathered sandstone is at a depth of 46 inches.

Permeability of the Ben Lomond soil is moderately rapid. Effective rooting depth is 40 to 60 inches. Available water capacity is 4.0 to 7.5 inches. Runoff is rapid, and the hazard of erosion is high.

The Felton soil is deep and well drained. It formed in residuum derived from sandstone, shale, schist, or siltstone. Typically, the surface layer is dark grayish brown and brown, slightly acid sandy loam about 11 inches thick. The subsoil is brown and yellowish red, slightly acid and strongly acid sandy clay loam and clay loam about 32 inches thick. The substratum is variegated light brownish gray and light olive brown, strongly acid loam and sandy loam about 20 inches thick. Weathered sandstone is at a depth of 63 inches.

Permeability of the Felton soil is moderately slow. Effective rooting depth is 40 to 72 inches. Available water capacity is 5.5 to 10.0 inches. Runoff is rapid, and the hazard of erosion is high.

These soils are used mainly for timber, recreation, wildlife habitat, and watershed. They are also used for firewood production and as homesites.

This complex is well suited to the production of redwood. It is capable of producing 13,360 cubic feet, or 70,000 board feet (International rule), of merchantable timber per acre from a fully stocked, even-aged stand of 80-year-old trees.

This complex provides habitat for band-tailed pigeon, jay, hawk, deer, raccoon, coyote, bobcat, rabbit, squirrel, mice, salamander, tree frog, lizard, and snake.

These soils are poorly suited to building site development and onsite sewage disposal because they have steep slopes. Capability subclass VIe(4), nonirrigated; Storie index 32.

115—Ben Lomond-Felton complex, 50 to 75 percent slopes. This complex is dominantly in concave areas near drainageways. Elevation ranges from 400 to 3,000 feet. The mean annual precipitation is about 45 inches, and the mean annual air temperature is about 56 degrees F. The frost-free season ranges from 220 to 245 days.

This complex is about 35 percent Ben Lomond sandy loam and 35 percent Felton sandy loam.

Included with these soils in mapping are areas of Nisene loam, Aptos sandy loam, and Lompico loam. Also included are small areas of Catelli sandy loam, Hecker gravelly sandy loam, and soils that are similar to the Ben Lomond and Felton soils but have slopes of 75 to 90 percent slopes.

The Ben Lomond soil is deep and well drained. It formed in residuum derived from sandstone or granitic rock. Typically, the soil is covered by a 2-inch mat of partially decomposed needles and twigs. The surface layer is dark grayish brown, slightly acid and neutral sandy loam about 19 inches thick. The subsoil is brown, medium acid sandy loam about 11 inches thick. The substratum is pale brown, medium acid sandy loam about 16 inches thick. Weathered sandstone is at a depth of 46 inches.

Permeability of the Ben Lomond soil is moderately rapid. Effective rooting depth is 40 to 60 inches. Available water capacity is 4.0 to 8.5 inches. Runoff is very rapid, and the hazard of erosion is very high.

The Felton soil is deep and well drained. It formed in residuum derived from sandstone, shale, schist, or siltstone. Typically, the surface layer is dark grayish brown and brown, slightly acid sandy loam about 11 inches thick. The subsoil is brown and yellowish red, slightly acid and strongly acid sandy clay loam and clay loam about 32 inches thick. The substratum is variegated light brownish gray and light olive brown, strongly acid loam and sandy loam about 20 inches thick. Weathered sandstone is at a depth of 63 inches.

Permeability of the Felton soil is moderately slow. Effective rooting depth is 40 to 70 inches. Available water capacity is 5.5 to 10.0 inches. Runoff is very rapid, and the hazard of erosion is very high.

These soils are used mainly for timber, recreation, wildlife habitat, and watershed. They are also used for firewood production.

These soils are well suited to the production of redwood and Douglas-fir. From a fully stocked, even-aged stand of 80-year-old trees, the soils are capable of producing about 13,360 cubic feet, or 70,000 board feet (International rule) of merchantable redwood timber. The production of merchantable Douglas-fir timber is slightly lower on these soils.

This complex provides habitat for band-tailed pigeon, jay, hawk, deer, raccoon, coyote, bobcat, rabbit, squirrel, mice, salamander, tree frog, lizard, and snake.

These soils are poorly suited to building site development and onsite waste disposal because of their very steep slopes. Capability subclass VIIe(4), nonirrigated; Storie index 20.

116—Bonnydoon loam, 5 to 30 percent slopes. This shallow, somewhat excessively drained soil is mainly on south-facing side slopes of hills and mountains. It formed in residuum derived from sandstone, mudstone, or shale. Elevation ranges from about 100 to 2,100 feet. Slopes are convex. The mean annual precipitation is about 30 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 220 to 245 days.

Typically, the surface layer is grayish brown, slightly acid and medium acid loam about 11 inches thick. Weathered sandstone is at a depth of 11 inches.

Included with this soil in mapping are areas of a soil that is similar to this Bonnydoon soil but is loam and sandy loam and is less than 18 percent clay and areas of a soil that is similar to this Bonnydoon soil but has bedrock at a depth of 20 to 40 inches. Also included are small areas of Elkhorn sandy loam, Aptos loam, warm, Los Osos loam, Tierra sandy loam, Watsonville loam, and soils that are similar to this Bonnydoon soil but have slopes of more than 30 percent.

Permeability of this Bonnydoon soil is moderate. Effective rooting depth is 10 to 20 inches. Available water capacity is 1.5 to 3.5 inches. Runoff is medium or rapid, and the hazard of erosion is moderate to high.

This soil is used for range, but rapid population growth in the county has created a demand for homesites.

The vegetation on this soil should be managed to increase the production of soft chess, purple needlegrass, and clover. If overgrazed, the range deteriorates; the proportion of desirable forage plants decreases, and the proportion of undesirable plants increases. Control of California buckwheat, poison-oak, and coyotebrush improves the condition of the range.

The potential is fair for habitat for deer, rabbit, squirrel, bobcat, coyote, gray fox, quail, dove, meadowlark, hawk, and owl. Small areas of natural brush should be maintained for wildlife habitat.

This soil is severely limited for use as homesites by slope and depth to rock. Only the part of the site necessary for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability subclass VIIe(4), nonirrigated; Storie index 30.

117—Bonnydoon loam, 30 to 50 percent slopes. This shallow, somewhat excessively drained soil is on hills and mountains. It is mostly on south-facing side slopes. It formed in residuum derived from sandstone, mudstone, or shale. Slopes are convex. Elevation ranges from about 100 to 2,100 feet. The mean annual precipitation is about 30 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 220 to 245 days.

Typically, the surface layer is grayish brown, slightly acid and medium acid loam about 11 inches thick. Weathered sandstone is at a depth of 11 inches.

Included with this soil in mapping are areas of a soil that is similar to this Bonnydoon soil but is less than 10 inches deep to bedrock, a soil that is similar but has bedrock at a depth of 20 to 40 inches, and a soil that is similar but is loam and sandy loam and is less than 18 percent clay. Also included are small areas of Aptos loam, warm; Los Osos loam; Tierra sandy loam; Watsonville loam; and soils that are similar to this Bonnydoon soil but have slopes of less than 30 percent or more than 50 percent.

Permeability of this Bonnydoon soil is moderate. Effective rooting depth is 10 to 20 inches. Available water capacity is 1.5 to 3.5 inches. Runoff is rapid, and the hazard of erosion is high.

The soil is used mainly for range, but rapid growth of population in the county has resulted in a demand for homesites.

If this soil is used for range, the native vegetation should be managed to increase the production of soft chess, purple needlegrass, and clover. If overgrazed, the range deteriorates; the proportion of desirable forage plants decreases, and the proportion of undesirable plants increases. Control of California buckwheat, poison-oak, and coyotebrush improves the condition of the range. Areas treated by burning or by chemical or mechanical methods to remove brush may be susceptible to erosion.

The potential is fair for habitat for deer, rabbit, squirrel, bobcat, coyote, quail, dove, meadowlark, hawk, and owl. Small areas of natural brush cover should be maintained for wildlife habitat.

This soil is severely limited for use as homesites because of slope and depth to rock. Only the part of the site necessary for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability subclass VIIe(4), nonirrigated; Storie index 13.

118—Bonnydoon-Rock outcrop complex, 50 to 85 percent slopes. This complex is on hills and mountains. Elevation ranges from about 100 to 2,100 feet. The mean annual precipitation is about 30 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 220 to 245 days.

This complex is about 45 percent Bonnydoon loam and 20 percent Rock outcrop.

Included with this complex in mapping are areas of a soil that is similar to this Bonnydoon soil but has more than 35 percent rock fragments in the profile and is 10 to 40 inches deep to bedrock. Also included are small areas of Baywood loamy sand; Aptos loam, warm; Los Osos loam; a soil that is similar to this Bonnydoon soil but is 20 to 40 inches deep to bedrock; a soil that is similar but is less than 18 percent clay and is 20 to 40 inches deep to bedrock; and soils that are similar but have slopes of less than 50 percent or more than 85 percent.

The Bonnydoon soil is shallow and somewhat excessively drained. It formed in residuum derived from sandstone, mudstone, or shale. Typically, the surface layer is grayish brown, slightly acid and medium acid loam about 11 inches thick. It is underlain by weathered sandstone.

Permeability of the Bonnydoon soil is moderate. The effective rooting depth is 10 to 20 inches. Available water capacity is 1.5 to 3.5 inches. Runoff is rapid or very rapid, and the hazard of erosion is very high.

Rock outcrop is mostly on escarpments. The exposures are thin bedded, are horizontally oriented, and occur in narrow bands. In a few areas they jut out at random.

This complex is used for range and wildlife habitat. It is also used for watershed, recreation, and esthetic purposes. Capability subclass VIIe(4), nonirrigated; Storie index 5.

119—Clear Lake clay, moderately wet. This very deep soil is in alluvial basins. It has been artificially drained. Slope ranges from 0 to 2 percent. Elevation ranges from 20 to 100 feet. The mean annual precipitation is about 25 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

Typically, the surface layer is dark gray, neutral and mildly alkaline clay about 44 inches thick. The underlying material to a depth of 62 inches is grayish brown, moderately alkaline clay.

Included with this soil in mapping are areas of Conejo loam, a soil that is similar to this Clear Lake soil but has a water table at a depth of 20 to 36 inches, and soils that are similar but have a dark grayish brown surface layer. Also included, in the vicinity of the Pajaro Dunes and Shell Road, is about 60 acres of a soil that is poorly drained.

Permeability of this Clear Lake soil is slow. Available water capacity is about 7.0 to 9.5 inches. Effective rooting depth generally is 60 inches. For water-sensitive plants, however, the rooting depth is limited by the depth to the water table. The water table is at a depth of 36 to 72 inches. The water table has been lowered and maintained at this depth by pumping and by use of tile drains and diversion ditches. Runoff is very slow, and the hazard of erosion is slight.

This soil is used mainly for irrigated row crops. Crops commonly grown are brussels sprouts, strawberries, broccoli, and cauliflower. A few areas are used for irrigated pasture and as homesites.

Irrigation of this soil at a slow rate but for longer periods of time reduces the ponding of water on the surface. Tillage or field traffic when this soil is wet can cause extensive damage to its structure. The addition of organic matter improves the tilth and increases water infiltration.

If this soil is used for pasture, grazing should be restricted to times when the soil is not wet. Grazing when this soil is wet causes surface compaction, which results in poor aeration.

This soil is severely limited for community development by its high shrink-swell potential and low strength. This necessitates special design of dwellings, local roads, and streets. Slow permeability and the high water table increase the possibility of failure of septic tank filter fields. Surface drainage is needed if the soil is used as building sites. Capability units IIW-5(14), irrigated, and IIIw-5(14), nonirrigated; Storie index 43.

120—Conejo loam, 0 to 2 percent slopes. This very deep, well drained soil is on alluvial fans and plains. Elevation ranges from 20 to 250 feet. The mean annual precipitation is about 25 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

Typically, the surface layer is dark gray, neutral loam about 7 inches thick over dark gray and dark grayish brown, mildly alkaline to moderately alkaline loam and clay loam about 38 inches thick. The underlying material to a depth of 65 inches is grayish brown, moderately alkaline loam.

Included with this soil in mapping are small areas of Clear Lake clay, Elder sandy loam, Elkhorn sandy loam, San Emigdio sandy loam, Mocho silt loam, and somewhat poorly drained soils that are similar to this Conejo soil but have a water table at a depth of 30 to 60 inches.

Permeability of this Conejo soil is moderately slow. The available water capacity is 8.5 to 11.0 inches. Effective rooting depth is 60 inches. Runoff is slow, and the hazard of erosion is slight. A few areas are subject to rare flooding.

Most areas of this soil are intensively cultivated. The chief crops are apples, lettuce, strawberries, brussels sprouts, and bushberries. Most other crops commonly grown in the county are suited to this soil. A few areas are in irrigated pasture.

If this soil is properly managed, it is highly productive. Such practices as using green-manure crops and fertilization help to maintain tilth and fertility. Most crops require irrigation. The usual method of irrigation is by furrow and sprinkler systems. Subsurface drainage systems may be needed where drainage is inadequate. The organic matter content generally can be maintained by returning all crop residue to the soil. Most crops respond to nitrogen, and some respond to phosphorus.

The potential is good for habitat for deer, rabbit, squirrel, gopher, mole, bobcat, coyote, quail, dove, hawk, and owl. Wildlife habitat is limited because this soil is so intensively cultivated.

Rapid growth of population has resulted in increased construction of homes on this soil. The soil is only slightly limited for this use and is moderately limited for use as septic tank absorption fields. Capability subclass I(14), irrigated, and capability unit IIIc-1(14), nonirrigated; Storie index 95.

121—Conejo loam, 2 to 9 percent slopes. This very deep, well drained soil is on alluvial fans and terraces. Elevation ranges from 20 to 250 feet. The mean annual precipitation is about 25 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

Typically, the surface layer is dark gray, neutral loam about 7 inches thick over dark gray and dark grayish brown, mildly alkaline to moderately alkaline loam and clay loam about 38 inches thick. The underlying material

to a depth of 65 inches is grayish brown, moderately alkaline loam.

Included with this soil in mapping are small areas of Conejo clay loam, Cropley silty clay, and Elder sandy loam. Also included is an area of soils that are similar to this Conejo soil but are gravelly and have slopes of more than 9 percent.

Permeability of this Conejo soil is moderately slow. Available water capacity is 8.5 to 11.0 inches. Effective rooting depth is 60 inches. Runoff is medium, and the hazard of erosion is slight to moderate.

This soil is used mainly for irrigated crops. Crops most commonly grown are apples, lettuce, brussels sprouts, strawberries, bushberries, sugar beets, and irrigated pasture. A few areas are used for urban development.

If this soil is properly managed, it is highly productive. Such practices as cross-slope farming, using cover crops and green manure crops, and fertilization are needed to control erosion and to maintain tilth and fertility. Most crops require irrigation. Sprinkler irrigation is used, but furrow irrigation can be used in the less sloping areas. Bushberries and apples are grown in steeper areas of this soil.

Organic matter content can be maintained by returning all crop residue to the soil. All crops respond to nitrogen, and some crops respond to phosphorus. Many areas of this soil receive periodic applications of animal manure.

The potential is good for habitat for deer, rabbit, squirrel, gopher, mole, bobcat, coyote, quail, dove, hawk, and owl. Wildlife habitat is limited because this soil is so intensively cultivated.

Rapid growth of population has resulted in increased construction of homes on this soil. The soil is only slightly limited for this use and for use as septic tank absorption fields. Capability units IIe-1(14) irrigated, and IIIe-1(14), nonirrigated; Storie index 86.

122—Conejo clay loam, 0 to 2 percent slopes. This very deep, well drained soil is on old alluvial fans and plains. It is in nearly level areas adjacent to basins. Elevation ranges from 20 to 250 feet. The mean annual precipitation is about 25 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

Typically, the surface layer is dark gray, neutral clay loam about 7 inches thick over dark gray and dark grayish brown, mildly alkaline to moderately alkaline loam and clay loam about 38 inches thick. The underlying material to a depth of 65 inches is grayish brown, moderately alkaline loam.

Included with this soil in mapping are small areas of Clear Lake clay, Elder sandy loam, San Emigdio sandy loam, Mocho silt loam, and a soil that is similar to this Conejo soil but has mottles between depths of 45 and 72 inches.

Permeability of this Conejo soil is moderately slow. The available water capacity is 8.5 to 11.0 inches. Effective rooting depth is 60 inches. Runoff is slow, and the hazard of erosion is slight.

This soil is used mainly for irrigated row crops. The crops most commonly grown are apples, lettuce, brussels sprouts, strawberries, bushberries, cauliflower, sugar beets, cucumbers, and irrigated pasture.

If this soil is properly managed, it is highly productive. Green manure crops and fertilization help to maintain tilth and fertility. Most crops require irrigation. The usual methods of irrigation are the furrow and sprinkler systems. Subsurface drainage systems are needed in areas of poorly drained soils. Tillage and field traffic when the soils are wet severely damage the soil structure and tilth.

The organic matter content can generally be maintained by returning crop residue to the soil. Most crops respond to nitrogen, and some respond to phosphorus.

The potential is good for habitat for deer, rabbit, squirrel, gopher, mole, bobcat, coyote, quail, dove, hawk, and owl. Wildlife habitat is limited by the intensive cultivation of this soil.

Rapid growth of population has resulted in increased construction of homes on this soil. The soil is only slightly limited for use as homesites and is moderately limited for use as septic tank absorption fields. Capability subclass I(14), irrigated, and capability unit IIIc-1(14), nonirrigated; Storie index 77.

123—Cropley silty clay, 2 to 9 percent slopes. This very deep, well drained soil is on fans and benches. It formed in fine alluvium. Elevation ranges from 20 to 250 feet. The mean annual precipitation is about 25 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

Typically, the surface layer is very dark gray, moderately alkaline silty clay 28 inches thick. The upper part of the underlying material to a depth of 45 inches is mixed very dark gray and light olive gray, moderately alkaline, strongly effervescent silty clay. The lower part to a depth of 60 inches is mixed olive gray and pale olive, mildly alkaline silty clay loam.

Included with this soil in mapping are small areas of Diablo clay, Elkhorn sandy loam, Pinto loam, Tierra sandy loam, and Watsonville loam.

Permeability of this Cropley soil is slow. Available water capacity is 8 to 10 inches. Effective rooting depth is 60 inches or more. Runoff is slow or medium, and the hazard of erosion is slight.

This soil is used mainly for range or irrigated pasture. Selected irrigated row crops are also grown. Artichokes are the main crop. Water is applied with sprinklers and at a low rate of application.

Improved grasses and legumes are needed in a few areas. Fertility generally is sufficient for sustained high production of nonirrigated pasture, but annual applications of nitrogen are needed to obtain high production on irrigated pasture. Rotation of grazing is essential for sustained high production of grass.

If this soil is used for range, the native vegetation should be managed to increase the production of soft chess, pine bluegrass, and burclover. If overgrazed, the

range deteriorates; the proportion of desirable plants decreases, and the proportion of undesirable plants increases. Control of narrowleaf plantain and purple star thistle makes these areas more suitable for livestock grazing. Because this soil is subject to compaction when grazed during wet periods, a properly designed and implemented grazing management system is needed. The less sloping areas have fewer limitations for stock pond development. Stock ponds and other livestock watering facilities spaced at suitable intervals improve the distribution of livestock grazing.

The potential is fair for habitat for deer, opossum, rabbit, bobcat, coyote, gray fox, quail, dove, meadowlark, and hawk.

Rapid growth of the population of Watsonville has resulted in increased construction of homes on this soil. High clay content severely limits the use of this soil as housing sites and as septic tank absorption fields. This soil swells when it becomes wet and shrinks when it dries. The movement of the soil as a result of shrinking and swelling can damage building foundations, roads, and other structures if they are not properly constructed. Slow permeability caused by the high clay content also limits the use of this soil as septic tank absorption fields. Community sewage systems are better suited to this soil. Capability unit IIIe-5(15), irrigated and nonirrigated; Storie index 57.

124—Danville loam, 0 to 2 percent slopes. This very deep, well drained soil is on alluvial fans and in narrow valleys. It formed in alluvium. Elevation ranges from 20 to 600 feet. The mean annual precipitation is about 28 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

Typically, the surface layer is very dark gray, slightly acid loam and clay loam about 17 inches thick. The subsoil is dark grayish brown and brown, slightly acid and neutral clay and sandy clay loam about 25 inches thick. The substratum to a depth of 65 inches is brown, neutral clay loam and sandy clay loam.

Included with this soil in mapping are small areas of Conejo loam, Elder sandy loam, Elkhorn sandy loam, Pinto loam, Soquel loam, and soils that are similar to this Danville soil but have a pale brown or light brownish gray surface layer. Also included are a few areas of soils that have slopes of 5 percent.

Permeability of this Danville soil is slow. Available water capacity is 7.5 to 10.0 inches. Effective rooting depth is 60 inches. Surface runoff is slow, and there is no hazard of erosion, or the hazard is slight. During wet periods small intermittent streams can overflow and cause deposition. A few areas of this soil are subject to occasional flooding.

Most areas of this soil are cultivated. The chief crops are apples, lettuce, strawberries, brussels sprouts, bushberries, and irrigated pasture. Most other crops suited to the area can also be grown on this soil.

If this soil is properly managed, the production of crops is medium to moderate to high. Such practices as cover crops, green-manure crops, and fertilization are needed to control erosion and maintain tilth and fertility. Most crops require irrigation. Either sprinkler or furrow type systems are suitable. Organic matter content can be maintained by returning all crop residue. All crops respond to nitrogen, and some crops require phosphorus for highest production and quality.

The potential is good for habitat for deer, rabbit, squirrel, bobcat, coyote, gray fox, quail, dove, meadowlark, hawk, and owl.

Rapid growth of population in the county has resulted in increased construction of homes on this soil. Special design is needed for building pads, roads, and other related urban structures to compensate for the low strength and the shrink-swell potential of this soil. Because of the slow permeability, septic tank absorption fields often fail. Community sewage systems should be provided for these sites. Capability units IIs-3(14), irrigated, and IIIs-3(14), nonirrigated; Storie index 65.

125—Danville loam, 2 to 9 percent slopes. This very deep, well drained soil is on alluvial fans and terraces. Areas are small. Elevation ranges from 20 to 600 feet. The mean annual precipitation is about 28 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

Typically, the surface layer is very dark, gray, slightly acid loam and clay loam about 17 inches thick. The subsoil is dark grayish brown and brown, slightly acid and neutral clay and sandy clay loam about 25 inches thick. The substratum to a depth of 65 inches is brown, neutral clay loam and sandy clay loam.

Included with this soil in mapping are small areas of Elder sandy loam, Elkhorn sandy loam, Pinto loam, Soquel loam, and soils that are similar to this Danville soil but have a pale brown or light brownish gray surface layer. Also included are areas of soils that have slopes of 9 to 12 percent.

Permeability of this Danville soil is slow. Available water capacity is 7.5 to 10.0 inches. Effective rooting depth is 60 inches. Surface runoff is slow to medium, and the hazard of erosion is slight to moderate.

Most areas of this soil are cultivated or are in irrigated pasture. Among the other crops grown are apples, lettuce, strawberries, and bushberries. A few areas are used as homesites.

If this soil is properly managed, the production of forage from irrigated pasture is medium to moderate to high. To obtain the highest production, practices such as rotation of grazing, fertilization, and management of irrigation water are needed. Sprinkler irrigation is the best method of applying water. Crop residue management, cross slope farming, cover crops, green-manure crops, and nitrogen fertilizer are needed to minimize erosion and maintain fertility. Sheet and rill erosion can be effectively reduced by use of gradient terraces and contour farming on the steeper slopes.

The potential is good for habitat for deer, rabbit, squirrel, bobcat, coyote, gray fox, quail, dove, meadowlark, hawk, and owl.

Rapid growth of population in the county has resulted in increased construction of homes on this soil. Special design is needed for building pads, roads, and other structures to compensate for the low strength and high shrink-swell potential of this soil. Because of slow permeability, septic tank absorption fields often fail. Only the part of the site necessary for construction should be disturbed. Community sewage disposal should be provided for these sites. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability unit IIIe-1(14) irrigated and nonirrigated; Storie index 62.

126—Diablo clay, 9 to 15 percent slopes. This deep, well drained soil is on hills. It formed in material weathered from sandstone or shale. Slopes are generally complex. Elevation ranges from 25 to 1,400 feet. The mean annual precipitation is about 28 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 270 days.

Typically, the surface layer is very dark gray, slightly acid and neutral clay about 30 inches thick. The underlying material is moderately alkaline clay about 29 inches thick. It is brown and dark olive gray mixed with very dark gray and pale olive. Below this is highly weathered shale.

Included with this soil in mapping are areas of soils that are similar to this Diablo soil but are less than 40 inches deep to weathered bedrock, and soils that are similar but have a dark grayish brown surface layer. Also included are small areas of Elkhorn sandy loam, Tierra sandy loam, Watsonville loam, and soils that are similar to this Diablo soil but have slopes of less than 9 percent or more than 15 percent.

Permeability of this Diablo soil generally is slow. When the soil is dry and deeply cracked, however, the initial water intake rate is rapid. Available water capacity is about 5.5 to 11.5 inches. Effective rooting depth is 40 to 60 inches. Surface runoff is medium, and the hazard of erosion is moderate.

This soil is used mainly for pasture or range. A few areas are being developed as homesites.

If this soil is used for pasture, management that includes rotation of pasture is needed to obtain sustained high production of forage. If the soil is irrigated, sprinkler irrigation systems are best suited. Because of the low water intake rate of the soil, water should be applied slowly to prevent runoff. Fertility is generally sufficient for sustained high production of nonirrigated pasture, but irrigated pasture requires annual applications of nitrogen and phosphorus for high production.

The native vegetation on this soil should be managed to increase the production of soft chess, pine bluegrass, and burclover. If the soil is overgrazed, the range deteriorates; the proportion of desirable plants decreases, and the proportion of undesirable plants increases. Control of narrowleaf plantain and purple star thistle makes areas of the soil more suitable for livestock grazing. This soil is subject to compaction when grazed by livestock during wet periods. A properly designed and implemented grazing management system helps to prevent soil compaction. The less sloping areas have fewer limitations for stock pond development.

The potential is fair for habitat for deer, opossum, rabbit, bobcat, coyote, gray fox, quail, dove, meadowlark, and hawk.

The rapid growth in the population of Watsonville has resulted in increased construction of homes on this soil. Special design is needed for building pads, roads, and other urban structures to compensate for the low strength and high shrink-swell potential of this soil. Because of the slow permeability of this soil, septic tank absorption fields often fail. Community sewage disposal systems should be provided for these sites. Capability units IVe-5(15), irrigated, and IIe 5(15), nonirrigated; Storie index 44.

127—Diablo clay, 15 to 30 percent slopes. This deep, well drained soil is on hills. It formed in material weathered from sandstone or shale. Elevation ranges from 25 to 1,400 feet. The mean annual precipitation is about 28 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 270 days.

Typically, the surface layer is very dark gray, slightly acid and neutral clay about 30 inches thick. The underlying material is moderately alkaline clay about 29 inches thick. It is brown and dark olive gray mixed with very dark gray and pale olive. Below this is highly weathered shale.

Permeability of this Diablo soil is slow. When the soil is dry and deeply cracked, however, the initial water intake rate is rapid. Available water capacity is about 5.5 to 11.5 inches. Effective rooting depth is 40 to 60 inches. Surface runoff is rapid, and the hazard of erosion is high.

This soil is used mainly for pasture or range. A few areas are being developed as homesites.

If this soil is used for pasture, management that includes rotation of pasture is needed to obtain sustained high production of forage. If the soil is irrigated, sprinkler systems are best suited. Because of the low intake rate, water should be applied slowly to prevent runoff. Fertility is generally sufficient for sustained high production of nonirrigated pasture, but irrigated pasture may require annual applications of nitrogen and phosphorus for high production.

If this soil is used for range, the native vegetation should be managed to increase the production of soft chess, purple needlegrass, pine bluegrass, and burclover. If the soil is overgrazed, the range deteriorates; the proportion of desirable plants decreases, and the proportion of undesirable plants increases. Control of narrowleaf plantain, purple star thistle, and other weeds improves the site for livestock grazing. This soil is subject to compaction if grazed by livestock during wet periods. Moderately steep slopes generally make it difficult to

locate good sites for stock water ponds. Poor distribution of livestock on these slopes may require the use of a number of range management practices to obtain proper use of forage.

The rapid growth of the population of Watsonville has resulted in increased construction of homes on this soil. Special design is needed for building pads, roads, and other urban structures to compensate for the low strength and high shrink-swell potential of this soil. Because of the slow permeability, septic tank absorption fields often fail. Community sewage disposal systems should be provided for these sites. Capability units VIe-5(15), irrigated, and IVe-5(15), nonirrigated; Storie index 38.

128—**Dune land.** This miscellaneous area consists of sloping to very steep hummocks, mounds, and hills of loose, wind-deposited sand. Dune land is derived mostly from quartzitic sand blown up from beaches. Elevation ranges from 10 to 150 feet.

Typically, Dune land is blown and shifted by the wind, and if it is not vegetated, it tends to encroach on inland areas adjacent to it. The stability of Dune land depends upon the amount and kinds of plant cover. Some areas have been planted to dune grasses. Other plants in the cover are chaparral, lupines, iceplant, Monterey cypress, and eucalyptus. Plant cover quickly deteriorates if disturbed, because the deposited sand is loose.

Included with this unit in mapping are areas of Baywood soils. Also included are small areas of Elder, Elkhorn, Pinto, and Watsonville soils.

Drainage is excessive, and permeability is very rapid. Runoff is slow or very slow. The hazard of soil blowing is very high. Effective rooting depth is 60 inches.

Dune land is used almost entirely for recreation and wildlife habitat. Except in the area of Pajaro Dunes, it is also used as housing sites. Capability subclass VIIIe(14), nonirrigated; Storie index is less than 5.

129—**Elder sandy loam, 0 to 2 percent slopes.** This very deep, well drained soil is on alluvial fans and plains and in narrow valleys. It formed in mixed alluvium. Elevation ranges from 20 to 600 feet. The mean annual precipitation is about 28 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

Typically, the surface layer is grayish brown and dark grayish brown, medium acid and slightly acid sandy loam about 31 inches thick. The underlying material, to a depth of 60 inches, is brown and dark grayish brown, slightly acid sandy loam and loamy sand.

Included with this soil in mapping are areas of a soil that is similar to this Elder soil but has a sandy substratum at a depth of more than 20 inches. Also included are areas of Soquel loam and small areas of Baywood loamy sand, Elkhorn sandy loam, Fluvaquentic Haploxerolls-Aquic Xerofluvents complex, and Watsonville loam.

Permeability of this Elder soil is moderate. Available water capacity is 6.0 to 9.0 inches. Effective rooting depth is 60 inches. Runoff is slow. There is no hazard of erosion, or the hazard is slight.

Most areas of this soil are intensively cultivated. Inland, the chief crops are apples, lettuce, strawberries, and bushberries. Along the coast, the main crop is brussels sprouts. Most other crops suited to the county can also be grown in inland areas. A few areas are used as homesites.

If this soil is properly managed, it is highly productive. Such practices as cover crops and fertilization help to maintain tilth and fertility. Most crops require irrigation. Either sprinkler or furrow irrigation systems are used and are suitable. If furrow irrigation is used, water should be applied at frequent intervals over short runs. Organic matter content can generally be maintained by returning all crop residue. All crops respond to nitrogen, and some crops respond to phosphorus. Much of this soil receives moderate periodic applications of animal manure.

The potential is good for habitat for deer, rabbit, squirrel, gopher, mole, bobcat, coyote, quail, dove, hawk, and owl. Because of the amount of cultivation, wildlife habitat is limited.

Rapid population growth has resulted in the increased construction of homes on this soil. The soil is only slightly limited for this use and for use as septic tank absorption fields. Capability subclass I(14), irrigated, and capability unit IIc-1(14), nonirrigated; Storie index 90.

130—**Elder sandy loam, 2 to 9 percent slopes.** This very deep, well drained soil is on alluvial fans and plains and in narrow valleys. It formed in mixed alluvium. Elevation ranges from 20 to 600 feet. The mean annual precipitation is about 28 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season is about 245 to 275 days.

Typically, the surface layer is grayish brown and dark grayish brown, medium acid and slightly acid sandy loam about 31 inches thick. The underlying material, to a depth of 60 inches, is brown and dark grayish brown, slightly acid sandy loam and loamy sand.

Included with this soil in mapping are areas of a soil that is similar to this Elder soil but has a sand substratum at a depth of more than 20 inches and areas of a soil that is similar but has a dark surface layer less than 20 inches thick. Also included are small areas of Baywood loamy sand, Elkhorn sandy loam, Soquel loam, and Watsonville loam.

Permeability of this Elder soil is moderate. Available water capacity is 6.0 to 9.0 inches. Effective rooting depth is 60 inches. Runoff is slow, and the hazard of erosion is slight to moderate.

Most areas of this soil are intensively cultivated. Inland, the chief crops are apples, lettuce, strawberries, and bushberries. Along the coast, the main crop is brussels sprouts. Most other crops suited to the area can also be grown in inland areas. Apples and berries are grown mainly in the steepest areas.

If this soil is properly managed, it is highly productive. Such practices as cross-slope farming, cover crops, and fertilization are needed to control erosion and maintain tilth and fertility. Most crops require irrigation. Sprinkler or contour furrow irrigation systems are best suited. Fur-

row systems are mainly used in areas that have slopes of less than 5 percent. Erosion can be reduced by terraces and contour farming on the steeper slopes. Organic matter content can generally be maintained by returning all crop residue to the soil. All crops respond to nitrogen, and some crops respond to phosphorus. Much of this soil periodically receives moderate applications of animal manure.

The potential is good for habitat for deer, rabbit, squirrel, gopher, mole, bobcat, coyote, quail, dove, hawk, and owl. Because of the amount of cultivation on this soil, wildlife habitat is limited.

Rapid growth of population has resulted in increased construction of homes on this soil. The soil is only slightly limited for use as homesites and as septic tank absorption fields. Capability units IIe-1(14), irrigated, and IIIe-1(14), nonirrigated; Storie index 81.

131—Elder sandy loam, 9 to 15 percent slopes. This very deep, well drained soil is on alluvial fans, in wide swales on alluvial and marine terraces, and in narrow valleys. It formed in mixed alluvium. Areas are elongated. Elevation ranges from 50 to 600 feet. The mean annual precipitation is about 28 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

Typically, the surface layer is dark grayish brown and grayish brown, medium acid and slightly acid sandy loam about 23 inches thick. The underlying material to a depth of 60 inches is mixed brown and dark grayish brown, slightly acid sandy loam and loamy sand.

Included with this soil in mapping are areas of Soquel loam and of a soil that is similar to this Elder soil but has a sandy substratum at a depth of more than 20 inches. Also included are small areas of Baywood loamy sand, Elkhorn sandy loam, and soils that are similar to this Elder soil but have slopes of less than 9 percent or more than 15 percent.

Permeability of this Elder soil is moderate. Available water capacity is 6 to 9 inches. Effective rooting depth is 60 inches. Runoff is slow to medium, and the hazard of erosion is moderate.

Most areas of this soil are cultivated. A few areas along the coast are used for brussels sprouts and strawberries.

If this soil is properly managed, it is moderately to highly productive. It is limited for many crops by the moderate hazard of erosion. Use of such practices as cover crops, crop residue management, minimum tillage, cross-slope farming, and fertilization helps to control erosion and to maintain fertility. Most crops require irrigation by a sprinkler system. Diversions or terraces and contour farming can be used successfully to reduce sheet and rill erosion on some cultivated slopes. Organic matter content can be maintained by returning crop residue to the soil or by using crop residue as a surface mulch. Tree prunings, for example, can be shredded and left in place. All crops respond to nitrogen, and some crops respond to phosphorus.

The potential is good for habitat for deer, rabbit, squirrel, gopher, mole, bobcat, coyote, quail, dove, hawk, and owl. Because of the extensive cultivation on this soil, wildlife habitat is limited.

Rapid growth of population has resulted in increased construction of homes on this soil. Slope is the main limitation in homesite development. Seeding of suitable grasses in areas that have been exposed during construction of homes reduces the hazard of erosion. Septic tank absorption fields should be laid out on the contour, and a sufficient area should be provided between filter fields and water supplies to prevent contamination of the water. Capability units IVe-1(14), irrigated, and IIIe-1(14), nonirrigated; Storie index 77.

132—Elkhorn sandy loam, 0 to 2 percent slopes. This very deep, well drained soil is on old alluvial fans and plains and on marine terraces. Elevation ranges from about 20 to 400 feet. The mean annual precipitation is about 28 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

Typically, the surface layer is very dark grayish brown and brown, slightly acid and medium acid sandy loam about 21 inches thick. The subsoil, to a depth of 61 inches, is pale brown and variegated light gray and very pale brown, neutral sandy clay loam.

Included with this soil in mapping are areas of Elder sandy loam, Pinto loam, and Watsonville loam. Also included are small areas of Baywood loamy sand, Danville loam, Soquel loam, and soils that are similar to this Elkhorn soil but have a gravelly and very gravelly subsoil or have a clay loam or clay substratum.

Permeability of this Elkhorn soil is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity ranges from 8.5 to 10 inches. Runoff is slow, and the hazard of erosion is slight.

Most areas of this soil are intensively cultivated. Along the coast, the main crops are lettuce, brussels sprouts, and bushberries (fig. 3). Inland, a few areas are in apple orchards. Most other crops commonly grown in the county are suited to this soil.

If this soil is properly managed, it is highly productive. Use of green-manure crops and fertilization help to maintain good tilth and fertility. Most crops require irrigation. The usual method of irrigation is by furrow and sprinkler systems. The organic matter content generally can be maintained by returning all crop residue to the soil. Most crops respond to nitrogen, and some respond to phosphorus.

The native vegetation on this soil should be managed to increase the production of soft chess and wild oats. If the soil is overgrazed, the range deteriorates; the proportion of desirable plants decreases, and the proportion of undesirable plants increases. The removal of tarweed, thistle, and poison-oak makes these areas more suitable for livestock grazing.

The potential is good for habitat for deer, opossum, rabbit, squirrel, bobcat, skunk, coyote, gray fox, band-tailed pigeon, quail, dove, meadowlark, hawk, and owl.

Very rapid population growth in the coastal part of the county has resulted in extensive construction of homes on this soil. The soil is limited for use as septic tank absorption fields by moderately slow permeability. Borings to a depth of 20 to 30 feet have located sand strata. Borings should be made to confirm the presence of sand strata before construction is started. Community sewage disposal systems should be used in areas where density of population is medium to high. Capability subclass I(14), irrigated, and capability unit IIIc-1(14), nonirrigated; Storie index 73.

133—Elkhorn sandy loam, 2 to 9 percent slopes. This very deep, well drained soil is on old alluvial fans and marine terraces. Elevation ranges from about 20 to 800 feet. The mean annual precipitation is about 28 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

Typically, the surface layer is very dark grayish brown and brown, slightly acid and medium acid sandy loam about 12 inches thick. The subsoil, to a depth of 61 inches, is pale brown and variegated light gray and very pale brown, neutral sandy clay loam.

Included with this soil in mapping are areas of Elder sandy loam, areas of Watsonville loam, and small areas of Baywood loamy sand, Pinto loam, Soquel loam, and soils that are similar to this Elkhorn soil but have a gravelly and very gravelly subsoil. Also included are soils that are similar to this Elkhorn soil but have slopes of more than 9 percent or less than 2 percent.

Permeability of this Elkhorn soil is moderately slow. Effective rooting depth is more than 60 inches. Available water capacity ranges from 8.5 to 10 inches. Runoff is slow to medium, and the hazard of erosion is slight to moderate.

Most areas of this soil are intensively cultivated. Along the coast, the main crops are brussels sprouts, lettuce, and bushberries. Inland, a few areas are in apple orchards.

Most of the crops commonly grown in the county are suited to this soil. If this soil is properly managed, it is highly productive. Such practices as farming across the slope, using cover crops, and fertilizing are needed to control erosion and maintain tilth and fertility. Most crops require irrigation. Sprinkler or drop irrigation is most suitable, but contour furrow irrigation can be used where slopes are less than 5 percent. On some of the steeper cultivated slopes, erosion can be reduced by terracing and farming on the contour. Organic matter content generally can be maintained by returning all crop residue to the soil. All crops respond to nitrogen, and some crops respond to phosphorus. Many areas of this soil receive periodic applications of animal manure.

If this soil is used for range, the native vegetation should be managed to increase the production of soft chess and wild oats. If the soil is overgrazed, the condition of the range deteriorates. The proportion of desirable plants decreases, and the proportion of undesirable plants increases. Removal of tarweed, thistle, and poison-oak helps to make these areas more suitable for livestock grazing.

The potential is good for habitat for deer, opossum, rabbit, squirrel, bobcat, skunk, coyote, gray fox, band-tailed pigeon, quail, dove, meadowlark, hawk, and owl.

Very rapid population growth along the coast has resulted in extensive construction of homes on this soil. Moderate shrink-swell potential and moderately slow permeability are the main limitations to use of this soil as homesites. Use of septic tank absorption fields is limited by the moderately slow permeability. Borings to a depth of 20 to 30 feet have located sand strata. Onsite investigations should be made to confirm the presence of sand strata before construction is started. Community sewage systems should be used where density of population is medium to high. Capability unit IIIe-1(14), irrigated and nonirrigated; Storie index 66.

134—Elkhorn sandy loam, 9 to 15 percent slopes. This very deep, well drained soil is on old alluvial fans and marine terraces. Elevation ranges from about 20 to 800 feet. The mean annual precipitation is about 28 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 45 to 275 days.

Typically, the surface layer is very dark grayish brown and brown, slightly acid and medium acid sandy loam about 21 inches thick. The subsoil, to a depth of 61 inches, is pale brown and variegated light gray and very pale brown, neutral sandy clay loam. In a few areas, much of the surface layer has been removed by sheet and rill erosion.

Included with this soil in mapping are areas of Baywood loamy sand, Elder sandy loam, Tierra sandy loam, and Watsonville loam. Also included are small areas of Pinto loam and soils that are similar to this Elkhorn soil but have slopes of less than 9 percent or more than 15 percent.

Permeability of this Elkhorn soil is moderately slow. Effective rooting depth is more than 60 inches. Available water capacity ranges from 8.5 to 10.0 inches. Runoff is medium, and the hazard of erosion is moderate.

Most areas of this soil are cultivated. A few areas are rangeland. The hazard of erosion limits the kinds of crops grown on this soil. Many areas are used for apple orchards. A few areas along the coast are used for brussels sprouts and bushberries.

If this soil is properly managed, it is moderately to highly productive. Use of cover crops, crop residue management, minimum tillage, cross-slope farming, and fertilization minimizes erosion and helps to maintain fertility. Practices such as grade control structures also help to control erosion. Sprinkler irrigation systems are suitable for use on this soil. Erosion on some cultivated slopes can be substantially reduced by using diversions or terraces and by farming on the contour. Organic matter content generally is maintained by returning all crop residue to the soil or by using the residue as a surface mulch. In orchards, tree prunings should be shredded and left in place. All crops require nitrogen for high production.

If this soil is used for range, the native vegetation should be managed to increase the production of soft chess and wild oats. If the range deteriorates, the proportion of desirable plants decreases and the proportion of undesirable plants increases. Removal of tarweed, thistle, and poison-oak makes this site more suitable for livestock grazing.

The potential is good for habitat for deer, opossum, rabbit, squirrel, bobcat, skunk, coyote, gray fox, band-tailed pigeon, quail, dove, meadowlark, hawk, and owl.

Very rapid growth of population along the coast has resulted in extensive construction of homes on this soil. The moderate shrink-swell potential of the subsoil, moderately slow permeability, and slope are the main limitations to use of this soil as homesites. The moderate shrink-swell potential of the subsoil should be considered in designing building pads, roads, or other structures. Because of the moderately slow permeability, problems can arise with septic tank absorption fields. Borings to a depth of 20 to 30 feet have located sand strata. Onsite investigations should be made to confirm the presence of sand strata before construction is started. Community sewage systems should be used where the density of the population is medium to high. To control erosion, only the part of the site necessary for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability units IVe-1(14), irrigated, and IIIe-1(14), nonirrigated; Storie index 59.

135—Elkhorn sandy loam, 15 to 30 percent slopes. This very deep, well drained soil is on old alluvial fans and marine terraces. Elevation ranges from about 20 to 800 feet. The mean annual precipitation is about 28 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

Typically, the surface layer is very dark grayish brown and brown, slightly acid and medium acid sandy loam about 21 inches thick. The subsoil to a depth of 61 inches is pale brown and variegated light gray and very pale brown, neutral sandy clay loam. In cultivated areas, much of the surface layer has been removed by sheet and rill erosion.

Included with this soil in mapping are areas of Pfeiffer sandy loam, Baywood loamy sand, Tierra sandy loam, and Watsonville loam. Also included are small areas of soils that are similar to this Elkhorn soil but have slopes of less than 15 percent or more than 30 percent.

Permeability of the Elkhorn soil is moderately slow. Effective rooting depth is 60 inches or more. Available water capacity ranges from 8.5 to 10.0 inches. Runoff is rapid, and the hazard of erosion is high.

About one-half the acreage of this soil is cultivated. The main crop is apples, but some strawberries and bush-berries are grown. Areas where slopes are more than 20 percent are best suited to pasture or rangeland.

This soil generally is suited to the production of apples and strawberries. Use of diversions, contour farming, and grade stabilization help to control erosion. Use of nitrogen and phosphate fertilizer and careful use of crop residue help to maintain fertility and organic matter content. Sprinkler irrigation is suitable for apples, and sprinkler irrigation combined with a level furrow system is suitable for strawberries.

High production of irrigated pasture requires the use of a rotation grazing system supplemented by proper use of water and fertilizer.

If this soil is used as rangeland, the native vegetation should be managed to increase the production of soft chess and wild oats. If the condition of the range deteriorates because of overgrazing, the proportion of desirable plants decreases and the proportion of undesirable plants increases. Control of tarweed, thistle, and poison-oak improves the range forage and improves the value of the soil for hydrologic, wildlife habitat, and recreational uses. Areas where brush is managed by prescribed burning or mechanical methods may be susceptible to soil erosion. Poor distribution of grazing on those slopes may require the application of a number of range practices to obtain proper use of forage.

The potential is good for habitat for deer, opossum, rabbit, squirrel, bobcat, skunk, coyote, gray fox, band-tailed pigeon, quail, dove, meadowlark, hawk, and owl.

Very rapid growth of population along the coast has resulted in extensive construction of homes on this soil. Slope severely limits the use of this soil as homesites. The soil is limited for use as septic tank absorption fields by excessive slope and moderately slow permeability. Borings to a depth of 20 to 30 feet have located sand strata. Onsite investigations should be made to confirm the presence of sand strata before construction is started. Because of the moderately steep slopes and the high hazard of erosion, community sewage systems are needed where density of the population is medium to high. Only the part of the site used for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability units VIe-1(14), irrigated, and IVe-1(14), nonirrigated; Storie index 49.

136—Elkhorn-Pfeiffer complex, 30 to 50 percent slopes. This complex is on dissected marine terraces and hills. Elevation ranges from about 100 to 800 feet. The mean annual precipitation is about 28 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from about 245 to 275 days.

This complex is about 45 percent Elkhorn sandy loam and 25 percent Pfeiffer gravelly sandy loam. Elkhorn soils are on marine terraces. Pfeiffer soils are in deep cuts on marine terraces and hills.

Included with this complex in mapping are areas of Baywood loamy sand, Tierra sandy loam, and Pinto loam. Also included are areas of a soil that is similar to the Pfeiffer soil but is less than 40 inches deep to weathered bedrock, and soils that are similar to the soils in this complex, but have slopes of less than 30 percent.

The Elkhorn soil is very deep and well drained. It formed in alluvium derived mainly from sedimentary rock. Typically, the surface layer is very dark grayish brown and brown, slightly acid and medium acid sandy loam about 21 inches thick. The subsoil, to a depth of 61 inches, is pale brown and variegated light gray and very pale brown, neutral sandy clay loam.

Permeability of the Elkhorn soil is moderately slow. The effective rooting depth is 60 inches or more. Available water capacity ranges from 8.5 to 10.0 inches. Runoff is rapid, and the hazard of erosion is high.

The Pfeiffer soil is deep and well drained. It formed in residuum derived from sandstone or marine sediment. Typically, the surface layer is dark grayish brown and brown, slightly acid gravelly sandy loam about 24 inches thick. The subsoil is brown, slightly acid gravelly sandy loam and cobbly sandy loam about 29 inches thick. The substratum is brown, slightly acid gravelly sandy loam about 13 inches thick. Weathered granodiorite bedrock is at a depth of 66 inches.

Permeability of this Pfeiffer soil is moderately rapid. Effective rooting depth is 40 to 66 inches. Available water capacity is 3 to 6 inches. Surface runoff is rapid, and the hazard of erosion is high.

Most areas of these soils are used as rangeland. A few areas are being developed as homesites. If these soils are used as rangeland, the Elkhorn soil should be managed to increase the production of soft chess and wild oats, and the Pfeiffer soil should be managed to increase the production of blue wildrye and purple needlegrass. If the range condition deteriorates because of overgrazing, the proportion of desirable plants decreases and the proportion of undesirable plants increases. Poor distribution of grazing may require the implementation of a number of range management practices to obtain proper use of forage. Control of tarweed, thistle, and poison-oak improves the forage and improves the value of the site for watershed, wildlife habitat, and recreation. Areas where brush is managed by burning or mechanical methods may be susceptible to erosion. Measures should be taken to control erosion in these areas.

The potential of this complex is fair for habitat for deer, opossum, rabbit, squirrel, bobcat, skunk, coyote, gray fox, band-tailed pigeon, quail, dove, meadowlark, hawk and owl.

Rapid growth of population in the county has resulted in the construction of some homes on these soils. Slope severely limits the use of these soils as homesites and as septic tank absorption fields. Because of slope and texture, the hazard of erosion is high; therefore, only the part of the site used for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability subclass VIe(14)(15), nonirrigated; Storie index 28.

137—Fagan loam, 30 to 50 percent slopes. This deep, well drained soil is in mountainous areas. It formed in residuum derived from sandstone and shale. Slopes are complex. Elevation ranges from 400 to 1,500 feet. The mean annual precipitation is about 28 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 270 days.

Typically, the surface layer is grayish brown, slightly acid and neutral loam about 32 inches thick. The subsoil to a depth of 60 inches is brown, slightly acid and neutral clay loam and clay.

Included with this soil in mapping are areas of localized deposits of alluvium and colluvium in the vicinity of earthquake rift zones, areas of Aptos loam, warm, and areas of Los Osos loam. Also included are small areas of soils that are similar to this Fagan soil but are moderately well drained and somewhat poorly drained and are generally associated with the gullies and slips in the area. There are also areas of soils that are similar to this Fagan soil but have slopes of less than 30 percent or more than 50 percent.

Permeability of this Fagan soil is slow. The available water capacity is 5.5 to 12.0 inches. Effective rooting depth is 40 to 65 inches. Runoff is rapid, and the hazard of erosion is moderate to high.

This soil is used for range.

The native vegetation on this soil should be managed to increase the production of soft chess and wild oats. If the condition of the range deteriorates because of overgrazing, the proportion of the most desirable plants decreases and the proportion of undesirable plants increases. Removal of tarweed, thistle, and poison-oak improves range that has deteriorated.

The potential is good for habitat for deer, opossum, rabbit, squirrel, bobcat, skunk, coyote, gray fox, quail, dove, meadowlark, hawk, and owl.

Rapid growth of population in the county has resulted in pressure for homesites. This soil is severely limited for use as homesites by slope, shrink-swell potential, and low strength. Only the part of the site used for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability subclass VIe(15), nonirrigated; Storie index 32.

138—Felton sandy loam, 5 to 9 percent slopes. This deep, well drained soil is on ridgetops and in rolling areas on mountains. Slopes are short. The soil formed in residuum derived from sandstone, shale, siltstone, or schist. Areas generally are concave. Elevation ranges from 400 to 3,000 feet but is dominantly less than 2,000 feet. The mean annual precipitation is about 45 inches, and the mean annual air temperature is about 56 degrees F. The frost-free season ranges from 220 to 245 days.

Typically, the surface layer is dark grayish brown and brown, slightly acid sandy loam about 11 inches thick. The subsoil is brown and yellowish red, slightly acid and strongly acid sandy clay loam and clay loam about 32 inches thick. The substratum is variegated light brownish gray and light olive brown, strongly acid loam and sandy loam about 20 inches thick. Weathered sandstone is at a depth of 63 inches.

Included with this soil in mapping are areas of Lompico loam, Aptos sandy loam, and Nisene loam. Also included

are small areas of Ben Lomond sandy loam, Lompico Variant loam, Zayante coarse sand, a soil that is similar to this Felton soil but has a dark surface layer and is less than 10 inches thick, and soils that are similar but have slopes of 0 to 5 percent and 9 to 15 percent.

Permeability of this Felton soil is moderately slow. Effective rooting depth is 40 to 72 inches. Available water capacity is 5.5 to 10.0 inches. Runoff is medium, and the hazard of erosion is slight to moderate.

This soil is used mainly for timber, recreation, wildlife habitat, and watershed. It is also used as homesites and for firewood production, apple orchards, and pasture.

This soil is well suited to the production of Douglas-fir. It is capable of producing 13,360 cubic feet, or 70,000 board feet (International rule), per acre of merchantable timber from a fully stocked stand of 80-year-old trees. The hazard of erosion is the main limitation in the management of this soil for timber production. Care must be taken during harvesting to minimize erosion.

This soil is suited to apple production. Use of minimum tillage and winter cover crops helps to control erosion. Returning crop residue to the soil or regularly adding other organic material improves fertility and increases the water infiltration rate.

Forested areas provide habitat for band-tailed pigeon, jay, hawk, deer, raccoon, coyote, bobcat, rabbit, squirrel, mice, salamander, tree frog, lizard, and snake.

Rapid population growth in the county has resulted in increased construction of homes on this soil. Moderately slow permeability imposes moderate limitations to the use of this soil as septic tank absorption fields. The moderate shrink-swell potential imposes moderate limitations to the use of this soil as homesites. Only the part of the site needed for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability unit IIIe-1(14), irrigated and nonirrigated; Storie index 73.

139—Fluvaquentic Haploxerolls-Aquic Xerofluvents complex, 0 to 15 percent slopes. These deep, moderately well drained soils formed in alluvium. Elevation ranges from 20 to 500 feet. The mean annual precipitation ranges from 20 to 35 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 270 days.

This complex is about 50 percent Fluvaquentic Haploxerolls and 35 percent Aquic Xerofluvents.

Included with this complex in mapping are areas of Danville loam, Elder sandy loam, and Soquel loam. Also included are small areas of Baywood loamy sand.

The main difference between the two major soils in this complex is that the Fluvaquentic Haploxerolls have a dark colored surface layer that has a high content of organic matter and the Aquic Xerofluvents have a light colored surface layer that has a low content of organic matter. These soils have strata of sand, sandy loam, silt loam, clay loam, and clay. Each stratum ranges from about 1 inch to 24 inches in thickness. Reaction ranges from medium acid to mildly alkaline, and the organic matter content differs from one stratum to another.

Effective rooting depth is 60 inches for water-loving plants but is limited to depths between 30 and 60 inches for water-sensitive plants. Runoff is slow to medium. The hazard of erosion is slight in most places, but it ranges to moderate in areas of concentrated runoff. Some areas of these soils are intermittently flooded during periods of prolonged, high intensity storms. Channeling and deposition take place along some streambanks.

These soils are used mainly for irrigated crops or pasture. Most areas that are protected from or are not subject to overflow are in irrigated row crops. Strawberries, brussels sprouts, lettuce, and bushberries are the main crops.

Because these soils are so highly variable, onsite investigation is needed to determine the practices needed to control erosion, and to determine suitability for wildlife habitat, farming, and engineering uses. Capability unit IIIw-2(14), irrigated and nonirrigated; Storie index 30 to 69.

140—Hecker gravelly sandy loam, 30 to 50 percent slopes. This deep, well drained soil is on mountains. It formed in material weathered from sandstone, mudstone, or shale. It is on south- and north-facing slopes mainly at or near fault zones. Elevation ranges from 1,000 to 3,000 feet. The mean annual precipitation is about 48 inches, and the mean annual air temperature is about 55 degrees F. The frost-free season ranges from 220 to 245 days.

Typically, the surface layer is brown and variegated pinkish gray and brown, neutral and medium acid gravelly sandy loam and gravelly loam about 9 inches thick. The upper part of the subsoil is variegated pale brown and light yellowish brown and variegated light brown and pink, medium acid very gravelly sandy loam and gravelly sandy loam about 14 inches thick. The lower part is variegated light brown and pink, medium acid very gravelly heavy loam and very gravelly clay loam about 18 inches thick. Shattered shale is at a depth of 41 inches.

Included with this soil in mapping are areas of a soil that is similar to this Hecker soil but is 20 to 40 inches deep to bedrock and areas of Lompico loam, Madonna loam, and Maymen stony loam. Also included are small areas of soils that are similar to this Hecker soil but have slopes of less than 30 percent or more than 50 percent.

Permeability is moderate. Effective rooting depth is 40 to 60 inches. Available water capacity is 2.0 to 5.5 inches. Runoff is rapid, and the hazard of erosion is high. Sheet erosion is moderate. A few areas are gullied or have slipped.

This soil is used mainly for watershed, wildlife habitat, and recreation. It is also used for firewood production or range.

