WASTEWATER MANAGEMENT PLAN

FOR THE

SAN LORENZO RIVER WATERSHED

County of Santa Cruz
Health Services Agency
Environmental Health Service

February 1995

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Approved by the California Regional Water Quality Control Board,
Central Coast Region, by Resolution 95-04, April 14, 1995

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1 SUMMARY

The San Lorenzo Wastewater Management Plan provides for the improvement of wastewater disposal practices to protect public health and beneficial uses of surface and groundwater in the San Lorenzo River Watershed. The Plan represents a refinement and strengthening of the wastewater management programs that have been implemented by the County of Santa Cruz Health Services Agency, Environmental Health Service, since 1985. The main elements of the Plan are summarized below (the sections of the Plan that deal with each element are identified in parentheses):

Inspection and Evaluation of Existing Onsite Disposal Systems (Section 3)

During the first 10 years of Plan implementation (1986-1996), the 12,900 developed parcels in the San Lorenzo River Watershed will be inspected to identify and require correction of any current disposal system malfunctions. All areas will be evaluated to determine what upgrades are likely to be needed on a longterm basis to meet the Plan objectives. The management area includes all parcels within the entire watershed, from Empire Grade to Skyline, to Highway 17, and the Branciforte Creek area (see Figure 2).

Disposal System Improvements (Section 4)

All disposal systems that are found to be malfunctioning will be required to be upgraded in conformance with specific repair requirements for the San Lorenzo Watershed (Tables 1 and 2). The repair standards are also applied to the large number of system upgrades which are voluntarily initiated by property owners. The repair standards provide for substantial improvements to existing systems and are designed to eliminate discharge of pathogens, reduce cumulative discharge of nitrate, and provide satisfactory longterm system performance for the property owners (Table 3). Included in these provisions are requirements for closer system management and inspection of systems which cannot fully meet standard requirements .

Based on the known constraints to septic system performance, it is expected that implementation of the Management Plan will result in the following types of system improvements for the 8520 parcels in the main developed areas of the San Lorenzo Valley: 77% of parcels will eventually use Standard Systems, 4% will use Alternative Technology Systems, 17% will use Nonconforming Systems (Low-flow or Limited Expansion), and 2% will use Haulaway Systems. The breakdown by area is as follows:

Breakdown of Projected Disposal Improvements by Area: Numbers of Parcels;
(Note: Numbers are rounded and may not add up. See other notes below.)

AREA	TOTAL PARCELS	STANDARD UPGRADES (a)		NONSTANDARD UPGRADE Noncon-forming (b)		Altern./ Haulaway (c)		POTENTIAL COMMUNITY DISPOSAL (d)	
Greater Kings Creek	760	512	67%	183	24%	63	8%	0	0%
Greater Boulder Creek	760	476	63%	194	26%	87	11%	200	26%
Ben Lomond	790	605	77%	147	19%	39	5%	60	8%
Glen Arbor (Class I & II)	470	322	69%	101	21%	47	10%	160	34%
Felton (Class I)	820	533	65%	175	21%	111	14%	250	30%
Brook Lomond (Class II+)	80	34	43%	22	27%	24	30%	80	100%
Other Areas (e)	4800	4080	85%	576	12%	144	3%	0	0%
TOTALS	**8480**	**6562**	**77%**	**1397**	**16%**	**515**	**6%**	**750**	**9%**

Notes:

a - The number of parcels which can fully meet repair requirements for a standard conventional septic system. This includes systems which would utilize effluent pumps to dispose of effluent on a part of the property that meets requirements.

b - The number of parcels which would be expected to utilize a nonconforming system which does not fully meet standard requirements due to reduced leachfield size (50-99%), reduced groundwater separation (1-3 feet) where the system is located over 250 feet from a stream, inadequate expansion area, or inadequate pump chamber size for pump up systems. Water conservation, restrictions on remodels, and an annual inspection fee are required.

c - The number of parcels that are expected to require either an individual alternative system, cluster system, winter haulaway, full haulaway, or community disposal system. An annual inspection fee and other restrictions are required.

d - The subset of parcels which would generally require a nonstandard upgrade which could be effectively served by community disposal systems, if found to be cost effective for that area.

e - Other Areas includes all parcels in and around: San Lorenzo Park, San Lorenzo Woods, Riverside Grove, Forest Springs, Zayante, Lompico, Mt. Hermon, Forest Lakes, Paradise Park, Lower Zayante, and additional parcels around the primary areas covered in this table.

Sources of Information: Figures for individual onsite upgrades were derived from Tables H-4, H-5, H-7, H-8, and H-9, except for Brook Lomond and Other Areas where estimates were made from Table H-2 and recent system upgrades. Figures for potential community disposal systems include the total service areas as presented in the feasibility study by Questa Engineering (1994).

Upgrades will be required when a system fails, or when the property owner does a major remodel. At the current rate of system upgrade, it is expected that by the year 2000, improvements will have been made to all the currently failing systems which may be contributing to public health problems or water quality degradation. Upgrades of the remaining prestandard systems will be encouraged to take place within the next 10 years, but some upgrades will probably not be completed for another 20 years. Upgrades of existing systems are also expected to reduce nitrate levels in the River by 15-30% over the next 20 years.

Ongoing System Inspection and Maintenance (Section 5)

After the initial inspection, systems will be reinspected at regular intervals to ensure satisfactory longterm system performance. Annual inspections will be conducted for pump up, low-flow, alternative, and haulaway systems. Inspections will be made every 1-3 years for existing substandard nonfailing systems and systems in close proximity (150 ft.) to creeks (Table 5). All other systems will be inspected at an average of 6 year intervals. Proper disposal system maintenance will be promoted through property owner education, monitoring of septic tank pumping, and regular inspections.

Development of Community Disposal Systems (Section 6)

Feasibility studies are conducted to identify and evaluate alternatives for community wastewater disposal systems to serve areas with concentrations of developed properties that do not meet requirements for standard conventional onsite disposal methods. Community disposal systems will be developed where they are the most cost-effective alternative for protecting public health and water quality. Under current conditions, community disposal systems do not appear to be the most cost-effective alternative for communities in the developed San Lorenzo Valley corridor. The feasibility of community disposal systems will be reevaluated if grant funds become available which might make them more cost-effective and affordable.

Management of Wastewater Disposal from New Development (Section 7)

Existing standards for new disposal systems which serve new development in the Watershed will remain in effect, including the one acre minimum lot size requirement for existing lots. Shallow disposal devices are now required and additional measures for 50% nitrogen reduction will be required in areas with highly permeable sandy soils. Any major remodel or bedroom addition will require upgrade of the system to meet the requirements for a standard or alternative system. New development could be accommodated in the commercial town areas where community disposal systems are developed.

Water Quality Monitoring and Evaluation (Section 8)

Water quality sampling efforts and special studies will continue in order to identify specific problems, monitor long term water quality (primarily bacteria and nitrogen levels), evaluate impacts of wastewater disposal on water quality, investigate related water quality issues, and guide any necessary changes in programs or policies.

Schedule for Implementation (Section 9)

The Plan includes a schedule which provides for completion of the initial evaluation of all parcels by 1996. As a part of the initial evaluation, upgrades of failing disposal systems will be required, and the suitability for longterm use of onsite disposal methods will be evaluated for all systems in each area. If parcel evaluations and follow-up feasibility studies indicate a need for a community disposal system in a particular area, such facilities will be developed over a two to three year period following development of funding and completion of technical studies and designs.

Program Administration and Financing (Section 10)

A computer information system is utilized to record and track data on system installations, site conditions, system performance, complaint investigations, inspection results, and septic tank pumping.

The annual budget for the management program in fiscal year 1994-95 is approximately $425,400. The majority of this funding (85%) is currently provided by annual service charges for wastewater management paid by properties in County Service Area No. 12 (CSA 12), with the remainder coming from the County General Fund. In the past the program has received substantial support in the form of grants from the City of Santa Cruz, the Regional Water Quality Control Board, and the State Water Resources Control Board.

Total annual service charges to property owners for wastewater management in 1994-95 are $20.56/parcel for properties with conventional systems, $117.56/parcel for properties with nonconforming systems, and $194.56 for properties with alternative systems or haulaway systems. It is expected that annual charges will increase by approximately $3.00 to pay for more frequent inspections as proposed in the Management Plan.

If costs of system upgrades are amortized over a 20 year period (at an interest rate of 8.5%), the average annual cost to property owners for upgrading and maintaining their system will be $525 for a conventional system, $1100-2400 for an alternative system, and up to $5700 for a full haulaway system. The County will pursue establishing a program using low cost state loans to finance individual system improvements, which could potentially reduce costs for alternative systems by 25-50%.

2 INTRODUCTION

This document provides a detailed description of Santa Cruz County's Wastewater Management Plan for the San Lorenzo River Watershed. The Plan represents an expansion and refinement of wastewater management activities initiated by the County in 1985. The findings from those activities form the basis for the Plan and have been summarized in the Preliminary Report, An Evaluation of Wastewater Disposal and Water Quality in the San Lorenzo River Watershed, published in September 1989 (hereafter called the Preliminary Report). Substantial additional supporting information has been compiled during program implementation and has been utilized in preparation of this Plan. Much of it is summarized in Appendix H and J.

2.1 Report Organization

This document is introduced by a general discussion of the context of the Management Plan, including a discussion of the problems to be addressed, the basic objectives of the Plan, the requirements of the Regional Board's Basin Plan, the development of the San Lorenzo Nitrate Management Plan, and the operation of County Service Area No. 12. The basic Plan includes a general description of the elements of the management program: disposal system evaluations, improvements and maintenance, development of community disposal systems, standards for new and expanded development, information management, water quality investigations, implementation schedule, and program funding. The detailed standards, procedures, and recommendations for specific geographic areas are contained in the Appendices.

2.2 Impacts of Current Wastewater Disposal Practices

A majority of existing onsite wastewater disposal systems in the San Lorenzo Watershed have potential limits to sewage disposal. Although there have been significant adverse impacts on water quality and public health, during the past five years there has been very good success with upgrading and managing onsite disposal systems to control those impacts. The characteristics and impacts of current disposal systems are discussed at length in the Preliminary Report and are summarized by area in Appendix H. Some of the key findings are described below.

System limitations within the developed corridors of the San Lorenzo Valley can be summarized as follows:
- Approximately 55% of the developed parcels are less than 15,000 square feet in size, limiting available disposal area (11% are less than 6000 square feet).
- Two thirds of the systems are substandard in size, and do not meet current repair standards.
- Approximately 40% of the systems are over 20 years old, reaching the end of their expected lifetime.
- 14% of the existing systems are located less than 100 feet from a stream.
- 30-50% of the systems have winter groundwater less than 10 feet from the ground surface, and 3-6% experience groundwater less than 3 feet from the surface for at least 30 days of the year. High groundwater can cause systems to back up, untreated sewage to come to the surface, and/or

groundwater to be contaminated.

The following impacts from existing disposal systems have been observed:
- Episodes of bacterial contamination occur occasionally at locations throughout the Watershed, but no stations have persistently high levels in excess of standards as a result of onsite wastewater disposal.
- An estimated 6-12% of the samples collected from the River and its tributaries during 1986-1989 showed evidence of wastewater contamination.
- Approximately 25% of the episodes of contamination in excess of bathing standards are estimated to have resulted from wastewater contamination. (The majority of high bacteria levels result from waterfowl, domestic animals, and cumulative urban nonpoint contamination unrelated to wastewater disposal.)
- During area surveys, 3-6% of the systems were found to be failing, discharging untreated sewage to the ground surface; another 7-9% were illegally discharging greywater which also has a high bacteria and pathogen level.
- Failing systems have been observed in areas throughout the Watershed, discharging sewage to roadside ditches, public right of ways, or other areas where there was significant risk of public contact.
- Although there are some areas with greater concentrations of problems, sewage failures have been observed throughout the study area.
- Many systems appearing to be functioning properly are releasing significant amounts of nitrate into groundwater and surface water, with potential adverse impacts on water supplies.
- Primarily as a result of wastewater disposal, nitrate levels in groundwater aquifers have increased 4-10 times. Further increases could threaten water supplies in Quail Hollow and other areas.
- Nitrate levels in the San Lorenzo River have increased 2-3 times since the mid 1960's, potentially resulting in increased biological growth which may be adversely affecting the quality of the water supply for the City of Santa Cruz. Septic systems, particularly in sandy soils are the primary source of the increased nitrate.

Despite the potential limitations and the observed impacts of onsite wastewater disposal systems, experience during the past seven years has shown that there is adequate opportunity to make substantial improvement in system performance in order to reduce impacts to acceptable levels:
- Over 85% of the existing systems have been found to be functioning well, without any surface discharge of sewage.
- Systems are being replaced or upgraded at a rate of 3-5% per year, primarily as a result of voluntary actions by the property owners.
- An estimated 75-90% of the upgraded systems are meeting the repair standards for conventional systems, which provide for larger disposal area, shallow disposal depth, greater stream setback, and more groundwater separation than previously occurred.
- The 10-25% of systems which have not met repair standards are subject to increased monitoring and management by the County and the property owner. These types of systems are now being addressed through more stringent enforcement of the repair standards, increased use of alternative technologies, more frequent inspection, required management, and development of community disposal facilities.
- Policies limiting density of development have previously been implemented which have substantially limited increases in nitrate discharge. Other

measures are being implemented which will reduce the amount of nitrate currently being discharged.

- Increased property owner education and oversight by County inspectors has resulted in more frequent tank pumping, use of water conservation methods, and better system management by the property owners.
- Rechecks during the wet winter of 1992-93 of upgraded systems and potential problem systems showed very low levels of failures (less than 2%) in areas already subject to management program activities.

2.3 Management Plan Approach

The elements of this Management Plan take into account the limitations on wastewater disposal in the San Lorenzo River Watershed and build on the opportunities and successes of the last seven years of program development. Determination of the best management approach has taken into account technical feasibility, impacts on water quality, environmental impacts, financial impacts on the residents, and long-term effectiveness. The background underlying these elements is discussed in detail in the Preliminary Report, and can be summarized briefly as follows:

- **The large majority of developed properties can be served by continued use of individual onsite wastewater disposal systems.** Based on the findings of the Preliminary Report, continued and improved onsite disposal is technically feasible for an estimated 95-99% of the parcels in the Watershed, using both conventional and alternative technologies where appropriate. System improvements, property owner education, and regular inspection by County staff will result in greatly improved system performance, and greatly diminished occurrence of system failures.

- **Implementing repair standards will allow for continued use of individual systems and establish a substantially improved performance.** Although the majority of existing systems in the Watershed probably cannot be upgraded to meet current Basin Plan standards or County standards for new development, there is an opportunity for substantial improvements which will protect water quality and beneficial uses, when implemented in conjunction with all the other elements of the Management Plan. The use of the repair standards will guide the system improvements and establish an effective bottom line for protection of water quality and public health. Implementation of system upgrades will ultimately reduce nitrate levels in ground and surface water by an estimated 15-30%.

- **Community disposal systems may be needed in some areas.** There are areas of the San Lorenzo Watershed where site conditions do not meet the repair standards for continued use of standard individual onsite disposal methods. In these areas, community disposal systems could be the most appropriate means of disposal, depending on technical feasibility, cost, environmental impacts and benefits, and community benefits. The Management Plan includes provisions for identifying such areas, conducting feasibility studies of the most appropriate alternatives, and developing and operating community systems where they are the most appropriate alternative. A valleywide sewer system option has been considered several times in the past, but each time it has been dropped due to high cost, environmental impact, and low overall benefit relative to cost.

- **Continued strong standards for wastewater disposal systems which serve new development are needed.** While the Management Plan focuses on alleviating problems that result from existing wastewater disposal practices, it also includes strict standards for new development in order to reduce cumulative impacts, particularly discharge of nitrate. In many cases, these standards are more strict than both those of the Basin Plan and those for new development in other parts of the County.

2.4 Amendment of Water Quality Control Plan for the Central Coast Basin

In 1982, the Regional Water Quality Control Board (Regional Board) adopted Resolution 82-10, which amended the Water Quality Control Plan for the Central Coast Basin (the Basin Plan) to impose waste discharge prohibitions and specify wastewater management measures in the San Lorenzo Valley. The Management Plan has been developed to address the concerns upon which Resolution 82-10 is based, and to move beyond those prohibitions to provide for comprehensive wastewater management for the entire watershed. Adoption of the Management Plan will be accompanied by amendment of the Basin Plan to remove the old prohibitions and specify a framework for future cooperation between the County and the Regional Board for management of wastewater disposal and protection of water quality in the watershed (Appendix K).

2.5 San Lorenzo Nitrate Management Plan

During the past five years the County has conducted a study to determine the extent that elevated nitrate levels have impacted uses of watershed resources, identify the primary sources of the elevated nitrate levels, and develop a plan for control of nitrate discharges. That study was completed in February 1995. The study recommends an objective of reducing nitrate levels in the River and underlying groundwater by 15-30% over the next 10-25 years through implementation of specific management measures contained in the proposed nitrate management plan.

