ENVIRONMENTAL RESOURCES AND

CONSTRAINTS INVENTORY

Adopted by the San Benito County Board of Supervisors July 26, 1994

ENVIRONMENTAL RESOURCES AND CONSTRAINTS INVENTORY

SAN BENITO COUNTY BOARD OF SUPERVISORS

Mike Graves, Chair, District 5
Richard Scagliotti, District 1
Ruth Kesler, District 2
Rita Bowling, District 3
Curtis Graves, District 4

Adopted by San Benito County Board of Supervisors on July 26, 1994 by Resolution 94-89

SAN BENITO COUNTY PLANNING COMMISSION

Jack Kent, Chairman
Murrill Conley
Bob Cruz
Pat Loe
John Shelton

Approved by San Benito County Planning Commission on June 15, 1994 by Resolution 94-12

SAN BENITO COUNTY PLANNING DEPARTMENT STAFF

Rob Mendiola, Director of Planning
Mary Paxton, Advanced Planning

TABLE OF CONTENTS

LIST OF CHARTS

LIST OF TABLES

LIST OF TABLES continued

LIST OF FIGURES

LIST OF FIGURES continued

APPENDICES

ENVIRONMENTAL RESOURCES AND CONSTRAINTS INVENTORY

The Open Space/Conservation Element Plan of the San Benito County General Plan identifies ten categories of open space. Some of the categories include resources that need to be protected while other categories pertain to areas with hazards that pose a constraint to development. This Environmental Resources and Constraints Inventory provides the technical background material for each category of open space. The categories are summarized below. Other issues that fall in the purview of analysis for General Plans but are not specifically listed as categories of open space are discussed such as air quality.

1. Public and private open space
2. Noise buffers
3. Soils
4. Slope/Erosion/Fault hazard/Landslide
5. Fire hazard
6. Water resources/wetlands
7. Flood Hazard
8. Wildlife
9. Septic tank limitations
10. Mineral lands
11. Cultural resources

BACKGROUND

San Benito County has a total land area of about 1,389 square miles, or 888,924 acres. Located in the California Coast Range, its westernmost tip is within ten miles of Monterey Bay, while its easternmost tip is approximately the same distance from the San Joaquin Valley. Physiographically, its most striking features are the Diablo and Gabilan Mountain Ranges and the valleys between them. Elevations range from 80 feet near Aromas in the northwest portion of the County to 5,241 feet at the peak of San Benito Mountain in the southeast (U.S. Geological Survey Map NJ 10-12).

For the purposes of the General Plan, the County has been divided into two general areas - North County and South County (see Figure 1). The two incorporated cities and the majority of the unincorporated population reside within the North County area.

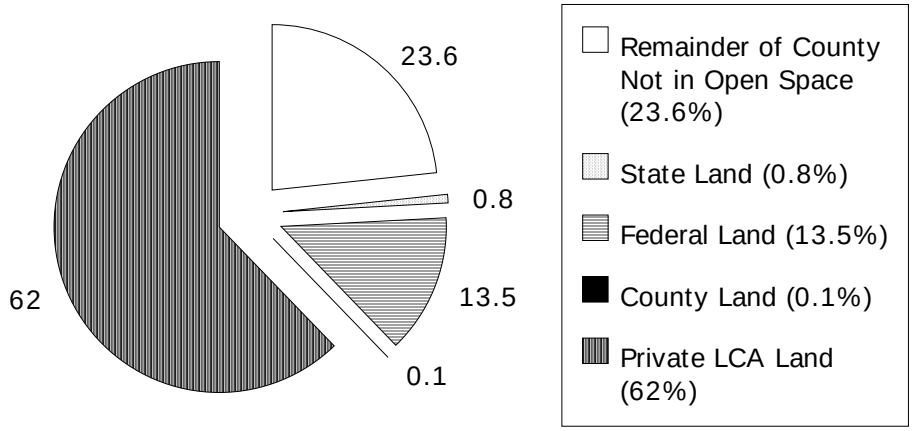
CATEGORY 1 EXISTING PUBLIC AND PRIVATE OPEN SPACE

About 77% of San Benito County is currently in some form of public or private open space. The majority of the open space lands are in private ownership as Williamson Act contract land (see Chart 1).

Public Lands: Public open space areas take the form of national and state parks, county parks, and public domain lands. The government lands are subjected to a wide variety of uses ranging from no public admittance in areas such as Paicines and Hernandez Reservoirs to heavy recreational uses at Bolado Park. Table 1 indicates that 14.68% of the unincorporated County is government-owned open space areas with the majority of public open space lands as federally owned land (93%). Public lands are available for a variety of recreational uses which are summarized in Table 2 and the locations are illustrated on Figure 2.
on Figure 2.

INSERT FIGURE 1 - PLANNING AREAS OF COUNTY

CHART 1
OPEN SPACE LANDS IN SAN BENITO COUNTY



Private Open Space: The vast majority of open space on private lands is Williamson Act Contract lands (see Chart 1). Williamson Act Land (Land Conservation Act - LCA) encompasses 582,079 acres of public and private lands. About 76% of the Williamson Act land is in private ownership and makes up approximately 62% of the County. The predominant other private open space land use in the County is private recreation facilities.

Private Recreation The majority of the open space recreational uses on private land are camping facilities (see Table 3 and Figure 3). The exceptions are the Ridgemark Golf and Country Club, Pioneer Park in the San Juan Canyon, Frazier Lake Airpark, and hunting clubs.

Williamson Act Contract (LCA) Property owners that participate in the LCA program sign 10-year contracts that give up the right to develop their agricultural land for urban/suburban uses during the period of the contract. In exchange, property owners benefit from reduced property tax assessment. The contract is automatically renewed every year unless the contract is terminated by non-renewal, cancellation, eminent domain or annexation to a city. The intent of the LCA program is to discourage the conversion of productive agricultural land to other uses. Figure 4 illustrates that there are large amounts of Williamson Act Contract lands in the north county planning area, particularly in the Diablo Mountain Range, the Lomerias Muertas/Flint Hills and the Gabilan Mountain Range.

TABLE 1

EXISTING GOVERNMENT OPEN SPACE LANDS

GOVERNMENT ENTITY	ACRES	PERCENT OF COUNTY
Federal		
Pinnacles National Monument	14055	
BLM Land	105403	
San Justo Reservoir	383	
Near San Justo Reservoir	118	
Subtotal	119959	13.50%
State		
Bolado Park	126	
Fremont Peak State Park	103	
Hollister Hills Off-Road Recreational	5320	
Buffer near Hollister Hills	1690	
Misc. State lands	2199	
Subtotal	9438	1.06%
County		
Griswold Hills	516	
Hernandez Reservoir	88	
Historical Park	33	
John Smith Landfill	57	
Other	116	
Subtotal	810	0.09
Other Agencies		
Water Agencies	211	
School Districts	113	
Subtotal	324	0.03%

Source: San Benito County Planning Department, 1992 Unasssessed Tax Rolls, County Assessor's Office

~~inserfigure 2~~

~~OMSERT figure 2~~

Public Recreation Areas

1. **Bolado Park Fairgrounds**
2. **Bolado Park Golfcourse**
3. **Bureau of Land Management Clear Creek Recreation Area**
4. **Hollister Hills State Vehicular Recreation Area**
5. **Fremont Peak State Park**
6. **Pinnacles National Monument**
7. **San Benito County Historical and Recreation Park**
8. **San Justo Reservoir**
9. **Veterans Memorial Park**
10. **Bureau of Land Management San Benito Mountain Natural Area**

~~INSERT TABLE 2~~

INSERT FIGURE 3

private recreation

INSERT table 3

private recreation

insert Figure 4 LCA lands

There are three categories of LCA contract lands: Open Space, Other Prime and Urban Prime. The Open Space category comprises the vast majority of LCA lands (90.5%) (see Chart 2 and Table 4). This land is predominantly suitable for grazing and dry farming and is the least productive of the three categories. Nearly 2.5% of the Open Space land is in "non-renewal" status. Table 5 indicates that the amount of land up for non-renewal in the North County area is disproportionately high at 88%.

The Other Prime category comprises 7.5% of the Williamson Act contract lands and consists of agricultural lands that are considered to be prime for grazing and the production of field, grain, fruit, nut, and row crops. Nearly six percent of the Other Prime land are in non-renewal status (see Table 5). Chart 2 and Table 4 indicate that 64% of the Other Prime lands are located in South County with the remaining 36% in the North County area. It is interesting to note that 83% of the contract cancellations for prime land are in the North County area (see Table 5).

Urban Prime lands comprise the smallest portion of LCA lands (1.5%) and are all located in the North County Area. These lands are among the most productive LCA lands in the County and are primarily suitable for the production of row, fruit, and nut crops. Nearly 39% of the lands in the Urban Prime category are in non-renewal status (see Table 5).

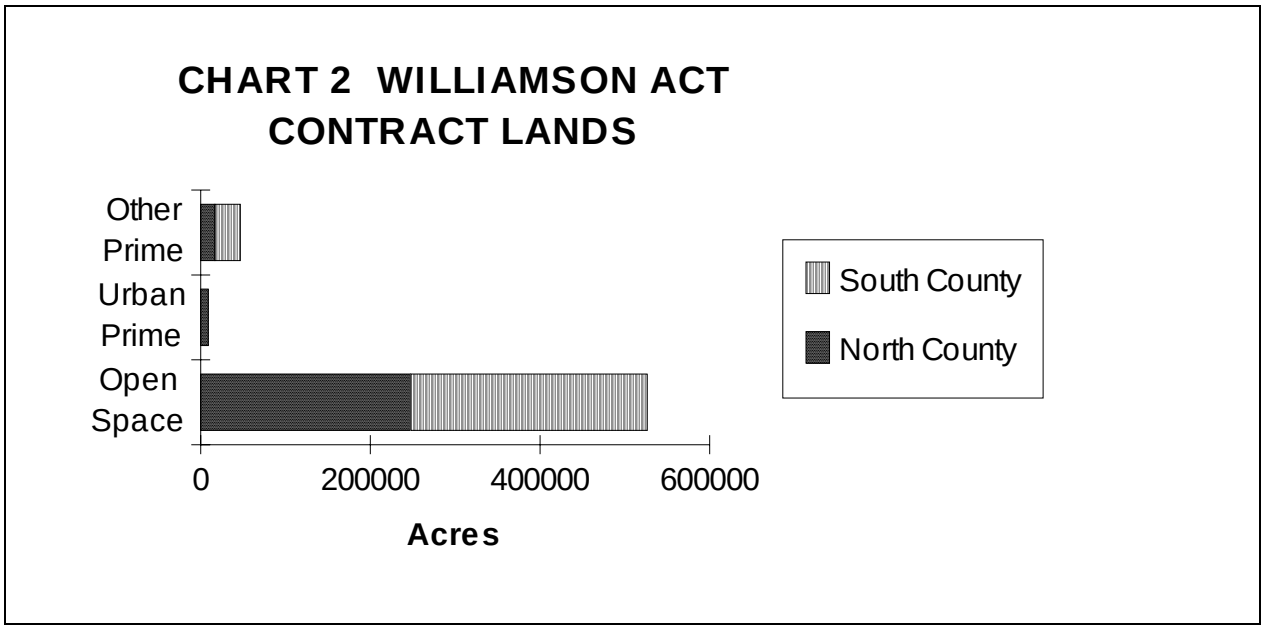


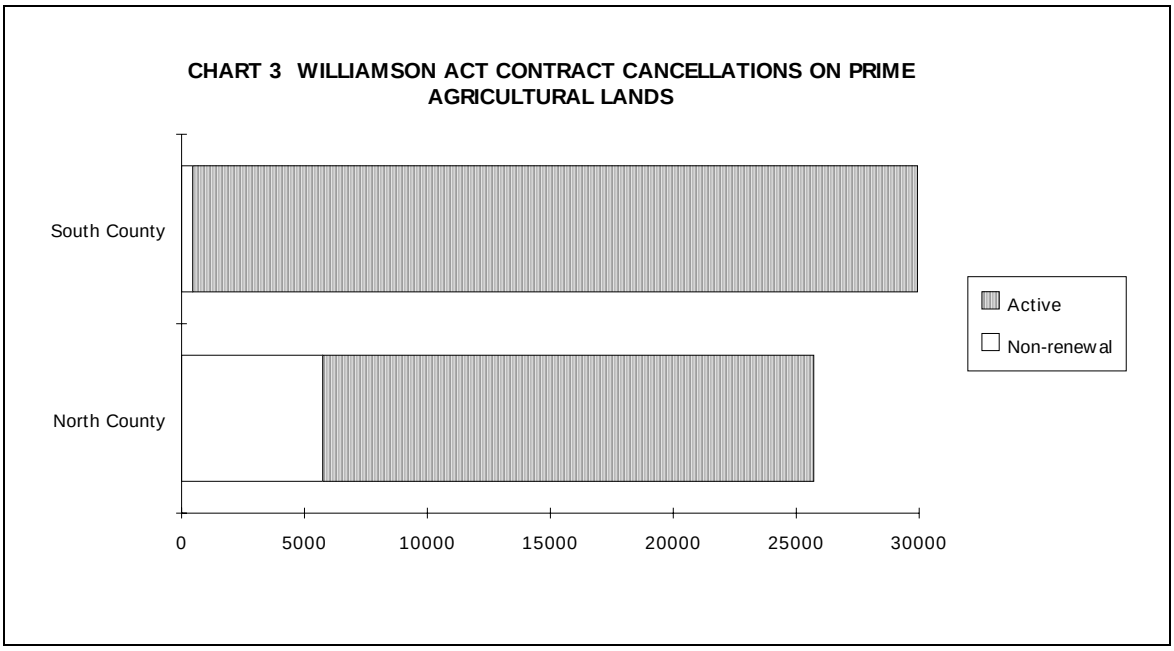
TABLE 4
Williamson Act Contract Lands by Area (in acres)

Type	North County	South County	Total County
Other Prime	16,769 (36%)	29,931 (64%)	46,700
Urban Prime	8,948 (100%)	0 (0%)	8,948
Subtotal Prime	25,717 (56%)	29,931 (54%)	55,648 (9.5%)
Open Space	247,615(47%)	278,816(53%)	526,431 (90.5%)
Total	273,332 (47%)	308,744 (53%)	582,079 (100%)

Sources: San Benito County Assessor's Office, listing of LCA contract land, 8/12/92 and San Benito County Planning Department

TABLE 5
Williamson Act Contract Lands Non-renewals (Acres)

Type	North County	South County	Total
Other Prime	2265 (83%)	459 (17%)	2,724
Urban Prime	3,477 (100%)	0	3,477
Subtotal Prime	5,742 (92.5%)	459 (7.5%)	6,201
Open Space	11,406 (88%)	1,628 (12%)	13,034
Total	17,148 (89%)	2,087 (11%)	19,235



CATEGORY 2 NOISE

Areas where the noise levels are equal to or greater than 60 decibels have been identified as a Category of Open Space in the San Benito County Open Space/Conservation Element and Noise Element. High noise levels may pose a constraint to some types of development which may be sensitive to noise levels such as residential subdivisions, hospitals and schools. Locations of high noise level areas include lands bordering State Routes 25, 129, and 156, U. S. Highway 101, quarries, Hollister Hills State Vehicular Recreation Area, and areas near the Hollister Municipal Airport.