Steep slopes reduce the potential of this soil for recreation to a few paths and trails, which should run across the slope. Roads should have a grade of 12 percent or less. Good drainage should be provided for roads and landings, and cuts and fills need to be seeded or mulched. An excellent practice that helps to control erosion and sedimenta-

tion and to enhance the beauty of this soil area is to maintain an adequate plant cover. Adequate provisions should be made to safeguard these areas from fire.

This soil provides habitat for dove, hawk, burrowing owl, meadowlark, quail, deer, brush rabbit, jackrabbit, opossum, ground squirrel, gopher, mice, mole, coyote, bobcat, gray fox, skunk, weasel, lizard, and snake.

Because of its steep slopes, this soil is poorly suited to building site development and onsite sewage disposal. Capability subclass VIe(4), nonirrigated; Storie index 15.

141—Hecker gravelly sandy loam, 50 to 75 percent slopes. This deep, well drained soil is on mountains, mainly at or near fault zones. It is mainly on south- and west-facing slopes. It formed in material weathered from sandstone, mudstone, or shale. Elevation ranges from 1,000 to 3,000 feet. The mean annual precipitation is about 48 inches, and the mean annual air temperature is about 55 degrees F. The frost-free season ranges from 220 to 245 days.

Typically, the surface layer is brown and variegated pinkish gray and brown, neutral and medium acid gravelly sandy loam and gravelly loam about 9 inches thick. The upper part of the subsoil is variegated pale brown and light yellowish brown and variegated light brown and pink, medium acid very gravelly sandy loam and gravelly sandy loam about 14 inches thick. The lower part is variegated light brown and pink, medium acid very gravelly heavy loam and very gravelly clay loam about 18 inches thick. Shattered shale is at a depth of 41 inches.

Included with this soil in mapping are areas of a soil that is similar to this Hecker soil but is 20 and 40 inches deep to bedrock, areas of a soil that is also similar but formed in colluvium, and areas of Maymen stony loam, Lompico loam, and Madonna loam. Also included are small areas of soils that are similar to this Hecker soil but have slopes of less than 50 percent.

Permeability of this Hecker soil is moderate. Effective rooting depth is 40 to 60 inches. Available water capacity is 20 to 55 inches. Runoff is very rapid, and the hazard of erosion is very high. Sheet erosion is moderate on about 80 percent of this unit and severe on the remaining 20 percent. A few areas are gullied.

This soil is used mainly for watershed, wildlife habitat, and recreation. It is also used for firewood production.

The potential of this soil for recreation is limited by the very steep slopes. This soil is suited to a few paths and trails, which should be constructed across the slope. Roads should have a grade of 12 percent or less. Good drainage should be provided for roads and landings, and cuts and fills should be seeded or mulched. An excellent practice to control erosion and sedimentation and to enhance the beauty of the area is to maintain an adequate plant cover. Adequate provisions should be made to protect these areas from fire.

This soil provides habitat for dove, hawk, burrowing owl, meadowlark, quail, deer, brush rabbit, jackrabbit, opossum, ground squirrel, gopher, mice, mole, coyote, bobcat, gray fox, skunk, weasel, lizard, and snake.

Because of its very steep slopes, this soil is poorly suited to building site development and onsite waste disposal. Capability subclass VIIe(4), nonirrigated; Storie index 7.

142—Lompico-Felton complex, 5 to 30 percent slopes. This complex consists of soils on foot slopes and wide ridges. Slopes are dominantly complex. Elevation ranges from 400 to 3,000 feet. The mean annual precipitation is about 48 inches, and the mean annual air temperature is about 55 degrees F. The frost-free season ranges from 220 to 245 days.

This complex is about 30 percent Lompico loam and 25 percent Felton sandy loam.

Included with these soils in mapping are areas of Aptos fine sandy loam, Nisene loam, Lompico Variant loam, and Lompico loam that has a gravelly and cobbly subsoil.

The Lompico soil is moderately deep and well drained. It formed in residuum derived from sandstone, shale, siltstone, or mudstone. Typically the surface layer is brown, slightly acid loam about 5 inches thick. The subsoil is brown, strong brown, and yellowish brown, strongly acid and medium acid clay loam and sandy clay loam. Highly weathered sandstone is at a depth of 37 inches.

Permeability of the Lompico soil is moderate. Effective rooting depth is 20 to 40 inches. Available water capacity is 3 to 7 inches. Runoff is medium or rapid, and the hazard of erosion is moderate or high.

The Felton soil is deep and well drained. It formed in residuum derived from sandstone, shale, siltstone, or schist. Typically, the surface layer is dark grayish brown and brown, slightly acid sandy loam about 11 inches thick. The subsoil is brown and yellowish red, slightly acid and strongly acid sandy clay loam and clay loam about 32 inches thick. The substratum is variegated light brownish gray and light olive brown, strongly acid loam and sandy loam about 20 inches thick. Weathered sandstone is at a depth of 63 inches.

Permeability of this Felton soil is moderately slow. Effective rooting depth is 40 to 72 inches. Available water capacity is 5.5 to 10.0 inches. Runoff is medium or rapid, and the hazard of erosion is moderate to high.

These soils are used mainly for timber, recreation, wildlife habitat, and watershed. They are also used as homesites and for firewood production, apple orchards, and pasture.

These soils are well suited to the production of Douglas-fir. The Lompico soil is capable of producing 10,350 cubic feet, or 43,560 board feet (International rule), of merchantable timber from a fully stocked, even-aged stand of 80-year-old trees. The Felton soil is capable of producing 13,360 cubic feet, or 70,000 board feet (International rule), of merchantable timber from a fully stocked, even-aged stand of 80-year-old trees. The hazard of erosion is the main limitation in timber production. Care must be taken during harvesting to minimize erosion.

The few areas of this complex that are used for apple orchards consist mainly of the deeper Felton soil. Use of

minimum tillage and winter cover crops helps to control erosion in these areas. Returning crop residue to the soil or the regular addition of other organic material improves fertility and increases the water infiltration rate.

This complex provides habitat for band-tailed pigeon, jay, hawk, deer, raccoon, coyote, bobcat, rabbit, squirrel, mice, salamander, tree frog, lizard, and snake.

Rapid population growth in the county has resulted in increased construction of homes on these soils. Slope severely limits the use of these soils as house sites and as septic tank absorption fields. Only the part of a site used for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability unit IVe-1(4), nonirrigated; Storie index 62.

143—Lompico-Felton complex, 30 to 50 percent slopes. This complex consists of soils on foot slopes and wide ridges. Slopes are dominantly complex. Elevation ranges from 400 to 3,000 feet. The mean annual precipitation is about 48 inches, and the mean annual air temperature is about 55 degrees F. The frost-free season ranges from 220 to 245 days.

This complex is about 35 percent Lompico loam and 30 percent Felton sandy loam.

Included with this complex in mapping are areas of Nisene loam and of Aptos fine sandy loam. Also included are small areas of Ben Lomond sandy loam, Catelli sandy loam, Lompico Variant loam, Maymen stony loam, and soils that are similar to those in this complex but have slopes of less than 30 percent or more than 50 percent.

The Lompico soil is moderately deep and well drained. It formed in residuum derived from sandstone, shale, siltstone, or mudstone. Typically, the surface layer is brown, slightly acid loam about 5 inches thick. The subsoil is brown, strong brown, and yellowish brown, strongly acid and medium acid clay loam and sandy clay loam. Highly weathered sandstone is at a depth of 37 inches.

Permeability of the Lompico soil is moderate. Effective rooting depth is 20 to 40 inches. Available water capacity is 3 to 7 inches. Runoff is rapid, and the hazard of erosion is high.

The Felton soil is deep and well drained. It formed in residuum derived from sandstone, shale, siltstone, or schist. Typically, the surface layer is dark grayish brown and brown, slightly acid sandy loam about 11 inches thick. The subsoil is brown and yellowish red, slightly acid and strongly acid sandy clay loam and clay loam about 32 inches thick. The substratum is variegated light brownish gray and light olive brown, strongly acid loam and sandy loam about 20 inches thick. Weathered sandstone is at a depth of 63 inches.

Permeability of the Felton soil is moderately slow. Effective rooting depth is 40 to 72 inches. Available water capacity is 5.5 to 10.0 inches. Runoff is rapid, and the hazard of erosion is high.

These two soils are used mainly for timber, recreation, wildlife habitat, and watershed. They are also used for firewood production, homesites, and pasture.

These soils are well suited to the production of Douglas-fir. The Lompico soil is capable of producing 10,350 cubic feet, or 43,560 board feet (International rule), of merchantable timber per acre from a fully stocked, even-aged stand of 80-year-old trees. The Felton soil is capable of producing 13,360 cubic feet, or 70,000 board feet (International rule), of merchantable timber per acre from a fully stocked, even-aged stand of 80-year-old trees. The erosion hazard is the main limitation of these soils in timber production. Care must be taken during harvesting to minimize erosion.

This complex provides habitat for band-tailed pigeon, jay, hawk, deer, raccoon, coyote, bobcat, rabbit, squirrel, mice, salamander, tree frog, lizard, and snake.

Because of the steep slopes these soils are poorly suited to building site development and onsite sewage disposal. Capability subclass VIe(4), nonirrigated; Storie index 31.

144—Lompico-Felton complex, 50 to 75 percent slopes. This complex consists of soils that are dominantly on footslopes but are also in areas near ridgetops. Elevation ranges from 400 to 3,000 feet. The mean annual precipitation is about 48 inches, and the mean annual air temperature is about 55 degrees F. The frost-free season ranges from 220 to 245 days.

This complex is about 35 percent Lompico loam and 30 percent Felton sandy loam.

Included with this complex in mapping are areas of Aptos fine sandy loam, Nisene loam, and Maymen stony loam. Also included are small areas of Ben Lomond sandy loam, Catelli sandy loam, Lompico Variant loam, soils that are similar to those in this complex but have slopes of 30 to 50 percent, and a soil that is similar to this Felton soil but has more than 15 percent shale and mudstone fragments in the subsoil.

The Lompico soil is moderately deep and well drained. It formed in residuum derived from sandstone, shale, siltstone, or mudstone. Typically, the surface layer is brown, slightly acid loam about 5 inches thick. The subsoil is brown, strong brown, and yellowish brown, strongly acid and medium acid clay loam and sandy clay loam. Weathered sandstone is at a depth of 37 inches.

Permeability of the Lompico soil is moderate. Effective rooting depth is 20 to 40 inches. Available water capacity is 3 to 7 inches. Runoff is very rapid, and the hazard of erosion is very high.

The Felton soil is deep and well drained. It formed in residuum derived from sandstone, shale, siltstone, or schist. Typically, the surface layer is dark grayish brown and brown, slightly acid sandy loam about 11 inches thick. The subsoil is brown and yellowish red, slightly acid and strongly acid sandy clay loam and clay loam about 32 inches thick. The substratum is variegated light brownish gray and light olive brown, strongly acid loam and sandy loam about 20 inches thick. Weathered sandstone is at a depth of 63 inches.

Permeability of the Felton soil is moderately slow. Effective rooting depth is 40 to 60 inches. Available water

capacity is 5.5 to 10.0 inches. Runoff is very rapid, and the hazard of erosion is very high.

These soils are used mainly for timber, recreation, wildlife habitat, and watershed. They are also used for firewood production.

These soils are well suited to the production of Douglas-fir. The Lompico soil is capable of producing 10,350 cubic feet, or 43,560 board feet (International rule), of merchantable timber per acre from a fully stocked, even-aged stand of 80-year-old trees. The Felton soil is capable of producing 13,360 cubic feet, or 70,000 board feet (International rule), of merchantable timber per acre from a fully stocked, even-aged stand of 80-year-old trees. The hazard of erosion is the major limitation of these soils in timber production. Care must be taken during harvesting to minimize erosion. The Lompico soil produces more timber than the Felton soil because the Lompico soil has weathered bedrock at a depth of 20 to 40 inches.

This complex provides habitat for band-tailed pigeon, jay, hawk, deer, raccoon, coyote, bobcat, rabbit, squirrel, mice, salamander, tree frog, lizard, and snake.

These soils are poorly suited to building site development and onsite sewage disposal because of their very steep slopes. Capability subclass VIIe(4), nonirrigated; Storie index 20.

145—Lompico Variant loam, 5 to 30 percent slopes. This moderately deep, well drained soil is on terraces and mountains. It is mainly on ridges and in small benchlike areas. It formed in residuum derived from sandstone, shale, or mudstone. Slopes are slightly convex. Elevation ranges from 400 to 2,000 feet. The mean annual precipitation is about 40 inches, and the mean annual air temperature is about 56 degrees F. The frost-free season ranges from 220 to 250 days.

Typically, the surface layer is dark grayish brown, slightly acid and medium acid loam and clay loam about 14 inches thick. The upper part of the subsoil is mixed grayish brown and dark yellowish brown, dark brown, and strong brown, medium acid and strongly acid clay about 9 inches thick. The lower part is variegated yellowish brown and brown, very strongly acid clay about 5 inches thick. Highly weathered shale is at a depth of 28 inches.

Included with this soil in mapping are areas of Aptos fine sandy loam and Felton sandy loam. Also included are small areas of Lompico loam, Madonna loam, Nisene loam, soils that are similar to this Lompico soil but are less than 20 inches or more than 40 inches deep to weathered bedrock, and soils that are similar to this soil but have slopes of less than 5 percent or more than 30 percent.

Permeability of this Lompico soil is slow. Effective rooting depth is 20 to 40 inches. Available water capacity is 3.0 to 6.5 inches. Runoff is medium or rapid, and the hazard of erosion is moderate or high.

This soil is used mainly for timber, recreation, wildlife habitat, and watershed. It is also used as homesites and for firewood production, pasture, and apple orchards.

This soil is well suited to the production of Douglas-fir. It is capable of producing 9,000 cubic feet, or 33,100 board feet (International rule), of merchantable timber per acre from a fully stocked, even-aged stand of 80-year-old trees. The soil is limited for this use by the claypan at a depth of 10 to 20 inches and weathered bedrock at a depth of 20 to 40 inches.

Forested areas of this soil provide habitat for band-tailed pigeon, jay, hawk, deer, raccoon, coyote, bobcat, rabbit, squirrel, mice, salamander, tree frog, lizard, and snake.

The potential of this soil for apple orchards is poor. The claypan at a depth of 20 to 40 inches restricts root growth and lowers both tree survival and production.

Rapid population growth in the county has resulted in increased construction of homes on this soil. The slow permeability and depth to bedrock severely limit the use of this soil as septic tank absorption fields. Shrink-swell potential and low strength severely limit the use of this soil as homesites. Only the part of the site used for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability unit IVe-1(4), nonirrigated; Storie index 47.

146—Los Osos loam, 5 to 15 percent slopes. This moderately deep, well drained soil is on hills and mountains. It is dominantly on wide ridges. It formed in material weathered from sandstone, siltstone, mudstone, or shale. Elevation ranges from 100 to 2,000 feet. The mean annual precipitation is about 32 inches, and the mean annual air temperature is about 58 degrees. The frost-free season ranges from 245 to 270 days.

Typically, the surface layer is dark grayish brown, medium acid loam and sandy loam about 11 inches thick. The upper part of the subsoil is brown, slightly acid sandy clay loam about 8 inches thick. The lower part is brown and pale brown, slightly acid heavy clay loam and clay about 17 inches thick. Weathered sandstone is at a depth of 36 inches.

Included with this soil in mapping are areas of a soil that is similar to this Los Osos soil but has a major texture change between the surface layer and the subsoil. Also included are areas of Bonnydoon loam and small areas of Aptos loam, warm; Pinto loam; Watsonville loam; and soils that are similar to this Los Osos soil but have slopes of less than 5 percent or more than 15 percent.

Permeability of this Los Osos soil is slow. Available water capacity is 3.0 to 6.5 inches. Effective rooting depth is 20 to 40 inches. Runoff is medium, and the hazard of erosion is moderate.

This soil is used mainly for range. A few areas are being developed as homesites.

If this soil is used for range, the native vegetation should be managed to increase the production of soft chess and wild oats. If the soil is continuously overgrazed, the condition of the range deteriorates; the proportion of desirable plants decreases, and the proportion of undesirable plants increases. Control of silver hairgrass,

plantain, tarweed, and nitgrass improves range that has deteriorated.

The potential is good for habitat for deer, opossum, rabbit, squirrel, bobcat, coyote, gray fox, band-tailed pigeon, jay, dove, meadowlark, hawk, and owl.

Rapid growth of population in the county has resulted in increased construction of homes on this soil. The shrink-swell potential, low strength, and depth to rock severely limit the use of this soil as homesites. Slow percolation and depth to rock severely limit the use of this soil as septic tank absorption fields. Only the part of the site used for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by banking and filling. Capability units IVe-1(15), irrigated, and IIIe-1(15), nonirrigated; Storie index 65.

147—Los Osos loam, 15 to 30 percent slopes. This moderately deep, well drained soil is on wide ridges on hills and mountains. It formed in material weathered from sandstone or shale. Slopes are complex. Elevation ranges from 100 to 2,000 feet. The mean annual precipitation is about 32 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 270 days.

Typically, the surface layer is dark grayish brown, medium acid sandy loam and loam about 11 inches thick. The upper part of the subsoil is brown, slightly acid sandy clay loam about 8 inches thick. The lower part is brown and pale brown, slightly acid heavy clay loam and clay about 17 inches thick. Weathered sandstone is at a depth of 36 inches.

Included with this soil in mapping are areas of a soil that is similar to this Los Osos soil but has a major texture change between the surface layer and the subsoil, areas of Aptos loam, warm, and areas of a soil that is similar but has a dark surface layer more than 20 inches thick and is 25 to 30 percent clay throughout the profile. Also included are small areas of Bonnydoon loam, Elkhorn sandy loam, Tierra sandy loam, Watsonville loam, and soils that are similar to this Los Osos soil but have slopes of less than 15 percent or more than 30 percent.

Permeability of this Los Osos soil is slow. Available water capacity is 3.0 to 6.5 inches. Effective rooting depth is 20 to 40 inches. Runoff is medium to rapid, and the hazard of erosion is moderate.

This soil is used mainly for range.

The native vegetation on this soil should be managed to increase the production of soft chess, wild oats, and purple needlegrass. Continuous overgrazing causes the condition of the range to deteriorate. As the range deteriorates, the proportion of desirable plants decreases and the proportion of undesirable plants increases. Control of narrowleaf plantain, tarweed, coyotebrush, and California live oak improves the suitablility of the range for grazing.

The potential is good for habitat for deer, opossum, rabbit, squirrel, bobcat, coyote, gray fox, band-tailed pigeon, jay, dove, meadowlark, hawk, and owl. Small natural areas of brush should be maintained for wildlife habitat.

Rapid growth of population in the county has resulted in increased construction of homes on this soil. Slope, shrink-swell potential, low strength, and depth to rock severely limit the use of this soil for homesites. Slope, slow percolation rate, and depth to rock severely limit the soil for use as septic tank absorption fields. Only the part of the site used for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability unit IVe-1(15), nonirrigated; Storie index 57.

148—Los Osos loam, 30 to 50 percent slopes. This moderately deep, well drained soil is on hills and mountains. It is dominantly on wide ridges. It formed in material weathered from sandstone or shale. Elevation ranges from 100 to 2,000 feet. The mean annual precipitation is about 32 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 270 days.

Typically, the surface layer is dark grayish brown, medium acid loam and sandy loam about 11 inches thick. The upper part of the subsoil is brown, slightly acid sandy clay loam about 8 inches thick. The lower part is brown and pale brown, slightly acid heavy clay loam and clay about 17 inches thick. Weathered sandstone is at a depth of 36 inches.

Included with this soil in mapping are areas of a soil that is similar to this Los Osos soil but has a major texture change between the surface layer and the subsoil. Also included are small areas of Bonnydoon loam; Aptos loam, warm; Tierra sandy loam; a soil that is similar to this Los Osos soil but has a dark colored surface layer more than 20 inches thick and has 25 to 30 percent clay throughout the profile; and soils that are similar but have slopes of less than 30 percent or more than 50 percent.

Permeability of this Los Osos soil is slow. Available water capacity is 3.0 to 6.5 inches. Effective rooting depth is 20 to 40 inches. Runoff is rapid, and the hazard of erosion is high.

This soil is used mostly for range.

If this soil is used for range, the native vegetation should be managed to increase the production of soft chess, wild oats, and purple needlegrass. Continuous overgrazing causes the condition of the range to deteriorate; the proportion of desirable plants decreases, and the proportion of undesirable plants increases. Control of narrowleaf plantain, tarweed, coyotebrush, and California live oak improves the suitability of the range for grazing. Range management practices are needed that insure proper use of forage. Steep slopes generally make it difficult to locate good sites for stock watering ponds. Livestock watering facilities should be spaced 1/4 to 1/2 mile apart to improve distribution of livestock grazing.

The potential is good for habitat for deer, opossum, rabbit, squirrel, bobcat, coyote, gray fox, band-tailed pigeon, jay, dove, meadowlark, hawk, and owl. Small areas of natural brush should be maintained for wildlife habitat.

Rapid growth of population in the county has resulted in increased construction of homes on this soil. Slopes,

shrink-swell potential, low strength, and depth to rock severely limit this soil for use as homesites. Slope, a slow percolation rate, and depth to rock severely limit the soil for use as septic tank absorption fields. Only the part of the site used for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability subclass VIe(15), nonirrigated; Storie index 29.

149—Madonna loam, 15 to 30 percent slopes. This moderately deep, well drained soil is on or near the crest of mountains. It formed in material weathered from mudstone or shale. Elevation ranges from 800 to 3,000 feet. The mean annual precipitation is about 48 inches, and the mean annual air temperature is about 56 degrees F. The frost-free season ranges from 220 to 245 days.

Typically, the surface layer is pale brown and brown, medium acid loam about 16 inches thick. The subsoil is light brownish gray, medium acid loam about 7 inches thick. Highly fractured mudstone is at a depth of 23 inches.

Included with this soil in mapping are areas of Lompico loam, Maymen stony loam, a soil that is similar to this Madonna soil but has a thick, dark colored surface layer, and areas of Hecker gravelly sandy loam. Also included are small areas of soils that are similar to this Madonna soil but have slopes of less than 15 percent or more than 30 percent.

Permeability of this Madonna soil is moderate. The effective rooting depth is 20 to 40 inches. Available water capacity is 2.0 to 5.5 inches. Runoff is rapid, and the hazard of erosion is high.

This soil is used mainly for range, watershed, and wildlife habitat.

If this soil is used for range, the native vegetation should be managed to increase the production of soft chess and wild oats. If the soil is continuously overgrazed, the condition of the range deteriorates; the proportion of the desirable plants decreases, and the proportion of undesirable plants increases. Control of rumex, plantain, poison-oak, and brackenfern and management of grazing improve range that has deteriorated.

The potential is good for habitat for deer, opossum, rabbit, squirrel, bobcat, skunk, coyote, gray fox, quail, dove, meadowlark, hawk, and owl.

Rapid growth of population in the county has resulted in increased construction of homes on this soil. Slope and depth to rock severely limit the soil for this use and for use as septic tank absorption fields. Only the part of the site used for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability unit IVe1(4), nonirrigated; Storie index 36.

150—Maymen stony loam, 15 to 30 percent slopes. This shallow, somewhat excessively drained soil is mainly on ridgetops. It formed in residuum derived from shale, sandstone, or granitic rock. Slopes are mostly convex. Elevation ranges from 800 to 3,000 feet. The mean annual precipitation is about 48 inches, and the mean annual air temperature is about 56 degrees F. The frost-free season ranges from 220 to 245 days.

Typically, a 1-inch mat of undecomposed leaves and twigs covers the surface. The surface layer is pale brown, slightly acid stony loam about 6 inches thick. The subsoil is pale brown, medium acid shaly loam about 8 inches thick. Unweathered, fractured shale is at a depth of 14 inches.

Included with this soil in mapping are areas of a soil that is similar to this Maymen soil, but it has a loamy sand or sandy surface layer. Also included are areas of Madonna loam, Hecker gravelly sandy loam, Lompico loam, and Rock outcrop.

Permeability of this Maymen soil is moderate. The effective rooting depth is 10 to 20 inches. Available water capacity is 1.0 to 2.5 inches. Runoff is rapid, and the hazard of erosion is high.

This soil is used for watershed and recreation and, in some places, as homesites.

Rapid growth of population in the county has resulted in increased construction of homes on this soil. Slope and depth to rock severely limit the use of this soil as homesites and as septic tank absorption fields. Only the part of the site used in construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability subclass VIIe(4), nonirrigated; Storie index 18.

151—Maymen stony loam, 30 to 75 percent slopes. This shallow, somewhat excessively drained soil is on mountains. It is mainly on the upper part of south-facing slopes. It formed in material derived from shale, sandstone, or granitic rock. Areas are dominantly convex. Elevation ranges from 800 to 3,000 feet. The mean annual precipitation is about 48 inches, and the mean annual air temperature is about 56 degrees F. The frost-free season ranges from 220 to 240 days.

Typically, a 1-inch mat of undecomposed leaves and twigs covers the surface. The surface layer is pale brown, slightly acid stony loam about 6 inches thick. The subsoil is pale brown, medium acid shaly loam about 8 inches thick. Unweathered, fractured shale is at a depth of 14 inches.

Included with this soil in mapping are areas of Madonna loam, Ben Lomond sandy loam, Hecker gravelly sandy loam, and a soil that is similar to this Maymen soil but has a loamy sand or sand surface layer. Also included are small areas of Catelli sandy loam, Sur stony sandy loam, and Rock outcrop.

Permeability of this Maymen soil is moderate. Effective rooting depth is 10 to 20 inches. Available water capacity is 1.0 to 2.5 inches. Runoff is rapid or very rapid, and the hazard of erosion is high or very high.

This soil is used for watershed and recreation.

This soil is poorly suited to use as homesites or as septic tank absorption fields because of slope and the depth to rock. Capability subclass VIIe(4), nonirrigated; Storie index 10.

152—Maymen-Madonna complex, 30 to 75 percent slopes. This complex consists of soils on mountains. Elevation ranges from 800 to 3,000 feet. The mean annual precipitation is about 48 inches, and the mean annual air temperature is about 55 degrees F. The frost-free season ranges from 220 to 245 days.

This complex is about 40 percent Maymen stony loam and 25 percent Madonna loam. The Maymen soil is on ridges and knolls and in convex areas. The Madonna soil is in swales.

Included with this complex in mapping are areas of a soil that is similar to the Madonna soil but is deeper and has a subsoil that is more than 35 percent clay. Also included are areas of Bonnydoon loam, Hecker gravelly sandy loam, Los Osos loam, a soil that is similar to the Madonna soil but has a thick, dark colored surface layer, and a soil that is similar to the Madonna soil but has more than 35 percent rock fragments in the profile.

The Maymen soil is shallow and somewhat excessively drained. It formed in material weathered from shale, sandstone, or granitic rock. Typically, a 1-inch mat of undecomposed leaves and twigs covers the surface. The surface layer is pale brown, slightly acid stony loam about 6 inches thick. The subsoil is pale brown, medium acid shaly loam about 8 inches thick. Unweathered, fractured shale is at a depth of 14 inches.

Permeability of the Maymen soil is moderate. Effective rooting depth is 10 to 20 inches. Available water capacity is 1.0 to 2.5 inches. Runoff is rapid or very rapid, and the hazard of erosion is high or very high.

The Madonna soil is moderately deep and well drained. It formed in material weathered from mudstone or shale. Typically, the surface layer is pale brown and brown, medium acid loam about 16 inches thick. The subsoil is light brownish gray, medium acid heavy loam about 7 inches thick. Highly fractured mudstone is at a depth of 23 inches.

Permeability of the Madonna soil is moderate. Effective rooting depth is 20 to 40 inches. Available water capacity is 2.0 to 5.5 inches. Runoff is rapid or very rapid, and the hazard of erosion is high or very high.

This complex is used for watershed and recreation and, in some places, as homesites.

Rapid growth of population in the county has resulted in increased construction of homes on these soils. Slope and depth to rock severely limit this complex for use as homesites and for use as septic tank absorption fields. Only the part of the site used for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting or filling. Where slopes are more than 50 percent, this complex is poorly suited for use as homesites and as septic tank filter fields. Capability subclass VIIe(4), nonirrigated; Storie index 10.

153—Maymen-Rock outcrop complex, 50 to 75 percent slopes. This complex is on ridges and the upper part of very steep slopes on mountains. Elevation ranges from 800 to 3,000 feet. The mean annual precipitation is about 48 inches, and the mean annual air temperature is about 55 degrees F. The frost-free season ranges from 220 to 245 days.

This complex is about 45 percent Maymen stony loam and 25 percent Rock outcrop.

Included with this complex in mapping are areas of soils that are similar to the Maymen soil but have bedrock at a depth of less than 10 inches. Also included are areas of Ben Lomond sandy loam and Madonna loam and small areas of Catelli sandy loam, Hecker gravelly sandy loam, and Sur stony sandy loam.

The Maymen soil is shallow and somewhat excessively drained. It formed in material weathered from shale, sandstone, or granitic rock. Typically, the surface is covered by a 1-inch mat of undecomposed leaves and twigs. The surface layer is pale brown, slightly acid stony loam about 6 inches thick. The subsoil is pale brown, medium acid shaly heavy loam about 8 inches thick. Unweathered, fractured shale is at a depth of 14 inches.

Permeability of the Maymen soil is moderate. Effective rooting depth is 10 to 20 inches. Available water capacity is 1.0 to 2.5 inches. Runoff is very rapid, and the hazard of erosion is very high.

Rock outcrop consists of exposures of sandstone, shale, and granitic rock.

This complex is used for watershed and recreation.

Rapid population growth in the county has resulted in increased pressure for homesites. This soil is poorly suited to use as homesites or for septic tank absorption fields because of the very steep slopes and depth to rock. Capability subclass VIIe(4), nonirrigated; Storie index 4.

154—Maymen Variant sandy loam, 5 to 30 percent slopes. This shallow, somewhat excessively drained soil is on mountains. It formed in material weathered from granite or schist. Elevation ranges from 400 to 2,000 feet. The mean annual precipitation is about 40 inches, and the mean annual air temperature is about 56 degrees F. The frost-free season ranges from 220 to 245 days.

Typically, the surface layer is grayish brown and brown, medium acid sandy loam about 9 inches thick. The subsoil is light yellowish brown, strongly acid gravelly sandy loam about 10 inches thick. Fractured, weathered granitic rock is at a depth of 19 inches.

Included with this soil in mapping are small areas of Lompico loam, Maymen stony loam, Sur stony sandy loam, and soils that are similar to this Maymen Variant soil but are 20 to 40 inches deep to weathered bedrock. Also included are areas of soils that are similar to this Maymen Variant soil but have a loam surface layer, and soils that are similar but have slopes of less than 5 percent or more than 30 percent.

Permeability of this Maymen Variant soil is moderate. Available water capacity is 1.0 to 2.5 inches. Effective rooting depth is 12 to 20 inches. Runoff is medium, and the hazard of erosion is moderate.

This soil is used mainly for watershed. It is also used for recreation, wildlife habitat, homesites, and firewood production.

Erosion is the main limitation to the use of this soil for recreation. An excellent practice to control erosion and sedimentation and to enhance the beauty of the area is to maintain adequate plant cover. Plant cover can be maintained by controlling traffic. Trails should be established on the contour.

This soil provides habitat for quail, deer, mice, bobcat, skunk, and coyote. The population of wildlife is low, however, compared with that in other areas in the county.

Rapid growth of population in the county has resulted in increased construction of homes on this soil. The shallow depth to bedrock limits the number of areas where septic tank filter fields can function properly. Because of the limited rooting depth and low available water capacity of this soil, landscaping is difficult and the choice of suitable plants is limited. Erosion is a hazard in the steeper areas. Only the part of the site used for construction should be disturbed. Sufficient topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. The supply of water in this area is limited. Roads should have a maximum grade of 12 percent. Good drainage should be provided for roads and landings. Cut and fill areas should be mulched and seeded to help control erosion. Adequate provisions are needed to safeguard the area from fire. Capability subclass VIIe(4), nonirrigated; Storie index 36.

155—Mocho silt loam, 0 to 2 percent slopes. This very deep, well drained soil is on the flood plain of the Pajaro River. It formed in mixed alluvium. Elevation ranges from 20 to 60 feet. The mean annual precipitation is about 25 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

Included with this soil in mapping are areas of a soil that is similar to this Mocho soil but has a lighter colored surface layer. Also included are small areas of Conejo loam and San Emigdio Variant sandy loam.

Typically, the surface layer is grayish brown, moderately alkaline, weakly effervescent silt loam about 16 inches thick. The upper part of the underlying material is light brownish gray, mildly alkaline, strongly effervescent silt loam about 7 inches thick over a buried surface layer of variegated grayish brown and light brownish gray, mildly alkaline, weakly effervescent silt loam about 20 inches thick. The lower part, to a depth of 60 inches, is light brownish gray, mildly alkaline, slightly effervescent silt loam.

Permeability of this Mocho soil is moderately slow. Available water capacity is 8.5 to 11.0 inches. Effective rooting depth is 60 inches. Runoff is slow, and the hazard of erosion is slight.

This soil is used mainly for irrigated crops. Crops commonly grown are apples, lettuce, brussels sprouts, strawberries, bushberries, cauliflower, and potatoes. A few areas are used for irrigated pasture.

If this soil is properly managed, it is highly productive. Use of green-manure crops and fertilization help to maintain tilth and fertility. Most crops require irrigation. The usual method of irrigation is by the furrow or sprinkler system. The organic matter content generally can be maintained by returning all crop residue to the soil. Most crops respond to nitrogen, and some respond to phosphorus.

The potential is good for habitat for deer, rabbit, squirrel, gopher, mole, bobcat, coyote, quail, dove, hawk and owl.

Rapid population growth has resulted in increased construction of homes on this soil. Special design is needed for building pads, roads, and other urban-related structures to compensate for the low strength and shrink-swell potential of this soil. Because of the permeability of the soil, sites that are larger than normal are needed for proper installation of septic tank filter fields. Capability subclass I(14), irrigated, and capability unit IIIc-1(14), nonirrigated; Storie index 95.

156—Nisene-Aptos complex, 15 to 30 percent slopes. This complex is mainly on foot slopes and wide ridges in the Santa Cruz Mountains. Slopes are complex. Elevation ranges from 400 to 3,000 feet. The mean annual precipitation is about 48 inches, and the mean annual air temperature is about 55 degrees F. The frost-free season ranges from 220 to 245 days.

This complex is 35 percent Aptos fine sandy loam and 30 percent Nisene loam.

Included with this complex in mapping are areas of Ben Lomond sandy loam, Felton sandy loam, and Lompico loam. Also included are small areas of Catelli sandy loam, Maymen stony loam, and Zayante coarse sand. There are also areas of soils that are similar to those in this complex but have slopes of 5 to 15 percent.

The Nisene soil is deep and well drained. It formed in residuum derived from sandstone or shale. Typically, a 2-inch mat of partially decomposed leaves, needles, and twigs covers the surface. The surface layer is dark grayish brown, neutral loam about 10 inches thick. The subsoil is brown and yellowish brown, slightly acid clay loam and gravelly loam about 48 inches thick. Weathered, fine-grained sandstone is at a depth of about 58 inches.

Permeability of the Nisene soil is moderate. Effective rooting depth is 40 to 60 inches. Available water capacity is 5.5 to 10.5 inches. Runoff is rapid, and the hazard of erosion is moderate or high.

The Aptos soil is moderately deep and well drained. It formed in residuum derived from sandstone, siltstone, or shale. Typically, a 1-inch mat of partially decomposed twigs and leaves covers the surface. The surface layer is dark grayish brown and grayish brown, slightly acid and medium acid fine sandy loam about 23 inches thick. The subsoil is brown, very strongly acid clay loam about 6 inches thick. Weathered, fine-grained sandstone is at a depth of about 29 inches.

Permeability of the Aptos soil is moderate. Effective rooting depth is 20 to 40 inches. Available water capacity is 2.5 to 6.5 inches. Runoff is rapid, and the hazard of erosion is moderate.

This complex is used mainly for timber, recreation, wildlife habitat, and watershed. It is also used for homesites, firewood production, apple orchards, pasture, and vineyards.

This complex is well suited to the production of redwood and Douglas-fir. The Aptos soil is capable of producing about 12,880 cubic feet, or 66,800 board feet (International rule), of merchantable timber from a fully stocked, even-aged stand of redwood trees 80 years old. The Nisene soil is capable of producing about 14,990 cubic feet, or 78,000 board feet (International rule), of merchantable timber from a fully stocked, even-aged stand of redwood trees 80 years old. The production of Douglas-fir is lower than that of redwood.

Most of this complex is in timber. A few areas are used for apple orchards, pasture, and vineyards. The areas used for apple orchards are mainly the deeper Nisene soil, which is better suited to apple trees because of its moderate available water capacity and good drainage. Minimum tillage and winter cover crops help to control erosion. Returning crop residue to the soil or the regular addition of other organic matter helps to maintain or improve fertility and to increase water infiltration.

This complex provides habitat for band-tailed pigeon, jay, hawk, deer, raccoon, coyote, bobcat, rabbit, squirrel, and mice.

Rapid growth of population in the county has resulted in increased construction of homes on these soils. Slope is the main limitation in homesite development. Because of the excessive slope, effluent from septic tank filter fields can surface in downslope areas and create a hazard to health. The excessive slope also increases the hazard of erosion. Only the part of a site use for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability unit IVe-1(4), nonirrigated; Storie index 60.

157—Nisene-Aptos complex, 30 to 50 percent slopes. This complex is mainly on foot slopes of the Santa Cruz Mountains. Slopes are complex. Elevation ranges from 400 to 3,000 feet but is mainly less than 2,000 feet. The mean annual precipitation is about 46 inches, and the mean annual air temperature is about 57 degrees F. The frost-free season ranges from 220 to 250 days.

This complex is about 35 percent Aptos fine sandy loam and 30 percent Nisene loam.

Included with these soils in mapping are areas of Felton sandy loam, Ben Lomond sandy loam, and Lompico loam. Also included are small areas of Catelli sandy loam, Madonna loam, Maymen stony loam, Zayante coarse sand, and soils that are similar to those in this complex but have slopes of less than 30 percent or more than 50 percent.

The Nisene soil is deep and well drained. It formed in residuum derived from sandstone or shale. Typically, a 2-inch mat of partially decomposed leaves, needles, and twigs covers the surface. The surface layer is dark grayish brown, neutral loam about 10 inches thick. The subsoil is brown and yellowish brown, slightly acid clay loam and gravelly loam about 48 inches thick. Weathered, fine-grained sandstone is at a depth of about 58 inches.

Permeability of the Nisene soil is moderate. Effective rooting depth is 40 to 60 inches. Available water capacity is 5.5 to 10.5 inches. Runoff is rapid, and the hazard of erosion is high.

The Aptos soil is moderately deep and well drained. It formed in residuum derived from sandstone, siltstone, or shale.

Typically, a 1-inch mat of partially decomposed twigs and leaves covers the surface. The surface layer is dark grayish brown and grayish brown, slightly acid and medium acid fine sandy loam about 23 inches thick. The subsoil is brown, very strongly acid clay loam about 6 inches thick. Weathered, fine-grained sandstone is at a depth of about 29 inches.

Permeability of the Aptos soil is moderate. Effective rooting depth is about 20 to 40 inches. Available water capacity is 2.5 to 6.5 inches. Runoff is rapid, and the hazard of erosion is high.

These soils are used mainly for timber, recreation, wildlife habitat, and watershed. They are also used for firewood production; some areas are used as homesites.

These soils are well suited to the production of Douglas-fir. The Aptos soil is capable of producing 12,880 cubic feet, or 65,800 board feet (International rule), of merchantable timber per acre from a fully stocked, even-aged stand of 80-year-old trees. The Nisene soil is capable of producing 14,990 cubic feet, or 78,000 board feet (International rule), of merchantable timber per acre from a fully stocked, even-aged stand of 80-year-old trees. The Nisene soil is better suited to the production of timber than the Aptos soil because the Aptos soil has weathered bedrock at a depth of 20 to 40 inches.

This complex provides habitat for band-tailed pigeon, jay, hawk, deer, raccoon, coyote, bobcat, rabbit, and squirrel.

Rapid growth of population in the county has resulted in increased pressure for homesites. Slope is the main limitation in homesite development. Because of the excessive slope, septic tank filter fields are difficult to install and effluent from filter fields can surface in downslope areas and create a hazard to health. Excessive slope also increases the hazard of erosion. Only the part of the site used for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability subclass VIe(4), nonirrigated; Storie index 32.

158—Nisene-Aptos complex, 50 to 75 percent slopes. This complex is in the Santa Cruz Mountains. Elevation ranges from 400 to 3,000 feet. The mean annual precipitation is about 48 inches, and the mean annual air temperature is about 55 degrees F. The frost-free season ranges from 220 to 245 days.

This complex is about 35 percent Aptos fine sandy loam and 30 percent Nisene loam.

Included with these soils in mapping are areas of Felton sandy loam, Ben Lomond sandy loam, and Lompico

loam. Also included are small areas of Catelli sandy loam, Maymen stony loam, Zayante coarse sand, and soils that are similar to those in this complex but have slopes of less than 50 percent.

The Nisene soil is deep and well drained. It formed in residuum derived from sandstone or shale. Typically, a 2-inch mat of partially decomposed leaves, needles, and twigs covers the surface. The surface layer is dark grayish brown and yellowish brown, slightly acid clay loam and gravelly loam about 48 inches thick. Weathered, fine-grained sandstone is at a depth of about 58 inches.

Permeability of the Nisene soil is moderate. Effective rooting depth is 40 to 60 inches. Available water capacity is 5.5 to 10.5 inches. Runoff is very rapid, and the hazard of erosion is very high.

The Aptos soil is moderately deep and well drained. It formed in residuum derived from sandstone, siltstone, or shale. Typically, a 1-inch mat of partially decomposed twigs and leaves covers the surface. The surface layer is dark grayish brown and grayish brown, slightly acid and medium acid fine sandy loam about 23 inches thick. The subsoil is brown, very strongly acid clay loam about 6 inches thick. Weathered, fine-grained sandstone is at a depth of about 29 inches.

Permeability of the Aptos soil is moderate. Effective rooting depth is about 20 to 40 inches. Available water capacity is 2.5 to 6.5 inches. Runoff is very rapid, and the hazard of erosion is very high.

These soils are used mainly for timber, recreation, wildlife habitat, and watershed. They are also used for firewood production.

These soils are well suited to the production of Douglas-fir. The Aptos soil is capable of producing 12,800 cubic feet, or 65,800 board feet (International rule), of merchantable timber per acre from a fully stocked, even-aged stand of 80-year-old trees. The Nisene soil is capable of producing 14,990 cubic feet, or 78,000 board beet (International rule), of merchantable timber per acre from a fully stocked, even-aged stand of 80-year-old trees. The Nisene soil produces more timber than the Aptos soil because the Aptos soil has bedrock at a depth of 20 to 40 inches.

This complex provides habitat for band-tailed pigeon, jay, hawk, deer, raccoon, coyote, bobcat, rabbit, squirrel, mice, salamander, tree frog, lizard, and snake.

These soils are poorly suited to use as homesites or for the installation of onsite sewage disposal systems because of their very steep slopes. Capability subclass VIIe(4), nonirrigated; Storie index 20.

159—Pfeiffer gravelly sandy loam, 15 to 30 percent slopes. This deep, well drained soil is on hills and dissected terraces. It formed in material weathered from granitic rock or sandstone or in marine sediment. Elevation ranges from about 100 to 800 feet. The mean annual precipitation is about 30 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 270 days.

Typically, the surface layer is dark grayish brown and brown, slightly acid gravelly sandy loam about 24 inches thick. The subsoil is brown, slightly acid gravelly sandy loam and cobbly sandy loam about 29 inches thick. The substratum is brown, slightly acid gravelly sandy loam about 13 inches thick. Weathered granodiorite is at a depth of 66 inches. In a few areas the surface layer is thinner because of sheet and rill erosion.

Included with this soil in mapping are areas of a soil that is similar to this Pfeiffer soil but is less than 15 percent pebbles, areas of Elkhorn sandy loam, and areas of a soil that is similar to this Pfeiffer soil but is less than 15 percent pebbles and has weathered bedrock at a depth of less than 40 inches. Also included are small areas of Baywood loamy sand, Elder sandy loam, and soils that are similar to those in this complex but have slopes of less than 15 percent or more than 30 percent.

Permeability of this Pfeiffer soil is moderately rapid. Effective rooting depth is 40 to 60 inches. Available water capacity is 3 to 6 inches. Runoff is rapid, and the hazard of erosion is high.

This soil is used mostly for range.

If this soil is used for range, the native vegetation should be managed to increase the production of soft chess and purple needlegrass. Continuous overgrazing and other poor management practices create a less favorable plant composition and reduce the inherent productivity of the site. Control of undesirable plants, such as brackenfern, poison-oak, California live oak, and blackberry, improves the range.

The potential is good for habitat for deer, opossum, rabbit, squirrel, bobcat, coyote, gray fox, band-tailed pigeon, quail, meadowlark, dove, and hawk. Small areas of natural brush should be maintained for wildlife food and cover.

Rapid growth of population in the county has resulted in increased construction of homes on this soil. Slope is the main limitation in homesite development. Because of excessive slope, effluent from septic tank filter fields can surface in downslope areas and create a hazard to health. Excessive slope also increases the hazard of erosion. Only the part of the site used for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability unit IVe-1(15), nonirrigated; Storie index 49.

160—Pfeiffer gravelly sandy loam, 30 to 50 percent slopes. This deep, well drained soil is on hills. It formed in material weathered from granitic rock, sandstone, or marine sediment. Elevation ranges from 100 to 800 feet. The mean annual precipitation is about 30 inches, and the annual air temperature is about 58 degrees F. The frost-free season ranges from 240 to 270 days.

Typically, the surface layer is dark grayish brown and brown, slightly acid gravelly sandy loam about 24 inches thick. The subsoil is brown, slightly acid gravelly sandy loam and cobbly sandy loam about 29 inches thick. The substratum is brown, slightly acid gravelly sandy loam about 13 inches thick. Weathered granodiorite is at a

depth of 66 inches. In a few areas the surface layer is thinner because of sheet and rill erosion.

Included with this soil in mapping are areas of a soil that is similar to this Pfeiffer soil but is less than 15 percent pebbles, areas of Elkhorn sandy loam, and areas of a soil that is similar but is less than 15 percent pebbles and has weathered bedrock at a depth of less than 40 inches. Also included are small areas of Baywood loamy sand, Elder sandy loam, and soils that are similar to this Pfeiffer soil but have slopes of less than 30 percent or more than 50 percent.

Permeability of this Pfeiffer soil is moderately rapid. Effective rooting depth is 40 to 60 inches. Available water capacity is 3.0 to 6.0 inches. Surface runoff is rapid, and the hazard of erosion is high.

This soil is used mainly for range.

If this soil is used for range, the native vegetation should be managed to increase the production of soft chess, wild oats, blue wildrye, and purple needlegrass. Continuous overgrazing and other poor management practices create a less favorable plant composition and reduce the inherent productivity of the site. Control of less desirable plants, such as blackberry, poison-oak, coyotebrush, and California live oak, improves the range. Suitable range management practices are those that promote distribution of grazing. The very steep slopes generally restrict livestock movement and create unused forage areas in large fields.

Potential is fair for habitat for deer, opossum, rabbit, squirrel, bobcat, coyote, gray fox, band-tailed pigeon, quail, meadowlark, dove, and hawk. Small areas of natural brush should be maintained as wildlife food and cover.

Rapid growth of population in the county has resulted in increased construction of homes on this soil. Slope is the main limitation in homesite development. Because of excessive slope, effluent from septic tank filter fields can surface and create a hazard to health. Only the part of the site used for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability subclass VIe(15), nonirrigated; Storie index 26.

161—Pinto loam, 0 to 2 percent slopes. This very deep, moderately well drained soil is on coastal terraces. It formed in old alluvium and marine deposits. Elevation ranges from 20 to 1,000 feet. The mean annual precipitation is about 28 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

Typically, the surface layer is grayish brown, medium acid loam about 14 inches thick. The subsurface layer is light brownish gray, medium acid loam about 7 inches thick. The subsoil is brownish yellow, light yellowish brown, or very pale brown, medium acid and slightly acid clay loam about 30 inches thick. The substratum, to a depth of 65 inches, is reddish yellow, strongly acid clay loam.

Included with this soil in mapping are areas of Watsonville loam. Also included are small areas of Elkhorn sandy loam, soils that are similar to this Pinto soil but have a cemented hardpan, and soils that are similar to this Pinto soil but have slopes of more than 2 percent.

Permeability of this Pinto soil is slow. Available water capacity is 6.5 to 8.0 inches. Additional water is available when water is perched above the compacted subsoil. Effective rooting depth is as much as 60 inches, but roots below a depth of 20 to 40 inches are restricted to cracks because the layers below this depth are compacted. Surface runoff is slow, and the hazard of erosion is slight.

Most areas of this soil are cultivated. The main crops are apples, brussels sprouts, and bushberries. A few areas are in irrigated pasture.

Shallow-rooted crops are best suited to this soil. Restriction of roots because of compaction of the subsurface layer is the main limitation of the soil for crops. Use of cover crops and green-manure crops, fertilization, crop residue management, and chiseling helps to maintain or improve tilth and fertility. Chiseling can temporarily increase permeability, but it does not have a lasting effect. It should be done when the soil is moderately dry to avoid further compaction. Most crops require irrigation. Either furrow or sprinkler systems are suitable. Drainage and careful irrigation water management are necessary to avoid a perched water table. Both surface and subsurface drainage systems are needed in places.

The potential is good for habitat for deer, opossum, rabbit, squirrel, bobcat, coyote, gray fox, quail, dove, meadowlark, hawk, and owl.

Rapid growth of population in the county has resulted in increased construction of homes on this soil. Special design is needed for building pads, roads, and other urban-related structures to compensate for the low strength and shrink-swell potential of this soil. Because of the slow permeability, septic tank absorption fields commonly fail. Borings to a depth of 20 to 30 feet have located sand strata. Onsite investigations should be made to confirm the presence of sand strata before construction is started. Community sewage systems should be used in areas where density of population is medium to high. Only the part of the site used for construction should be disturbed. Topsoil should be stockpiled and used to reclaim disturbed areas. Capability units IIs-3(14), irrigated, and IIIs-3(14), nonirrigated; Storie index 68.

162—Pinto loam, 2 to 9 percent slopes. This very deep, moderately well drained soil is on coastal terraces and old alluvial fans. It formed in old alluvium. Most areas are gently sloping. Elevation ranges from 20 to 1,000 feet. The mean annual precipitation is about 28 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

Typically the surface layer is grayish brown, medium acid loam about 14 inches thick. The subsurface layer is light brownish gray, medium acid loam about 7 inches thick. The subsoil is brownish yellow, light yellowish brown, or very pale brown medium acid and slightly acid clay loam about 30 inches thick. The substratum to a

depth of 65 inches is reddish yellow, strongly acid clay loam.

Included with this soil in mapping are small areas of Elkhorn sandy loam, Watsonville loam, soils that are similar to this Pinto soil but have a cemented hardpan, and soils that are similar but have slopes of less than 2 percent or more than 9 percent.

Permeability of this Pinto soil is slow. Available water capacity is 6.5 to 8.0 inches. Water is perched above the compacted subsoil at times. Effective rooting depth is to 60 inches, but roots below a depth of 20 to 40 inches are restricted to cracks because of compaction below this depth. Surface runoff is slow or medium, and the hazard of erosion is slight or moderate.

Many areas of this soil are used for row crops. Brussels sprouts is the main crop. Some areas are in irrigated pasture or are rangeland. A few areas are in apple orchards.

If this soil is cultivated, restriction of roots because of compaction of the subsurface layer is the main limitation to use. Such practices as using cover crops and green-manure crops, fertilization, crop residue management, and chiseling are needed to maintain or improve tilth and fertility. Chiseling can temporarily improve permeability, but it does not have a lasting effect. Chiseling should be done when the soil is moderately dry to avoid further compaction. Most crops require irrigation. Contour furrow or sprinkler irrigation systems are suitable. Drainage and careful irrigation water management are necessary to avoid a perched water table.

If this soil is properly managed, the production of forage yields from irrigated pasture is moderate to high. Such practices as rotation of grazing, fertilization, and irrigation water management are required for best production. Sprinkler irrigation systems are suitable.

If this soil is used for range, the native vegetation should be managed to increase the production of soft chess, wild oats, and purple needlegrass. Continuous overgrazing causes the condition of the range to deteriorate; as the proportion of desirable plants decreases, the proportion of undesirable plants increases. Control of narrowleaf plantain, tarweed, coyotebrush, and California live oak improves the condition of the range.

The potential is good for habitat for deer, opossum, rabbit, squirrel, bobcat, coyote, gray fox, quail, dove, meadowlark, hawk, and owl. Small natural brush areas should be maintained for wildlife habitat.

Rapid growth of population in the county has resulted in increased construction of homes on this soil. Special design is needed for building pads, roads, and other urban-related structures to compensate for the low strength and shrink-swell potential of this soil. Because of the slow permeability, septic tank filter fields commonly fail. Borings to a depth of 20 to 30 feet have located sand strata. Onsite investigations should be made to confirm the presence of sand strata before homesite development is started. Community sewage systems should be used in areas where density of population is medium to high. Only the part of the site used for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability unit IIIe-3(14), irrigated and nonirrigated; Storie index 62.

163—Pinto loam, 9 to 15 percent slopes. This very deep, moderately well drained soil is on coastal terraces and old alluvial fans. It formed in alluvium and in marine deposits. Elevation ranges from 20 to 1,000 feet. The mean annual precipitation is about 28 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

Typically, the surface layer is grayish brown, medium acid loam about 14 inches thick. The subsurface layer is light brownish gray, medium acid loam about 7 inches thick. The subsoil is brownish yellow, light yellowish brown, or very pale brown, medium acid and slightly acid clay loam about 30 inches thick. The substratum, to a depth of 65 inches, is reddish yellow, strongly acid clay loam.

Included with this soil in mapping are small areas of Elkhorn sandy loam, Watsonville loam, soils that are similar to this Pinto soil but have a cemented hardpan, and other soils that are similar but have slopes of less than 9 percent or more than 15 percent.

Permeability of this Pinto soil is slow. Available water capacity is 6.5 to 8.0 inches. Additional water may be available because of the perching of water above the compacted subsoil. Effective rooting depth is as much as 60 inches, but roots below a depth of 20 to 40 inches are restricted to cracks because of compaction below this depth. Surface runoff is rapid, and the hazard of erosion is moderate.

Many areas are used for row crops. Brussels sprouts is the main crop. Some areas are in irrigated pasture or are rangeland. A few areas are in apple orchards.

If this soil is cultivated, the restriction of roots because of compaction of the subsurface layer is the main limitation. Cover crops and green-manure crops, fertilization, crop residue management, and chiseling are needed to maintain or improve tilth and fertility. Chiseling can temporarily improve permeability, but it does not have a lasting effect. Chiseling should be done when the soil is moderately dry to avoid further compaction. Most crops require irrigation. Sprinkler or drip irrigation systems are suitable. Drainage and careful irrigation water management are necessary to avoid creating a perched water table. Farming across the slope, or on the contour, reduces erosion. Grassed waterways should be established to carry away excess water.

High forage yields from irrigated pasture can be obtained if management is good. Such practices as rotation grazing, fertilization, and irrigation water management are required for best production. Sprinkler irrigation systems are best suited.

If this soil is used for range, the native vegetation should be managed to increase the production of soft chess, wild oats, and purple needlegrass. Continuous over-

grazing causes the condition of the range to deteriorate; as the proportion of desirable plants decreases, the proportion of undersirable plants increases. Control of narrowleaf plantain, tarweed, coyotebrush and California live oak improves the condition of the range.

The potential is good for habitat for deer, opossum, rabbit, squirrel, bobcat, coyote, gray fox, quail, dove, meadowlark, hawk, and owl. Small natural brush areas should be maintained for wildlife habitat.

Rapid growth of the population in the county has resulted in increased construction of homes on this soil. Special design is needed for building pads, roads, and other urban-related structures to compensate for the low strength and shrink-swell potential of this soil. Because of the slow permeability, septic tank filter fields commonly fail. Effluent from filter fields can also surface in areas downslope and present a hazard to health. Borings to a depth of 20 to 30 feet have located sand strata. Borings should be made to confirm the presence of sand strata before homesite development is started. Community sewage systems should be used in areas where density of population is medium to high. Only the part of the site used for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Capability units IVe-3(14), irrigated, and IIIe-3(14), nonirrigated; Storie index 55.

164—Pits-Dumps complex. Pits are open excavations from which soil material has been removed. Dumps are uneven areas of accumulated waste material. Elevation ranges from 50 to 1,500 feet. The native vegetation generally is sparse and consists mainly of annual grasses and forbs.

Included with this complex in mapping are small areas of Rock outcrop.

This complex is used by industry as sand and gravel pits, mine pits, quarries, borrow pits, and waste disposal sites. Capability subclass VIIIe-(4)(14)(15), nonirrigated; Storie index 0.

165—Riverwash. This miscellaneous area consists mostly of water-deposited, stratified sand, pebbles, cobbles, and stones. The native vegetation is redwood, willow, sycamore, maple, a few oaks, and some grasses and forbs.

During floods, debris sometimes clogs the channels and new watercourses are cut in areas where material was formerly deposited. Elevation ranges from about 5 to 500 feet.

Riverwash is in areas that are subject to overflow by streams during and for short periods after prolonged storms of high intensity. The low-lying areas next to the drainageways are frequently flooded, but the higher areas are flooded only under extreme storm conditions. The hazard of erosion is variable.