Septic systems in sandy soils contribute to 38% of the summer nitrate load in the River. Septic systems in nonsandy soils contribute another 19% of the nitrate load. The nitrate management plan includes specific recommendations for reducing nitrate discharge from new and existing septic systems, particularly in sandy soils. These recommendations have been incorporated in the wastewater management plan and proposed standards. The nitrate plan is summarized in Appendix J.

2.6 County Service Area No. 12

Implementation of this Management Plan has been supported by the formation of County Service Area No. 12 (CSA 12), a countywide service area created by the Santa Cruz County Board of Supervisors in 1989 to provide for improved management of wastewater disposal in unsewered areas (Figure 1).

CSA 12 service charges are collected from all properties in the county with septic systems. Charges were first collected in Fiscal Year 1990-91. The

charges for 1994-95 are $6.38 per parcel per year, and fund the following activities:
- development of septic tank sludge disposal facilities,
- development and maintenance of a computerized information system to track septic system performance and maintenance,
- use of new water quality monitoring equipment to evaluate impacts of wastewater disposal,
- development of educational programs and materials, and
- other countywide programs for enhanced septic system management.

In response to the increased need for more comprehensive wastewater management in the San Lorenzo Watershed, the Board of Supervisors also created a specific zone of benefit, Zone A, of CSA 12 which includes all properties on septic systems in the Watershed (Figure 2). An additional annual fee ($14.18 per parcel in 1994-95) is collected to help pay for programs specific to the Watershed. This additional revenue has allowed considerable expansion of the management activities which were conducted from 1985 to 1990. These expanded activities are reflected in this Management Plan.

Beginning in 1993-94, an additional annual charge under CSA 12 is collected for those parcels served by nonstandard systems: alternative, nonconforming, and haulaway systems. This charge pays the costs of the County's monitoring efforts, which are needed to ensure that the systems are continuing to perform adequately. Additional annual charges are $97 for nonconforming systems, $174 for haulaway systems and alternative system repairs, and $499 for new alternative systems (mounds and pressure distribution systems).

It is expected that any development of community disposal facilities will be funded either through formation of additional individual zones of CSA 12 or new county service areas which would encompass each sewered area and provide for collection of annual charges for payment of the local share of capital costs and annual operation and maintenance costs.

Figure 1: Boundaries of County Service Area No. 12, Septic System Maintenance

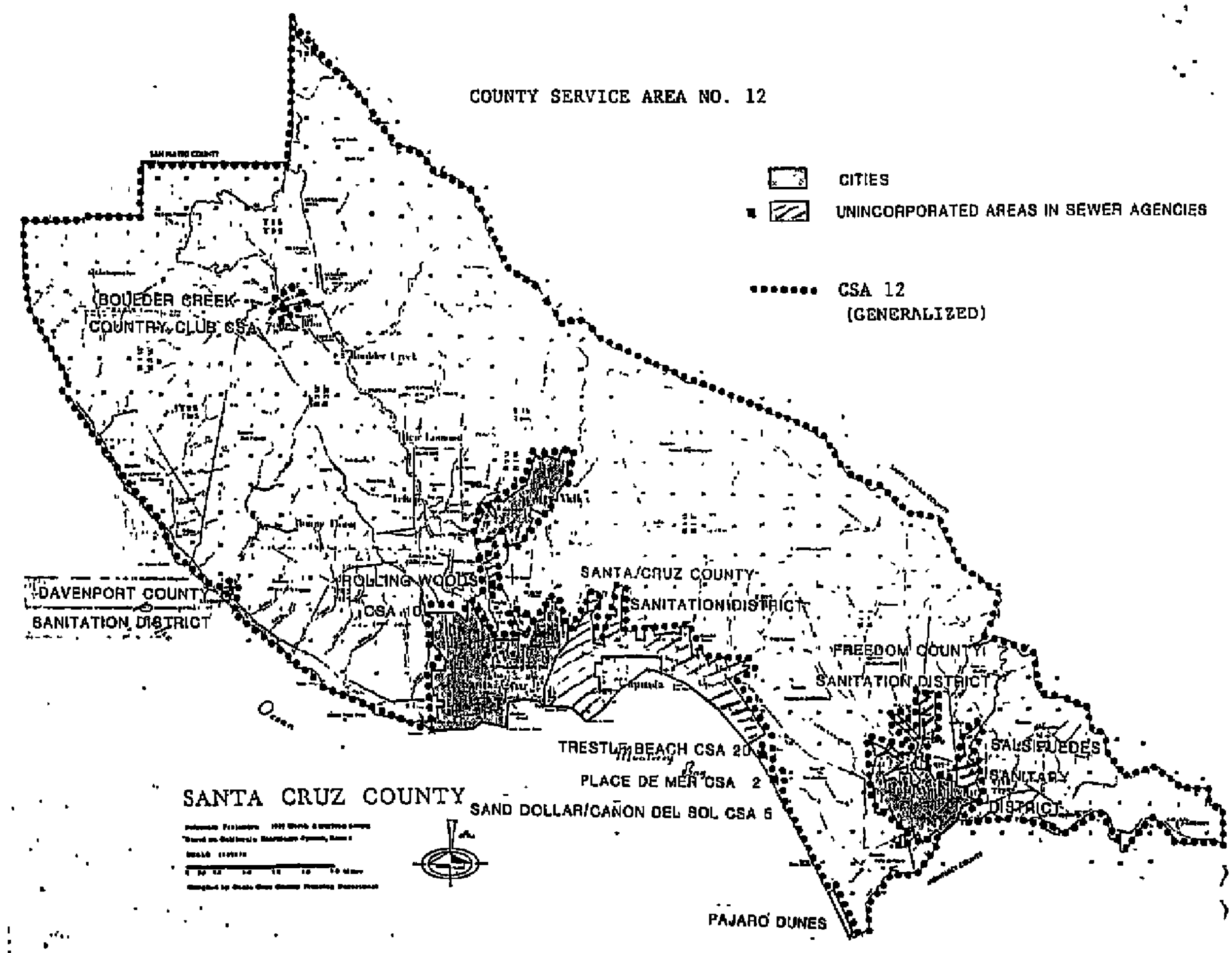
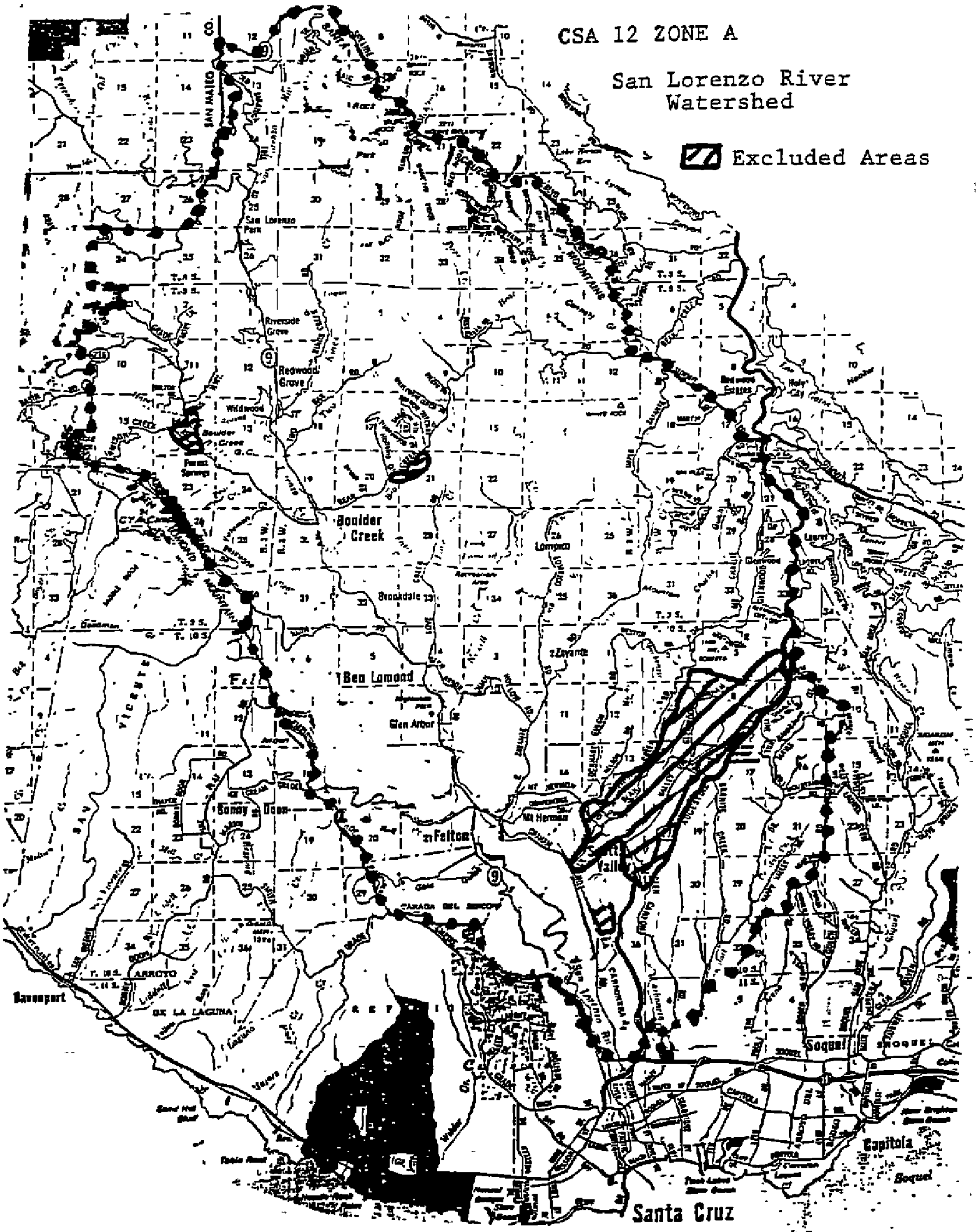


Figure 2: County Service Area No. 12, Zone A, San Lorenzo Wastewater Management



3 INITIAL DISPOSAL SYSTEM EVALUATIONS

A key aspect of the Management Plan is the initial survey and evaluation of the performance of each individual onsite disposal system. Each disposal system is evaluated through review of existing file information and field inspections of system performance. This work is supplemented by investigation of soils and groundwater levels, general water quality monitoring, and followup investigations of water quality degradation.

The assessments have been conducted by subarea, beginning with the previously designated Class I areas and other areas expected to have more significant problems. (The Class I areas are those areas where continued onsite discharge of sewage was prohibited by the Regional Board through adoption of Resolution 82-10.) A survey area is generally a distinct neighborhood or community, consisting of 100 to 600 parcels. The specific procedures for the initial area surveys and the evaluation of long term disposal needs are described in the following sections.

3.1 Information Compilation

The evaluation procedure is initiated by compiling and organizing all available information for the area to be evaluated. Information from Environmental Health historical files and from previous studies has been compiled in a computerized database which includes the following information for individual parcels where it is available:

- land use and number of bedrooms for residential uses;
- system characteristics:
    - septic tank size, age, and material;
    - leachfield size, depth, and age
    - any other system characteristics (such as water conservation, pump-up, use of a greywater sump, etc.);
- site characteristics:
    - parcel size;
    - stream setback
    - depth to groundwater and depth to bedrock
    - slope, soil type, and percolation rate
- history of system performance: installation dates, inspections, pumping, failures, repairs, and any indication of prior problems.

(Prior to data entry in the computer system, the information from the files is compiled on standardized data entry sheets by student research assistants and thoroughly checked by professional staff to ensure that it has been correctly interpreted.)

Key pieces of information such as groundwater depth and soil characteristics are also plotted on detailed maps of the survey areas to identify geographic concentrations of potential problems. The compiled information is made available to the field inspector to provide background on the systems and warn the inspector of potential problems. An example of the information available in the computer database is provided in Appendix B.

3.2 Field Surveys

After the information has been compiled, the actual field survey process begins. Each accessible developed parcel within the survey area is inspected to determine if there is surfacing of septic effluent, surface discharge of greywater, high effluent level in leachfield riser pipes, or any other indication of problems with the sewage disposal system. The inspector makes notes of site constraints such as clay soils, high groundwater, steep slopes, embankments, proximity to drainageways or wells, and small lot size. The potential for repair is estimated to be good, fair, or poor, and potential constraints to repair are noted. Notes are kept on parcel survey sheets (Appendix A).

Any property with surfacing effluent or greywater discharge is determined to have a system failure requiring correction. For each of these systems, the inspector completes a problem system sheet, which includes a plot plan of the property and specific observations regarding the problem (Appendix A). This sheet is then used to refer the problem on to the appropriate staff person for resolution of the problem. Problem systems may also be identified through investigations of complaints received from the public or through investigations of the source of observed water quality degradation.

If the occupant is home when a problem system is discovered, the problem is discussed with them immediately. Otherwise, a notice is left at the property and follow-up contact is made by telephone. A notice to repair will also be mailed to the owner. The procedures for making septic system improvement are discussed in Section 4.1, and enforcement methods are discussed in Section 4.2.

Whenever contacts are made with residents during the survey process, time is taken to discuss the purpose of the wastewater management program and educate them regarding proper maintenance of their septic system. Informational brochures are made available to residents at the time of the inspection (see Appendix G).

Where access to a property is limited by gates, dogs, large parcel size, or other factors, the inspector will contact the owner to set up an appointment for a field inspection. Field inspections will be waived if all the following criteria are met: there is sufficient file information to know that the system is less than 15 years old, that it meets current repair standards, and there are no other reasons to suspect a potential problem.

During the survey process, the inspector will identify parcels or areas where the septic system may be marginal, or where more problems might be expected during the winter with high groundwater or saturated soil conditions. These parcels to be rechecked are noted on the parcel inspection sheets, and are identified in the computer database. The inspector will make the rechecks as part of the survey process. Additionally, where greywater discharges are corrected by reconnecting the greywater lines to the septic system, a follow-up check will be needed to ensure that the greywater has not been subsequently disconnected, and that the system is not failing as a result of the greywater connection.

3.3 Soil and Groundwater Investigations

For most areas there has been a lack of adequate information regarding the occurrence of problematic soils and groundwater. Where constraints are suspected based on history of problems and/or observations of soils and topography, management program staff construct shallow testholes or monitoring wells to expand the available information. Holes are generally constructed at times when high water tables are expected, and in locations where the information can be extrapolated to surrounding parcels. Some of the monitoring wells are also sampled for nitrate and bacteria to evaluate the extent to which groundwater contamination may be occurring.

The findings are plotted on parcel maps, along with any previous file information (including the previous Class I and II studies), and estimates for groundwater levels and soil conditions in the surrounding areas are made. These maps are used in the evaluation of longterm disposal needs for an area and are also used to warn of potential constraints due to soil or groundwater when reviewing designs for individual system upgrades. However, at the time of system upgrade, actual site specific information will also be obtained to provide more accurate information for designing and completing the upgrade (see Appendix C on repair procedures).

Groundwater maps are presented in Appendix H for portions of the Kings Creek area, Boulder Creek, Brookdale, Ben Lomond, Brook Lomond, Glen Arbor, and Felton. Additional wells will be placed and monitored in these and additional areas to give better resolution of the groundwater maps and to develop maps for other areas.

3.4 Evaluation of Long Term Needs

The information compiled for a survey area is used to evaluate the long term capabilities of that area for wastewater disposal and to identify the specific type of improvements that will ultimately be needed in order for all systems to perform without impacting public health and water quality. These findings guide individual repairs and determine the need for further pursuit of a community disposal system for the area.

The following factors are tabulated and assessed for the area under consideration (much of this information is presented in Appendix H):
- failure rate from surveys: tabulated by area from the computer database and plotted on parcel maps;
- presence of chronic or historical problems, tabulated and plotted;
- severity of water quality degradation in the area (including cumulative degradation) as determined from downstream monitoring stations and monitoring wells;
- extent of occurrence of poor soils, high groundwater, and/or close proximity to waterways: tabulated and plotted
- extent of steep slope, small lot sizes, and shallow depth to bedrock: tabulated from database;
- proportion of systems which can ultimately be repaired to conform with standard requirements versus the number which would require nonconforming, alternative, or haulaway systems (as indicated by mapped areas of constraints and matrices showing the number of parcels which meet and do not

meet single or multiple numeric standards (such as depth to groundwater and setback from streams));
- availability of offsite or community disposal sites, as indicated by staff knowledge, previous studies, or new feasibility studies; and,
- perceptions and concerns of the residents and property owners regarding performance of disposal systems in their area, as indicated by community meetings, questionnaires, or direct discussions.