The Renz acquisition for the Hollister Hills State Vehicular Recreation Area comprises 1,690 acres that were purchased by the State with the intent to help buffer noises between the motorcycle park and residences in the nearby Hidden Valley subdivision and along the Cienega Road corridor.

CATEGORY 3 SOILS

Agricultural Soil Resources: The following paragraph from the Soils Survey of San Benito County, California published by the United States Department of Agriculture, Soil Conservation Service in 1969 is still relevant over 20 years later:

> "Farming is the main source of income in San Benito County. The principal crops are fruits and nuts, vegetables and other row crops, and small grains. The raising of livestock, namely beef cattle and sheep, is also important. Lack of water is the main factor limiting production in this County. Where water is available, irrigated fields are intensively cropped. Ponds and reservoirs are used for watering livestock on range and pasture." (page 1)

=

In 1992, gross agricultural income in San Benito County amounted to $132 million dollars. Table 6 indicates that when the effect of food processing, marketing, trucking, and related services is factored, agriculture contributed $409 million dollars to the local economy. Chart 4 shows that nearly half of the gross agricultural income (49%) was from vegetable and row crops cultivated on an estimated 13,400 acres of land (about 3,600 acres were double-cropped). An additional 9,233 acres were used for the cultivation of fruit and nut crops. These crops yield the highest revenues per acre of land (see Chart 5).

The types of crops and commodities produced in San Benito County has changed in response to ever-changing market conditions. Appendix A documents patterns of cultivation and animal production over the past 30 years.

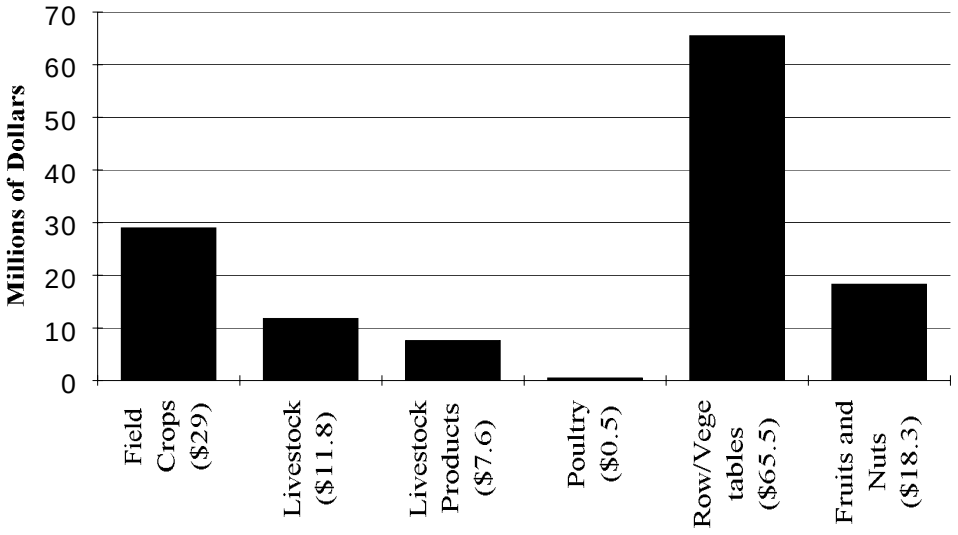
TABLE 6
ECONOMIC VALUE OF AGRICULTURE IN SAN BENITO COUNTY
(Based on 1992 Crop Report)

Agricultural Sector	Gross Value(1)	Economic Multiplier(2)	Value with Multiplier
Dairy Farm Products	1,790,000	2.8571	5,114,209
Poultry and Eggs	6,326,000	2.2989	14,542,841
Cattle	11,606,000	2.2774	26,432,000
Other Livestock Products	192,000	2.2135	425,000
Food/Feed Grains	1,017,000	2.4373	2,478,700
Hay and Pasture	7,158,000	2.3690	16,957,000
Fruits and Nuts	18,268,000	3.7183	67,926,000
Vegetables	65,523,000	3.3496	219,476,000
Sugar/Misc/Seed	2,236,000	2.9986	6,705,000
Nursery Products	18,598,000	2.6457	49,205,000
Total	132,714,000		409,261,750

(1) 1992 Agricultural Crop Report, San Benito County, Office of the Agricultural Commissioner, 1993, Hollister, California

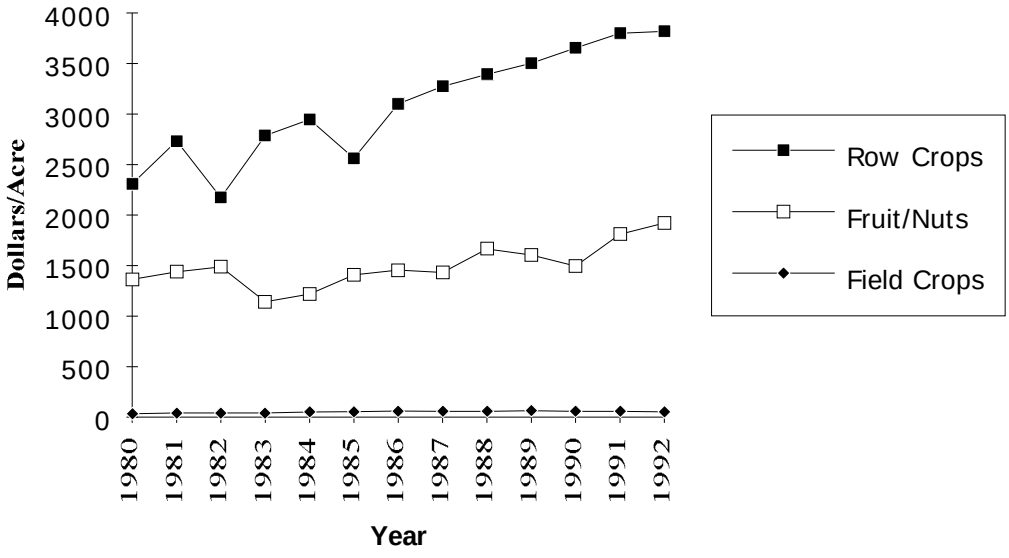
(2) George Goldman and Vijay Pradhan, "San Benito County: Impacts of Agricultural Sectors", Agricultural and Resource Economics, University of California at Berkeley, December 1992.

CHART 4
DOLLAR VALUE OF AGRICULTURAL PRODUCTS IN 1992



Source: Office of the Agricultural Commissioner, 1992 Agricultural Crop Report, San Benito County, CA

CHART 5
DOLLAR PER ACRE VALUE OF CROPS IN SAN BENITO COUNTY



Source: Office of Agricultural Commissioner, Agricultural Crop Reports 1980 - 1992
San Benito County, California

Description and Extent of Soils Figure 5 illustrates the more productive agricultural soils within San Benito County. These soils, found on terraces, alluvial fans and flood plains, include most of the farmland within the County. These lands occupy approximately 15% of the total land area. The Soil Conservation Service has identified five major soil associations in this group. Of the five associations, the Sorrento-Yolo-Mocho Association and the Clear Lake-Pacheco-Willows Association are the most productive and intensively cultivated soils in the County (see Figure 5). These two associations alone make up approximately nine percent of the total land area of the County.

The Edenvale-Conejo Association and the Panoche-Los Banos-Panhill Association represent an additional four percent of the land area and are potentially highly productive soils. However, according to the Soil Conservation Service, the lack of irrigation water limits the use of these soils and is available only in parts of the associations.

The remaining association, the Rincon-Antioch-Cropley Association, is used for fruits, nuts, row, and field crops. Erosion is a problem on these soils in areas where it is more sloping, and in some places the irrigation water is of poor quality due to the high boron content. This soil association represents approximately 2.6% of the land area.

Perhaps it is most important to note the percentage of productive agricultural land that each association represents. Table 7 groups the associations (from A to C) according to their limitations and provides information with respect to the percentage of productive agricultural land, the total aerial extent as compared to the County, and the number of acres.

TABLE 7
SOIL GROUPINGS

LAND GROUP	ASSOCIATION	PERCENT OF COUNTY	ACRES	PERCENT OF AGRI-CULTURAL
A	Sorrento-Yolo-Mocho	6	53,610	39
A	Clearlake-Pacheco-Willows	3	26,800	20
B	Edenvale-Conejo	0.70	6,250	4
B	Panoche-Los Banos-Panhill	3	26,800	20
C	Rincon-Antioch-Cropley	2.60	23,230	17
TOTALS		15.30	136,690	100

Source: TERRA-SOL, LTD., 1980

The two soil associations making up Group A represent almost 60% of the productive agricultural land within the County. These associations are shown in Figure 5. It can be seen that approximately three-fourths of the productive agricultural land is located north of Tres Pinos to the County line and from Hollister west to Highway 101, in the San Juan

16

Valley. The remainder of these soils are located in Bear, Topo, Paicines, and Bitterwater Valleys and in the area of San Benito.

Portions of the Clearlake-Pacheco-Willows and the Rincon-Antioch-Cropley associations near Fairview Road (north and northeast of Hollister) have shallow root zones (less than 20 inches) making them suitable for row crops and hay, but not for any crops requiring deep soils (Personal communication: Phil Fitzbuck, Planning Director, San Benito County, May 1980).

The soil associations in the Soil Survey of San Benito County are further divided into specific soil types. Table 8 lists soil types in San Benito County with a Storie Index rating of 80 or better. These soils are listed as Grade 1 soils and are considered to have few or no limitations that restrict their use for agricultural crops. Grade 1 soils are considered by San Benito County to be the highest priority for protection. These soils overlay 8.1% of the developed and undeveloped areas of the County. At least 35% of the Grade 1 soils are located outside of the Zone 6 benefit area (see discussion of water resources for explanation of Zone 6 benefit area). Figure 6 illustrates general areas where there are large concentrations of Grade 1 soils (Ausuymas/Spring Grove, Bolsa/Hudner Lane, Hollister vicinity, Paicines, San Juan Valley, Southside Road corridor, Panoche Valley, Bitterwater Valley, Topo Valley, and San Benito Valley). By comparing Figures 3 and 6 it is noteworthy that many of the areas with concentrations of Grade 1 soils in the North County Planning area are not included in Williamson Act Contracts for protection.

Prime agricultural lands are considered to be most highly productive for the production of row, fruit, and nut crops. There are a variety of legislative definitions for prime agricultural lands with some variation. Two governmental agencies have defined and mapped lands considered to be prime in San Benito County, the United States Department of Agriculture, Soil Conservation Service and the State of California Department of Conservation. All of the Grade 1 soil types listed in Table 8 are considered to be the highest priority for protection by the County. Areas mapped as prime by the USDA and SCDC are available for public review at the County Planning Department.

CATEGORY 4: UNSTABLE SOILS/FAULT HAZARDS/LANDSLIDE

Unstable Soils:

Slope Slopes in excess of 30% are considered to be a development hazard in San Benito County. Appendix B lists soil types based on the Soils Survey of San Benito County that are or have the potential for slope hazard. Chart 6 illustrates that an estimated 33% of the County has average slopes equaling or exceeding 30%, an additional 19% has slopes on portions of the land that pose a constraint to development (15% to 50%, or 15% to 75%). The majority of the areas with steep slopes are along the two mountain ranges that straddle the County on the west and east, the Gabilan Range and the Diablo Range, the Cienega Del Gabilan, as well as the Aromas hills and the Lomerias Muertas - Flint Hills.