Included with Riverwash in mapping are small areas of Baywood soils and parts of perennial streams.

Areas of Riverwash are used mainly for recreation or wildlife habitat and for limited grazing and woodland. A few areas are grazed in conjunction with adjoining areas that have higher grazing value. Capability subclass VIIIw(4) (14) (15), nonirrigated; Storie index is less than 5 percent.

166—San Emigdio Variant sandy loam, 0 to 2 percent slopes. This very deep, well drained soil is on the flood plain of the Pajaro River. It formed in coarse alluvium. Elevation ranges from 20 to 60 feet. The mean annual precipitation is about 25 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 250 to 275 days.

Typically, the surface layer is light brownish gray, moderately alkaline, effervescent sandy loam about 8 inches thick. The underlying material, to a depth of 60 inches, is light brownish gray, moderately alkaline, strongly and weakly effervescent, stratified very fine sandy loam, fine sandy loam, and fine sand.

Included with this soil in mapping are areas of Mocho silt loam and soils that are similar to this San Emigdio Variant soil but are loamy fine sand or fine sand between depths of 10 and 40 inches. Also included are a few small areas of similar soils that have a surface layer of loamy fine sand and fine sand.

Permeability of this San Emigdio Variant soil is moderately rapid. The available water capacity is 7.0 to 8.5 inches. Effective rooting depth is 60 inches. Runoff is slow, and the hazard of erosion is slight.

Most areas of this soil are intensively cultivated. The chief crops are lettuce, brussels sprouts, strawberries, and bushberries. A few areas are in irrigated pasture.

If this soil is properly managed, it is highly productive. Use of green manure crops and fertilization helps to maintain tilth and fertility. Most crops require irrigation. The usual method of irrigation is by furrow or sprinkler systems. Underground drainage systems are needed in a few places where drainage is inadequate.

The potential is good for habitat for deer, rabbit, squirrel, gopher, mole, bobcat, coyote, quail, dove, hawk, and owl. Because of the amount of cultivation on this soil, wildlife habitat is limited.

Rapid growth of population has resulted in the construction of homes on this soil. This soil has few limitations for homesite development. Capability units I(14), irrigated, and IIIc-1(14), nonirrigated; Storie index 90.

167—Santa Lucia shaly clay loam, 5 to 30 percent slopes. This moderately deep, well drained soil is on hills and mountains. It formed in material weathered from siliceous shale. Elevation ranges from 100 to 1,800 feet. The mean annual precipitation is about 30 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 270 days.

Typically, the surface layer is dark gray and grayish brown, neutral, medium acid and strongly acid shaly clay loam and very shaly clay loam about 38 inches thick. Below this is fractured siliceous shale.

Included with this soil in mapping are areas of a soil that is similar to this Santa Lucia soil but is less than 35 percent shale fragments in the profile; areas of Bonnydoon loam, Maymen stony loam, and a soil that is

similar to this Santa Lucia soil but has a subsoil; and areas of Los Osos loam. Also included are small areas of Soquel loam and soils that are similar to this Santa Lucia soil but have bedrock at a depth of less than 20 inches or more than 40 inches.

Permeability of this Santa Lucia soil is moderate. Effective rooting depth is 20 to 40 inches. Available water capacity is 1.5 to 4.5 inches. Runoff is medium to rapid, and the hazard of erosion is moderate to high.

Nearly all areas of this soil are rangeland. A few areas are used for homesites.

If this soil is used for range, the native vegetation should be managed to increase the production of soft chess, purple needlegrass, and California fescue. If the soil is continuously overgrazed, the condition of the range deteriorates; the proportion of desirable forage plants decreases, and the proportion of undesirable plants increases. Control of chamise, brackenfern, poison-oak, and coyotebrush improves the condition of the range and improves the value of the site for watershed, wildlife habitat, and recreation.

The potential is good for habitat for deer, jackrabbit, ground squirrel, bobcat, coyote, gray fox, quail, dove, and hawk.

Rapid growth of population in the county has resulted in increased construction of homes on this soil. Moderate depth to bedrock and the hazard of erosion, especially in the steep areas of this soil, are the main limitations for homesites. Depth to rock causes difficulty in trenching for pipelines and also can cause failure of septic tank filter fields. Erosion is a hazard if the surface is disturbed and left bare. Only the area necessary for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Disturbed areas should be reseeded to suitable grasses as soon after development as possible. Capability unit IVe-1(15), nonirrigated; Storie index 43.

168—Santa Lucia shaly clay loam, 30 to 50 percent slopes. This moderately deep, well drained soil is on hills and mountains. It formed in material weathered from siliceous shale. Elevation ranges from 100 to 1,800 feet. The mean annual precipitation is about 30 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 270 days.

Typically, the surface layer is dark gray and grayish brown, neutral, medium acid and strongly acid shaly clay loam and very shaly clay loam about 38 inches thick. Below this is fractured siliceous shale.

Included with this soil in mapping are areas of Maymen stony loam, Bonnydoon loam, Los Osos loam, a soil that is similar to this Santa Lucia soil but is 18 to 35 percent clay, and a soil that is similar but has a subsoil. Also included are small areas of soils that are similar to this Santa Lucia soil but have bedrock at a depth of less than 20 inches or more than 40 inches.

Permeability of this Santa Lucia soil is moderate. The effective rooting depth is 20 to 40 inches. Available water capacity is 1.5 to 4.5 inches. Runoff is rapid, and the hazard of erosion is high.

Nearly all areas of this soil are rangeland. A few areas are used as homesites.

If this soil is used as range, the native vegetation should be managed to increase the production of soft chess, purple needlegrass, and California fescue. If the soil is continuously overgrazed, the condition of the range deteriorates; the proportion of desirable forage plants decreases, and the proportion of undesirable plants increases. Control of chamise, brackenfern, poison-oak, and coyotebrush improves the condition of the range and improves the value of the site for watershed, wildlife habitat, and recreation. The moderately steep slope of this soil generally makes it difficult to locate good sites for stock watering ponds. Management of brushy areas by burning or by mechanical methods can increase the hazard of erosion unless precautionary measures are taken.

The potential is good for habitat for deer, jackrabbit, ground squirrel, bobcat, coyote, gray fox, quail, dove, and hawk.

Rapid growth of population in the county has resulted in increased construction of homes on this soil. Depth to bedrock and slope are the main limitations of this soil for homesites. Depth to bedrock also causes difficulty in trenching for pipelines and can cause failure of septic tank filter fields. Effluent from filter fields can surface in areas downslope and create a hazard to health. Because of the slope, erosion is a hazard if the surface is disturbed and left bare. Only the areas used for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Disturbed areas should be reseeded to suitable grasses as soon after development as possible. Capability subclass VIe(15), nonirrigated; Storie index 21.

169—Santa Lucia shaly clay loam, 50 to 75 percent slopes. This moderately deep, well drained soil is on hills and mountains. It formed in material weathered from siliceous shale or mudstone. Elevation ranges from 100 to 1,800 feet. The mean annual precipitation is about 30 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 270 days.

Typically, the surface layer is dark gray and grayish brown, neutral, medium acid and strongly acid shaly clay loam and very shaly clay loam about 38 inches thick. Below this is fractured siliceous shale.

Included with this soil in mapping are areas of a soil that is similar to this Santa Lucia soil but is less than 20 inches deep to bedrock; areas of Bonnydoon loam, Maymen stony loam, and a soil that is similar but has a subsoil; and areas of Aptos loam, warm. Also included are small areas of a soil that is similar to this Santa Lucia soil but is more than 40 inches deep to bedrock.

Permeability of this Santa Lucia soil is moderate. Effective rooting depth is 20 to 40 inches. Available water capacity is 1.5 to 4.5 inches. Runoff is very rapid, and the hazard of erosion is very high.

Nearly all areas of this soil are rangeland.

If this soil is used for range, the native vegetation should be managed to increase the production of soft chess, purple needlegrass, and California fescue. If the soil is continuously overgrazed, the condition of the range deteriorates; the proportion of desirable forage plants decreases, and the proportion of undesirable plants increases. Control of chamise, brackenfern, poison-oak, and coyotebrush improves the range and increases the value of the site for watershed, wildlife habitat, and recreation. Management of brush areas by burning, chemical, or mechanical methods can increase the hazard of erosion unless precautionary measures are taken. Among the suitable management practices are those that improve the distribution of grazing.

The potential is good for habitat for deer, jackrabbit, ground squirrel, bobcat, coyote, gray fox, quail, dove, and hawk.

Rapid growth of population in the county has resulted in increased pressure for homesites. The moderate depth over bedrock and excessive slope severely limit the use of this soil for construction of homes. Capability subclass VIIe(15), nonirrigated; Storie index 12.

170—Soquel loam, 0 to 2 percent slopes. This very deep, moderately well drained soil is on plains and in narrow valleys. It formed in alluvium. Elevation ranges from 20 to 1,000 feet. The mean annual precipitation is about 30 inches, and the mean annual air temperature is about 57 degrees F. The frost-free season ranges from 220 to 250 days.

Typically, the surface layer is very dark grayish brown and brown, medium acid and slightly acid loam about 21 inches thick. The upper part of the underlying material is brown, neutral silt loam about 16 inches thick over a buried surface layer of brown, neutral silty clay loam about 14 inches thick. The lower part, to a depth of 62 inches, is yellowish brown, neutral loam.

Included with this soil in mapping are areas of the Fluvaquentic Haploxerolls-Aquic Xerofluvents complex and a soil that is similar to this Soquel soil but has a very gravelly subsoil at a depth of more than 30 to 48 inches. Also included are some small narrow valleys that do not have intrenched streams that are subject to intermittent flooding.

Permeability of this Soquel soil is moderately slow. Available water capacity is 8.5 to 10.5 inches. Effective rooting depth is 60 inches. Surface runoff is slow, and the hazard of erosion is none to slight.

Most areas of this soil are intensively cultivated. The main crops are apples, lettuce, brussels sprouts, strawberries, and bushberries. Most other crops commonly grown in the county are suited to this soil. A few areas have been left in timber.

If this soil is properly managed, it is highly productive. Use of green-manure crops and fertilizer helps to maintain tilth and fertiity. Most crops respond to nitrogen, and some respond to phosphorus. Where the soil is irrigated, the usual method of irrigation is by furrow or sprinkler systems. Water should be applied at a slow rate over a long period to assure that the root zone is properly wetted.

This soil is well suited to the production of Douglas-fir. It is capable of producing 13,360 cubic feet, or 70,000 board feet (International rule), of merchantable timber per acre from a fully stocked, even-aged stand of 80-year-old trees.

Forested areas of this soil provide habitat for band-tailed pigeon, jay, hawk, deer, raccoon, coyote, bobcat, rabbit, squirrel, mice, salamander, tree frog, lizard, and snake. Openland areas consisting of croplands, orchards, and pastures attract quail, dove, meadowlark, finch, deer, opossum, rodents, and predators, such as bobcat, skunk, coyote, and gray fox.

Rapid growth of population in the county has resulted in increased construction of homes on this soil. This soil is limited for homesites by moderately slow permeability. Lots larger than normal are needed to provide the additional area needed for septic tank filter fields. Onsite inspection is needed to determine if the site is subject to flooding. Unless protected, areas that are subject to flooding should not be used as homesites. Capability unit I(4), irrigated, and IIIc-1(4), nonirrigated; Storie index 90.

171—Soquel loam, 2 to 9 percent slopes. This very deep, moderately well drained soil is on plains. It formed in alluvium. Elevation ranges from 20 to 1,000 feet. The mean annual precipitation is about 30 inches, and the mean annual air temperature is about 57 degrees F. The average frost-free season ranges from 220 to 250 days.

Typically, the surface layer is very dark grayish brown and brown, medium acid and slightly acid loam about 21 inches thick. The upper part of the underlying material is brown, neutral silt loam about 16 inches thick over a buried surface layer of brown, neutral silty clay loam about 14 inches thick. The lower part, to a depth of 62 inches, is yellowish brown, neutral loam.

Included with this soil in mapping are areas of the Fluvaquentic Haploxerolls-Aquic Xerofluvents complex and soils that are similar to this Soquel soil but have a very gravelly subsoil at a depth of 30 to 48 inches. Also included are a few narrow valleys that do not have intrenched streams and are subject to intermittent flooding and soils that have a sandy loam surface layer.

Permeability of this Soquel soil is moderately slow. Available water capacity is 8.5 to 10.5 inches. Effective rooting depth is 60 inches. Surface runoff is slow to medium, and the hazard of erosion is slight to moderate.

Most areas of this soil are intensively cultivated. The main crops are apples, lettuce, brussels sprouts, strawberries, and bushberries. Most other crops commonly grown in the county also are suited to this soil. A few areas have been left in timber.

If this soil is properly managed, it is highly productive. Use of green-manure crops and fertilizer helps to maintain tilth and fertility. Most crops respond to nitrogen, and some respond to phosphorus. Most crops require irrigation. Where this soil is irrigated, contour furrow and sprinkler systems generally are used. Because the soil is

moderately slowly permeable, water should be applied at a slow rate for a long period to wet the entire root zone.

Erosion can be controlled by minimum tillage, contour or cross-slope farming, proper crop residue management, and use of winter cover crops. Sheet and rill erosion can be substantially reduced on steeper slopes used for row crops by terracing and farming on the contour.

This soil is well suited to the production of Douglas-fir. It is capable of producing 13,360 cubic feet, or 70,000 board feet (International rule), of merchantable timber per acre from a fully stocked, even-aged stand of 80-year-old trees.

Forested areas of this soil provide habitat for band-tailed pigeon, jay, hawk, deer, raccoon, coyote, bobcat, rabbit, squirrel, mice, salamander, tree frog, lizard, and snake. Croplands, orchards, and pastures provide habitat for openland wildife species, such as quail, dove, meadowlark, finch, deer, opossum, and rodents, and such predators as bobcat, skunk, coyote, and gray fox.

Rapid growth of population in the county has resulted in increased construction of homes on this soil. The main limitations of this soil for homesites are moderately slow permeability and moderate slope. Because of the moderately slow permeability, lots larger than normal are needed to provide the additional area needed for septic tank filter fields. Erosion is a hazard in these moderately sloping areas. To reduce erosion, only the part of the site used for construction should be disturbed. Disturbed areas should be reseeded to suitable grasses as soon after construction as possible. Capability unit IIIe-1(4), irrigated and nonirrigated; Storie index 81.

172—Soquel loam, 9 to 15 percent slopes. This very deep, moderately well drained soil is on plains and fans. It formed in alluvium. Elevation ranges from 20 to 1,000 feet but is dominantly more than 500 feet. The mean annual precipitation is about 30 inches, and the mean annual air temperature is about 57 degrees F. The frost-free season is about 220 to 250 days.

Typically, the surface layer is very dark grayish brown and brown, medium acid and slightly acid loam about 21 inches thick. The upper part of the underlying material is brown, neutral silt loam about 16 inches thick over a buried surface layer of brown, neutral silty clay loam about 14 inches thick. The lower part, to a depth of 62 inches, is yellowish brown, neutral loam. In places, the surface layer is sandy loam.

Included with this soil in mapping are areas of Elkhorn sandy loam. Also included are small areas of loam and coarse sand along narrow stream channels; a soil that is similar to this Soquel soil but is very gravelly at a depth of 30 to 48 inches; narrow alluvial escarpments that have slopes of as much as 30 percent; and soils that are similar to this Soquel soil but have slopes of less than 9 percent.

Permeability of this Soquel soil is moderately slow. Available water capacity is 8.5 to 10.5 inches. Effective rooting depth is 60 inches. Surface runoff is medium, and the hazard of erosion is moderate.

Most areas of this soil are cultivated. The hazard of erosion limits use in most places to apple orchards or pasture. A limited acreage of brussels sprouts and strawberries is grown along the coastal area. A few areas are used for timber.

If this soil is properly managed, it is moderately to highly productive. Use of cover crops, crop residue management, minimum tillage, cross-slope or contour farming, and fertilization help to control erosion and to maintain fertility. Most crops require irrigation. Sprinkler or drip type irrigation systems are most suitable. Because this soil is moderately slowly permeable, water should be applied at a slow rate for a long period to wet the entire root zone.

The Soquel soil is well suited to the production of Douglas-fir. It is capable of producing 13,360 cubic feet, or 70,000 board feet (International rule), of merchantable timber per acre from a fully stocked, even-aged stand of 80-year-old trees.

Forested areas of this soil provide habitat for band-tailed pigeon, jay, hawk, deer, raccoon, coyote, bobcat, rabbit, squirrel, mice, salamander, tree frog, lizard, and snake. Croplands, orchards, and pastures provide habitat for openland wildlife species, such as quail, dove, meadowlark, finch, deer, opossum, and rodents, and such predators as bobcat, skunk, coyote, and gray fox.

Rapid growth of population in the county has resulted in increased construction of homes on this soil. The main limitations of the soil for homesites are moderately slow permeability and strong slope. Because this soil is moderately slowly permeable, lots that are larger than normal are needed to provide the additional area needed for septic tank filter fields. Effluent can surface in downslope areas and become a hazard to health. Erosion is a hazard if this strongly sloping soil is disturbed. To control erosion, only the part of the site used for construction should be disturbed. Disturbed areas should be reseeded to suitable grasses as soon after construction as possible. Capability units IVe-1(4), irrigated, and IIIe-1(4), nonirrigated; Storie index 72.

173—Sur-Catelli complex, 50 to 75 percent slopes. This complex consists of soils on mountainsides. The areas extend from the ridges to the drainageways. Slopes are complex. Elevation ranges from 400 to 3,000 feet. The mean annual precipitation is about 48 inches, and the mean annual air temperature is about 55 degrees F. The frost-free season ranges from 220 to 245 days.

This complex is 35 percent Sur stony sandy loam and 25 percent Catelli sandy loam. Catelli soils generally have slopes of less than 60 percent, and Sur soils have slopes of more than 60 percent.

Included with these soils in mapping are areas of Ben Lomond sandy loam, Lompico loam, Madonna loam, Maymen stony loam, soils that are similar to the Sur soil but are less than 20 inches deep to bedrock or have loamy sand and sand texture, and a soil that is similar to the Catelli soil but is underlain by hard sandstone. Also included are small areas of Hecker gravelly sandy loam,

Zayante coarse sand, soils that are similar to the soils in this complex but have slopes of 75 to 85 percent, and a soil that is similar to the Sur soil but has a light colored surface layer and is strongly acid.

The Sur soil is moderately deep and somewhat excessively drained. It formed in residuum derived from sandstone, schist, or granitic rock. Typically, a 1-inch mat of partially decomposed needles, leaves, and twigs covers the surface. The surface layer is brown, neutral and slightly acid stony sandy loam about 18 inches thick. The underlying material is reddish yellow, medium acid very stony sandy loam. Hard quartz diorite is at a depth of 35 inches.

Permeability of the Sur soil is moderately rapid. Effective rooting depth is 20 to 40 inches. Available water capacity is 1.0 to 3.5 inches. Runoff is very rapid, and the hazard of erosion is very high.

The Catelli soil is moderately deep and well drained. It formed in residuum derived from sandstone or granitic rock. Typically, a 3-inch mat of partially decomposed leaves, bark, and twigs covers the surface. The surface layer is brown, slightly acid sandy loam about 7 inches thick. The subsoil is yellowish brown and light yellowish brown, slightly acid and medium acid sandy loam about 16 inches thick. The substratum is very pale brown, strongly acid sandy loam about 14 inches thick. Weathered sandstone is at a depth of 37 inches.

Permeability of the Catelli soil is moderately rapid. Effective rooting depth is 20 to 40 inches. Available water capacity is 2.0 to 5.0 inches. Runoff is very rapid, and the hazard of erosion is very high.

These soils are used mainly for watershed, wildlife habitat, recreation, and timber. They are also used for firewood production.

The Catelli soil is well suited to the production of Douglas-fir, and the Sur soil is poorly suited. Small areas of the Sur soil are in ponderosa pine and Coulter pine. The Sur soil is capable of producing 5,510 cubic feet, or 10,220 board feet (International rule), of merchantable timber per acre from a fully stocked, even-aged stand of 80-year-old trees. The Catelli soil is capable of producing 10,795 cubic feet, or 47,400 board feet (International rule), of merchantable timber from a fully stocked, even-aged stand of 80-year-old trees. The main limitation of this complex for the production of timber is the presence of unweathered bedrock at a depth of 20 to 40 inches and a rock fragment content of 35 percent or more in the Sur soil. An additional limitation is the presence of weathered bedrock at a depth of 20 to 40 inches in the Catelli soil.

This complex provides habitat for band-tailed pigeon, jay, hawk, deer, raccoon, coyote, bobcat, rabbit, squirrel, mice, salamander, tree frog, lizard, and snake.

These soils are poorly suited to building site development and onsite sewage disposal because of their very steep slopes. Capability subclass VIIe(4), nonirrigated; Storie index 14.

174—Tierra-Watsonville complex, 15 to 30 percent slopes. This complex consists of soils on alluvial and marine terraces. Elevation ranges from about 20 to 1,200 feet. The mean annual precipitation is about 28 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

This complex is about 55 percent Tierra sandy loam and 30 percent Watsonville loam.

Included with this complex in mapping are areas of Elkhorn sandy loam. Also included are small areas of Baywood loamy sand, Pfeiffer gravelly sandy loam, Los Osos loam, a soil that is similar to the Tierra soil but has less clay in the profile, and soils that are similar to those in this complex but have slopes of less than 15 percent or more than 30 percent.

The Tierra soil is very deep and moderately well drained. It formed in alluvium derived from sedimentary rock. Typically, the surface layer is grayish brown and dark gray, slightly acid sandy loam about 14 inches thick. The upper part of the subsoil is brown, light brownish gray, pale brown, and light gray, slightly acid sandy clay and sandy clay loam about 23 inches thick. The lower part to a depth of 66 inches is light gray and yellow, slightly acid and strongly acid clay and silty clay.

Permeability of the Tierra soil is very slow. Available water capacity is 2.0 to 3.5 inches. Water is perched above the clay at times. The effective rooting depth of this soil is as much as 60 inches, but roots are restricted to cracks in the clay below a depth of 12 to 20 inches. Runoff is rapid, and the hazard of erosion is high. Small areas that periodically have not had plant cover are moderately eroded.

The Watsonville soil is very deep and somewhat poorly drained. It formed in alluvium derived from sedimentary rock. Typically, the surface layer is very dark grayish brown, slightly acid loam about 12 inches thick. The subsurface layer is light gray, slightly acid sandy loam about 6 inches thick. The subsoil is pale brown and mixed light gray and very pale brown, slightly acid clay about 21 inches thick. The substratum to a depth of 63 inches is mixed light gray, very pale brown, and yellow, slightly acid and medium acid sandy clay loam.

Permeability of the Watsonville soil is very slow. Available water capacity is 4.0 to 5.0 inches. Water is perched above the clay at times. The effective rooting depth is as much as 60 inches, but roots are restricted to cracks in the clay below a depth of 10 to 20 inches. Runoff is rapid, and the hazard of erosion is high. Small areas that periodically have not had plant cover are moderately eroded.

This complex is used mostly for range. If this complex is used for range, the native vegetation should be managed to increase the production of soft chess, wild oats, and purple needlegrass. If the range is continuously overgrazed, the condition of the range deteriorates; the proportion of desirable plants decreases and the proportion of undesirable plants increases. Control of narrowleaf plantain, tarweed, coyotebrush, and California live oak improves the condition of the range.

The potential is fair for habitat for deer, rabbit, squirrel, bobcat, coyote, gray fox, quail, dove, hawk, and owl.

Rapid growth of population in the county has resulted in increased construction of homes on these soils. Slope, shrink-swell potential, and low strength are the main features that limit these soils for homes. Special design is needed for building pads, roads, and other urban-related structures to compensate for the low strength and the shrink-swell potential of this soil. Because of the very slow permeability, septic tank absorption fields do not function properly. In a few areas, borings to a depth of 20 to 30 feet have located sand strata. Onsite investigation is needed to confirm the presence of sand strata before homesite development is started. Community sewage systems are needed in areas where density of population is medium to high. Capability unit IVe-3(14, 15), nonirrigated; Storie index 28.

175—Tierra-Watsonville complex, 30 to 50 percent slopes. This complex consists of soils on alluvial and marine terraces. Elevation ranges from about 20 to 1,200 feet. The mean annual precipitation is about 28 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season is 245 to 275 days.

This map unit is about 50 percent Tierra sandy loam and 25 percent Watsonville loam.

Included with these soils in mapping are areas of Elkhorn sandy loam and Los Osos loam. Also included are small areas of Baywood loamy sand, Diablo clay, Pfeiffer gravelly sandy loam, a soil that is similar to this Tierra soil but has less clay in the lower part of the subsoil, and soils that are similar to those in this complex but have slopes of less than 30 percent.

The Tierra soil is very deep and moderately well drained. It formed in alluvium derived from sedimentary rock. Typically, the surface layer is grayish brown and dark gray, slightly acid sandy loam about 14 inches thick. The upper part of the subsoil is brown, light brownish gray, pale brown and light gray, slightly acid sandy clay and sandy clay loam about 23 inches thick. The lower part to a depth of 66 inches is light gray and yellow, slightly acid and strongly acid clay and silty clay.

Permeability of the Tierra soil is very slow. Available water capacity is 2.0 to 3.5 inches. Water is perched above the clay at times. The effective rooting depth of this soil is as much as 60 inches, but it is restricted to cracks in the clay below a depth of 12 to 20 inches. Runoff is rapid, and the hazard of erosion is high. Small areas that periodically do not have plant cover are moderately eroded. A few gullies have formed in the steeper areas.

The Watsonville soil is very deep and somewhat poorly drained. It formed in alluvium derived from sedimentary rock. Typically, the surface layer is very dark grayish brown, slightly acid loam about 12 inches thick. The subsurface layer is light gray, slightly acid sandy loam about 6 inches thick. The subsoil is pale brown and mixed light gray and very pale brown, slightly acid clay about 21 inches thick. The substratum is mixed light gray, very pale brown, and yellow, slightly acid and medium acid sandy clay loam.

Permeability of the Watsonville soil is very slow. Available water capacity is 4.0 to 5.0 inches. Water is perched above the clay at times. The effective rooting depth is as much as 60 inches, but roots are restricted to cracks in the clay below a depth of 10 to 20 inches. Runoff is rapid, and the hazard of erosion is high. Small areas that periodically do not have plant cover are moderately eroded. A few gullies have formed in the steeper areas.

This complex is used mostly for range. If this complex is used for range, the native vegetation should be managed to increase the production of soft chess, wild oats, and purple needlegrass. If the soils are continuously overgrazed, the condition of the range deteriorates; the proportion of desirable plants decreases, and the proportion of undesirable plants increases. Control of narrowleaf plantain, tarweed, coyotebrush, and California live oak improves the condition of the range. Suitable range management practices are those that improve the distribution of livestock. Livestock watering facilities should be spaced one-fourth to one-half mile apart to improve the distribution of livestock. Steep slopes generally make it difficult to locate good sites for stock watering ponds.

The potential is fair for habitat for deer, rabbit, squirrel, bobcat, gray fox, quail, dove, hawk, and owl. Small natural areas of brush should be maintained for wildlife habitat.

Rapid growth of population in the county has resulted in increased construction of homes on these soils. Slopes, shrink-swell potential, and low strength are the main features that limit these soils for homes. Special design is needed for building pads, roads, and other urban-related structures to compensate for the low strength and the shrink-swell potential of the soils. Because of the very slow permeability, septic tank absorption fields do not function properly.

In a few areas borings to a depth of 20 to 30 feet have located sand strata. Borings should be made to confirm the presence of sand strata before homesite development is started. Community sewage systems are needed in areas where density of population is medium to high. Capability subclasses VIe(14)(15), nonirrigated; Storie index 14.

176—Watsonville loam, 0 to 2 percent slopes. This very deep, somewhat poorly drained soil is on coastal terraces. It formed in alluvium. Elevation ranges from 20 to 1,000 feet. The mean annual precipitation is about 28 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

Typically, the surface layer is very dark grayish brown, slightly acid loam about 12 inches thick. The subsurface layer is light gray, slightly acid sandy loam about 6 inches thick. The subsoil is pale brown, mixed light gray and very pale brown, slightly acid clay about 21 inches thick. The substratum to a depth of 63 inches is mixed light gray, very pale brown, and yellow, slightly acid and medium acid sandy clay loam.

Included with this soil in mapping are areas of Elkhorn sandy loam, Pinto loam, and Watsonville loam, thick surface. Also included are small areas of Danville loam and Elder sandy loam.

Permeability of the Watsonville soil is very slow. Available water capacity is 4.0 to 5.0 inches. The water table is perched above the clay at times. The effective rooting depth is as much as 60 inches, but roots are restricted to cracks in the clay below a depth of 10 to 20 inches. Runoff is slow, and the hazard of erosion is slight.

About 50 percent of the acreage is cultivated. Crops are mainly irrigated pasture or brussels sprouts. A few areas are in apple orchards. Production of apples is generally low.

All cultivated crops require frequent but light applications of irrigation water, preferably by a sprinkler irrigation system. Crops respond to nitrogen and phosphorus. Use of minimum tillage, crop residue management, and green-manure crops helps to maintain tilth and organic matter content.

The potential is good for habitat for deer, rabbit, squirrel, bobcat, coyote, quail, dove, meadowlark, hawk, and owl.

Rapid growth of population in the county has resulted in increased construction of homes on this soil. Shrink-swell potential (fig. 5), low strength, and very slow permeability are the main limitations of this soil for homesites. Special design is needed for building pads, roads, and other urban-related structures to compensate for the low strength and the shrink-swell potential of this soil. Because of the very slow permeability, septic tank absorption fields do not function properly. Borings to a depth of 20 to 30 feet have located sand strata in a few areas. Onsite inspections should be made to confirm the presence of sand strata before construction is started. Community sewage systems are needed in areas where density of population is medium to high. Capability unit IVs-3(14), irrigated and nonirrigated; Storie index 42.

177—Watsonville loam, 2 to 15 percent slopes. This very deep, somewhat poorly drained soil is on coastal terraces. It formed in alluvium. Elevation ranges from 20 to 1,000 feet. The mean annual precipitation is about 28 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

Typically, the surface layer is very dark grayish brown, slightly acid loam about 12 inches thick. The subsurface layer is a light gray, slightly acid sandy loam about 6 inches thick. The subsoil is pale brown and mixed light gray and very pale brown, slightly acid clay about 21 inches thick. The substratum to a depth of 63 inches is mixed light gray, very pale brown, and yellow, slightly acid and medium acid sandy clay loam.

Included with this soil in mapping are areas of Elkhorn sandy loam, Pinto loam, and Watsonville loam, thick surface. Also included are small areas of Cropley silty clay, Danville loam, Elder sandy loam, a sandy loam that is similar to this Watsonville soil but does not have a subsurface layer, a soil that is similar but has a subsoil that has high concentrations of sodium, and a soil on hilltops that is similar but is underlain at a depth of 24 to 60 inches by a layer of consolidated sandy sediment 2 to 6 feet thick.

Permeability of this Watsonville soil is very slow. Available water capacity is 4.0 to 5.0 inches. Water is perched above the clay at times. The effective rooting depth is as much as 60 inches, but roots are restricted to cracks in the clay below a depth of 10 to 20 inches. Runoff is slow or medium, and the hazard of erosion is slight to moderate.

About 25 percent of the acreage of this soil is cultivated. Crops are mainly irrigated pasture and brussels sprouts. A few areas are used for apple orchards, but production of apples is generally low.

To minimize erosion, orchards should be maintained without cultivation and with grass strips planted across the slope between rows of trees. All prunings should be shredded in place for mulch. Diversions and grade stabilization structures may be needed in steeper areas. Careful sprinkler irrigation is required to avoid perching excess water within the crop root zone.

If this soil is used for range, the native vegetation should be managed to increase the production of soft chess, purple needlegrass, burclover, and filaree. If the soil is continuously overgrazed, the condition of the range deteriorates; the proportion of desirable forage plants decreases, and the proportion of undesirable plants increases. Control of narrowleaf plantain, tarweed, thistle, and coyotebrush improves the range.

The potential of this soil is fair for habitat for deer, rabbit, squirrel, bobcat, coyote, quail, dove, meadowlark, hawk, and owl.

Rapid growth of population in the county has resulted in increased construction of homes on this soil. Shrink-swell potential, low strength, and very slow permeability are the main limitations to the use of this soil for homesites. Special design is needed for building pads, roads, and other urban-related structures to compensate for the low strength and the shrink-swell potential of this soil. Because of the very slow permeability, septic tank absorption fields do not function properly. In a few areas, borings to a depth of 20 to 30 feet have located sand strata. Onsite investigations should be made to confirm the presence of sand strata before construction is started. Community sewage systems are needed in areas where density of population is medium to high. Capability unit IVe-3(14), irrigated and nonirrigated; Storie index 36.

178—Watsonville loam, thick surface, 0 to 2 percent slopes. This very deep, somewhat poorly drained soil is on coastal terraces. It formed in alluvium. Elevation ranges from 20 to 1,200 feet. The mean annual precipitation is about 28 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

Typically, the surface layer is very dark grayish brown, slightly acid loam about 20 inches thick. The subsurface

layer is light gray, slightly acid sandy loam about 6 inches thick. The subsoil is pale brown and mixed light gray and very pale brown, slightly acid clay about 21 inches thick. The substratum to a depth of 63 inches is mixed light gray, very pale brown, and yellow, slightly acid and medium acid sandy clay loam.

Included with this soil in mapping are areas of Elkhorn sandy loam and Pinto loam. Also included are small areas of Danville loam, Watsonville loam, a loam that is similar to this Watsonville soil but has a clay subsoil at a depth of 40 to 60 inches, a Watsonville loam that is underlain by sandstone bedrock at a depth of 40 to 60 inches, and soils that are similar to this Watsonville soil but have slopes of more than 2 percent.

Permeability of this Watsonville soil is very slow. Available water capacity is 4.5 to 6.0 inches. Water is perched above the clay at times. The effective rooting depth is as much as 60 inches, but roots are restricted to the cracks in the clay below a depth of 20 to 40 inches. Runoff is slow, and the hazard of erosion is slight.

Most areas of this soil are cultivated. Shallow-rooted crops are best suited to this soil. The main crops are apples, lettuce, brussels sprouts, strawberries, and loganberries. A few areas are in irrigated pasture.

Even if management of this soil is good, production of most crops generally is lower than that on soils that do not have a claypan. Use of such practices as cover crops, green-manure crops, fertilization, crop residue management, and chiseling helps to maintain or improve tilth and fertility. Most crops require irrigation. Either furrow or sprinkler systems are needed. Drainage and careful management of irrigation water are necessary to avoid a perched water table. Both surface and subsurface drainage systems are needed in places.

The potential is good for habitat for deer, rabbit, squirrel, bobcat, coyote, gray fox, quail, dove, meadowlark, hawk, and owl.

Rapid growth of population in the county has resulted in increased construction of homes on this soil. Shrink-swell potential, low strength, and very slow permeability are the main limitations of this soil for homesites. Special design is needed for building pads, roads, and other urban-related structures to compensate for the low strength and the shrink-swell potential of this soil. Because of the very slow permeability, septic tank absorption fields do not function properly. In a few areas borings to a depth of 20 to 30 feet have located sand strata. Onsite investigations should be made to confirm the presence of sand strata before construction is started. Community sewage systems should be used in areas where density of population is medium to high. Capability unit IIIs-3(14), irrigated and nonirrigated; Storie index 50.

179—Watsonville loam, thick surface, 2 to 15 percent slopes. This deep, somewhat poorly drained soil is on coastal terraces. It formed in alluvium. Elevation ranges from 20 to 1,200 feet. The mean annual precipitation is about 28 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

Typically, the surface layer is very dark grayish brown, slightly acid loam about 20 inches thick. The subsurface layer is light gray, slightly acid sandy loam about 6 inches thick. The subsoil is pale brown and mixed light gray and very pale brown, slightly acid clay about 21 inches thick. The substratum to a depth of 63 inches is mixed light gray, very pale brown, and yellow, slightly acid and medium acid sandy clay loam.

Included with this soil in mapping are areas of Watsonville loam and small areas of Danville loam, Elder sandy loam, Elkhorn sandy loam, Pinto loam, and a soil that is similar to this Watsonville soil but does not have a subsurface layer and is underlain by sandstone at a depth of 30 to 60 inches. Also included are small areas of a sandy loam that is similar to this Watsonville soil but does not have a subsurface layer and soils that are similar but have slopes of less than 12 percent or more than 15 percent.

Permeability of this soil is very slow. Available water capacity is 4.5 to 6.0 inches. Water is perched above the clay in places. The effective rooting depth is as much as 60 inches, but roots are restricted to cracks in the clay below a depth of 20 to 40 inches. Runoff is slow to medium, and the hazard of erosion is slight to moderate.

Most areas of this soil are cultivated. Shallow-rooted crops are best suited. The main crops are apples, lettuce, brussels sprouts, strawberries, and loganberries. A few areas are in irrigated pasture.

Even if this soil receives good management, production of most crops is generally lower than that on soils that do not have a claypan. Use of cover and green-manure crops, fertilization, crop residue management, and chiseling help to maintain or improve tilth and fertility. Most crops require irrigation. Either contour furrow or sprinkler systems are suitable. Drainage and careful irrigation water management are needed to avoid creating a perched water table. Both surface and subsurface drainage systems are needed in places.

The potential is good for habitat for deer, rabbit, squirrel, bobcat, coyote, gray fox, quail, dove, and hawk.

Rapid growth of population in the county has resulted in increased construction of homes on this soil. Shrink-swell potential, low strength, very slow permeability, and slope are the main limitations of this soil for homesites. Special design is needed for building pads, roads, and other urban-related structures to compensate for the low strength and the shrink-swell potential of this soil. Because of the very slow permeability, septic tank absorption fields do not function properly. In a few areas borings to a depth of 20 to 30 feet have located sand strata. Borings should be made to confirm the presence of sand strata before construction is started. Community sewage systems are needed in areas where density of population is medium to high. Erosion can be a hazard in steeper areas of this unit if the soil is disturbed and left bare. Topsoil should be stockpiled and used to reclaim disturbed areas. These areas should be reseeded to grasses as soon after development as possible. Capability

units IVe-3(14), irrigated, and IIIe-3(14), nonirrigated; Storie index 42.

180—Watsonville loam, thick surface, 15 to 30 percent slopes. This deep, somewhat poorly drained soil is on coastal terraces. It formed in alluvium. Elevation ranges from 20 to 1,200 feet. The mean annual precipitation is about 28 inches, and the mean annual air temperature is about 58 degrees F. The frost-free season ranges from 245 to 275 days.

Typically, the surface layer is very dark grayish brown, slightly acid loam about 20 inches thick. The substratum is light gray, slightly acid sandy loam about 6 inches thick. The subsoil is pale brown and mixed light gray and very pale brown, slightly acid clay about 21 inches thick. The substratum to a depth of 63 inches is mixed light gray, very pale brown, and yellow, slightly acid and medium acid sandy clay loam.

Included with this soil in mapping are areas of Tierra sandy loam and Watsonville loam. Also included are small areas of Bonnydoon loam, Elkhorn sandy loam, Fagan loam, Los Osos loam, and soils that are similar to this Watsonville soil but have slopes of less than 15 percent or more than 30 percent.

Permeability of the Watsonville soil is very slow. Available water capacity is 4.5 to 6.0 inches. Water is perched above the clay at times. The effective rooting depth is as much as 60 inches, but roots are restricted to cracks in the clay below a depth of 20 to 40 inches. Runoff is rapid, and the hazard of erosion is high. Runoff from higher areas has caused a few drainage channels to become deeply entrenched.

Most areas of this soil are used as rangeland. A few areas are in apple orchards.

Production of apples is generally low. To minimize erosion in orchards, grass strips can be planted across the slope between tree rows. All prunings should be shredded in place and left as mulch. Diversions and grade stabilization structures are also needed in places. Sprinkler or deep irrigation systems are suitable. Proper water management is needed to avoid perching water within the root zone.

If this soil is used for range, the native vegetation should be managed to increase the production of soft chess, purple needlegrass, burclover, and filaree. If this soil is continuously overgrazed, the condition of the range deteriorates; the proportion of the most desirable forage plants decreases, and the proportion of undesirable plants increases. Control of narrowleaf plantain, tarweed, thistle, and coyotebrush improves the range. Moderately steep slopes generally make it difficult to locate good sites for stock watering ponds. Suitable grazing management practices are those that insure better distribution of livestock.

The potential is good for habitat for deer, rabbit, squirrel, bobcat, coyote, gray fox, quail, dove, and hawk.

Rapid growth of population in the county has resulted in increased construction of homes on this soil. Shrink-swell potential, low strength, very slow permeability, and slope are the main limitations of this soil for homesites. Special design is needed for building pads, roads, and other urban-related structures to compensate for the low strength and the shrink-swell potential of this soil. Because of the very slow permeability, septic tank absorption fields do not function properly. In a few areas, borings to a depth of 20 to 30 feet have located sand strata. Onsite investigations should be made to confirm the presence of sand strata before construction is started. Community sewage systems are needed where density of population is medium to high. Erosion can be a hazard in these areas if they are disturbed and left bare during construction. Topsoil should be stockpiled and redistributed over disturbed areas. These areas should be reseeded to grasses as soon after development as possible. Capability units VIe-3(14), irrigated and IVe-3(14), nonirrigated; Storie index 37.

181—Xerorthents-Rock outcrop complex, 50 to 100 percent slopes. This complex is on mountains. Elevation ranges from about 400 to 3,000 feet. The mean annual precipitation is about 48 inches, and the mean annual air temperature is about 55 degrees F. The frost-free season ranges from 220 to 245 days.

This complex is 45 percent Xerorthents and 35 percent Rock outcrop.

Included with this complex in mapping are areas of Maymen stony loam, Bonnydoon loam, and Zayante coarse sand.

Xerorthents are shallow. They formed in material weathered from sandstone or shale. Xerorthents consist of light colored sand, loamy sand, or sandy loam. In places, they consist of very shaly clay loam about 4 to 14 inches thick over sandstone or shale.

Rock outcrop consists of exposures of sandstone and shale. It is mainly on ridges or crests of mountains.

This complex is used mainly for watershed, wildlife habitat, and recreation. Capability subclass VIIIe(4)(15), nonirrigated; Storie index is less than 2.

182—Zayante coarse sand, 5 to 30 percent slopes. This very deep, somewhat excessively drained soil is on hills and mountains. It formed in residuum weathered from consolidated marine sediment or sandstone. Elevation ranges from 250 to 1,500 feet. The mean annual precipitation is about 48 inches, and the mean annual air temperature is about 55 degrees F. The frost-free season ranges from 220 to 245 days.

Typically, the surface layer is dark gray, dark grayish brown, and grayish brown, strongly acid and medium acid coarse sand about 30 inches thick. The underlying material is light brownish gray and very pale brown, medium acid and neutral coarse sand about 30 inches thick.

Included with this soil in mapping are areas of a soil that is similar to this Zayante soil but is less than 40 inches deep to bedrock and has a light colored surface layer. Also included are small areas of Ben Lomond sandy loam, Catelli sandy loam, Pfeiffer gravelly sandy loam, a soil that is similar to this Zayante soil but has 15 to 35 percent pebbles, and soils that are similar but have slopes of more than 30 percent.

Permeability of this Zayante soil is rapid. The effective rooting depth is more than 60 inches. Available water capacity is 2.5 to 5.0 inches. Runoff is medium or rapid, and the hazard of erosion is slight or moderate. A few areas have been subject to moderate to severe rilling and gullying.

This soil is mainly used for wildlife habitat, recreation, and watershed. It is also used for sand pits and for firewood production. There are a few homesites.

A few areas of this soil produce sparse stands of ponderosa pine.

The potential is good for habitat for dove, hawk, burrowing owl, meadowlark, quail, deer, rabbit, opossum, ground squirrel, gopher, mice, mole, coyote, bobcat, gray fox, skunk, weasel, lizard, and snake.

This soil is poorly suited to building site development and onsite sewage disposal because of its steep slope. Only the part of the site used for construction should be disturbed. Topsoil should be stockpiled and used to reclaim disturbed areas. Roads should have a grade of no more than 12 percent. Good drainage should be provided for roads and landings, and cuts and fills need to be seeded or mulched. Adequate measures should also be taken to safeguard the trees from harmful insects and from fire. Capability subclass VIs4, nonirrigated; Storie index 31.

183—Zayante coarse sand, 30 to 50 percent slopes. This very deep, somewhat excessively drained soil is on hills and mountains. It formed in residuum weathered from consolidated marine sediment or sandstone. The mean annual precipitation is about 48 inches, and the mean annual air temperature is about 55 degrees F. The frost-free season ranges from 220 to 245 days.

Typically, the surface layer is dark gray, dark grayish brown, and grayish brown, strongly acid and medium acid coarse sand about 30 inches thick. The underlying material is light brownish gray and very pale brown, medium acid and neutral coarse sand about 30 inches thick.

Included with this soil in mapping are areas of a soil that is similar to this Zayante soil but is less than 40 inches deep to bedrock and has a light colored surface layer. Also included are small areas of Ben Lomond sandy loam, Catelli sandy loam, Pfeiffer gravelly sandy loam, a soil that is similar to this Zayante soil but is 15 to 35 percent pebbles, and soils that are similar but have slopes of less than 30 percent or more than 50 percent.

Permeability of this Zayante soil is rapid. The effective rooting depth is more than 60 inches. Available water capacity is 2.5 to 5.0 inches. Runoff is rapid, and the hazard of erosion is moderate or high. Soil blowing is a moderate hazard. Most areas are subject to only slight erosion, but a few small areas have been subject to moderate to severe rilling and gullying.

This soil is used mainly for wildlife habitat, recreation, and watershed. It is also used for homesites, sand pits, and firewood production.

A few areas of this soil produce thin stands of ponderosa pine.

The potential is good for habitat for dove, hawk, burrowing owl, meadowlark, quail, deer, rabbit, opossum, ground squirrel, gopher, mice, mole, coyote, bobcat, gray fox, skunk, weasel, lizard, and snake.

This soil is poorly suited to building site development and onsite sewage disposal because of its steep slope. Only the part of the site used for construction should be disturbed. Topsoil should be stockpiled and used to reclaim disturbed areas. Roads should have a grade of no more than 12 percent. Good drainage should be provided for roads and landings, and cuts and fills need to be seeded or mulched. Adequate measures should also be taken to safeguard the trees from harmful insects and from fire. Capability subclass VIs(4), nonirrigated; Storie index 15.

184—Zayante-Rock outcrop complex, 15 to 75 percent slopes. This complex is on hills and mountains. Elevation ranges from about 250 to 1,500 feet. The mean annual precipitation is about 48 inches, and the mean annual air temperature is about 55 degrees F. The frost-free season ranges from 220 to 245 days.

This complex is 45 percent Zayante coarse sand and 30 percent Rock outcrop.

Included with this complex in mapping are areas of Ben Lomond sandy loam and a soil that is similar to this Zayante soil but is less than 40 inches deep to bedrock and has a light colored surface layer. Also included are small areas of Catelli sandy loam, Felton sandy loam, and Maymen stony loam.

The Zayante soil is very deep and somewhat excessively drained. It formed in residuum derived from consolidated marine sediment or sandstone.

Typically, the surface layer is dark gray, dark grayish brown and grayish brown, strongly acid and medium acid coarse sand about 30 inches thick. The underlying material is light brownish gray and very pale brown, medium acid and neutral coarse sand about 30 inches thick.

Permeability of the Zayante soil is rapid. Effective rooting depth is more than 60 inches. Available water capacity is 2.5 to 5.0 inches. Runoff is very rapid, and the hazard of erosion is high or very high.

Rock outcrop consists of exposures of weathered sandstone bedrock and consolidated sediment. Prolonged heavy storms tend to keep areas of Rock outcrop from accumulating a soil mantle because the limited plant cover in most areas does not afford adequate protection from erosion.

This complex is used mainly for wildlife habitat, recreation, and watershed. It is also used for sand pits and limited firewood production.

A few areas of this complex produce thin stands of ponderosa pine.

The potential is good for habitat for dove, hawk, burrowing owl, meadowlark, quail, deer, rabbit, opossum, ground squirrel, gopher, mice, mole, coyote, bobcat, gray fox, skunk, weasel, lizard, and snake.

The steeper areas of this complex are poorly suited to building site development and onsite sewage disposal.

With careful management, however, the less sloping areas can be used for homesites. Areas of Rock outcrop are unsuitable for use as septic tank absorption fields. Only the part of the site used for construction should be disturbed. Topsoil should be stockpiled and used to reclaim areas disturbed by cutting and filling. Roads should have grade of no more than 12 percent. Good drainage must be provided for roads and landings, and cuts and fills should be seeded or mulched. Adequate provisions must also be made to safeguard the trees from harmful insects and from fire. Capability subclass VIIe(4), nonirrigated; Storie index 6.

Use and management of the soils

The soil survey is a detailed inventory and evaluation of the most basic resource of the survey area—the soil. It is useful in adjusting land use, including urbanization, to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in uses of the land.

While a soil survey is in progress, soil scientists, conservationists, engineers, and others keep extensive notes about the nature of the soils and about unique aspects of behavior of the soils. These notes include data on erosion, drought damage to specific crops, yield estimates, flooding, the functioning of septic systems, and other factors affecting the productivity, potential, and limitations of the soils under various uses and management. In this way, field experience and measured data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section is useful in planning use and management of soils for crops and pasture, rangeland, and woodland, and as sites for buildings, highways and other transportation systems, sanitary facilities, parks and other recreation facilities, and wildlife habitat. From the data presented, the potential of each soil for specified land uses can be determined, soil limitations to these land uses can be identified, and costly failures in houses and other structures, caused by unfavorable soil properties, can be avoided. A site where soil properties are favorable can be selected, or practices that will overcome the soil limitations can be planned.

Planners and others using the soil survey can evaluate the impact of specific land uses on the overall productivity of the survey area or other broad planning area and on the environment. Productivity and the environment are closely related to the nature of the soil. Plans should be designed to maintain or create a land-use pattern in harmony with the natural soil.

Contractors can find information that is useful in locating sources of sand and gravel, roadfill, and topsoil. Other information indicates the presence of bedrock, wetness, or very firm soil horizons that cause difficulty in excavation.

Health officials, highway officials, engineers, and many other specialists also can find useful information in this soil survey. The safe disposal of wastes, for example, is closely related to properties of the soil. Pavements, sidewalks, campsites, playgrounds, lawns, and trees and shrubs are influenced by the nature of the soil.

Crops and pasture

ANTHONY J. SILVA, soil conservation technician, Soil Conservation Service, prepared this section.

The major management concerns in the use of the soils for crops and pasture are described in this section. In addition, the crops or pasture plants best suited to the soil, including some not commonly grown in the survey area, are discussed; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and pasture plants are presented for each soil.

This section provides information about the overall agricultural potential of the survey area and about the needed management practices. The information is useful to equipment dealers, land improvement contractors, fertilizer companies, processing companies, planners, conservationists, and others. For each kind of soil, information about management is presented in the section "Soil maps for detailed planning." Planners of management systems for individual fields or farms should also consider the detailed information given in the description of each soil.

In the paragraphs that follow, the chief management practices for the soils of Santa Cruz County that are suitable for tilled crops and pasture are briefly discussed. The chief concerns in farming the soils are choosing a suitable cropping system, irrigation, minimum tillage, providing drainage, controlling brush, and protecting streambanks.

Conservation cropping system.—A suitable conservation cropping system is one that includes soil-improving crops such as green-manure crops of grasses and legumes. In addition, all crop residue is returned to the soil to promote good tilth; proper tillage is used to minimize soil compaction; adequate amounts of fertilizers are applied to maintain optimum fertility; and weeds, insects, and other pests are controlled.

In choosing a cropping system, the kinds of soil on the farm, the type of crops to be grown, and the suitability of the system for the area should be considered.

Irrigation.—Where water is available, irrigation is practiced. By properly timing and regulating its application, the irrigation water can be applied uniformly. Irrigation water should be applied only in the amount required by the crop being grown. The rate at which water is applied and the length of runs vary with soil texture. Sprinklers are best suited on steeper slopes.

Minimum tillage.—Keeping tillage to a minimum is effective in reducing erosion and the breakdown of the soil structure. An animal traffic pan or plowpan tends to form below the plow layer in many soils. Such a pan consists of a firm dense layer 2 to 4 inches thick. The pan limits permeability, and in places it restricts the penetration of

roots. Subsoiling is needed periodically to break the tillage pan. Compaction occurs if soils are worked when they are too moist.

Drainage.—Tile drains are used in places to improve drainage of soils that are somewhat poorly drained. Onsite investigation is needed to determine the most feasible and efficient system for drainage.

Controlling brush.—A major concern to management is the control of encroaching brush and other unwanted plants to improve the quality and quantity of forage and to keep the brush away from mountain orchards. Spraying, burning, or chopping helps to eradicate some of these invaders; and if the plant material is left on the soil as mulch, it helps to control erosion. After the brush and other undesirable plants are eliminated, the seeding of improved plants produces forage of better quality.

Protecting streambanks.—Protection is needed along streambanks and drainageways that are subject to scouring by runoff during heavy rains. Use of properly designed structures helps to slow the velocity of runoff.

Yields per acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 2. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. Absence of an estimated yield indicates that the soil is not suited to the crop or the crop is not commonly grown on the soil or that a given crop is not commonly irrigated.

The estimated yields were based mainly on the experience and records of farmers, conservationists, and extension agents. Results of field trials and demonstrations and available yield data from nearby counties were also considered.

The yields were estimated assuming that the latest soil and crop management practices were used. Pasture yields were estimated for the most productive varieties of grasses and legumes suited to the climate and the soil. A few farmers may be obtaining average yields higher than those shown in table 2.

The management needed to achieve the indicated yields of the various crops depends on the kind of soil and the crop. Such management provides drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate tillage practices, including time of tillage and seedbed preparation and tilling when soil moisture is favorable; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residues, barnyard manure, and green-manure crops; harvesting crops with the smallest possible loss; and timeliness of all fieldwork.

Capability classes and subclasses

Capability classes and subclasses show, in a general way, the suitability of soils for most kinds of field crops. The soils are classed according to their limitations when they are used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to rice, cranberries, horticultural crops, or other crops that require special management. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forest trees, or for engineering purposes.

In the capability system, soils can be grouped at three levels: capability class, subclass, and unit. These levels are defined in the following paragraphs. A survey area may not have soils of all classes.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use; they are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants, or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and landforms have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w*, *s*, or *c* because the soils in class V are subject to little or no erosion, though they have

other limitations that restrict their use to pasture, rangeland, woodland, wildlife habitat, or recreation.

Capability units are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Thus, the capability unit is a convenient grouping for making many statements about management of soils for cropland. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIIs-3 or IVe-5. The numbers used to designate units within the subclasses are as follows:

0. Indicates that a problem or limitation is caused by stony, cobbly, or gravelly material in the substratum.

1. Indicates that a problem or limitation is caused by slope or by actual or potential hazard of erosion.

2. Indicates that a problem or limitation of wetness is caused by poor drainage or flooding.

3. Indicates that a problem or limitation of slow or very slow permeability of the subsoil or substratum is caused by a clayey subsoil or a substratum is caused by a clayey subsoil or a substratum that is semiconsolidated.

4. Indicates that a problem or limitation is caused by sandy or gravelly soils that have low available water holding capacity.

5. Indicates that a problem or limitation is caused by a fine textured or very fine textured surface layer.

6. Indicates that a problem or limitation is caused by salt or alkali.

7. Indicates that a problem or limitation is caused by rocks, stones, or cobbles.

8. Indicates that a problem or limitation exists in the root zone, which generally is less than 40 inches thick over massive bedrock and lacks moisture for plants.

9. Indicates that a problem or limitation is caused by low or very low fertility, acidity, or toxicity that cannot be corrected by adding normal amounts of fertilizer, lime, or other amendments.

No unit designations are shown for class I soils, because the characteristics are similar for all the soils in this class. Most unit designations are also deleted from classes V through VIII soils, because these soils generally are not intensively managed for cropland.

Capability groupings are identified at the end of the description of each soil map unit in the section "Soil maps for detailed planning."

Land resource areas

In Santa Cruz County, capability classification is further refined by designating the land resource area in which the soils in a unit occur. A land resource area is a broad geographic area that has a distinct combination of climate, soils, management needs, and cropping systems. The 48 conterminous states in the Nation have been divided into 156 land resource areas.

It is necessary to make assumptions that affect management in a land resource area if soils are to be placed consistently in capability units. In the paragraphs that follow, those land resource areas having parts within Santa Cruz County are described so that local farming can be related to the resource area. Following the description of each resource area is a list of those conditions typical of the area that guided placement of the soils in capability classes and units.

Santa Cruz County has been divided into three land resource areas based on soil, climate, topography, vegetation, and land use. These resource areas are designated nationally as 4, 14, and 15. Land resource area 4 consists of the Santa Cruz Mountains. Land resource area 14 is the irrigated cropland in the Pajaro and Corralitos Valleys and along the coastal plain. Land resource area 15 consists of rangeland along the northern coast and northeast of the Pajaro Valley.

Capability units in two or more resource areas may be similar, but the management needs differ. These management differences result from differences in climate, vegetation, availability and quality of irrigation water, and kinds of crops that can be grown. In the section "Soil maps for detailed planning," at the end of each soil description, capability unit symbols are followed by the number (4), (14), or (15) to identify the three resource areas. The Felton soil in capability unit IIIe-1(14) and the Elkhorn soil in IIIe-1(14) have moderately slow permeability and available water capacity that averages more than 7.5 inches. The Felton soil, however, has a shorter growing season than the Elkhorn soil, and in many places water is not available for irrigating the Felton soil.