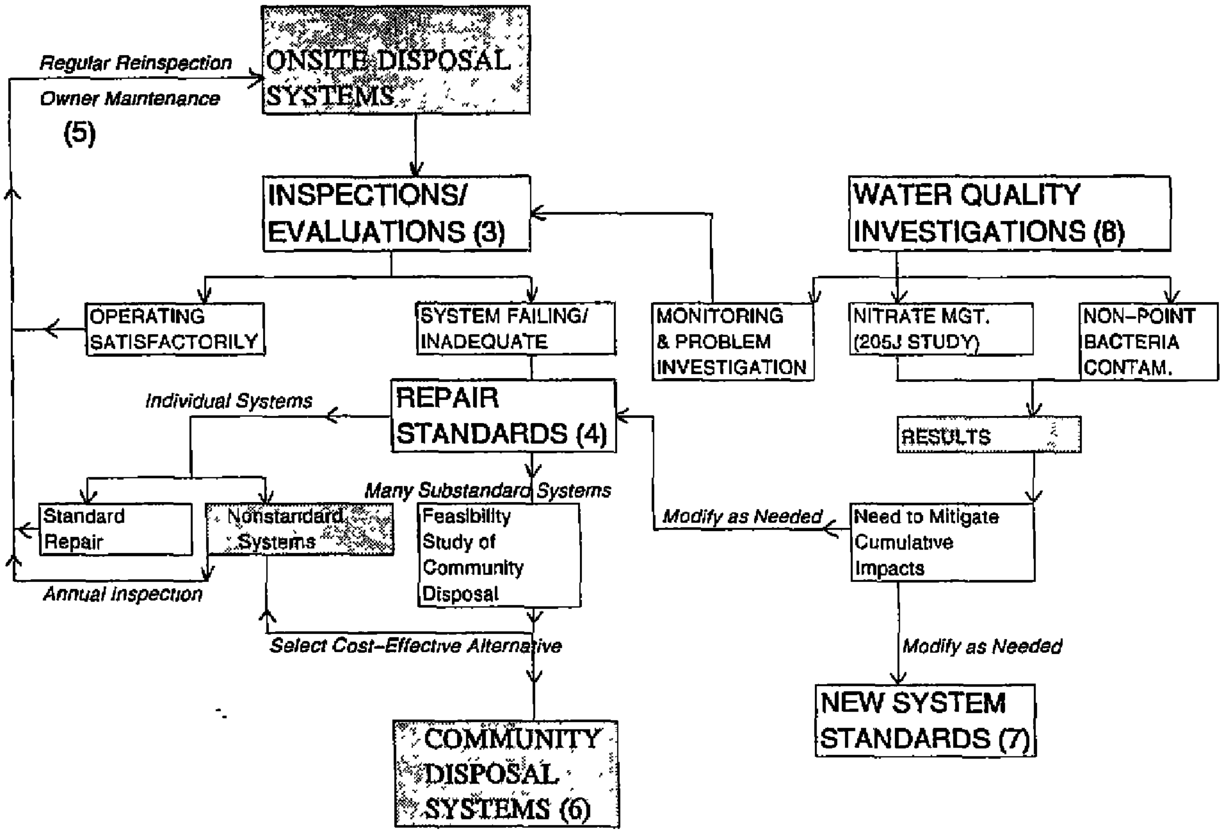
The survey findings and file information regarding site conditions and septic system performance in the area provide the primary basis for the evaluation. This information is augmented by additional soil and groundwater investigations as described above. If the period during which the survey takes place is unusually dry, and existing file information is inadequate to describe wet weather conditions, final evaluation may be postponed until observations can be made during periods of elevated winter groundwater.

If the occurrence of parcels which cannot meet repair standards is low and scattered within an area, the long term approach for that area will be the use of onsite repairs for most parcels, with use of individual alternative systems, nonconforming systems, or haulaway systems on the parcels which cannot meet conventional standards. If there are concentrations of parcels which cannot meet conventional repair standards and there are offsite disposal sites available, the County will evaluate the technical and economic feasibility of available alternatives. Detailed assessment of water quality degradation and public health threat in the area will also be performed to confirm the need for a project.

Based on the outcome of the feasibility study, the following actions may be taken:
- A community system will be pursued if that proves to be more feasible and cost effective than individual alternative solutions.
- If disposal sites are not available and/or a community system is not cost-effective, individual nonstandard systems will be utilized for parcels that cannot meet conventional standards. This will be accompanied by a higher level of inspection, management, water conservation, and seasonal haulaway as needed.

The various elements of the Management Program, particularly as they relate to the determination of long term approaches to wastewater disposal, are shown in Figure 3. The specific types of systems expected to be used for making improvements in wastewater disposal are summarized in Tables 3 and 4, and described in Appendix E. The evaluation of conditions and recommendations for long term wastewater disposal in the specific areas of the San Lorenzo Valley are presented in Appendix H. As other areas are evaluated, the results will be summarized in the program status reports.

Figure 3: ELEMENTS OF THE SAN LORENZO WASTEWATER MANAGEMENT PROGRAM



Numbers in Parentheses refer to Section Numbers in Management Plan

4 DISPOSAL SYSTEM IMPROVEMENTS

Following the survey and evaluation process, improvements will be required for those systems found to be failing and/or degrading water quality. Most improvements will involve upgrade and improved management of individual onsite disposal systems, the procedures for which are discussed in this section. If the evaluation process indicates that a community disposal system may be more appropriate for an area, such a project will be pursued, as discussed in Section 6.

4.1 Septic System Repair Procedures

Disposal system improvements are required for problem systems identified through the evaluation process, inspections, complaint investigations or other means. Problem systems are defined as any system which has surfacing effluent, discharge of greywater, or contributes to measurable water quality degradation, as indicated by water quality sampling. Required improvements may include immediate, temporary actions as well as long term solutions. The general guidelines for determining the extent of system improvement needed are listed in Table 1.

In addition to the improvements required for identified problem systems, the large majority of system improvements are voluntarily initiated by the property owner. This may result from a home improvement, a property transfer, recommendations made by a septic tank pumper, or the homeowner's own observation that their system is in 'pre-failure' condition. The latter may be indicated by slow drains, frequent pumping required, odor, soggy ground, or occasional surfacing effluent during times of heavy loading. As a part of the County's effort to monitor system management and promote education, emphasis will be placed on encouraging voluntary repairs, including the possibility of sending notices to owners whose system may be approaching a pre-failure condition, as indicated by inspections and information in the computer system.

Septic system repairs and replacements are required to conform with the Procedures and Standards for the Repair and Upgrade of Septic Systems. These requirements are presented in Appendix C and summarized in Table 2. The various technologies for disposal system improvement, the applicability to particular site conditions, and the estimated costs are summarized in Tables 3 and 4, and described further in Appendix E.

When a property owner desires to make or is required to make a septic system repair, the typical first step is to submit a repair permit application showing the location and type of system to be installed. Actual permit submittal may be preceded by consultation with County staff, a private wastewater consultant, and/or a septic system contractor in order to identify site limitations and specify the requirements to be met. Once an application is received, County staff will check available information in order to determine whether the application complies with repair requirements, particularly in regard to leachfield size and depth, groundwater separation, soil percolation, and stream setback. If there are concerns, the specialist may require the applicant to conduct site investigations and/or modify the proposed system to ensure compliance with all requirements. Once requirements are met, the permit is approved, and the system is installed under the supervision of the field specialist.

If the site conditions are such that a system replacement cannot fully meet the requirements for a standard system, the repair may be made using a nonconforming system, haulaway system, or alternative system, according to the requirements for such nonstandard systems (also contained in the Repair Standards, Appendix C). A nonconforming system is a conventional system that meets all the requirements for a standard system except for disposal area, groundwater separation (at distances greater than 250 feet from a water body), or size of pump chamber. A nonconforming system can be allowed if all other standard requirements are met, if there will be no significant remodel of the property, and if there is no expectation of failure or adverse water quality impact. Where these conditions will not be met, an alternative system or haulaway system must be used. If a system improvement cannot meet either the nonconforming or alternative requirements, the property is required to go to a haulaway system, with effluent pumped from the septic tank as needed to prevent surfacing of effluent. This may be required on a year-round basis or just during the winter months when required groundwater separation cannot be met. For all nonconforming, alternative, and haulaway systems, special management provisions and regular inspections are required to ensure that these nonstandard systems perform satisfactorily (see Section 4.3).

The nomenclature to describe the standard and nonstandard systems will be revised upon Plan implementation to further define the nonconforming category and to give the systems more generic labels (described further in Appendix C):
- Category A (Standard) System - meets all standard requirements.
- Category B (Alternative) System - uses alternative technology, meets standards for major remodels.
- Category C (Nonconforming, Limited Expansion) System - meets all requirements except for expansion area, size of pump chamber or groundwater separation; major remodels not allowed.
- Category D (Nonconforming, Low-Flow) System - meets all requirements except size of disposal area and possibly groundwater separation; remodels limited, water conservation required.
- Category E (Haulaway) System - includes seasonal haulaway.
- Category F (Prestandard) System - older system which is not failing.

Where a concentration of problems is found, with site conditions which limit the potential for successful onsite system repair, interim improvements are required while County staff evaluates the potential for a community approach. Interim measures usually involve water conservation, use of nonconforming repairs, and/or seasonal pumping of the tank as necessary to prevent surfacing of effluent until a final solution can be developed.

Construction and financing of the necessary improvements to individual systems are primarily the responsibility of the individual property owner. The role of the County is to require that improvements be done to County standards, provide information on possible financial assistance, provide technical advice, and generally help facilitate the work as much as possible. The 1994-95 permit fees are $296 for most repairs, or $74 for minor repairs (tank replacement or greywater sumps). The County will pursue development of a low cost loan program using Clean Water Act Funds to help fund the costs of repair, design, and construction, particularly to promote use of enhanced treatment through alternative systems, as discussed in Section 10.5.

TABLE 1: SUMMARY OF IMPROVEMENT GUIDELINES

PROBLEM	CONDITIONS	IMPROVEMENT REQUIREMENTS	INSPECTION FREQUENCY
Greywater Bypass	Septic System Meets Standards	Connect to Existing System	Regular*
	System Substandard, Old, Functioning	Install GW Sump	Regular*
		Upgrade System	Regular*
		Connect to System	1 yr. Recheck
	Cannot install Sump, or Connect Washer to System	Remove Clotheswasher Connect other lines to System	Annual
Effluent Discharge Continuous Failure	Plumbing Blockage Only	Open, Replace Pipes	Regular*
	Site Meets Conventional Repair Standards	Install Standard Repair	Regular*
	Site Meets Standards Except Disposal Size is 50–99% of Required	Install Nonconforming System & Water Conservation Devices	Annual Nonstand.**
	Site Meets Alternative Repair Standards	Install Alternative System	Annual Nonstand.**
	Site Cannot Meet Standards in Winter	Winter Haulaway	Annual Nonstand.**
	Site Cannot Meet Alternative Standards	Full Haulaway or Blackwater Haulaway	Annual Nonstand.**
Effluent Discharge Intermittent Failure	System Fails Once with Excessive Water Use or Winter Time Only	Warning Letter: Flow Reduction Voluntary Winter Pumping	1 year Winter Recheck
	System Fails Intermittently in Winter	Standard Repair, if possible	Regular*
		Nonstandard Repair	Annual Nonstand.**
		Required Winter Haulaway	Annual Nonstand.**
System Functioning	Meets Repair Standards	No Potential Problems	Regular*
		Potential problem soil or groundwater	Winter 1 yr Recheck
	Old or Substandard	Improvements to be made prior to failure	3 years*
Community Evaluations	Numerous Sites in Area Cannot Meet Standards	Interim Repairs	Annual Nonstand.**
		Evaluate Feasibility of Community Disposal	

* See Table 5 for display of regular inspection frequencies.
** Nonstandard Systems require Recordation of Notice of Nonstandard System on Deed, Payment of Annual Fee, Compliance with Conditions, and Annual Inspections

Table 2 - Summary of Repair Standards

Leaching Area Requirements (sidewall area square feet)

	Percolation Rate (MPI) 1-5	6-30	31-60	61-120	Maximum Water Use Gal/Day
1 bedroom	500	600	900	2150	215
2 bedrooms	625	750	1125	2700	270
3 bedrooms	750	900	1350	3250	325
4 bedrooms	875	1050	1575	3750	375
Additional Bedrooms	125	150	225	550	55

- Installation of 50 - 99% of the standard leaching area may be allowed for nonconforming systems, provided water conservation measures are installed.
- Soils not percolating in the range 1-120 MPI or not able to install at least 50% of standard leaching area must use an alternative system or haulaway system.

Groundwater Separation Below Leachfield:

- At distances of 50-100 feet from a stream, spring, or other waterbody the minimum separation shall be 5 feet; at greater distances the minimum separation shall be 3 feet.
- At distances greater than 250 feet from a waterbody, a nonconforming system may be allowed which has a 1 foot separation between groundwater and bottom of leachfield for a minimum of ninety percent of the year.
- Where specified groundwater separation cannot be met, systems which provide for enhanced treatment may be allowed on a case by case basis.

Minimum Setbacks to Leaching Devices

- Setback from cuts or embankments shall be 2 times the height of the bank, up to a setback of 25 feet. If an impermeable layer, or high groundwater is present, the setback shall be 4 times the height, up to 50 feet.
- Setbacks from streams shall be at least 100 feet if possible, but may be reduced to a minimum of 50 feet, if groundwater separation is greater than 5 feet and percolation rate is slower than 1 mpi.
- Setbacks from drainageways shall be 25 feet.

Trench Depth

- Maximum of 4 feet (2.5 foot flow) in sandy soils (> 5 mpi) or 6.5 feet (5 foot flow) in other soils.

Slope

- The general limit is 30%, however installation on slopes up to 50% may be allowed if the leachpipe is installed at least 2 feet deep and a minimum of 5 feet of permeable soil is maintained below the leachfield and there are no other constraints.

Greywater Sumps

- Greywater sumps may be installed to absorb washing machine water, or bathwater, to reduce the load on the leachfield, particularly to correct an illegal greywater discharge.

NonStandard Systems

- Nonconforming System - Where only 50-99% of the standard leaching area can be provided, the system shall be deemed a nonconforming system and flow must be reduced through use of water conservation devices, with provisions made to pump the tank as necessary to prevent system failure.
- Haulaway Systems - When a system is failing and cannot be repaired, sewage shall be pumped on a regular basis to prevent any surfacing of effluent. Haulaway may be required on a year-round basis, or only in the winter when groundwater levels are high.
- Alternative Systems - Where repair standards for a conventional system cannot be met, an alternative system may be allowed, such as a mound system, pressure-distribution system, sand filter, or other approved alternative which provides for adequate treatment and disposal.
- Deed Recordation and Fee - All nonstandard systems shall be subject to an annual fee to cover the costs of inspection, and recordation of a notice of nonstandard system on the deed.

TABLE 3: COSTS OF POTENTIAL SYSTEM IMPROVEMENTS AND SUITABILITY FOR CONSTRAINTS

DISPOSAL TYPE	SUITABILITY FOR CONSTRAINTS: (a)					NITR. RED. (b)	ESTIMATED COSTS (c)		
	GROUND WATER	CREEK SETBK	CLAY SOIL	SAND SOIL	SMALL PARCEL		CAPITAL	O&M	ANNUAL
STANDARD SYSTEMS									
Standard System						20%	$4,500	$50	$526
Greywater Sump					X	10%	$1,500	$0	$159
NONSTANDARD SYSTEMS									
Nonconforming System	X		X		X	20%	$4,500	$125	$601
Mounded Bed	X		X	X		20%	$20,000	$300	$2,413
Pressure Distribution	X	X	X	X	X	15%	$10,000	$300	$1,357
Sand Filter (inc. system)	X	X	X	X	X	50%	$10,000	$300	$1,357
Full Haulaway	X	X	X		X	100%	$3,500	$5,350	$5,720
Winter Haulaway	X		X		X	20%	$1,000	$1,650	$1,756
Blackwater Haulaway			X		X	80%	$4,000	$500	$923
COMMUNITY DISPOSAL	X	X	X	X	X	75%	$20,000	$720	$2,833
EXPERIMENTAL SYSTEMS									
Zeolite Filters				X		85%	$1,950	$475	$681
Package Sys. (eg. Clearwater)			X	X		90%	$16,000	$600	$2,291
Upflow Anaerobic Filter With Sand Filter	X			X		75%	$16,000	$300	$1,991

NOTES:

a. See Table 4 for the extent to which a particular system type is expected to be utilized for a particular constraint. See Table 2 and the Repair Standards for detailed specifications and requirements (Appendix C).

b. Increased amount of nitrogen removal (over an old system) is shown for each disposal type (see SCCHSA, 1995).

c. Capital Costs are estimated in 1993 dollars. Operation and Maintenance Costs include tank pumping, electrical, pump maintenance, and annual inspection fees, if any. Annual costs are the capital cost amortized over 20 years at 8.5%, with the addition of the O &M costs.

Table 4 Total Number of Parcels with Constraints And Expected Types of Onsite System Upgrades

For Major Communities:

Felton, Glen Arbor, Ben Lomond, Boulder Creek, Kings Creek

	Secondary Constraint STREAM SETBACK											
Primary Constraint	25–50 FT			50–100 FT			100–250 FT			over 250 FT		
GROUNDWATER <3 FT	3			6			55			184		
	90%	Pu	3	75%	WH	5	75%	WH	41	30%	NC	55
	5%	H	0	25%	M	2	25%	M	14	45%	WH	83
	5%	M	0							25%	M	46
3–6 FT	7			40			104			364		
	90%	Pu	6	10%	NC	4	30%	S	31	50%	S	182
	10%	MPF	1	65%	Pu	26	35%	NC	36	40%	NC	146
			0	5%	WH	2	20%	WH	21	5%	WH	18
				20%	MPF	8	15%	MPF	16	5%	MPF	18
6–10 FT	7			164			58			201		
	90%	Pu	6	40%	S	66	80%	S	46	90%	S	181
	10%	PF	1	30%	Pu	49	20%	NC	12	10%	NC	20
				20%	NC	33						
				10%	PF	16						
Over 10 ft	11			183			348			1241		
	90%	Pu	10	90%	S	165	90%	S	313	90%	S	1117
	10%	MPF	1	10%	NC	18	10%	NC	35	10%	NC	124
CLAY SOIL	95											
	10%	S	10									
	70%	NC	67									
	10%	PF	10									
	10%	H	10									
PARCEL SIZE <5000 SQ FT	183											
	80%	NC	146									
	10%	F	18									
	10%	H	18									
5000–7500 SQ FT	337											
	70%	S	236									
	30%	NC	101									

Shaded blocks are parcels with limited constraints.