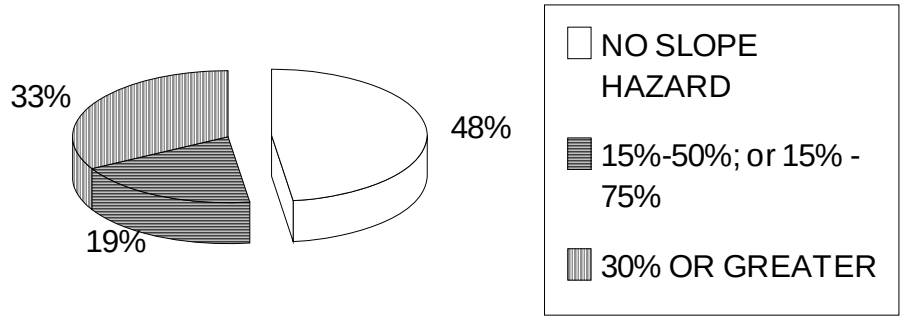
TABLE 8
IMPORTANT AGRICULTURAL LAND IN SAN BENITO COUNTY
(Grade 1 Soils with Storie Index Rating of 80 or Better)

SOIL TYPE	STORIE INDEX	ACRES	WITHIN ZONE 6
Botella loam, 0-2% slopes (BoA)	95	480	No
Botella loam, 2-9% (BoC)	90	330	No
Docas silt loam, 0-2% (DoA)	95	1,165	No
Docas silt loam, 2-9% (DoC)	90	1,920	No
Docas clay loam, 0-2% (DsA)	81	1,405	No
Kettleman loam, 5-15% (KeD)	81	4,155	No
Metz sandy loam, 0-2% (MeA)	90	1,605	Yes(1)
Mocho loam, 0-2% (MpA)	100	1,440	No
Mocho loam, 2-9% (MpC)	95	1,090	No
Mocho clay loam, 2-9% (MsC)	81	305	No
Mocho sandy loam, 0-2% (MoA)	95	220	No
Mocho sandy loam, 2-9% (MoC)	90	495	No
Panhill loam, 2-9% (PhC)	95	3,615	No
Panoche loam, 0-2% (PlA)	100	7,030	No
Panoche loam, 2-9% (P1C)	95	1,855	No
Panoche sandy loam, 0-2% (PkA)	95	2,415	No
Panoche sandy loam, 2-9% (PkC)	90	2,260	No
Pleasanton loam, 2-5% (PtB)	85	3,885	Yes(1)
Reiff sandy loam, 0-2% (ReA)	90	3,495	Yes(1)
Reiff sandy loam, 2-9% (ReC)	85	2,095	Yes(1)
Rincon loam, 0-2% (RnA)	85	505	Yes(1)
Rincon loam, 2-9% (RnC)	81	2,355	Yes(1)
Salinas clay loam, 0-2% (SaA)	81	1,660	Yes(1)
Sorrento silt loam, 0-2% (SnA)	100	7,865	Yes(1)
Sorrento silt loam, 2-9% (SnC)	95	5,655	Yes(1)
Sorrento silty clay loam, 0-2% (SrA)	85	9,650	Yes(1)
Sorrento silty clay loam, 2-9% (SrC)	81	2,475	Yes(1)
Yolo loam, 0-2% (YoA)	90	1,370	No
Subtotal		72,795	

(1) This soil type also occurs outside of Zone 6 of the San Benito County Water District
Source: United States Department of Agriculture, Soil Conservation Service, In Cooperation with University of California Agricultural Experiment Station, Soils Survey of San Benito County (1969)

insert figure 6

CHART 6 SLOPE HAZARDS



Source: Soils Survey of San Benito County, 1969

Erosion Erosion is a normal, ongoing process that should be considered in land use planning. Major problems can be avoided if the process is understood. The erosion potential throughout the valley floors of San Benito County is low. Moderate potential exists on lower slopes at the sides of valleys, while the mountainous areas on either side are highly erodible. Stream bank erosion may occur during periods of high water. During floods, waterborne sediment may be deposited on valley floors, principally within the flood plain.

Erosion is a serious problem in two distinct, but closely related aspects. On the one hand, it depletes a very valuable natural resource and on the other, it produces sediment, which is one of the most damaging factors to the economy and the environment. Thus, when one addresses the problem of erosion, one should consider not only the removal of material from one site, but also its deposition at another.

Erosion can be a major problem when the natural cover of the soil has been disturbed. Loss of topsoil can occur within a few days or even hours if a slope is left uncovered during the rainy season. This can cause severe problems for not only the land owner, but the County, as topsoil frequently ends up in streets, storm drains and on adjacent property. Erosion also causes siltation in streams, restricting the recharge ability and frequently damaging aquatic life.

Soil erosion may result from natural causes, such as rainstorms, windstorms and geologic disturbances, or from man's activities. The construction of roads and driveways, building pads and other improvements during the normal course of development for residential, commercial or industrial property exposes topsoil to the elements, which may erode it.

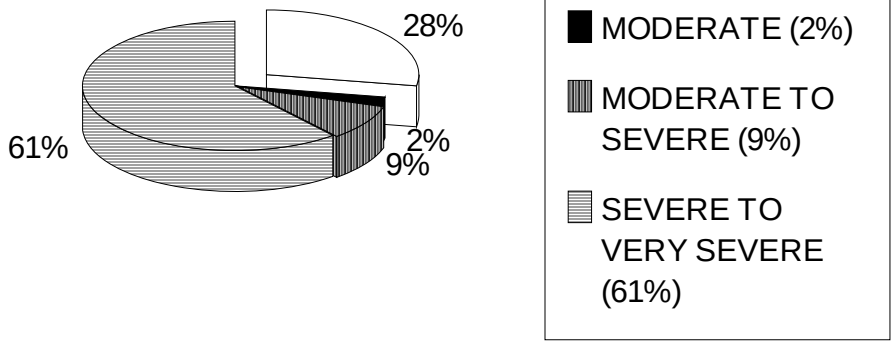
Erosion prevention measures include limitation of land uses, restrictions on grading during the rainy season, as well as grading and land engineering practices designed to prevent erosion problems and land sliding. The reduction of erosion losses is the responsibility of the developer, who modifies the land surface, as well as the governmental agency, which reviews and regulates land modification.

It is the County's responsibility to require landscaping plans, detailed erosion control plans (such as grading plans) and details on the construction of retaining walls and drainage systems. The County is then responsible for inspecting the work as it is constructed and giving final approval to a successfully completed project.

Evaluation of Erosion Hazards The soils located on terraces, alluvial fans and flood plains generally have little or no erosion problems. Gullying and erosion does, of course, occur on some of the more sloping soils within these areas. The low, slight, and moderate categories represent approximately 28% of the County. Approximately two percent of the County is ranked by the Soil Conservation Service as having moderate erosion potential and nine percent as having moderate to severe erosion potential (See Chart 7 and Appendix C). These soils, which are made up of the San Benito-Gazos-Linne Association and the Sheridan-Cienega-Auberry Association, are located along the westerly boundary of the County and extend from the north all the way to the southerly extremities through the center.

Approximately 61% of the County is considered to have severe to very severe erosion hazards. The potential for severe erosion is concentrated along the easterly boundary of the County, with smaller areas west of Hernandez Valley in the Clear Creek area and around Red Mountain. Some extensive areas for significant soil erosion are present west, south, and north of San Juan Bautista and all of the Aromas area.

CHART 7 EROSION HAZARDS



Source: Soils Survey of San Benito County, 1969

Sesimic Hazards: The County is bordered by the Diablo Range to the east and the Gabilan Range to the west. The two urban centers, San Juan Bautista and Hollister, are located on the nearly flat valley floor between these ranges, in the northern portion of the County. The valley floor is underlain by geologically young, unconsolidated stream deposits. The floor gives way to low foothills and predominantly slopes to the west and east. These older deposits have been locally modified by renewed surface erosion. The higher and steeper mountain areas of the two mountain ranges are underlain by a variety of semiconsolidated to consolidated bedrock materials.

San Benito County, like most of California, is in a highly active seismic area. The probability of a major earthquake occurring in the near future is a factor with which we must live. Communities in California are particularly vulnerable to earthquakes because of the very active San Andreas Fault system, which is capable of generating large, destructive earthquakes. The San Andreas Fault has been mapped from the northern portion of the County, a short distance east of Aromas diagonally through the entire length of the County, passing immediately east of San Juan Bautista and emerging at the southern border of the County, approximately 3.5 miles west of Priest Valley.

The Hayward/Calaveras Fault passes through Santa Clara County and enters San Benito County at San Felipe Lake, terminating at a point just south of Hollister. Numerous other faults, both named and unnamed, have been mapped within the County. Some of these faults are active; others have had no movement observed on them during recorded history. Faults considered active are shown on Earthquake Fault Zone maps and are available for public review at the County Planning Department.

Other geologic hazards in the Planning Area include landslides, soil erosion and deposition, flooding and expansive soils.

The first tasks in any seismic assessment is to identify and characterize the faults that will most likely generate significant earthquakes. The San Andreas Fault extends the full length of the county. The Hayward/Calaveras Fault extends from immediately south of Hollister through the northern portion of the County on into the San Francisco Bay Region. Both of these fault systems have about equal potential to produce damage. The greater length of the San Andreas Fault suggests that it is capable of generating larger earthquakes than the Hayward/Calaveras Fault.

Earthquakes on the San Andreas Fault were assigned a Probable Intensity Distribution ranging from magnitude 6.0 to 8.3 in a report entitled "A Study of Earthquake Losses in the San Francisco Bay Area "(Algermissen, 1972). The projected Intensity Distributions are largely based on observed intensity patterns of the 1906 San Francisco earthquake.

Variations of intensity will occur from place to place, due to local variations in the geologic and soils conditions. This is especially true for areas such as Hollister and San Juan Bautista, where the earth materials vary in thickness, consolidation, grain size, sorting and water saturation.

Earthquakes of different magnitudes along the San Andreas system will not only create different intensities of ground shaking, but will also generate earthquakes with different frequencies, accelerations, velocities and durations. These characteristics are very important parameters for design of earthquake resistant structures and, like intensities, they are commonly controlled by the dynamic properties of rock and soil along with transmission path of the seismic waves.

Active faults within the State of California have been of such importance that the Legislature passed Chapter 7.5, Division 2 of the California Public Resources Code, which required that the State Geologist provide Earthquake Fault Zone Maps to delineate areas of known active faulting. Numerous other studies have been undertaken by state and federal agencies. With few exceptions, these studies either show faulting at a very small scale with little detail or at a very large scale with great detail. The County Planning Department maintains a library of completed special study reports that have been prepared for specific developments.

One study, the 1973 Geology of California Maps prepared by the California Division of Mines and Geology, is at a scale identical to that used for the General Plan (1" = 4 miles).

In order of decreasing potential for loss of life and property damage, earthquake hazards in San Benito County include ground shaking, ground failure, ground rupture and inundation.

Ground Shaking Earthquake-generated ground shaking, in many instances, causes the most widespread earthquake damage (Nichols, 1974). This phenomenon is considered to be potentially the most hazardous in many areas. It affects the greatest number of people and is present, to some extent, in all earthquakes. Ground shaking is also one of the most difficult of earthquake hazards to predict or quantify.

In a broad sense, the severity of ground shaking appears to be related to the firmness of the ground. Areas underlain by thick, saturated, unconsolidated sediments, such as those found in the Hollister and San Juan Valleys, will experience greater shaking motion than areas underlain by firm bedrock. In other words, ground shaking will have a lesser affect on buildings and persons in areas of hard granite than it will on buildings and persons located on thick beds of sand or other unconsolidated sediments.

Additional factors in the assessment of ground shaking severity and associated damage include the magnitude of the earthquake, the acceleration, the number of shocks, the duration of the shocks, the distance from the epicenter, the structural integrity of the building and the relationship between the waves or vibrations of the ground motion and the fundamental period of the building. The fundamental period of the ground movement is controlled by the local geologic and hydrologic conditions. Damage is particularly likely to occur when the natural vibration or period of a building is similar to that of the soil deposit on which it is constructed. Damage to structures is caused by the transmission of earthquake waves from the ground into the structure and back again.

Attempting to predict how the ground surface at any given location will react to an event such as a maximum probable earthquake (the largest earthquake which can be reasonably expected to occur in the foreseeable future) is a difficult and complex undertaking. Within the San Benito County area, detailed data on the dynamic properties of the surface and sub-surface earth materials are insufficient to precisely define ground surface response to the maximum probable event. The seismic response of unconsolidated alluvium and soils is so highly variable that, even with good sub-surface data, it is difficult to accurately predict the ground surface acceleration.

Based upon physical characteristics within San Benito County, some general observations can be made. In general, more damage from ground shaking can be expected in areas underlain by thick, unconsolidated, fine-grained, water soaked alluvial sediments than an area underlain by firm, dry rigid bedrock, which in turn is covered by a very thin soil.

Ground water conditions would appear to fluctuate locally and this will strongly influence the intensity of ground shaking. Where ground water is shallow, the alluvial materials will be saturated and thus will respond to earthquakes more severely.

Ground Failure Earth materials in a natural condition tend to reach an equilibrium over a long period of time. In geologically active areas there are many regions where earth materials have not yet reached a natural state of stability. In addition, man's activities tend to make earth materials less stable and increase the chances of ground failure. Some of the natural causes of instability are earthquakes, weak materials, erosion, and rainfall. Human activities which contribute to instability include oversteepening of slopes by undercutting or overloading them with artificial fill, extensive irrigation and poor drainage. Groundwater withdrawal with removal of stabilizing vegetation can also contribute to the instability of earth materials (Nichols 1974). These everyday causes of failure can produce landslides or settling and are enhanced during earthquakes by the strong ground motion which results in rapid changes in these materials.

Various processes and phenomena are grouped within the general classification of ground failure. These include landsliding, liquefaction, lateral spreading, lurch cracking, differential settlement, and bedrock shattering. All of these involve a displacement of the ground surface due to a loss of strength or failure of underlying materials during ground shaking.

Landslides and liquefaction are the two most likely forms of ground failure to occur in San Benito County. Ground displacement along the Calaveras or San Andreas Fault is taking place daily. This form of movement, called "creep", is not usually damaging to structures on a catastrophic basis. Over long periods of time however, damage to foundations, roads, sidewalks, and utilities does occur.

Liquefaction, the temporary loss of strength recognized as a "quick" condition, can result in ground failure. Liquefaction has been known to adversely affect buildings even

when the beds which liquefy are located at depths of 30 and 40 feet. Structures may rotate or slowly sink into the soil.

In more urbanized areas of Hollister and San Juan Bautista water levels vary from 80 to over 200 feet. Areas of perched water could bring water levels much closer to the surface and increase the potential for liquefaction.

Some local areas in San Benito County, where ground water is near the surface, are vulnerable to this problem. In such areas, during a large earthquake, building foundations may sink or tilt several feet into the underlying soil. Differential ground subsidence may occur or slope failure may take place along unsupported slopes, such as creek banks or road cuts.

Lateral Spreading is the horizontal displacement of flat lying alluvial materials toward an open or "free" face, such as the steep bank of a stream channel or river bank. This movement is due to failure, perhaps liquefaction, of one or more layers of alluvium exposed in the free face.

Lurching is also referred to as ground fissuring or ground cracking. It is the fracturing and displacement of the ground surface, sometimes resulting in local subsidence and further ground fracturing. Lurch cracking is sometimes due to local liquefaction of sub-surface materials.