Land resource area 4.—This land resource area is in the central California coastal mountains known as the Santa Cruz Mountains. The topography is dominated by steep and very steep slopes but includes small narrow mountain valleys that have some strongly sloping ridgetops. Most of the very steep slopes are the side slopes of the mountains and the sides of young, V-shaped river valleys. Elevation ranges from 100 feet to about 3,000 feet.

The summers are warm and dry except for morning and evening fog. The annual precipitation ranges from 35 to 60 inches in summer. Rainfall occurs mostly in winter and spring, but there are occasional thundershowers at higher elevations. The frost-free season is 220 to 245 days.

It is assumed that irrigation water is not available for most of the soils because a water supply has not been developed. Water is used in some places for irrigation of orchards and Christmas trees.

The soils in this area are used mainly for lumber production. Some apple orchards and Christmas trees are also grown. The number of houses has increased in recent years.

Land resource area 14.—This land resource area is in the Pajaro and Corralitos Valleys and on the part of the coastal plain that extends from the Pajaro Valley to Davenport. The valleys are alluvial plains, and the coastal plains are remnants of the marine terraces. The area near

the Pajaro Valley has been eroded to a rolling surface that has areas of old dunes near the coast. The area north of Santa Cruz has terraces that are mostly relatively small, irregularly shaped remnants left after the streams have intrenched. Elevation ranges from 20 feet to about 600 feet.

The summers generally are cool and dry, but there is heavy fog in the morning and evening. The annual precipitation ranges from 25 to 35 inches. Rainfall occurs mostly in winter and spring. The frost-free season is 245 to 275 days.

It is assumed that irrigation water will be available for all irrigable soils.

The soils in this area are used mainly for irrigated row crops and apples. Some areas are used for pasture, and some areas are in urban uses.

Land resource area 15.—This land resource area is the rangeland along the coast, north of Santa Cruz, and northeast of the Pajaro Valley. The area on the north coast is above the irrigated terraces and below the forested areas. The area northeast of the Pajaro Valley represents the foothills and slopes that extend to the forested areas. Elevation ranges from 20 feet to about 1,800 feet.

The summers generally are warm and dry, but there is fog in the morning and evening. The annual precipitation ranges from 25 to 35 inches. Rainfall occurs mostly in winter and spring. The frost-free season is from 245 to 275 days.

It is assumed that no significant amount of water is available for irrigation and that dryland farming is practiced in the area.

The soils in this area are used mainly for grazing. Small areas are used for housing.

Storie index rating

By E. L. BEGG, lecturer and soil specialist, University of California, Davis.

The soils in Santa Cruz County are rated according to the Storie index (*17, 18, 19*). This index expresses numerically the relative degree of suitability of a soil for general intensive agriculture as it exists at the time of evaluation. The rating is based on soil characteristics only and is obtained by evaluating such factors as soil depth, surface layer texture, subsoil characteristics, drainage, salts and alkali, and relief. Other factors, such as availability of water for irrigation, climate, and distance from markets that might determine the desirability of growing certain plants in a given locality, are not considered. Therefore, in itself, the index should not be considered as a direct index of land value. However, where economic factors are known to the user, the Storie index provides additional objective information for land tract value comparisons. In this survey the index rating is given at the end of each soil description in the section "Soil maps for detailed planning."

Four general factors are considered in the index rating. These factors are *A*—the characteristics of the soil profile and soil depth; *B*—the texture of the surface layer; *C*—the dominant slope of the soil area; and *X*—other factors more readily subject to management or modification. In Santa Cruz County, the X factors include drainage, flooding, salinity, salts and alkali, general nutrient level of the soil, surface microrelief, and erosion. For some soils more than one X factor may be used. Each of the four general factors is evaluated on the basis of 100 percent. A rating of 100 percent expresses the most favorable or ideal condition for general crop production; lower percentage ratings are assigned for conditions that are less favorable. Factor ratings are selected from tables prepared from data and observations that related soil properties, plant growth, and crop yield (*17*). Where ranges of values for these factors exist within a given soil unit, the modal condition for a factor is used in assigning a rating value.

The index rating for a soil is obtained by multiplying the four factors, A, B, C, and X; thus, any factor may dominate or control the final rating. For example, a soil such as Clear Lake clay, moderately wet, is a very deep soil with a slowly permeable profile. This warrants a rating of 90 percent for factor A. It has a clay surface texture, requiring some care in handling and warranting a rating of 60 percent for factor B. A smooth, nearly level soil surface justifies 100 percent for factor C. A moderate drainage problem results in a rating of 80 percent for factor X. Multiplying these four factors gives a Storie index of 43 percent for this soil. If, in time, the drainage problem is corrected, the Storie index can be revised by assigning an appropriate higher value to the X factor to reflect the changed conditions.

Soil complexes in this area—for example, Ben Lomond-Felton complex, 30 to 50 percent slopes—are rated to reflect the proportion of the dominant soils described as present in the unit in the same manner that tracts or fields containing several different soil map units can be rated. The latter is done by weighted averaging of the sum of the Storie index values for the soils present based on the acreages of the soils in the tract or field.

Ratings for each of the map units in this area are for the dominant soil or soils within the unit as described and do not take into account smaller included areas of other kinds of soils or miscellaneous areas.

Soils are placed in grades according to their suitability for general intensive agriculture as shown by their Storie index ratings. The six grades and their range in index ratings are given in the following list.

Soils of grade 1 are excellent or well suited to general intensive agriculture. Soils of grade 2 are good and are also well suited to agriculture, although they are not so desirable as soils of grade 1. Soils of grade 3 are only fairly well suited; soils of grade 4 are poorly suited; and soils of grade 5 are very poorly suited. Grade 6 consists of soils and miscellaneous areas that are not suited to agriculture.

Rangeland

JOHN DAVID SWANSON, range conservationist, Soil Conservation Service, helped prepare this section.

About 15 percent of the survey area is rangeland. Less than 1 percent of the annual farm and ranch income is derived from the cattle industry. The major rangeland areas are in the mountains along the coast north of Santa Cruz and in the southeastern quarter of the county. Many areas have been cleared of native brush and trees, and these areas provide good range forage for livestock and wildlife. Introduced annual grasses and forbs have replaced the native perennial grasses and presently constitute most of the range forage production in most areas of the county.

The soils in the northern areas of the county generally are loamy and are very shallow over fractured mudstone or sandstone. These soils support annual grasses and forbs and some areas of shrubs and coastal live oak. The direct influence of coastal fog appreciably increases the annual production of vegetation. In much of the southeastern part of the county, the soils are deep loams that have moderate to high available water capacity and good fertility. These soils support stands of shrubs that provide browse; they also support stands of annual high-producing grass.

The major management concern on most of the rangeland is to control grazing in order to maintain or increase the kinds and amounts of desirable plants that make up the optimum plant community for livestock and wildlife. Controlling brush and minimizing soil erosion are also important management concerns. If sound range management based on the soil survey information and rangeland inventories is applied, there is good potential for increasing the productivity of the rangeland in the survey area.

In areas that have similar climate and topography, differences in the kind and amount of vegetation that rangeland can produce are related closely to the kind of soil. Effective management is based on the relationships among soils, vegetation, and water.

Table 3 shows, for each kind of soil, the name of the range site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the expected percentage of each species in the composition of the potential natural plant community. Soils not listed cannot support a natural plant community of predominately grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. The following are explanations of column headings in table 3.

A *range site* is a distinctive kind of rangeland that differs from other kinds of rangeland in its ability to produce a characteristic natural plant community. Soils that produce a similar kind, amount, and proportion of range plants are grouped into range sites. For those areas where the relationship between soils and vegetation has been established, range sites can be interpreted directly from the soil map. Properties that determine the capacity of the soil to supply moisture and plant nutrients have the greatest influence on the productivity of range plants. Soil reaction, salt content, and a seasonal high water table are also important.

Total production refers to the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a favorable year the amount and distribution of precipitation and the temperatures are such that growing conditions are substantially better than average; in a normal year these conditions are about average for the area; in an unfavorable year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight refers to the total air-dry vegetation produced per acre each year by the potential natural plant community. Vegetation that is highly palatable to livestock and vegetation that is unpalatable are included. Some of the vegetation can also be grazed extensively by wildlife.

Characteristic vegetation—the grasses, grasslike plants, forbs, and shrubs that make up most of the potential natural plant community on each soil—is listed by common name. Under *Composition*, the expected proportion of each species is presented as the percentage, in air-dry weight, of the total annual production of herbaceous and woody plants. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season. Generally all of the vegetation produced is not used.

Range management requires, in addition to knowledge of the kinds of soil and the potential natural plant community, an evaluation of the present condition of the range vegetation in relation to its potential. Range condition is determined by comparing the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential community, the better the range condition. The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management generally results in the maximum production of vegetation, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Woodland management and productivity

FRANCIS T. HOLT, state woodland conservationist, Soil Conservation Service, helped prepare this section.

This survey area has about 190,000 acres of woodland. About 125,000 acres of this is commercial woodland, and the rest is noncommercial woodland (*25*). This section provides information that can aid landowners in managing this resource.

The main forest type in the county consists of redwood and Douglas-fir (*9*). Madrone, red alder, and California laurel grew in some areas, and there are places where the dominant forest type is Pacific ponderosa pine and Douglas-fir.

The county is a transitional zone from true timber types to lesser woody vegetation, and a few old-growth remnants of redwood can be found throughout the county. These are representative of some of the most southern extensions of these trees(*16*).

The importance of the woodland resource in Santa Cruz County has changed in recent years. Although several thousand acres are still used for commercial production of timber, the rapid increase in population in the county has resulted in increased homesite development on soils that were formerly used exclusively for timber production. Information in this survey concerning potential for timber production can be used to plan management of these soils for either purpose.

If the soils are used exclusively for commercial timber production, various cultural operations may be needed to maintain healthy and esthetically pleasing stands of trees. Thinning some stands may be necessary in some areas, and trees may need to be planted in others. Other stands of trees may be near maturity and ready for harvesting. During all operations in the timbered areas, erosion control practices should be used. Suitable practices include: 1) yarding uphill with high-lead equipment; 2) yarding on the contour with skidding equipment; 3) logging with light equipment where possible; 4) exposing as little mineral soil as possible; and 5) never stripping steep areas. Roads must be located on a grade of 12 percent or less and well above streams and bottoms of drainageways. Effective surface drainage must be provided for roads and landings. Cuts and fills should be seeded and mulched. Adequate provisions must be made to safeguard the trees from harmful insects and from fire.

It is essential that all operations in timbered areas comply with state and local regulations. Professional advice should be sought about this aspect of woodland management.

Table 4 contains information useful to woodland owners or forest managers in planning the use of the soils for wood crops. Only those soils suitable for wood crops are listed, and the ordination (woodland suitability) symbol for each soil is given. All soils bearing the same ordination symbol require the same general kinds of woodland management and have about the same potential productivity (*11*).

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *t*, toxic substances in the soil; *d*, restricted root depth; *c*, clay in the upper part of the soil; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates insignificant limitations or restrictions. If a soil has more than one limitation, priority in placing the soil into a limitation class is in the following order: x, w, t, d, c, s, f, and r.

In table 4 the soils are also rated for a number of factors to be considered in management. *Slight*, *moderate*, and *severe* are used to indicate the degree of major soil limitations.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or equipment; *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree that the soil affects expected mortality of planted tree seedlings. Plant competition is not considered in the ratings. Seedlings from good planting stock that are properly planted during a period of sufficient rainfall are rated. A rating of *slight* indicates that the expected mortality of the planted seedlings is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

Considered in the ratings of *windthrow hazard* are characteristics of the soil that affect the development of tree roots and the ability of the soil to hold trees firmly. A rating of *slight* indicates that trees in wooded areas are not expected to be blown down by commonly occurring winds; *moderate*, that some trees are blown down during periods of excessive soil wetness and strong winds; and *severe*, that many trees are blown down during periods of excessive soil wetness and moderate or strong winds.

Ratings of *plant competition* indicate the degree to which undesirable plants are expected to invade or grow if openings are made in the tree canopy. The invading plants compete with native plants or planted seedlings by impeding or preventing their growth. A rating of *slight* indicates little or no competition from other plants; *moderate* indicates that plant competition is expected to hinder the development of a fully stocked stand of desirable trees; *severe* means that plant competition is expected to prevent the establishment of a desirable stand unless the site is intensively prepared, weeded, or otherwise managed for the control of undesirable plants.

The *potential productivity* of merchantable or *important trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-

aged, unmanaged stands. Important trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suitable for commercial wood production and that are suited to the soils.

Recreation

GLENN WILCOX, area biologist, Soil Conservation Service, helped prepare this section.

The population of the survey area is increasing rapidly, and the need for more recreation facilities is also increasing. The beaches of Santa Cruz County are a major attraction. There are three State parks that provide overnight camping facilities.

The coastal climate and redwood forest setting are other attractions of Santa Cruz County. Several state and county parks provide recreational facilities in the redwood forests. Soils such as Aptos, Nisene, Ben Lomond, and Catelli are associated with redwood forests.

The soils of the survey area are rated in table 5 according to limitations that affect their suitability for recreation uses. The ratings are based on such restrictive soil features as flooding, wetness, slope, and texture of the surface layer. Not considered in these ratings, but important in evaluating a site, are location and accessibility of the area, size and shape of the area and its scenic quality, the ability of the soil to support vegetation, access to water, potential water impoundment sites available, and either access to public sewerlines or capacity of the soil to absorb septic tank effluent. Soils subject to flooding are limited, in varying degree, for recreation use by the duration and intensity of flooding and the season when flooding occurs. Onsite assessment of height, duration, intensity, and frequency of flooding is essential in planning recreation facilities.

The degree of the limitation of the soils is expressed as slight, moderate, or severe. *Slight* means that the soil properties are generally favorable and that the limitations are minor and easily overcome. *Moderate* means that the limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 5 can be supplemented by information in other parts of this survey. Especially helpful are interpretations for septic tank absorption fields, given in table 8, and interpretations for dwellings without basements and for local roads and streets, given in table 7.

Camp areas require such site preparation as shaping and leveling for tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils for this use have mild slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing camping sites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for use as picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that will increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones or boulders, is firm after rains, and is not dusty when dry. If shaping is required to obtain a uniform grade, the depth of the soil over bedrock or hardpan should be enough to allow necessary grading.

Paths and trails for walking, horseback riding, bicycling, and other uses should require little or no cutting and filling. The best soils for this use are those that are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once during the annual period of use. They have moderate slopes and have few or no stones or boulders on the surface.

Wildlife habitat

RICHARD MCCABE, area biologist, Soil Conservation Service, helped prepare this section.

Santa Cruz County provides habitat for openland, woodland, wetland, and rangeland wildlife. The kinds of wildlife in the county include mammals, birds, reptiles, amphibians, and fish.

Warm-water fish such as bluegill, redear, black bass crappie, and catfish live in the lakes and ponds. Steelhead, salmon, and striped bass spawn in the rivers and larger streams flowing into Monterey Bay. In the streams are rainbow trout, suckers, and other fish and crustaceans. The main fish caught at the beaches are surf perch, tom cod, striped bass, and sculpin. The beaches are also a source of shellfish and crabs.

Soils directly affect the kind and amount of vegetation that is available to wildlife as food and cover, and they affect the construction of water impoundments. The kind and abundance of wildlife that populate an area depend largely on the amount and distribution of food, cover, and water. If any one of these elements is missing, is inadequate, or is inaccessible, wildlife either is scarce or does not inhabit the area.

If the soils have the potential, wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by helping the natural establishment of desirable plants.

In table 6, the soils in the survey area are rated according to their potential to support the main kinds of wildlife habitat in the area. This information can be used in planning for parks, wildlife refuges, nature study areas, and other developments for wildlife; selecting areas that are suitable for wildlife; selecting soils that are suitable for creating, improving, or maintaining specific elements of wildlife habitat; and determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* means that the element of wildlife habitat or the kind of habitat is easily created, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected if the soil is used for the designated purpose. A rating of *fair* means that the element of wildlife habitat or kind of habitat can be created, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* means that limitations are severe for the designated element or kind of wildlife habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* means that restrictions for the element of wildlife habitat or kind of habitat are very severe and that unsatisfactory results can be expected. Wildlife habitat is impractical or even impossible to create, improve, or maintain on soils having such a rating.

The elements of wildlife habitat are briefly described in the following paragraphs.

Grain and seed crops are seed-producing annuals used by wildlife. The major soil properties that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are planted for wildlife food and cover. Examples are tall fescue, orchardgrass, clover, and alfalfa. Major soil properties that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Examples are mustards, turkey mullien, sheepsfoot sorrel, filaree, and prickly lettuce. Major soil properties that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations.

Hardwood trees and the associated woody understory provide cover for wildlife and produce nuts or other fruit, buds, catkins, twigs, bark, or foliage that wildlife eat. Examples of plants are tan oak, coastal live oak, valley oak, and California laurel. An example of a fruit-producing shrub that is commercially available and suitable for planting on soils rated good is crabapple. Major soil properties that affect growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness.

Coniferous plants are cone-bearing trees, shrubs, or ground cover plants that furnish habitat or supply food in the form of browse, seeds, or fruitlike cones. Examples are pine, fir, and redwood. Soil properties that have a major effect on the growth of coniferous plants are depth of the root zone, available water capacity, and wetness.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, or foliage used by wildlife or that provide cover and shade for some species of wildlife. Examples are ceanothus species, Frenchbroom, coyotebrush, manzanita, chamise, mountainmahogany, bitterbrush, snowberry, and big sagebrush. Major soil properties that affect the growth of shrubs are depth of the root zone, available water capacity, salinity, and moisture.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites, exclusive of submerged or floating aquatics. They produce food or cover for wildlife that use wetland as habitat. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, and cordgrass and rushes, sedges, and reeds. Major soil properties affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness.

Shallow water areas are bodies of water that have an average depth of less than 5 feet and that are useful to wildlife. They can be naturally wet areas, or they can be created by dams or levees or by water-control devices in marshes or streams. Examples are marshes, waterfowl feeding areas, and ponds. Major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. The availability of a dependable water supply is important if water areas are to be developed.

The kinds of wildlife habitat are briefly described in the following paragraphs.

Openland habitat consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The kinds of wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail rabbit, and gray fox.

Woodland habitat consists of areas of hardwoods or conifers, or a mixture of both, and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include band-tailed pigeon, dove, jay, hawk, owl, deer, brush rabbit, wild turkey, ruffed grouse, woodcock, thrush, woodpecker, mice, salamander, lizard, squirrel, gray fox, raccoon, and deer.

Wetland habitat consists of open, marshy or swampy, shallow water areas where water-tolerant plants grow. Some of the wildlife attracted to such areas are ducks,

geese, heron, shore birds, muskrat, mink, and beaver. Endangered species associated with wetlands are the Santa Cruz long-toed salamander, found only in two locations in the county, and the migratory black rail (*6*), associated with shallow water areas.

Rangeland habitat consists of areas of wild herbaceous plants and shrubs. Wildlife attracted to rangeland include antelope, white-tailed deer, desert mule deer, sage grouse, meadowlark, and lark bunting.

Engineering

EVERETT C. JARHR, area engineer, Soil Conservation Service, helped prepare this section.

This section provides information about the use of soils for building sites, sanitary facilities, construction material, and water management. Among those who can benefit from this section are engineers, landowners, community planners, town and city managers, land developers, builders, contractors, and farmers and ranchers.

The ratings in the engineering tables are based on test data and estimated data in the "Soil properties" section. The ratings were determined jointly by soil scientists and engineers of the Soil Conservation Service using known relationships between the soil properties and the behavior of soils in various engineering uses.

Among the soil properties and site conditions identified by a soil survey and used in determining the ratings in this section were grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock that is within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure or aggregation, in-place soil density, and geologic origin of the soil material. Where pertinent, data about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of absorbed cations were also considered.

On the basis of information assembled about soil properties, ranges of values can be estimated for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, shear strength, compressibility, slope stability, and other factors of expected soil behavior in engineering uses. As appropriate, these values can be applied to each major horizon of each soil or to the entire profile.

These factors of soil behavior affect construction and maintenance of roads, airport runways, pipelines, foundations for small buildings, ponds and small dams, irrigation projects, drainage systems, sewage and refuse disposal systems, and other engineering works. The ranges of values can be used to (1) select potential residential, commercial, industrial, and recreational areas; (2) make preliminary estimates pertinent to construction in a particular area; (3) evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; (4) evaluate alternative sites for location of sanitary landfills, onsite sewage disposal systems, and other waste disposal facilities; (5) plan detailed onsite investigations of soils and geology; (6) find sources of gravel, sand, clay, and topsoil; (7) plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; (8) relate performance of structures already built to the properties of the kinds of soil on which they are built so that performance of similar structures on the same or a similar soil in other locations can be predicted; and (9) predict the trafficability of soils for cross-country movement of vehicles and construction equipment.

Data presented in this section are useful for land-use planning and for choosing alternative practices or general designs that will overcome unfavorable soil properties and minimize soil-related failures. Limitations to the use of these data, however, should be well understood. First, the data are generally not presented for soil material below a depth of 5 or 6 feet. Also, because of the scale of the detailed map in this soil survey, small areas of soils that differ from the dominant soil may be included in mapping. Thus, these data do not eliminate the need for onsite investigations, testing, and analysis by personnel having expertise in the specific use contemplated.

The information is presented mainly in tables. Table 7 shows, for each kind of soil, the degree and kind of limitations for building site development; table 8, for sanitary facilities; and table 10, for water management. Table 9 shows the suitability of each kind of soil as a source of construction materials.

The information in the tables, along with the soil map, the soil descriptions, and other data provided in this survey can be used to make additional interpretations and to construct interpretive maps for specific uses of land.

Some of the terms used in this soil survey have a special meaning in soil science. Many of these terms are defined in the Glossary.

Building site development

The degree and kind of soil limitations that affect shallow excavations, dwellings without basements, small commercial buildings, and local roads and streets are indicated in table 7. A *slight* limitation indicates that soil properties generally are favorable for the specified use; any limitation is minor and easily overcome. A *moderate* limitation indicates that soil properties and site features are unfavorable for the specified use, but the limitations can be overcome or minimized by special planning and design. A *severe* limitation indicates one or more soil properties or site features are so unfavorable or difficult to overcome that a major increase in construction effort, special design, or intensive maintenance is required. For some soils rated severe, such costly measures may not be feasible.

Shallow excavations are made for pipelines, sewerlines, telephone and power transmission lines, basements, and open ditches. Such digging or trenching is influenced by the soil wetness caused by a seasonal high water table;

the texture and consistence of soils; the tendency of soils to cave in or slough; and the presence of very firm, dense soil layers, bedrock, or large stones. In addition, excavations are affected by slope of the soil and the probability of flooding. Ratings do not apply to soil horizons below a depth of 6 feet unless otherwise noted.

In the soil series descriptions, the consistence of each soil horizon is defined, and the presence of very firm or extremely firm horizons, usually difficult to excavate, is indicated.

Dwellings and *small commercial buildings* referred to in table 7 are built on undisturbed soil and have foundation loads of a dwelling no more than three stories high. Separate ratings are made for small commercial buildings without basements and for dwellings with and without basements. For such structures, soils should be sufficiently stable that cracking or subsidence from settling or shear failure of the foundation does not occur. These ratings were determined from estimates of the shear strength, compressibility, and shrink-swell potential of the soil. Soil texture, plasticity and in-place density, potential frost action, soil wetness, and depth to a seasonal high water table were also considered. Soil wetness and depth to a seasonal high water table indicate potential difficulty in providing adequate drainage for basements, lawns, and gardens. Depth to bedrock, slope, and large stones in or on the soil are also important considerations in the choice of sites for these structures and were considered in determining the ratings. Susceptibility to flooding is a serious hazard.

Local roads and streets referred to in table 7 have an all-weather surface that can carry light to medium traffic all year. They consist of subgrade of the underlying soil material; a base of gravel, crushed rock fragments, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. The roads are graded with soil material at hand, and most cuts and fills are less than 6 feet deep.

The load supporting capacity and the stability of the soil as well as the quantity and workability of fill material available are important in design and construction of roads and streets. The classifications of the soil and the soil texture, density, shrink-swell potential, and potential frost action are indicators of the traffic supporting capacity used in making the ratings. Soil wetness, flooding, slope, depth to hard rock or very compact layers, and content of large stones affect stability and ease of excavation.

Sanitary facilities

Favorable soil properties and site features are needed for proper functioning of septic tank absorption fields, sewage lagoons, and sanitary landfills. The nature of the soil is important in selecting sites for these facilities and in identifying limiting soil properties and site features to be considered in design and installation. Also, those soil properties that affect ease of excavation or installation of these facilities will be of interest to contractors and local officials. Table 8 shows the degree and kind of limitations of each soil for such uses and for use of the soil as daily cover for landfills. It is important to observe local ordinances and regulations.

If the degree of soil limitation is expressed as *slight*, soils are generally favorable for the specified use and limitations are minor and easily overcome; if *moderate*, soil properties or site features are unfavorable for the specified use, but limitations can be overcome by special planning and design; and if *severe*, soil properties or site features are so unfavorable or difficult to overcome that major soil reclamation, special designs, or intensive maintenance is required.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into the natural soil. Only the soil horizons between depths of 18 and 72 inches are evaluated for this use. The soil properties and site features considered are those that affect the absorption of the effluent and those that affect the construction of the system.

Properties and features that affect absorption of the effluent are permeability, depth to seasonal high water table, depth to bedrock, and susceptibility to flooding. Stones, boulders, and shallowness to bedrock interfere with installation. Excessive slope may cause lateral seepage and surfacing of the effluent. Also, soil erosion and soil slippage are hazards if absorption fields are installed on sloping soils.

In some soils, loose sand and gravel or fractured bedrock is less than 4 feet below the tile lines. In these soils the absorption field does not adequately filter the effluent, and ground water in the area may be contaminated.

On many of the soils that have moderate or severe limitations for use as septic tank absorption fields, a system to lower the seasonal water table can be installed or the size of the absorption field can be increased so that performance is satisfactory.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons have a nearly level floor and cut slopes or embankments of compacted soil material. Aerobic lagoons generally are designed to hold sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Soils that are very high in organic matter and those that have cobbles, stones, or boulders are not suitable. Unless the soil has very slow permeability, contamination of ground water is a hazard where the seasonal high water table is above the level of the lagoon floor. Where the water table is seasonally high, seepage of ground water into the lagoon can seriously reduce the lagoon's capacity for liquid waste. Slope, depth to bedrock, and susceptibility to flooding also affect the suitability of sites for sewage lagoons or the cost of construction. Shear strength and permeability of compacted soils affect the performance of embankments.

Sanitary landfill is a method of disposing of solid waste by placing refuse in successive layers either in excavated trenches or on the surface of the soil. The waste is spread, compacted, and covered daily with thin layers of soil. Landfill areas are subject to heavy vehicular traffic. Risk of polluting ground water and trafficability affect the suitability of a soil for this use. The best soils have a loamy or silty texture, have moderate to slow permeability, are deep to a seasonal water table, and are not subject to flooding. Clayey soils are likely to be sticky and difficult to spread. Sandy or gravelly soils generally have rapid permeability, which might allow noxious liquids to contaminate ground water. Soil wetness can be a limitation because operating heavy equipment on a wet soil is difficult. Seepage into the refuse increases the risk of pollution of ground water.

Ease of excavation affects the suitability of a soil for the trench type of landfill. A suitable soil is deep to bedrock and free of large stones and boulders. If the seasonal water table is high, water will seep into trenches.

Unless otherwise stated, the limitations in table 8 apply only to the soil material within a depth of about 6 feet. If the trench is deeper, a limitation of slight or moderate may not be valid. Site investigation is needed before a site is selected.

Daily cover for landfill should be soil that is easy to excavate and spread over the compacted fill in wet and dry weather. Soils that are loamy or silty and free of stones or boulders are better than other soils. Clayey soils may be sticky and difficult to spread; sandy soils may be subject to soil blowing.

The soils selected for final cover of landfills should be suitable for growing plants. Of all the horizons, the A horizon in most soils has the best workability, more organic matter, and the best potential for growing plants. Thus, for either the area- or trench-type landfill, stockpiling material from the A horizon for use as the surface layer of the final cover is desirable.

If it is necessary to bring in soil material for daily or final cover, thickness of suitable soil material available and depth to a seasonal high water table in soils surrounding the sites should be evaluated. Other factors to be evaluated are those that affect reclamation of the borrow areas. These factors include slope, erodibility, and potential for plant growth.

Construction materials

The suitability of each soil as a source of roadfill, sand, gravel, and topsoil is indicated in table 9 by ratings of good, fair, or poor. The texture, thickness, and organic-matter content of each soil horizon are important factors in rating soils for use as construction material. Each soil is evaluated to the depth observed, generally about 6 feet.

Roadfill is soil material used in embankments for roads. Soils are evaluated as a source of roadfill for low embankments, which generally are less than 6 feet high and less exacting in design than high embankments. The ratings reflect the ease of excavating and working the material and the expected performance of the material where it has been compacted and adequately drained. The performance of soil after it is stabilized with lime or cement is not considered in the ratings, but information about some of the soil properties that influence such performance is given in the descriptions of the soil series.

The ratings apply to the soil material between the A horizon and a depth of 5 to 6 feet. It is assumed that soil horizons will be mixed during excavation and spreading. Many soils have horizons of contrasting suitability within their profile. The estimated engineering properties in table 11 provide specific information about the nature of each horizon. This information can help determine the suitability of each horizon for roadfill.

Soils rated *good* are coarse grained. They have low shrink-swell potential, low frost action potential, and few cobbles and stones. They are at least moderately well drained and have slopes of 15 percent or less. Soils rated *fair* have a plasticity index of less than 15 and have other limiting features, such as moderate shrink-swell potential, moderately steep slopes, wetness, or many stones. If the thickness of suitable material is less than 3 feet, the entire soil is rated *poor*.

Sand and *gravel* are used in great quantities in many kinds of construction. The ratings in table 9 provide guidance as to where to look for probable sources and are based on the probability that soils in a given area contain sizable quantities of sand or gravel. A soil rated *good* or *fair* has a layer of suitable material at least 3 feet thick, the top of which is within a depth of 6 feet. Coarse fragments of soft bedrock material, such as shale and siltstone, are not considered to be sand and gravel. Fine-grained soils are not suitable sources of sand and gravel.

The ratings do not take into account depth to the water table or other factors that affect excavation of the material. Descriptions of grain size, kinds of minerals, reaction, and stratification are given in the soil series descriptions and in table 11.

Topsoil is used in areas where vegetation is to be established and maintained. Suitability is affected mainly by the ease of working and spreading the soil material in preparing a seedbed and by the ability of the soil material to support plantlife. Also considered is the damage that can result at the area from which the topsoil is taken.

The ease of excavation is influenced by the thickness of suitable material, wetness, slope, and amount of stones. The ability of the soil to support plantlife is determined by texture, structure, and the amount of soluble salts or toxic substances. Organic matter in the A1 or Ap horizon greatly increases the absorption and retention of moisture and nutrients. Therefore, the soil material from these horizons should be carefully preserved for later use.

Soils rated *good* have at least 16 inches of friable loamy material at their surface. They are free of stones and cobbles, are low in content of gravel, and have gentle slopes. They are low in soluble salts that can restrict plant

growth. They are naturally fertile or respond well to fertilizer. They are not so wet that excavation is difficult during most of the year.

Soils rated *fair* are loose sandy soils or firm loamy or clayey soils in which the suitable material is only 8 to 16 inches thick or soils that have appreciable amounts of gravel, stones, or soluble salt.

Soils rated *poor* are very sandy soils or very firm clayey soils; soils with suitable layers less than 8 inches thick; soils having large amounts of gravel, stones, or soluble salt; steep soils; and poorly drained soils.

Although a rating of *good* is not based entirely on high content of organic matter, a surface horizon is generally preferred for topsoil because of its organic-matter content. This horizon is designated as A1 or Ap in the soil series descriptions. The absorption and retention of moisture and nutrients for plant growth are greatly increased by organic matter.

Water management

Many soil properties and site features that affect water management practices have been identified in this soil survey. In table 10 the degree of soil limitation and soil and site features that affect use are indicated for each kind of soil. This information is significant in planning, installing, and maintaining water control structures.

Soil and site limitations are expressed as slight, moderate, and severe. *Slight* means that the soil properties and site features are generally favorable for the specified use and that any limitation is minor and easily overcome. *Moderate* means that some soil properties or site features are unfavorable for the specified use but can be overcome or modified by special planning and design. *Severe* means that the soil properties and site features are so unfavorable and so difficult to correct or overcome that major soil reclamation, special design, or intensive maintenance is required.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have a low seepage potential, which is determined by permeability and the depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material that is resistant to seepage, erosion, and piping and has favorable stability, shrink-swell potential, shear strength, and compaction characteristics. Large stones and organic matter in a soil downgrade the suitability of the soil for use in embankments, dikes, and levees.

Drainage of soil is affected by such soil properties as permeability; texture; depth to bedrock, hardpan, or other layers that affect the rate of water movement; depth to the water table; slope; stability of ditchbanks; susceptibility to flooding; salinity and alkalinity; and availability of outlets for drainage.

Irrigation is affected by such features as slope, susceptibility to flooding, hazards of water erosion and soil blowing, texture, presence of salts and alkali, depth of root zone, rate of water intake at the surface, permeability of the soil below the surface layer, available water capacity, need for drainage, and depth to the water table.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to intercept runoff. They allow water to soak into the soil or flow slowly to an outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock, hardpan, or other unfavorable material; large stones; permeability; ease of establishing vegetation; and resistance to water erosion, soil blowing, soil slipping, and piping.

Grassed waterways are constructed to channel runoff to outlets at a nonerosive velocity. Features that affect the use of soils for waterways are slope, permeability, erodibility, wetness, and suitability for permanent vegetation.

Soil properties

Extensive data about soil properties are summarized on the following pages. The two main sources of these data are the many thousands of soil borings made during the course of the survey and the laboratory analyses of selected soil samples from typical profiles.

In making soil borings during field mapping, soil scientists can identify several important soil properties. They note the seasonal soil moisture condition or the presence of free water and its depth. For each horizon in the profile, they note the thickness and color of the soil material; the texture, or amount of clay, silt, sand, and gravel or other coarse fragments; the structure, or the natural pattern of cracks and pores in the undisturbed soil; and the consistence of the soil material in place under the existing soil moisture conditions. They record the depth of plant roots, determine the pH or reaction of the soil, and identify any free carbonates.

Samples of soil material are analyzed in the laboratory to verify the field estimates of soil properties and to determine all major properties of key soils, especially properties that cannot be estimated accurately by field observation. Laboratory analyses are not conducted for all soil series in the survey area, but laboratory data for many soil series not tested are available from nearby survey areas.

The available field and laboratory data are summarized in tables. The tables give the estimated range of engineering properties, the engineering classifications, and the physical and chemical properties of each major horizon of each soil in the survey area. They also present data about pertinent soil and water features, engineering test data, and data obtained from physical and chemical laboratory analyses of soils.

Engineering properties

Table 11 gives estimates of engineering properties and classifications for the major horizons of each soil in the survey area.

Most soils have, within the upper 5 or 6 feet, horizons of contrasting properties. Table 11 gives information for each of these contrasting horizons in a typical profile. *Depth* to the upper and lower boundaries of each horizon is indicated. More information about the range in depth and about other properties in each horizon is given for each soil series in the section "Soil series and morphology."

Texture is described in table 11 in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If a soil contains gravel or other particles coarser than sand, an appropriate modifier is added, for example, "gravelly loam." Other texture terms are defined in the Glossary.

The two systems commonly used in classifying soils for engineering use are the Unified Soil Classification System (*27*) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO) (*2*).

The *Unified* system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter, plasticity index, liquid limit, and organic-matter content. Soils are grouped into 15 classes—eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes have a dual classification symbol, for example, CL-ML.

The *AASHTO* system classifies soils according to those properties that affect their use in highway construction and maintenance. In this system a mineral soil is classified in one of seven basic groups ranging from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines. At the other extreme, in group A-7, are fine-grained soils. Highly organic soils are classified in group A-8 on the basis of visual inspection.

When laboratory data are available, the A-1, A-2, and A-7 groups are further classified as follows: A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, and A-7-6. As an additional refinement, the desirability of soils as subgrade material can be indicated by a group index number. These numbers range from 0 for the best subgrade material to 20 or higher for the poorest. The estimated classification, without group index numbers, is given in table 11. Also in table 11 the percentage, by weight, of rock fragments more than 3 inches in diameter is estimated for each major horizon. These estimates are determined mainly by observing volume percentage in the field and then converting that, by formula, to weight percentage.

Percentage of the soil material less than 3 inches in diameter that passes each of four sieves (U.S. standard) is estimated for each major horizon. The estimates are based on tests of soils that were sampled in the survey area and in nearby areas and on field estimates from many borings made during the survey.

Liquid limit and *plasticity index* indicate the effect of water on the strength and consistence of soil. These indexes are used in the Unified and AASHTO soil classification systems. They are also used as indicators in making general predictions of soil behavior. Range in liquid limit and in plasticity index is estimated on the basis of test data from the survey area or from nearby areas and on observations of the many soil borings made during the survey.

In some surveys, the estimates are rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount across classification boundaries (1 or 2 percent), the classification in the marginal zone is omitted in table 11.

Physical and chemical properties

Table 12 shows estimated values for several soil characteristics and features that affect behavior of soils in engineering uses. These estimates are given for each major horizon, at the depths indicated, in the typical pedon of each soil. The estimates are based on field observations and on test data for these and similar soils.

Permeability is estimated on the basis of known relationships among the soil characteristics observed in the field—particularly soil structure, porosity, and gradation or texture—that influence the downward movement of water in the soil. The estimates are for vertical water movement when the soil is saturated. Not considered in the estimates is lateral seepage or such transient soil features as plowpans and surface crusts. Permeability of the soil is an important factor to be considered in planning and designing drainage systems, in evaluating the potential of soils for septic tank systems and other waste disposal systems, and in many other aspects of land use and management.

Available water capacity is rated on the basis of soil characteristics that influence the ability of the soil to hold water and make it available to plants. Important characteristics are content of organic matter, soil texture, and soil structure. Shallow-rooted plants are not likely to use the available water from the deeper soil horizons. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design of irrigation systems.

Soil reaction is expressed as range in pH values. The range in pH of each major horizon is based on many field checks. For many soils, the values have been verified by laboratory analyses. Soil reaction is important in selecting the crops, ornamental plants, or other plants to be grown; in evaluating soil amendments for fertility and stabilization; and in evaluating the corrosivity of soils.

Shrink-swell potential depends mainly on the amount and kind of clay in the soil. Laboratory measurements of the swelling of undisturbed clods were made for many soils. For others the swelling was estimated on the basis of the kind and amount of clay in the soil and on measurements of similar soils. The size of the load and the magnitude of the change in soil moisture content also influence the swelling of soils. Shrinking and swelling of some soils can cause damage to building foundations, basement walls, roads, and other structures unless special designs are used. A high shrink-swell potential indicates that special design and added expense may be required if the planned use of the soil will not tolerate large volume changes.

Erosion factors are used to predict the erodibility of a soil and its tolerance to erosion in relation to specific kinds of land use and treatment. The soil erodibility factor (K) is a measure of the susceptibility of the soil to erosion by water. Soils having the highest K values are the most erodible. K values range from 0.10 to 0.64. To estimate annual soil loss per acre, the K value of a soil is modified by factors representing plant cover, grade and length of slope, management practices, and climate. The soil-loss tolerance factor (T) is the maximum rate of soil erosion, whether from rainfall or soil blowing, that can occur without reducing crop production or environmental quality. The rate is expressed in tons of soil loss per acre per year.

Soil and water features

Table 13 contains information helpful in planning land uses and engineering projects that are likely to be affected by soil and water features.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are placed in one of four groups on the basis of the intake of water after the soils have been wetted and have received precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist chiefly of deep, well drained to excessively drained sands or gravels. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep to deep, moderately well drained to well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils that have a layer that impedes the downward movement of water or soils that have moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clay soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

High water table is the highest level of a saturated zone more than 6 inches thick for a continuous period of more than 2 weeks during most years. The depth to a seasonal high water table applies to undrained soils. Estimates are based mainly on the relationship between grayish colors or mottles in the soil and the depth to free water observed in many borings made during the course of the soil survey. Indicated are the depth to the seasonal high water table; the kind of water table, that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. Only saturated zones above a depth of 5 or 6 feet are indicated.

Information about the seasonal high water table helps in assessing the need for specially designed foundations, the need for specific kinds of drainage systems, and the need for footing drains to insure dry basements. Such information is also needed to decide whether or not construction of basements is feasible and to determine how septic tank absorption fields and other underground installations will function. Also, a seasonal high water table affects ease of excavation.

Depth to bedrock is shown for all soils that are underlain by bedrock at a depth of 5 to 6 feet or less. For many soils, the limited depth to bedrock is a part of the definition of the soil series. The depths shown are based on measurements made in many soil borings and on other observations during the soil mapping. The kind of bedrock and its hardness as related to ease of excavation is also shown. Rippable bedrock can be excavated with a single-tooth ripping attachment on a 200-horsepower tractor, but hard bedrock generally requires blasting.

Risk of corrosion pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to soil moisture, particle-size distribution, total acidity, and electrical conductivity of the soil material. The rate of corrosion of concrete is based mainly on the sulfate content, texture, and acidity of the soil. Protective measures for steel or more resistant concrete help to avoid or minimize damage resulting from the corrosion. Uncoated steel intersecting soil boundaries or soil horizon is more susceptible to corrosion than an installation that is entirely within one kind of soil or within one soil horizon.

Classification of the soils

The system of soil classification used by the National Cooperative Soil Survey has six categories(*26*). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. In this

system the classification is based on the different soil properties that can be observed in the field or those that can be inferred either from other properties that are observable in the field or from the combined data of soil science and other disciplines. The properties selected for the higher categories are the result of soil genesis or of factors that affect soil genesis. In table 14, the soils of the survey area are classified according to the system. Categories of the system are discussed in the following paragraphs.

ORDER. Ten soil orders are recognized as classes in the system. The properties used to differentiate among orders are those that reflect the kind and degree of dominant soil-forming processes that have taken place. Each order is identified by a word ending in *sol*. An example is Entisol.

SUBORDER. Each order is divided into suborders based primarily on properties that influence soil genesis and are important to plant growth or that are selected to reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquent (*Aqu*, meaning water, plus *ent*, from Entisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of expression of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and a prefix that suggests something about the properties of the soil. An example is Haplaquents (*Hapl*, meaning simple horizons, plus *aquent*, the suborder of Entisols that have an aquic moisture regime).

SUBGROUP. Each great group may be divided into three subgroups: the central (typic) concept of the great groups, which is not necessarily the most extensive subgroup; the intergrades, or transitional forms to other orders, suborders, or great groups; and the extragrades, which have some properties that are representative of the great groups but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that is thought to typify the great group. An example is Typic Haplaquents.

FAMILY. Families are established within a subgroup on the basis of similar physical and chemical properties that affect management. Among the properties considered in horizons of major biological activity below plow depth are particle-size distribution, mineral content, temperature regime, thickness of the soil penetrable by roots, consistence, moisture equivalent, soil slope, and permanent cracks. A family name consists of the name of a subgroup and a series of adjectives. The adjectives are the class names for the soil properties used as family differentiae. An example is fine-loamy, mixed, nonacid, mesic, Typic Haplaquents.

SERIES. The series consists of soils that formed in a particular kind of material and have horizons that, except for texture of the surface soil or of the underlying substratum, are similar in differentiating characteristics and in arrangement in the soil profile. Among these characteristics are color, texture, structure, reaction, consistence, and mineral and chemical composition.

Soil series

In this section, each soil series recognized in the survey area is described in detail. The descriptions are arranged in alphabetic order by series name.

Characteristics of the soil and the material in which it formed are discussed for each series. The soil is then compared to similar soils and to nearby soils of other series. Then a pedon, a small three-dimensional area of soil that is typical of the soil series in the survey area, is described. The detailed descriptions of each soil horizon follow standards in the Soil Survey Manual (*23*). Unless otherwise noted, colors described are for dry soil.

Following the pedon description is the range of important characteristics of the soil series in this survey area. Phases, or map units, of each soil series are described in the section "Soil maps for detailed planning."

Aptos series

The Aptos series consists of moderately deep, well drained soils on mountains and hills. These soils formed in material weathered from sandstone, siltstone, or shale. Slope ranges from 15 to 75 percent. Mean annual precipitation ranges from 25 to 60 inches, and mean annual air temperature ranges from 55 to 59 degrees F.

Aptos soils are similar to Felton, Lompico, and Nisene soils. They are mapped in a complex with Nisene soils and are near Ben Lomond, Catelli, Felton, Lompico, and Sur soils. Felton and Nisene soils have a paralithic contact at a depth of more than 40 inches. Lompico soils have a mollic epipedon less than 20 inches thick. Ben Lomond, Catelli, and Sur soils do not have a B2t horizon and average less than 18 percent clay in the control section.

Typical pedon of Aptos fine sandy loam in an area of Nisene-Aptos complex, 50 to 75 percent slopes, about 0.1 mile north-northwest of Woodland Way on Love Creek Road and about 350 feet uphill east of Love Creek Road in SE1/4NW1/4, sec. 33, T. 9 S., R. 2 W. (projected):

O—1 inch to 0; twigs and leaves from plant cover; slightly acid; abrupt smooth boundary.

A11—0 to 9 inches; dark grayish brown (10YR 4/2) fine sandy loam, dark brown (7.5YR 3/2) moist; moderate coarse angular blocky structure; slightly hard, friable, nonsticky and nonplastic; many medium roots and common fine and very fine roots; many medium pores, common fine and very fine tubular pores, and common very fine interstitial pores; slightly acid; clear wavy boundary.

A12—9 to 18 inches; brown (7.5YR 5/2) fine sandy loam, dark brown (7.5YR 3/2) moist; weak coarse angular blocky structure; slightly hard, friable, nonsticky and nonplastic; many medium and coarse roots and common fine and very fine roots; many very fine and fine tubular pores and common very fine interstitial pores; few worm casts; slightly acid; clear wavy boundary.

A13—18 to 23 inches; grayish brown (10YR 5/2) fine sandy loam, dark brown (7.5YR 3/2) moist; weak coarse angular blocky structure; hard, friable, slightly sticky and slightly plastic; many medium and coarse roots and common fine and very fine roots; common fine and very fine tubular pores and many very fine interstitial pores; medium acid; clear wavy boundary.

B2t—23 to 29 inches; brown (10YR 5/3) clay loam, dark brown (7.5YR 3/2) moist; moderate medium and coarse angular blocky structure; hard, friable, sticky and plastic; many medium and coarse roots and common fine and very fine roots; many very fine pores, common fine tubular pores and few very fine interstitial pores; common thin clay films lining pores and coating faces of peds; very strongly acid; gradual irregular boundary.

Cr—29 to 39 inches; weathered fine-grained sandstone, can be dug with moderate difficulty; very strongly acid.

The depth to paralithic contact ranges from 20 to 40 inches. The mollic epipedon is 20 to 40 inches thick. The profile is 0 to 25 percent pebbles.

The A horizon has hue of 10YR or 7.5YR, value of 3 to 5, and chroma of 1 to 3. It is fine sandy loam or loam. It ranges from medium acid to neutral.

The B2t horizon commonly has hue of 10YR, value of 4 or 5, and chroma of 1 to 4. In places, at a depth of more than 20 inches, it has hue of 10YR, value of 6, and chroma of 3. The B2t horizon is loam, sandy clay loam, or clay loam. It ranges from very strongly acid to slightly acid.

The C horizon, where present, is as much as 15 inches thick. The Cr horizon is sandstone, siltstone, or weathered shale.

Baywood series

The Baywood series consists of very deep, somewhat excessively drained soils on old sand dunes and in narrow valleys. These soils formed mainly in eolian deposits. Slope ranges from 0 to 50 percent. The mean annual precipitation ranges from 20 to 35 inches, and the mean annual air temperature is about 58 degrees F.

Baywood soils are similar to Baywood Variant and Zayante soils. They are near Baywood Variant, Elder, Elkhorn, Pfeiffer, Tierra, and Watsonville soils. Baywood Variant soils have a sandy over clayey control section. Elder and Pfeiffer soils have a coarse-loamy control section. Elkhorn soils have a pachic epipedon and have a fine-loamy control section. Tierra and Watsonville soils have a fine control section. Zayante soils are mesic.

Typical pedon of Baywood loamy sand, 15 to 30 percent slopes, about 3,700 feet west and 580 feet north from the intersection of Buena Vista and San Andreas Roads in T. 12 S., R. 1 E. (projected):

Ap—0 to 7 inches; brown (10YR 5/3) loamy sand, dark brown (10YR 3/3) moist; moderate medium granular structure; slightly hard, friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine interstitial pores; slightly acid; clear wavy boundary.

A1—7 to 17 inches; brown (10YR 5/3) loamy sand, dark brown (7.5YR 3/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; common very fine interstitial pores; slightly acid; diffuse wavy boundary.

C1—17 to 27 inches; brown (10YR 5/3) loamy sand, dark reddish brown (5YR 3/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; few very fine interstitial pores; slightly acid; diffuse wavy boundary.

C2—27 to 39 inches; brown (10YR 5/3) loamy sand, dark reddish brown (5YR 3/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; few very fine interstitial pores; slightly acid; diffuse wavy boundary.

C3—39 to 56 inches; brown (7.5YR 5/4) loamy sand, reddish brown (5YR 4/4) moist; many coarse prominent splotches of light gray (10YR 7/2) bleached sand are well distributed within matrix of soil mass; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; few very fine interstitial pores; slightly acid; diffuse wavy boundary.

C4—56 to 61 inches; variegated very pale brown (10YR 6/4) and light yellowish brown (10YR 7/4) sand, brown (7.5YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots; few very fine tubular pores; slightly acid.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. It is medium acid to neutral.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 7, and chroma of 2 to 4. It is sand, fine sand, or loamy sand. It ranges from medium acid to neutral.

Baywood Variant

The Baywood Variant consists of very deep, moderately well drained soils. These soils formed in alluvium. Slope ranges from 0 to 2 percent. The mean annual precipitation ranges from 20 to 30 inches, and the mean annual air temperature is about 58 degrees F.

Baywood Variant soils are similar to Baywood soils. They are near Baywood, Conejo, and Elder soils. Baywood soils have a sandy control section. Conejo soils have a fine-loamy control section. Elder soils have a coarse-loamy control section.

Typical pedon of Baywood Variant loamy sand, about 1,050 feet west of the intersection of Smith and Casserly Roads and 500 feet south of Casserly Road, about 3.3 miles north and 2.7 miles east of the southwest corner of T. 11 S., R. 2 E. (projected):

Ap—0 to 10 inches; brown (10YR 5/3) loamy sand, dark brown (10YR 3/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; many very fine, fine, medium, and coarse roots; many very fine and fine interstitial pores; and many fine tubular pores; 5 percent subangular pebbles 2 to 20 millimeters in diameter; slightly acid; clear wavy boundary.

C1—10 to 22 inches; yellowish brown (10YR 5/4) sand, mixed brown (10YR 4/3) and dark yellowish brown (10YR 4/4) moist; single grained; loose when dry or moist; few fine roots; many very fine and fine interstitial pores; mildly alkaline; gradual wavy boundary.

C2—22 to 29 inches; mixed brown (10YR 4/3), yellowish brown (10YR 5/4), and pale brown (10YR 6/3) sand, mixed very dark gray (10YR 3/1), dark grayish brown (10YR 4/2), and brown (10YR 4/3) moist; single grained; loose, dry or moist; many very fine and fine interstitial pores; about 10 percent rounded and subangular pebbles 2 to 15 millimeters in diameter; mildly alkaline; abrupt broken boundary.

C3—29 to 38 inches; mixed brown (10YR 5/3), yellowish brown (10YR 5/4), and strong brown (7.5YR 5/6) loamy sand, mixed dark grayish brown (10YR 4/3) and brown (7.5YR 4/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; common fine and many very fine interstitial pores; 5 percent pebbles 2 to 15 millimeters in diameter; mildly alkaline; abrupt smooth boundary.

IIAb—38 to 55 inches; very dark grayish brown (2.5Y 3/2) clay loam, black (N 2/0) moist; common medium prominent yellowish red (5YR 4/6) mottles; massive; very hard, friable, sticky and plastic; few very fine roots; many very fine tubular pores and common fine tubular pores; moderately alkaline; abrupt wavy boundary.

IIC4b—55 to 70 inches; brown (10YR 5/3) and pale brown (10YR 6/3) sandy loam, variegated very dark grayish brown (10YR 3/2) and dark brown (7.5YR 3/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; many very fine interstitial pores and common fine interstitial pores; neutral.

Depth to the contrasting C horizon ranges from 20 to 40 inches.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. It is loamy sand or sand. It is slightly acid to neutral.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 to 6. It is sand or loamy sand. This horizon is 0 to 15 percent pebbles. It ranges from neutral to moderately alkaline.

The buried A horizon has hue of 2.5Y or 10YR, value of 3, and chroma of 1 or 2. Below the buried A horizon, between depths of 40 and 60 inches, are strata of loamy sand, sandy loam, clay loam, and silt loam; these strata occur in places below a depth of 60 inches.

Ben Lomond series

The Ben Lomond series consists of deep, well drained soils on mountains. These soils formed in material weathered from sandstone or granitic bedrock. Slope ranges from 5 to 75 percent. The mean annual precipitation ranges from about 35 to 60 inches, and the mean annual air temperature is about 55 degrees F.

Ben Lomond soils are similar to Catelli and Pfeiffer soils. They are mapped in a complex with Catelli, Felton, and Sur soils and are near Aptos, Catelli, Felton, Lompico, Nisene, Sur, and Zayante soils. Catelli soils have paralithic contact at a depth of 20 to 40 inches. Pfeiffer soils have a thermic soil temperature regime. Aptos, Felton, Lompico, and Nisene soils have a fine-loamy control section. Sur soils have lithic contact at a depth of 20 and 40 inches. Zayante soils have a sandy control section.

Typical pedon of Ben Lomond sandy loam, 50 to 75 percent slopes, about 2.5 miles west of Summit Road on Bear Creek Road and 250 feet southwest on a private road commencing at mailbox number 21890; then 70 feet uphill, near a clump of redwoods in SE1/4SE1/4, sec. 3, T. 9 S., R. 2 W. (projected):

O—2 inches to 0; redwood needles and twigs in various stages of decomposition.

A11—0 to 7 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; soft, very friable, slightly sticky and nonplastic; many very fine and fine roots; common very fine and fine tubular pores; neutral; clear smooth boundary.

A12—7 to 19 inches; dark grayish brown (10YR 4/2) sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; soft, very friable, slightly sticky and nonplastic; many very fine, fine, and medium roots; common very fine and fine tubular pores; slightly acid; clear smooth boundary.

B2—19 to 30 inches; brown (10YR 4/3) sandy loam, dark brown (10YR 3/3) moist; weak fine subangular blocky structure; soft, very friable, slightly sticky and nonplastic; many very fine, fine, medium, and coarse roots; common fine and very fine tubular pores; medium acid; clear wavy boundary.

C1—30 to 46 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 4/3) moist; massive; slightly hard, friable, nonsticky and nonplastic; common fine roots and many medium and coarse roots; few very fine tubular pores; medium acid; gradual wavy boundary.

C2r—46 to 50 inches; weathered sandstone.

Depth to paralithic contact is 40 to 60 inches. The mollic epipedon is thicker than 20 inches. Pebble content in the profile ranges from 0 to 10 percent.

The A horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 2 or 3. It is medium acid to neutral.

The B horizon has hue of 7.5YR or 10YR and chroma of 3 or 4. It is sandy loam, fine sandy loam, very fine sandy loam, or loam. It is strongly acid to slightly acid.

The C horizon has value of 5 or 6 and chroma of 3 or 4. It has sand grains that have hue of 10YR, value of 4 or 8, and chroma of 1 or 3. It is strongly acid to medium acid.

Bonnydoon series

The Bonnydoon series consists of shallow, somewhat excessively drained soils on hills and mountains. These soils formed in material weathered from sandstone, mudstone, or shale. Slope ranges from 5 to 85 percent. The mean annual precipitation ranges from 25 to 40 inches, and the mean annual air temperature is about 58 degrees F.

Bonnydoon soils are mapped in a complex with Rock outcrop and are near Aptos, Los Osos, Pfeiffer, and Santa Lucia soils. Rock outcrop consists of exposures of bedrock of sandstone or shale. Aptos and Los Osos soils have paralithic contact at a depth of 20 to 40 inches, and they have a fine control section. Pfeiffer soils have paralithic contact at a depth of 40 to 66 inches. Santa Lucia soils have lithic contact at a depth of 20 to 40 inches.

Typical pedon of Bonnydoon loam, 5 to 30 percent slopes, in Scotts Valley, about 1,550 feet west-northwest of Glenwood Drive on Hacienda Drive, 300 feet north-northwest on Casa Way, and 50 feet west in a pasture; 2,500 feet east and 1,000 feet south of the northwest corner of sec. 18, T. 10 S., R. 1 W. (projected):

A1—0 to 6 inches; grayish brown (10YR 5/2) loam, very dark brown (7.5YR 2/2) moist; moderate medium subangular blocky structure parting to strong medium and coarse granules; hard, friable, slightly sticky and slightly plastic; many very fine roots and common fine roots; common very fine tubular pores; slightly acid; clear wavy boundary.