Summary	Number	%	Actual Upgrades 1986–1993
Total Parcels	3591		490
Standard Systems	2346	65%	56%
Nonconforming Systems	797	22%	34%
Pump Up Systems	100	3%	7%
Alternative Systems	150	4%	2%
Haulaway Systems	198	5%	1%

1986–93 upgrade figures are for Class I parcels only.

- First number indicates the number of parcels with that constraint or combination of constraints. All parcels are accounted for once in this table: under the major constraint(s) for that parcel.
- Percentages are estimates of the extent to which a particular alternative will be utilized on parcels with that general constraint or combination of constraints (see narrative).
- Numbers on right are calculated estimates of the number of parcels utilizing that alternative,

POTENTIAL ALTERNATIVES:

S – Standard, Conventional Septic System

NC – Nonconforming System, Reduced Size, and/or Reduced Groundwater Separation (over 250 from a stream)

Pu – Pump Up System (to another disposal area on the parcel)

F – Sand Filter

P – Pressure Distribution System

M – Mounded Bed System

H – Full-time Haulaway

WH – Winter Haulaway

Where there are concentrations of parcels requiring nonstandard upgrades, community disposal systems may be the best alternative, if feasible.

A more detailed explanation of the table is presented on the following page.

Explanation of Constraint Tabulations by Area (Tables 4, H-3 - H-5, H-7 - H-9)

Following is a more detailed description of the contents of the above listed tables. Table 4 (H-3), which tabulate the totals for all areas, is used as an example. These tables show the following information:
- the number of parcels affected by shallow groundwater, minimal setbacks from streams, clay soil, and small parcel size.
- the types of improvements which will likely be required to comply with repair standards, given the presence of those constraints.
- a tabulation of the total parcels expected to require the various types of disposal system improvements, including a tally of the actual upgrades completed in the Class I areas from 1986-1993, as compared to the proposed repair standards.

All parcels are accounted for only once in the table. If a parcel has more than one set of constraints, it is only listed under the most significant constraint type. Parcels with groundwater less than 10 feet and/or stream setbacks less than 250 feet are listed under stream and groundwater constraints, even though they may also be affected by clay soil or small parcel size. The shaded parcels are those with few constraints to standard conventional onsite system use.

The total number of parcels affected by a particular constraint or combination of constraints is indicated at the top of each cell. For example, for all areas, 40 developed parcels have winter groundwater levels that are between 3 and 6 feet from the surface and have existing disposal systems that are between 50 and 100 feet from a stream.

Below the numbers of parcels in each category are letters which indicate the types of system improvements which would be acceptable for those constraints, with a percentage which estimates the expected occurrence of each type of system improvement. The percentages are set estimates and the number of parcels is calculated from those percentages and from the number of parcels in that category.
<u>It is important to note that the calculated number of parcels are rounded, and do not necessarily add up exactly.</u>
For example, on the same group of 40 parcels with groundwater 3 to 6 feet below the surface and stream setback between 50 and 100 feet, it is estimated that:
- 10% would utilize nonconforming systems which had less than the standard amount of leachfiled area as a result of needing to use very shallow trenches to meet the groundwater setback of 5 feet.
- 65% would utilize an effluent pump to dispose of the effluent to a location on the parcel more than 100 feet from the stream where the required groundwater setback is only 3 feet. (Probably half of these would use standard trenches and half would use nonconforming trenches.)
- 5% would utilize winter haulaway to comply with groundwater separation requirements during the winter. This option would only be allowed if none of the other options were available for that particular parcel.
- 20% would utilize an alternative system (mound, sand filter, or pressure distribution system) to meet the requirements for enhanced treatment in close proximity to a stream and or groundwater. The proportion of parcels expected to utilize alternative systems is generally low due to the current high cost of such systems. It is expected that the proportion will increase by at least 10% over what is indicated in this table by reducing the cost of alternatives, providing low cost financing for alternative systems, and providing more incentives/requirements for alternative system use.
- No standard systems would be utilized with these constraints, unless an effluent pump were used.

The actual numbers of parcels expected to utilize each onsite alternative is indicated for each constraint type and is totalled in the lower right side of the table. Full-time haulaway and winter haulaway are combined.

Information on constraints for each parcel is taken from the parcel database for planning purposes. However, because of the extrapolations and generalizations made, actual site conditions and the type of system improvements required must be determined at the time of system repair.

4.2 Enforcement

When a problem is identified either through the survey/inspection process or through complaint investigations, a series of actions are taken to have the situation corrected by the property owner. In most cases the property owner is cooperative and the County's role is to provide assistance and oversee the work. However, if the property owner does not respond to the request to repair their system, followup actions become progressively more stringent and punitive. This section summarizes the enforcement procedures, which are described in detail in the policy memorandum contained in Appendix F.

When a problem is first identified and/or a complaint is received, it is entered into the computer database for tracking and the assigned staffperson investigates the situation. If the owner is present when the inspection is conducted, the problem is discussed, and many corrections can be initiated by this minimal enforcement effort.

If the owner is not present when a problem is identified, or if they fail to take action after the initial verbal contact, a Notice to Repair Septic System is mailed to the owner of record giving not more than 15 calendar days from the date of mailing to respond with a proposal to correct the problem. The notice also requires pumping of the septic tank as needed to prevent surface discharge of sewage. For situations where the failure is creating a significant health hazard, the owner is given only 3 days to start corrective actions. Most owners respond to the first notice, and begin to take action to correct the problem. On the average, the repair is completed within 30 days of discovery of the failure.

If no response to the first notice is received, a second and final Notice to Repair Septic System is mailed and a $72 violation reinspection fee is levied against the owner. If there is still no response after an additional 15 days, another field inspection is made and another $72 violation reinspection fee is levied against the owner. An administrative hearing with the Director of Environmental Health is then scheduled and the owner of record is duly noticed. If the hearing is ignored by the owner, or if the hearing produces no action from the owner, the matter is referred to the District Attorney or County Counsel for criminal or civil prosecution.

During the enforcement process, if the owner fails to respond to official notices, an overt septic system failure with surfacing effluent that directly endangers the public health can be abated through the County Emergency Abatement Process.

During the repair process, there may be violations of the repair standards or permit conditions. Because these do not necessarily result in surface discharge of sewage, civil or criminal action may not be effectively brought to secure compliance. In these cases, if after due process the owner fails to comply, a notice of violation will be recorded against the property, which clouds the title and warns any prospective buyer or lender of inadequacies of the sewage disposal system. A notation will also be made in the County's land use information system that will prevent the owner from obtaining any other County permit for building, etc., until the violation is corrected.

4.3 Nonstandard System Provisions

Nonstandard systems are defined to include any new or upgraded system which does not meet requirements for a standard conventional septic tank and leachfield. Nonstandard systems include alternative systems, nonconforming systems, and haulaway systems (including existing systems which may be required to pump regularly to prevent system failure and/or protect water quality). Nonstandard systems can be operated without failures if they are managed properly. However, because they do not meet all standard system requirements, nonstandard systems are subject to a number of other requirements to ensure proper management and adequate performance:

- restriction on volume of water use, property use, and or future development to ensure the capacity of the system is not exceeded;
- requirement of regular monitoring and maintenance of any pumps, filters, grease traps, alarm systems, disposal system monitoring risers, groundwater monitoring wells, and other system components;
- regular inspection and monitoring by the property owner and County staff;
- payment of an annual fee by the property owner to cover the costs of the County for system inspection; and,
- recordation on the deed of a notice notifying potential buyers and future owners of the presence and limitations of the nonstandard system.

When a permit for a nonstandard system is issued, the County notifies the owner of its limitations and the requirements for satisfactory operation. These are specified in a "Notice of Nonstandard System" which the County records on the deed. Annual inspection fees are collected through a special charge on the property tax bill under County Service Area 12 (CSA 12N) since the 1993-94 tax year.

There are four different levels of charge for the annual inspection, depending on the type of system and the amount of monitoring required. In 1994-95 the annual fees are $97 for a nonconforming system which requires an annual check for failure, $174 for an alternative repair or haulaway requiring a more thorough annual inspection, $499 for a new alternative system such as a mound system which is relatively accepted but requires annual groundwater monitoring, and $958 for a new system served by a less proven alternative system which requires quarterly monitoring. (Any type of technology which does not have documentation of effective performance will not be approved.)

5 ONGOING INSPECTION AND MAINTENANCE OF ONSITE SYSTEMS

Improved system maintenance and management is a critical element contributing to the long-term effectiveness of the wastewater management program. This will be accomplished through regular reinspection programs, and various efforts to promote adequate maintenance by property owners.

5.1 Ongoing Inspections

After the initial evaluations and upgrades have been completed, properties will continue to be checked for indications of septic system failure on a regular basis. The frequency of inspection will vary depending on the type of system, the condition and past performance of the system, and the presence of site constraints. The frequency of regular system reinspections is shown in Table 5.

Systems subject to a one year reinspection are nonstandard systems and systems which are identified during surveys or complaint investigation for followup inspections. Nonstandard systems will be inspected at least 1-4 times per year, depending on the type of system that was installed. Other systems subject to a one year recheck are those in which a greywater bypass has been reconnected to a substandard system, the washer has been removed, a onetime intermittent failure has been observed, or any others where the inspector believes a followup inspection during wet conditions is warranted (see Table 1).

Systems needing annual inspection or recheck are identified in the computer database and reinspections are done during wet winter conditions (generally as defined in County Code Chapter 7.38) to ensure that the systems are working properly under conditions when they would be most likely to fail. During the visit, aspects of system operation and appropriate methods of water conservation/flow reduction, if needed, will be discussed with the occupant of the home. If the system is not operating properly, additional maintenance efforts (ie. more stringent water conservation) or system improvements will be required. Based on the results of the reinspection, the frequency of followup inspections may be reduced if no problems are found or expected. However, if there are still problems with the system, and it appears that closer supervision will be necessary to ensure proper functioning, the system will be required to be upgraded, incorporated into the nonstandard system program, and/or the level of inspection and the annual inspection charge may be increased if it is already in the program.

All developed parcels in the Watershed that are not subject to the annual inspections or rechecks will be subject to an evaluation once every three to six years. For those parcels with site and system characteristics that do not meet new system standards and those parcels with the system located within 150 feet of a stream, the regular inspection will take place on the average once every three years. For the systems which meet standards, system evaluation will take place on the average once every 6 years. System evaluations will be facilitated by an annual review of records of tank pumping, inspections, and permits for system upgrades. For most parcels, the evaluation will include a physical inspection of the site for signs of system failure.

TABLE 5: INSPECTION FREQUENCIES AND OTHER LIMITS

SYSTEM TYPE Notes (see below):	FREQUENCY (years) a	MAJOR REMODEL ALLOWED b	NOTICE ON DEED c	ANNUAL SERVICE CHARGES d
Standard Conventional System (Category A) Over 150 ft. from stream or well	6	Y		$21
Standard Conventional System (Category A) 50-150 ft. from stream or well Standard Conventional System with effluent pumping over 150 ft. from stream or well	3	Y		$21
Standard Conventional System (Category A), With effluent pumping less than 150 ft. from watercourse or well	1	Y		$21
Prestandard System (Category F) (e) (Approved prior to 1994, No failures)	3	N		$21
Nonconforming System, Limited Expansion (Category C, Meets all standard system requirements, Except 100% expansion area, or groundwater separation 1-3 ft No history of problems	6	N	Y	$21
Nonconforming System, Low-Flow (Category D) 50-99% of disposal area, and/or reduced pump chamber size	1	N	Y	$118
Standard Alternative System (Category B)	1	Y	Y	$195
Nonconforming Alternative System (Category D)	1	N	Y	$195
Haulaway System (Including Seasonal) (Cat. E)	1	N	Y	$195

Notes:

a. This inspection frequency does not include one-time or intermittent followup checks to check on compliance after repair or connection of greywater (see Table 1).

b. All properties are allowed to do minor remodels, including one-time additions of up to 250 square feet, if it does not encroach on area needed for sewage disposal. Sewage disposal systems which meet standards, including expansion area, may do larger additions and may add bedrooms if the size of the disposal system will allow it. For Prestandard Systems, major remodels may be allowed if the system is upgraded to meet standards.

c. For properties which are served by nonstandard systems (alternative, nonconforming or haulaway), as evidenced by repeated failure or nonstandard repair, a notice of nonstandard system wil be recorded on the deed to indicate the limitations of the system and the conditions for continued operation, including payment of the additional annual inspection fee.

d. An annual service charge (in CSA 12) to support wastewater management programs and regular inspections is charged on the property tax bill of all parcels with septic systems. For all nonstandard systems (except those lacking expansion area or full groundwater separation (over 250 feet from a water body)) an additional charge is levied for annual inspections. Fees shown are 1994-95 rates (rounded to the nearest whole dollar).

e. Prestandard systems are those systems that do not meet current requirements for a standard system and were installed prior to 1993, serving uses developed prior to 1983.

5.2 Maintenance and Education

In addition to regular inspection by County staff, ongoing maintenance will also be accomplished through resident education, enactment of maintenance requirements on repair permits and operating permits, promotion of inspections at the time of property transfer, and improved tracking of maintenance records. Following is a more specific description of these elements:

Education - General education of the public is accomplished through periodic newspaper articles regarding septic system construction, performance, and maintenance with special emphasis on the benefits of water conservation. Four brochures on water conservation, greywater disposal, and general septic system use have been produced and are widely distributed. Site specific education of the septic system user will occur annually for systems that are subject to frequent monitoring. These annual (or more frequent if needed) visits give direct instruction to the occupant(s) regarding the proper use and maintenance of the septic system. Education programs are described in more detail in Appendix G.

Required Maintenance - When a system is repaired utilizing a nonstandard system, specific maintenance and operation requirements are specified. These requirements may limit the amount and type of wastewater that may be discharged to the system and may impose other maintenance requirements appropriate to the site and system. The nonstandard system provisions ensure that there will be adequate monitoring of systems that are in need of a high degree of maintenance.

Property Transfer Inspections - The real estate community and the general public are becoming much more aware of the legal disclosure requirements and the need for septic system evaluation (and upgrade if necessary) at the time of sale. The evaluation should include both a physical inspection and a review of the file relating to that system in the Environmental Health office. The County has reminded all real estate agents of this need, and of the County's willingness to assist in such evaluations. County staff continue to stress the need for inspections in their day-to-day contacts with realtors and the public. Use of the recorded "Notice of Nonstandard System" will also help to better warn prospective buyers of potential system limitations so that people will not buy a house with a system that won't meet their needs.

Maintenance Records - In 1987, the County adopted an ordinance requiring submittal of a pumping and inspection report to the property owner and to the County every time a private septic pumper pumps a tank. This will allow the County and the property owners to maintain a maintenance record for each parcel. With pumping records in the database, pumping efforts will be monitored, and if necessary, additional action will be taken to ensure adequate pumping. As an example, property owners could be reminded by mail of the need to pump, or at least check their tank, if their system had not been pumped within three to five years.

6 COMMUNITY DISPOSAL SYSTEMS

Parcel-by-parcel surveys and evaluations are intended to detect any parcel specific wastewater disposal problems as well as provide an overall view of the general suitability of continued onsite wastewater disposal in that area. This process results in identification of areas that may require a community approach to wastewater disposal. In areas where there is a potential need for the use of community disposal systems, the County is taking the following steps to evaluate and develop such systems:

1. Identify areas where there are concentrations of developed properties which have soil, groundwater and parcel size limitations that make standard septic system repairs difficult or impossible.

2. Identify and evaluate potential community disposal sites.

3. Determine the technical feasibility of transporting effluent to disposal sites and make a preliminary estimate of costs. If the project appears to be feasible and cost effective, proceed to the next phase of project development. A technical advisory committee of property owners and interested citizens will be formed early in the process to provide feedback as the process develops.

4. Contract with an engineering firm to prepare a thorough analysis of alternatives, identify expected service area boundaries, prepare preliminary designs, and prepare cost estimates for the preferred alternative. Use this information to establish firm support from the users.

5. In developing alternatives, include consideration for accommodating new or expanded development, as proposed in adopted planning documents for the area. Consult with business and home owners in and around the proposed service area. Consider inclusion of surrounding areas if there is adequate capacity and economies of scale which could make community disposal more cost-effective than conventional onsite disposal for those areas.