Some risk of lateral spreading and lurch cracking exists along the banks of the San Benito River and many of the tributaries to the river.

Landslides involve a downslope movement of soil or rock materials and can range from rock falls to earth flows. Earthquake-induced landslides will occur generally in the same areas as landslides induced by other natural forces. The addition of earthquake energy may induce landslides that otherwise might not have occurred.

Regardless of the source, landslides are due to the failure of either surficial material or, in some cases, bedrock. Failures usually result from a combination of factors including unstable or weak rock and soil materials, adversely oriented geologic structures, insufficient vegetative cover, high water content, over steepened slopes, or high slope angles.

Urban development can affect landslide potential by increasing slope angles, removing downslope supporting earth materials, adding weight upslope of fill or construction, and the addition of water by gardening, septic tank effluent, or the directing of surface drainage into unstable areas. The Soils Survey of San Benito County indicates that landslide areas cover about 7,730 acres or 0.9 percent of the County. The area northeast of San Juan Bautista, known as the Sargent Anticline (a portion of Flint Hills) is an excellent example of an unstable area which contains landslides resulting from both earthquake generated forces, man-made forces, and the addition of rain water. A second large unstable area is west of the San Benito River and Thomas Road in the Cienega Del

Gabilan Rancho. The Swanson Bluff, an area southwest of the Tres Pinos Creek and Panoche Road (near Elkhorn Ranch) are two other notable landslide areas. (State of California, Special Studies Zones, Chittenden Quadrangle 1982, Tres Pinos Quadrangle 1986, Paicines Quadrangle 1986, and Cherry Peak Quadrangle 1986). Maps of these landslide hazard areas are available for public review at the San Benito County Planning Department. The County has entered into a landslipe mapping project for northern San Benito County. The maps should be available in the next few years.

Ground Rupture The San Andreas and Calaveras Fault Zones are considered to be active faults in San Benito County. (The term "active" for this report is the same as the one officially adopted by the State Mining Geology Board with reference to the Alquist-Priolo Geologic Hazard Zones Act that includes faults that have moved within the last 11,000 years.)

In compliance with the Alquist-Priolo Geologic Hazard Zones Act, the California Division of Mines and Geology has established Fault Hazard Zones along fault traces considered active or potentially active. Special studies relating to earthquakes are required before development within these zones can occur. Detailed official maps of one inch equals 2,000 feet are available for viewing at the Planning Department.

Vertical and horizontal displacement has occurred along both the San Andreas and Calaveras Faults. It is reasonable to assume that displacement will occur along these faults in the future.

Fault creep, that is the slow but steady movement along a fault zone, has deformed numerous streets, curbs, gutters, and homes in the community of Hollister. Creep along the San Andreas Fault is visible in the San Juan-Hollister Road area just east of The Alameda in San Juan Bautista. Continuous repairs are required both on state and county roads as a result of this slow, but damaging, movement.

Landslide Splash Hazards (Seiche) If a large earthquake generated landslide should enter the Hernandez, San Justo Reservoir, or any of a number of privately owned reservoirs, a wave could be generated that could damage shoreline development and possibly overtop the dam. Factors to be considered in a site-by-site evaluation should include the length of time that the reservoir is full or nearly full, the depth of the water, and the configuration of the water surface, as well as the downstream topography.

Although the chance of the complete failure of the Hernandez Reservoir is remote, it does exist. Little damage is likely to occur due to the remote location of the dam. However, proposals for development in the area should include an analysis of the potential for inundation damage.

In the Seiche analysis for the San Justo Dam, it was concluded to be unlikely that a seismic induced wave would overtop the dam face (Kiran Adhya, P.E., Technical Memorandum No. JU-230-2, Seiche Analysis Due to Strong Ground Motion, San Justo

Dam Central Valley Project California, January 6, 1984, Bureau of Reclamation Division of Dam and Waterway Design).

CATEGORY 5 FIRE HAZARDS

Hazardous Fire Areas: As in most of California, San Benito County has a Mediterranean type climate, with mild winters and hot, dry summers that combine with rugged mountains and limited access to make fire control difficult.

Much of the vegetation in San Benito County consists of brush or chaparral. That, in combination with oak grassland and hot, dry, and windy conditions during summer and fall months, does present critical fire hazards. Natural vegetation, which makes pleasant surroundings for homesites, is extremely flammable.

Wildfires take a heavy toll in lost vegetation and damage to watersheds and viewsheds as urban uses encroach on wildlands. Structural damage becomes an ever increasing possibility. Much of the loss might be avoided through the identification of risk areas and the corresponding application of strict building regulations with respect to siting and construction materials.

The value of watershed lands is discussed under Category 6, Water Resources. In addition to its capacity for receiving and passing water into surface and ground water tables, these lands are valuable for recreational use, which is becoming more and more important to our society. Wildlands are prime recreational areas and host a wide range of outdoor sports and activities, including hunting, fishing and motorcycle riding.

Fuel, climate, accessibility, and slope are factors which are used to determine fire hazard areas. The California Department of Forestry and Fire Protection (CDF) provided San Benito County with maps showing areas of moderate, high, very high, and extreme fire hazard in State Responsibility Areas (SRA) in 1988. The SRA is where wildland fire protection service is provided by CDF. These maps also illustrate Local Responsibility Areas (LRA) where fire protection services are provided by local government. The County contracts with the CDF for fire protection in the LRA. That information has been compiled on Figure 7 for northern San Benito County. A set of 37 detailed maps is on file with Planning Department and should be used for site specific determination of fire hazard.

Fire hazard does not preclude development. However, it must be considered an area of important constraint. The accessibility of an area has direct correlation with fire hazards.

The County should recognize that the approval of urban and rural developments, even on large acreage lots, when they are far removed from County services such as police and fire protection, will directly increase the costs and hazards to persons living within the County.

Fire Safety: The San Benito County fire service is composed of the following regularly organized public agency fire organizations within two zones (see Table 9). The boundaries of Zone 1 are nearly coterminous with the boundaries of the Local Responsibility Area (LRA) depicted on Figure 7. Fire protection services within Zone 1 include fire protection, emergency medical and hazardous material control services for suburban and urban service levels.

TABLE 9 - FIRE PROTECTION AGENCIES AND ZONES

Zone 1	Acres
City of Hollister Fire Department	3,840
County of San Benito/CDF (1)	58,000
City of San Juan Bautista Volunteer Fire Department	640

Zone 2	Acres
Aromas Tri-County Fire Protection District	17,560
County of San Benito/CDF (2)	808,884

(1) Structural fire protection services for San Benito County are provided on a contract
basis with the California Department of Forestry (CDF).
(2) BLM contracts with CDF for wildland and structural fire protection on about 112,000 acres.

Fire protection for 58,000 acres in the unincorporated area, outside cities, is primarily the responsibility of the County and is designated Local Responsibility Area the State Board of Forestry. These lands typically comprise the valley floor around Hollister. Structural fire protection is primarily the County's responsibility. The location of existing fire protection facilities in the County is illustrated on Figure 8. The appropriate fire protection agency should have early input to all development proposals with regard to public fire safety matters.

The California Department of Forestry (CDF) has responsibility for wildland fires within the unincorporated areas of the County identified as State Responsibility Area. CDF administers the San Benito County Fire Department under contract with the County. The San Benito County operational fire service is composed of all County fire districts and the

State Department of Forestry. The Ranger Unit Chief, California Department of Forestry in Monterey, is designated as the Chief of the San Benito County fire department and is the area coordinator of the State O.E.S. fire and rescue operations.

The San Benito County Fire Protection Master Plan sets an objective to have the first engine respond to a fire incident within five minutes in Zone 1 90% of the time. All other fire suppression resources required as a "first alarm assignment" in Zone 1 should arrive within 10 minutes at 90% of the incidents (Fire Loss Management Systems, San Benito County Fire Protection Master Plan, June 21, 1991, Section II, page 5). Figure 9 illustrates the existing five minute and 10 minute response time areas for Zone 1 and that it is difficult to meet the objective in many areas.

Zone 2 covers most of the State Responsibility Area and is a rural/wildland fire zone. This is predominantly the rural and southern portions of the County. Fire protection and life safety services in Zone 2 are provided through a combination of built-in fire protection, risk reduction, and other self-help safety programs. The California Department of Forestry is charged by Section 4125 of the Public Resources Code with providing wildland fire protection on lands having natural resource value as designated by the State Board of Forestry. There are 825,373 acres of State Responsibility Areas within San Benito County. Typically, these lands are the grass, brush and timber covered hills. The CDF has statutory responsibility for wildland fire protection in about 808,884 acres of Zone 2.

Within Zone 2, there are two agencies that also provide or contract for fire protection. The Aromas Tri-County Fire Protection District in the northwest corner of the County provides structural and wildland fire protection. The CDF provides wildland fire protection on a contract basis to the BLM. Development within Zone 2 must comply with the Public Resource Code 4290.

The San Benito County Fire Protection Master Plan establishes an objective for a performance standard of having the first engine arrive at the scene of a fire incident within 15 minutes of notification 90% of the time. All resources should arrive at a fire incident for "first alarm assignment" within 25 minutes at 90% of the incidents. This objective may be acheived in some areas but is unrealistic in others.

Facilities Planning The need for additional fire protection facilities has been identified in the San Benito County Fire Master Plan (op. cit. Section IV, pages 14 and 15). Table 10 lists the general location and type of facilities needed. To date, a funding source has not been established to construct and staff the facilities.

TABLE 10
NEEDED FIRE FACILITY IMPROVEMENTS

Facility Improvement Needed	General Location	Approximate Time Frame
Hollister Area		
Fire station 3	North County	Seven Years
Upgrade existing station/Paid on-call company (POC)	Tres Pinos	Indefinite
San Juan Bautista Area		
Fire station 2	San Jaun Bautista area	Five Years
Volunteer station/POC	San Juan Canyon area	Two Years
South County		
Fire station 1	Southeast County	Two Years
Volunteer company	Pinnacles	Two Years

Source: Fire Loss Management Systems, *San Benito County Fire Protection Master Plan*, June 21, 1991, Mountain View, California.

CATEGORY 6 WATER RESOURCES

The State of California is divided into regions that are responsible for water quality, implementing state law, and preparing basin plans. Figure 10 illustrates that the majority of the County is within the Central Coast Region. Most of the eastern portions of the County are located within two subbasins of the San Joaquin Region - the San Joaquin and Tulare Lake subasins.

Water Districts: There are five public water districts in the unincorporated area of the County, the Aromas Water District, Pacheco Pass Water District, Sunnyslope County Water District, San Benito County Water District and Tres Pinos Water District. The Aromas Water District provides water service to unincorporated residences in the community of Aromas (see Figure 11). The district serves a tri-county area (Monterey, San Benito and Santa Cruz).

The Pacheco Pass Water District operates a dam and reservoir located in Santa Clara County, which serves the northeastern part of the irrigated land in San Benito County. The area is roughly north of Comstock Road.

9

10

11

The Sunnyslope County Water District provides sewer and water service to the unincorporated area east of Hollister, the Ridgemark development, and incorporated properties east of Memorial Drive in Hollister. The District is in the process of drilling new wells to increase its capacity. Figure 12 illustrates the present District boundaries.

The Tres Pinos Water District provides sewer and water service to the community of Tres Pinos (see Figure 13). The district presently has transmission and water capacity limitations and there is a moratorium for new development.

The San Benito County Water District (see Figure 14) is responsible for the administration of the United States Bureau of Reclamation San Felipe Water Project (see discussion of Groundwater Recharge - page 40).

Groundwater Resources Groundwater is the primary source of water for domestic and agricultural uses within the County. Any plan for land use or conservation requires consideration of water: how to get it, how to use it and how to dispose of it. Every new subdivision will require domestic water and facilities to dispose of wastewater. Every industrial site requires provisions for both potable water and for processing and/or cooling water. County and city parks need water for visitors, landscape maintenance, wastewater disposal and often-times for recreational purposes.

Urbanization has brought with it a host of new demands on natural resources and the physical environment. Problems involving water as a vital resource and a powerful environmental agent are among the most critical that planners will have to consider. These problems include the maintenance of both the quantity and quality of the water supply in San Benito County. The major responsibility in planning is for the maintenance of water for recreation, general welfare and the alleviation of hazards caused by floods, drainage, erosion, and sedimentation.

There are a potential 28 groundwater basins in San Benito County. The vast majority are located along streambanks and in small valleys. There is relatively little knowledge of the extent and range of groundwater resources in most of the groundwater basins. Table 11 indicates that many of the basins may not be definable groundwater basins and that water resources are probably limited to domestic or stock uses. The general locations of the larger basins are depicted on Figure 15.

Several of the groundwater basins extend into other counties. At the northwest tip of San Benito County the Pajaro Valley (Aromas) basin extends into Santa Cruz County. Located at the northern portion of San Benito County, the Pacheco Creek Valley lies mostly in Santa Clara County. Two of the groundwater basins in the southeastern area of the County are part of the San Joaquin Groundwater Basin - the Little Panoche Valley and Vallecitos Creek.

Two basins at the southern tip of the County extend into Monterey County, the Peachtree Valley and the Priest Valley basins.

12

13

1414

15

Within San Benito County the major groundwater resources that have been studied in the most detail are the North County Basins which cover the Bolsa, Hollister, and San Juan Valley basins.