A2—6 to 11 inches; grayish brown (10YR 5/2) loam, very dark brown (7.5YR 2/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many very fine roots and common fine roots; common coarse tubular pores, many fine, very fine, and medium tubular pores, and many very fine interstitial pores; medium acid; abrupt wavy boundary.

Cr—11 to 60 inches; white (2.5Y 8/2) weathered and fractured fine-grained sandstone, light yellowish brown (2.5Y 6/4) moist; massive; slightly acid.

Depth to paralithic contact is 10 to 20 inches. The mollic epipedon is 7 to 20 inches thick. The control section averages 18 to 30 percent clay. The profile is 0 to 10 percent pebbles. It is medium acid to neutral.

The A1 horizon has value of 4 or 5 and chroma of 2 or 3.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 or 4. The Cr horizon is sandstone or shale.

Catelli series

The Catelli series consists of moderately deep, well drained soils on mountains. These soils formed in material weathered from sandstone or granitic rock. Slope ranges from 30 to 75 percent. The mean annual precipitation ranges from 35 to 60 inches, and the mean annual air temperature is about 55 degrees F.

Catelli soils are similar to and are mapped in a complex with Ben Lomond and Sur soils. They are near Aptos, Ben Lomond, Felton, Lompico, Nisene, and Zayante soils. Ben Lomond soils have paralithic contact at a depth of more than 40 inches. Sur soils have more than 35 percent rock fragments in the control section. Aptos, Felton, Lompico, and Nisene soils have a fine-loamy control section. Zayante soils have a sandy control section.

Typical pedon of a Catelli sandy loam in an area of Ben Lomond-Catelli-Sur complex, 30 to 75 percent slopes, about 2,100 feet up Bloom Grade Road from Hilton Drive opposite junction with a side road and 15 feet back from road cut in the northwest corner of sec. 14, T. 9 S., R. 3 W. (projected):

O—3 inches to 0; litter of leaves, bark, and twigs in various stages of decomposition; medium acid; abrupt wavy boundary.

A1—0 to 7 inches; brown (10YR 5/3) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium granular structure; slightly hard, friable, nonsticky and nonplastic; common very fine and fine roots and few medium roots; many very fine and fine tubular and interstitial pores; slightly acid; clear wavy boundary.

B21—7 to 13 inches; yellowish brown (10YR 5/4) sandy loam, dark brown (10YR 3/3) moist; moderate coarse and very coarse granular structure; slightly hard, friable, nonsticky and nonplastic; common very fine, fine, and medium roots; many very fine and fine tubular pores; few thin clay bridges on the faces of some peds; slightly acid; clear wavy boundary.

B22—13 to 23 inches; light yellowish brown (10YR 6/4) sandy loam, dark brown (10YR 3/3) moist; moderate coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine roots and few medium roots; many very fine and fine tubular pores; very few thin clay films as bridges on the faces of some peds; medium acid; clear wavy boundary.

C1—23 to 37 inches; very pale brown (10YR 7/4) sandy loam, brown (7.5YR 4/4) moist; moderate coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine, fine, and medium roots; common very fine and fine tubular pores; few pebbles; strongly acid; gradual wavy boundary.

C2—37 to 42 inches; very pale brown (10YR 7/4) strongly weathered sandstone, yellowish brown (10YR 5/4) moist; massive and hard in places but crushes to sandy loam under hand pressure; roots in fractures that are more than 10 centimeters apart; strongly acid.

Depth to paralithic contact is 20 to 40 inches. Thickness of the mollic epipedon is 10 to 20 inches. The solum is 0 to 15 percent pebbles.

The A horizon has value of 4 or 5, and chroma of 2 or 3. It ranges from medium acid to neutral.

The B horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 or 4. It is sandy loam, fine sandy loam, or very fine sandy loam. It is medium acid to slightly acid.

The C horizon, where present, has hue of 2.5Y, 7.5YR, or 10YR; value of 6 to 8; and chroma of 2 to 4. The Cr horizon is weathered sandstone or weathered granodiorite. This horizon is gravelly sandy loam or sandy loam. It is strongly acid to slightly acid.

Clear Lake series

The Clear Lake series consists of very deep soils in basinlike areas that have been drained. These soils formed in mixed alluvium under poor drainage conditions. Slope is less than 2 percent. Elevation ranges from 5 to 100 feet. The mean annual precipitation ranges from 20 to 30 inches, and the mean annual air temperature is about 58 degrees F.

Clear Lake soils are similar to Cropley and Diablo soils. They are near Conejo, Cropley, and Danville soils. Conejo soils are well drained. Cropley and Diablo soils have chroma of more than 1.5 above a depth of 40 inches. Danville soils are well drained. Diablo soils are well drained, are on uplands, and have slopes of 9 to 30 percent.

Typical pedon of Clear Lake clay, moderately wet, about 85 feet east of Coward Road and 1,600 feet north of Highway 129 in T. 12 S., R. 2 E. (projected):

Ap—0 to 7 inches; dark gray (10YR 4/1) clay, black (10YR 2/1) moist; strong medium subangular blocky structure; very hard, firm, very sticky and very plastic; few very fine roots; few very fine tubular pores; neutral; clear wavy boundary.

A11—7 to 21 inches; dark gray (10YR 4/1) clay, black (10YR 2/1) moist; weak coarse and medium angular blocky structure; very hard, firm, very sticky and very plastic; few very fine roots; common very fine tubular pores; common slickensides; common smooth pressure cutans; mildly alkaline; gradual wavy boundary.

A12—21 to 35 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; few fine distinct light yellowish brown (10YR 6/4) mottles, brown (10YR 4/3) moist; strong coarse angular blocky structure; very hard, very firm, very sticky and very plastic; few very fine roots; many very fine and fine tubular pores; common intersecting slickensides, many smooth pressure cutans; mildly alkaline; clear wavy boundary.

AC—35 to 44 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; common medium prominent light yellowish brown (10YR 6/4) mottles, dark grayish brown and light olive brown (2.5Y 4/2, 5/4) rubbed moist; strong coarse angular blocky structure; very hard, firm, very sticky and very plastic; few very fine roots; common very fine tubular pores; many intersecting slickensides, many smooth pressure cutans; mildly alkaline; clear wavy boundary.

C—44 to 62 inches; grayish brown (2.5Y 5/2) clay, very dark grayish brown (10YR 3/2) moist, many medium distinct light olive brown (2.5Y 5/4) mottles, olive brown (2.5Y 4/4) moist; strong coarse angular blocky structure; very hard, firm, very sticky and very plastic; few very fine roots; common very fine tubular pores; many intersecting slickensides; many smooth pressure cutans; moderately alkaline; gradual wavy boundary.

In summer, cracks 0.5 inch to 1.5 inches wide extend from the surface to a depth of more than 20 inches. These cracks, however, are not visible in cultivated areas. The water table has been lowered by subsurface drains, pumping, and diversion ditches to a depth between 36 and 60 inches.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 1. Most pedons have mottles below a depth of 21 inches. The mottles have hue of 2.5Y or 10YR, value of 5 or 6, and chroma of 2 or 4. Reaction is neutral to moderately alkaline.

The C horizon has value of 4 or 5 and chroma of 2 or 4. It has mottles that have hue of 2.5Y or 10YR, value of 5 or 6, and chroma of 2 or 4. This horizon is clay, silty clay, or heavy clay loam. It is mildly alkaline to moderately alkaline, and in some pedons it is slightly effervescent and has soft masses of segregated lime.

Conejo series

The Conejo series consists of very deep, well drained soils on alluvial fans and plains. These soils formed in alluvium derived from sedimentary rock. Slope ranges from 0 to 9 percent. The mean annual precipitation ranges from 20 to 30 inches, and the mean annual air temperature is about 58 degrees F.

Conejo soils are similar to Soquel soils. They are near Clear Lake, Danville, Elder, Elkhorn, Mocho, San Emidgio, and Soquel soils. Clear Lake soils have a fine control section. Danville soils have an argillic horizon and a fine control section. Elder soils have a cumulic epipedon and have a coarse-loamy control section. Elkhorn soils have an argillic horizon. Mocho soils have a mollic epipedon less than 20 inches thick. San Emidgio soils have an ochric epipedon and a coarse-loamy control section. Soquel soils have a mesic temperature regime.

Typical pedon of Conejo loam, 0 to 2 percent slopes, about 2,250 feet southwest of intersection of Coward Road and Carlton Road and about 15 feet west of edge of Carlton Road, T. 11 S., R. 2 E. (projected):

Ap—0 to 7 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; moderate medium granular structure; hard, friable, sticky and plastic; common very fine roots; many very fine interstitial pores; neutral; clear wavy boundary.

A12—7 to 17 inches; dark gray (10YR 4/1) clay loam, black (10YR 2/1) moist; moderate coarse angular blocky structure; very hard, firm, sticky and plastic; common very fine roots; few very fine tubular pores; mildly alkaline; gradual wavy boundary.

A13—17 to 33 inches; dark gray (10YR 4/1) clay loam, black (10YR 2/1) moist; weak coarse subangular blocky structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; few very fine roots; common very fine tubular pores; moderately alkaline; gradual wavy boundary.

A14—33 to 45 inches; dark grayish brown (10YR 4/2) loam, very dark gray (10YR 3/1) moist; weak coarse subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; common very fine tubular pores; moderately alkaline; gradual wavy boundary.

C—45 to 65 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, sticky and slightly plastic; common very fine tubular pores; moderately alkaline.

The mollic epipedon is more than 20 inches thick. It is mildly alkaline or moderately alkaline. Some pedons have sandy and gravelly strata below a depth of 40 inches. Some pedons have a buried A horizon below a depth of 20 inches. Some pedons are effervescent below a depth of 45 inches.

The A horizon has value of 4 or 5 when dry and chroma of 1 or 2. It is loam or clay loam. It ranges from neutral to moderately alkaline.

The C horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 or 3. It is sandy loam, loam, silt loam, clay loam, or silty clay loam.

Cropley series

The Cropley series consists of very deep, well drained soils on fans and benches. These soils formed in alluvium derived from sedimentary rock. Slope ranges from 2 to 9 percent. The mean annual precipitation ranges from 20 to 30 inches, and the mean annual air temperature is about 58 degrees F.

Cropley soils are similar to Clear Lake and Diablo soils. They are near Clear Lake, Diablo, Elkhorn, Pinto, Tierra, and Watsonville soils. Clear Lake soils have chroma of less than 1.5 to a depth of 40 inches. Diablo soils formed on uplands and have slopes of more than 9 percent. Elkhorn and Pinto soils have a fine-loamy control section. Tierra soils are moderately well drained and have an argillic horizon. Watsonville soils have an A2 horizon and are somewhat poorly drained.

Typical pedon of Cropley silty clay, 2 to 9 percent slopes, about 100 feet west of the intersection of Pennsylvania and Clifford Streets, about 1,600 feet south and 6,800 feet east of the northwest corner of T. 12 S., R. 2 E. (projected):

A11—0 to 12 inches; very dark gray (5Y 3/1) silty clay, black (N 2/) moist; strong very coarse prismatic structure; extremely hard, firm, very sticky and very plastic; many very fine roots; many very fine and fine interstitial and tubular pores; the upper 1 inch has strong granular structure; moderately alkaline; clear wavy boundary.

A12—12 to 28 inches; very dark gray (5Y 3/1) silty clay, black (N 2/) moist; strong very coarse prismatic structure; extremely hard, very firm, very sticky and very plastic; common very fine roots and few fine roots; many very fine tubular pores and few fine tubular pores; many intersecting slickensides; about 5 percent shale pebbles 2 to 15 millimeters in diameter; moderately alkaline; gradual wavy boundary.

ACca—28 to 38 inches; mixed very dark gray (5Y 3/1) and light olive gray (5Y 6/2) silty clay, very dark gray (2.5Y 3/1) and dark grayish brown (2.5Y 4/2) moist; strong very coarse prismatic structure; extremely hard, very firm, very sticky and very plastic; few very fine roots; common very fine tubular pores and few fine tubular pores; many intersecting slickensides; about 5 percent yellowish brown (10YR 4/4) and brown (7.5YR 5/4) weathered shale pebbles 2 to 15 millimeters in diameter; strong effervescence; common soft rounded lime masses about 3 millimeters in diameter; moderately alkaline; gradual wavy boundary.

C1ca—38 to 45 inches; light olive gray (5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate coarse prismatic structure; very hard, firm, very sticky and very plastic; common fine tubular pores and few very fine tubular pores; common intersecting slickensides; strongly effervescent; common soft rounded lime masses about 3 millimeters in diameter; moderately alkaline; gradual wavy boundary.

C2—45 to 60 inches; mixed olive gray (5Y 5/2) and pale olive (5Y 6/3) silty clay loam, dark grayish brown (2.5Y 4/2) and olive brown (2.5Y 4/4) moist; moderate coarse prismatic structure parting to strong coarse subangular blocks; very hard, firm, sticky and plastic; common very fine and few fine tubular pores; mildly alkaline.

Where these soils are not irrigated, the profile has cracks at the surface from about late in July to October. The cracks are 1 inch to 3 inches wide and extend to a depth of about 45 inches. The profile is 0 to 5 percent pebbles.

The A horizon has hue of 10YR to 5Y and value of 2 to 4, or it is neutral. It is slightly acid to moderately alkaline.

The C horizon has hue of 2.5Y or 5Y, value of 5 or 6, and chroma of 2 to 4. It is heavy clay loam, heavy silty clay loam, clay, or silty clay. It ranges from neutral to moderately alkaline.

Danville series

The Danville series consists of very deep, well drained soils on alluvial fans and terraces. These soils formed in alluvium. Slopes range from 0 to 9 percent. The mean annual precipitation ranges from 20 to 35 inches, and the mean annual air temperature is about 58 degrees F.

Danville soils are similar to Elkhorn and Fagan soils. They are near Clear Lake, Conejo, Cropley, Elder, Elkhorn, Soquel, and Watsonville soils. Clear Lake and Cropley soils have a clay and silty clay surface layer that cracks upon drying. Conejo and Elkhorn soils have a fine-loamy control section. Elder soils have a coarse-loamy control section. Fagan soils formed in residual material and have paralithic contact at a depth of 40 to 80 inches. Soquel soils have a fine-loamy control section and are mesic. Watsonville soils have an albic horizon.

Typical pedon of Danville loam, 0 to 2 percent slopes, about 120 feet south of U. S. Highway 1 and 1,500 feet west of Rio Del Mar Road overpass of U. S. Highway 1 in T. 11 S., R. 1 E. (projected):

Ap—0 to 8 inches; very dark gray (10YR 3/1) loam, black (N 2/) moist; massive, recent cultivation has resulted in clods about 2 inches long making up about one-half of the upper 2 to 3 inches; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; slightly acid; clear wavy boundary.

A3—8 to 17 inches; very dark gray (10YR 3/1) clay loam, black (10YR 2/1) moist; moderate medium angular blocky structure; hard, friable, sticky and plastic; common very fine, fine, and medium roots; common very fine and fine tubular pores, common very fine interstitial pores; few thin clay films lining pores; slightly acid; clear wavy boundary.

B21t—17 to 22 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; strong medium prismatic structure; very hard, very firm, very sticky and very plastic; common very fine, fine, and medium roots; common fine tubular pores and many very fine interstitial pores; common thin and moderately thick clay films on the faces of peds and lining pores; slightly acid; gradual wavy boundary.

B22t—22 to 29 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; strong medium prismatic structure; very hard, very firm, very sticky and very plastic; few fine and very fine roots; common fine and very fine tubular pores; common thin and moderately thick clay films lining pores and on the faces of peds; slightly acid; gradual wavy boundary.

B3t—29 to 42 inches; brown (10YR 4/3) sandy clay loam, dark brown (10YR 3/3) moist; common fine distinct olive brown (2.5Y 4/4) mottles, dark grayish brown (2.5Y 4/2) moist; moderate coarse angular blocky structure; very hard, firm, sticky and plastic; few very fine and fine roots; common fine tubular pores and many very fine interstitial pores; common moderately thick clay films on faces of peds; neutral; gradual wavy boundary.

C1—42 to 59 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; common fine distinct olive brown (2.5Y 4/4) mottles, dark grayish brown (2.5Y 4/2) moist; weak coarse angular blocky structure; very hard, firm, sticky and plastic; few fine and very fine roots; common very fine and fine tubular pores; common thin clay films on faces of peds; neutral; gradual wavy boundary.

C2—59 to 65 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 3/3) moist; massive; very hard, firm, sticky and plastic; few very fine and fine roots; common fine tubular pores; common thin clay films as bridges between sand grains; neutral.

The mollic epipedon is more than 20 inches thick. Montmorillonite is the dominant clay mineral.

The A horizon has value of 3 to 5 and chroma of 1 or 2. It is slightly acid to neutral.

The B2t horizon has value of 4 or 5 and chroma of 2 or 3. It is silty clay or clay. It is slightly acid to neutral.

The C horizon has hue of 7.5Y or 10YR, value of 4 to 6, and chroma of 2 to 4. It is clay loam or sandy clay loam and has strata of sandy loam to clay. It is slightly acid to neutral. Some pedons have mottles in the C horizon.

Diablo series

The Diablo series consists of deep, well drained soils on hills. These soils formed in material weathered from sandstone or shale. Slope ranges from 9 to 30 percent. The mean annual precipitation ranges from 20 to 35 inches, and the mean annual air temperature is about 58 degrees F.

Diablo soils are similar to Clear Lake and Cropley soils. They are near Cropley, Elkhorn, Los Osos, Pfeiffer, Tierra, and Watsonville soils. Clear Lake soils have chroma of less than 2 to a depth of 40 inches. Cropley soils formed in alluvium and have slopes of 2 to 9 percent. Elkhorn soils have a fine-loamy control section. Los Osos, Tierra, and Watsonville soils have an argillic horizon. Pfeiffer soils have a coarse-loamy control section.

Typical pedon of Diablo clay, 9 to 15 percent slopes, about 900 feet north of Highway 152, 1,600 feet east of Green Valley Road, and about 1,100 feet southwest of the Watsonville Drive-in Theater in T. 12 S., R. 2 E. (projected):

A11—0 to 5 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; strong fine and medium angular blocky structure; extremely hard, very firm, very sticky and plastic; many very fine vertical roots and common fine vertical roots; common very fine and few fine tubular pores; slightly acid; gradual wavy boundary.

A12—5 to 14 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate coarse prismatic structure parting to moderate coarse angular blocky; extremely hard, very firm, very sticky and plastic; many very fine roots; many very fine tubular pores; slightly acid; gradual wavy boundary.

A13—14 to 30 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate coarse prismatic structure; extremely hard, very firm, very sticky and plastic; many very fine and fine roots; few very fine and fine tubular pores; vertical cracks 1/2 inch wide and 4 to 6 inches apart; common intersecting slickensides; common wedge-shaped structural aggregates tilted 30 to 60 degrees from the horizontal; neutral; gradual wavy boundary.

AC—30 to 38 inches; brown (10YR 5/3) mixed with very dark gray (10YR 5/3, 3/1) clay, very dark grayish brown (10YR 3/2) mixed with black (10YR 2/1) moist; massive; very hard, very firm, very sticky and very plastic; common very fine and fine roots; common very fine and fine tubular pores; vertical cracks 1/2 inch wide and 4 to 6 inches apart through horizon; many intersecting slickensides; common wedge-shaped structural aggregates tilted 30 to 60 degrees from the horizontal; slightly effervescent; moderately alkaline; clear wavy boundary.

C1ca—38 to 51 inches; dark olive gray (5Y 3/2) mixed with pale olive (5Y 6/3) clay, dark olive gray (5Y 3/2) mixed with olive (5Y 4/3) moist; moderate medium and coarse subangular blocky structure; hard, very firm, very sticky and plastic; common very fine and fine roots; common very fine interstitial pores, and many very fine and fine tubular pores; common pressure cutans; strongly effervescent; white (5Y 8/1) lime concretions 1 to 3 inches in diameter and randomly scattered lime filaments; moderately alkaline; gradual wavy boundary.

C2ca—51 to 59 inches; pale olive (5Y 6/3) clay, olive (5Y 4/3) moist; massive; very hard, very firm, very sticky and plastic; few very fine and fine roots; common very fine and fine tubular pores and common very fine interstitial pores; common pressure cutans; slightly effervescent; lime in filaments; moderately alkaline; gradual wavy boundary.

C3r—59 to 68 inches; pale olive (5Y 6/3) weathered shale.

Depth to paralithic contact is 40 to 60 inches. Cracks 1/2 inch to 3 inches wide form in these soils when they are dry and close when they are wet. Slickensides close enough to intersect are between depths of 10 and 40 inches.

The A horizon has value of 3 or 4. It is slightly acid to moderately alkaline and is effervescent in the lower part in some pedons.

The C horizon has hue of 2.5Y or 5Y, value of 3 to 7, and chroma of 2 or 3. It is silty clay or clay. It is moderately alkaline and slightly effervescent to strongly effervescent. The Cr horizon is sandstone or shale.

Elder series

The Elder series consists of very deep, well drained soils on alluvial fans and plains and in narrow valleys. These soils formed in mixed alluvium. Slope ranges from 0 to 15 percent. The average annual precipitation ranges from 20 to 35 inches, and the average annual air temperature is about 58 degrees F.

Elder soils are near Baywood, Baywood Variant, Conejo, Danville, Elkhorn, and Soquel soils. Baywood soils have a sandy control section. Baywood Variant soils have a sandy over clayey control section. Conejo and Soquel soils have a fine-loamy control section. Soquel soils also have a mesic soil temperature regime. Danville and Elkhorn soils have an argillic horizon.

Typical pedon of Elder sandy loam, 0 to 2 percent slopes, about 1,300 feet north from the intersection of

Pleasant Valley Road and Freedom Boulevard in R. 1 E., T. 11 S. (projected):

Ap—0 to 8 inches; grayish brown (10YR 5/2) sandy loam, very dark gray (10YR 3/1) moist; weak coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; few fine tubular pores and common very fine interstitial pores; medium acid; clear wavy boundary.

A11—8 to 19 inches; dark grayish brown (10YR 4/2) sandy loam, very dark gray (10YR 3/1) moist; weak coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; common very fine and fine tubular pores and common very fine interstitial pores; mixture of thin clay and silt coatings on sand grains in vertical fractures; few worm casts; slightly acid; gradual wavy boundary.

A12—19 to 23 inches; dark grayish brown (10YR 4/2) sandy loam, variegated very dark gray and very dark grayish brown (10YR 3/1, 3/2) moist, very dark gray (10YR 3/1) rubbed; moderate coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; many very fine and fine tubular pores and many very fine interstitial pores; mixture of thin clay and silt coatings on sand grains in vertical fractures; few worm casts; slightly acid; gradual irregular boundary.

AC—23 to 31 inches; dark grayish brown (10YR 4/2) sandy loam, dark brown (10YR 3/3) moist, very dark grayish brown (10YR 3/2) rubbed; moderate medium and coarse angular blocky structure; hard, friable, slightly sticky and slightly plastic; many medium and coarse roots and common fine roots; many very fine and fine tubular pores, and many very fine interstitial pores; krotovinas containing soil material similar to that in the A12 horizon; slightly acid; clear wavy boundary.

C1—31 to 40 inches; variegated dark grayish brown (10YR 4/2) and brown (10YR 5/3) sandy loam, dark brown (10YR 3/3) moist, very dark grayish brown (10YR 3/2) rubbed; moderate coarse angular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine, medium, and coarse roots; many very fine interstitial and tubular pores and common fine tubular pores; krotovinas containing soil material similar to that in the A12 horizon; slightly acid; clear wavy boundary.

C2—40 to 50 inches; brown (10YR 4/3, 5/3) sandy loam, dark brown (10YR 3/3) moist; massive; hard, very friable, slightly sticky and slightly plastic; few fine, medium, and coarse roots; many very fine tubular and interstitial pores; slightly acid; diffuse smooth boundary.

C3—50 to 60 inches; brown (10YR 4/3) loamy sand, dark brown (10YR 3/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few fine, medium, and coarse roots, many very fine tubular and interstitial pores; slightly acid.

The profile is more than 60 inches thick. The mollic epipedon is more than 20 inches thick. Organic matter content decreases irregularly with depth. The profile is 0 to 10 percent pebbles.

The A horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 1 to 3. It is medium acid to neutral.

The C horizon has value of 4 to 6 and chroma of 2 or 3. It is generally loam, sandy loam, fine sandy loam, or loamy sand, but in some areas it has sand at a depth of 40 inches or more. It is medium acid or mildly alkaline.

Elkhorn series

The Elkhorn series consists of very deep, well drained soils on alluvial fans and marine terraces. These soils formed in old alluvium and in marine deposits. Slopes range from 0 to 50 percent. The average annual precipitation ranges from 20 to 35 inches, and the average annual air temperature is about 58 degrees F.

Elkhorn soils are similar to Danville and Pinto soils. They are mapped in a complex with Pfeiffer soils and are near Conejo, Danville, Elder, Pfeiffer, Pinto, Soquel, and Watsonville soils. Danville and Watsonville soils have a fine argillic horizon that has montmorillonitic mineralogy. Pinto soils have a mollic epipedon less than 20 inches thick. Conejo and Soquel soils do not have an argillic horizon. Elder and Pfeiffer soils have a coarse-loamy control section.

Typical pedon of Elkhorn sandy loam, 2 to 9 percent slopes, near Aptos, about 400 feet west-northwest of intersection of New Brighton Road and McGregor Drive and 25 feet southerly from McGregor Drive, in T. 11 S., R. 1 W. (projected):

A11—0 to 3 inches; very dark grayish brown (10YR 3/2) sandy loam, very dark brown (10YR 2/2) moist; strong fine and medium granular structure; hard, friable, slightly sticky and slightly plastic; many fine roots and common medium roots; many very fine and fine interstitial and tubular pores; slightly acid; abrupt smooth boundary.

A12—3 to 15 inches; very dark grayish brown (10YR 3/2) sandy loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; many very fine interstitial pores and common very fine and fine tubular pores; about 5 percent pebbles 2 to 15 millimeters in diameter; medium acid; clear wavy boundary.

A3—15 to 21 inches; brown (10YR 4/3) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common medium and fine roots; many very fine interstitial pores and common very fine and fine tubular pores; few thin coatings on ped faces; slightly acid; clear wavy boundary.

B21t—21 to 29 inches; pale brown (10YR 6/3) sandy clay loam, dark yellowish brown (10YR 3/4) moist, dark brown (10YR 3/3) rubbed; many medium distinct yellowish brown (10YR 5/6) mottles and few fine prominent very dark brown (10YR 2/2) mottles, dry or moist; weak coarse and very coarse angular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine roots; many very fine tubular and interstitial pores; few thin clay films as bridges between mineral grains; few fine black (10YR 2/1) flaked particles; few brown (10YR 4/3) weathered coarse sand grains; few iron and manganese krotovinas filled with material from A3 horizon; neutral; gradual wavy boundary.

B22t—29 to 41 inches; variegated light gray (10YR 7/2) and very pale brown (10YR 7/3) sandy clay loam, dark yellowish brown (10YR 4/4) and dark brown (7.5YR 4/4) moist, dark yellowish brown (10YR 4/4) rubbed; many medium and large distinct yellowish brown (10YR 5/6, 5/8) and strong brown (7.5YR 5/8) mottles; weak very coarse angular blocky structure; hard, friable, sticky and plastic; common very fine roots; common very fine interstitial pores and common very fine and fine tubular pores; few thin clay bridges between sand grains and clay films lining pores; many large thick to thin black (10YR 2/1) iron and manganese coatings in fractures; about 5 percent pebbles 2 to 15 millimeters in diameter; neutral; clear wavy boundary.

B23t—41 to 61 inches; variegated light gray (10YR 7/2) and very pale brown (10YR 7/3) sandy clay loam, grayish brown (10YR 5/2) and brown (10YR 5/3) moist, brown (7.5Y 4/4) rubbed; many medium prominent yellowish brown (10YR 5/8) and strong brown (10YR 5/8; 7.5YR 5/8) mottles; weak coarse and medium blocky structure; extremely hard, friable, sticky and plastic; few very fine roots; common very fine interstitial and tubular pores and common fine tubular pores; common thin to moderately thick clay bridges between sand grains and clay films lining pores; common black (10YR 2/1) thin to thick films of iron and magnesium in fractures and as thin bridges between sand grains; neutral.

The mollic epipedon ranges from 20 to 30 inches in thickness. The profile is 0 to 10 percent pebbles.

The A1 horizon has value of 3 to 5 when dry and chroma of 2 or 3. It ranges from medium acid to neutral.

The B2t horizon has value of 5 to 7 and chroma of 2 to 4. In most pedons, the B2t horizon has value of 7 and chroma of 2 and 3 in a variegated pattern. Mottles occur in parts of the horizon where value is 6 or more. In some or all parts of the B2t horizon in most pedons, there are iron and manganese concretions, flakes, or coatings that have hue of 10YR, value of 2, and chroma of 1 or 2. The B2t horizon is sandy clay loam or clay loam. It is slightly acid to neutral.

A C horizon occurs in a few pedons. It has colors that are similar to those of the B2t horizon. The C horizon is typically loamy sand, sandy loam, or clay loam. It is slightly acid or neutral.

Fagan series

The Fagan series consists of deep, well drained soils on hills. These soils formed in residuum weathered from sandstone, siltstone, mudstone, or shale. Slope ranges from 30 to 50 percent. The mean annual precipitation ranges from 20 to 35 inches, and the mean annual air temperature is about 58 degrees F.

Fagan soils are similar to Danville and Los Osos soils. They are near Aptos and Los Osos soils. Danville soils formed in alluvium. Los Osos and Aptos soils are 20 to 40 inches deep to paralithic contact.

Typical pedon of Fagan loam, 30 to 50 percent slopes, on the Chamberlain Ranch, about 35 feet north of private road leading to the ranch headquarters, 35 feet east of the final right bend in road to headquarters, and 1,320 feet northwesterly from fork in road; T. 11 S., R. 3 E. (projected):

A11—0 to 7 inches; grayish brown (10YR 5/2) loam, very dark gray (10YR 3/1) moist; moderate medium granular structure; hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; common fine tubular pores; 5 percent red (2.5YR 4/6) pebbles 2 to 50 millimeters in size; neutral; clear wavy boundary.

A12—7 to 22 inches; grayish brown (10YR 5/2) loam, very dark gray (10YR 3/1) moist; moderate coarse subangular blocky structure; hard, friable, sticky and slightly plastic; common very fine and fine roots; many very fine pores and common medium tubular pores; 5 percent red (2.5YR 4/6) pebbles 2 to 20 millimeters in diameter; neutral; gradual wavy boundary.

A13—22 to 32 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate coarse subangular blocky structure; hard, friable, sticky and slightly plastic; many very fine and fine roots; many fine tubular pores; 5 percent red (2.5YR 4/6) pebbles 2 to 20 millimeters in size; slightly acid; gradual wavy boundary.

B1t—32 to 41 inches; brown (7.5YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate coarse subangular blocky structure; hard, firm, sticky and plastic; common very fine and fine roots; common very fine tubular pores; very few moderately thick clay films on faces of peds; 5 percent white (10YR 8/1) shale pebbles 10 to 40 millimeters in diameter; neutral; clear wavy boundary.

B21t—41 to 55 inches; brown (7.5YR 5/2) clay, dark brown (7.5YR 3/2) moist; moderate coarse angular blocky structure; hard, firm, sticky and plastic, common very fine and fine roots; many very fine tubular pores; few moderately thick clay films on faces of peds and lining pores; slightly acid; gradual wavy boundary.

B22t—55 to 60 inches; brown (7.5YR 5/2) clay, dark brown (7.5YR 4/2) moist; moderate coarse angular blocky structure; very hard, firm, sticky and plastic; few very fine roots; common very fine tubular pores; common moderately thick clay films on faces of peds and lining pores; neutral; gradual wavy boundary.

Depth to paralithic contact is 40 to 66 inches. The mollic epipedon is more than 20 inches thick. The profile is 0 to 10 percent pebbles. It ranges from medium acid to neutral.

The A horizon has value of 4 or 5.

The Bt horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. It is clay loam or clay.

Fagan soils in this survey area have a thicker mollic epipedon and are deeper to paralithic contact than is defined in the range for the Fagan series. This difference, however, does not significantly affect their use and management.

Felton series

The Felton series consists of deep, well drained soils on mountains. These soils formed in material weathered from sandstone, shale, schist, or siltstone. Slope ranges from 5 to 75 percent. The mean annual precipitation ranges from 35 to 60 inches, and the mean annual air temperature is about 55 degrees F.

Felton soils are similar to Aptos, Lompico, and Nisene soils. They are mapped in a complex with Ben Lomond and Lompico soils and are near Aptos, Ben Lomond, Catelli, Lompico, Nisene, and Sur soils. Aptos and Lompico soils have paralithic contact at a depth of 20 and 40 inches. Nisene soils have a mollic epipedon more than 20 inches thick. Ben Lomond and Catelli soils have a coarse-loamy control section but do not have a B2t horizon. Sur soils do not have a B2t horizon; they have a loamy-skeletal control section.

Typical pedon of Felton sandy loam in an area of Lompico-Felton complex, 50 to 75 percent slopes, about 1,300 feet north and 500 feet west of Zayante Road crossing on Mountain Charlie Gulch, in the lower mid part of NE1/4NE1/4 of sec. 36, T. 9 S., R. 2 W. (projected):

A11—0 to 6 inches; dark grayish brown (10YR 4/2) sandy loam, very dark brown (10YR 2/2) moist; moderate medium and coarse granular structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots and many medium roots; common fine and very fine tubular pores and common fine interstitial pores; slightly acid; gradual wavy boundary.

A12—6 to 11 inches; brown (7.5YR 5/2) sandy loam, very dark brown (10YR 2/2) moist; moderate coarse angular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots, common fine roots, and many medium roots; common medium, fine, and very fine tubular pores and common very fine interstitial pores; about 10 percent strong brown (7.5YR 5/6) weathered sandstone pebbles 2 to 6 millimeters in diameter; slightly acid; clear wavy boundary.

B21t—11 to 18 inches; brown (7.5YR 5/4) sandy clay loam, dark brown (7.5YR 3/2) moist; moderate medium and coarse angular blocky structure; hard, friable, sticky and plastic; many very fine roots, common fine roots, and many coarse roots; common very fine, fine, medium, and coarse tubular pores and common fine interstitial pores; common thin clay films lining pores and common thin clay bridges between sand grains; few moderately thick clay films on faces of peds; few weathered strong brown (7.5YR 5/6) pebbles; few black (N/2) charcoal flakes and granules; slightly acid; gradual wavy boundary.

B22t—18 to 26 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate coarse angular blocky structure; hard, friable, sticky and plastic; common very fine, fine, and medium roots; common very fine and fine tubular pores and common very fine interstitial pores; common thin clay bridges between sand grains, common thin clay films on faces of peds and few thin clay films lining pores; strongly acid; gradual wavy boundary.

B23t—26 to 35 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate medium and coarse angular blocky structure; hard, friable, sticky and plastic; common very fine and fine roots and many medium coarse roots; common very fine interstitial and tubular pores, common fine and medium tubular pores, and few

coarse tubular pores; many thin clay films on faces of peds and lining pores; strongly acid; clear irregular boundary.

B3t—35 to 43 inches; variegated yellowish red (5YR 4/6) and light brownish gray (10YR 6/2) sandy clay loam, dark reddish brown (5YR 3/4) and grayish brown (10YR 5/2) moist; moderate coarse angular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots and common medium roots; common fine and very fine tubular pores and common very fine interstitial pores; few thin clay films lining pores; clay bridges between sand grains in the yellowish red part of this horizon; strongly acid; gradual irregular boundary.

C1—43 to 53 inches; variegated light brownish gray (2.5Y 6/2) and light olive brown (2.5Y 5/6) loam, dark grayish brown (2.5Y 4/2) and olive brown (2.5Y 4/4) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots and common medium roots; many very fine interstitial and tubular pores and common fine tubular pores; common thin clay films bridging sand grains and along vertical fractures; strongly acid; diffuse wavy boundary.

C2—53 to 63 inches; variegated light brownish gray (2.5Y 6/2) and light olive brown (2.5Y 5/6) sandy loam, dark grayish brown (2.5Y 4/2) and olive brown (2.5Y 4/4) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine and fine roots and common medium roots; many very fine interstitial pores and common fine and very fine tubular pores, common thin clay films bridging sand grains and along vertical fractures; strongly acid; diffuse wavy boundary.

C3r—63 to 71 inches; variegated light brownish gray (2.5Y 6/2) and light olive brown (2.5Y 5/4) weathered sandstone that crushes to sandy loam.

Pedons in heavily wooded areas have an O horizon of leaves and twigs in various stages of decomposition. Depth to a paralithic contact is 40 to 72 inches. Thickness of the mollic epipedon is 10 to 20 inches.

The A1 horizon has hue of 10YR and 7.5YR, value of 4 or 5, and chroma of 2 or 3. It is 0 to 10 percent pebbles.

The Bt horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 3 to 6. It is sandy clay loam or clay loam. The Bt horizon is slightly acid to strongly acid. It is 0 to 15 percent pebbles.

The C horizon has hue of 2.5Y or 10YR, value of 5 or 6, and chroma of 2 to 6. It is loam, sandy loam, or sandy clay loam. The C horizon is medium acid or strongly acid. It is 0 to 15 percent pebbles. The Cr horizon is weathered sandstone, shale, schist, or siltstone.

Hecker series

The Hecker series consists of deep, well drained soils on mountains. These soils formed in material weathered from sandstone, mudstone, or shale. Slope ranges from 30 to 75 percent. The mean annual precipitation ranges from 35 to 60 inches, and the mean annual air temperature is about 55 degrees F.

Hecker soils are near Catelli, Felton, Lompico, Madonna, Maymen, and Sur soils. Catelli and Sur soils have less than 18 percent clay in the control section. Felton, Lompico, and Madonna soils have less than 35 percent rock fragments in the control section. Lompico and Madonna soils also have paralithic contact at a depth of 20 to 40 inches. Maymen soils have lithic contact at a depth of 10 to 20 inches.

Typical pedon of Hecker gravelly sandy loam, 50 to 75 percent slopes, about 1.76 miles east-southeast on Highland Way from the intersection of Mt. Bache Road and Highland Way, 600 feet south of road in SE1/4NE1/4, sec. 5, T. 10 S., R. 1 E. (projected):

A11—0 to 4 inches; brown (7.5YR 5/2) gravelly sandy loam, dark brown (7.5YR 3/2) moist; moderate very coarse angular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common medium, fine, and very fine tubular pores and common very fine and fine interstitial pores; 25 percent pebbles, 5 percent cobbles, and 1 percent stones; few scattered stones and cobbles on surface; neutral; abrupt wavy boundary.

A12—4 to 9 inches; variegated pinkish gray (7.5YR 6/2) and brown (10YR 5/3) gravelly loam, dark brown (7.5YR 4/4; 7.5YR 3/2) moist; weak medium and coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine, fine, medium, and coarse roots; common medium and fine tubular pores and common fine and very fine interstitial pores; 25 percent pebbles, 5 percent cobbles, and 1 percent stones; medium acid; clear wavy boundary.

B11—9 to 16 inches; variegated pale brown (10YR 6/3) and light yellowish brown (10YR 6/4) very gravelly sandy loam, brown (7.5YR 4/4) and strong brown (7.5YR 5/6) moist; weak medium subangular blocky structure; hard, friable, sticky and plastic; many coarse and medium roots and common fine and very fine roots; many very fine, fine, and medium tubular pores, many very fine interstitial pores, and common fine interstitial pores; few thin clay films lining pores and common thin clay bridges between sand grains; 35 percent pebbles, 5 percent cobbles, and 1 percent stones; medium acid; gradual wavy boundary.

B12—16 to 23 inches; variegated light brown (7.5YR 6/4) and pink (7.5YR 7/4) very gravelly sandy loam, strong brown (7.5YR 5/6) moist; weak medium and coarse subangular blocky structure; very hard, friable, sticky and plastic; many coarse and medium roots and common fine and very fine roots; many very fine interstitial pores and many very fine and fine tubular pores; common thin clay films bridging sand grains and lining pores; 30 percent pebbles, 5 percent cobbles, and 1 percent stones; medium acid; gradual wavy boundary.

B21t—23 to 31 inches; variegated light brown (7.5YR 6/4) and pink (7.5YR 7/4) very gravelly loam, strong brown (7.5YR 5/6) moist; weak medium and coarse subangular blocky structure; very hard, friable, sticky and plastic; many coarse and medium roots and common fine and very fine roots; many very fine interstitial pores and many very fine and fine tubular pores; common thin clay films bridging sand grains and lining pores; 70 percent pebbles and 5 percent cobbles and stones; medium acid; gradual wavy boundary.

B22t—31 to 41 inches; variegated light brown (7.5YR 6/4) and pink (7.5YR 7/4) very gravelly clay loam, brown (7.5YR 4/4) moist, strong brown (7.5YR 5/6) rubbed; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few fine and very fine roots and common medium roots; few very fine tubular and interstitial pores; many thin clay films bridging sand grains and lining pores; 70 percent pebbles and 10 percent cobbles and stones; medium acid; gradual wavy boundary.

Cr—41 to 58 inches; shattered shale.

Depth to paralithic contact is 40 to 60 inches.

The A horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 2 to 4. It is 20 to 40 percent pebbles and 0 to 10 percent cobbles and stones. It ranges from medium acid to neutral.

The B2t horizon has hue of 10YR to 5YR, value of 5 to 7, and chroma of 3 or 4. It is very gravelly, very cobbly, or very stony loam, sandy clay loam, or clay loam and has 35 to 80 percent rock fragments. It is slightly acid to medium acid.

The Cr horizon is sandstone or shale.

Lompico series

The Lompico series consists of moderately deep, well drained soils on mountains. These soils formed in residuum derived from sandstone, shale, siltstone, or mudstone. Slope ranges from 5 to 75 percent. The mean annual precipitation ranges from 35 to 60 inches, and the mean annual air temperature is about 55 degrees F.

Lompico soils are similar to Aptos, Felton, Nisene, and Lompico Variant soils. They are mapped in complexes

with Felton soils and are near Aptos, Ben Lomond, Catelli, Felton, Nisene, and Sur soils. Aptos soils have a mollic epipedon more than 20 inches thick. Felton and Nisene soils have paralithic contact at a depth of more than 40 inches; in addition, Nisene soils have a mollic epipedon more than 20 inches thick. Ben Lomond, Catelli, and Sur soils do not have an argillic horizon and average less than 18 percent clay in the control section.

Typical pedon of a Lompico loam in an area of the Lompico-Felton complex, 50 to 75 percent slopes, about 1,500 feet north and 550 feet west of the intersection of Zayante Road and Mountain Charlie Gulch, or 650 feet south and 400 feet west of the northeast corner of T. 9 S., R. 2 W. (projected):

A1—0 to 5 inches; brown (7.5YR 5/2) loam, dark brown (7.5YR 3/2) moist; moderate coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many fine, medium, and coarse roots and common very fine roots; common very fine interstitial pores, common fine tubular pores, and many very fine tubular pores; slightly acid; clear wavy boundary.

B21t—5 to 11 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 3/2) moist; moderate coarse subangular blocky structure; hard, friable, sticky and plastic; common fine and very fine roots and many coarse and medium roots; many very fine and fine tubular pores and common very fine interstitial pores; few thin clay films lining pores; strongly acid; gradual wavy boundary.

B22t—11 to 20 inches; brown (7.5YR 5/4) clay loam, dark brown (7.5YR 4/4) moist; moderate medium and coarse subangular blocky structure; hard, friable, sticky and plastic; common coarse and medium roots and few fine roots; many very fine and fine tubular pores and common medium and coarse tubular pores; many thin clay films on faces of peds and lining pores; strongly acid; gradual wavy boundary.

B31t—20 to 29 inches; variegated brown and strong brown (7.5YR 5/4, 5/6) sandy clay loam, dark brown (7.5YR 4/4) moist, dark yellowish brown (10YR 4/4) rubbed; moderate medium and coarse angular blocky structure; hard, friable, sticky and plastic; common coarse and medium roots and few fine roots; many very fine tubular pores, common fine tubular pores, and common very fine interstitial pores; many thin clay films lining pores and on faces of peds; medium acid; clear irregular boundary.

B32t—29 to 37 inches; yellowish brown (10YR 5/4) sandy clay loam, dark brown (10YR 4/3) moist, dark yellowish brown (10YR 4/4) rubbed; moderate medium angular blocky structure; hard, friable, slightly sticky and slightly plastic; common coarse and medium roots and few fine roots; common fine and very fine tubular pores; common thin clay films on faces of peds and few thin clay films lining pores; 60 percent weathered shale and sandstone gravel; medium acid; diffuse irregular boundary.

Cr—37 to 48 inches; weathered sandstone.

In wooded areas the profile has an O horizon of leaves and twigs in various stages of decomposition. Depth to paralithic contact is 20 to 40 inches. Thickness of the mollic epipedon is 10 to 20 inches. The profile generally is 0 to 15 percent pebbles, but in some pedons the horizon immediately above paralithic contact is as much as 65 percent pebbles.

The A horizon has hue of 10YR or 7.5YR and chroma of 2 to 4. It is slightly acid or neutral.

The Bt horizon has hue of 10YR to 5YR, value of 4 to 6, and chroma of 3 to 6. It is loam, sandy clay loam, or clay loam. It ranges from very strongly acid to medium acid.

In a few pedons there is a C horizon; it has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 3 to 8. The C horizon is sandy clay loam or clay loam. It ranges from medium acid to very strongly acid. The Cr horizon consists of sandstone, shale, mudstone, or siltstone.

Lompico Variant

The Lompico Variant consists of moderately deep, well drained soils on mountains. These soils formed in material weathered from sandstone, siltstone, shale, or mudstone. Slope ranges from 5 to 30 percent. The mean annual precipitation ranges from 35 to 45 inches, and the mean annual air temperature is about 56 degrees F.

Lompico Variant soils are similar to Lompico soils. They are near Lompico and Felton soils. Felton and Lompico soils have a fine-loamy control section. Felton soils also have paralithic contact at a depth of more than 40 inches.

Typical pedon of Lompico Variant loam, 5 to 30 percent slopes, about 1.51 miles north and 0.25 mile east of the fork of Granite Creek Road and Branciforte Drive, or about 2,350 feet south of center of sec. 20, T. 10 S., R. 1 W. (projected):

A11—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate fine and medium granular structure; hard, friable, slightly sticky and slightly plastic; many fine and very fine roots and common medium roots; many very fine and fine interstitial pores; slightly acid; gradual wavy boundary.

A12—5 to 10 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate medium and coarse granular structure; hard, friable, slightly sticky and slightly plastic; many medium roots, common fine and very fine roots, and few coarse roots; many fine or very fine interstitial pores between granules, and few fine tubular pores; slightly acid; clear wavy boundary.

A13—10 to 14 inches; dark grayish brown (10YR 4/2) clay loam, very dark brown (10YR 2/2) moist; moderate medium and coarse angular blocky structure; hard, friable, sticky and plastic; many fine, very fine, medium, and coarse roots; few pressure cutans; medium acid; abrupt wavy boundary.

B21t—14 to 19 inches; mixed grayish brown (10YR 5/2) and dark yellowish brown (10YR 4/4) clay, very dark grayish brown (10YR 3/2) and brown (7.5YR 4/4) moist; moderate medium and coarse angular blocky structure; extremely hard, firm, sticky and very plastic; many coarse and medium roots and common fine and very fine roots; many fine and very fine tubular pores; common moderately thick clay films on ped faces and lining pores; medium acid; diffuse irregular boundary.

B22t—19 to 23 inches; variegated dark brown (7.5YR 4/2, 4/4) and strong brown (7.5YR 5/6) clay, dark grayish brown (10YR 4/2), very dark grayish brown (10YR 3/2), and dark brown (7.5YR 4/4) moist; dark yellowish brown (10YR 4/4) rubbed; moderate coarse and very coarse angular blocky structure; extremely hard, firm, very sticky and very plastic; common very fine, fine, medium, and coarse roots; many very fine and fine tubular pores; common moderately thick clay films lining pores and on faces of peds; strongly acid; diffuse irregular boundary.

B3t—23 to 28 inches; clay that is variegated yellowish brown (10YR 5/4), brown (7.5YR 4/4), and very dark grayish brown (10YR 3/2) dry or moist; dark grayish brown (10YR 4/2) rubbed; moderate coarse and very coarse angular blocky structure; extremely hard, firm, very sticky and very plastic; common coarse and medium roots and few fine and very fine roots; many fine tubular pores; common thin and moderately thick clay films on faces of peds and lining pores; very strongly acid; diffuse irregular boundary.

Cr—28 to 36 inches; weathered very strongly acid shale.

Some profiles have an O horizon of leaf and twig litter as much as 3 inches thick. Depth to paralithic contact is 20 to 40 inches. The mollic epipedon is 10 to 20 inches thick. The profile is 0 to 10 percent pebbles.

The A horizon has value of 3 or 5 and chroma of 2 or 3. It is medium acid to neutral.

The B2t horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 2 to 6. It is heavy clay loam or clay. It ranges from very strongly acid to medium acid.

The Cr horizon is weathered sandstone, shale, siltstone, or mudstone bedrock.

Los Osos series

The Los Osos series consists of moderately deep, well drained soils on hills and mountains. These soils formed in material weathered from sandstone, siltstone, mudstone, or shale. Slope ranges from 5 to 50 percent. The mean annual precipitation ranges from 20 to 45 inches, and the mean annual air temperature is about 58 degrees F.

Los Osos soils are similar to Tierra and Watsonville soils. They are near Bonnydoon, Diablo, Fagan, Aptos, and Santa Lucia soils. Diablo, Fagan, Tierra, and Watsonville soils are more than 40 inches deep over bedrock. Bonnydoon soils are less than 20 inches deep to paralithic contact. Aptos soils have a mollic epipedon more than 20 inches thick. Santa Lucia soils have more than 35 percent rock fragments in the control section.

Typical pedon of Los Osos loam, 30 to 50 percent slopes, about 2,000 feet north and 2,200 feet west of the intersection of Old San Jose Road and Soquel Drive in the NE1/4NE1/4 of sec. 9, T. 11 S., R. 1 W. (projected):

A11—0 to 2 inches; dark grayish brown (10YR 4/2) sandy loam, black (10YR 2/1) moist; strong medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots and common fine roots; common fine tubular pores and many very fine tubular pores; medium acid; abrupt wavy boundary.

A12—2 to 11 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; strong medium and coarse subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine roots; many very fine tubular and interstitial pores and common fine and medium tubular pores; about 5 percent weathered cobbles and pebbles; medium acid; gradual wavy boundary.

B1t—11 to 19 inches; brown (10YR 5/3) sandy clay loam, dark brown (10YR 3/3) moist; moderate medium and coarse angular blocky structure; very hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; many very fine tubular and interstitial pores and common fine and medium tubular pores; common thin clay films coating faces of peds, and few thin clay films lining pores; about 5 percent weathered cobbles and pebbles; slightly acid; clear wavy boundary.

B21t—19 to 24 inches; pale brown (10YR 6/3) heavy clay loam, brown (10YR 4/3) moist; weak very coarse angular blocky structure; very hard, firm, sticky and plastic; few very fine roots; common very fine interstitial pores and many very fine and fine tubular pores; many thin, common moderately thick, and few thick clay films lining pores, and few thin clay films coating faces of peds; about 5 percent weathered cobbles and pebbles; slightly acid; abrupt wavy boundary.

B22t—24 to 36 inches; brown (10YR 5/3) clay, dark brown (10YR 3/3) moist; massive; extremely hard, firm, sticky and plastic; few fine roots; few very fine interstitial pores and many very fine tubular pores; many thin and moderately thick clay films lining pores; 10 percent weathered sandstone cobbles and pebbles; slightly acid; clear irregular boundary.

Cr—36 to 42 inches; weathered sandstone.

Depth to paralithic contact is 20 to 40 inches. The mollic epipedon is 10 to 20 inches thick. The profile is 0 to 10 percent pebbles.

The A horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 to 4. It is medium acid to slightly acid.

The B2t horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 5 or 6. It is clay loam, silty clay loam, silty clay, or clay. It ranges from medium acid to neutral.

Madonna series

The Madonna series consists of moderately deep, well drained soils on mountains. These soils formed in material weathered from mudstone or shale. Slope ranges from 15 to 75 percent. The mean annual precipitation ranges from 35 to 60 inches, and the mean annual air temperature is about 56 degrees F.

Madonna soils are similar to Maymen Variant and Maymen soils. They are mapped in a complex with Maymen soils and are near Catelli, Felton, Hecker, Lompico, Maymen, and Sur soils. Maymen Variant soils have paralithic contact at a depth of 12 to 20 inches. Maymen soils have lithic contact at a depth of 10 to 20 inches. Catelli soils have a coarse-loamy control section. Sur and Hecker soils have a loamy-skeletal control section. Felton and Lompico soils have a mollic epipedon and an argillic horizon.

Typical pedon of a Madonna loam in an area of Maymen-Madonna complex, 30 to 75 percent slopes, off Bear Creek Road about 1.3 miles up Hopkins Gulch Road, about 30 feet north of the road fence, in the center of sec. 17, T. 9 S., R. 2 W. (projected):

A11—0 to 7 inches; pale brown (10YR 6/3) loam, dark grayish brown (10YR 4/2) moist; massive; hard, friable, nonsticky and nonplastic; many very fine roots; common very fine, few fine, and common medium tubular pores; medium acid; clear wavy boundary.

A12—7 to 16 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; weak coarse subangular blocky structure parting to moderate medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common very fine roots and few fine to coarse roots; many very fine tubular pores and few fine tubular pores; medium acid; clear wavy boundary.

B2—16 to 23 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular structure; hard, friable, slightly sticky and slightly plastic; common very fine roots and few fine to coarse roots; many very fine tubular pores; few thin clay films lining pores; 5 percent pebbles in lower part; medium acid; clear wavy boundary.

Cr—23 to 35 inches; medium acid mudstone.

Depth to paralithic contact is 20 to 40 inches. The part of the profile between a depth of 10 inches and bedrock averages 18 to 27 percent clay.

The A horizon has value of 5 or 6. It is 0 to 10 percent pebbles. It is strongly acid to slightly acid.

The B horizon has value of 5 or 6 and chroma of 3 or 4. It is 0 to 10 percent pebbles. It is strongly acid to medium acid.

The Cr horizon is mudstone or shale.

Maymen series

The Maymen series consists of shallow, somewhat excessively drained soils on mountains. These soils formed in material weathered from shale, sandstone, or granitic rock. Slope ranges from 15 to 75 percent. The mean annual precipitation ranges from 35 to 60 inches, and the mean annual air temperature is about 56 degrees F.

Maymen soils are similar to Maymen Variant and Madonna soils. They are mapped in a complex with

Madonna soils and are near Catelli, Felton, Hecker, Lompico, Madonna, and Sur soils. Maymen Variant soils have paralithic contact at a depth of less than 20 inches. Catelli, Lompico, and Madonna soils have paralithic contact at a depth of 20 to 40 inches. Felton soils have paralithic contact at a depth of more than 40 inches. Hecker and Sur soils have lithic contact at a depth of 40 to 60 inches and 20 to 40 inches, respectively.

Typical pedon of Maymen stony loam, 30 to 75 percent slopes, 2,100 feet south of White Rock Peak in the SE1/4NE1/4 of sec. 13, T. 9 S., R. 2 W. (projected):

O1—1 inch to 0; undecomposed leaves and twigs.

A1—0 to 6 inches; pale brown (10YR 6/3) stony loam, dark brown (10YR 4/3) moist; moderate fine granular structure; soft, very friable, sticky and slightly plastic; common coarse and medium roots and many fine and very fine roots; many very fine interstitial pores; 10 percent cobbles, 10 percent stones, and 10 percent shale pebbles; slightly acid; clear wavy boundary.

B2—6 to 14 inches; pale brown (10YR 6/3) shaly loam, dark brown (10YR 4/3) moist; weak fine subangular blocky structure parting to moderate fine granules; slightly hard, friable, sticky and plastic; many coarse and medium roots; common fine tubular pores and many very fine interstitial pores; 10 percent cobbles, 2 percent stones, and 15 percent shale pebbles; medium acid; clear wavy boundary.

R—14 inches; dark grayish brown, strongly acid, shale.

Depth to lithic contact is 10 to 20 inches. The surface is covered by 5 to 10 percent stones, 5 to 10 percent cobbles, and 5 to 25 percent shale pebbles. The profile averages 18 to 27 percent clay throughout.

The A horizon has value of 5 or 6 and chroma of 2 to 4. It is 5 to 10 percent stones, 5 to 10 percent cobbles, and 5 to 10 percent pebbles. Reaction ranges from slightly acid to strongly acid.

The B horizon has chroma of 2 to 4. It is loam, sandy clay loam, or clay loam. It is 0 to 10 percent stones, 5 to 10 percent cobbles, and 15 to 25 percent pebbles. It ranges from very strongly acid to slightly acid.

The R horizon consists of unweathered sandstone, shale, or granodiorite.

Maymen Variant

The Maymen Variant consists of shallow, somewhat excessively drained soils on mountains. These soils formed in material weathered from granite or schist. Slope ranges from 5 to 30 percent. The mean annual precipitation ranges from 35 to 45 inches, and the mean annual air temperature is about 56 degrees F.

Maymen Variant soils are similar to Madonna and Maymen soils. They are near Ben Lomond, Catelli, Felton, Lompico, and Sur soils. Madonna, Catelli, and Lompico soils have paralithic contact at a depth of 20 to 40 inches. Maymen soils have lithic contact at a depth of less than 20 inches. Ben Lomond and Felton soils have paralithic contact at a depth of more than 40 inches.