6. Determine if community disposal is the most cost-effective alternative and if it is affordable. Identify funding sources and mechanisms necessary to implement the project. If it is cost-effective and affordable, proceed with the project.

7. Establish the funding package for the project, finalize the service area, create a zone of benefit (or assessment district), and collect initial charges from potential users necessary to fund development of the project designs. Prepare the project plan, environmental documents, and prepare construction designs.

8. Construct the project and make hookups to the new facility.

9. Collect user fees through a special zone of benefit of CSA 12 or through a new County Service Area, and contract with County Public Works to provide for operation and maintenance of the facility.

It is expected that this process will take two to three years for large facilities and less time for small cluster systems. Timing also depends on available financing. Possible sources of financing include a combination of: county service area charges from users, loans from the State Revolving Fund, grants from the State's Small Community Program, funds from economic development grants, or other assistance programs. Funding availability will depend on the type of project and the nature of the community to be served.

The County is currently at step 6 in evaluating facilities for downtown Boulder Creek, Ben Lomond, Felton, Brook Lomond, and Glen Arbor. Although community disposal projects appear to be technically feasible, they do not currently appear to be the most cost-effective approach, nor are they affordable. Future changes in financing options could make them more affordable and desirable, and the feasibility of projects for those areas will be reevaluated at that time. Additional areas of the Watershed will be evaluated for feasibility of community disposal, as discussed in the implementation schedule (Section 9).

7 NEW DEVELOPMENT AND EXPANSION OF EXISTING USES

Any new sewage disposal system which will serve new development in the management area must meet standards as set forth in the County's sewage disposal ordinance (Chapter 7.38 of the County Code). These standards are in conformance with the requirements regarding individual onsite disposal contained in the Regional Board's Basin Plan (Appendix D). In addition, the County has adopted a minimum one acre parcel size for new development in the San Lorenzo Watershed and other new requirements which are designed to prevent any potential worsening of problems that already result from present development. Any significant expansion of existing development requires that the septic system be brought up to current standards.

The new system requirements are intended to prevent any significant cumulative increase in nitrate release to streams and groundwater basins, prevent a cumulative increase in non-point background bacterial contamination, improve effluent treatment, and ensure indefinite longterm performance of onsite disposal systems. The current requirements for new development include: 1) requirement of shallow effluent discharge depth (less than 4 ft. in sandy soils and less than 6.5 ft. in other soils); and, 2) requirement of a minimum parcel size of 1 acre throughout the designated San Lorenzo Watershed area. Additional measures for sandy areas may ultimately be required, depending upon the outcome of the nitrate management study (see Section 8.2).

For any significant addition to an existing use (including bedroom additions), the septic system must be upgraded to meet current standards. These requirements are discussed in detail in Appendix C. Table 5 indicates which types of systems can support a major remodel. If a system cannot meet requirements for either a standard system or alternative system, additions are limited to a one time addition of up to 250 square feet, with no increase in sewage discharge. Even in these cases, the system must be shown to be functioning properly or be upgraded to meet nonconforming system requirements if it is not.

In addition to the above requirements, the wastewater discharge prohibitions imposed by the Regional Board are still in place for the 2500 parcels in the village (Class I) areas of the Valley. Any new development or expansion of existing uses has been prohibited in these areas. Approval of the Wastewater Management Plan by the Regional Board will result in removal or modification of these restrictions. While removal of the restrictions will benefit many properties, development on many other properties, particularly in the downtown areas, will continue to be constrained because they cannot meet the County's current standards for septic system use: 1) the requirement of one acre for any new development in the San Lorenzo Watershed, and 2) the need to meet the technical standards for any new development or significant expansion of an existing use.

In the commercial village areas, some new and expanded uses could be served by new community disposal systems if such systems are found to be the most cost-effective method to solve the existing problems in those areas. However, outside the village centers (designated Town Plan Areas) of the Valley, current policies would prohibit any new community disposal system in the Valley from serving new development. In some cases, possible availability of economic development grants might make it feasible to construct small community systems which would primarily serve the commercial districts and allow new and expanded uses there. The County will be an active participant in such projects if there is interest from the business community and property owners.

8 WATER QUALITY MONITORING AND EVALUATION

Ongoing evaluation of water quality is a significant component of the wastewater management program. Investigations are conducted to measure the long-term impacts of wastewater disposal on surface and ground water quality, to identify sources of degradation, to measure the effectiveness of management programs, and guide the development of any additional standards or programs that may be needed. Water quality evaluations consist of both routine monitoring efforts and special studies, as described below.

8.1 Routine Monitoring

The routine evaluation efforts include regular monitoring of established surface water stations and natural bathing areas, investigation of incidents of water quality degradation, sampling of shallow groundwater wells, and monitoring of algae growth in the River:

- Regular Surface Water Monitoring - Twenty stations are monitored on a monthly basis, with 6 of those stations monitored weekly. Parameters measured each time include: temperature, pH, electroconductivity, dissolved oxygen, turbidity, and fecal coliform. For the monthly samples, nitrate concentration and streamflow are also measured. During summer months of June through September, bacteria samples are collected on a weekly basis from five additional stations at natural bathing areas. A listing of the regular monitoring stations and map of their location is contained in Appendix I.

- Investigations - Approximately 10-15 samples per week are collected to investigate specific problem areas and to sample locations that are not otherwise tested regularly. This allows for investigation, identification, and control of septic systems that are failing and degrading water quality. Investigations also may result in the identification and control of other sources of bacterial contamination such as livestock, waterfowl, or urban runoff.

- Groundwater Quality Sampling - Monthly sampling of shallow and deep groundwater for nitrate and bacteria is done to assess possible impacts of wastewater disposal in different areas. Initial work focussed on Boulder Creek and Quail Hollow, but shallow monitoring wells have subsequently been placed in Felton, Glen Arbor, Ben Lomond, and Brook Lomond.

- Investigation of Algae Growth - In order to monitor potential impacts of nitrate released from wastewater and other sources, observations of algae growth are made at 5 stations on a biweekly to monthly basis.

- Data Management - Water quality data is maintained in a computerized database, with data summaries prepared on an annual basis for submittal to interested parties and the Regional Board. Statistical analyses and summaries are prepared for the program status reports, which are published every 1-3 years.

8.2 Special Studies

In addition to regular monitoring efforts, special studies are conducted for in-depth water quality investigations. Two specific investigations are currently underway:

- Nitrate Management Study - Since 1987, county staff have conducted field investigations to quantify sources of nitrate in surface water and evaluate the impacts of current nitrate levels in the San Lorenzo River, which are two to three times higher than levels that occurred in the mid 1960's. These investigations have been augmented through the receipt of two Section 205j grants from the State Water Resources Control Board. This work includes the monitoring of nitrogen levels in surface and ground water, determination of significant nitrogen sources, further evaluation of the extent of biological growth in watershed streams, determination of the impact on beneficial uses from biological growth, determination of the relationship between nitrate levels and amount of growth, and development of effective nitrate control measures. Work was performed by county employees and technical consultants and supervised by a technical advisory committee with representatives from interested agencies. This work is being completed in 1995, and has resulted in recommendations an objective for nitrate in surface water, and a workable plan for achieving that objective. The recommendations of that plan regarding wastewater disposal have been incorporated in this wastewater management plan (Appendix J).

- Urban Runoff and other Nonpoint Sources - County water quality monitoring efforts have indicated that most of the bacterial contamination in the San Lorenzo River results from non-point sources unrelated to wastewater disposal: waterfowl, horses, dogs, urban runoff, garbage disposal, etc. Problems are particularly acute in the urbanized areas of the City of Santa Cruz. County staff have conducted various investigations to better evaluate these nonpoint sources, including: analysis of *E.coli*, enterococcus, and other indicator organisms; in-depth sampling of storm drain discharges; and controlled sampling of known sources. This work will continue and is expected to be supported by a new 205J grant from the State Water Resources Control Board.

9 SCHEDULE

Most elements of the Wastewater Management Plan are already in place and fully operational. Once the Plan is adopted by the Regional Board and the Board of Supervisors, the following actions will be taken to complete implementation of the Wastewater Plan and the Nitrate Management Plan:

1. Amend County Code Chapter 7.38 and the Standards for Repair of Septic Systems to reflect the specific standards for the San Lorenzo Watershed contained in the Wastewater Plan and the Nitrate Management Plan:
   a. increased groundwater separation,
   b. requirement for enhanced nitrogen removal for new and expanded systems in sandy soils,
   c. requirement for enhanced treatment for large systems at the time of repair or expansion,
   d. redesignation of the types of Nonstandard Systems as Category B, C, D, or F systems.

2. Add an additional staff position for inspections and increase annual CSA 12 service charges by up to $3.00 to cover the increased costs of program implementation.

3. Apply to the State Water Resources Control Board for State Revolving Funds to support a locally administered program for low interest loans for individual septic system improvements, primarily for alternative systems.

Following is a year by year chronology of work completed and work to be done. A listing of the status and schedule of management efforts to be taken for each subarea of the basin is presented in Table 6.

<u>Schedule by Year</u>

1985
- Wastewater Management efforts initiated in October, 1985: water quality monitoring and surveys of individual systems

Publications:
- San Lorenzo Valley Onsite Wastewater Disposal Pilot Management Project, Final Report;
- An Evaluation of Water Quality and Wastewater Disposal in the San Lorenzo Watershed

1986
- **Survey** of Greater Kings Creek area (690 parcels) completed
- **Preliminary evaluation and system upgrades** in Greater Kings Creek completed

Publications:
- San Lorenzo Wastewater Management Program Progress Report;
- A Technical Report on Wastewater Management in the San Lorenzo Watershed, including:
- Criteria for Repair and Improvement of Existing Individual Onsite Wastewater Disposal Systems

1987 - **Survey** of majority of Greater Boulder Creek (450 parcels) and Brook Lomond (50 parcels)
- Additional survey work delayed by unusually dry winter.
- **Preliminary evaluation and system upgrades** in Brook Lomond completed; system upgrades in Boulder Creek initiated.
- Adoption by Board of Supervisors of new requirements for septage disposal and septic tank pumping; submittal of individual inspection reports required for each tank pumped

Publications:
- San Lorenzo Wastewater Management Program, 1986 Annual Report

1988 - **Survey** of parcels in Boulder Creek (100 additional parcels)
- Additional survey work limited by dry weather.
- Analysis of water quality data in progress.
- Development of alternative sewage disposal systems program.
- Board of Supervisors adopts alternative systems program.

1989 - **Survey** of parcels performed in Ben Lomond (100 parcels) and in El Solyo Heights (50 parcels in North Felton).
- Additional survey work was limited by dry weather.
- **Evaluation and system upgrades** in Ben Lomond and El Solyo Heights
- Board of Supervisors establishes County Service Area No. 12 for improved wastewater management in unsewered areas.

Publications:
- San Lorenzo Wastewater Management Program, Status Report 1987-88
- Preliminary Report, An Evaluation of Wastewater Disposal and Water Quality in the San Lorenzo River Watershed

1990 - **Preliminary survey** in Glen Arbor and Ben Lomond, but completion deferred due to dry conditions.
- Commencement of Nitrate Management Study, funded by State Water Resources Control Board with 205j funds.
- Board of Supervisors approves collection of first annual CSA 12 Service charges and implementation of augmented wastewater management programs for the San Lorenzo Watershed in fiscal year 1990-91.

1991 - **Survey** of parcels performed in Ben Lomond (350 parcels), Glen Arbor (420 parcels), Felton (650 parcels), Forest Lakes (520 parcels), and Mount Hermon (60 parcels).
- **Recheck** of past problem parcels in Boulder Creek and Kings Creek
- **Community evaluation** of Boulder Creek, Kings Creek, Felton, Glen Arbor, Ben Lomond, Brook Lomond, and Forest Lakes done.
- **Feasibility Study** of community disposal alternatives for downtown Boulder Creek completed.
- Septic System Permit Processing and Information Management System developed and implemented on County mainframe computer, including conversion of data from the pre-existing system on microcomputer.

Publications:
- San Lorenzo Wastewater Management Plan (preliminary draft)
- San Lorenzo Nitrate Management Study, Phase 1 Interim Report (draft)

1992 - **Survey** of parcels in Felton, Forest Lakes, Ben Lomond, Boulder Creek, Mt. Hermon, and Boulder Creek Corridor completed
- **Recheck** of parcels subject to high winter water table in Felton, Glen Arbor, Ben Lomond, Boulder Creek, and Kings Creek.
- **Feasibility Study** of long term disposal needs and potential for community disposal initiated for Glen Arbor, Felton, Brook Lomond, and portion of Ben Lomond.

Publications:
- San Lorenzo Wastewater Management Plan (revised drafts)
- San Lorenzo Nitrate Management Study, Phase 1 Interim Report (final)
- New forms and procedures for amended Sewage Disposal Ordinance

1993 - **Survey and Evaluation** of parcels in Upper San Lorenzo, Pasatiempo, and Brookdale area.
- **Wet Year Recheck** of parcels subject to high winter water table in Felton, Glen Arbor, Ben Lomond, Boulder Creek, and Kings Creek.
- Development of funding options for Community Disposal Projects
- Revision of Nonstandard System Policies and Procedures
- Revision of Data Management System

Publications:
- San Lorenzo Wastewater Management Plan (public draft)

1994 - **Survey and Evaluation** of parcels in Lompico, Lower Zayante, and Paradise Park
- Preliminary adoption of San Lorenzo Wastewater Management Plan
- Completion of Computerized Septic System Database.
- Completion of San Lorenzo Valley Community Wastewater Disposal Feasibility Study

Proposed Work:

1995 - **Survey and Evaluation** of parcels in Lompico, Upper Zayante, Bean Creek, Bear Creek Corridor
- **Feasibility Study** of community wastewater disposal for Pasatiempo
- Completion of Nitrate Management Plan
- San Lorenzo Wastewater Management Plan (final)
- Pursuit of state loan to develop local revolving fund for low cost loans for enhanced individual system improvements.
- Amend Septic System Ordinance for implementation of Management Plan
- Increase staffing for implementation of Management Plan

1996 - **Survey and Evaluation** of parcels in Quail Hollow, Branciforte Creek, Carbonera Creek
- Continue reinspection of parcels areas already inspected.
- San Lorenzo Wastewater Management Program, 1989-95 Status Report
- Review of Management Plan efforts.

TABLE 6 - Schedule for Evaluation and Management in Community Areas

AREA	NUMBER PARCELS	SURVEY/ UPGRADES	COMMUN. EVAL.	FEASIB. STUDY	DESIGN/ FINANC.	PROJECT CONST.
Upper San Lorenzo	350	1993	1994			
Greater Kings Creek	750	1986	1991			
Boulder Creek	770	1988	1991	1991-94		
Boulder Cr. Corridor	500	1992	1994			
Bear Creek Corridor	300	1995	1996			
Brookdale	400	1993	1994			
Brook Lomond	100	1987	1991	1992-94		
Ben Lomond	780	1991-92	1991	1992-94		
Quail Hollow	400	1996	1996			
Glen Arbor	740	1991	1992	1992-94		
El Solyo Heights	80	1989	1989	1992-94		
Felton	660	1991-92	1991	1992-94		
Forest Lakes	960	1991-92	1991			
Mt. Hermon	500	1991-92	1992			
Lompico	500	1994-95	1995			
Upper Zayante	300	1995	1995			
Lower Zayante	300	1994	1995			
Bean Creek	400	1995	1995			
Pasatiempo	800	1993	1993	1994-95	1996	1997
Carbonera Creek	700	1996	1996			
Branciforte Creek	800	1996	1996			
Paradise Park	400	1994-95	1995			
Outlying Areas	1400	1992-96				
TOTAL	12890					

Survey/Upgrades: The year indicates when the initial survey and first round of onsite system upgrades will take place.

Community Evaluation: The evaluation of longterm disposal needs which will determine if upgrade of onsite disposal will be adequate or if community disposal options should be investigated.

Feasibility Study: If the final evaluation indicates that community disposal should be considered as an appropriate alternative for an area, the date for a more detailed feasibility study is indicated. No feasibility study date is indicated if it is not expected a study to evaluate community disposal needs will be needed for that area, based on information already obtained from current and prior studies.

Design/Financing and Project Construction indicate the timing for development of a community disposal system, if the feasibility study shows that it is the most cost-effective and affordable means of longterm system improvement. Dates will be established as a result of the outcome of feasibility studies.

10 PROGRAM ADMINISTRATION, STAFFING, AND FINANCING

The San Lorenzo Wastewater Management Program is conducted by Santa Cruz County's Environmental Health Service, a division of the Health Services Agency. Work is performed by the Wastewater Management Program within Environmental Health and supported by the Environmental Health Land Use Program, which has responsibility for permitting and inspection of individual sewage disposal system installations and repairs. The Wastewater Management Program also has responsibility for countywide wastewater management activities, such as information management and funding of septage disposal facilities, which contribute to the San Lorenzo Wastewater Management programs.

Financing of management efforts comes from a variety of sources: service charges from County Service Area No. 12, permit fees, County General Fund, and grants from state and local agencies. Financing of individual system improvements currently comes from private property owners. In the future, funds may be made available from economic development grants, the state loan program, and/or additional financing from the service area. Other funding sources will also be explored.