TABLE 11
GROUND WATER BASINS

Ground Water Basin	Square Miles
North Planning Area	
Aromas Subbasin	10
Cienega Valley	3 *
North County Basins	
Quien Sabe Valley	7 *
Pacheco Creek Valley	*
Paicines	
San Benito River/Tres Pinos Creek	10
Santa Ana Valley	4 *
Upper Santa Ana Valley	7 *
South Planning Area	
Antelope Valley	1 *
Bear Valley	3 *
Bitterwater Valley	9 *
Dry Lake Valley	4 *
Gloria Valley	2 *
Hernandez Valley	5 *
Las Aguilas	6 *
Los Mueritos Valley	2 *
Little Panoche Valley	51
Panoche Valley	50
Peach Tree Valley	4 *
Priest Valley	2 *
Topo Valley	5 *
Upper Tres Pinos Creek	36 *
Vallecitos Creek Valley	23 *

* May not be definable groundwater basin and the water resources are probably limited to domestic or stock uses

Source: Ludhorff & Scalmanini Consulting Engineers, San Benito County Ground-Water Investigation, October 1992)

North County Basins Fault systems may separate the North County basins into four sub-basins: the Bolsa, Hollister Valley, Hollister and San Juan Valley (see Figure 16). The Hollister Sub-basin is west of the Calaveras Fault and the Hollister Valley Sub-basin is situated east of the fault. The Bolsa and the San Juan Subbasins are both west of the Calaveras fault and are separated by the Sargent Anticline, extending along the ridge of

16

the Lomerias Muertas/Flint Hills. The northern boundary of the Basin is defined as the Pajaro River. South of Hollister is extensive faulting, complex geologic relationships, and limited groundwater data. For these reasons the San Benito River/Tres Pinos Creek subbasin is considered to be a separate smaller basin but contributes to the recharge of the Northern Groundwater basins (see Figure 16). Alluvium is the principal water bearing unit and consists primarily of unconsolidated or poorly consolidated deposits of clay, silt, sand and gravel, or loosely unconsolidated sandstone. Until recently it was believed that the fault systems impeded the movement of groundwater between the North County sub basins. Recent findings from the San Benito County Ground-Water Investigation (1992) by Luhdorff and Scalmanini indicate that the basins are hydrologically and hydraulically connected.

With the development of irrigation wells in 1878, a continuous process of "mining" of a natural resource in the northern basins has taken place. This continued pumping of groundwater from the 1870's to the late 1980's has significantly affected the direction of groundwater flow and has caused large cones of groundwater depression to form (U.S. Geological Survey, Page 18). In fact, ground water flow since the 1940's has literally reversed itself. In the 1940's groundwater flow was out of the Valley toward the Santa Clara area. Although it was once believed that the most significant amount of recharge was from subsurface flow from the Santa Clara County area (U.S. Geological Survey, page 18) testimony before the Department of Water Resources shows that only insignificant amounts of water crosses the Pajaro River into San Benito County. The major sources of recharge are creek beds (surface) and subsurface flows to the east and from surface and subsurface flows from the Flint Hills area into the Bolsa.

Safe Yield In 1991, the Board of Supervisors commissioned Ludhorff and Scalmanini, Consulting Engineers to develop "safe-yield" groundwater pumping estimates for the Northern Groundwater basins (Hollister, Hollister Valley, San Juan Valley, San Benito River and Tres Pinos Creek, and Bolsa) the Paicines, and Aromas basins (see Figure 16).

The term "safe yield" can vary depending upon whether "safe" applies to just water supply or whether ecosystems and adjoining water rights are considered. The following
chronology of definitions was summarized in the Ludhorff & Scalmanini report (Luhdorff & Scalmanini San Benito County Ground-water Investigation, page II-1, October 1991).

Date	Author	Definition
1915	Lee	"the limit to the quantity of water which can be withdrawn regularly and permanently without dangerous depletion of the storage reserve".
1923	Meinzer	"the rate at which water can be withdrawn from an aquifer for human use without depleting the supply to the extent that withdrawal at this rate is no longer economically feasible".

1946	Conkling	safe yield is an annual extraction of water which does not : 1) exceed average annual recharge, 2) lower the water table so that the permissible cost of pumping is exceeded, and 3) lower the water table so as to permit intrusion of water of undesirable quality.
1953	Banks	added a fourth condition to the Conkling definition for existing water rights
1959	Todd	"the amount of water which can be withdrawn from a ground water basin without producing an undesirable result".

North County Basins In the Ludhorff and Scalmanini report it was concluded that with average precipitation of 13.25 inches per year, an average of 16,000 acre-feet of San Felipe water per year, and an existing rate and pattern of use of 38,000 acre-feet per year (from domestic, and agricultural pumping) that long-term overdraft in the North County Basins will not occur. As San Felipe water deliveries increase to the contract entitlement of 43,800 acre-feet per year, and agricultural pumping decreases from supplemental water, groundwater storage will increase and groundwater levels will rise.

Paicines area Preliminary estimates from the Ludhorff and Scalmanini groundwater report indicate that there is a safe yield of 6,000 to 7,000 acre-feet per year in the Paicines area.

Aromas area Luhdorff and Scalmanini made a tentative estimate of "safe-yield" pumping of 675 acre-feet per year for the Aromas area. The tentative estimate was made due to the limited availability of data. The report concluded that "large increases (greater than 10 percent of the JMM [model] reported average total pumpage) in pumping in the Aromas area should be avoided until or unless detailed water level information can be adequately evaluated and a more accurate basis can be developed to evaluate ground-water conditions and "safe yield" in the area" (Ludhorff and Scalmanini Consulting Engineers, Letter of April 24, 1992, File No 90-1-084, from Joseph C. Scalmanini, Woodland, California).

Recharge and Watershed Areas: Sources of natural ground water recharge in the Hollister and San Juan Valleys are infiltration from streams, direct infiltration of rain and subsurface flows from surrounding areas, such as the Flint Hills. Although recharge from rain varies from year to year, the U.S. Geological Survey estimated that it could average from 20% to as much as 40% of the total available recharge from all sources. This figure indicates the value of surface water percolation and conversely, the inherent dangers with excessive covering of soils by impervious surfaces.

In the Northern Basins, ground water is derived mainly from rainfall and stream flow. The most likely source for stream flow recharge is from Arroyo dos Picachos, Santa Ana Creek, Tres Pinos Creek, and the San Benito River.

In the San Juan Subbasin, most of the ground water is inflow from areas immediately west of Hollister. Inflow from the San Benito River, rainfall, reclaimed wastewater and deep percolation from applied irrigation water comprise a large portion of this groundwater resource.

In the Bolsa Subbasin, recharge from surface sources is by rain and irrigation water that percolates into the soil. Some water may be derived from the Pajaro River, but the largest and most significant amount of recharge is from the surface and subsurface inflow from areas around the basin.

Artificial ground water recharge has a total of two major sources: percolation of captured storm water runoff and imported San Felipe Water.

According to the U.S. Geological Survey, "the results of the very limited study of the feasibility of artificial ground water recharge suggests that present stream channels are the best places for recharging the ground water reservoir" (U.S.G.S., page 30).

The Pacheco Dam is used by the Pacheco Pass Water District to augment recharge in Pacheco Creek during the spring and summer. The San Benito County Water District, through it's San Felipe Project, operates groundwater recharge outfalls in the Pacheco, Lone Tree, Los Viboras, Santa Ana, and Tres Pinos Creek as well as the San Benito River. The 18,700 acre foot Hernandez and 3,500 acre foot Paicines Reservoirs capture locally occurring rainfall and runoff for recharge into the San Benito River and Tres Pinos Creek during the drier months.

In 1976, the San Benito County Water District formed an area of benefit known as Zone 6. This 50,000 acre zone was formed to finance and construct a distribution system to bring imported San Felipe Project water into the County by the year 2037.

The San Benito County Water District is responsible for the operation and maintenance of the San Felipe Project, a division of the U.S. Bureau of Reclamation's Central Valley Project. The 10,000 acre foot San Justo Reservoir is a part of San Felipe Project facilities.
The San Benito County Water District's contract with the Bureau of Reclamation provides for an annual allocation of 35,550 acre feet of water for agricultural purposes and 8,250 acre feet for municipal and industrial uses, although, under certain conditions, agricultural supplies may be shifted to meet municipal and industrial needs. Based upon annual hydrologic conditions and environmental requirements, supply deficiencies may be imposed; however, municipal and industrial supplies receive a higher level of reliability.
During drought conditions, San Felipe deliveries from the Bureau of Reclmation were reduced (25% to 75%) for several years and similar reductions could occur in the future.

The San Felipe Project was designed to supplement existing groundwater supply. Since delivery of imported water began in 1987, nearly 9,000 acre feet of water has been

delivered through the distribution system and about 14,000 acre feet percolated into the underground.
Recent groundwater pumping data collected by the San Benito County Water District indicates that, on average, approximately 28,000 acre feet of water is pumped annually for agricultural purposes and about 6,500 acre feet is pumped for municipal and industrial uses.

As of March 1994, direct delivery and groundwater recharge of San Felipe Project water have contributed to an overall stabilization of groundwater levels within Zone 6. Future stabilization will be dependent upon water conservation programs, rainfall, land use development patterns, and possible reductions on the supply of imported water due to drought conditions. Stabilization has not occurred uniformly throughout the basin. In the Pacheco and East of the Calaveras fault areas, which are closest to the San Felipe distribution service area, groundwater levels have risen. The San Juan Basin has experienced a continued groundwater deficit (Creegan + D'Angelo, "San Benito County Water District 1991 - 1992 Water Year Groundwater Report 1993", page 4, March 8, 1993, Monterey, California.)

Another important water resource is the watershed lands of San Benito County (see Table 12). Watershed lands are important because they provide ground water regeneration for other water sources and habitat for wildlife. Brush and forest lands on steep terrain within the watershed should be managed so as to prevent excessive runoff and erosion damage downstream. The intrusion of urban land use on steep hillsides, in addition to being a fire hazard, presents definite problems with respect to siltation and erosion. Subsequent downstream damage can be difficult and expensive to repair.

Surface Water Resources San Benito County has limited surface water resources. Rivers and creeks cover an estimated 8,575 acres or .095% of the County but most flow intermittently (Soils Survey of San Benito County California, 1969). Figure 17 illustrates that waterbodies in San Benito County flow into one of five major drainage basins, the Pajaro River, the Salinas River Valley, the Elkhorn Slough, the Los Banos Reservoir, and the San Joaquin drainage basins.

The watercourses flowing to each drainage system are listed in Appendix D and major creeks and some tributaries are illustrated on Figure 18. The majority of the surface water resources ultimately drain into the Pajaro River including the Pajaro River, the San Benito River, Tres Pinos Creek, the Hernandez Reservoir, intermittent tributaries to the San Benito River, Tequisquita Slough, and Pacheco Creek, as well as intermittent lakes. San Justo Lake is located between San Juan Bautista and Hollister on the south side of Highway 156. San Felipe Lake, also known as Soap Lake is located just south of Highway 152, about 12 miles north of Hollister at the County line.

San Justo Reservoir, a 10,000 acre foot regulating and storage reservoir, is located between San Juan Bautista and Hollister along Union Road. Recreational activities including sailing, wind surfing, fishing and picnicking are allowed at the reservoir.

17

TABLE 12
WATERSHED LANDS BY SOIL TYPES

Soil Type	Acreage
Nacimiento clay loam, eroded NaF2	8,680
Nacimiento clay loam, eroded NaG2	3,155
Nacimiento loam, severely eroded, NcG3	12,140
Pinnacles coarse sandy loam PnG3	7,415
Riverwash	5,665
Santa Lucia shaly loam, eroded SdF2	3,045
Santa Lucia shaly loam, severely eroded SdG3	1,570
Sedimentary rock land, SeG	88,125
Shedd loam, eroded ShF2	4,395
Shedd loam, severely eroded ShF3	5,365
Sheridan coarse sandy loam, eroded, SkE2	6,735
Sheridan coarse sandy loam eroded, SkG2	11,860
Sheridan coarse sandy loam, severely eroded, SkG3	38,450
Vallecitos loam, eroded VaF2	23,015
Vallecitos loam, VaF	10,545
Vallecitos rocky loam, eroded, VrE2	575
Vallecitos rocky loam, eroded, VrF2	29,595
Total	260,330 (29%)

University of California Agricultural Experiment Station, Soils Survey of San Benito County (1969)

In 1962, the San Benito County Water District constructed Hernandez Dam and Reservoir on the San Benito River approximately 50 miles southeast of Hollister. This reservoir has
a capacity of 18,700 acre-feet and yields a ten year average of 12,200 acre-feet of water. Controlled releases are relocated into the San Benito River at the time of release or temporarily stored at the 3,500 acre-foot Paicines Reservoir for later release into Tres Pinos Creek. Surface water resources are shown in Figure 18.

In the southeastern area of San Benito County, the Panoche Creek is the predominant drainageway which drains to the San Joaquin Valley.

The southeastern portion of San Benito County drainage is comprised of many small creeks and Chalone Creek which are tributaries to the Salinas River Valley.

Water Quality The water quality within several streams and a lake in the County is in impaired or intermediate condition. The Central Coast Regional Water Quality Control Board has identified the water quality of Chalone Creek and Hernandez Reservoir as impaired. The Board has also categorized the water quality in Clear, Jamison, and Laguna
Creeks, and the San Benito and Pajaro Rivers as intermediate. Appendix E provides a list of waterbodies with water quality problems.

The watercourses flowing to each drainage system are listed in Appendix D and major creeks and some tributaries are illustrated on Figure 18. The majority of the surface water resources ultimately drain into the Pajaro River including the Pajaro River, the San Benito River, Tres Pinos Creek, the Hernandez Reservoir, intermittent tributaries to the San Benito River, Tequisquita Slough, and Pacheco Creek, as well as intermittent lakes. San Justo Lake is located between San Juan Bautista and Hollister on the south side of Highway 156. San Felipe, also known as Soap, Lake is located just south of Highway 152, about 12 miles north of Hollister at the County line.

San Justo Reservoir, a 10,000 acre foot regulating and storage reservoir, is located between San Juan Bautista and Hollister along Union Road. Recreational activities including sailing, wind surfing, fishing and picnicking are allowed at the reservoir.

In 1962, the San Benito County Water District constructed Hernandez Dam and Reservoir on the San Benito River approximately 50 miles southeast of Hollister. This reservoir has a capacity of 18,700 acre-feet and yields a ten year average of 12,200 acre-feet of water. Controlled releases are relocated into the San Benito River at the time of release or temporarily stored at the 3,500 acre-foot Paicines Reservoir for later release into Tres Pinos Creek. Surface water resources are shown in Figure 18.