Typical pedon of Maymen Variant sandy loam, 5 to 30 percent slopes, about 1,350 feet north and 1,100 feet east of the southwest corner of sec. 20, T. 10 S., R. 2 W. (projected):

O—1 inch to 0; litter of pine needles and leaves and twigs of shrub and hardwood trees, very strongly acid.

A11—0 to 1 inch; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and common medium roots; many very fine interstitial pores; medium acid; abrupt wavy boundary.

A12—1 to 9 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; moderate medium and fine granular structure; slightly hard, friable, nonsticky and nonplastic; many very fine and medium roots and common coarse roots; many very fine interstitial pores; some charcoal; medium acid; clear wavy boundary.

B2—9 to 19 inches; light yellowish brown (10YR 6/4) gravelly sandy loam, dark yellowish brown (10YR 4/4) moist; weak fine granular structure; slightly hard, friable, nonsticky and nonplastic; common very fine to coarse roots; common very fine tubular pores; few thin clay films lining pores and bridging sand grains; 20 percent pebbles 5 to 20 millimeters; strongly acid; clear wavy boundary.

Cr—19 to 28 inches; brownish yellow (10YR 6/6) weathered granitic bedrock; strongly acid; clear wavy boundary.

Depth to paralithic contact is 12 to 20 inches. The profile is 0 to 20 percent pebbles.

The A horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 to 4. It is medium acid to slightly acid.

The B horizon has hue of 7.5YR or 10YR, value of 6 or 7, and chroma of 3 to 6. It is gravelly sandy loam or sandy loam. This horizon is strongly acid to medium acid. It is 10 to 25 percent pebbles.

The Cr horizon consists of weathered granite or schist.

Mocho series

The Mocho series consists of very deep, well drained soils on the alluvial plain of the Pajaro River. These soils formed in mixed alluvium. Slope ranges from 0 to 2 percent. The mean annual precipitation ranges from 20 to 30 inches, and the mean annual air temperature is about 58 degrees F.

Mocho soils are near Conejo and San Emigdio soils. Conejo soils have a mollic epipedon more than 20 inches thick. San Emigdio soils have a coarse-loamy control section.

Typical pedon of Mocho silt loam, 0 to 2 percent slopes. about 1,650 feet south from the intersection of Coward Road and Highway 129, about 240 feet north from an irrigation stand pipe, and about 5 feet east from a farm lane in T. 12 S., R. 2 E. (projected):

Ap1—0 to 3 inches; grayish brown (2.5Y 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; strong medium and coarse granular structure; slightly hard, friable, sticky and slightly plastic; few very fine roots; common very fine and fine tubular pores; effervescent; moderately alkaline; clear wavy boundary.

Ap2—3 to 16 inches; grayish brown (2.5Y 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure; slightly hard, firm, sticky and slightly plastic; few very fine roots; common very fine and fine tubular pores; effervescent; moderately alkaline; clear wavy boundary.

C1—16 to 23 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure; hard, friable, sticky and slightly plastic; few very fine roots; many very fine and fine tubular pores; strongly effervescent; mildly alkaline; gradual wavy boundary.

A1b—23 to 43 inches; variegated grayish brown (2.5Y 5/2) and light brownish gray (2.5Y 6/2) silt loam, very dark gray (10YR 3/1) and dark grayish brown (10YR 4/2) moist; weak coarse subangular blocky structure; slightly hard, friable, sticky and slightly plastic; few very fine roots; many very fine and fine tubular pores; few worm casts; effervescent; mildly alkaline; clear wavy boundary.

C2—43 to 60 inches; light brownish gray (2.5Y 6/2) silt loam, brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine tubular pores; few worm casts; strongly effervescent; mildly alkaline.

The profile is more than 60 inches deep. The mollic epipedon is 10 to 20 inches thick. In some pedons thin strata of fine sand to silty clay are below a depth of 40 inches. The profile is 0 to 15 percent pebbles.

The A horizon has hue of 10YR or 2.5Y. It is mildly alkaline to moderately alkaline and slightly effervescent to strongly effervescent.

The C horizon has value of 5 or 6 and chroma of 2 to 4. It is mildly alkaline to moderately alkaline and slightly effervescent to strongly effervescent.

Nisene series

The Nisene series consists of deep, well drained soils on mountains. These soils formed in residuum derived from sandstone or shale. Slope ranges from 15 to 75 percent. The mean annual precipitation ranges from 35 to 60 inches, and the mean annual air temperature is about 55 degrees F.

Nisene soils are similar to Aptos, Felton, and Lompico soils. They are mapped in a complex with Aptos soils and are near Ben Lomond, Catelli, Felton, Lompico, and Sur soils. Aptos and Lompico soils have paralithic contact at a depth of 20 to 40 inches. Felton soils have a mollic epipedon less than 20 inches thick. Ben Lomond, Catelli, and Sur soils do not have an argillic horizon, and they average less than 18 percent clay in the control section.

Typical pedon of a Nisene loam in an area of Nisene-Aptos complex, 30 to 50 percent slopes, about 6,400 feet due east of intersection of Olive Springs Road and Hinckley Creek Road on Hinckley Creek Road in T. 10 S., R. 1 E. (projected):

O—2 inches to 0; mat of partially decomposed leaves, needles, and twigs.

A1—0 to 10 inches; dark grayish brown (10YR 4/2) loam, black (10YR 2/1) moist; strong medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; common fine roots and many medium and coarse roots; many fine and medium interstitial and tubular pores; neutral; clear wavy boundary.

B21t—10 to 22 inches; brown (7.5YR 5/2) clay loam, dark brown (7.5YR 3/2) moist; moderate medium and coarse subangular blocky structure; hard, friable, sticky and plastic; common fine roots and many medium and coarse roots; many fine tubular pores, common medium tubular pores, and common fine interstitial pores; common thin clay films on faces of peds, and few thin clay films lining pores; 10 percent angular pebbles; slightly acid; gradual wavy boundary.

B22t—22 to 32 inches; brown (7.5YR 5/2) clay loam, dark brown (7.5YR 3/2) moist; moderate medium and coarse subangular blocky structure; hard, friable, sticky and plastic; common fine roots and many medium and coarse roots; common fine pores and many medium tubular pores; common thin clay films on faces of peds, and few thin clay films lining pores; 10 percent angular pebbles; slightly acid; gradual wavy boundary.

B23t—32 to 48 inches; brown (7.5YR 5/2) clay loam, dark brown (7.5YR 3/2) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; common fine roots and many medium and coarse roots; common fine tubular pores and many medium tubular pores; few thin clay films lining pores, and common thin clay films on the faces of peds; 10 percent angular pebbles; slightly acid; diffuse irregular boundary.

B3t—48 to 58 inches; yellowish brown (10YR 5/4) gravelly loam, dark yellowish brown (10YR 4/4) moist; weak fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots and common medium and coarse roots; few fine tubular pores and common very fine interstitial pores; common thin clay films bridging mineral grains; 15 percent angular pebbles; slightly acid; clear irregular boundary.

Cr—58 inches; weathered fine-grained sandstone; slightly acid.

Depth to paralithic contact is 40 to 66 inches. The profile is 0 to 15 percent pebbles.

The A horizon has value of 3 to 5 and chroma of 1 or 2. It is slightly acid to neutral.

The B2t horizon has hue of 10YR or 7.5YR, value of 4 or 5, and chroma of 2 or 3. In places, at a depth of more than 20 inches, it has value of 6 and chroma of 4. The B2t horizon is sandy clay loam or clay loam. It is medium acid to slightly acid.

Some pedons have a C horizon 5 to 10 inches thick that has hue of 10YR, value of 6 or 7, and chroma of 4. It is loam or sandy clay loam. It is slightly acid.

The Cr horizon is weathered sandstone or shale.

Pfeiffer series

The Pfeiffer series consists of deep, well drained soils on hills. These soils formed in material weathered from granitic rock, sandstone, or marine sediment. Slope ranges from 15 to 50 percent. The mean annual precipitation ranges from 25 to 40 inches, and the mean annual air temperature is about 58 degrees F.

Pfeiffer soils are similar to Ben Lomond soils. They are mapped in a complex with Elkhorn soils and are near Baywood, Bonnydoon, Elkhorn, and Aptos soils. Ben Lomond soils have a mollic epipedon more than 20 inches thick. Elkhorn and Aptos soils have a fine-loamy control section and an argillic horizon; in addition, Aptos soils also have paralithic contact at a depth of 20 to 40 inches. Baywood soils have a sandy control section. Bonnydoon soils have paralithic contact at a depth of less than 20 inches.

Typical pedon of Pfeiffer gravelly sandy loam, 30 to 50 percent slopes, about 900 feet southeast from intersection of Mt. Hermon and Glenn Canyon Roads, about 40 feet uphill from fence along Glenn Canyon Road, in Scotts Valley, in the SE1/4SE1/4 of sec. 24, T. 10 S., R. 2 W. (projected):

A11—0 to 3 inches; dark grayish brown (10YR 4/2) gravelly sandy loam, very dark brown (10YR 2/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine and very fine roots; many very fine and fine interstitial pores; about 20 percent pebbles; slightly acid; clear wavy boundary.

A12—3 to 13 inches; dark grayish brown (10YR 4/2) gravelly sandy loam, dark brown (7.5YR 3/2) moist; weak coarse angular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine and very fine roots; many very fine and common fine interstitial and tubular pores; about 20 percent pebbles; slightly acid; gradual wavy boundary.

A13—13 to 24 inches; brown (10YR 5/3) gravelly sandy loam, dark brown (7.5YR 3/2) moist; weak coarse and medium angular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots and common very fine roots; many very fine and fine interstitial pores and common very fine and fine tubular pores; about 20 percent pebbles; slightly acid; gradual wavy boundary.

B21—24 to 38 inches; brown (7.5YR 5/2) gravelly sandy loam, dark reddish brown (5YR 3/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few fine and very fine roots; many very fine and fine interstitial pores and common very fine and fine tubular pores; about 20 percent pebbles; slightly acid; gradual wavy boundary.

B22—38 to 53 inches; brown (7.5YR 5/2) cobbly sandy loam, reddish brown (5YR 4/3) moist; massive; hard, friable, nonsticky and nonplastic; few fine and very fine roots; many fine and very fine tubular pores and interstitial pores; about 30 percent cobbles and pebbles; slightly acid; gradual wavy boundary.

C1—53 to 66 inches; brown (7.5YR 5/2) gravelly sandy loam, dark brown (7.5YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; few very fine roots; many very fine and fine tubular and interstitial pores; about 20 percent pebbles; slightly acid; gradual wavy boundary.
C2r—66 to 77 inches; weathered granodiorite.

Depth to paralithic contact ranges from 40 to 66 inches. The profile is slightly acid to neutral throughout. The mollic epipedon ranges from 10 to 19 inches in thickness.

The A horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 2 to 4. It is about 10 to 30 percent pebbles.

The B2 horizon is sandy loam, fine sandy loam, gravelly sandy loam, gravelly fine sandy loam, or cobbly sandy loam. It is 0 to about 15 percent cobbles and 10 to 30 percent pebbles.

The C horizon is sandy loam, fine sandy loam, gravelly sandy loam, or gravelly fine sandy loam. It is about 10 to 40 percent pebbles.

The Cr horizon is weathered granitic bedrock, sandstone, or marine sediment.

Pinto series

The Pinto series consists of very deep, moderately well drained soils on coastal terraces and alluvial fans. These soils formed in old alluvial and marine deposits. Slope ranges from 0 to 15 percent. The mean annual precipitation ranges from 20 to 35 inches, and the mean annual air temperature is about 58 degrees F.

Pinto soils are similar to Elkhorn soils. They are near Elkhorn, Tierra, and Watsonville soils. Elkhorn soils have a mollic epipedon more than 20 inches thick. Tierra and Watsonville soils have a fine control section.

Typical pedon of Pinto loam, 2 to 9 percent slopes, about 350 feet south and 57 feet east from the intersection of Webb and Casserly Roads in T. 11 S., R. 2 E. (projected):

A1—0 to 14 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate coarse subangular blocky structure parting to moderate fine and medium granular; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots and few fine roots; common very fine and fine tubular pores; medium acid; clear wavy boundary.
A2—14 to 21 inches; light brownish gray (10YR 6/2) loam, very dark grayish brown (10YR 3/2) moist; moderate coarse subangular blocky structure; slightly hard, friable, sticky and plastic; common very fine and few fine roots; many very fine and fine tubular pores; medium acid; abrupt wavy boundary.
B2t—21 to 38 inches; mixed brownish yellow (10YR 6/6) and very pale brown (10YR 7/3) clay loam, brown (7.5YR 5/3) and strong brown (10YR 5/6) moist; moderate coarse subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; many very fine interstitial and tubular pores and common fine tubular pores; common thin and few moderately thick clay films on faces of peds and lining pores; few krotovinas filled with soil material from horizon above; few fine black (10YR 2/1) manganese stains and concretions; slightly acid; diffuse wavy boundary.
B3t—38 to 51 inches; variegated light yellowish brown (10YR 6/4) and very pale brown (10YR 7/3) clay loam, brown (10YR 5/3) and yellowish brown (10YR 5/6) moist; weak coarse subangular blocky structure; hard, friable, sticky and plastic; few very fine roots; common very fine interstitial pores and many very fine and fine tubular pores; few thin clay films lining pores; 5 percent cobbles and 5 percent pebbles; few fine black (10YR 2/1) manganese stains and concretions; medium acid; diffuse wavy boundary.
C—51 to 65 inches; reddish yellow (7.5YR 6/6) clay loam, yellowish brown (10YR 5/6) and pale brown (10YR 6/3) moist; massive; hard, friable, sticky and plastic; few very fine roots; many very fine and fine tubular pores and many very fine interstitial pores; few fine black (10YR 2/1) manganese stains and concretions; strongly acid.

The A1 horizon has value of 4 or 5 and chroma of 2 or 3. It is medium acid to neutral.

The A2 horizon has value of 6 or 7 and chroma of 2 or 3. It is sandy loam, fine sandy loam, very fine sandy loam, or loam. It is medium acid to neutral.

The B2t horizon has hue of 10YR or 7.5YR, value of 5 to 7, and chroma of 3 to 6. It is sandy clay loam or clay loam. It is medium acid to neutral.

The C horizon has value of 5 to 7 and chroma of 4 to 6. It is sandy clay loam, clay loam, or loam. It is medium acid to strongly acid.

San Emigdio Variant

The San Emigdio Variant consists of very deep, well drained soils on the alluvial plain of the Pajaro River. These soils formed in coarse alluvium. Slope ranges from 0 to 2 percent. The mean annual precipitation ranges from 20 to 30 inches, and the mean annual air temperature is about 58 degrees F.

San Emigdio Variant soils are near Conejo, Elder, and Mocho soils. Conejo and Mocho soils have a mollic epipedon and a fine-loamy control section. Elder soils have a mollic epipedon and are noncalcareous throughout.

Typical pedon of San Emigdio Variant sandy loam, 0 to 2 percent slopes, about 550 feet north of the river levee in T. 12 S., R. 2 E. (projected):

Ap—0 to 8 inches; light brownish gray (2.5Y 6/2) sandy loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; many very fine and fine roots; common very fine tubular pores and interstitial pores; effervescent; moderately alkaline; abrupt smooth boundary.
C1—8 to 26 inches; light brownish gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, friable, nonsticky and nonplastic; common very fine roots; common very fine tubular pores; effervescent; moderately alkaline; clear wavy boundary.
C2—26 to 40 inches; light brownish gray (2.5Y 6/2) very fine sandy loam stratified with thin lenses of fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak thick platy structure; slightly hard, friable, nonsticky and nonplastic; few very fine roots; common very fine tubular pores; strongly effervescent; moderately alkaline; clear wavy boundary.
IIC3—40 to 51 inches; light brownish gray (2.5Y 6/2) fine sand; dark grayish brown (2.5Y 4/2) moist; single grained; loose when dry or moist; few very fine roots; common fine tubular pores; effervescent; moderately alkaline; clear wavy boundary.
IIC4—51 to 60 inches; light brownish gray (2.5Y 6/2) very fine sandy loam stratified with thin lenses of fine sandy loam, dark grayish brown (2.5Y 4/2) moist, common medium distinct dark yellowish brown (10YR 4/4) mottles; weak coarse subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; few very fine roots; common very fine tubular pores; strongly effervescent; moderately alkaline.

The A horizon has hue of 10YR or 2.5Y. It is mildly alkaline or moderately alkaline.

The C horizon has chroma of 2 or 3. The C horizon to a depth of 40 inches is dominantly fine sandy loam or very fine sandy loam but contains fine strata of silt loam to fine sand. Below a depth of 40 inches the strata range from silty clay loam to fine sand. Below a depth of 30 inches in places are dark yellowish brown (10YR 5/3) and brown (10YR 4/4) mottles.

Santa Lucia series

The Santa Lucia series consists of moderately deep, well drained soils on hills and mountains. These soils formed in material weathered from mudstone or shale. Slope ranges from 5 to 75 percent. The mean annual precipitation ranges from 25 to 40 inches, and the mean annual air temperature is about 58 degrees F.

Santa Lucia soils are near Ben Lomond, Bonnydoon, Felton, Lompico, and Los Osos soils. Ben Lomond soils have less than 18 percent clay in the control section. Bonnydoon soils have paralithic contact at a depth of 10 to 20 inches. Felton and Lompico soils have 18 to 35 percent clay in the control section. Los Osos soils have more than 35 percent clay in the control section. All of these soils have less than 35 percent rock fragments in the control section.

Typical pedon of Santa Lucia shaly clay loam, 50 to 75 percent slopes, about 3 miles northeast of Davenport in the SE1/4SW1/4SW1/4 of sec. 22, T. 10 S., R. 3 W. (projected):

A11—0 to 5 inches; dark gray (10YR 4/1) shaly clay loam, very dark gray (10YR 3/1) moist, weak medium and coarse subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky and slightly plastic; many very fine, fine, and medium roots; many very fine interstitial pores; about 20 percent shale fragments; neutral; gradual wavy boundary.

A12—5 to 21 inches; dark gray (10YR 4/1) shaly clay loam, very dark gray (10YR 3/1) moist, strong fine and medium granular structure; slightly hard, friable, sticky and plastic; many very fine to coarse roots; many very fine interstitial pores; 25 percent shale fragments; medium acid; gradual wavy boundary.

A13—21 to 38 inches; grayish brown (10YR 5/2) very shaly clay loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium granular structure; slightly hard, friable, sticky and plastic; common very fine to coarse roots; many very fine interstitial pores; 60 percent shale fragments; strongly acid; abrupt irregular boundary.

R—38 inches; white (10YR 8/2) siliceous shale.

Depth to lithic contact is 20 to 40 inches. The mollic epipedon is 20 to 40 inches thick. The profile is 15 to 75 percent coarse fragments throughout. The weighted average content of coarse fragments at a depth of more than 10 inches ranges from 35 to 50 percent. The control section averages more than 35 percent clay, and the content of clay increases with depth.

The A horizon has value of 4 or 5 and chroma of 1 or 2. It generally ranges from strongly acid to slightly acid, but it is neutral in the upper few inches.

Soquel series

The Soquel series consists of very deep, moderately well drained soils on alluvial fans, plains, and narrow valley bottoms. These soils formed in alluvium derived from sedimentary rock. Slope ranges from 0 to 15 percent. The mean annual precipitation ranges from 25 to 50 inches, and the mean annual air temperature is about 57 degrees F.

Soquel soils are similar to Conejo soils and are near Aptos, Conejo, Danville, Elder, Elkhorn, and Nisene soils. Conejo soils have an irregular decrease in organic matter content with depth and a thermic soil temperature regime. Aptos, Elkhorn, and Nisene soils have an argillic horizon. Danville and Elder soils have a fine and a coarse-loamy control section, respectively.

Typical pedon of Soquel loam, 0 to 2 percent slopes, about 750 feet east along Varni Road from intersection of Corralitos Road and Varni Road, then 36 feet north in T. 11 S., R. 1 E. (projected):

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) loam, very dark gray (10YR 3/1) moist; weak fine granular structure; hard, friable, sticky and slightly plastic; common very fine roots; many very fine interstitial pores; medium acid; abrupt wavy boundary.

A12—7 to 13 inches; very dark grayish brown (10YR 3/2) loam, very dark gray (10YR 3/1) moist; moderate coarse subangular blocky structure; hard, friable, sticky and slightly plastic; many very fine, medium, and coarse roots; common very fine and medium tubular pores and few fine tubular pores; slightly acid; clear wavy boundary.

A13—13 to 21 inches; brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moderate medium subangular blocky structure; hard, friable, sticky and slightly plastic; few very fine roots and many medium and coarse roots; common very fine tubular pores and few fine tubular pores; slightly acid; gradual wavy boundary.

C1—21 to 37 inches; brown (10YR 5/3) silt loam, brown (10YR 4/3) moist, common fine distinct dark grayish brown (10YR 4/2) and brownish yellow (10YR 6/6) mottles; moderate coarse subangular blocky structure; hard, friable, sticky and plastic; few very fine roots and many medium and coarse roots; few fine tubular pores; neutral; clear wavy boundary.

A1b—37 to 51 inches; brown (10YR 5/3) silty clay loam, dark yellowish brown (10YR 3/4) moist; common fine distinct dark grayish brown (10YR 4/2) and light yellowish brown (10YR 6/4) mottles; weak coarse subangular blocky structure; hard, friable, sticky and plastic; few very fine roots and many medium and coarse roots; many very fine tubular pores and common fine tubular pores; neutral; gradual wavy boundary.

C2b—51 to 62 inches; yellowish brown (10YR 5/4) loam, dark brown (10YR 3/3) moist; common fine distinct dark brown (10YR 3/3) and very pale brown (10YR 7/4) mottles; weak coarse subangular blocky structure; hard, friable, sticky and plastic; few very fine roots and common medium roots; common very fine and fine tubular pores; neutral.

The profile is more than 60 inches deep. It is 0 to 15 percent pebbles throughout. It is slightly acid to medium acid.

The buried A horizon, where present, has value of 4 or 5 and chroma of 2 or 3. It is silty clay loam or clay loam.

The C horizon has value of 4 or 5 and chroma of 2 to 4. It is loam, silt loam, clay loam, or silty clay loam. In some pedons it has thin strata of sandy loam, loamy sand, or sand and is 0 to 25 percent pebbles. It ranges from neutral to medium acid.

Sur series

The Sur series consists of moderately deep, somewhat excessively drained soils on mountains. These soils formed in material weathered from sandstone, schist, or granitic rock. Slope ranges from 30 to 75 percent. The mean annual precipitation ranges from 35 to 60 inches, and the mean annual air temperature is about 55 degrees F.

Sur soils are similar to Catelli soils. They are mapped in a complex with Ben Lomond and Catelli soils and are near Aptos, Ben Lomond, Felton, Lompico, Nisene, and Zayante soils. Ben Lomond and Catelli soils have a coarse-loamy control section. Aptos, Felton, Lompico, and Nisene soils have a fine-loamy control section. Zayante soils have a sandy control section.

Typical pedon of Sur stony sandy loam in an area of Sur-Catelli complex, 50 to 75 percent slopes, along Jameson Road, about 1 mile northeast from intersection of Jameson Road and Empire Grade, NW1/4SE1/4 of sec. 15, T. 9 S., R. 3 W. (projected):

O—1 inch to 0; litter of needles, leaves, and twigs in various stages of decomposition.

A11—0 to 3 inches; brown (10YR 5/2) stony sandy loam, dark brown (10YR 3/2) moist; moderate medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine interstitial pores; about 5 percent pebbles and 15 percent cobbles and stones; neutral; clear wavy boundary.

A12—3 to 18 inches; brown (7.5YR 5/4) stony sandy loam, dark brown (7.5YR 3/2) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots and common medium roots; many very fine interstitial pores; about 25 percent cobbles and stones; slightly acid; clear wavy boundary.

C1—18 to 35 inches; reddish yellow (7.5YR 6/6) very stony sandy loam, brown (7.5YR 4/4) moist; massive; slightly hard, friable, nonsticky and nonplastic; common very fine, fine, and medium roots; many very fine interstitial pores; about 35 percent pebbles and 25 percent stones and cobbles; medium acid; abrupt irregular boundary.

R—35 inches; yellow (10YR 7/6) fractured schist.

Depth to lithic contact is 20 to 40 inches. The mollic epipedon is 10 to 20 inches thick.

The A horizon has value of 4 or 5 and chroma of 2 or 3. It is slightly acid or neutral.

The C horizon has value of 5 or 6 and chroma of 3 or 4. It is generally stony or very stony sandy loam but grades to stony loamy sand above the bedrock. It ranges from strongly acid to neutral.

Tierra series

The Tierra series consists of very deep, moderately well drained soils on alluvial and marine terraces. These soils formed mainly in alluvium derived from sedimentary rock. Slope ranges from 15 to 50 percent. The mean annual precipitation ranges from 20 to 35 inches, and the mean annual air temperature is about 58 degrees F.

Tierra soils are similar to Los Osos and Watsonville soils. They are mapped in a complex with Watsonville soils and are near Baywood, Diablo, Elkhorn, Pinto, and Watsonville soils. Los Osos soils are less than 40 inches deep to bedrock and do not have an abrupt AB horizon boundary. Watsonville soils have an albic horizon. Baywood soils have a sandy control section. Diablo soils do not have an abrupt AB horizon boundary. Elkhorn and Pinto soils have a fine-loamy control section.

Typical pedon of a Tierra sandy loam in an area of Tierra-Watsonville complex, 15 to 30 percent slopes, from the intersection of Buena Vista Drive and Harkins Slough Road, about 1,600 feet north along Buena Vista Drive, then 200 feet west in T. 12 S., R. 1 E.:

Ap—0 to 7 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist, common brown (7.5YR 4/4) root stains; massive; hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; common fine and very fine tubular pores and very fine interstitial pores; about 5 percent pebbles; slightly acid; gradual wavy boundary.

A12—7 to 14 inches; dark gray (10YR 4/1) sandy loam, variegated very dark brown (10YR 2/2) and black (10YR 2/1) moist; massive; hard, friable, slightly sticky and slightly plastic; many very fine roots and common fine roots; many very fine tubular pores, common medium tubular pores, and common very fine interstitial pores; slightly acid; abrupt wavy boundary.

B21t—14 to 19 inches; brown (10YR 5/3) sandy clay, dark brown (10YR 4/3) moist, strong coarse angular blocky structure; extremely hard, firm, very sticky and plastic; common very fine and fine exped roots; common very fine exped tubular pores and few fine exped tubular pores; common thin clay films lining pores; many moderately thick pressure faces on peds; many thin dark grayish brown (10YR 4/2) colloidal stains on faces of peds; slightly acid; clear wavy boundary.

B22t—19 to 25 inches; light brownish gray (10YR 6/2) sandy clay, brown (10YR 5/3) moist; many fine distinct light yellowish brown (10YR 6/4) mottles; moderate coarse prismatic structure parting to moderate coarse angular blocky; extremely hard, firm, very sticky and very plastic; common very fine exped roots and few fine exped roots; common very fine exped tubular pores, few fine exped tubular pores, and few very fine interstitial pores; many thin and moderately thick pressure faces on peds, and many thin and moderately thick clay films lining pores; slightly acid; clear wavy boundary.

B23t—25 to 31 inches; pale brown (10YR 6/3) sandy clay, variegated light brownish gray (10YR 6/3) and brown (10YR 4/3) moist; common fine prominent brownish yellow (10YR 6/6) mottles; moderate coarse columnar structure; extremely hard, firm, very sticky and plastic; common very fine exped roots and few fine exped roots; common fine exped tubular pores and many very fine exped tubular pores; many thin clay films lining pores and many moderately thick clay films on faces of peds; many thin light brownish gray colloidal stains on faces of peds; slightly acid; clear wavy boundary.

B3t—31 to 37 inches; light gray (10YR 7/2) sandy clay loam, grayish brown (10YR 5/2) moist, yellowish brown (10YR 5/4) rubbed; moderate coarse angular blocky structure; extremely hard, firm, sticky and plastic; few fine and very fine exped roots; many very fine tubular and interstitial pores; many moderately thick light yellowish brown (10YR 6/4) clay films on faces of peds and in pores; few small black (10YR 2/1) specks in soil matrix; slightly acid; clear wavy boundary.

IIB21t—37 to 51 inches; light gray (10YR 7/2) clay, light brownish gray (10YR 6/2) moist; strong very coarse prismatic structure parting to strong coarse angular blocky; extremely hard, firm, very sticky and very plastic; common very fine exped roots; many very fine exped tubular pores; many thick and moderately thick light gray (10YR 7/1) clay films lining pores; continuous thick pressure faces on peds; slightly acid; gradual wavy boundary.

IIB22t—51 to 66 inches; light gray (2.5Y 7/2) and yellow (2.5Y 7/6) silty clay, light brownish gray (2.5Y 6/2) and light olive brown (2.5Y 5/6) moist; moderate fine angular blocky structure; very hard, friable, very sticky and plastic; very few very fine exped roots; common very fine and fine exped tubular pores; common to many thick and moderately thick clay films lining pores; continuous moderately thick pressure faces on peds; some black (N/2) carbon specks on some ped faces; strongly acid.

Depth to the claypan is 10 to 20 inches. The mollic epipedon is 10 to 20 inches thick.

The A horizon has value of 4 or 5 and chroma of 1 to 3. It is sandy loam, fine sandy loam, or loam. The A horizon is 0 to 10 percent pebbles. It ranges from medium acid to neutral.

The Bt horizon has hue of 10YR or 2.5Y, value of 4 to 7, and chroma of 2 to 4. In some pedons the B horizon has mottles that have hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 4 to 6. The B2t horizon is clay loam, sandy clay, or clay. It is 0 to 15 percent pebbles. It ranges from medium acid to neutral.

Most pedons do not have a C horizon. Where present, the C horizon is at a depth of more than about 30 inches and extends to a depth of 60 inches or more. It has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 or 4. It is sandy clay loam, clay loam, loam, or sandy loam. It ranges from medium acid to neutral.

Watsonville series

The Watsonville series consists of very deep, somewhat poorly drained soils on old coastal terraces. These soils formed in alluvium. Slope ranges from 0 to 50 percent. The mean annual precipitation ranges from 20 to 35 inches, and the mean annual air temperature is about 58 degrees F.

Watsonville soils are similar to Tierra soils. They are mapped in a complex with Tierra soils and are near Baywood, Danville, Diablo, Elkhorn, and Pinto soils. Tierra soils do not have an albic horizon and are moderately well drained. Baywood soils have a sandy control section. Danville soils have a mollic epipedon more than 20 inches thick. Diablo soils do not have an albic horizon, and they are more than 30 percent clay in the upper 20 inches if the upper 7 inches is mixed. Elkhorn and Pinto soils have a fine-loamy control section.

Typical pedon of Watsonville loam, 0 to 2 percent slopes, near Santa Cruz County Fairgrounds, about 2,000 feet southwest from intersection of East Lake Avenue (Highway 152) and Carlton Road in T. 11 S., R. 2 E. (projected):

Ap—0 to 12 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few fine roots; many very fine tubular pores; slightly acid; abrupt wavy boundary.

A2—12 to 18 inches; light gray (10YR 7/2) sandy loam, dark grayish brown (10YR 4/2) moist; many fine prominent yellowish brown (10YR 5/6) mottles and many fine distinct light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common fine and very fine roots; common fine and very fine tubular pores; slightly acid; abrupt wavy boundary.

B21t—18 to 26 inches; pale brown (10YR 6/3) clay, dark grayish brown (10YR 4/2) moist; common medium prominent brownish yellow (10YR 6/6) mottles; moderate coarse columnar structure; very hard, very firm, very sticky and very plastic; common fine and very fine exped roots; common fine and very fine exped tubular pores; continuous thick very dark brown (10YR 2/2) clay films on faces of peds; slightly acid; diffuse wavy boundary.

B22t—26 to 33 inches; mixed light gray (10YR 7/2) and very pale brown (10YR 7/3) clay, grayish brown (10YR 5/2) moist; common medium prominent brownish yellow (10YR 6/6) mottles; moderate coarse prismatic structure; very hard, very firm, very sticky and very plastic; common fine and very fine exped roots; common fine and very fine exped tubular pores; continuous thick very dark brown (10YR 2/2) clay films on faces of peds; slightly acid; gradual wavy boundary.

B23t—33 to 39 inches; mixed light gray (10YR 7/2) and very pale brown (10YR 7/3) clay, grayish brown (2.5Y 5/2) moist, common medium faint light brownish gray (10YR 6/2) mottles; massive; very hard, very firm, very sticky and very plastic; common fine and very fine roots; common fine and very fine tubular pores; continuous thick very dark brown (10YR 2/2) clay films lining pores; slightly acid; gradual wavy boundary.

C1—39 to 45 inches; mixed light gray (10YR 7/2) and very pale brown (10YR 7/3) sandy clay loam, grayish brown (2.5Y 5/2) moist; massive; hard, friable, very sticky and plastic; few fine and very fine roots; common fine and very fine tubular pores; many thick clay films lining pores; few reddish yellow (7.5YR 7/6) and brownish yellow (10YR 6/6) weathered pebbles; slightly acid; gradual wavy boundary.

C2—45 to 57 inches; mixed light gray (10YR 7/2), very pale brown (10YR 7/3), and yellow (10YR 7/6) sandy clay loam, grayish brown (2.5Y 5/2), brownish yellow (10YR 6/8), and yellowish brown (10YR 5/4) moist; massive; hard, friable, sticky and plastic; few fine and very fine roots; many very fine and fine tubular pores; many thick clay films lining pores; medium acid; clear wavy boundary.

C3—57 to 63 inches; mixed light gray (10YR 7/2), very pale brown (10YR 7/3), and yellow (10YR 7/6) sandy clay loam, grayish brown (2.5Y 5/2), brownish yellow (10YR 6/8), and yellowish brown (10YR 5/4) moist; massive; hard, friable, sticky and plastic; few fine and very fine roots; many fine and very fine tubular pores; common thick clay films lining pores; medium acid.

The profile is more than 60 inches thick. The mollic epipedon is 10 to 20 inches thick. The profile is 0 to 10 percent pebbles.

The Ap or A1 horizon has value of 3 to 5 and chroma of 1 to 3. It ranges from medium acid to neutral. The A2 horizon has value of 6 to 8 and chroma of 1 to 3. In some pedons it has mottles that have hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 to 6. The A2 horizon is sandy loam, fine sandy loam, or loam. It ranges from medium acid to neutral.

The B2t horizon has hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 1 to 3. Most strata in the B2t horizon have hue of 10YR to 5YR, value of 4 to 8, and chroma of 4 to 6. The B2t horizon is clay loam or clay that has an average clay content of 35 to 50 percent. It ranges from medium acid to moderately alkaline.

The C horizon has hue of 7.5YR to 2.5Y, value of 6 to 8, and chroma of 2 to 6. It is typically sandy clay loam or clay loam, but in a few pedons there are strata of sandy loam. It ranges from medium acid to neutral.

Zayante series

The Zayante series consists of very deep, somewhat excessively drained soils on hills and mountains. These soils formed in material weathered from consolidated marine sediment or sandstone. Slope ranges from 5 to 75 percent. The mean annual precipitation is about 48 inches, and the mean annual air temperature is about 55 degrees F.

Zayante soils are similar to Baywood soils. They are near Ben Lomond, Catelli, Felton, Lompico, and Sur soils. Baywood soils have a thermic soil temperature regime. Ben Lomond and Catelli soils have a coarse-loamy control section. Felton and Lompico soils have a fine-loamy control section. Sur soils have lithic contact at a depth of 20 to 40 inches.

Typical pedon of Zayante coarse sand, 5 to 30 percent slopes, about 1.6 miles west of intersection of Glenn Canyon and Mt. Hermon Roads in Scotts Valley, about 1,000 feet north of Lockwood Land and 100 feet west of Graham Hill Road in sec. 23, T. 10 S., R. 2 W. (projected):

A1—0 to 10 inches; dark gray (10YR 4/1) coarse sand, very dark brown (10YR 2/2) moist; single grained; loose when dry or moist; many fine roots; many very fine and fine interstitial pores; strongly acid; clear wavy boundary.

A12—10 to 20 inches; dark grayish brown (10YR 4/2) coarse sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable; common fine roots; many fine and very fine interstitial pores; medium acid; gradual wavy boundary.

A13—20 to 30 inches; grayish brown (10YR 5/2) coarse sand, very dark grayish brown (10YR 3/2) moist; massive; soft, very friable; common fine roots; many fine and very fine interstitial pores; medium acid; gradual wavy boundary.

C1—30 to 48 inches; light brownish gray (10YR 6/2) coarse sand, brown (10YR 4/3) moist; massive; soft, very friable; few fine roots; many very fine and fine interstitial pores; medium acid; gradual wavy boundary.

C2—48 to 60 inches; very pale brown (10YR 7/3) coarse sand, pale brown (10YR 6/3) moist; massive; soft, very friable; few coarse roots; many fine and very fine interstitial pores; neutral.

Depth to paralithic contact is more than 60 inches. The mollic epipedon is less than 20 inches thick. The profile is coarse sand, sand, fine sand, loamy sand, or loamy fine sand. It is 0 to 15 percent pebbles.

The A horizon has hue of 2.5Y or 10YR, value of 3 to 5, and chroma of 1 to 3. It is strongly acid or medium acid.

The C horizon has hue of 10YR or 7.5YR, value of 5 to 7, and chroma of 2 to 4. It is typically medium acid but ranges from very strongly acid to neutral.

Formation and morphology of the soils

This section discusses the factors of soil formation, relates them to the formation of soils in the survey area, and explains the processes of soil formation.

Formation of the soils

Soil is a natural body on the surface of the earth in which plants grow; it consists of organic and mineral matter (*24*). The characteristics of a soil at any given place are determined by the interaction of five factors of soil formation: (1) the climate under which the soil material has accumulated or weathered; (2) the influence of plants and animals; (3) the relief, or topography; (4) physical and chemical properties of the parent material; and (5) the length of time these factors have been active. Each of these factors affects the formation of every soil, and each modifies the effects of the other four. The importance of the individual factors differs from place to place.

Climate and plants and animals are the "active" factors of soil formation. They act on the parent material that has accumulated through the weathering of rocks and slowly change it into soil. Relief modifies the effects of climate and vegetation, mainly by its influence on runoff and temperature. The nature of the parent material also affects the kind of soil that is formed. Time is needed for changing the parent material into soil, and generally a long time is needed for distinct soil horizons to form.

The interactions among these factors are more complex for some soils than for others. In places, for example, the environment has changed, and the characteristics of a new soil have been superimposed on those of an older soil.

In the pages that follow, the five major factors of soil formation are discussed in relation to their effects on the formation of the soils in Santa Cruz County.

Climate

The climate has a marked influence on the kind of soil that forms. Heat and moisture strongly influence the amount and kind of vegetation, the rate at which organic matter decomposes, the rate at which minerals weather, and the removal or accumulation of material in the different soil horizons.

There are different climatic regions in the county. These regions are the coastal areas and valleys that open to the coast and the higher, more rugged mountainous areas of the Ben Lomond and Santa Cruz Mountains.

The mean annual air temperature in the county only varies from 55 to 58 degrees F. There is, however, a great difference between the maximum and the minimum temperatures from one region to another. The mean maximum temperature in the coastal areas and valleys ranges from about 68 degrees along the coast to about 76 degrees along the foothills. In the mountains the temperature ranges from 76 to 80 degrees F. The mean minimum temperature in the coastal areas and in the valleys is about 38 degrees F, and in the mountains it is about 36 degrees. Summers are cool, foggy, and dry, and winters are cool and moist.

Most of the precipitation in the county occurs from November through April. Mean annual precipitation ranges from 20 to 35 inches in the coastal areas and valleys to as much as 35 to 60 inches in the Ben Lomond and Santa Cruz Mountains. In the mountains, snowfall occurs about every other year and averages less than 5 inches (*8*). Additional climatic data is given in the section "General nature of the county."

Along the immediate coast, fog occurs in summer, humidity is higher, and the transpiration rate and temperature are lower. This mild climate influences the decomposition of the surface litter and results in soils that have a gray, dark gray, or grayish brown surface layer.

In the hills and mountains, the effects of higher precipitation and lower temperature are reflected in the kinds of vegetation and soil; woody and herbaceous vegetation is more abundant, and the organic matter content of the soils increases. Laboratory analyses indicate that the surface layer of the soils in these areas contains 3 percent to as much as 5 percent organic carbon. The soils are commonly dark colored and have a granular surface layer overlain by a layer of leaves, twigs, and decomposed organic matter.

In the mountains, rainfall is sufficient to leach the soils of bases, which results in lower soil reaction. The soils are commonly medium acid to very strongly acid.

Warm temperatures in spring, when the soils are moist, accelerates the soil-forming processes. The warm weather permits rapid chemical reactions to take place, and the water from the spring rains moves through the soils to translocate dissolved or suspended clay particles. The surface litter decomposes rapidly, which increases the organic matter content of the soil. Climate alone does not account for all the local differences among the soils.

Plants and animals

Plants and animals are important biological forces that affect soil formation. They affect organic matter and nitrogen content and soil reaction and help improve structure and porosity.

The most extensive plant community in Santa Cruz County is woodland-shrub. The coastal and stream terraces are dominantly in grasses and forbs, but there are a few areas of oak, eucalyptus, and pine. Much of the Pajaro Valley area that is now cultivated was originally grass (*5*).

Soils that formed under grasses have a dark-colored A horizon (*7*). The A horizon is thickest and darkest in the Pajaro Valley and along the terraces, and it is thinnest on the southwest-facing slopes of the mountains. Soils represented are those of the Conejo, Elder, Fagan, and Los Osos series.

About 70 percent of the county is dominated by coniferous and broadleaf trees that occur mainly on north- and northeast-facing slopes. This type of plant cover reduces runoff, erosion, and evaporation. Soils that formed under coniferous forest commonly have a mat of fresh and decomposed bark, twigs, leaves, and needles 1 inch to 6 inches thick. Such material is acid, and it contributes to the acid reaction of soils. When decomposed, this mat of organic matter gives a dark color to the surface; this dark color extends deeply into the soil profile. Trees and other plants take up plant nutrients from the soil and store them in their roots, branches, and leaves. When these plants die and decompose, elements are returned to the soil to be used again. Accumulation of organic matter on and in the soil is an important process in horizon differentiation in the soils of Santa Cruz County (*4, 18, 28*). Soil analyses indicate 1 percent to about 6 percent organic carbon in the surface layer.

The roots of coniferous and broadleaf trees follow cracks and fracture planes in the parent rock and help in the physical and chemical weathering processes (fig. 6). In places roots make up more than 20 percent of the upper 2 or 3 feet of the soil. In most places the carbon-to-nitrogen ratio of these soils is more than 20 to 1. Soils that have dark color, porosity, and structure associated with wooded areas are those of the Ben Lomond, Nisene, Felton, Catelli, Lompico, and Sur series. The dominant tree species on these soils are redwood, Douglas-fir, tan oak, madrone, California live oak, black oak, and laurel (*20*).

On south- and southwest-facing slopes and in areas higher than the persistent summer fog belt, the steep and very steep slopes are covered mostly with brush and chaparral. Brush in these areas does not adequately protect the soils from erosion. Because of continual erosion, the soils in most of these areas are less than 20 inches deep. Examples are Maymen and Maymen Variant soils. The main species growing in these areas are Chamis, Manzanita, ceanothus, and coyotebrush.

Man has disturbed the soils by mining, clearing, or burning vegetation, harvesting timber, grazing livestock, and cultivating the soils. Burning has influenced the soils most by depleting organic matter, accelerating erosion, and changing the characteristics of the surface layer.

The effect of animals on soils in the county is less apparent, and few major soil features are attributed solely to their activity (*21*). Ground squirrel and pocket gopher nest and burrow in the soils, bringing a large volume of soil material to the surface each year. This mixing alters the profile of some soils.

Relief

Relief has had an important effect on soil formation in Santa Cruz County. Steepness, shape, and length of slopes affect the runoff, erosion, and the amount of moisture available for soil development. For example, Maymen soils that have steep to very steep slopes have features that have been largely determined by the degree of slope. Because of rapid runoff and erosion, these soils are less than 20 inches deep. The surface layer is very thin, and little or no clay has accumulated in the subsoil. In nearly level to moderately sloping areas, however, where Danville soils formed, more water filters into the soil. A moderately thick to thick surface layer has formed. The increased moisture passing throught the profile aids development of the subsoil by moving clay particles out of the surface layer and into the subsoil.

Aspect is especially important in the hills and mountains. It has an important effect upon the microclimate of the soils (*15*). For example, soils that have north-facing slopes have cooler temperatures and retain moisture longer than soils that have south-facing slopes. Consequently, the soils that have north-facing slopes have a denser plant cover, are deeper, have a thicker, darker colored surface layer, and have a greater clay increase in the subsoil than do soils that have south-facing slopes. Differences in soil characteristics as a result of aspect are readily evident in Ben Lomond or Felton soils that have north- and northeast-facing slopes and Bonnydoon and Maymen soils that have southwest-facing slopes.

Elevation also influences soil formation, mainly through its effect on soil climate. Elevation in the county ranges from sea level to about 3,000 feet.

On alluvial plains the water table is closest to the surface where the local relief is least. When the soil profile is saturated with water, many physical and chemical reactions are inhibited. Downward movement of water is restricted. Anaerobic reactions become dominant because there is inadequate oxygen. These soils tend to be colder than soils that have aerobic conditions. In Aquents, the ground water is very near the surface.

Soils on alluvial plains, because of their low-lying position, commonly receive additional sediment from flooding. This generally retards soil development, because each episode of flooding and deposition provides new soil parent material and initiates another cycle of soil development. An example of this is the stratified Mocho soil.

Parent material

Parent material is the great variety of unconsolidatd material from which the soil forms. Some features of the parent material that affect the kinds of soil that form are mineralogical composition, degree of consolidation, grain size, and presence or absence of salts.

Santa Cruz County consists of many geologic formations that are made up of a wide variety of igneous, sedimentary, and metamorphic rocks (*3*). These rocks differ greatly in age, hardness, and resistance to weathering. These differences in the rocks cause differences in the landscape, and they also affect the characteristics of the soils that form.

The Sur Formation, which consists of metamorphosed rock, is the oldest formation in the county. The soils in the northeastern part of the Ben Lomond Mountains and near the University of California are commonly moderately steep to very steep. Schist is the most common rock. The soils that formed in material derived from schist have a loamy texture. Examples of soils that formed in this material are Aptos, Nisene, Felton, and Lompico.

Most of the northeast-facing landscapes of Ben Lomond Mountain consist of intrusions of granitic rock. Most areas consist of material derived from quartz diorite, but some areas consist of material derived from granodiorite (*12*). The soils that formed in material derived from these rocks have a loamy texture. The dominant soils are Ben Lomond, Catelli, and Sur. Sur soils have a high content of rock fragments.

Rock of the Paleocene Epoch occupies relatively small areas in Santa Cruz County. It consists mostly of micaceous sandy siltstone and sandstone of the Locatelli Formation. Some of the soils that formed in material derived from siltstone are Felton and Lompico. The soils that formed in material derived from sandstone are Ben Lomond and Sur. The sedimentary rock of the Eocene, Oligocene, and Miocene Epochs is most extensive rock in Santa Cruz County. Several formations of sedimentary rock have been recognized, including the Vaqueros (Oligocene), Butano (Eocene), Monterey and Santa Margarita (Miocene), and Purisima (Pliocene) Formations.

The rock of the Vaqueros Formation consists largely of arkosic sandstone and distinct interbeds of mudstone and shale. This rock is exposed in large areas, mainly along the summit and on ridgetops in the Santa Cruz Mountains. Where the rock is coarse-grained sandstone, the soils that commonly formed are Sur, Catelli, and Ben Lomond; where the rock is weathered fine-grained sandstone, the soils that formed are Los Osos, Fagan, and Diablo. Felton and Lompico soils formed in weathered mudstone and shale. The stony, shallow Maymen soils occur along the summit and are underlain by consolidated shale and mudstone. Large areas of exposed rock outcrop are common on the Maymen and Sur soils.

The Butano Formation consists largely of arkosic sandstone and interbeds of mudstone, shale, and siltstone. Where these rocks are on northeast- and north-facing slopes, they commonly are deeply weathered. Where they are on ridgetops and southwest- and south-facing slopes, the soils that formed in these areas are commonly sandy loam and fine sandy loam. Maymen and Sur soils generally are stony, and they formed in hard sandstone, shale, or mudstone. Catelli, Ben Lomond, and Pfeiffer soils formed in weathered coarse-grained sandstone. Pfeiffer soils have a high content of rock fragments.

The Monterey Formation extends from Boulder Creek east to an area south of Glenwood. The rocks are porcellaneous or clastic mudstone, shale, and various amounts of diatoms. The Monterey Formation also includes small areas of siltstone. The rock is generally light gray or olive gray to white and has low bulk density. On weathering, the rock becomes highly fractured and individual pieces remain hard and firm. The soils that formed in this material are generally gray, dark gray, or grayish brown. Bonnydoon and Maymen soils formed over shale and are generally less than 20 inches deep. Aptos loam, warm phase; Lompico soils; and Felton soils formed in material weathered from mudstone and siltstone and are generally 20 to 60 inches deep. The soils that formed in alluvial material derived mainly from porcellaneous and clastic mudstone, shale, and siltstone have a grayish surface layer similar to that of the soils on uplands that formed in material derived from these rocks.

The Santa Margarita Formation generally consists of highly weathered arkosic sandstone. Laboratory analyses of this sandstone indicate that it is 85 to 90 percent sand, 7 to 8 percent silt, and 4 percent clay. Zayante soils formed in material weathered from this sandstone.

The rock of the Purisima Formation consists mostly of fine-grained sandstone, mudstone, and siltstone. This rock is commonly deeply weathered, especially on the north- and northeast-facing slopes, where greater moisture contributes to deep weathering. The soils that formed in these areas commonly are loam, fine sandy loam, and sandy loam. In some places where the slopes face southwest, the mudstone or siltstone is hard and firm and the soils commonly are 10 to 20 inches deep. The soils that commonly formed in material derived from these rocks are Bonnydoon, Pfeiffer, Ben Lomond, Felton, Aptos, Nisene, and Lompico. The Pfeiffer soils have a high content of rock fragments.

The Pleistocene and Holocene deposits consist of unconsolidated sediment. The oldest of these deposits is the Aromas Red Sands in the Aptos La Selva Beach area (*1*). The formation consists of unconsolidated, well-sorted quartzose, brown to red sand that has strata of silt and clay. Baywood soils formed in this material. Terrace deposits consist mostly of clayey and loamy alluvium. The soils on the terraces are moderately to strongly developed. In places the soils have been dissected by drainageways. The soils that formed in these terrace deposits include Watsonville, Elkhorn, Tierra, and Pinto.

The youngest geologic material consists of late Holocene alluvium (*14*) that eroded from the uplands

north and east of Watsonville. The alluvium has mixed lithology because there is a wide variety of rock sources, mostly of sedimentary origin. These deposits have been in place for so short a time that organisms and weathering have had little affect on the soils. The alluvium on fans and foot slopes generally has texture and other characteristics similar to those of the material in the hills directly above. Soquel soils are an example. The alluvium in the larger valleys has been deposited by flooding streams and rivers. As a stream or river overflows its channel and the water spreads over the flood plain, the coarse-textured sediment settles first. The floodwaters continue to spread, but they move more slowly and the finer sediment is next deposited. Most of the clay is deposited when the flood has passed and the water becomes still on the lowest part of the flood plain. In the Pajaro Valley, the alluvial material that extends from west Salsipuedes Creek to the ocean is finer textured than the alluvium in the upper part of the valley. The soils that formed in loamy sandy alluvium are Elder, San Emigdio Variant, and Baywood Variant. The soils that formed in the finer textured alluvium are Conejo, Clear Lake, Cropley, Mocho, Fluvaquentic Haploxerolls, and Aquic Xerofluvents.

Time

The factors of soil formation are interrelated, and the effect of any one factor depends on the length of time the factor has been operating. The oldest geologic formations are of Paleozoic and upper Cretaceous age. These formations, however, provided the parent material for some of the youngest soils. These soils commonly are steep or very steep, and geologic erosion and soil creep takes place at a rate that equals or exceeds the rate of soil formation or weathering of the parent material. The soil material originally derived from the older formations has been deposited and removed many times. The soils most strongly developed formed on alluvial terraces and fans of Pleistocene age.

The oldest soils generally have distinct horizons and are those in which the parent material has been most altered. Soils are considered to be old if their horizons markedly differ in color, texture, reaction, structure, and other features.

Soils that have only a few or indistinct horizon differences are considered to be of intermediate age. Soils that have few if any horizon differences are considered to be young. Differences between horizons or layers marked by lithologic discontinuities are not considered in evaluating the relative age of a soil.

Young soils can be separated into three groups. The most recent soils are those that formed in eolian deposits or in sand dunes. An example is the Baywood soils. Other recent soils formed on alluvial fans, alluvial plains, and flood plains. Examples of these soils are San Emidgio and Elder. Baywood and San Emigdio soils have had very little time for the accumulation of organic matter.

Soils on somewhat older alluvial fans and flood plains are represented by Mocho, Conejo, and Elder. These soils have had time for organic matter to accumulate and, consequently, exhibit darkening of the surface layer. Another group of young soils formed in material derived from consolidated rock, with new soil material being added by further weathering of the parent material. In this group are such soils as Maymen and the Xerorthents-Rock outcrop complex.

Somewhat older soils have undergone changes other than additions of organic matter and the gain or loss of bases. Clay has been removed from the surface layer and has accumulated in the subsoil. As clay accumulates in the subsoil over time, pores become fewer or smaller and permeability is reduced. The difference between the surface layer and subsoil becomes greater, and the horizon boundaries become more distinct. Water can accumulate just above the clay subsoil, causing temporary saturation in the lower part of the surface layer.

There is a relationship between the age of soils and the amount of clay that has accumulated in them. Ben Lomond, the youngest soils in the county, have about a 1 percent clay increase in the upper 35 inches. Watsonville, the oldest soils, have a clay increase of more than 33 percent within a 1-inch vertical distance.

Morphology of the soils

Because the influence of the soil-forming factors varies greatly within the survey area, many different kinds of soil have formed. Many soils in the area have several prominent horizons; some have only one horizon, and others have several weak horizons. In places, the soils that have prominent horizons are adjacent to those that have less distinct horizons. The processes that have the greatest influence on horizon formation are (1) the weathering of parent material, (2) the accumulation of organic matter, (3) the removal of organic matter, cations, clay; and (4) the formation and translocation of clay (*7*, *22*).

The relative importance of these processes in horizon differentiation is not uniform in all soils. For example, montmorillonitic clay cracks extensively upon drying. Soil material falls into the cracks and swells when wet. The soil is churned to the depth to which the cracks extend, thus inhibiting the formation of major horizons. Clear Lake, Cropley, and Diablo are examples of these soils.

Some of the distinguishing features of soils that formed in material derived from bedrock are related to the degree to which the parent material has weathered. For example, where weathering has been slight, the soils have few horizons and the distinguishing features are generally inherited from the parent material. As weathering increases, horizon differences are less directly related to the parent material and are more the product of alteration, such as occurs with gains in organic matter or translocation of clay. The deep Felton soils have a brown, reddish brown, and yellowish red clay loam or sandy clay

loam Bt horizon. This horizon contrasts sharply with the light brownish gray, weathered sandstone that underlies it.

In all the soils of the county, enough organic matter has accumulated in the surface layer to form an A1 horizon. The A1 horizon ranges from a thin pale horizon that is low in organic matter to a thick dark horizon. At lower elevations, the soils have an A1 horizon, about 3 to 8 inches thick, that is less than 2 percent organic matter. Organic matter does not accumulate in large quantities in warm temperatures. In the wooded north and eastern parts of the county where cooler temperatures prevail, the A1 horizon is thicker, darker, and higher in content of organic matter. The Ben Lomond, Aptos, and Nisene soils have a thick, dark A1 horizon that is about 4 percent organic matter in the upper 15 inches.

The translocation of silicate clay minerals has taken place in many soils in the county. The clay films on the ped faces and in root channels, as well as colloidal bridges between the sand grains, indicate the movement of clay minerals from the A horizon to the B2t horizon. Ben Lomond, Catelli, and Sur soils have little or no translocated clay. Watsonville soils have a large amount of translocated clay. As much as 33 percent more clay is in the Bt horizon than in the A horizon. Another evidence of clay translocation is the many thick clay films in the Bt horizon.

Ben Lomond, Catelli, and Sur soils have had accumulations of organic matter, but they have had little downward movement of clay. Because of the high amount of precipitation, more than 50 inches, the leaching process removes the bases from the profile, which increases the acidity of the lower horizons. Aptos, Ben Lomond, Catelli, Nisene, Lompico, Lompico Variant, Santa Lucia, and Zayante are examples of soils that have been subject to this process.

Additions of organic matter, leaching of bases, and translocation of clay are among the most important processes that contribute to horizon differentiation in the soils of Santa Cruz County.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher), or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim. An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	More than 9

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Calcareous soil. A soil containing enough calcium carbonate (commonly with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid. A soil having measurable amounts of calcium carbonate or magnesium carbonate.

California bearing ratio (CBR). The load-supporting capacity of a soil as compared to that of a standard crushed limestone, expressed as a ratio. First standardized in California. A soil having a CBR of 16 supports 16 percent of the load that would be supported by standard crushed limestone, per unit area, with the same degree of distortion.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Chiseling. Tillage with an implement having one or more soil-penetrating points that loosen the subsoil and bring clods to the surface. A form of emergency tillage to control soil blowing.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coat, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures is difficult.