The details of administration and funding are provided in the following sections.

10.1 Information Management

The County has created a septic system database on its mainframe computer system which serves to organize, track, and evaluate information related to septic system performance on individual parcels. It can also be used to compile and summarize information for larger areas. The database includes basic site, system, and historical information taken from the files. It includes records of all permits applied for since 1983 and all records of septic tanks pumped since 1988. A description of the system and examples of the displays are contained in Appendix B.

The database has a component for processing and tracking septic system permits and complaints. It is also used to identify those properties which require frequent reinspection and track the performance of those reinspections. The system is tied into the County's other land use information and permit processing systems and into the tax system which provides for the collection of the CSA 12 service charges on the tax bill. In 1993-1994 the system is being completely overhauled for greater effectiveness and improved accessibility to all users.

10.2 Staffing and Costs

Approximately 4 full time equivalent staff positions are directly allotted to the San Lorenzo Wastewater Management Program, with additional staff time devoted to permit supervision (1.6 positions) and countywide wastewater management activities (0.9 position). Staffing is summarized as follows:

- **Program Manager** (35% time to San Lorenzo Wastewater (SLW) programs, 30% to countywide wastewater (CW) programs) - Directs wastewater management programs, compiles program information and prepares reports, manages grant contracts, oversees program financing, manages information systems.

- **Senior Environmental Health Specialist** (30% SLW, 20% CW) - Develops, evaluates, and implements specific policy and procedures; manages development of community disposal systems; manages consultant contracts for feasibility studies and design work; manages septage disposal programs.

- **Wastewater Disposal Technicians** (200% SLW, 60% CW) - Conducts parcel-by-parcel evaluations of septic system performance, investigates complaints of system failures, advises property owners on appropriate improvement and maintenance techniques, conducts public education programs, supervises student workers analysis and input of file information and installation of soil and groundwater monitoring wells.

- **Water Quality Technician** (85% SLW) - Monitors water quality in surface and groundwater, investigates sources of water quality degradation.

- **Student Workers** (40% SLW, 10% CW) - Compile file information and enter information into computerized database, install soil and groundwater monitoring wells, assist with water quality monitoring.

The following staff positions support the efforts of the Wastewater Management Program, but are funded separately from permit fees and County General Fund.

- **District Environmental Health Specialists** (125% SLW) - Permit processing and inspections for individual septic system repairs. (Time spent on system installations for new development and water system permits is not included.)

- **Alternative Systems Specialist** (40% SLW) - Permit processing and inspections for disposal system improvements requiring non-conventional systems, operating permit processing, regular followup monitoring of alternative systems. (Time spent on system installations for new development is not included.)

Other costs of the management program include data processing costs (hardware, software, and programmer time), analytical costs for laboratory support and supplies, engineering services, other professional services (primarily for the grant-funded nitrate management study), and financing of septage disposal facilities.

The total projected expenditures and revenues for wastewater management for the 1994-95 fiscal year are summarized in Table 7. The sources of revenue are described more fully in the following sections.

In 1993-94 60% of a wastewater Disposal Technician was added to the program to increase the inspection frequency for substandard systems. Once this Plan is adopted and full management authority is returned to the County, an additional

Environmental Health Aide will be added to increase the inspection frequencies to match those contained in Table 5, as requested by the Regional Board. The additional cost will be approximately $40,000 per year.

10.3 County Service Area No. 12 and County Revenue Sources

In 1989, the County Board of Supervisors established County Service Area No. 12 (CSA 12) to provide additional funding for expansion of wastewater management activities in unsewered areas of the County. At that time, a zone of benefit within CSA 12, Zone A, was created to provide additional funding for a higher level of wastewater management in the San Lorenzo Watershed. In 1993, an additional subdivision of CSA 12 (CSA 12N) was created to provide for collection of annual inspection charges for all nonstandard systems throughout the county.

CSA 12 service charges were first collected in fiscal year 1990-91. The 1994-95 charges are $6.38 per parcel with septic system for the countywide CSA 12 program, with an additional $14.18 collected from developed parcels in the San Lorenzo Watershed to augment the San Lorenzo Wastewater Management Program. The CSA 12A charges have funded the addition of 2.6 staff positions, expansion of data processing, and performance of engineering studies for improving wastewater disposal practices. The CSA 12A charges are expected to increase by approximately $3.00 by 1996-97 in order to fund the increased inspection frequency as proposed in this Plan. Because grants received in prior years offset some costs, there has been some carry-over of funds which is currently available to for one-time costs, such as engineering feasibility studies and completion of the computer system used to track the septic system information.

The countywide CSA 12 charges lend additional support to the San Lorenzo Program by funding septage disposal facilities, water quality sampling equipment, and the majority of costs of establishing the countywide septic system information system. Approximately 60% of the parcels in CSA 12 are in the San Lorenzo Watershed. Additional annual CSA 12N charges of approximately $97-$174 are collected from those parcels served by nonstandard systems in order to fund the annual inspection and monitoring of those systems. It is expected that this revenue will increase significantly as the program progresses and more systems are upgraded using alternative and nonconforming systems.

Other County based funding sources are permit fees and contributions from the County General Fund, which is derived from property taxes and other general sources. Permit fees are collected for all system repairs. Repair activities in the San Lorenzo Watershed generally account for 70% of the total repairs in the County, much of this resulting from the increased emphasis put on repairs through the Management Program. For fiscal year 1994-95, it is projected that repair permit fees collected from properties in the Watershed will amount to $66,000. The General Fund currently provides approximately 13-20% of the total cost of the Wastewater Management Program, a proportion consistent with the amount of General Fund support for the entire Environmental Health Service budget.

10.4 Financing and Assistance from Other Agencies

Additional funding and assistance to the management efforts have historically been provided by other agencies interested in water quality in the area: the City of Santa Cruz, the San Lorenzo Valley Water District, the Regional Water Quality Control Board, and the State Water Resources Control Board. This assistance provided approximately 16% of funding for management program effort in fiscal year 1992-93.

The City of Santa Cruz Water Department provided $10,000 - $13,500 each fiscal year from 1986 to 1993 in direct contributions to the San Lorenzo Program, primarily to support water quality monitoring and protection efforts. In fiscal year 86-87, the Regional Board provided a $10,000 contribution, and in 1987-88, the Regional Board provided staff time and lab work for the evaluation of factors affecting algal growth in the Watershed. The Regional Board provided an additional $40,000 in 1992-93 to support engineering studies of wastewater disposal alternatives in selected communities of the Watershed. The San Lorenzo Valley Water District has also assisted the County with the monitoring of nitrate in the Quail Hollow wells, and other efforts.

The County has received funding under Section 205j of the Clean Water Act from the State Water Resources Control Board to complete investigations of the impacts and sources of increased nitrate, and the management measures needed to control excessive nitrate released to the Watershed. This project has received approximately $136,000 in grant funding from 1990 to 1994. An additional $50,000 has also been provided by the State and Regional Boards to install demonstration projects to reduce nitrogen discharge from stables and septic systems.

TABLE 7 - Wastewater Management Budget, 1994-95 Fiscal Year

EXPENDITURES	**COST**	
San Lorenzo Wastewater Management Staff Time	$221,700	
Countywide Wastewater Management Staff (SLW share)	$38,000	
Indirect Costs (Clerical, Office, Mileage, etc)	$20,000	
Data Processing (SLW share) *	$31,900	
Engineering *	$40,000	
Other Professional Services *	$44,000	
Analytical Costs	$4,000	
Septage Disposal Facilities (SLW share)	$25,800	
TOTAL EXPENDITURES	**$425,400**	
REVENUES		
CSA 12A Charges - San Lorenzo	$173,600	41%
CSA 12 Charges (SLW share)	$80,400	19%
Annual Nonstandard System Charges	$13,600	3%
Carry-over from Prior Years *	$104,000	24%
County General Fund	$53,800	13%
TOTAL REVENUES	**$425,400**	

* Primarily onetime costs or revenue sources, not ongoing.

10.5 Financing of Disposal Improvements

Improvements to individual sewage disposal systems are financed by individual property owners, with the possibility of some assistance through loans and interim financing. The capital costs and amortized costs of typical improvements are shown in Table 3. In addition, the property owner must pay the costs of annual maintenance, and any additional fees for operating permits.

If a property owner cannot pay for a repair, the County has the ability to "abate" a septic system failure by having the repair made and subsequently billing the property owner. This gives the owners up to five years to pay off the cost of the repair, plus interest and administrative costs. These abatements are typically done at the property owner's request, but they have not been in high demand. The Environmental Health budget contains funds for several abatements per year. This could potentially be expanded if there was greater demand and if it was authorized by the Board of Supervisors.

The State Water Resources Control Board now offers low interest loans for the purposes of upgrading onsite disposal systems. County staff is investigating this program for applicability to the San Lorenzo Management Program, and will request the Board of Supervisors to authorize pursuit of funding for a loan program if it seems feasible once this Management Plan is approved by the State.

Individual septic system maintenance is primarily financed by the individual property owners, although the County is currently providing for the permanent availability of septage disposal facilities using the annual charges collected from all septic system owners under CSA 12. These charges fund the capital costs of the disposal facilities. Operation and maintenance costs are charged to the septic pumpers through their disposal charge at the facility.

The County will seek to develop financing for any community disposal projects which are pursued. Financing options would likely include a combination of: State Revolving Fund loan money, annual service charges collected from properties within the sewer service area, economic development grants, or other potential grant funding sources. Specific financing methodologies will be determined as a part of project development.

APPENDICES

Appendix A - Inspection Forms

Appendix B - Description of Septic System Database

Appendix C - Procedures and Standards for Repair and Upgrade of Septic Systems

Appendix D - Basin Plan Standards

Appendix E - Description of Wastewater Disposal Methods

Appendix F - Complaint Investigation and Enforcement Procedures

Appendix G - Education Programs

Appendix H - Projected Wastewater Disposal Improvements by Area

Appendix I - Water Quality Monitoring Program

Appendix J - Nitrate Management Plan (Summary and Excerpts Related to Wastewater Disposal)

Appendix K - Regional Board Resolution 95-04: Amendment of the Basin Plan

Appendix A - Inspection Forms

Two forms are utilized during inspections to record important information about each parcel. Copies of both forms are attached.

The Parcel Survey Field Form summarizes information for all parcels surveyed or rechecked. Basic information entered on the form is:

- the Assessor's Parcel Number,
- the Address;
- the results of the evaluation are checked off:
    - OK,
    - GW (Greywater Bypass),
    - SF (Sewage Failure), or
    - SP (Suspected Problem, but no obvious failure).
- the expected potential for repair is checked off:
    - G (Good)
    - F (Fair)
    - L (Limited)
    - A (Requiring Alternative System)
- the potential limits to repair are indicated by codes:
    - E (Lack of Expansion Area)
    - G (High Groundwater)
    - W (Water setback, well or stream)
    - B (Embankment close by)
    - S (Slope)
    - R (Shallow Bedrock or Impermeable Layer)
    - P (Slow Percolation Rate)

- a box can be checked to indicate the need for followup check during winter months (FUP)

- The inspector can also write various notes for each parcel based on field observations or information obtained from the file records before going out in the field.

The Wastewater Disposal Complaint Investigation form is completed for any system found to have a greywater bypass or a sewage failure. These forms provide room to describe the disposal system and the problems encountered, including a drawing of the situation. The codes for violation type indicate whether the problem is a failure (F) or greywater bypass (G), and whether it represents a high hazard (H) (such as a discharge to a creek or public area), or low hazard (L). The completed form provides a record of the problem for entry into the computer tracking system. The form itself is referred to the appropriate staff person to take action and is used to record enforcement and correction actions. These are the same forms that are used to track complaints through the process described in Appendix F.

GENERAL AREA ____________ DATE ____________

PARCEL SURVEY FIELD FORM

FUP	APN	ADDRESS	OK	GW	SF	SP	G	F	L	A

COUNTY OF SANTA CRUZ
ENVIRONMENTAL HEALTH SERVICE
WASTEWATER DISPOSAL INVESTIGATION

RECEIVED BY ______________

NO. X ______________
CAUSE: C S Q R O I P
STATUS: ______________

APN: ______________ SYSTEM ____ DATE ______________ STAFF INVESTIGATOR ______________

ADDRESS LOCATION OF PROBLEM: ______________ SEWER ______________

DATE RESOLVED: ______________ IS RECHECK NEEDED? N Y W D YR/MO ______________

VIOLATION TYPE: F G __ HAZARD: H L ALLEGED VIOLATION F ______

DESCRIPTION OF PROBLEM ______________

OWNER: ______________ PHONE: (H) ______________

ADDRESS: ______________ PHONE: (W) ______________

TENANT: ______________ PHONE: ______________

COMPLAINANT: ______________ PHONE: ______________

ADDRESS: ______________ CONTACTED: ______________

USE: SR MR COM ______________

TANK ______ GAL. BEDRMS ______

LEACHFIELD ______ SQ. FT.

LEACHFIELD DEPTH ______ FT.

DATE LAST REPAIR ______________

DATE LAST PUMPED ______________

PAST FAILURE ______________

EST. WINTER G.W. ______________

DEPTH GW/RISER ______________

WQ RESULTS ______________

DATE	ACTIVITY

SKETCH OF SYSTEM

SYSTEM TYPE ______ SYSTEM STATUS ______________

SUMMARIZE PROBLEM FOUND:

SUMMARIZE HOW RESOLVED:

HSA-59 [REV. 4/93]

APPENDIX B: Extract of:

ENVIRONMENTAL HEALTH LAND USE INFORMATION SYSTEM

USER'S MANUAL

1 INTRODUCTION

The Environmental Health Land Use Information System is a mainframe computer system which records and organizes information on septic system installation and performance and related information on permits for wells and individual water systems and other land use activities. It provides an accessible and standardized display of information that was previously maintained in a highly variable fashion in paper files. The database allows for tracking of various permit and septic system maintenance activities, and provides a quick characterization of conditions in different geographic areas. The system is a part of the County's Automated Land Use System (ALUS) which includes parcel and permit information from the Assessor's Office, the Planning Department, Public Works, and the Fire agencies. The system is also tied into the County's geographic Information System (EMIS).

The first section of this manual is intended to provide general familiarity with the system and its features, and the general procedures for entering and maintaining information in the system. The subsequent sections provide details on procedures for data entry, inquiry, and maintenance.

2 SCREENS AND INQUIRY PROCEDURES

The system contains records for each Environmental Health land use permit and other actions affecting septic systems, including the following: septic system installations and repairs, septic inspections and complaint investigations, pumping records, well permits, individual water system permits, clearances for building permit applications, and basic background information on the parcel. The individual records are identified by: Assessor's Parcel Number, System Number (relevant when there is more than one system on an individual parcel), Action Date, and Action Type. These records are organized in several separate files and are displayed through several types of screens. The database is also tied into other land use information systems in the County mainframe, so that additional information is displayed in the EHS screens (such as parcel size, owner of record, situs, floodplain, pending building application, or other information from the Assessor's files, Planning Department, or EMIS).

Description of Screens - The following screens are used to display different types of information of use to the Environmental Health User (the initial code is the screen designation in the system). Examples of the primary screens are attached at the end of this document.

EH3 Background Summary - Shows basic information by APN, including, site address (as determined by Environmental Health) owner of record, use code, area, system type, system status, constraints, riparian corridor, watershed, recharge area, summary of tank pumping, summary of older septic history (generally prior to 1988), and parcel size (estimated by EMIS). Some other miscellaneous summary information is shown.

EH4 History by APN - This screen shows a summary of all records for a specific APN (and optionally, system number (records for the same parcel, but different system number will be shown on the same screen unless a specific system number is typed on the top line)). If there are more than 8 records for that APN/System, additional records can be viewed by pressing PF8. This screen may be used to select specific records for detailed review by typing "y" on the line number and pressing enter.

EH5 Comments - For some APN's, narrative comments have been entered in the system to describe unusual conditions on the property or circumstances of permit approval. Most of the basic screens have a field which displays a Y if there are comments for that parcel.

EH6 Septic Installation/Repair - The installation screen shows information on system installation or repairs. Information is entered either based on a file search, or input of permit information when the permit is completed. Each record has two screens: the primary screen shows recent history and information on the septic system; the secondary screen shows past history and site information (groundwater, soils, stream setback, etc.). The secondary history screen is accessed by pressing PF20 from the primary screen; return to the primary history screen by pressing PF19. To access earlier records for that parcel, or subsequent APN's, press PF8. To access more recent records, or preceding APN's press PF7.

EH7 Pumping History - This screen displays pumping records for the APN. Five records can be shown on the screen, with the most recent first. If there are more than five records for the parcel, press PF8 to view earlier records. Press PF8 to view subsequent parcels, or press PF7 to view records for preceding parcels.

EH8 Inspection Records - This screen displays inspection records on four lines (2 records on a screen for each parcel) with the most recent record first. Use PF7 and PF8 to page forward or back.

EH9 Water Systems/Wells - This screen will display information on wells and individual water systems. This part of the system is not in operation.