The 1992 California State Water Quality Aaasssessment has identified the entire Panoche-Silver Creek watershed as impaired to aquatic life and by sedimentation and selenium. Figure 19 illustrates that the western and upper portions of the watershed are located in San Benito County. The Diablo Hills contain shale with relatively high concentrations of naturallly occuring selenium. Sediments carry selenium and salts downstream during flood periods to a perched, shallow acquifer where they are deposited and trapped. A CRMP -Coordinated Resource Management Planning has been formed to study and identify the extent of the problem, and develop a plan, implementation program and funding.

CATEGORY 7 FLOOD HAZARDS

Flood hazard maps are available for public review at the County Planning Department. Flood hazard areas are confined, for the most part, to agricultural, mineral and open space uses at this time.

The flood season generally lasts from November through April. Over 90% of the annual precipitation falls during these months. Statistically, January has been the wettest month.

More than just the quantity of rain affects flood levels. Natural obstructions to flood flows include trees, brush and other vegetation growing along stream banks in flood-way areas. Of particular hazard are man-made encroachments on or above the streams.

50

Bridges, culverts, and building pads are obvious examples and can create more extensive flooding than would otherwise occur.

During floods, debris may be washed and carried down the stream to collect on bridges and other obstructions. Bridges may be damaged or destroyed. Culverts may be plugged or debris may pile up, causing increased flood height due to backwater. As the flood increases, masses of debris may break loose and the accumulation of water and debris can surge downstream until another obstruction is encountered.

The flood prone areas are based on the 1991 National Flood Insurance Program Maps delineating flood hazard boundaries. These flood prone areas have a one-in-100 chance, of being inundated during any year, more commonly referred to as the 1% flood, or 100 year flood.

The flood-way is the channel of a stream that must be kept free from encroachment in order that a 100-year flood might be accommodated without substantial increase in flood height. The flood-ways in San Benito County are restricted almost entirely to areas immediately adjacent to either side of river and creek channels. In the northernmost portion of the County, the Pajaro River has the potential of inundating much larger areas, but as is shown on the map, most of the flood waters are expected to be contained within the Tequisquita Slough.

It is important that the County keep these designated flood areas free from encroachment in order to minimize future loss of life and property and enhance ground water recharge. Encroachment into the flood plain can be accommodated with proper mitigation, so long as the shift of flood waters does not increase adjacent flood-ways or flood plain areas. The Colby-Alquist Flood Plain Management Act of 1965 requires that local governments adopt regulatory measures which prevent encroachment into designated flood-ways as a prerequisite to state financial assistance in cost of land, easements and rights-of-way.

Fees are presently being collected for flood improvements in two areas of the County: Enterprise Road and San Felipe Lake. Fees for future improvements to San Felipe Lake are being collected from new development within the drainage area which includes both the City of Hollister and the unincorporated area within the drainage area.
In addition to exposure to flooding from overbank flow in local streams and rivers, portions of the County would be subject to inundation in the event of the failure of dams. These dams are considered to be safe by California Division of Dam Safety; however, state law requires maps to be prepared by dam owners indicating the extent of areas subject to inundation in the event of dam failure. Seismic stability studies are needed to provide information on the probability of dam failure due to seismic effects. A study for the San Justo Reservoir has been completed and is discussed in Category 4, Unstable Soils/Fault Hazards "Landslide Splash Hazards".

CATEGORY 8 WILDLIFE HABITAT

The preservation of wildlife habitat is the key to maintaining a healthy and abundant wildlife population. Wildlife habitats are increasingly being encroached upon by spreading urban influences and the higher intensities of use in previously remote areas. This results in a disruption of critical food chains, an altering of ground cover patterns and an interference with reproductive processes. Conservation then becomes a matter of increasingly active management, more restrictive use and an additional understanding of the natural interrelationships of ecosystems. The habitats found in San Benito County are briefly described below and are illustrated in Figure 20.

There are eleven wildlife species that are considered by the State of California or the Federal government to be either threatened or endangered (see Table 13). An additional 26 species having habitat located within San Benito County are candidate species to be included on federal lists of rare, threatened or endangered or species recognized by the State of California to be "Species of Special Concern" (See Table 14). San Benito County is in the process of preparing a County-wide Habitat Conservation Plan. The blunt-nosed leopard lizard, California condor, San Joaquin kit fox, Giant Kangaroo Rat, San Joaquin Antelope Squirrel, Southern Bald Eagle, and Western Yellow Billed Cuckoo, and giant garter snake are all listed as endangered, threatened or rare forms of wildlife by the State of California Natural Diversity Data Base. Table 13 indicates that most of these species are found in the southeastern areas of the County.

Several sensitive animal species inhabit the Panoche, Tumey Hills and Ciervo Hills areas. This habitat has become increasingly rare due to urbanization and farming in the San Joaquin Valley area. From 80 to 98% of the habitat has been lost for the Blunt nosed leopard lizard, the San Joaquin Antelope Squirrel, the Giant Kangaroo Rat and the San Joaquin kit fox. The Giant Kangaroo Rat is considered to be a good indicator of the health of the remnant San Joaquin Valley endangered species habitats. The rat's abandoned burrows furnish habitat for the Blunt-nosed leopard lizard and the San Joaquin Antelope squirrels are found in the rat's colonies. The rat is part of the diet for the endangered San Joaquin kit fox where they coexist (BLM 1992).

Several plant species of special concern have been found in the Vallecitos Valley area - the Forked-fiddleneck, Hollisteria and Jared's Peppergrass (see Table 13).

The San Benito Mountain area is noteworthy for the endangered San Benito Evening Primrose and because it is one of the only places where the Jeffery Pine, incense cedar, and Coulter Pine all coexist. This 1,500 acre area has been designated as a natural area by the United States Department of Interior Bureau of Land Management.

San Benito County also has good populations of game species, such as deer, wild pig, quail, chukar partridge, and cottontail rabbit. Tule elk and prong-horned antelope have been introduced in southern San Benito County at the Laguna Ranch Hunt Club.

insert table 13

insert table 14

FIGURE 20

WILDLIFE COMMUNITIES

Valley Grassland Community: Grasslands are usually found at low elevations and confined to flat lands or gently rolling hillsides that have a deep layer of clay bearing soil. The use of such land for urbanization, agriculture, and grazing has greatly altered the community's composition and distribution. The remaining natural fields and meadows provide the habitat for many birds which feed not only on the seeds of the grasses and the flowers, but also on the numerous field rodents and reptiles. The most widely recognized
characteristic of this community is the expanse of wildflowers which appear briefly each spring. The predominant vegetation in this community is annual grasses, herbs such as filaree, fiddleneck, popcorn flower, and lupines, and shrub species including saltbush, Mexican tea, golden bush, buckwheat, California sage, and California juniper.

Of special importance within the Grassland Community are the grasslands near Tres Pinos and Panoche. These areas have been identified by the California Department of Fish and Game as having an unusually high value as a wildlife resource. In particular, the San Joaquin kit fox ranges within these areas and is considered to be endangered. Valley and Foothill Grasslands also provide habitat for the San Joaquin Antelope Squirrel, and the endangered Giant Kangaroo Rat.

Riparian Community The presence of water provides a favorable habitat for a variety of trees, shrubs, and grasses, as well as a habitat for the largest number of animal species of any vegetative community in San Benito County. The Riparian Community exists wherever there is a fairly permanent water supply. These areas serve as attractive habitats for many birds and animals on a permanent basis, while still greater numbers venture into riparian areas in search of shelter or to feed and obtain water.

Riparian habitats and members of the Riparian Community are extremely susceptible to destruction by natural processes and human activities. Any proposed changes should be carefully considered in terms of balancing the benefits against the possible risk to the wildlife community.

Riparian habitat, viable cold water streams capable of supporting salmon and steelhead, and wetland habitats have been nearly reduced in the past. Fish and wildlife are renewable resources, but the habitats of these resources must be protected. Major riparian habitats include the Pajaro and San Benito Rivers. These two rivers also support cold water fish, as do Arroyo Dos Picachos and Laguna Creek.

Chaparral Community The slopes and ridges of the foothills and mountainous regions of San Benito County exemplify the Chaparral Community. A large portion of southern San Benito County is made up of the Chaparral Community, consisting of deep-rooted shrubs, which are able to survive in dry, sunny locations. These provide habitat for an extremely wide variety of animal life, ranging from the common quail to the endangered kit fox. Common species in this plant community include the following: chamise, manzanita, buckbrush, red berry, coffee berry, choke cherry, toyon, silk-tassel bush, mountain mahogany, California buckeye, interior live oak, and scrub oak.

Much of the County's rugged and scenic area is covered within this dense impenetrable growth. Its highly flammable characteristics and difficult access combine to make this community one of the most hazardous to develop.

Oak Woodland Community The Oak Woodland Community is characteristic of sheltered valleys and northfacing sides of canyons and is found predominantly in the western and southern regions of San Benito County. It forms a shelter for a wide variety of plant and animal species with the shade it produces keeping the temperature lower than in the surrounding grasslands and chaparral. This community has the highest rainfall and the lowest average temperature of any wildlife habitat in San Benito County.

Plants commonly found in this habitat include coast live oak, valley oak, poison oak, buckeye, laurel, madrone, ceanothus and manzanita. The oak woodland provides nesting areas for a wide variety of birds and shelter for a large number of animal species, including opossum, raccoon, skunk, blacktail deer and bobcat.

The General Plan Guidelines recommend that Counties identify specific oak species that occur in stands that are five acres or larger and have five or more trees per acre. The San Benito County Hardwood Rangelands Map was prepared for the Forest and Rangeland Resources Assessment Program (Pillsbury, N. H. et. al. 1991). The generalized map identifies the location of stands of hardwoods at elevations less than 5,000 feet in areas of 40 acres or larger by type and density of coverage and is available for public review at the County Planning Department.

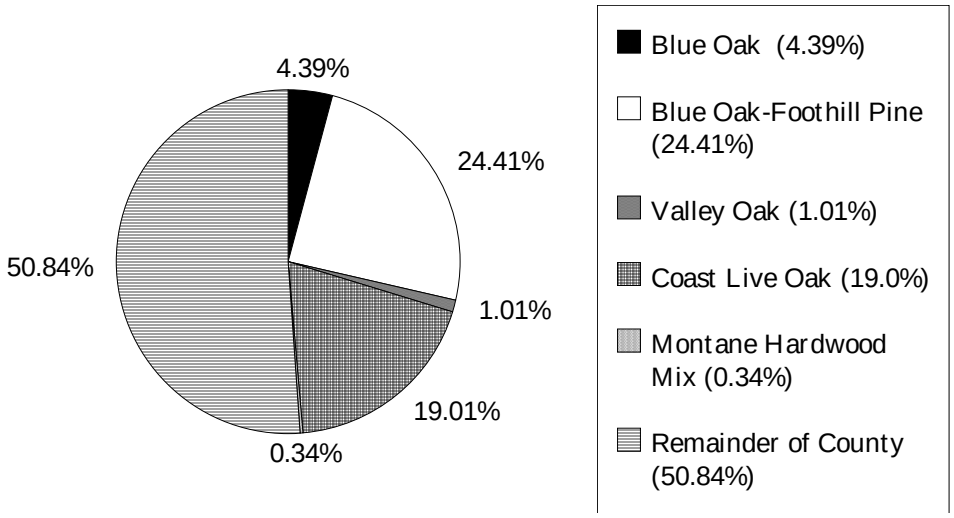
The Forest and Rangeland Assessment Program was developed to establish baseline data on the extent, range, and ownership of hardwood trees in the State and to monitor removal of the resource. San Benito County is one of ten counties in the State recommended for decenennial photo surveys to monitor change in acres of hardwoods. Historic hardwood land conversion has been from agricultural development, rangeland modification, urban and suburban development and construction of reservoirs (Pilsbury Norman H. et. al. California Mapping and GIS Database Development for California Hardwood Resources, April 1991, Natural Resource Management Department, California Polytechnic State University, San Luis Obispo).

Data compiled by the Forest and Rangeland Resources Assessment Program (FRRAP) indicates that an estimated 4.3% of the mapped hardwood resources in the state are located in San Benito County. Hardwood rangeland covers nearly half of the County (see Chart 8). Over 82% of the hardwood lands are in private ownership (see Table 15).

Figure 21 shows that Blue Oak Woodlands are predominantly located in the western and central areas of the County. Blue Oak Foothill Pine woodlands is the most dominant woodland habitat in the County. The hardwoods are generally located in the southern areas of the county between the Gabilan and Diablo ranges and the southern tip. The Valley Oak woodland is confined to the Diablo mountain range in the northeastern corner of the County. There is little evidence of successful regeneration of the Blue Oak, Blue Oak Foothill Pine and Valley Oak woodland hardwoods. The Coastal Oak Woodland is

the second largest woodland type found in the County. It is predominantly located in the Diablo and Gabilan Mountain ranges in the northern half of the County with an exception in the southwest tip. The Mountain hardwood mix is localized in the southwestern edge of the County in the Gabilan Mountain Range between Pinnacles National Monument and the Topo Valley. There has been successful regeneration of this hardwood group.

CHART 8
PERCENT OF HARDWOOD RANGELAND IN SAN BENITO COUNTY BY TYPE



Source: Forest and Rangeland Resources Assessment Program , Pillsbury, N. H. 1991

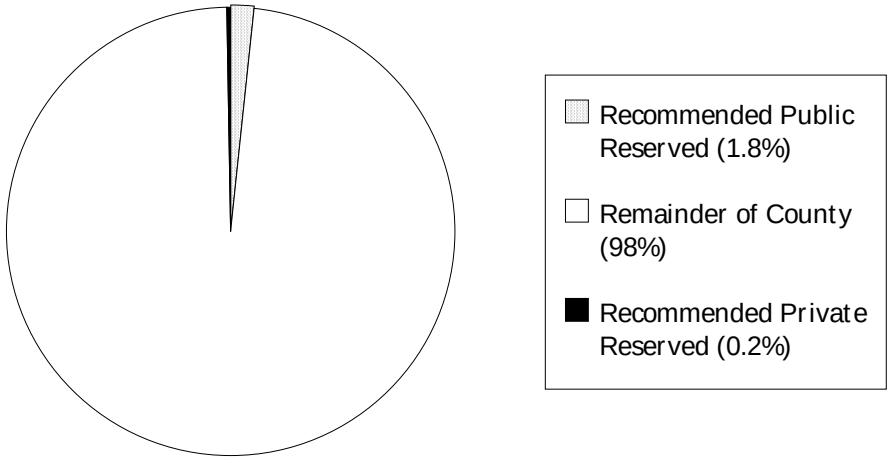
None of the hardwood resources in the County are "reserved", or protected as habitat on public or private lands. In the FRRAP the amount of hardwood resources within each county are compared by type to a state average. Table 16 lists the amount of acreage that would need to be protected to meet the state average (15,787 acres of public land and 1,860 acres of private land). In order to meet the state average, about two percent of the land within the County would be reserved as hardwood rangeland habitat (see Chart 9). The state average is not set as a mandate nor as a guidelines. It is used as a benchmark to guage how habitat protection programs might be altered.