Complex, soil. A mapping unit of two or more kinds of soil occurring in such an intricate pattern that they cannot be shown separately on a soil map at the selected scale of mapping and publication.

Compressible. Excessive decrease in volume of soft soil under load.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping (or contour farming). Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is 40 or 80 inches (1 or 2 meters).

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave. Unstable walls of cuts made by earthmoving equipment. The soil sloughs easily.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically for long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients, as for example in "hillpeats" and "climatic moors."

Drainage, surface. Runoff, or surface flow of water, from an area.

Erosion. The wearing away of the land surface by running water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes a bare surface.

Fast intake. The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Flooding. The temporary covering of soil with water from overflowing streams, runoff from adjacent slopes, and tides. Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs on an average of once or less in 2 years; and *frequent* that it occurs on an average of more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; *November-May*, for example, means that flooding can occur during the period November through May. Water standing for short periods after rainfall or commonly covering swamps and marshes is not considered flooding.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Green manure (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. The major horizons of mineral soil are as follows:

O horizon.—An organic layer, fresh and decaying plant residue, at the surface of a mineral soil.

A horizon.—The mineral horizon, formed or forming at or near the surface, in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon most of which was originally part of a B horizon.

A2 horizon.—A mineral horizon, mainly a residual concentration of sand and silt high in content of resistant minerals as a result of the loss of silicate clay, iron, aluminum, or a combination of these.

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or a combination of these; (2) by prismatic or blocky structure; (3) by redder or browner colors than those in the A horizon; or (4) by a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that from which the solum is presumed to have formed. If the material is known to differ from that in the solum the Roman numeral II precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—

Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Pan. A compact, dense layer in a soil. A pan impedes the movement of water and the growth of roots. The word "pan" is commonly combined with other words that more explicitly indicate the nature of the layer; for example, *hardpan*, *fragipan*, *claypan*, *plowpan*, and *traffic pan*.

Parent material. The great variety of unconsolidated organic and mineral material in which soil forms. Consolidated bedrock is not yet parent material by this concept.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percs slowly. The slow movement of water through the soil adversely affecting the specified use.

Permeability. The quality that enables the soil to transmit water or air, measured as the number of inches per hour that water moves through the soil. Terms describing permeability are *very slow* (less than 0.06 inch), *slow* (0.06 to 0.20 inch), *moderately slow* (0.2 to 0.6 inch), *moderate* (0.6 to 2.0 inches), *moderately rapid* (2.0 to 6.0 inches), *rapid* (6.0 to 20 inches), and *very rapid* (more than 20 inches).

pH value. (See Reaction, soil). A numerical designation of acidity and alkalinity in soil.

Piping. Moving water of subsurface tunnels or pipelike cavities in the soil.

Productivity (soil). The capability of a soil for producing a specified plant or sequence of plants under a specified system of management. Productivity is measured in terms of output, or harvest, in relation to input.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulates over disintegrating rock.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Saline-alkali soil. A soil that contains a harmful concentration of salts and exchangeable sodium; contains harmful salts and is strongly alkaline; or contains harmful salts and exchangeable sodium and is very strongly alkaline. The salts, exchangeable sodium, and alkaline reaction are in the soil in such location that growth of most crop plants is less than normal.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Seepage. The rapid movement of water through the soil. Seepage adversely affects the specified use.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and runoff water.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Soil. A natural, three-dimensional body at the earth's surface that is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in mature soil consists of the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristics of the soil are largely confined to the solum.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it can soak into the soil or flow slowly to a prepared outlet without harm. A terrace in a field is generally built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. A stream terrace is frequently called a second bottom, in contrast with a flood plain, and is seldom subject to overflow. A marine terrace, generally wide, was deposited by the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or " very fine."

Thin layer. Otherwise suitable soil material too thin for the specified use.

Tilth, soil. The condition of the soil, especially the soil structure, as related to the growth of plants. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variant, soil. A soil having properties sufficiently different from those of other known soils to justify a new series name, but the limited geographic soil area does not justify creation of a new series.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Water table. The upper limit of the soil or underlying rock material that is wholly saturated with water.

Water table, apparent. A thick zone of free water in the soil. An apparent water table is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil.

Water table, artesian. A water table under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole.

Water table, perched. A water table standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Illustrations

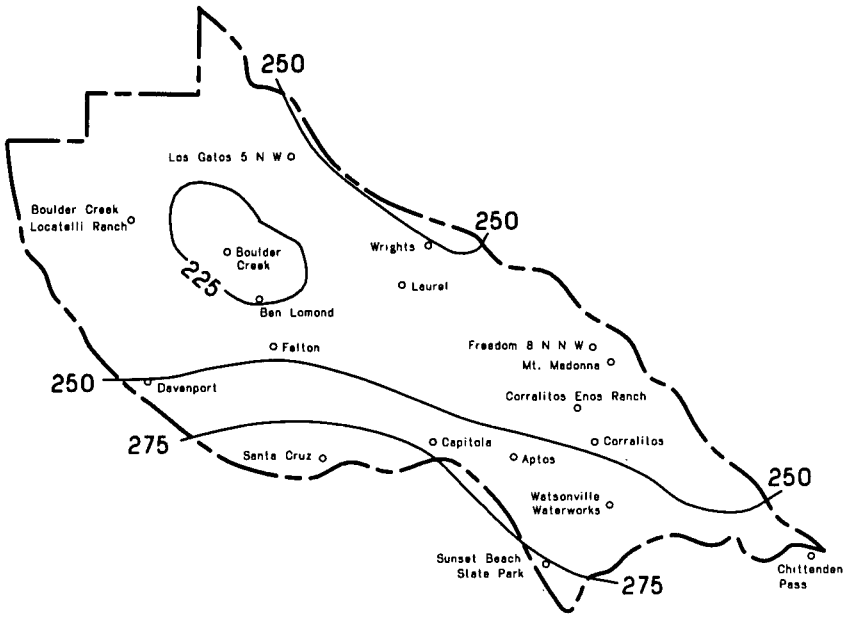

Figure 1.—Average length of growing season in days.

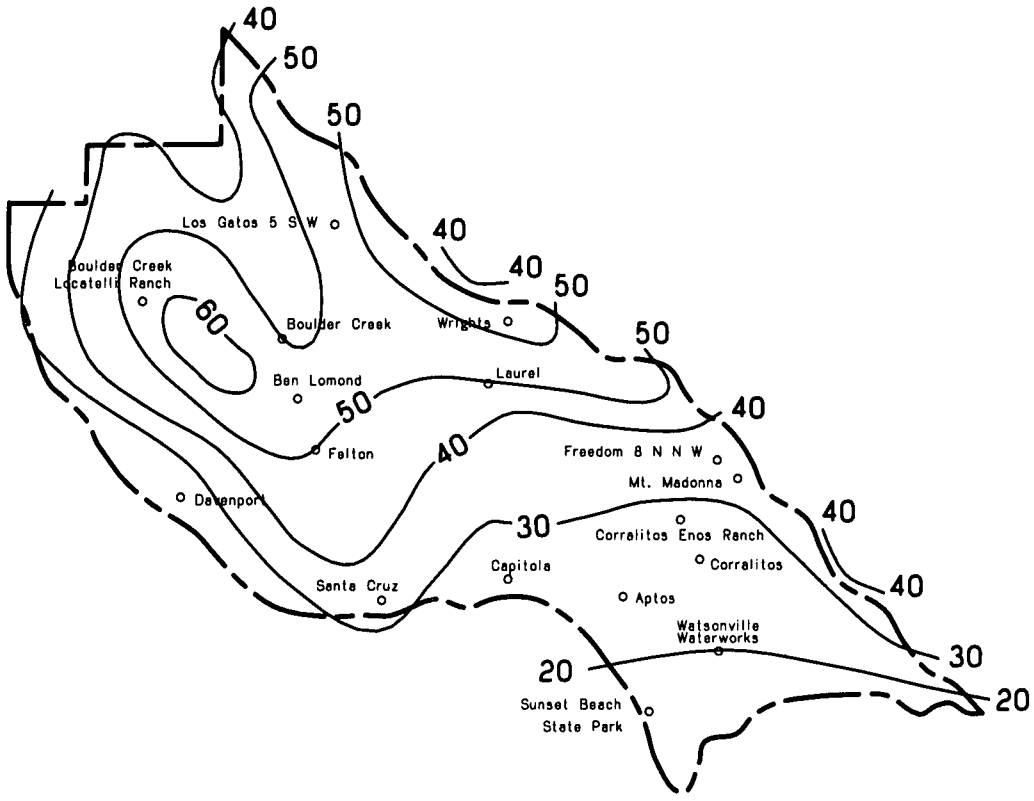

Figure 2.—Mean annual precipitation in inches.

Figure 3.—Brussels sprouts in an area of Elkhorn sandy loam, 0 to 2 percent slopes.

Figure 4.—Road cut in an area of Baywood loamy sand, 15 to 30 percent slopes.

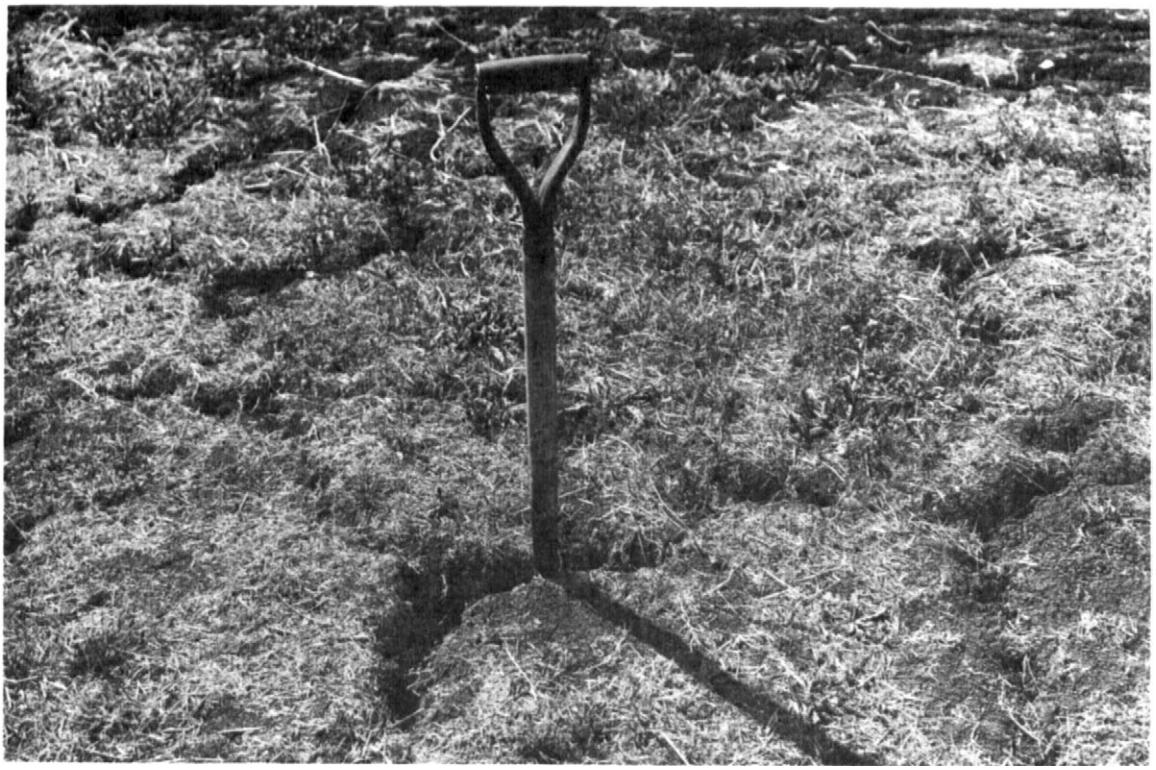

Figure 5.—Wide cracks in an area of Watsonville soils. Cracks are the result of the high shrink-swell potential of these soils.

Figure 6.—Roots from redwood trees have entered cracks in bedrock in search of nutrients and water.

Tables

TABLE 1.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
100	Aptos loam, warm, 15 to 30 percent slopes	2,080	0.7
101	Aptos loam, warm, 30 to 50 percent slopes	1,790	0.6
102	Aptos loam, warm, 50 to 75 percent slopes	700	0.2
103	Aquents, flooded	455	0.2
104	Baywood loamy sand, 0 to 2 percent slopes	1,495	0.5
105	Baywood loamy sand, 2 to 15 percent slopes	2,945	1.0
106	Baywood loamy sand, 15 to 30 percent slopes	2,420	0.9
107	Baywood loamy sand, 30 to 50 percent slopes	1,575	0.6
108	Baywood Variant loamy sand	590	0.2
109	Beaches	1,090	0.4
110	Ben Lomond sandy loam, 5 to 15 percent slopes	2,290	0.8
111	Ben Lomond sandy loam, 15 to 50 percent slopes	3,885	1.4
112	Ben Lomond sandy loam, 50 to 75 percent slopes	9,030	3.2
113	Ben Lomond-Catelli-Sur complex, 30 to 75 percent slopes	23,320	8.4
114	Ben Lomond-Felton complex, 30 to 50 percent slopes	4,670	1.7
115	Ben Lomond-Felton complex, 50 to 75 percent slopes	20,645	7.3
116	Bonnydoon loam, 5 to 30 percent slopes	3,035	1.1
117	Bonnydoon loam, 30 to 50 percent slopes	2,220	0.8
118	Bonnydoon-Rock outcrop complex, 50 to 85 percent slopes	4,355	1.6
119	Clear Lake clay, moderately wet	2,060	0.7
120	Conejo loam, 0 to 2 percent slopes	2,355	0.8
121	Conejo loam, 2 to 9 percent slopes	725	0.3
122	Conejo clay loam, 0 to 2 percent slopes	1,345	0.5
123	Cropley silty clay, 2 to 9 percent slopes	485	0.2
124	Danville loam, 0 to 2 percent slopes	405	0.1
125	Danville loam, 2 to 9 percent slopes	700	0.2
126	Diablo clay, 9 to 15 percent slopes	415	0.1
127	Diablo clay, 15 to 30 percent slopes	1,180	0.4
128	Dune land	255	0.1
129	Elder sandy loam, 0 to 2 percent slopes	2,940	1.0
130	Elder sandy loam, 2 to 9 percent slopes	2,110	0.8
131	Elder sandy loam, 9 to 15 percent slopes	460	0.2
132	Elkhorn sandy loam, 0 to 2 percent slopes	465	0.2
133	Elkhorn sandy loam, 2 to 9 percent slopes	3,885	1.4
134	Elkhorn sandy loam, 9 to 15 percent slopes	1,155	0.4
135	Elkhorn sandy loam, 15 to 30 percent slopes	2,590	0.9
136	Elkhorn-Pfeiffer complex, 30 to 50 percent slopes	2,815	1.0
137	Fagan loam, 30 to 50 percent slopes	1,040	0.4
138	Felton sandy loam, 5 to 9 percent slopes	990	0.4
139	Fluvaquentic Haploxerolls-Aquic Xerofluvents complex, 0 to 15 percent slopes	770	0.3
140	Hecker gravelly sandy loam, 30 to 50 percent slopes	1,045	0.4
141	Hecker gravelly sandy loam, 50 to 75 percent slopes	1,790	0.6
142	Lompico-Felton complex, 5 to 30 percent slopes	10,355	3.7
143	Lompico-Felton complex, 30 to 50 percent slopes	14,880	5.3
144	Lompico-Felton complex, 50 to 75 percent slopes	14,100	5.0
145	Lompico Variant loam, 5 to 30 percent slopes	1,035	0.4
146	Los Osos loam, 5 to 15 percent slopes	805	0.3
147	Los Osos loam, 15 to 30 percent slopes	1,490	0.5
148	Los Osos loam, 30 to 50 percent slopes	675	0.2
149	Madonna loam, 15 to 30 percent slopes	2,025	0.7
150	Maymen stony loam, 15 to 30 percent slopes	635	0.2
151	Maymen stony loam, 30 to 75 percent slopes	9,450	3.4
152	Maymen-Madonna complex, 30 to 75 percent slopes	965	0.3
153	Maymen-Rock outcrop complex, 50 to 75 percent slopes	11,470	4.1
154	Maymen Variant sandy loam, 5 to 30 percent slopes	815	0.3
155	Mocho silt loam, 0 to 2 percent slopes	410	0.1
156	Nisene-Aptos complex, 15 to 30 percent slopes	1,890	0.7
157	Nisene-Aptos complex, 30 to 50 percent slopes	3,715	1.3
158	Nisene-Aptos complex, 50 to 75 percent slopes	15,035	5.4
159	Pfeiffer gravelly sandy loam, 15 to 30 percent slopes	1,610	0.6
160	Pfeiffer gravelly sandy loam, 30 to 50 percent slopes	760	0.3
161	Pinto loam, 0 to 2 percent slopes	930	0.3
162	Pinto loam, 2 to 9 percent slopes	1,940	0.7
163	Pinto loam, 9 to 15 percent slopes	575	0.2
164	Pits-Dumps complex	1,180	0.4
165	Riverwash	285	0.1
166	San Emigdio Variant sandy loam, 0 to 2 percent slopes	490	0.2
167	Santa Lucia shaly clay loam, 5 to 30 percent slopes	735	0.3
168	Santa Lucia shaly clay loam, 30 to 50 percent slopes	855	0.3
169	Santa Lucia shaly clay loam, 50 to 75 percent slopes	3,050	1.1
170	Soquel loam, 0 to 2 percent slopes	1,940	0.7
171	Soquel loam, 2 to 9 percent slopes	3,845	1.4

TABLE 1.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
172	Soquel loam, 9 to 15 percent slopes	360	0.1
173	Sur-Catelli complex, 50 to 75 percent slopes	19,090	6.8
174	Tierra-Watsonville complex, 15 to 30 percent slopes	3,310	1.2
175	Tierra-Watsonville complex, 30 to 50 percent slopes	2,005	0.7
176	Watsonville loam, 0 to 2 percent slopes	695	0.2
177	Watsonville loam, 2 to 15 percent slopes	8,275	2.9
178	Watsonville loam, thick surface, 0 to 2 percent slopes	2,320	0.8
179	Watsonville loam, thick surface, 2 to 15 percent slopes	3,760	1.3
180	Watsonville loam, thick surface, 15 to 30 percent slopes	370	0.1
181	Xerorthents-Rock outcrop complex, 50 to 100 percent slopes	2,995	1.1
182	Zayante coarse sand, 5 to 30 percent slopes	4,310	1.5
183	Zayante coarse sand, 30 to 50 percent slopes	1,990	0.7
184	Zayante-Rock outcrop complex, 15 to 75 percent slopes	2,120	0.8
	Water	845	0.3
	Total	280,960	100.0

TABLE 2.--YIELDS PER ACRE OF IRRIGATED CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. The estimates were made in 1975. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Soil name and map symbol	Strawberries	Brussels sprouts	Lettuce	Loganberries	Apples	Pasture
	Crate[1]	Crate[2]	Box[3]	Ton	Box[4]	AUM[5]
104---------- Baywood	2,800	180	---	4	550	---
105---------- Baywood	2,625	180	---	4	550	---
106---------- Baywood	2,625	180	---	---	550	---
108---------- Baywood Variant	2,800	---	---	4	540	---
119---------- Clear Lake	1,050	220	---	---	---	---
120---------- Conejo	2,350	220	1,200	5	780	12
121---------- Conejo	3,500	220	1,200	5	780	12
122---------- Conejo	2,975	220	950	5	780	12
123---------- Cropley	---	---	---	---	---	12
124---------- Danville	1,125	200	850	3	500	12
125---------- Danville	1,125	180	850	3	500	12
126---------- Diablo	---	---	---	---	---	12
127---------- Diablo	---	---	---	---	---	12
129---------- Elder	2,975	240	1,250	5	750	---
130---------- Elder	2,800	240	1,250	5	750	---
131---------- Elder	2,000	240	---	---	---	---
132---------- Elkhorn	---	240	950	5	600	---
133---------- Elkhorn	---	240	850	5	600	---
134---------- Elkhorn	---	220	---	4	600	---
135---------- Elkhorn	---	---	---	3	500	10
138---------- Felton	---	---	---	---	360	---

See footnotes at end of table.

TABLE 2.--YIELDS PER ACRE OF IRRIGATED CROPS AND PASTURE--Continued

Soil name and map symbol	Strawberries	Brussels sprouts	Lettuce	Loganberries	Apples	Pasture
	Crate[1/]	Crate[2/]	Box[3/]	Ton	Box[4/]	AUM[5/]
139*---------- Fluvaquentic Haploxerolls	3,500	220	1,000	5	---	10
155---------- Mocho	2,350	220	900	4	650	12
161---------- Pinto	---	200	---	4	300	10
162---------- Pinto	---	200	---	4	300	10
163---------- Pinto	---	150	---	3	300	8
166---------- San Emigdio Variant	2,350	200	900	4	---	10
170---------- Soquel	2,975	220	950	5	700	12
171---------- Soquel	2,625	220	850	5	700	12
172---------- Soquel	2,350	---	---	4	700	12
176, 177---------- Watsonville	---	180	---	---	150	10
178---------- Watsonville	1,125	220	950	3	300	12
179---------- Watsonville	1,050	220	950	3	300	12
180---------- Watsonville	---	---	---	---	300	---

*. Yields are for areas protected from flooding.
1/ One crate equals 12 pounds.
2/ One crate equals 50 pounds.
3/ One box equals 46 pounds.
4/ One box equals 38 pounds.
5/ Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for a period of 30 days.

TABLE 3.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES

[Soils not listed do not support rangeland vegetation suited to grazing]

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
100, 101, 102---- Aptos	Loamy----------	Favorable	3,000	Wild oats----------	20
		Normal	2,400	Soft chess----------	20
		Unfavorable	1,800	Ripgut brome----------	15
				Filaree----------	15
				California live oak----------	10
				Clover----------	10
				Burclover----------	10
				Poison-oak----------	5
				Oak----------	5
104, 105, 106, 107- Baywood	Sandy----------	Favorable	2,000	Manzanita----------	25
		Normal	1,500	Scrub oak----------	20
		Unfavorable	1,000	Chamise----------	15
				Wild oats----------	10
				Soft chess----------	5
				Ripgut brome----------	5
				Red brome----------	5
				Annual lupine----------	5
				Eucalyptus----------	5
108---------- Baywood Variant	Sandy----------	Favorable	4,500	Mustard----------	20
		Normal	3,200	Ripgut brome----------	15
		Unfavorable	2,000	Eucalyptus----------	10
				Soft chess----------	10
				Willow----------	10
				Wild oats----------	5
				Poison-oak----------	5
116, 117---------- Bonnydoon	Shallow Coarse Loamy----------	Favorable	4,500	Soft chess----------	30
		Normal	3,100	Wild oats----------	26
		Unfavorable	2,000	Ripgut brome----------	10
				Filaree----------	5
				Purple needlegrass----------	5
				Beardless wildrye----------	5
118*:					
Bonnydoon----------	Shallow Coarse Loamy----------	Favorable	4,500	Soft chess----------	30
		Normal	3,100	Wild oats----------	26
		Unfavorable	2,000	Ripgut brome----------	10
				Filaree----------	5
				Purple needlegrass----------	5
				Beardless wildrye----------	5
Rock outcrop.					
126, 127---------- Diablo	Clayey----------	Favorable	4,000	Wild oats----------	25
		Normal	3,200	Soft chess----------	20
		Unfavorable	2,400	Clover----------	12
				Burclover----------	10
				Ripgut brome----------	10
				Annual lupine----------	10
				Filaree----------	5
132, 133, 134---- Elkhorn	Fine Loamy----------	Favorable	4,300	Wild oats----------	20
		Normal	3,100	Soft chess----------	20
		Unfavorable	2,000	Burclover----------	10
				Oak----------	10
				Blue oak----------	10
				Filaree----------	10
				Ripgut brome----------	7
				Clover----------	5
				Annual lupine----------	5

See footnote at end of table.

TABLE 3.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
136*:					
Elkhorn	Fine Loamy	Favorable	4,300	Wild oats	20
		Normal	3,100	Soft chess	20
		Unfavorable	2,000	Burclover	10
				Oak	10
				Blue oak	10
				Filaree	10
				Ripgut brome	7
				Clover	5
				Annual lupine	5
Pfeiffer	Coarse Loamy	Favorable	2,400	Wild oats	40
		Normal	1,500	Soft chess	40
		Unfavorable	1,200	Ripgut brome	6
				Redstem filaree	5
				Clover	5
137 Fagan	Claypan	Favorable	3,200	Soft chess	20
		Normal	2,500	Wild oats	10
		Unfavorable	1,600	Burclover	10
				Needlegrass	5
				California brome	5
				Blue wildrye	5
				Ripgut brome	5
				Red brome	5
				Filaree	5
146, 147, 148 Los Osos	Fine Loamy	Favorable	4,300	Wild oats	20
		Normal	3,100	Soft chess	20
		Unfavorable	2,400	Burclover	10
				Oak	10
				Blue oak	10
				Filaree	10
				Ripgut brome	7
				Clover	5
				Annual lupine	5
149 Madonna	Loamy	Favorable	3,000	Wild oats	20
		Normal	2,000	Soft chess	20
		Unfavorable	1,500	Ripgut brome	15
				Filaree	15
				Clover	10
				Burclover	10
				Oak	5
152*:					
Maymen.					
Madonna	Loamy	Favorable	3,000	Wild oats	20
		Normal	2,000	Soft chess	20
		Unfavorable	1,500	Ripgut brome	15
				Filaree	15
				Clover	10
				Burclover	10
				Oak	5
159, 160 Pfeiffer	Coarse Loamy	Favorable	2,400	Wild oats	40
		Normal	1,500	Soft chess	40
		Unfavorable	1,200	Ripgut brome	6
				Redstem filaree	5
				Clover	5
163 Pinto	Claypan	Favorable	3,200	Soft chess	20
		Normal	2,500	Wild oats	10
		Unfavorable	1,500	Burclover	10
				Ripgut brome	5
				Needlegrass	5
				California brome	5
				Blue wildrye	5
				Red brome	5
				Filaree	5

See footnote at end of table.

TABLE 3.--RANGELAND PRODUCTIVITY AND CHARACTERISTIC PLANT COMMUNITIES--Continued

Soil name and map symbol	Range site name	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
167, 168, 169---- Santa Lucia	Loamy----------	Favorable	3,000	Wild oats----------	20
		Normal	2,400	Soft chess----------	20
		Unfavorable	1,800	Ripgut brome----------	15
				Filaree----------	15
				Clover----------	10
				Burclover----------	5
				Oak----------	5
174*, 175*: Tierra----------	Claypan----------	Favorable	3,200	Soft chess----------	20
		Normal	2,500	Wild oats----------	10
		Unfavorable	1,600	Filaree----------	10
				Burclover----------	10
				Red brome----------	10
				California buckwheat----------	10
				Needlegrass----------	5
				Ripgut brome----------	5
				Foxtail barley----------	5
				Fescue----------	5
				Nitgrass----------	5
				California sagebrush----------	5
Watsonville-------	Claypan----------	Favorable	3,200	Soft chess----------	20
		Normal	2,500	Wild oats----------	10
		Unfavorable	1,600	Burclover----------	10
				Ripgut brome----------	5
				Needlegrass----------	5
				California brome----------	5
				Blue wildrye----------	5
				Red brome----------	5
				Filaree----------	5
176, 177, 180---- Watsonville	Claypan----------	Favorable	3,200	Soft chess----------	20
		Normal	2,500	Wild oats----------	10
		Unfavorable	1,600	Burclover----------	10
				Ripgut brome----------	5
				Needlegrass----------	5
				California brome----------	5
				Blue wildrye----------	5
				Red brome----------	5
				Filaree----------	5

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry in a column means the information was not available]

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Important trees	Site index	
110---------- Ben Lomond	3o	Slight	Moderate	Slight	Moderate	Redwood----------	127	Redwood, Douglas-fir.
						Douglas-fir----------	147	
111---------- Ben Lomond	3r	Moderate	Moderate	Slight	Moderate	Redwood----------	127	Redwood, Douglas-fir.
						Douglas-fir----------	147	
112---------- Ben Lomond	3r	Severe	Moderate	Slight	Moderate	Redwood----------	127	Redwood, Douglas-fir.
						Douglas-fir----------	147	
113*: Ben Lomond--------	3r	Severe	Moderate	Slight	Moderate	Redwood----------	127	Redwood, Douglas-fir.
						Douglas-fir----------	147	
Catelli----------	3r	Severe	Severe	Slight	Slight	Redwood----------	140	Douglas-fir, redwood.
						Douglas-fir----------	147	
Sur----------	5x	Severe	Moderate	Slight	Slight	Ponderosa pine------	50	
						Coulter pine--------	50	
114*: Ben Lomond--------	3r	Moderate	Moderate	Slight	Moderate	Redwood----------	127	Redwood, Douglas-fir.
						Douglas-fir----------	147	
Felton----------	3r	Moderate	Slight	Slight	Severe	Douglas-fir----------	150	Douglas-fir, Monterey pine, Coulter pine, ponderosa pine.
						Redwood----------	130	
115*: Ben Lomond--------	3r	Severe	Moderate	Slight	Moderate	Redwood----------	127	Redwood, Douglas-fir.
						Douglas-fir----------	147	
Felton----------	3r	Severe	Slight	Slight	Severe	Douglas-fir----------	150	Douglas-fir, Monterey pine, Coulter pine, ponderosa pine.
						Redwood----------	130	
138---------- Felton	3o	Slight	Slight	Slight	Severe	Douglas-fir----------	150	Douglas-fir, Monterey pine, Coulter pine, ponderosa pine.
						Redwood----------	130	
142*: Lompico----------	3r	Slight	Moderate	Slight	Moderate	Redwood----------	153	Redwood, Douglas-fir.
						Douglas-fir----------	131	
Felton.								
143*: Lompico----------	3r	Moderate	Moderate	Slight	Moderate	Redwood----------	153	Redwood, Douglas-fir.
						Douglas-fir----------	131	
Felton----------	3r	Moderate	Slight	Slight	Severe	Douglas-fir----------	150	Douglas-fir, Monterey pine, Coulter pine, ponderosa pine.
						Redwood----------	130	
144*: Lompico----------	3r	Severe	Moderate	Slight	Moderate	Redwood----------	153	Redwood, Douglas-fir.
						Douglas-fir----------	131	

See footnote at end of table.

TABLE 4.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity		Trees to plant
		Equipment limitation	Seedling mortality	Windthrow hazard	Plant competition	Important trees	Site index	
144*:								
Felton	3r	Severe	Slight	Slight	Severe	Douglas-fir Redwood	150 130	Douglas-fir, Monterey pine, Coulter pine, ponderosa pine.
145 Lompico Variant	3r	Slight	Moderate	Moderate	Moderate	Redwood Douglas-fir	130 140	Redwood, Douglas-fir.
156*:								
Nisene	2r	Slight	Slight	Slight	Severe	Redwood Douglas-fir	180 160	Redwood, Douglas-fir.
Aptos	3r	Slight	Moderate	Slight	Moderate	Redwood Douglas-fir	155 145	Redwood, Douglas-fir.
157*:								
Nisene	2r	Moderate	Slight	Slight	Severe	Redwood Douglas-fir	180 160	Redwood, Douglas-fir.
Aptos	3r	Moderate	Moderate	Slight	Moderate	Redwood Douglas-fir	155 145	Redwood, Douglas-fir.
158*:								
Nisene	2r	Severe	Slight	Slight	Severe	Redwood Douglas-fir	180 160	Redwood, Douglas-fir.
Aptos	3r	Severe	Moderate	Slight	Moderate	Redwood Douglas-fir	155 145	Redwood, Douglas-fir.
170, 171, 172 Soquel	2r	Slight	Slight	Slight	Severe	Redwood Douglas-fir	180 160	Redwood, Douglas-fir.
173*:								
Sur	5x	Severe	Moderate	Slight	Slight	Ponderosa pine Coulter pine	50 50	
Catelli	3r	Severe	Severe	Slight	Slight	Redwood Douglas-fir	140 147	Douglas-fir, redwood.
182 Zayante	2s	Slight	Severe	Slight	Slight	Ponderosa pine	107	
183 Zayante	2s	Moderate	Severe	Slight	Slight	Ponderosa pine	107	
184*:								
Zayante	2s	Moderate	Severe	Slight	Slight	Ponderosa pine	107	
Rock outcrop.								

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 5.--RECREATIONAL DEVELOPMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
100 Aptos	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
101, 102 Aptos	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
103. Aquents.				
104 Baywood	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.
105 Baywood	Moderate: too sandy, soil blowing, slope.	Moderate: too sandy, soil blowing, slope.	Severe: slope.	Moderate: too sandy, soil blowing.
106 Baywood	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: too sandy, soil blowing, slope.
107 Baywood	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
108 Baywood Variant	Severe: floods.	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.	Moderate: too sandy, soil blowing.
109. Beaches.				
110 Ben Lomond	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
111, 112 Ben Lomond	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
113*: Ben Lomond	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Catelli	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Sur	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.
114*, 115*: Ben Lomond	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Felton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
116 Bonnydoon	Moderate: slope.	Moderate: slope.	Severe: slope, depth to rock.	Slight.

See footnote at end of table.

TABLE 5.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
117---------- Bonnydoon	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.
118*: Bonnydoon----------	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.
Rock outcrop.				
119---------- Clear Lake	Severe: floods, too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
120---------- Conejo	Slight----------	Slight----------	Slight----------	Slight.
121---------- Conejo	Slight----------	Slight----------	Moderate: slope.	Slight.
122---------- Conejo	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
123---------- Cropley	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.	Severe: too clayey.
124---------- Danville	Slight----------	Slight----------	Slight----------	Slight.
125---------- Danville	Slight----------	Slight----------	Moderate: slope.	Slight.
126---------- Diablo	Severe: too clayey.	Severe: too clayey.	Severe: slope, too clayey.	Severe: too clayey.
127---------- Diablo	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: slope, too clayey.	Severe: too clayey.
128. Dune land.				
129---------- Elder	Slight----------	Slight----------	Slight----------	Slight.
130---------- Elder	Slight----------	Slight----------	Moderate: slope.	Slight.
131---------- Elder	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
132---------- Elkhorn	Slight----------	Slight----------	Slight----------	Slight.
133---------- Elkhorn	Slight----------	Slight----------	Moderate: slope.	Slight.
134---------- Elkhorn	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
135---------- Elkhorn	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
136*: Elkhorn----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 5.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
136*: Pfeiffer	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
137 Fagan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
138 Felton	Slight	Slight	Severe: slope.	Slight.
139*: Fluvaquentic Haploxerolls.				
Aquic Xerofluvents.				
140, 141 Hecker	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
142*: Lompico	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Felton	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
143*, 144*: Lompico	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Felton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
145 Lompico Variant	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
146 Los Osos	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
147 Los Osos	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
148 Los Osos	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
149 Madonna	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
150 Maymen	Severe: slope.	Severe: slope.	Severe: slope, depth to rock, large stones.	Moderate: slope, large stones.
151 Maymen	Severe: slope.	Severe: slope.	Severe: slope, depth to rock, large stones.	Severe: slope.
152*: Maymen	Severe: slope.	Severe: slope.	Severe: slope, depth to rock, large stones.	Severe: slope.
Madonna	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 5.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
153*: Maymen	Severe: slope.	Severe: slope.	Severe: slope, depth to rock, large stones.	Severe: slope.
Rock outcrop.				
154 Maymen Variant	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Moderate: slope.
155 Mocho	Slight	Slight	Slight	Slight.
156*: Nisene	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
Aptos	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.
157*, 158*: Nisene	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Aptos	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
159 Pfeiffer	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Moderate: small stones.
160 Pfeiffer	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
161 Pinto	Slight	Slight	Slight	Slight.
162 Pinto	Slight	Slight	Moderate: slope.	Slight.
163 Pinto	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
164*: Pits.				
Dumps.				
165. Riverwash.				
166 San Emigdio Variant	Slight	Slight	Slight	Slight.
167 Santa Lucia	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: small stones.
168, 169 Santa Lucia	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.	Severe: slope, small stones.
170 Soquel	Slight	Slight	Moderate: small stones.	Slight.

See footnote at end of table.

TABLE 5.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
171---------- Soquel	Slight----------	Slight----------	Moderate: slope, small stones.	Slight.
172---------- Soquel	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
173*: Sur----------	Severe: slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.
Catelli----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
174*: Tierra----------	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, percs slowly.	Moderate: slope.
Watsonville----------	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, percs slowly.	Moderate: slope.
175*: Tierra----------	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, percs slowly.	Severe: slope.
Watsonville----------	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, percs slowly.	Severe: slope.
176, 178---------- Watsonville	Severe: percs slowly.	Moderate: wetness.	Severe: percs slowly.	Slight.
177, 179---------- Watsonville	Severe: percs slowly.	Moderate: slope, wetness.	Severe: slope, percs slowly.	Slight.
180---------- Watsonville	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, percs slowly.	Moderate: slope.
181*: Xerorthents. Rock outcrop.				
182---------- Zayante	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy.
183, 184*: Zayante---------- Zayante	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.
Rock outcrop.				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 6.--WILDLIFE HABITAT POTENTIALS

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates the soil was not rated]

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
100---------- Aptos	Fair	Good	Good	---	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
101---------- Aptos	Poor	Fair	Good	---	---	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
102---------- Aptos	Very poor.	Very poor.	Good	---	---	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
103. Aquents.												
104---------- Baywood	Fair	Good	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
105---------- Baywood	Fair	Good	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
106---------- Baywood	Fair	Good	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
107---------- Baywood	Poor	Fair	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
108---------- Baywood Variant	Fair	Fair	Good	---	---	Good	Poor	Poor	Fair	---	Poor	Good.
109. Beaches.												
110---------- Ben Lomond	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
111---------- Ben Lomond	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Good.
112---------- Ben Lomond	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
113*:												
Ben Lomond--------	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
Catelli----------	Very poor.	Very poor.	Good	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
Sur----------	Very poor.	Poor	Poor	---	Poor	---	Very poor.	Very poor.	Very poor.	Poor	Very poor.	---
114*:												
Ben Lomond--------	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Good.
Felton----------	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Good.
115*:												
Ben Lomond--------	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
Felton----------	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.

See footnote at end of table.

TABLE 6.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
116---------- Bonnydoon	Poor	Fair	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
117---------- Bonnydoon	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
118*: Bonnydoon----------	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Rock outcrop.												
119---------- Clear Lake	Fair	Good	Poor	---	---	Poor	Poor	Good	Fair	---	Fair	Poor.
120, 121, 122------ Conejo	Good	Good	Good	---	---	Good	Poor	Very poor.	Good	---	Very poor.	Good.
123---------- Cropley	Good	Good	Poor	---	---	Poor	Poor	Very poor.	Fair	---	Very poor.	Poor.
124---------- Danville	Good	Good	Good	---	---	Good	Good	Fair	Good	---	Fair	Good.
125---------- Danville	Good	Good	Good	---	---	Good	Poor	Very poor.	Good	---	Very poor.	Good.
126, 127---------- Diablo	Fair	Good	Poor	---	---	Poor	Very poor.	Very poor.	Fair	---	Very poor.	Poor.
128. Dune land.												
129---------- Elder	Fair	Good	Good	---	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
130---------- Elder	Fair	Good	Good	---	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
131---------- Elder	Fair	Good	Good	---	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
132, 133---------- Elkhorn	Fair	Good	Good	---	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
134---------- Elkhorn	Fair	Good	Good	---	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
135---------- Elkhorn	Fair	Good	Good	---	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
136*: Elkhorn----------	Poor	Fair	Good	---	---	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
Pfeiffer----------	Very poor.	Very poor.	Good	---	---	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
137---------- Fagan	Very poor.	Very poor.	Good	---	---	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
138---------- Felton	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
139*: Fluvaquentic Haploxerolls.												

See footnote at end of table.

TABLE 6.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
139*--continued Aquic Xerofluvents.												
140---------- Hecker	Poor	Poor	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
141---------- Hecker	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
142*:												
Lompico----------	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
Felton----------	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
143*:												
Lompico----------	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Good.
Felton----------	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Good.
144*:												
Lompico----------	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
Felton----------	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
145---------- Lompico Variant	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Good.
146---------- Los Osos	Fair	Good	Good	---	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
147---------- Los Osos	Fair	Good	Good	---	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
148---------- Los Osos	Poor	Fair	Good	---	---	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
149---------- Madonna	Fair	Good	Good	---	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
150, 151---------- Maymen	Very poor.	Very poor.	Poor	---	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Very poor.
152*:												
Maymen----------	Very poor.	Very poor.	Poor	---	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Very poor.
Madonna----------	Very poor.	Very poor.	Good	---	---	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
153*:												
Maymen----------	Very poor.	Very poor.	Poor	---	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Very poor.
Rock outcrop.												
154---------- Maymen Variant	Very poor.	Very poor.	Poor	---	---	Poor	Very poor.	Very poor.	Very poor.	---	Very poor.	Poor.
155---------- Mocho	Good	Good	Good	---	---	Good	Good	Good	Good	---	Good	Good.

See footnote at end of table.

TABLE 6.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
156*:												
Nisene	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
Aptos	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
157*:												
Nisene	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Good.
Aptos	Poor	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Good.
158*:												
Nisene	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.	Good.
Aptos	Very poor.	Very poor.	Good	Good	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.	Good.
159---- Pfeiffer	Poor	Fair	Good	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
160---- Pfeiffer	Very poor.	Poor	Good	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
161, 162---- Pinto	Good	Good	Good	---	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
163---- Pinto	Fair	Good	Good	---	---	Good	Very poor.	Very poor.	Good	---	Very poor.	Good.
164*:												
Pits.												
Dumps.												
165. Riverwash.												
166---- San Emigdio Variant	Good	Good	Good	---	---	Good	Poor	Poor	Good	---	Poor	Good.
167---- Santa Lucia	Fair	Good	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
168---- Santa Lucia	Poor	Fair	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
169---- Santa Lucia	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
170---- Soquel	Good	Good	Good	Good	Good	Good	Good	Poor	Good	Good	Poor	Good.
171---- Soquel	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	Good.
172---- Soquel	Fair	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.	Good.
173*:												
Sur----	Very poor.	Poor	Poor	---	Poor	---	Very poor.	Very poor.	Very poor.	Poor	Very poor.	---

See footnote at end of table.

TABLE 6.--WILDLIFE HABITAT POTENTIALS--Continued

Soil name and map symbol	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
173*--continued Catelli	Very poor.	Very poor.	Good	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.	Fair.
174*: Tierra	Poor	Fair	Fair	---	---	Fair	Very poor.	Very poor.	Fair	---	Very poor.	Fair.
Watsonville	Poor	Fair	Good	---	---	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
175*: Tierra	Very poor.	Very poor.	Fair	---	---	Fair	Very poor.	Very poor.	Poor	---	Very poor.	Fair.
Watsonville	Very poor.	Very poor.	Good	---	---	Good	Very poor.	Very poor.	Poor	---	Very poor.	Good.
176, 177. Watsonville												
178, 179--- Watsonville	Fair	Good	Good	---	---	Good	Poor	Very poor.	Good	---	Poor	Good.
180--- Watsonville	Poor	Fair	Good	---	---	Good	Very poor.	Very poor.	Fair	---	Very poor.	Good.
181*: Xerorthents.												
Rock outcrop.												
182--- Zayante	Fair	Good	Good	Fair	Fair	Good	Very poor.	Very poor.	Good	Fair	Very poor.	Good.
183--- Zayante	Poor	Fair	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Fair	Very poor.	Good.
184*: Zayante	Poor	Fair	Good	Fair	Fair	Good	Very poor.	Very poor.	Fair	Fair	Very poor.	Good.
Rock outcrop.												

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--BUILDING SITE DEVELOPMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets
100, 101, 102----- Aptos	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
103. Aquents.				
104----- Baywood	Severe: cutbanks cave.	Severe: floods.	Severe: floods.	Slight.
105----- Baywood	Severe: cutbanks cave.	Moderate: slope.	Severe: slope.	Moderate: slope.
106, 107---------- Baywood	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.
108----- Baywood Variant	Severe: cutbanks cave, wetness.	Severe: floods.	Severe: floods.	Moderate: wetness, floods.
109. Beaches.				
110----- Ben Lomond	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, low strength.
111, 112---------- Ben Lomond	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
113*: Ben Lomond-------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Catelli----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Sur----------	Severe: slope, depth to rock, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
114*, 115*: Ben Lomond-------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Felton----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.
116----- Bonnydoon	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope, depth to rock.
117----- Bonnydoon	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
118*: Bonnydoon--------	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets
118*: Rock outcrop.				
119---------- Clear Lake	Severe: too clayey.	Severe: floods, shrink-swell, low strength.	Severe: floods, shrink-swell, low strength.	Severe: shrink-swell, low strength.
120---------- Conejo	Moderate: too clayey.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: low strength, shrink-swell.
121---------- Conejo	Moderate: too clayey.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Moderate: low strength, shrink-swell.
122---------- Conejo	Moderate: too clayey.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Moderate: low strength, shrink-swell.
123---------- Cropley	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
124, 125---------- Danville	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
126---------- Diablo	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, slope, low strength.	Severe: shrink-swell, low strength.
127---------- Diablo	Severe: too clayey, slope.	Severe: slope, shrink-swell, low strength.	Severe: shrink-swell, slope, low strength.	Severe: shrink-swell, low strength, slope.
128. Dune land.				
129---------- Elder	Slight----------	Slight----------	Slight----------	Slight.
130---------- Elder	Slight----------	Slight----------	Moderate: slope.	Slight.
131---------- Elder	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
132---------- Elkhorn	Slight----------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, low strength.
133---------- Elkhorn	Slight----------	Moderate: shrink-swell.	Moderate: slope, shrink-swell.	Moderate: shrink-swell, low strength.
134---------- Elkhorn	Moderate: slope.	Moderate: slope, shrink-swell.	Severe: slope.	Moderate: slope, shrink-swell, low strength.
135---------- Elkhorn	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets
136*:				
Elkhorn	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Pfeiffer	Severe: slope, small stones.	Severe: slope.	Severe: slope.	Severe: slope.
137--- Fagan	Severe: slope.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.	Severe: slope, low strength, shrink-swell.
138--- Felton	Moderate: too clayey.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength, slope.	Severe: low strength.
139*:				
Fluvaquentic Haploxerolls.				
Aquic Xerofluvents.				
140, 141--- Hecker	Severe: slope, small stones.	Severe: slope.	Severe: slope.	Severe: slope.
142*, 143*, 144*:				
Lompico	Severe: slope, small stones.	Severe: slope.	Severe: slope.	Severe: slope, low strength.
Felton	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.
145--- Lompico Variant	Severe: slope, depth to rock, too clayey.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.	Severe: slope, low strength, shrink-swell.
146--- Los Osos	Severe: too clayey.	Severe: shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.	Severe: low strength, shrink-swell.
147, 148--- Los Osos	Severe: slope, too clayey.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.	Severe: slope, low strength, shrink-swell.
149--- Madonna	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
150, 151--- Maymen	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, low strength.
152*:				
Maymen	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, low strength.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets
152*:				
Madonna	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
153*:				
Maymen	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock, low strength.
Rock outcrop.				
154 Maymen Variant	Severe: slope, depth to rock.	Severe: slope.	Severe: slope.	Severe: slope.
155 Mocho	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: low strength, shrink-swell.
156*, 157*, 158*:				
Nisene	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, low strength.
Aptos	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
159, 160 Pfeiffer	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
161 Pinto	Moderate: too clayey.	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.
162 Pinto	Moderate: too clayey.	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: low strength.
163 Pinto	Moderate: slope, too clayey.	Moderate: slope, shrink-swell, low strength.	Severe: slope.	Severe: low strength.
164:				
Pits.				
Dumps.				
165. Riverwash.				
166 San Emigdio Variant	Slight	Slight	Slight	Moderate: low strength.
167, 168, 169 Santa Lucia	Severe: slope, depth to rock, small stones.	Severe: slope.	Severe: slope.	Severe: slope.
170 Soquel	Slight	Moderate: shrink-swell, low strength.	Moderate: shrink-swell, low strength.	Severe: low strength.

See footnote at end of table.

TABLE 7.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Small commercial buildings	Local roads and streets
171---------- Soquel	Slight----------	Moderate: shrink-swell, low strength.	Moderate: slope, shrink-swell, low strength.	Severe: low strength.
172---------- Soquel	Moderate: slope.	Moderate: slope, shrink-swell, low strength.	Severe: slope.	Severe: low strength.
173*:				
Sur----------	Severe: slope, depth to rock, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.
Catelli----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
174*, 175*:				
Tierra----------	Severe: slope, too clayey.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.
Watsonville------	Severe: slope, wetness, too clayey.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.
176, 178---------- Watsonville	Severe: wetness, too clayey.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.	Severe: shrink-swell, low strength.
177, 179---------- Watsonville	Severe: wetness, too clayey.	Severe: shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.	Severe: shrink-swell, low strength.
180---------- Watsonville	Severe: slope, wetness, too clayey.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.	Severe: slope, shrink-swell, low strength.
181*: Xerorthents.				
Rock outcrop.				
182, 183---------- Zayante	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.
184*:				
Zayante----------	Severe: slope, cutbanks cave.	Severe: slope.	Severe: slope.	Severe: slope.
Rock outcrop.				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--SANITARY FACILITIES

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry means soil was not rated]

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
100 Aptos	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, area reclaim.
101, 102 Aptos	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, area reclaim.
103. Aquents.					
104 Baywood	Slight	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: too sandy.
105 Baywood	Moderate: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: slope, too sandy.
106 Baywood	Severe: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: slope, seepage.	Poor: slope.
107 Baywood	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
108 Baywood Variant	Severe: wetness, percs slowly.	Severe: wetness, seepage.	Severe: wetness, seepage, too sandy.	Severe: wetness, seepage.	Poor: too sandy, seepage.
109. Beaches.					
110 Ben Lomond	Moderate: slope, depth to rock.	Severe: slope, seepage.	Severe: seepage, depth to rock.	Severe: seepage.	Fair: slope.
111, 112 Ben Lomond	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage.	Poor: slope.
113*: Ben Lomond	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage.	Poor: slope.
Catelli	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage.	Poor: slope.
Sur	Severe: slope, depth to rock, large stones.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage.	Poor: slope, large stones, small stones.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
114*, 115*: Ben Lomond	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage.	Poor: slope.
Felton	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.
116 Bonnydoon	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Moderate: slope.	Poor: thin layer, area reclaim.
117 Bonnydoon	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
118*: Bonnydoon	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Rock outcrop.					
119 Clear Lake	Severe: wetness, percs slowly.	Moderate: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey.
120 Conejo	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: too clayey.
121 Conejo	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
122 Conejo	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Fair: too clayey.
123 Cropley	Severe: percs slowly.	Moderate: slope.	Severe: too clayey.	Slight	Poor: too clayey.
124 Danville	Severe: percs slowly.	Slight	Moderate: too clayey.	Slight	Poor: too clayey.
125 Danville	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight	Poor: too clayey.
126 Diablo	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: slope.	Poor: too clayey.
127 Diablo	Severe: slope, percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Severe: slope.	Poor: slope, too clayey.
128. Dune land.					
129 Elder	Moderate: percs slowly.	Moderate: seepage.	Slight	Slight	Good.
130 Elder	Moderate: percs slowly.	Moderate: slope, seepage.	Slight	Slight	Good.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
131---------- Elder	Moderate: slope, percs slowly.	Severe: slope.	Slight----------	Moderate: slope.	Fair: slope.
132---------- Elkhorn	Severe: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
133---------- Elkhorn	Severe: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
134---------- Elkhorn	Severe: percs slowly.	Severe: slope, seepage.	Severe: seepage.	Severe: seepage.	Fair: slope.
135---------- Elkhorn	Severe: slope, percs slowly.	Severe: slope, seepage.	Severe: seepage.	Severe: slope, seepage.	Poor: slope.
136*: Elkhorn----------	Severe: slope, percs slowly.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
Pfeiffer----------	Severe: slope.	Severe: slope, seepage, small stones.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage.	Poor: slope, small stones.
137---------- Fagan	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, depth to rock, too clayey.	Severe: slope.	Poor: slope, too clayey, area reclaim.
138---------- Felton	Severe: percs slowly.	Severe: slope.	Severe: depth to rock.	Slight----------	Fair: too clayey.
139*: Fluvaquentic Haploxerolls.					
Aquic Xerofluvents.					
140, 141---------- Hecker	Severe: slope.	Severe: slope, small stones.	Severe: slope, depth to rock.	Severe: slope, seepage.	Poor: slope, small stones.
142*: Lompico----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope, seepage.	Poor: slope, small stones, area reclaim.
Felton----------	Severe: slope, percs slowly.	Severe: slope.	Severe: depth to rock.	Severe: slope.	Poor: slope.
143*, 144*: Lompico----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, seepage.	Poor: slope, small stones, area reclaim.
Felton----------	Severe: slope, percs slowly.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope.

See footnote at end of table.

TABLE 8--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
145---------- Lompico Variant	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: slope.	Poor: slope, too clayey, area reclaim.
146---------- Los Osos	Severe: depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Moderate: slope.	Poor: area reclaim, too clayey.
147---------- Los Osos	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: depth to rock, too clayey.	Severe: slope.	Poor: area reclaim, slope, too clayey.
148---------- Los Osos	Severe: slope, depth to rock, percs slowly.	Severe: slope, depth to rock.	Severe: slope, depth to rock, too clayey.	Severe: slope.	Poor: area reclaim, slope, too clayey.
149---------- Madonna	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope, seepage.	Poor: slope, area reclaim.
150, 151---------- Maymen	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
152*:					
Maymen----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Madonna----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, seepage.	Poor: slope, area reclaim.
153*:					
Maymen----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, thin layer, area reclaim.
Rock outcrop.					
154---------- Maymen Variant	Severe: slope, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: seepage, depth to rock.	Severe: slope, seepage.	Poor: slope, thin layer, area reclaim.
155---------- Mocho	Severe: percs slowly.	Slight----------	Moderate: too clayey.	Slight----------	Fair: too clayey.
156*:					
Nisene----------	Severe: slope.	Severe: slope.	Severe: depth to rock.	Severe: slope, seepage.	Poor: slope.
Aptos----------	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Poor: slope, area reclaim.
157*, 158*:					
Nisene----------	Severe: slope.	Severe: slope.	Severe: slope, depth to rock.	Severe: slope, seepage.	Poor: slope.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
157*, 158*: Aptos	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, area reclaim.
159--- Pfeiffer	Severe: slope.	Severe: slope, seepage.	Severe: seepage.	Severe: slope, seepage.	Poor: slope.
160--- Pfeiffer	Severe: slope.	Severe: slope, seepage.	Severe: slope, seepage.	Severe: slope, seepage.	Poor: slope.
161--- Pinto	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight---	Fair: too clayey.
162--- Pinto	Severe: percs slowly.	Moderate: slope, seepage.	Moderate: too clayey.	Slight---	Fair: too clayey.
163--- Pinto	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: slope, too clayey.
164*: Pits.					
Dumps.					
165. Riverwash.					
166--- San Emigdio Variant	Slight---	Severe: seepage.	Severe: seepage.	Severe: seepage.	Good.
167--- Santa Lucia	Severe: slope, depth to rock.	Severe: slope, depth to rock, small stones.	Severe: depth to rock.	Severe: slope.	Poor: slope, small stones, area reclaim.
168, 169--- Santa Lucia	Severe: slope, depth to rock.	Severe: slope, depth to rock, small stones.	Severe: slope, depth to rock.	Severe: slope.	Poor: slope, small stones, area reclaim.
170--- Soquel	Severe: percs slowly.	Moderate: seepage.	Moderate: too clayey.	Slight---	Good.
171--- Soquel	Severe: percs slowly.	Moderate: seepage, slope.	Moderate: too clayey.	Slight---	Good.
172--- Soquel	Severe: percs slowly.	Severe: slope.	Moderate: too clayey.	Moderate: slope.	Fair: slope.
173*: Sur---	Severe: slope, depth to rock, large stones.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage.	Poor: slope, large stones, small stones.
Catelli---	Severe: slope, depth to rock.	Severe: slope, depth to rock, seepage.	Severe: slope, seepage, depth to rock.	Severe: slope, seepage.	Poor: slope.

See footnote at end of table.

TABLE 8.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
174*:					
Tierra	Severe: slope, percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Severe: slope.	Poor: slope.
Watsonville	Severe: slope, percs slowly, wetness.	Severe: slope, wetness.	Severe: wetness, too clayey.	Severe: slope, wetness.	Poor: slope.
175*:					
Tierra	Severe: slope, percs slowly.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Watsonville	Severe: slope, percs slowly, wetness.	Severe: slope, wetness.	Severe: slope, wetness, too clayey.	Severe: slope, wetness.	Poor: slope.
176--- Watsonville	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey.
177--- Watsonville	Severe: percs slowly, wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, slope.
178--- Watsonville	Severe: percs slowly, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey.
179--- Watsonville	Severe: percs slowly, wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, slope.
180--- Watsonville	Severe: slope, percs slowly, wetness.	Severe: slope, wetness.	Severe: wetness.	Severe: slope, wetness.	Poor: slope.
181*:					
Xerorthents.					
Rock outcrop.					
182--- Zayante	Severe: slope.	Severe: slope, seepage.	Severe: seepage, too sandy.	Severe: slope, seepage.	Poor: slope, too sandy.
183--- Zayante	Severe: slope.	Severe: slope, seepage.	Severe: slope, too sandy, seepage.	Severe: slope, seepage.	Poor: slope, too sandy.
184*:					
Zayante	Severe: slope.	Severe: slope, seepage.	Severe: slope, too sandy, seepage.	Severe: slope, seepage.	Poor: slope, too sandy.
Rock outcrop.					