EH10 Permits by APN - This screen shows information on the status of any Environmental Health Land Use permit applied for after July 1, 1991. (Many Septic repair permits applied for since 1983 in the San Lorenzo Watershed are also shown.) Permit records are shown for septic, well, IWS, Building Permit Clearance, MLD's, Geotechnical Reports, and old Operating permits.

EH11 Permits by Category - This screen shows a listing of permit applications in chronological order beginning with a specified date of application. This can be used similarly to the permit logs in order to look up a particular permit that took place on a given date. Inquiry begins by entering the permit code and the starting date and pressing enter. You can then page ahead by pressing PF8, or back by pressing PF7. Specific records can be viewed by typing "y" over the line number and pressing enter.

Other Screens in ALUS - Can be accessed from the menu, or by typing the fast path code in the lower left corner of any EH screen and pressing enter.

AS3 Assessor's - Used to look up APN's or access property characteristics.
AS4 - Used to look up APN by owner's name.
AS5 - Used to look up APN by site address.

IN3 Code Compliance Investigations - Displays Planning Code compliance investigations, EH housing violations, and wastewater violations where a second letter has been sent.

XR5 Cross-Reference - Used to find a Planning application or permit number by APN. The application number or permit number is necessary to go into the Planning subsystem.
XR8 Can also be used to access EH applications by applicant name.

PL Planning Projects - Building permit applications, building inspections, holds, clearances and discretionary permits. Before going into PL, you must either know the building permit or application number, or go first to XR5 to look up the application number by APN.

PP10 Parcel Profile - Displays a variety of information about a parcel taken from the County's geographic information system (EMIS) and other sources: such as supervisorial district, coastal zone, watershed, recharge area, floodplain, school district, etc.
PP4 Shows summary of EMIS characteristics that are of interest to EHS.

Interpreting Codes

This system uses many codes to present simplified and standardized information. To determine the meaning of a code in any screen, use the arrow keys to move the cursor to that code (if the field is blank, the cursor will turn from green to blue when it is in the proper place). Press PF4 to display a window of the codes and their meaning for that field. They are in alphabetical order. Page through them with PF7 or PF8. To exit the code window, press PF4 again. Explanations of all the fields and codes are also included in the User's Manual, keyed to the field number shown on the screen printout. (Codes for selected screens are attached.)

Multiple Parcels Associated with One Septic System (XREF)

Often there may be several parcels associated with a septic system, where the owner may own several adjacent parcels. Frequently all the parcel owners are shown on a septic application. Within the database, all information is listed under the APN that the Assessor shows as having the residence or other primary use, even though the system may actually be located on an adjacent parcel. Cross reference data is entered into the system to indicate the relationship among the parcels. One parcel is designated as the primary parcel, the other(s) are secondary. If a secondary APN is entered into the APN field, the system will automatically display the primary APN and bring up the information for that primary APN. A message to that effect will be displayed at the bottom of the screen. The paper files are also being reorganized to hold information under the primary APN. (Previously they were listed under the lowest APN, even if that was just a secondary APN.)

Multiple Systems (System Numbers)

Many screens show a flag which indicates whether there are multiple systems on a property. In some cases there may be multiple uses and multiple septic systems on one APN. An effort has been made to designate each system with a system number, and the information in the system is organized according to that APN and system number. The files are also being organized to show the different systems and to have the system number clearly marked on the permits, pumping reports, etc. Within the database, there is an option to display all the information for an APN (if the field for system number on the top line is left blank) or for a specific system number, if the field is filled in. You may need to erase the system number when you look up information for other parcels. The correct format for system numbers is "01", not "1". If there is only one system on a parcel, the default system number is 01. If a single house is served by multiple systems, separate system numbers are not created.

3 AVAILABLE DATA IN SYSTEM

The EHS information system contains the following information:

Septic System Installations

- Basic file information for all parcels in the following areas of the San Lorenzo Valley: (the date of the file search is shown in parentheses)
    - San Lorenzo Park (1983, 1991)
    - San Lorenzo Woods/Ramona Woods (1991)
    - Riverside Grove (1983)
    - Kings Creek/Wildwood (1985)
    - Boulder Creek (1985)
    - Forest Springs/Forest Park (1988)
    - Brookdale (1986)
    - Brook Lomond (1986)
    - Ben Lomond (1989, 1991)
    - Glen Arbor (1988)
    - Felton (1991)
    - Forest Lakes (1983, 1991)
    - Mount Hermon (1991)
    - Lower Zayante (1991)
    - Upper Zayante (1992)
    - Lompico (1992)
    - Pasatiempo (1993)
    - Paradise Park (1993)
- Information on septic repairs and upgrades completed after the initial survey date and before July 1, 1991 is available for all system installations and repairs for all of the above areas.
- Complete installation information is available for all repairs and upgrades throughout the San Lorenzo Watershed beginning July 1, 1991.
- It is anticipated that complete installation data countywide will be entered

beginning July 1, 1994.

Pumping Records

- The system includes records of all septic tank pumping, countywide, since the end of 1987 (Records are not available for approximately 5% of the parcels, for which APN's have not been determined.)

Permit Applications

- Permit applications for septic repairs or additions from August, 1983 through June 30, 1991 for the entire San Lorenzo River Watershed.
- All land use permit applications countywide submitted or approved after July 1, 1991.

Inspections, Complaint Investigations

- Results of all survey inspections and rechecks conducted in the San Lorenzo Watershed since 1985.
- All complaint investigations and loan inspections countywide since July 1, 1991.
- All nonstandard system inspections conducted since July 1, 1993 will be entered in the system.

Ongoing Data Entry

Since the database came online in fall of 1991, permit information, septic complaints, and pumping information has been entered into the database as it comes into the office. By July 1, 1994, it is projected that details of all system installations will be entered into the database as permits are finalled. Wastewater Management staff will continue entering file information into the database, focusing on the San Lorenzo Valley, and eventually moving into other parts of the County, at a rate of approximately 2000 parcels per year.

4 INPUT PROCEDURES

Information is input into the database as it is generated by the normal business activities of the department. It is anticipated that ultimately the computer database can replace the use of paper logs and make the day to day management of information much easier. The general procedures for information input are described in the following subsections. Detailed instructions on input procedures and codes are in subsequent sections of the User's Manual.

File Search

Wastewater Management staff will continue to review files and input basic background information into the database. This work is performed primarily by student workers under the guidance of the professional staff. This work is done area by area, with a high priority given to suspected problem areas. Most of the work will be done for the San Lorenzo Watershed, but problem areas in other parts of the County may be selected for special study.

Pumping Records

Each time a septic tank is pumped in Santa Cruz County, the pumper is required to submit a record of the pumping and inspection to the County. Clerical staff inputs information from the pumper's reports as the reports are submitted.

Permit Applications

Clerical staff inputs information into the permit screen as permit applications are received. This is done in addition to logging applications in the paper logs. The permit screen is designed to capture all the information currently recorded in the paper logs for: septic permits, well permits, Individual Water System (IWS) permits, inspections requested for property transfers, building application clearance forms, geohydrologic reports, and operating permits. Information is entered both at the time of initial application, and during subsequent approvals by staff.

Inspections and Complaints

Results of CSA 12A inspections in the San Lorenzo Watershed (surveys and rechecks) are entered into the computer by Wastewater Management Team staff as the inspections are completed. Clerical staff inputs the results of inspections conducted by district staff for annual nonstandard system inspections, property transfers, or other requests for consultation.

Complaints regarding sewage discharges from septic systems and problems identified from inspections are entered into the computer as they are received by clerical staff. If the APN of the problem is not known, a temporary complaint number is entered into the APN field. This number is also written on the complaint form for future reference. The actual APN is entered at the time of final disposition. Once staff has completed an investigation, the results are entered into the computer before the complaint form is filed in the APN file. The new complaint form has been modified to include various codes and entry fields to simplify data entry (see Appendix F).

If a complaint or inspection results in a permit application, an additional record for that permit application is generated as described under the heading, Permit Application, above. The complaint or inspection will be indicated as the cause of the permit application.

Installation Information

Once permits have been approved, and projects installed and finalled, the specific information on the site and the installation will be entered into the database. New forms will serve both as a checklist and a data entry form. These will be completed by the field staff and used by clerical staff, in conjunction with the permit form, for input of the information into the database. This information will be entered into the database prior to filing the completed forms in the APN file.

5 REPORTS

An important feature of the new database is the ability to produce a variety of reports summarizing or extracting information from the database for management or informational purposes. Examples of potential reports include:

- a listing of complaints which have not been resolved within 30 days,
- mailing labels of owners of property which have been told they need a winter water table test,
- a listing of permits which have expired without being finalled,
- a summary of the total volume of septage pumped by each pumper during a given time period,
- a listing of the total number of permits and complaints handled by each district specialist,
- a listing of basic septic system information for each parcel in an area for use by the inspector when conducting surveys or rechecks (copy attached).

Reports will be produced in two different ways: either online through the County's new query software, or using batch reports which can produce print-outs of standard reports on a regular basis.

Query Software

County Information Services has recently provided new query software that can be used to extract and summarize information contained in the mainframe files. Environmental Health staff has already been working with this on a test basis, and it is very useful for summarizing and organizing information in the new Environmental Health database.

Batch Reports

Standard and specialized reports can be requested by Environmental Health and prepared by Information Services on a regular or as needed basis. Such reports might be a listing of outstanding permit applications or complaints. Related to this, mailing labels can also be produced for parcels which match specified criteria.

```
04/27/94 LOGO                                                     ALALOG
16:00:49          C O U N T Y    O F    S A N T A    C R U Z      ALSLOG
                  %%       %%%  %%%         %%%   %%%%%%%%%%
                % %%      %%%   %%%         %%%  %%       %%%
              %%  %%     %%%    %%%         %%% %%
            %%    %%    %%%     %%%         %%%  %%%%%%%%%%%%%%%
          %%      %%   %%%      %%%         %%%   %%%%%%%%%%%%%%%
      %%%%%%%%%%%%%% %%%        %%%         %%%              %%%%%
    %%%%%%%%%%%%%%%% %%%%%%%%%    %%%%%%%%%%%    %%%%       %%%%%%
  %%%%            %% %%%%%%%%%%     %%%%%%%       %%%%     %%%%%
  %%%%%           %% %%%%%%%%%%%     %%%%%          %%%%%%%%%%%
 ====================AUTOMATED LAND USE INFORMATION SYSTEM=============
                      %%%%%%%%        %%%%%%%%%
                           %%         %         %
                          %%          %         %
                         %%%%         %         %
                             %        %         %
                             %  ...   %         %
                     %%%%%%%%   ...   %%%%%%%%%
                     PLEASE ENTER YOUR PASSWORD:        :
```

```
04/27/94 MM              COUNTY OF SANTA CRUZ   ALUS 3.0              ALMENHMM
16:00:54                                                              ALSENHMM
                          ENVIRONMENTAL HEALTH MAIN MENU
                                                                     (FASTPATH)
      ENVIRONMENTAL HEALTH LAND USE SUB-SYSTEM................. PF3     (EH)
      INVESTIGATIONS SUB-SYSTEM................................ PF4     (IN)
      CSA 12 (DPW) SUB_SYSTEM.................................. PF5     (SI)
      PLANNING PROJECT_SUB-SYSTEM.............................. PF6     (PL)
      ASSESSOR'S PARCEL INFORMATION SUB-SYSTEM................. PF7     (AS)
      PARCEL PROFILE SUB-SYSTEM................................ PF8     (PP)
      CROSS-REFERENCE SUB-SYSTEM............................... PF9     (XR)
      DOCUMENTS SUB-SYSTEM..................................... PF10    (DO)
      HAZMAT INFORMATION SUB-SYSTEM............................ PF11    (HZ)
      REPORT SUB-SYSTEM........................................ PF12    (RE)
      SYSTEM ADMINISTRATION SUB-SYSTEM......................... PF13    (SA)

      HELP= PF1            EXTENDED HELP= PF2            EXIT= PA2
```

```
04/27/94 EH              COUNTY OF SANTA CRUZ   ALUS 3.0               ALMENHEH
16:01:00                   ENVIRONMENTAL HEALTH                         ALSENHEH
                          LAND USE SUB-SYSTEM MENU

INQUIRY                                   UPDATE

BACKGROUND SUMMARY................. PF3   BACKGROUND SUMMARY........... PF13
HISTORY BY APN..................... PF4   ONLINE REPORT GENERATOR...... PF14
COMMENTS BY APN.................... PF5   COMMENTS BY APN.............. PF15
SEPTIC INSTALLATION BY APN......... PF6   SEPTIC INSTALLATION.......... PF16
PUMPING HISTORY BY APN............. PF7   PUMPING MAINTENANCE.......... EH17
INSPECTIONS BY APN................. PF8   INSPECTIONS.................. PF18
WATER SYSTEMS/WELLS BY APN......... PF9   WATER SYSTEMS/WELLS.......... PF19
PERMITS BY APN..................... PF10  PERMITS...................... PF20
PERMITS BY CATEGORY................ PF11  XREF......................... PF21
                                          EDIT TABLE FILE.............. PF22

                                HELP= PF1
                                EXIT= PA2
```

11/05/93 EH3
15:32:56

COUNTY OF SANTA CRUZ ALUS 3.0
ENVIRONMENTAL HEALTH
BACKGROUND SUMMARY

I-ALPEH705
ALSEH705

I

APN...................... 1
SYSNO.................... 2
SITE ADDRESS............. 3

COMMENTS: 4
MULTIPLE SYSTEMS FLAG: 5

DISTRICT/AREA/CLASS...... 6 7 8
SYSTEM TYPE/STATUS....... 9 10
OPER PERMIT NO/LEVEL..... 11 12
USE...................... 13
CONSTRAINT AREA/TYPE..... 14 15a b c
REPAIR POTENTIAL/LIMITS.. 16 17a b c

BACKGROUND SUMMARY DATE. 25
PRIOR HISTORY/DATE 1.... 26 27
PRIOR HISTORY/DATE 2.... 26 27
PRIOR HISTORY/DATE 3.... 26 27
PAST PROBLEM 1/2........ 28 29
EMIS SIZE ACRES......... 30
EMIS SIZE FEET.......... 31
ASSR SIZE ACRES......... 32
ASSR SIZE FEET.......... 33

WATERSHED CODE........ 18
WATERSHED............. 19
RIPARIAN CORRIDOR..... 20
GROUNDWATER RCHG AREA. 21
TIMES TANK PUMPED W/I PREVIOUS 1 YR: 22 3 YRS: 23 7 YRS: 24
TYPE APN (SYSNO OPTIONAL), THEN PRESS 'ENTER'.
PF7=BACKWARD PF8=FORWARD

11/05/93 EH4
15:33:30

COUNTY OF SANTA CRUZ ALUS 3.0
ENVIRONMENTAL HEALTH
HISTORY BY APN

I-ALPEH710
ALSEH710

COMMENTS: 5
APN: 1 SYSTEM: 2 STATUS: 3 SYSTEM TYPE: 4
OWNER: 6 ADDR: 7
FLAGS: MULT SYST 8 PLAN APL 9 INVEST 10 HAZ 11 BUILD HOLDS 12 ADDITION 13

ACT	SYS	CAUSE	DATE	STAT	FINL DATE	STAFF	PRM CD	RCHECK	DATE	PROBI	PROB2
14	2	15	16	17	18	19	20	21	22	23a	b

TYPE APN (SYSNO OPTIONAL). THEN PRESS 'ENTER'.
PF7=BACKWARD PF8=FORWARD

Type "Y" over line number and press "Enter" for details

SEPTIC SYSTEM DATABASE: HISTORY BY APN

Screen Element Number		(Explanation) Description	Code	(Description of Codes)
1	APN	Assessor's Parcel Number (where the home or use served by the septic system is located, paper file is located).		
2	System No.	Number to distinguish between multiple systems on the parcel (will be 01, if there is only one septic system on the parcel)		
3	System Status	System Status: (Management Needs, Restrictions)	Sx	Meets standards for x bedrooms
			RO	Onetime Recheck
			RW	Winter Recheck, Annual
			R3	Recheck 3 years (SLW)
			N1	Nonstandard, Level 1
			N2	Nonstandard, Level 2, New Mound, P.D.
			N3	Nonstandard, Level 3, Haualway, Alt. Repair
			N4	Nonstandard, Level 4, Nonconforming
			N5	Nonstandard, Level 5, Fee Waived
			--S	In Sewer Study Area
4	System Type	System Type:	S	Standard
			SP	Standard with Pump
		Nonstandard System Type:	NCX	Nonconforming, lacks exp. area
			NCS	Nonconforming, substandard leaching
			NCG	Nonconforming, reduced groundwater separation
			NCP	Nonconforming, with Pump
			AM	Alternative, Mound
			AP	Alternative, Pressure Distribution
			AF	Alternative, Sand Filter
			AO	Alternative, Other
			AG	Alternative, At-Grade System
			HA	Haulaway
			WH	Winter Haulaway
			O	Old
			OR	Meets Old Repair Standards (inc GW sep.)
			OSS	Old, substandard
			ONG	Old, no groundwater separation
			OGS	Old, with Greywater Sump
5	Comments Flag	Are there Comments associated with this APN/Record?		
6	Owner - Assesor	Owner of Record - from Assessor's file		
7	Site Address	Address of Site, as observed by field inspector or provided by applicant		
8	Multiple Systems	Are there Multiple Septic Systems on this Parcel?		
9	Planning App.	Are there Planning Applications for this Parcel?		
10	Investigations	Are there any Code Compliance Investigations on this Parcel?		