One of the factors used to determine whether hardwoods are and will be threatened by urbanization is to review zoning and land use practices. The majority of the hardwood

TABLE 15
OWNERSHIP OF OAK WOODLANDS BY TYPE

table 14

CHART 9
PERCENT OF HARDWOOD RANGELAND RECOMMENDED FOR PROTECTION BY OWNERSHIP (SAN BENITO COUNTY)



Source: Forest and Rangeland Resources Assessment Program , Pillsbury, N. H. 1991

TABLE 16
ACRES OF HARDWOOD RANGELAND RECOMMMENDED FOR PROTECTION

resources in the County are located within the Agricultural Rangeland zoning district with a minimum lot size of 40 acres. The base density will deter suburbanization of most woodlands. The allowed land uses of rangeland and some wood cutting could hinder successful regeneration of some hardwood habitats - particularly the Blue Oak., Blue Oak Foothill Pine and Valley Oak. The Coast Oak Woodland is the only habitat in the County that may be threatened by suburban development. Existing and future development in the Aromas area with zoning designations of Rural (one unit per five acres) and Rural Transitional (one unit per 2.5 acres) and the San Juan Canyon with zoning designation of Rural (one unit per five acres) could limit habitat.

Conifer Forest The Conifer Forest Community, which is localized on San Benito Mountain, is unique because it contains the only known coexistence of the Coulter pine, Jeffery pine, and incense cedar in the world. There is also a Coulter-jeffery pine hybrid.

Wetlands An important resource the County has are wetland areas. These areas include freshwater sloughs, swamps, vernal pools, wet meadows, wet pastures, springs and seeps, portions of lakes, ponds, rivers and streams, and all other areas which are periodically or permanently covered by shallow water, or dominated by hydrophic vegetation, or in which the soils are predominantly hydric in nature (Department of Fish and Game, Environmental Services Division, Department of Fish and Game Recommended Wetland Definition, Mitigation Strategies, and Habitat Value Assessment Methodology, June 24, 1987). Notable lakes and reservoirs in the County are San Felipe Lake (Soap Lake), Tequisquita Slough, Anzar Lake, and San Justo, Paicines and Hernandez Reservoirs. These areas not only provide important habitats for wildlife, but are important ground water recharge and potential recreational areas. It is the policy of the California Department of Fish and Game to "strongly discourage development in or conversion of wetlands". The Fish and Game Commission "opposes wetland development proposals unless at a minimum, project mitigation assures there will be no net loss of either wetland habitat values or acreage." (California Department of Fish and Game, Wetlands Resource Policy, January 9, 1987). Wetland areas that are lost due to development must be compensated for on an acre-for-acre basis. Alternative mitigation programs for loss of wetland habitat are provided in Appendix F.

CATEGORY 9 SEPTIC LIMITATIONS

Background -How Septic Tank Systems Work: Less than one percent of the unincorporated area of the County has the potential to utilize public sewer and water service. Wastewater from rural dwellings and other buildings are usually disposed of in the ground. If soil and site conditions are favorable, and maintence is adequate, a septic tank system can be expected to provide satisfactory service . In a septic system, the intermittent flow of waste materials is decomposed by anaerobic bacteria.

The first step in the design of a septic system is to determine whether the soil is suitable for absorbing the effluent water, and if so, at what rate. The soil must have a satisfactory absorption rate without interference from ground water or impervious strata. The

minimum depth to ground water should be greater than four feet and impervious strata should be at a depth greater than four feet below the tile trench or seepage pit. If these conditions cannot be met, the site is generally unsuitable for a septic tank installation. Studies with infiltration ponds indicate that harmful bacteria are reduced to a safe level somewhere between four and seven feet in unsaturated sandy silt. In more coarse textured soils, distances of up to 250 feet may be required to reduce bacteria counts to acceptable levels.
The safe operation of septic tanks is important because failed or improperly designed systems can contribute to the degradation of groundwater quality. Of particular concern is nitrate build-up. The direction of ground water movement is identified in the section of Ground Water Resources of this Environmental Inventory. As rural residential development increases, the quantities of nitrates within the ground water table can be expected to increase. These would then move toward the cones of depression identified in the Hollister and San Juan Valleys, ultimately being taken up in the incorporated community water system. This, in turn, would require extensive treatment of the water prior to the consumption of the water by urban residents.

Reasons that a septic tank may fail include insufficient permeability, saturation of the leach line, high ground water table, testing during the wrong season, lack of maintenance, and slope. These issues are discussed in greater detail in Appendix G. The County Health Department maintains standards for evaluating the suitability of soils for septic disposal.

Septic Limitations in San Benito County Within San Benito County, 97,855 acres of soil (11%) are identified by the Soil Conservation Service as having slight to moderate septic tank limitations. The remainder of the soils (89%) have severe limitations. The soils with relatively few limitations, their approximate area, their percent of the entire county, and their limitations are given in Table 17.

TABLE 17
SOIL TYPES WITH SLIGHT TO MODERATE LIMITATIONS FOR SEPTIC DISPOSAL

SOIL NAME	AREA IN ACRES	PERCENT OF COUNTY LAND AREA
Slight to Moderate		
Corralitos	375	-
Hanford	4,970	0.56
Yolo	5,560	0.60
Moderate		
Docas	5,920	0.66
Kettleman	43,265	4.80
Metz	3,105	0.40
Mocho	3,585	0.40
Panhill	3,615	0.40
Panoche	13,560	1.50
Reiff	2,095	0.20
Sorrento	14,200	1.60
Total	100,250	11.28

SOURCE: United States Soil Conservation Service Soil Survey, San Benito County California 1969

CATEGORY 10 MINERAL RESOURCES

State Designated Mineral Resources In San Benito County significant aggregate resources in the northern portion of the County have been classified and mapped through the authority of the Surface Mining and Reclamation Act (SMRA). The purpose is to ensure that signficant mineral resources can be protected from premature and/or incompatible development and will be available for extraction over the next 50 years. Listed below are five mineral resource classifications from the state. Lands classified with MRZ-2 and SZ designations are considered to be of the highest value from a resource perspective. Figures 22 through 24 illustrate aggregate deposits listed as significant MRZ-2 and possibly significant MRZ-3 by the California Division of Mines and Geology which are sand and gravel resources along Tres Pinos Creek and the portions of San Benito River north of its tributary with Tres Pinos and stone (granitic) deposits in the
Aromas area and mixed aggregate resources at the site of the abandoned Pearce Quarry.

MRZ-1: Areas where adequate information indicates that no significant mineral deposits are present or where it is judged that little likelihood exists for their presence.

MRZ-2: Areas where adequate information indicates that significant mineral deposits are present or where it is judged that a high likelihood for their presence exists.

MRZ-3: Areas containing mineral deposits the significance of which cannot be evaluated from available data.

MRZ-4: Areas where available information is inadequate for assignment to any other MRZ zone.

SZ: Areas containing unique or rare occurrences of rocks, minerals, or fossils that are of outstanding scientific significance shall be classified in this zone.

Sand and Gravel Among the principal economic minerals within the County are the sand and gravel deposits of the San Benito River and the San Andreas fault. These deposits are presently being mined in a number of locations. In addition, alluvial deposits in the hills also have the potential for use as a natural resource. Hillsdale Rock is mining a sand deposit in the Lomerias Muertas hills. At the present time there is ready availability of materials in the San Benito River. Tres Pinos Creek helps recharge sand and gravel in the San Benito River. The high cost of transportation, and the excavation of overburden makes most other alluvial deposits marginal to infeasible economically. Figures 22 and 23 illustrate that most of sand and gravel resources which are significant (MRZ-2) are concentrated along Tres Pinos Creek and the portions of the San Benito River north of the tributary of Tres Pinos Creek.

Limestone Extensive deposits of limestone are located in the Gabilan Range in a several square mile area extending from Fremont Peak. Figure 24 shows that the site of the former Pearce Quarry has been designated MRZ-2. This major deposit was quarried by Ideal Cement Company for many years until the plant closed. Fremont Peak and the Bird Creek and Cienega areas also contain large deposits of limestone. The San Benito Aggregates is presently marketing a large deposit of dolomite (a Calcium - Magnesia Carbonate) in the Bird Creek-Cienega area. Granite Rock is mining a dolomite-limestone deposit in the same area. The limestone deposits of the Mount Harlan-McPhails Peak district contain the only known chemical grade deposits of limestone in San Benito County. These deposits are located generally west of Cienega Valley between Pescadero Canyon and McPhails Peak.

Several lime kilns were operated in the area prior to 1910. However, as the lime deposits are remotely situated from markets and rail transportation, there has been less incentive to develop this resource.

22

23

24

25

A detailed report entitled "Limestone and Dolomite in the Northern Gabilan Range, California" (California Division of Mines & Geology Special Report 56) describes, in detail, the location of limestone and dolomite deposits in San Benito County.

Granite A large deposit of a unique hornblend quartz gabro commonly called "granite" is located in the Aromas area south of the Pajaro River, west of U.S. 101 and just east of the Monterey-San Benito County line. (see Figure 22) This deposit (the Wilson) is presently (1992) being mined by the Granite Rock Company and is used on construction sites throughout Central Coastal California and has been determined to be a significant mineral resource by the California Division of Mines and Geology.

Oil and Gas Wells The location of existing and potential for gas and oil wells has been mapped by the Bureau of Land Management. Figure 26 identifies areas with high potential for oil or gas resources within the County. Oil fields in the Vallecitos Valley southwest of the Griswold Hills have continued to produce low volumes of oil and if the cost of oil increases, this area could become more productive.

Asbestos In the South County area, asbestos is being been mined by King City Asbestos Company in their "Joe Pit". These resources are located in Sections 23 through 25 of Township 18 South and Range 12 East.

Gems The only known deposit of Benitoite, the state gem, occurs in San Benito County. The proximity of the deposit to the headwaters of the San Benito River and San Benito Mountain influenced the naming of the gem. Benitoite is found near Willow Creek, Panoche and San Benito Mountain. This gem occurs associated with natorilite and neptunite in serpentine areas. A deposit was mined as early as 1915.

Gypsum There are deposits of gypsum between the Topo Valley west to the San Benito River and south to Lewis Creek which were mined as early 1915 (Section 5, T.19, R10 E, and Sec. 15, T. 18, S. R. 9 E. and Secs. 8 and 17, T 18 S. R. 9 E). A deposit has been mined in the Bitterwater area over the past ten years.

Mercury As of 1915, San Benito County was the largest producer of mercury in the United States. There were numerous deposits mined in the San Benito Mountain, Idria, Cerro Colorado, Panoche, and Quien Sabe areas (Sections 7, 12, 18, 19, 31, 35).

Other Mineral Resources As early as 1915 numerous other mineral deposits had been mined including antimony, asphalt, bituminous rock, bituminous coal, chromite, manganese, and mineral water.

Antimony deposits are found in the Quien Sabe area. Chromite occurs in the serpentine of San Benito Mountain area of the Diablo Range. Magnesite deposits are found in the Sampson Peak area. Cinnabar and antimony have been found in the northeast corner of the County.

CATEGORY 11 HISTORIC AND CULTURAL RESOURCES

Native Americans Archaeological investigations indicate that a group of Hokan-speaking Native Americans, lived in the region of San Benito County as early as 8,500 B.C. Between 1000 B.C. and 300 A.D., the Hokans were displaced or had absorbed the Ohlone, a group of people that resided between the San Francisco Bay area south to Point Sur of the Monterey Bay and east to the Diablo Range. Archaeologists classify the Ohlones as using a "hunting and gathering" technology. It is estimated that by 1770, there were 10,000 Ohlones.

There were over fifty smaller tribal groups that were part of the Ohlone. An estimated five tribal groups were located within San Benito County and adjoining counties including the Mutsun, Pagsin, Chalon, Tamarron, and Ausaima and Salinan. The Mutsun Indians were a tribal group known to inhabit the San Juan Canyon area. The Pagsin resided in the Hollister area. The Ausaima lived in the San Juan Valley and northeast of Hollister. The Tamarron lived in the Diablo Range on the eastern portion of the County. The Chalon tribal groups lived in the south central portions of the County and the Salinan in the southernmost area. It is estimated that the Salinan and Chalon were ethnographically extinct by 1850.

The northwestern portion of the County near the Pajaro Gap was the junction of several regional trade routes. One trade route extended along the San Benito River to Coalinga. Another route was along Pacheco Pass and on to the San Joaquin Valley. Finally there were connections in the area to the Santa Clara Valley and Monterey Bay area.

Today there is an estimated 300 descendants of the Costanoan (Ohlone) that remain in the Mission San Jose and the Mission San Juan Bautista/Watsonville areas.

The Mission Period Five Spanish expeditions crossed the area in the late 18th century: Anza and Font, Palou, Fages and Crespi, Fages, and Danti and Sal. The diaries of these explorers provide data on the condition of the environment during various seasons and the existence of early villages and settlements.