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--CONSTRUCTION MATERIALS

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and "poor." Absence of an entry means soil was not rated]

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
100 Aptos	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
101, 102 Aptos	Poor: slope, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
103. Aquents.				
104 Baywood	Good	Poor: excess fines.	Unsuited: excess fines.	Fair: too sandy.
105 Baywood	Good	Poor: excess fines.	Unsuited: excess fines.	Fair: too sandy, slope.
106 Baywood	Fair: slope.	Poor: excess fines.	Unsuited: excess fines.	Poor: slope.
107 Baywood	Poor: slope.	Poor: excess fines.	Unsuited: excess fines.	Poor: slope.
108 Baywood Variant	Fair: low strength, wetness.	Poor: excess fines.	Unsuited: excess fines.	Fair: too sandy, small stones.
109. Beaches.				
110 Ben Lomond	Fair: low strength, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope.
111, 112 Ben Lomond	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
113*: Ben Lomond	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Catelli	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer.	Unsuited: excess fines.	Poor: slope.
Sur	Poor: slope, thin layer, large stones.	Unsuited: large stones, thin layer.	Unsuited: thin layer, large stones.	Poor: slope, small stones, large stones.
114*, 115*: Ben Lomond	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Felton	Poor: slope, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
116 Bonnydoon	Poor: thin layer, area reclaim.	Unsuited: excess fines, thin layer.	Unsuited: excess fines, thin layer.	Poor: area reclaim.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
117---------- Bonnydoon	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines, thin layer.	Unsuited: excess fines, thin layer	Poor: slope, area reclaim.
118*: Bonnydoon----------	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines, thin layer.	Unsuited: excess fines, thin layer.	Poor: slope, area reclaim.
Rock outcrop.				
119---------- Clear Lake	Poor: shrink-swell, low strength, wetness.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
120, 121, 122--------- Conejo	Fair: low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
123---------- Cropley	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
124, 125---------- Danville	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
126---------- Diablo	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: too clayey.
127---------- Diablo	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope, too clayey.
128. Dune land.				
129, 130---------- Elder	Good----------	Poor: excess fines.	Unsuited: excess fines.	Good.
131---------- Elder	Good----------	Poor: excess fines.	Unsuited: excess fines.	Fair: slope.
132, 133---------- Elkhorn	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
134---------- Elkhorn	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope.
135---------- Elkhorn	Fair: low strength, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
136*: Elkhorn----------	Poor: slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Pfeiffer----------	Poor: slope.	Poor: excess fines.	Poor: excess fines.	Poor: slope, small stones.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
137---------- Fagan	Poor: slope, low strength, shrink-swell.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
138---------- Felton	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: too clayey.
139*: Fluvaquentic Haploxerolls.				
Aquic Xerofluvents.				
140, 141---------- Hecker	Poor: slope.	Poor: excess fines.	Poor: excess fines.	Poor: small stones, slope.
142*: Lompico----------	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Felton----------	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
143*, 144*: Lompico----------	Poor: low strength, slope.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Felton----------	Poor: slope, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
145---------- Lompico Variant	Poor: low strength, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
146---------- Los Osos	Poor: low strength, shrink-swell, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope.
147---------- Los Osos	Poor: low strength, shrink-swell, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
148---------- Los Osos	Poor: low strength, slope, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
149---------- Madonna	Poor: thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
150---------- Maymen	Poor: thin layer, area reclaim, low strength.	Unsuited: thin layer, excess fines.	Unsuited: thin layer, excess fines.	Poor: small stones, area reclaim, slope.
151---------- Maymen	Poor: thin layer, slope, low strength.	Unsuited: thin layer, excess fines.	Unsuited: thin layer, excess fines.	Poor: small stones, area reclaim, slope.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
152*:				
Maymen	Poor: thin layer, slope, low strength.	Unsuited: thin layer, excess fines.	Unsuited: thin layer, excess fines.	Poor: small stones, area reclaim, slope.
Madonna	Poor: slope, thin layer, area reclaim.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
153*:				
Maymen	Poor: thin layer, slope, low strength.	Unsuited: thin layer, excess fines.	Unsuited: thin layer, excess fines.	Poor: small stones, area reclaim, slope.
Rock outcrop.				
154 Maymen Variant	Poor: thin layer, area reclaim.	Unsuited: thin layer, excess fines.	Unsuited: thin layer, excess fines.	Poor: slope, small stones.
155 Mocho	Fair: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
156*:				
Nisene	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Aptos	Poor: thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
157*, 158*:				
Nisene	Poor: slope, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Aptos	Poor: slope, thin layer.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
159 Pfeiffer	Fair: slope.	Poor: excess fines.	Poor: excess fines.	Poor: slope, small stones.
160 Pfeiffer	Poor: slope.	Poor: excess fines.	Poor: excess fines.	Poor: slope, small stones.
161, 162 Pinto	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
163 Pinto	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope.
164*:				
Pits.				
Dumps.				
165.				
Riverwash.				
166 San Emigdio Variant	Fair: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
167--- Santa Lucia	Poor: thin layer.	Unsuited: excess fines.	Unsuited: thin layer, excess fines.	Poor: slope, small stones.
168, 169--- Santa Lucia	Poor: slope, thin layer.	Unsuited: excess fines.	Unsuited: thin layer, excess fines.	Poor: slope, small stones.
170, 171--- Soquel	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Good.
172--- Soquel	Poor: low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Fair: slope.
173*:				
Sur---	Poor: slope, thin layer.	Unsuited: excess fines.	Unsuited: thin layer.	Poor: slope, small stones.
Catelli---	Poor: slope, thin layer, area reclaim.	Unsuited: thin layer.	Unsuited: excess fines.	Poor: slope.
174*:				
Tierra---	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Watsonville---	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
175*:				
Tierra---	Poor: slope, shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
Watsonville---	Poor: slope, shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
176, 177, 178, 179--- Watsonville	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor.
180--- Watsonville	Poor: shrink-swell, low strength.	Unsuited: excess fines.	Unsuited: excess fines.	Poor: slope.
181*: Xerorthents. Rock outcrop.				
182--- Zayante	Fair: slope.	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy, slope.
183--- Zayante	Poor: slope.	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy, slope.

See footnote at end of table.

TABLE 9.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
184*: Zayante	Poor: slope.	Poor: excess fines.	Unsuited: excess fines.	Poor: too sandy, slope.
Rock outcrop.				

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WATER MANAGEMENT

[Some of the terms used in this table to describe restrictive soil features are defined in the Glossary. Absence of an entry means soil was not evaluated]

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
100, 101, 102----- Aptos	Slope, depth to rock, seepage.	Low strength, thin layer.	Slope, depth to rock.	Slope, rooting depth.	Slope, depth to rock.	Slope, depth to rock.
103. Aquents.						
104---------- Baywood	Seepage--------	Piping, seepage.	Cutbanks cave	Droughty, fast intake.	Too sandy, soil blowing.	Droughty.
105---------- Baywood	Slope, seepage.	Piping, seepage.	Slope, cutbanks cave.	Droughty, fast intake.	Too sandy, soil blowing.	Slope, droughty.
106, 107---------- Baywood	Slope, seepage.	Piping, seepage.	Slope, cutbanks cave.	Droughty, fast intake.	Slope, too sandy, soil blowing.	Slope, droughty.
108---------- Baywood Variant	Seepage--------	Seepage, piping.	Percs slowly, wetness, cutbanks cave.	Wetness, percs slowly, droughty.	Wetness, soil blowing, percs slowly.	Wetness, droughty, soil blowing.
109. Beaches.						
110, 111, 112----- Ben Lomond	Seepage, slope.	Piping, low strength.	Slope----------	Slope----------	Slope, piping.	Slope.
113*: Ben Lomond-------	Seepage, slope.	Piping, low strength.	Slope----------	Slope----------	Slope, piping.	Slope.
Catelli----------	Slope, seepage, depth to rock.	Piping, thin layer.			Slope, depth to rock.	Slope, depth to rock.
Sur----------	Slope, seepage, depth to rock.	Thin layer, piping, large stones.			Slope, depth to rock, large stones.	Slope, large stones, depth to rock.
114*, 115*: Ben Lomond-------	Seepage, slope.	Piping, low strength.	Slope----------	Slope----------	Slope, piping.	Slope.
Felton----------	Slope, depth to rock.	Low strength---	Slope----------	Slope----------	Slope----------	Slope.
116, 117---------- Bonnydoon	Slope, depth to rock.	Thin layer, low strength, piping.			Slope, depth to rock, piping.	Slope, rooting depth, depth to rock.
118*: Bonnydoon--------	Slope, depth to rock.	Thin layer, low strength, piping.			Slope, depth to rock, piping.	Slope, rooting depth, depth to rock.
Rock outcrop.						
119---------- Clear Lake	Favorable------	Low strength, hard to pack, compressible.	Percs slowly, floods.	Slow intake, percs slowly, floods.	Percs slowly---	Percs slowly.
120---------- Conejo	Favorable------	Low strength, piping.	Favorable------	Favorable------	Favorable------	Favorable.
121---------- Conejo	Slope----------	Low strength, piping.	Slope----------	Slope----------	Slope----------	Slope.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
122---------- Conejo	Favorable------	Low strength, piping.	Favorable------	Favorable------	Favorable------	Favorable.
123---------- Cropley	Slope----------	Low strength, hard to pack, compressible.	Percs slowly, slope.	Slow intake, percs slowly, slope.	Percs slowly---	Percs slowly, slope.
124---------- Danville	Favorable------	Low strength---	Percs slowly---	Percs slowly---	Percs slowly---	Percs slowly.
125---------- Danville	Favorable------	Hard to pack---	Percs slowly, slope.	Percs slowly---	Percs slowly---	Percs slowly.
126, 127---------- Diablo	Slope----------	Low strength, hard to pack, compressible.	Percs slowly---	Slope, slow intake, percs slowly.	Slope, percs slowly.	Slope, percs slowly.
128. Dune land.						
129---------- Elder	Seepage--------	Piping---------	Favorable------	Favorable------	Favorable, piping.	Favorable.
130, 131---------- Elder	Slope, seepage.	Piping---------	Slope----------	Slope----------	Slope, piping.	Slope.
132---------- Elkhorn	Favorable------	Piping---------	Favorable------	Favorable------	Piping---------	Favorable.
133, 134, 135----- Elkhorn	Slope----------	Piping---------	Slope----------	Slope----------	Piping, slope.	Slope.
136*: Elkhorn----------	Slope----------	Piping---------	Slope----------	Slope----------	Piping, slope.	Slope.
Pfeiffer---------	Slope, seepage.	Piping---------	Slope----------	Slope, droughty.	Slope----------	Slope, droughty.
137---------- Fagan	Slope, depth to rock.	Low strength, compressible.	Complex slope, percs slowly.	Complex slope, percs slowly.	Complex slope, percs slowly.	Slope, percs slowly.
138---------- Felton	Slope, depth to rock.	Low strength---	Slope----------	Slope----------	Slope----------	Slope.
139*: Fluvaquentic Haploxerolls.						
Aquic Xerofluvents.						
140, 141---------- Hecker	Slope, seepage.	Piping---------			Slope, small stones.	Slope, droughty.
142*, 143*, 144*: Lompico----------	Slope, depth to rock, seepage.	Low strength, thin layer.	Slope, depth to rock.	Slope, rooting depth.	Slope, depth to rock.	Slope, depth to rock.
Felton----------	Slope, depth to rock.	Low strength---	Slope----------	Slope----------	Slope----------	Slope.
145---------- Lompico Variant	Depth to rock, slope.	Depth to rock, low strength, hard to pack.	Depth to rock, percs slowly, slope.	Slope, rooting depth, percs slowly.	Slope, percs slowly, depth to rock.	Slope, percs slowly, erodes easily.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
146---------- Los Osos	Slope, depth to rock.	Hard to pack, thin layer, low strength.	Complex slope, depth to rock, percs slowly.	Slope, rooting depth, percs slowly.	Depth to rock, percs slowly.	Slope, erodes easily, depth to rock.
147, 148---------- Los Osos	Slope, depth to rock.	Hard to pack, thin layer, low strength.	Complex slope, depth to rock, percs slowly.	Slope, rooting depth, percs slowly.	Slope, depth to rock, percs slowly.	Slope, erodes easily, depth to rock.
149---------- Madonna	Slope, depth to rock, seepage.	Thin layer, piping.	Slope, depth to rock.	Slope, rooting depth.	Slope, depth to rock.	Slope, depth to rock.
150, 151---------- Maymen	Slope, depth to rock.	Thin layer, low strength.			Slope, depth to rock, large stones.	Rooting depth, slope, large stones.
152*:						
Maymen----------	Slope, depth to rock.	Thin layer, low strength.			Slope, depth to rock, large stones.	Rooting depth, slope, large stones.
Madonna----------	Slope, depth to rock, seepage.	Thin layer, piping.	Slope, depth to rock.	Slope, rooting depth.	Slope, depth to rock.	Slope, depth to rock.
153*:						
Maymen----------	Slope, depth to rock.	Thin layer, low strength.			Slope, depth to rock, large stones.	Rooting depth, slope, large stones.
Rock outcrop.						
154---------- Maymen Variant	Slope, seepage, depth to rock.	Piping, thin layer.			Slope, depth to rock.	Slope, rooting depth.
155---------- Mocho	Favorable------	Low strength---	Favorable------	Favorable------	Erodes easily--	Erodes easily.
156*, 157*, 158*:						
Nisene----------	Slope, seepage.	Low strength---	Slope----------	Slope----------	Slope----------	Slope.
Aptos----------	Slope, depth to rock, seepage.	Low strength, thin layer.	Slope, depth to rock.	Slope, rooting depth.	Slope, depth to rock.	Slope, depth to rock.
159, 160---------- Pfeiffer	Slope, seepage.	Seepage, piping.	Slope----------	Slope, droughty.	Slope, piping.	Slope, droughty.
161---------- Pinto	Seepage--------	Low strength---	Percs slowly---	Percs slowly---	Percs slowly---	Percs slowly.
162, 163---------- Pinto	Slope, seepage.	Low strength---	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.	Slope, percs slowly.
164*:						
Pits.						
Dumps.						
165. Riverwash.						
166---------- San Emigdio Variant	Seepage--------	Piping---------	Favorable------	Favorable------	Favorable------	Favorable.

See footnote at end of table.

TABLE 10.--WATER MANAGEMENT--Continued

Soil name and map symbol	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
167, 168, 169----- Santa Lucia	Slope, depth to rock.	Piping, thin layer.	Complex slope, depth to rock.	Complex slope, rooting depth.	Complex slope, depth to rock.	Slope, depth to rock.
170----- Soquel	Favorable------	Low strength---	Favorable------	Favorable------	Erodes easily--	Erodes easily.
171, 172---------- Soquel	Slope----------	Low strength, shrink-swell.	Slope----------	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
173*: Sur----------	Slope, seepage, depth to rock.	Thin layer, piping, large stones.			Slope, depth to rock, large stones.	Slope, large stones, depth to rock.
Catelli----------	Slope, seepage, depth to rock.	Piping, thin layer.			Slope, depth to rock.	Slope, depth to rock.
174*, 175: Tierra----------	Slope----------	Hard to pack, low strength, compressible.	Slope, percs slowly.	Percs slowly, slope.	Percs slowly, slope.	Slope, percs slowly.
Watsonville------	Slope----------	Low strength, hard to pack, compressible.	Slope, percs slowly, wetness.	Slope, percs slowly, wetness.	Slope, percs slowly, wetness.	Slope, percs slowly, wetness.
176, 178---------- Watsonville	Favorable------	Low strength, hard to pack, compressible.	Percs slowly, wetness.	Wetness, percs slowly.	Percs slowly, wetness.	Percs slowly, wetness.
177, 179, 180----- Watsonville	Slope----------	Low strength, hard to pack, compressible.	Slope, percs slowly, wetness.	Wetness, percs slowly, slope.	Slope, percs slowly, wetness.	Slope, percs slowly, wetness.
181*: Xerorthents.						
Rock outcrop.						
182, 183---------- Zayante	Slope, seepage.	Seepage, piping.	Slope, cutbanks cave.	Slope, droughty, seepage.	Slope, too sandy, soil blowing.	Slope, droughty.
184*: Zayante----------	Slope, seepage.	Seepage, piping.	Slope, cutbanks cave.	Slope, droughty, seepage.	Slope, too sandy, soil blowing.	Slope, droughty.
Rock outcrop.						

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS

[The symbol < means less than; > means greater than. Absence of an entry means data were not estimated]

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
100, 101, 102------ Aptos	0-18	Loam----------	CL-ML, CL	A-4, A-6	0-5	85-100	75-100	60-90	50-70	25-35	5-15
	18-24	Sandy clay loam, clay loam, loam.	SC, CL	A-6	0-5	85-100	75-100	50-95	35-80	25-40	10-20
	24-36	Shaly clay loam	CL	A-6	0	65-80	65-75	60-70	50-60	25-40	10-20
	36	Weathered bedrock.	---	---	---	---	---	---	---	---	---
103. Aquents.											
104---------- Baywood	0-17	Loamy sand------	SM	A-2	0	100	100	50-90	15-35	---	NP
	17-61	Loamy sand, loamy fine sand.	SM	A-2	0	100	100	50-95	15-35	---	NP
105, 106, 107------ Baywood	0-17	Loamy sand------	SM	A-2	0	100	100	50-90	15-35	---	NP
	17-56	Loamy sand, loamy fine sand.	SM	A-2	0	100	100	50-95	15-35	---	NP
	56-61	Fine sand, sand	SP-SM, SM	A-2, A-3	0	100	100	50-80	5-30	---	NP
108---------- Baywood Variant	0-10	Loamy sand------	SM	A-1, A-2	0	95-100	80-100	40-70	15-30	---	NP
	10-38	Loamy sand, sand	SM	A-1, A-2	0	95-100	80-100	40-70	10-30	---	NP
	38-55	Clay loam-------	ML, CL	A-6, A-7	0	100	95-100	85-100	70-80	35-45	10-20
	55-70	Sandy loam------	SM	A-4	0	100	75-100	60-70	35-50	10-20	NP-5
109. Beaches.											
110, 111, 112------ Ben Lomond	0-19	Sandy loam------	SM	A-2, A-4	0-5	90-100	85-100	55-70	30-50	20-30	NP-5
	19-46	Sandy loam, fine sandy loam, loam.	SM, ML	A-2, A-4	0-5	90-100	85-100	55-80	30-65	20-35	NP-10
	46	Weathered bedrock.	---	---	---	---	---	---	---	---	---
113*: Ben Lomond--------	0-19	Sandy loam------	SM	A-2, A-4	0-5	90-100	85-100	55-70	30-50	20-30	NP-5
	19-46	Sandy loam, fine sandy loam, loam.	SM, ML	A-2, A-4	0-5	90-100	85-100	55-80	30-65	20-35	NP-10
	46	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Catelli----------	0-7	Sandy loam------	SM	A-2, A-4	0	95-100	75-100	45-75	25-40	15-25	NP-5
	7-37	Sandy loam, fine sandy loam, very fine sandy loam.	SM	A-2, A-4	0	95-100	75-100	50-90	25-50	15-25	NP-5
	37	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Sur----------	0-18	Stony sandy loam	GP-GM, GM	A-1	15-25	50-60	45-55	30-50	10-20	---	NP
	18-35	Stony sandy loam, very stony sandy loam.	GP-GM, GM	A-1	15-40	50-60	45-55	30-50	10-20	---	NP
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
114*, 115*:											
Ben Lomond	0-19	Sandy loam	SM	A-2, A-4	0-5	90-100	85-100	55-70	30-50	20-30	NP-5
	19-46	Sandy loam, fine sandy loam, loam.	SM, ML	A-2, A-4	0-5	90-100	85-100	55-80	30-65	20-35	NP-10
	46	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Felton	0-11	Sandy loam	SM	A-4	0-5	85-100	75-100	45-60	35-50	15-30	NP-5
	11-43	Clay loam, silty clay loam, sandy clay loam.	CL, SC	A-6	0-5	85-100	75-100	75-95	40-85	20-40	10-20
	43-63	Sandy loam, loam, sandy clay loam.	SM, SM-SC ML, CL-ML	A-2, A-4	0	85-100	75-100	50-80	25-60	20-30	NP-10
	63	Weathered bedrock.	---	---	---	---	---	---	---	---	---
116, 117	0-11	Loam	CL, CL-ML	A-6, A-4	0	90-100	85-100	85-95	50-75	25-35	5-15
Bonnydoon	11	Weathered bedrock.	---	---	---	---	---	---	---	---	---
118*:											
Bonnydoon	0-11	Loam	CL, CL-ML	A-6, A-4	0	90-100	85-100	85-95	50-75	25-35	5-15
	11	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
119	0-7	Clay	CH, CL	A-7	0	100	100	95-100	85-95	40-60	20-30
Clear Lake	7-62	Clay, silty clay	CH, CL	A-7	0	100	100	95-100	85-95	40-60	20-30
120, 121	0-7	Loam	CL	A-6, A-7	0	95-75	90-75	55-70	50-60	30-45	10-20
Conejo	7-65	Loam, clay loam	CL-ML, ML	A-6, A-7	0	95-100	90-100	60-90	50-80	20-45	5-15
122	0-7	Clay loam	CL	A-6, A-7	0	95-100	90-100	70-100	65-80	30-45	10-20
Conejo	7-65	Loam, clay loam	CL-ML, ML	A-6, A-7	0	95-100	90-100	60-90	50-80	20-45	5-15
123	0-28	Silty clay	CL, CH	A-7	0	100	95-100	80-100	70-95	40-60	15-30
Cropley	28-45	Clay, silty clay	CL, CH	A-7	0	100	95-100	80-100	70-95	40-60	15-30
	45-60	Clay loam, silty clay loam.	CL	A-6, A-7	0	100	95-100	80-100	70-95	35-50	15-30
124, 125	0-17	Loam	SC, CL, CL-ML, SM-SC	A-6, A-4	0	90-100	80-100	65-85	45-65	20-35	5-20
Danville	17-29	Clay, sandy clay, silty clay.	CL, CH	A-7	0	100	95-100	70-85	55-70	40-60	20-30
	29-65	Gravelly sandy clay loam, clay loam, sandy clay loam.	SC	A-2, A-6	0	85-100	70-90	50-75	25-50	25-35	10-20
126, 127	0-30	Clay	CL, CH	A-7	0	100	95-100	95-100	85-95	45-70	20-40
Diablo	30-59	Silty clay, clay, clay loam.	CL, CH	A-7	0	100	95-100	95-100	85-95	45-70	20-40
	59	Weathered bedrock.	---	---	---	---	---	---	---	---	---
128. Dune land.											

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
129, 130, 131------ Elder	0-31	Sandy loam------	SM	A-2, A-4	0	80-100	75-100	50-70	30-50	10-20	NP-5
	31-60	Sandy loam, fine sandy loam, loamy sand.	SM	A-2, A-4	0	80-100	75-100	50-70	25-50	10-20	NP-5
132, 133, 134, 135- Elkhorn	0-21	Sandy loam------	SM	A-2, A-4	0	90-100	75-100	50-80	25-50	10-25	NP-5
	21-61	Sandy clay loam, clay loam.	SC, CL	A-6	0	90-100	75-100	75-90	35-70	25-40	10-15
136*:											
Elkhorn----------	0-21	Sandy loam------	SM	A-2, A-4	0	90-100	75-100	50-80	25-50	10-25	NP-5
	21-61	Sandy clay loam, clay loam.	SC, CL	A-6	0	90-100	75-100	75-90	35-70	25-40	10-15
Pfeiffer----------	0-24	Gravelly sandy loam.	SM	A-1, A-2	0	60-80	50-75	30-55	15-35	15-30	NP-5
	24-66	Gravelly coarse sandy loam, gravelly sandy loam, cobbly sandy loam.	SM	A-1, A-2	0-10	60-80	50-75	30-55	15-35	15-30	NP-5
	66	Weathered bedrock.	---	---	---	---	---	---	---	---	---
137---------- Fagan	0-32	Loam----------	CL	A-6	0	100	100	80-95	60-80	25-35	10-15
	32-65	Clay, silty clay clay loam.	CL, CH	A-7	0	100	100	90-100	70-95	40-55	20-35
138---------- Felton	0-11	Sandy loam------	SM	A-4	0-5	85-100	75-100	45-60	35-50	15-30	NP-5
	11-43	Clay loam, silty clay loam, sandy clay loam.	CL, SC	A-6	0-5	85-100	75-100	75-95	40-85	20-40	10-20
	43-63	Sandy loam, loam sandy clay loam	SM, SM-SC ML, CL-ML	A-2, A-4	0	85-100	75-100	50-80	25-60	20-30	NP-10
	63	Weathered bedrock.	---	---	---	---	---	---	---	---	---
139*: Fluvaquentic Haploxerolls.											
Aquic Xerofluvents.											
140, 141---------- Hecker	0-9	Gravelly sandy loam.	GM-GC, GM, SM, SM-SC	A-2, A-1	0-15	55-75	50-65	30-50	20-35	15-25	NP-10
	9-23	Very gravelly sandy loam, very gravelly loam.	GM-GC, GM	A-2, A-1	0-15	40-55	35-50	20-50	15-35	15-25	NP-10
	23-41	Very gravelly loam, very gravelly clay loam, very cobbly loam.	GC	A-2	0-30	15-50	10-45	10-40	10-30	25-35	10-20
	41	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
142*, 143*, 144*: Lompico----------	0-5	Loam----------	CL-ML	A-4	0-5	90-100	80-100	70-95	50-75	20-30	5-10
	5-37	Clay loam, sandy clay loam, loam.	CL, SC	A-6	0-5	75-100	75-100	65-95	45-70	20-40	10-20
	37	Weathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	> 3 inches	4	10	40	200		
	In				Pct					Pct	
142*, 143*, 144* Felton	0-11	Sandy loam	SM	A-4	0-5	85-100	75-100	45-60	35-50	15-30	NP-5
	11-43	Clay loam, silty clay loam, sandy clay loam.	CL, SC	A-6	0-5	85-100	75-100	75-95	40-85	20-40	10-20
	43-63	Sandy clay loam, sandy loam, loam.	SM, SM-SC ML, CL-ML	A-2, A-4	0	85-100	75-100	50-80	25-60	20-30	NP-10
	63	Weathered bedrock.	---	---	---	---	---	---	---	---	---
145 Lompico Variant	0-10	Loam	CL-ML, CL	A-4, A-6	0	95-100	90-100	85-95	55-75	20-40	5-20
	10-14	Clay loam	CL	A-6, A-7	0	95-100	90-100	90-100	65-80	30-50	10-25
	14-28	Clay	CL, CH	A-7	0	95-100	90-100	90-100	70-95	40-65	20-40
	28	Weathered bedrock.	---	---	---	---	---	---	---	---	---
146, 147, 148 Los Osos	0-19	Loam	ML, CL-M	A-4	0	95-100	90-100	70-100	60-95	20-35	5-10
	19-36	Silty clay, clay loam, clay.	CL, CH	A-7	0	95-100	90-100	75-100	55-90	45-60	20-30
	36	Weathered bedrock.	---	---	---	---	---	---	---	---	---
149 Madonna	0-16	Loam	SM	A-4	0	90-100	85-100	65-75	40-50	15-25	NP-5
	16-23	Loam, fine sandy loam.	SM, ML, CL-ML, SM-SC	A-4	0	95-100	85-100	55-90	40-60	15-30	NP-10
	23	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
150, 151 Maymen	0-6	Stony loam	SM, ML	A-2, A-4	25-30	80-95	75-90	45-80	25-65	10-20	NP-5
	6-14	Shaly clay loam, shaly sandy clay loam, shaly loam.	SC, CL	A-6, A-2	10-15	65-80	60-75	50-70	30-60	25-40	10-20
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
152*: Maymen	0-6	Stony loam	SM, ML	A-2, A-4	25-30	80-95	75-90	45-80	25-65	10-20	NP-5
	6-14	Shaly clay loam, shaly sandy clay loam, shaly loam.	SC, CL	A-6, A-2	10-15	65-80	60-75	50-70	30-60	25-40	10-20
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Madonna	0-16	Loam	SM	A-4	0	90-100	85-100	65-75	40-50	15-25	NP-5
	16-23	Loam, fine sandy loam.	SM. ML, CL-ML, SM-SC	A-4	0	95-100	85-100	55-90	40-60	15-30	NP-10
	23	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
153*: Maymen	0-6	Stony loam	SM, ML	A-2, A-4	25-30	80-95	75-90	45-80	25-65	10-20	NP-5
	6-14	Shaly clay loam, shaly sandy clay loam, shaly loam.	SC, CL	A-6, A-2	10-15	65-80	60-75	50-70	30-60	25-40	10-20
	14	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unifiad	AASHTO		4	10	40	200		
	In				Pct					Pct	
154----------	0-9	Sandy loam------	SM	A-2, A-4	0	80-100	75-100	55-65	30-40	15-25	NP-5
Maymen Variant	9-19	Gravelly sandy loam, sandy loam.	SM	A-2, A-1	0	70-80	65-80	40-50	20-35	15-25	NP-5
	19	Weathered bedrock.	---	---	---	---	---	---	---	---	---
155----------	0-16	Silt loam-------	CL-ML, CL	A-4, A-6	0	80-100	75-100	70-95	60-80	20-40	5-15
Mocho	16-60	Loam, silt loam, clay loam.	CL, CL-ML	A-4, A-6	0	80-100	75-100	70-100	65-85	25-40	5-20
156*, 157*, 158*:											
Nisene----------	0-10	Fine sandy loam	SM	A-2, A-4	0-5	90-100	75-100	45-85	25-50	20-30	NP-5
	10-58	Sandy clay loam, clay loam.	SC, CL	A-6	0-5	85-100	75-100	50-95	40-75	25-40	10-20
	58	Weathered bedrock.	---	---	---	---	---	---	---	---	---
Aptos----------	0-23	Fine sandy loam	CL-ML, CL	A-4, A-6	0-5	85-100	75-100	70-90	50-60	25-35	5-15
	23-29	Sandy clay loam, clay loam, loam.	SC, CL	A-6	0-5	85-100	75-100	50-95	35-80	25-40	10-20
	29	Weathered bedrock.	---	---	---	---	---	---	---	---	---
159, 160----------	0-38	Gravelly sandy loam.	SM	A-1, A-2	0	60-80	50-75	30-55	15-35	15-30	NP-5
Pfeiffer	38-66	Gravelly coarse sandy loam, gravelly sandy loam, cobbly sandy loam.	SM, GM	A-1, A-2	0-20	55-90	50-75	20-60	15-30	15-30	NP-5
	66	Weathered bedrock.	---	---	---	---	---	---	---	---	---
161, 162, 163------	0-21	Loam----------	ML, CL-ML	A-4	0	95-100	90-100	85-95	50-75	20-35	5-10
Pinto	21-65	Sandy clay loam, clay loam, loam.	CL, SC	A-6	0-3	90-100	85-100	75-95	40-75	20-35	10-20
164*:											
Pits.											
Dumps.											
165.											
Riverwash.											
166----------	0-8	Sandy loam------	SM	A-4	0	100	95-100	60-70	35-45	15-25	NP-5
San Emigdio	8-26	Fine sandy loam	SM, ML	A-4	0	100	95-100	70-85	45-55	15-25	NP-5
Variant	26-60	Stratified very fine sandy loam to fine sand.	SM, ML	A-4	0	100	95-100	85-95	40-60	--	NP
167, 168, 169------	0-5	Shaly clay loam	GC,CH,CL	A-6, A-7	0	55-80	50-75	45-70	35-60	35-55	15-30
Santa Lucia	5-38	Very shaly clay loam.	GC	A-2	0	30-65	25-50	20-45	10-35	35-55	15-30
	38	----------	---	---	---	---	---	---	---	---	---
170, 171, 172------	0-21	Loam----------	CL-ML, CL	A-4, A-6	0	100	75-100	65-100	50-80	20-35	5-15
Soquel	21-37	Silt loam, loam	CL-ML, CL	A-4, A-6	0	100	75-100	65-95	50-75	20-35	5-15
	37-51	Silty clay loam, clay loam.	CL	A-6, A-7	0	100	75-100	75-100	60-85	30-45	10-20
	51-62	Loam----------	CL-ML, CL	A-4, A-6	0	80-100	75-95	55-90	50-70	20-35	5-15

See footnote at end of table.

TABLE 11.--ENGINEERING PROPERTIES AND CLASSIFICATIONS--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
173*:											
Sur	0-18	Stony sandy loam	GM	A-1	15-25	50-60	45-55	30-50	10-20	---	NP
	18-35	Stony sandy loam, very stony sandy loam.	GM	A-1	15-40	50-60	45-55	30-50	10-20	---	NP
	35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Catelli	0-7	Sandy loam	SM	A-2, A-4	0	95-100	75-100	45-75	25-40	15-25	NP-5
	7-37	Sandy loam, fine sandy loam, very fine sandy loam.	SM	A-2, A-4	0	95-100	75-100	50-90	25-50	15-25	NP-5
	37	Weathered bedrock.	---	---	---	---	---	---	---	---	---
174*, 175*:											
Tierra	0-14	Sandy loam	SM-SC, SM	A-4	0	90-100	80-100	55-75	35-50	15-25	NP-10
	14-66	Clay, clay loam, sandy clay.	CH, CL	A-6, A-7	0	100	85-100	70-100	50-95	35-55	15-30
Watsonville	0-18	Loam	ML	A-4	0	95-100	90-100	75-95	50-75	20-35	NP-10
	18-39	Clay, clay loam	CL, CH	A-7	0	95-100	90-100	85-100	65-90	40-60	20-35
	39-63	Sandy clay loam, clay loam.	SC, CL	A-6	0	95-100	90-100	70-90	40-75	25-40	10-20
176, 177	0-18	Loam	ML	A-4	0	95-100	90-100	75-95	50-75	20-35	NP-10
Watsonville	18-39	Clay, clay loam	CL, CH	A-7	0	95-100	90-100	85-100	65-90	40-60	20-35
	39-63	Sandy clay loam, clay loam.	SC, CL	A-6	0	95-100	90-100	70-90	40-75	25-40	10-20
178, 179, 180	0-26	Loam	ML	A-4	0	95-100	90-100	75-95	50-75	20-35	NP-10
Watsonville	26-47	Clay, clay loam	CL, CH	A-7	0	95-100	90-100	85-100	65-90	40-60	20-35
	47-63	Sandy clay loam, clay loam.	SC, CL	A-6	0	95-100	90-100	70-90	40-75	25-40	10-20
181*:											
Xerorthents.											
Rock outcrop.											
182, 183	0-30	Coarse sand	SM	A-2	0	100	100	50-75	10-30	---	NP
Zayante	30-60	Coarse sand, sand, fine sand.	SM	A-2	0	100	100	50-75	10-30	---	NP
184*:											
Zayante	0-30	Coarse sand	SM	A-2	0	100	100	50-75	10-30	---	NP
	30-60	Coarse sand, sand, fine sand.	SM	A-2	0	100	100	50-75	10-30	---	NP
Rock outcrop.											

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS

[The symbol < means less than; > means greater than. The erosion tolerance factor (T) is for the entire profile. Absence of an entry means data were not available or were not estimated]

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
100, 101, 102----	0-18	0.6-2.0	0.13-0.16	5.6-7.3	Low----------	0.28	2
Aptos	18-24	0.6-2.0	0.13-0.18	4.5-6.5	Moderate-------	0.20	
	24-36	0.6-2.0	0.09-0.12	4.5-6.5	Moderate-------	0.17	
	36	---	---	---	----------	---	
103.							
Aquents.							
104----------	0-17	6.0-20	0.07-0.10	5.6-7.3	Low----------	0.15	5
Baywood	17-61	6.0-20	0.06-0.09	5.6-7.3	Low----------	---	
105, 106, 107----	0-17	6.0-20	0.07-0.10	5.6-7.3	Low----------	0.15	5
Baywood	17-56	6.0-20	0.06-0.09	5.6-7.3	Low----------	---	
	56-61	6.0-20	0.04-0.05	5.6-7.3	Low----------	0.15	
108----------	0-10	6.0-20	0.06-0.08	6.1-7.3	Low----------	0.17	5
Baywood Variant	10-38	6.0-20	0.06-0.08	6.6-8.4	Low----------	0.17	
	38-55	0.06-0.2	0.17-0.19	7.9-8.4	Moderate-------	0.37	
	55-70	0.6-2.0	0.09-0.11	6.6-7.3	Low----------	0.28	
109.							
Beaches.							
110, 111, 112----	0-19	2.0-6.0	0.10-0.12	5.6-7.3	Low----------	0.17	3
Ben Lomond	19-46	2.0-6.0	0.09-0.15	5.1-6.0	Low----------	0.17	
	46	---	---	---	----------	---	
113*:							
Ben Lomond------	0-19	2.0-6.0	0.10-0.12	5.6-7.3	Low----------	0.17	3
	19-46	2.0-6.0	0.09-0.15	5.1-6.0	Low----------	0.17	
	46	---	---	---	----------	---	
Catelli---------	0-7	2.0-6.0	0.10-0.13	5.6-7.3	Low----------	0.20	2
	7-37	2.0-6.0	0.10-0.13	5.6-6.5	Low----------	0.20	
	37	---	---	---	----------	---	
Sur----------	0-18	2.0-6.0	0.05-0.10	6.1-7.3	Low----------	0.10	1
	18-35	2.0-6.0	0.05-0.08	5.1-7.3	Low----------	0.10	
	35	---	---	---	----------	---	
114*, 115*:							
Ben Lomond------	0-19	2.0-6.0	0.10-0.12	5.6-7.3	Low----------	0.17	3
	19-46	2.0-6.0	0.09-0.15	5.1-6.0	Low----------	0.17	
	46	---	---	---	----------	---	
Felton----------	0-11	2.0-6.0	0.11-0.13	5.1-6.5	Low----------	0.17	2
	11-43	0.2-0.6	0.15-0.19	5.1-6.5	Moderate-------	0.28	
	43-63	0.6-2.0	0.12-0.14	5.1-6.0	Low----------	0.37	
	63	---	---	---	----------	---	
116, 117---------	0-11	0.6-2.0	0.14-0.18	5.6-7.3	Moderate-------	0.32	1
Bonnydoon	11	---	---	---	----------	---	
118*:							
Bonnydoon-------	0-11	0.6-2.0	0.14-0.18	5.6-7.3	Moderate-------	0.32	1
	11	---	---	---	----------	---	
Rock outcrop.							
119----------	0-7	0.06-0.2	0.12-0.16	6.6-8.4	High----------	0.24	5
Clear Lake	7-62	0.06-0.2	0.12-0.16	7.4-8.4	High----------	0.24	

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
120, 121--------- Conejo	0-7 7-65	0.6-2.0 0.2-0.6	0.15-0.17 0.14-0.18	6.6-8.4 7.4-8.4	Moderate------- Moderate-------	0.32 0.32	5
122-------------- Conejo	0-7 7-65	0.2-0.6 0.2-0.6	0.17-0.19 0.14-0.18	6.6-8.4 7.4-8.4	Moderate------- Moderate-------	0.28 0.32	5
123-------------- Cropley	0-28 28-45 45-60	0.06-0.2 0.06-0.2 0.06-0.2	0.13-0.17 0.13-0.17 0.13-0.17	6.1-8.4 6.6-8.4 6.6-8.4	High----------- High----------- High-----------	0.24 0.24 0.24	5
124, 125--------- Danville	0-17 17-29 29-65	0.2-0.6 0.06-0.2 0.2-0.6	0.14-0.17 0.12-0.16 0.12-0.17	6.1-7.3 6.1-7.3 6.1-7.3	Moderate------- High----------- Moderate-------	0.28 0.24 0.15	5
126, 127--------- Diablo	0-30 30-59 59	0.06-0.2 0.06-0.2 ---	0.14-0.19 0.14-0.19 ---	6.1-8.4 7.9-8.4 ---	High----------- High----------- ---	0.24 0.24 ---	3
128. Dune land.							
129, 130, 131---- Elder	0-23 23-60	0.6-2.0 0.6-2.0	0.10-0.15 0.10-0.15	5.6-7.3 5.6-7.8	Low------------ Low------------	0.32 0.32	5
132, 133, 134, 135---------- Elkhorn	0-21 21-61	2.0-6.0 0.2-0.6	0.10-0.14 0.16-0.18	5.6-7.3 6.1-7.3	Low------------ Moderate-------	0.32 0.28	5
136*: Elkhorn--------- Pfeiffer--------	0-21 21-61 0-24 24-66 66	2.0-6.0 0.2-0.6 2.0-6.0 2.0-6.0 ---	0.10-0.14 0.16-0.18 0.07-0.10 0.07-0.10 ---	5.6-7.3 6.1-7.3 6.1-7.3 6.1-7.3 ---	Low------------ Moderate------- Low------------ Low------------ ---	0.32 0.28 0.17 0.20 ---	5 3
137-------------- Fagan	0-32 32-60	0.2-0.6 0.06-0.2	0.14-0.20 0.14-0.20	5.6-7.3 5.6-7.3	Moderate------- High-----------	0.32 0.28	3
138-------------- Felton	0-11 11-43 43-63 63	2.0-6.0 0.2-0.6 0.6-2.0 ---	0.11-0.13 0.15-0.19 0.12-0.14 ---	5.1-6.5 5.1-6.5 5.1-6.0 ---	Low------------ Moderate------- Low------------ ---	0.17 0.28 0.37 ---	2
139*: Fluvaquentic Haploxerolls. Aquic Xerofluvents.							
140, 141--------- Hecker	0-9 9-23 23-41 41	2.0-6.0 0.6-2.0 0.6-2.0 ---	0.06-0.09 0.05-0.09 0.05-0.09 ---	5.6-7.3 5.6-6.5 5.6-6.5 ---	Low------------ Low------------ Low------------ ---	0.17 0.15 0.10 ---	3
142*, 143*, 144*: Lompico--------- Felton----------	0-5 5-37 37 0-11 11-43 43-63 63	2.0-6.0 0.6-2.0 --- 2.0-6.0 0.2-0.6 0.6-2.0 ---	0.13-0.16 0.15-0.18 --- 0.11-0.13 0.15-0.19 0.12-0.14 ---	6.1-7.3 4.5-6.0 --- 5.1-6.5 5.1-6.5 5.1-6.0 ---	Low------------ Moderate------- --- Low------------ Moderate------- Low------------ ---	0.28 0.17 --- 0.17 0.28 0.37 ---	2 2

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
145---------- Lompico Variant	0-10	0.6-2.0	0.13-0.15	5.6-7.3	Moderate-------	0.37	2
	10-14	0.2-0.6	0.16-0.18	4.5-6.0	Moderate-------	0.28	
	14-28	0.06-0.2	0.14-0.16	4.5-6.0	High----------	0.20	
	28	---	---	---	----------	---	
146, 147, 148---- Los Osos	0-19	0.6-2.0	0.14-0.17	5.6-6.5	Moderate-------	0.37	2
	19-36	0.06-0.2	0.12-0.16	5.6-7.3	High----------	0.28	
	36	---	---	---	----------	---	
149---------- Madonna	0-16	2.0-6.0	0.11-0.14	5.1-6.5	Low-----------	0.28	2
	16-23	0.6-2.0	0.11-0.14	5.1-6.0	Low-----------	0.37	
	23	---	---	---	----------	---	
150, 151--------- Maymen	0-6	0.6-2.0	0.08-0.12	5.1-6.5	Low-----------	0.20	1
	6-14	0.6-2.0	0.11-0.13	4.5-6.5	Moderate-------	0.24	
	14	---	---	---	----------	---	
152*:							
Maymen----------	0-6	0.6-2.0	0.08-0.12	5.1-6.5	Low-----------	0.20	1
	6-14	0.6-2.0	0.11-0.13	4.5-6.5	Moderate-------	0.24	
	14	---	---	---	----------	---	
Madonna---------	0-16	2.0-6.0	0.11-0.14	5.1-6.5	Low-----------	0.28	2
	16-23	0.6-2.0	0.11-0.14	5.1-6.0	Low-----------	0.37	
	23	---	---	---	----------	---	
153*:							
Maymen----------	0-6	0.6-2.0	0.08-0.12	5.1-6.5	Low-----------	0.20	1
	6-14	0.6-2.0	0.11-0.13	4.5-6.5	Moderate-------	0.24	
	14	---	---	---	----------	---	
Rock outcrop.							
154---------- Maymen Variant	0-9	2.0-6.0	0.10-0.13	5.6-6.5	Low-----------	0.24	2
	9-19	2.0-6.0	0.08-0.11	5.1-6.0	Low-----------	0.20	
	19	---	---	---	----------	---	
155---------- Mocho	0-16	0.6-2.0	0.14-0.17	7.4-8.4	Moderate-------	0.37	5
	16-60	0.2-0.6	0.14-0.18	7.4-8.4	Moderate-------	0.43	
156*, 157*, 158*:							
Nisene----------	0-10	2.0-6.0	0.09-0.13	6.1-7.3	Low-----------	0.20	3
	10-58	0.6-2.0	0.15-0.18	5.6-6.5	Moderate-------	0.20	
	58	---	---	---	----------	---	
Aptos----------	0-23	0.6-2.0	0.13-0.16	5.6-7.3	Low-----------	0.28	2
	23-29	0.6-2.0	0.13-0.18	4.5-6.5	Moderate-------	0.20	
	29	---	---	---	----------	---	
159, 160--------- Pfeiffer	0-38	2.0-6.0	0.07-0.10	6.1-7.3	Low-----------	0.17	3
	38-66	2.0-6.0	0.07-0.10	6.1-7.3	Low-----------	0.17	
	66	---	---	---	----------	---	
161, 162, 163---- Pinto	0-21	0.6-2.0	0.14-0.17	5.6-7.3	Low-----------	0.28	4
	21-65	0.06-0.2	0.09-0.11	5.1-7.3	Moderate-------	0.17	
164*:							
Pits.							
Dumps.							
165.							
Riverwash.							
166---------- San Emigdio Variant	0-8	2.0-6.0	0.13-0.15	7.4-8.4	Low-----------	0.32	5
	8-26	2.0-6.0	0.11-0.13	7.9-8.4	Low-----------	0.32	
	26-60	2.0-6.0	0.12-0.14	7.9-8.4	Low-----------	0.32	

See footnote at end of table.

TABLE 12.--PHYSICAL AND CHEMICAL PROPERTIES OF SOILS--Continued

Soil name and map symbol	Depth	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors	
						K	T
	In	In/hr	In/in	pH			
167, 168, 169----	0-5	0.6-2.0	0.10-0.14	5.1-7.3	Low----------	0.15	2
Santa Lucia	5-38	0.6-2.0	0.08-0.11	5.1-6.5	Low----------	0.10	
	38	---	---	---	----------	---	
170, 171, 172----	0-21	0.6-2.0	0.14-0.18	5.6-6.5	Moderate-------	0.43	5
Soquel	21-37	0.2-0.6	0.14-0.17	5.6-7.3	Moderate-------	0.43	
	37-51	0.2-0.6	0.17-0.19	5.6-7.3	Moderate-------	0.28	
	51-62	0.2-0.6	0.13-0.17	5.6-7.3	Moderate-------	0.37	
173*:							
Sur----------	0-18	2.0-6.0	0.05-0.10	6.1-7.3	Low----------	0.10	1
	18-35	2.0-6.0	0.05-0.08	5.1-7.3	Low----------	0.10	
	35	---	---	---	----------	---	
Catelli---------	0-7	2.0-6.0	0.10-0.13	5.6-7.3	Low----------	0.20	2
	7-37	2.0-6.0	0.10-0.13	5.6-6.5	Low----------	0.20	
	37	---	---	---	----------	---	
174*, 175*:							
Tierra----------	0-14	0.6-2.0	0.09-0.13	5.6-7.3	Low----------	0.32	1
	14-66	<0.06	0.02-0.04	5.1-7.3	High----------	0.28	
Watsonville-----	0-18	0.6-2.0	0.14-0.17	5.6-7.3	Low----------	0.28	3
	18-39	<0.06	0.02-0.04	5.6-8.4	High----------	0.28	
	39-63	0.06-0.2	0.04-0.06	5.6-8.4	Moderate-------	0.24	
176, 177---------	0-18	0.6-2.0	0.14-0.17	5.6-7.3	Low----------	0.28	3
Watsonville	18-39	<0.06	0.02-0.04	5.6-8.4	High----------	0.28	
	39-63	0.06-0.2	0.04-0.06	5.6-8.4	Moderate-------	0.24	
178, 179, 180----	0-26	0.6-2.0	0.14-0.17	5.6-7.3	Low----------	0.28	3
Watsonville	26-41	<0.06	0.02-0.04	5.6-8.4	High----------	0.28	
	41-63	0.06-0.2	0.04-0.06	5.6-8.4	Moderate-------	0.24	
181*:							
Xerorthents.							
Rock outcrop.							
182, 183---------	0-30	6.0-20	0.04-0.08	5.1-6.0	Low----------	0.10	5
Zayante	30-60	6.0-20	0.04-0.08	4.5-7.3	Low----------	0.10	
184*:							
Zayante---------	0-30	6.0-20	0.04-0.08	5.1-6.0	Low----------	0.10	5
	30-60	6.0-20	0.04-0.08	4.5-7.3	Low----------	0.10	
Rock outcrop.							

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--SOIL AND WATER FEATURES

[The definition of "water table" in the Glossary explains the terms "apparent" and "perched." The symbol > means more than. Absence of an entry indicates that the feature is not a concern]

Soil name and map symbol	Hydrologic group	High water table			Bedrock		Risk of corrosion	
		Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
		Ft			In			
100, 101, 102----- Aptos	C	>6.0	---	---	20-40	Rippable	High--------	High.
103. Aquents.								
104, 105, 106, 107----- Baywood	A	>6.0	---	---	>60	---	Moderate----	Moderate.
108----- Baywood Variant	B/D	2.0-4.0	Perched	Nov-Mar	>60	---	High--------	Low.
109. Beaches.								
110, 111, 112----- Ben Lomond	B	>6.0	---	---	40-60	Rippable	Moderate----	Low.
113*:								
Ben Lomond-------	B	>6.0	---	---	40-60	Rippable	Moderate----	Low.
Catelli----------	B	>6.0	---	---	20-40	Rippable	Moderate----	Moderate.
Sur---------------	B	>6.0	---	---	20-40	Hard	Moderate----	Moderate.
114*, 115*:								
Ben Lomond-------	B	>6.0	---	---	40-60	Rippable	Moderate----	Low.
Felton-----------	B	>6.0	---	---	40-72	Rippable	High--------	High.
116, 117---------- Bonnydoon	D	>6.0	---	---	10-20	Rippable	Moderate----	Low.
118*:								
Bonnydoon--------	D	>6.0	---	---	10-20	Rippable	Moderate----	Low.
Rock outcrop.								
119----- Clear Lake	D	3.0-6.0	Apparent	Dec-Mar	>60	---	High--------	High.
120, 121, 122----- Conejo	B	>6.0	---	---	>60	---	High--------	Moderate.
123----- Cropley	D	>6.0	---	---	>60	---	High--------	Low.
124, 125---------- Danville	C	>6.0	---	---	>60	---	High--------	Moderate.
126, 127---------- Diablo	D	>6.0	---	---	40-60	Rippable	High--------	Low.
128. Dune land.								
129, 130, 131----- Elder	B	>6.0	---	---	>60	---	Moderate----	Moderate.
132, 133, 134, 135----- Elkhorn	B	>6.0	---	---	>60	---	Moderate----	Low.

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	High water table			Bedrock		Risk of corrosion	
		Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
		Ft			In			
136*: Elkhorn	B	>6.0	---	---	>60	---	Moderate	Low.
Pfeiffer	B	>6.0	---	---	40-66	Rippable	Moderate	Low.
137--- Fagan	C	>6.0	---	---	40-65	Rippable	High	High.
138--- Felton	B	>6.0	---	---	40-72	Rippable	High	High.
139*: Fluvaquentic Haploxerolls.								
Aquic Xerofluvents.								
140, 141--- Hecker	B	>6.0	---	---	40-60	Rippable	Moderate	Moderate.
142*, 143*, 144*: Lompico	B	>6.0	---	---	20-40	Rippable	High	High.
Felton	B	>6.0	---	---	40-72	Rippable	High	High.
145--- Lompico Variant	C	>6.0	---	---	20-40	Rippable	High	High.
146, 147, 148--- Los Osos	C	>6.0	---	---	20-40	Rippable	High	Moderate.
149--- Madonna	C	>6.0	---	---	20-40	Rippable	Moderate	Moderate.
150, 151--- Maymen	D	>6.0	---	---	10-20	Hard	Moderate	Moderate.
152*: Maymen	D	>6.0	---	---	10-20	Hard	Moderate	Moderate.
Madonna	C	>6.0	---	---	20-40	Rippable	Moderate	Moderate.
153*: Maymen	D	>6.0	---	---	10-20	Hard	Moderate	Moderate.
Rock outcrop.								
154--- Maymen Variant	C	>6.0	---	---	12-20	Rippable	High	High.
155--- Mocho	B	>6.0	---	---	>60	---	High	Low.
156*, 157*, 158*: Nisene	B	>6.0	---	---	40-60	Rippable	Moderate	Moderate.
Aptos	C	>6.0	---	---	20-40	Rippable	High	High.
159, 160--- Pfeiffer	B	>6.0	---	---	40-66	Rippable	Low	Low.
161, 162, 163--- Pinto	C	>6.0	---	---	>60	---	High	Moderate.
164*: Pits.								

See footnote at end of table.

TABLE 13.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	High water table			Bedrock		Risk of corrosion	
		Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
		Ft			In			
164*: Dumps.								
165. Riverwash.								
166---------- San Emigdio Variant	B	>6.0	---	---	>60	---	High--------	High.
167, 168, 169----- Santa Lucia	C	>6.0	---	---	20-40	Hard	High--------	High.
170, 171, 172----- Soquel	B	>6.0	---	---	>60	---	Moderate----	Moderate.
173*: Sur----------	B	>6.0	---	---	20-40	Hard	Moderate----	Moderate.
Catelli----------	B	>6.0	---	---	20-40	Rippable	Moderate----	Moderate.
174*, 175*: Tierra----------	D	>6.0	---	---	>60	---	High--------	Moderate.
Watsonville------	D	1.5-3.0	Perched	Nov-Mar	>60	---	High--------	High.
176, 177, 178, 179, 180--------- Watsonville	D	1.5-3.0	Perched	Nov-Mar	>60	---	High--------	High.
181*: Xerorthents.								
Rock outcrop.								
182, 183---------- Zayante	A	>6.0	---	---	>60	---	Moderate----	High.
184*: Zayante----------	A	>6.0	---	---	>60	---	Moderate----	High.
Rock outcrop.								

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Aptos	Fine-loamy, mixed, mesic Pachic Ultic Argixerolls
Baywood	Sandy, mixed, thermic Entic Haploxerolls
Baywood Variant	Sandy over clayey, mixed thermic Fluventic Haploxerolls
Ben Lomond	Coarse-loamy, mixed, mesic Pachic Ultic Haploxerolls
Bonnydoon	Loamy, mixed, thermic, shallow Entic Haploxerolls
Catelli	Coarse-loamy, mixed, mesic Ultic Haploxerolls
Clear Lake	Fine, montmorillonitic, thermic Typic Pelloxererts
Conejo	Fine-loamy, mixed, thermic Pachic Haploxerolls
Cropley	Fine, montmorillonitic, thermic Chromic Pelloxererts
Danville	Fine, montmorillonitic, thermic Pachic Argixerolls
Diablo	Fine, montmorillonitic, thermic Chromic Pelloxererts
Elder	Coarse-loamy, mixed, thermic Cumulic Haploxerolls
Elkhorn	Fine-loamy, mixed, thermic Pachic Argixerolls
*Fagan	Fine, montmorillonitic, thermic Typic Argixerolls
Felton	Fine-loamy, mixed, mesic Ultic Argixerolls
Hecker	Loamy-skeletal, mixed, mesic Mollic Haploxeralfs
Lompico	Fine-loamy, mixed, mesic Ultic Argixerolls
Lompico Variant	Fine, montmorillonitic, mesic Ultic Palexerolls
Los Osos	Fine, montmorillonitic, thermic Typic Argixerolls
Madonna	Fine-loamy, mixed, mesic Dystric Xerochrepts
Maymen	Loamy, mixed, mesic Dystric Lithic Xerochrepts
Maymen Variant	Mixed, mesic, shallow Dystric Xerochrepts Loamy
Mocho	Fine-loamy, mixed, thermic Fluventic Haploxerolls
Nisene	Fine-loamy, mixed, mesic Pachic Ultic Argixerolls
Pfeiffer	Coarse-loamy, mixed, thermic Typic Haploxerolls
Pinto	Fine-loamy, mixed, thermic Typic Argixerolls
San Emigdio Variant	Coarse-loamy, mixed (calcareous), thermic Typic Xerofluvents
Santa Lucia	Clayey-skeletal, mixed, thermic Pachic Ultic Haploxerolls
Soquel	Fine-loamy, mixed, mesic Cumulic Haploxerolls
Sur	Loamy-skeletal, mixed, mesic Entic Haploxerolls
Tierra	Fine, montmorillonitic, thermic Mollic Palexeralfs
Watsonville	Fine, montmorillonitic, thermic Xeric Argialbolls
Zayante	Sandy, mixed, mesic Entic Xerumbrepts

*The Fagan soil is a taxadjunct to the series. See text for a description of those characteristics of this soil that are outside the range of the series.

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