In 1775, Juan Bautista de Anza set out to find an overland route from Mexico to the San Francisco Bay area of California. The party comprised 30 families, a dozen soldiers, 1,000 cattle, horses, and mules. A National Historic Trail has been established. The historic route is estimated to have been along the Salinas Grade Road area. The Old Stage Road is considered as a potential recreational trail which would lead from Monterey County and to the City of San Juan Bautista and proceed north through agricultural lands to the Pajaro River (see Appendix H). The City of San Juan Bautista is identified as a potential interpretive site. It is noted in the Draft National Trail Study Environmental Assessment that establishing a trail on private agricultural land north of San Juan Bautista may be difficult (National Park Service, Western Regional Office, Juan Bautista de Anza National Trail Study, Draft Feasibility Study and Environmental Assessment, page 23, August 1985).

In their expedition of 1795, Danti and Sal explored the San Benito Valley and found two suitable mission sites: One situated near the present day City of Gilroy and one on the San Benito River, which was named in honor of St. Benedict. The latter site was chosen and on June 24, 1797, the Mission San Juan Bautista was founded. The pueblo of San Juan Bautista became the first white settlement in San Benito Valley.

The Early American Period The City of Hollister, located seven miles east of San Juan Bautista, became a sheep raising center in the mid-19th century. A group of 50 farmers formed the San Justo Homestead Association in 1868 and purchased 21,000 acres of land located at the eastern part of Rancho San Justo from sheep rancher Colonel William Hollister. Of this land, 100-acres was reserved for what is now the City of Hollister. When the Southern Pacific Railroad was routed through Hollister, the town grew in size and eventually overshadowed San Juan Bautista, which had been bypassed by the railroad.
Up until this time, the area now known as San Benito County, was a part of Monterey County. The settlement of the San Benito Valley and the surrounding area is separated from the rest of Monterey County by the Gabilan Mountains. This mountain range prompted the eventual division of the two areas. San Benito County, which takes its name from the San Benito River, was formed in 1874, following a five-year battle by the "divisionists" which was finally resolved at the senate level.

Although San Benito County contains only two incorporated cities, Hollister and San Juan Bautista, a number of unincorporated towns and settlements formed in the 19th century. These unincorporated areas were formed primarily through the concentrations of homesteaders in different parts of southern San Benito County.

Tres Pinos, eight miles south of Hollister was, for a time, the southern terminus of the San Benito branch of the Southern Pacific Railroad. Tres Pinos was a shipping point for a large area that produced grain, hay, dairy products, etc.

The town of Paicines, which was originally known as Tres Pinos, is located several miles south of what is now known as Tres Pinos and consisted, even during its busiest times, of little more than a hotel, school and Snyder's General Merchandise Store. Snyder's Store gained its notoriety from having been robbed by the bandit Tiburcio Vasquez in the 1870's. It was this robbery and shoot-out which resulted in the killing of three men, leading to Vasquez's hanging.

Located to the southeast of Paicines is Panoche, a settlement which is historically significant as a stagecoach and ore wagon stop. Ranches in the Panoche Valley provided overnight lodging for travelers destined for the New Idria Mines to the southeast.

The New Idria Quicksilver mines went into operation in 1854. One of the three largest quicksilver mines in the world, it provided a financial boon to the area, particularly to San Juan Bautista, where quicksilver was hauled from the mines by six to 12-horse freight teams.

Bear Valley, lying 25 miles south of Hollister, was originally occupied by early homesteaders. Large crops of wheat, barley, vegetables and fruit were produced in Bear Valley, known for its deep, fertile soil.

A list of archaeological and historically significant sites and structures has been compiled, the locations of which are shown on Figure 27. This is by no means a comprehensive list and should be updated following the completion of a thorough inventory of San Benito County's cultural resources.

AIR RESOURCES

Clean air is a basic and vital resource to a community. Unlike other resources which may be usable to a few, clean air is a resource vital to all. Air quality is of regional concern and San Benito County is affected by neighboring communities, such as Santa Clara County and Monterey County.

The climate, wind and rain patterns strongly influence air quality. Even though the amount of air pollution is emitted at a fairly constant rate throughout the year, the amounts of air pollution actually present in the air we breathe fluctuates widely from day-to-day. These variations depend wholly upon the weather. Rain and air changes that accompany rain are important cleansing mechanisms.

Open space performs several vitally important air quality functions. Vegetation is an important part of the natural air filter system. Particulates are captured by vegetation. The presence of vegetation can reduce dust particles by as much as 90%.

Air Quality Standards: Both the federal and state governments have established standards for air quality. When the national "primary" standards are exceeded there are known impacts to human health. The national "secondary" standards are intended to protect public welfare (i.e. property, visibity, vegetation). The California air quality standards are more stringent than the Federal standards. A detailed discussion of air quality standards and conditions in the region is provided in the 1991 Air Quality Management Plan for the Monterey Bay Region (Monterey Bay Unified Air Pollution Control District, Monterey, California). The Monterey Bay Unified Air Pollution Control District (MBUAPCD) and the state Air Resources Board (ARB) are responsible for developing programs to meet or maintain federal and state air quality standards. The North Central Coast Air Bains (NCCAB) was designated a nonattainment area for the federal ozone standard in 1978 due to violations prior to 1980. Federal ozone standards have been met since 1990 but the EPA has not formally redesiganted the basin yet. The NCCAB is designated nonattainment area for the state ozone standard.

PM10 is particulate matter less than 10 microns in aerodynamic diameter. The NNAB is deisgnated unclassified for the federal PM10 and nonattainment for the state PM10 standard. Air quality sampling for PM10 was initiated in 1986. Table 19 illustrates that ten violations of State Ambient Air Quality Standards (AAQS) have occurred since 1986.

The highest oxidant concentrations occurr during late spring and early fall, while other pollutants peaked during the fall and winter months. These peak periods can be directly attributed to the light winds and relatively stable atmosphere during the fall and winter months. During calm periods, suspended particulate concentrations often exceed the State standards.

The prevailing climatic conditions, together with the physical characteristics of San Benito County, favor the formation of concentrated air pollutants. Abundant sunshine, low precipitation and light winds, in combination with narrow valleys surrounded by steep mountains, are conditions which tend to concentrate pollutants. The general air circulation patterns substantially aid the transport of these pollutants over long distances. This is most readily apparent when heavy concentrations of pollutants can be seen as they move south from Santa Clara County into the San Juan and Hollister Valleys. Pollutants generated in northern San Benito County easily move down the long axis of the County and the effects can be felt many miles away.

Agricultural, industrial and urban activities in the County are the major sources of air pollution. According to the Monterey Bay Unified Air Pollution Control District, motor vehicles are the largest source of organic gases and it is anticipated that with increased population, industry and motor vehicles, a potential for developing higher than current air pollution levels in the County does exist.

Those trends which contribute to air degradation (urbanization, industrialization and automobile use) are a continuing fact of life. San Benito County is just beginning to feel the effects of the policies of other counties. The combined effect of area policies shows an increase in separation between employment and residential areas. This directly increases commute trip distances. Additional miles traveled increase carbon monoxide pollution potential all along the routes and contribute to excessive ambient air pollution of several types.

TABLE 18

Ozone Hourly Averages Exceeding State or Federal Ambient Air Quality Standards

Year	Federal		State	
	Days	Hours	Days	Hours
1978	0	0	4	13
1979	0	0	3	3
1980	1	3	12	32
1981	2	4	7	24
1982	0	0	1	1
1983	0	0	4	9
1984	0	0	6	8
1985	0	0	11	20
1986	0	0	1	1
1987	0	0	7	15

Source: Monterey Bay Unified Air Pollution Control District, 1989 Air Quality Management Plan - For the Bay Region, June 1989, Salinas, California

TABLE 19

Recorded Violations of the PM10 California AAQS in the North Central Coast Air Basin, for 1986 through 1988

Station	Date	Concentration (ug/m3)
Hollister	2/5/86	52
Hollister	9/6/87	50
Hollister	9/30/87	58
Hollister	10/18/87	53
Hollister	1/28/88	58
Hollister	12/5/88	58
Hollister	10/15/91	55
Hollister	9/27/92	64
Hollister	10/28/93	61
Hollister	12/27/93	51

Miles traveled to jobs and schools is only part of the travel demand. Service uses also create significant numbers of trips. Most activities are now geographically separated by considerable distances.

Patterns of air pollution are also important. Future industrial areas will be located north of Hollister and since the winds are out of the west and southwest most morning hours, it is expected that these pollutants will be carried away from the urbanized areas. However, afternoons will find a reversal of wind patterns, with air pollution being carried into the city.

Present rural zoning allows low density residential uses outside of urban service areas. Many rural residents in the future will not primarily be employed on their land. Each residential use established outside urban service areas, particularly in locations where employment areas are not close by, establishes a use in which additional increments of excessive air pollution can result.

Many currently allowed rural land uses have significant air pollution potential. Land clearing, controlled burning, industrial activities related to cement, gravel and mining operations and the regular use of unimproved roads all have significant local and, in some cases, County-wide pollution impacts. As the County population increases, these sources impact more and more people. Practices that may have been acceptable in the past will become subject to question in the context of a large population.

Local governments have very direct responsibility for maintaining the health, safety and welfare of their citizens. Air pollution affects citizens in each of these areas. County, as well as city governments, regulate land use decisions. Pollution is generated in separate jurisdictions, but directly impacts everyone in the County.

Factors which will influence air quality include:

1. Overall population and particular activities pursued
2. The location or arrangement of populations
3. Activities on a regional basis
4. The amount and type of fuels burned
5. The amount of open space and its location
6. Transportation programs
7. The proximity of population growth to employment

Adverse air quality conditions with airborne particulate and noxious gases cause numerous effects on the health of the inhabitants of San Benito County. Eye irritations, increased potential for lung disease, restricted breathing, increased susceptibility to bronchitis and pneumonia, irritation of mucous membranes in the nose and throat, choking, headaches, dizziness and accelerated fatigue are some of the known effects that are possible results of poor land use planning. Many of these effects have been noted by residents of San Benito County as they visit such places as Los Angeles or Santa Clara. Concentrations of air pollution can also affect vegetation. Farmers can suffer from reduced yield and quality of crops. Natural vegetation can also be affected by ozone.

RECLAMATION OF LAND AND WATER RESOURCES

The need for reclamation of land or water resources can be triggered by land use practices, improper disposal or storage of hazardous materials and waste, or the recognition of contaminated areas from abandoned land uses. Often the need for land and water reclamation go hand in hand because contaminated soils may seep into surface and groundwater supplies.

Abandoned mines can be a potential source of surface or groundwater contamination. The Regional Water Quality Control Board draft Basin Plan amendments indicate that over the long-term, this agency may begin to inventory data on inactive mines in the region. There are numerous inactive mercury mines in south County and the Pearce Quarry in the San Juan Canyon which was a limestone mine. The draft basin plan also recognizes that grazing control measures can reduce potential contamination of surface water resources through dispersal of livestock away from surface waters and development of non-lake shore and non-stream zone watering sites.

The San Benito County Hazardous Waste Management Plan lists known uncontrolled hazardous waste sites in San Benito County (Brown, Venice & Associates, San Franciso, California, December 22, 1988).

Contaminated sites There are five sites that have been identified by the Environmental Protection Agency (EPA) as potential uncontrolled hazardous waste sites which include the P G & E gas plant in Hollister, the U.S. Bureau of Land Management Vallecitos Oil Fields about 50 miles southeast of Hollister, the John Smith Road former Class 1 landfill, the Joe Pit Union Carbide Mine, and the Pinnacles National Monument. No further action is recommended for the PG & E gas plant and the Vallecitos oil fields.

The Californian Department of Health Services (DHS) is also required to identify contaminated sites which require public funds for clean-up. Six sites have been identified by the California DHS Abandoned Sites Program: John Smith Road Disposal, P G & E gas plant, Hall Marion E., Holex, New Idria, Pinnacles National Monument, and Union Carbide Joe Pit. The DHS has determined that no action is necessary at the New Idria and Holex site. There is an ongoing cleanup to close the Class I disposal area at the John Smith Road Disposal. The Union Carbide - Joe Mine is an asbestos ore surface mine at the southern tip of the County. Surface runoff from the stockpiles flows to two small intermittent streams that are tributaries to the south for of the San Benito River. The EPA has determined that action is not necessary because the mine is isolated from permanent population. The State Regional Water Quality Control Board on the other hand has enacted a water monitoring program. There is a closed gas production PG &E site in Hollister. The facility was closed in 1954. Water has been tested for contamination from two wells located within 500 feet of the site. The well water had trace quantities of nickel and thallium but there were no organics detected. The EPA has not required interim management measures but the DHS has continued to monitor the site. DHS is continuing to investigate the Vallecitos oil wells.

EXPLANATION

Drill Hole

OUTER BOUNDARY OF AREAS SUBJECT TO URBANIZATION
AND LIMIT OF AREA CLASSIFIED
Boundaries established from date supplied by the Office of Planning and Research with modifications developed from information supplied by local government and other sources

PRODUCTION-CONSUMPTION REGION BOUNDARY

MINERAL RESOURCE ZONE BOUNDARIES

SAND AND GRAVEL

MRZ-1	Areas where adequate information indicates that no significant mineral deposits are present, or where it is judged that little likelihood exists for their presence.
MRZ-2	Areas where adequate information indicates that significant mineral deposits are present or where it is judged that a high likelihood for their presence exists.
MRZ-3	Areas containing mineral deposits the significance of which cannot be evaluated from available data.
MRZ-4	Areas where available information is inadequate for assignment to any other MRZ zone

See Title 14 for additional explanation of MRZ Symbols

FIGURE 22

STATE DESIGANTED MRZ-2 AND MRZ-3 MINERAL RESOURCES (Eastern portion of San Juan Valley and Hollister area)

FIGURE 22

STATE DESIGANTED MRZ-2 AND MRZ-3 MINERAL RESOURCES (Eastern portion of San Juan Valley and Hollister area)

FIGURE 21

STATE DESIGANTED MRZ-2 AND MRZ-3 MINERAL RESOURCES (Aromas and Western Portion of San Juan Valley)

FIGURE 21

STATE DESIGANTED MRZ-2 AND MRZ-3 MINERAL RESOURCES (Aromas and Western Portion of San Juan Valley)