 PRINT DATE: 04/22/94

Screen Number	Element	(Explanation) Description	Code	(Description of Codes)
11	Haz Mat Permit	Is there a Hazardous Materials Permit for this Parcel?		
12	Env. Hlth Holds	Are thee any Building Permit Holds by Environmental Health?		
13	Add. Allowed	Addition Allowed	N	No addition allowed, already done
			O	One time 250 sf addition allowed
			Y	Addition over 250 sf allowed, check bedrooms
14	Action	Action/Record Type	A	Permit Application
			F	File Search (Installation)
			R	Repair (Septic Installation)
			N	New Septic Installation
			U	Upgrade (Septic Installation)
			I	Inspection: Complaint, Survey, Loan
			P	Pumping Report
			W	Well/Water System
15	Cause	Cause, Reason for action.		
			B	Building Permit Condition
			M	Maintenance
			L	Loan/Sale Inspection
			F	Failure (Reason for Pumping)
			H	Haulaway System (Pumping)
			O	Other (Reason for Pumping)
			W	Work on System (Reason for Pumping)
			C	Complaint
			S	Survey
			R	Recheck
			Q	Water Quality Investigation
			A	Annual Check (Nonstandard System)
			P	Follow up on Pumper's Report
16	Initial Date	Date when current action started· date of complaint, inspection, permit application, file search, etc. All dates use format yymmdd: 910103		
17	Status	Status of Investigation	P	Pending
			PI	Pending, entering in Planning Inves. System
			PA	Pending, Application Received
			D	Denied (Loan Approval)
			RP	Resolved by permit
			RN	Resolved, no permit needed
			RX	Resolved, no problem found
			RM	Marginally Resolved, should be rechecked
			CL	Complaint Warning Letter Sent
			RL	Resolved, No Response to Letter
18	Final Date	Date Permit Finaled or Action Completed		

SEPTIC SYSTEM DATABASE: HISTORY BY APN

Screen Element Number		(Explanation) Description	Code	(Description of Codes)
19	Staff/Inspector	Initials of Staff Person processing permit or inspection		
20	Permit Code	Permit (Application) Code	S	Septic
			W	Well
			M	Minor Land Division
			O	Operating Permit
			C	Clearance (for Bldg Permit App)
			G	Geotechnical Rpt
			I	Individual Water System
21	Recheck?	Recheck Needed?	N	No Followup Necessary (May be left blank)
			Y	Yes, One-time Followup Needed
			W	Winter Recheck Needed
			L	Warning Letter Sent
			A	Annual Recheck
			D	Recheck Done, no additional checks needed
22	Recheck Date	Date for Recheck (YRMO, ie. 9206)		
23	Problem 1	Problems Found, additional	F	Failure
	Problem 2	contributions to problem, and	G	Greywater Bypass
	Alleg Probl	hazard presented by problem	R	Riser Full
	Alleg Prob2	(May list 2)	T	Tank Collapsed or Broken
		Alleged Problems, also	S	Substandard or Old System
			Q	Water Quality Degradation
			P	Plumbing Leak, Break, Clog, etc.
			V	Violation, work without permit
			Z	Zoning, Planning Violation
			X	No Disposal System
			N	No Problem found
			U	Unknown
			M	Suspected Marginal System
			A	Animal Droppings, Manure
			H	High Hazard, effluent enters stream, drainage, roadside, or public area
			L	Low Hazard, effluent confined to property, not accesible to public

11/05/93 EH6
15:37:08

COUNTY OF SANTA CRUZ ALUS 3.0
ENVIRONMENTAL HEALTH
SEPTIC INSTALLATION/REPAIR BY APN

I-ALPEH720
ALSEH720
Screen 1

APN: 1 SYS NO: 2 DATE: 3 SITE ADDR: 4

PERMIT TYPE........: 5
PERMIT NUMBER......: 6
INITIAL DATE.......: 7
FINAL DATE.........: 8
RECHECK/DATE.......: 9 10
OWNER..............: 11

SYSTEM STATUS: 12
ADDN ALLOWED: 13
BEDROOMS....: 14
WATER SYSTEM: 15 16

SYSTEM TYPE..: 17
USE..........: 18
CAUSE PROB1/2: 19 20a b
LEVEL....: 21
IWS NO.......: 22
INSPECTOR....: 23

TANK SIZE/MATERIAL/DATE.....: 24 25 26
DISPOSAL TYPE/DATE..........: 27 28
DISPOSAL SIZE/DEPTH.........: 29 30
ADDITION/TOTAL AREA.........: 31 32
GREYWATER SUMP/SIZE.........: 33 34
REQUIREMENTS................: 35a b c d

DUAL............: 36
RISERS..........: 37
PERC CAT/METHOD.: 38 46
INSTALLER.......: 40
EXPANSION AREA..: 41
COMMENTS?.......: 42

~~APN/SYSNO NOT FOUND~~. REKEY AND PRESS 'ENTER' OR EXIT PROGRAM.
PF 20 = Screen 2 PF7=BACKWARD PF8=FORWARD

11/05/93 EH6
15:37:08

COUNTY OF SANTA CRUZ ALUS 3.0
ENVIRONMENTAL HEALTH
SEPTIC INSTALLATION/REPAIR BY APN

I-ALPEH720
ALSEH720
Screen 2

APN: SYS NO: DATE: SITE ADDR:

STREAM TYPE/NAME........: 43 44
WELL NEARBY.............: 47
GRNDWTR MIN/DATE/METHOD.: 49 50 46
GRNDWTR MAX/DATE/METHOD.: 51 52 46
GRNDWTR SYS/DATE/METHOD.: 53 54 46
MAX DRY/DATE............: 55 56

STREAM SETBACK/METHOD...: 45 46
WELL SETBACK/METHOD.....: 48 46

EMBANKMENT HEIGHT.......: 57
EMBANKMENT SETBCK/METHOD: 58 46
SLOPE MIN/MAX/SYSTEM....: 59 60 61

SOIL DEPTH..............: 62 a b c d
SOIL/METHOD.............: 63 a b c d 46
IMPERVIOUS LAYER/METHOD.: 64 46

PERC RATE MIN (MPI).....: 65
PERC RATE MAX (MPI).....: 66
PERC CATEGORY/METHOD....: 38 46

OLD TANK SIZE...........: 68
OLD DISPOSAL TYPE/SIZE..: 69 70

OLD DISPOSAL DEPTH......: 71

~~APN/SYSNO NOT FOUND~~. REKEY AND PRESS 'ENTER' OR EXIT PROGRAM.
PF19=SCREEN 1 PF7=BACKWARD PF8=FORWARD

SEPTIC SYSTEM DATABASE: SEPTIC INSTALLATIONS

Screen Number	Element	(Explanation) Description	Code	(Description of Codes)
1	APN	Assessor's Parcel Number (where the home or use served by the septic system is located, paper file is located)		
2	System No.	Number to distinguish between multiple systems on the parcel (will be 01, if there is only one septic system on the parcel)		
3	Initial Date	Date when current action started: date of complaint, inspection, permit application, file search, etc. All dates use format yymmdd: 910103		
4	Site Address	Address of Site, as observed by field inspector or provided by applicant		
5	Permit Types	Permit Types		
	Septic Permits	Septic Permit Type	S	Standard New System
			I	Innovative New System
			A	Addition to System
			U	Upgrade to existing system for building
			R	Repair Permit, Standard
			M	Minor Repair Permit
			MT	Tank, minor repair
			MG	Greywater Sump, minor repair
			MC	Curtain drain, minor repair
			E	Engineered (Innovative) Repair Permit
			F	Information from file search
6	Permit Number	Number Assigned to Permit, Clearance, etc.		
8	Final Date	Date Permit Finaled or Action Completed		
9	Recheck?	Recheck Needed?	N	No Followup Necessary (May be left blank)
			Y	Yes, One-time Followup Needed
			W	Winter Recheck Needed
			L	Warning Letter Sent
			A	Annual Recheck
			D	Recheck Done, no additional checks needed
10	Recheck Date	Date for Recheck (YRMO, ie. 9206)		
11	Owner	Owner as indicated on Pumper Report or Permit Application		
12	System Status	System Status: (Management Needs, Restrictions)	Sx	Meets standards for x bedrooms
			RO	Onetime Recheck
			RW	Winter Recheck, Annual
			R3	Recheck 3 years (SLW)
			N1	Nonstandard, Level 1
			N2	Nonstandard, Level 2, New Mound, P D
			N3	Nonstandard, Level 3, Haualway, Alt Repair

Screen Element Number		(Explanation) Description	Code	(Description of Codes)
			N4	Nonstandard, Level 4, Nonconforming
			N5	Nonstandard, Level 5, Fee Waived
			--S	In Sewer Study Area
13	Add. Allowed	Addition Allowed	N	No addition allowed, already done
			O	One time 250 sf addition allowed
			Y	Addition over 250 sf allowed, check bedrooms
14	Bedrooms (EHS)	Number of Bedrooms (EHS records)		
15	Water System	Type of water system:	P	Public, more than 200 connections
			M	Small private or mutual
			S	Shared, less than 5 connections
			I	Individual, one connection
16	Water System Name	Name of water system, if named		
17	System Type	System Type:	S	Standard
			SP	Standard with Pump
		Nonstandard System Type:	NCX	Nonconforming, lacks exp. area
			NCS	Nonconforming, substandard leaching
			NCG	Nonconforming, reduced groundwater separation
			NCP	Nonconforming, with Pump
			AM	Alternative, Mound
			AP	Alternative, Pressure Distribution
			AF	Alternative, Sand Filter
			AO	Alternative, Other
			AG	Alternative, At-Grade System
			HA	Haulaway
			WH	Winter Haulaway
			O	Old
			OR	Meets Old Repair Standards (inc GW sep)
			OSS	Old, substandard
			ONG	Old, no groundwater separation
			OGS	Old, with Greywater Sump
18	Land Use	Land Use Code (as identified by Environmental Health)	SR	Single-family residential
			MR	Multiple-family residential
			VH	Vacation home
			VA	Vacant
			VU	Vacant, unbuildable
			LA	Laundry
			CO	Commercial
			RE	Restaurant
			MO	Motel or hotel
			MP	Mobile home park
			CM	Community facility (church, park, etc)
			AB	Abandoned
			GS	Gas Station

Screen Number	Element	(Explanation) Description	Code	(Description of Codes)
			CE	Cemetery
			DA	Damaged or Burned Down house
			CA	Camp
			UT	Utility
			MI	Miscellaneous
			FS	Fire Station
19	Cause	Cause, Reason for action:		
			B	Building Permit Condition
			M	Maintenance
			L	Loan/Sale Inspection
			C	Complaint
			S	Survey
			R	Recheck
			P	Follow up on Pumper's Report
20	Problem 1	Problems Found, additional	F	Failure
	Problem 2	contributions to problem, and	G	Greywater Bypass
	Alleg Probl	hazard presented by problem	R	Riser Full
	Alleg Prob2	(May list 2)	T	Tank Collapsed or Broken
		Alleged Problems, also	S	Substandard or Old System
			Q	Water Quality Degradation
			P	Plumbing Leak, Break, Clog, etc.
			V	Violation, work without permit
			Z	Zoning, Planning Violation
			X	No Disposal System
			N	No Problem found
			U	Unknown
			M	Suspected Marginal System
			A	Animal Droppings, Manure
			H	High Hazard, effluent enters stream, drainage, roadside, or public area
			L	Low Hazard, effluent confined to property, not accesible to public
21	Non Stand. Level	Nonstandard Sys. Fee Level	1	Level 1
			2	Level 2
			3	Level 3
			4	Level 4
			5	Level 5
			E	Existing alternative, no fee
23	Staff/Inspector	Initials of Staff Person processing permit or inspection		
24	Tank Size	Septic Tank Size (gallons)		

Screen Number	Element	(Explanation) Description	Code	(Description of Codes)
25	Tank Material	Septic Tank Material	R	Redwood
			C	Concrete
			F	Fiberglass
			M	Metal
			P	Plastic
			O	Other
26	Tank Date	Date Tank Installed (Year, or Year-Month, ie. 8209)		
27	Disposal Type	Disposal Device (may include combination of two types)	ST	Single trench (including combination of mult
			DT	Dual Trenches (with diversion valve between t
			DP	Dual Seepage Pits, with Diversion Valve
			STA	Addition of area to existing single trench sy
			SU	Sump (for all sewage)
			MD	Mound
			HA	Haulaway
			AB	Absorbtion Bed
			AS	Alternative System
			SP	Seepage Pit
			CF	Capped Fill
			CS	Community System
			SF	Sand Filter
			PD	Pressure Distribution
			TS	Sand-filled Trench
			CP	Cess Pool
28	Disp. Device Date	Date Disposal Device Installed (Year, or Year-Month, ie. 8209)		
29	Disposal Area	Size of Disposal Device, Absorbtion Area (square feet)		
30	Disposal Depth	Depth of Bottom of Disposal Device (feet below ground surface)		
31	Leachfield Additi	Is this permit a leachfield addition, with additional, older, leaching devices?	Y	Leachfield addition
			G	Addition of Greywater Sump
32	Total Area	Total Absorbtion Area in System (including both additions and older devices (in square feet))		
33	Greywater Sump	Is there a Greywater Sump?	Y	
			N	Or left blank
34	Sump Size	Size of Greywater Sump, Absorbtion Area (square feet)		
35	Requirements	Requirements:	WC	Water conservation devices installed or requi
		Actions taken to resolve problem:	GC	Greywater connected to septic system

Screen Element Number		(Explanation) Description	Code	(Description of Codes)
		and other aspects of system	WX	Washer removed and/or prohibited
			GS	Greywater sump installed
			GA	Greywater Sump Expanded
			RA	Repair of Absorbtion device (leachfield)
			RT	Repair of Tank
			RB	Repair of both tank and leachfield
			RP	Repair of plumbing or pump
			TG	Red-tagged
			FX	Failure Dried-up, no action taken
			IM	Parcel marginally passed an inspection, no ac
			WH	Winter Haulaway
			HA	Haulaway
			PS	Poor Soil/Problem System Letter
			RD	Runoff Diversion
			PR	Pumping Required
			VA	House Vacated (or burned down, etc.)
			XW	Water Turned Off
			OK	Inspected, OK
			WL	Warning Letter Sent
			A1	Animals, livestock, 1-4 head on property
			A5	Over 5 animals on property
			GR	Grease Trap
			DB	Distribution Box
			CD	Uses curtain drain
			GT	Greywater Tank
			OP	Operating Permit
			PU	Uses Effluent Pump
			MS	Multiple Systems for One Structure
			AT	Aerobic Tank
36	Dual System	Dual System/Diversion Valve?	Y/N	
37	Risers	Leachfield Risers?	Y/N	
38	Perc. Category	Soil Percolation Category	0	faster than 1 MPI
			1	1-5 MPI
			2	6-30 MPI
			3	31-60 MPI
			4	61-120 MPI
			5	slower than 120 MPI
40	Installer	Initials of Septic Installer	Initials	
41	Expansion Area	What Type of Expansion Area is Available?	G	Good, Equal Area Available
			M	Marginal, Only Partial Area Available
			N	None
			P	Present (shown on old plans)
42	Comments Flag	Are there Comments associated with this APN/Record?		

Screen Number	Element	(Explanation) Description	Code	(Description of Codes)
43	Stream Type	Type of stream or other drainage on or near property (within 250 feet of septic system)	P I D	Perennial Stream Intermittent Stream Storm Drainageway
44	Stream Name	Name of Stream (if named)		
45	Stream Setback	Distance from stream or drainageway to disposal device (feet) Enter "205" if distance is undetermined, but less than 250 feet.		
46	Method	Method of determining setbacks, groundwater separation, or soil type:	M E X R W	Measured/Observed Estimated Extrapolated Reported from other source Measured during Winter Test Period
47	Well Nearby	Is there a well within 250 ft?	Y N	 Or leave blank
48	Well Setback	Distance from Well to Disposal Device (feet) Enter "205" if distance is undetermined, but less than 250 feet.		
49	Min. grndwtr dept	Minimum depth from ground surface to groundwater encountered on parcel (feet)		
50	Min. Grndwtr Date	Date that minimum depth measurement was made, (or date when it would be expected to occur, if depth is estimated)		
51	Max. grndwtr dept	Maximum depth from ground surface to groundwater encountered on parcel (feet)		
52	Max. Grndwtr Date	Date that maximum depth measurement was made, (or date when it would be expected to occur, if depth is estimated)		
53	System Groundwate	Depth from ground surface to groundwater in system area encountered on parcel (feet)		
54	Sys. Grndwtr. Dat	Date that system gw measurement was made, (or date when it would be expected to occur, if depth is estimated)		
55	Maximum Dry Depth	Maximum depth of excavation that no groundwater was encountered		
56	Date of Dry Depth	Date that excavation was made and no groundwater was encountered		
57	Embankment Height	Height of nearby embankment (feet)		
58	Embankment Setbac	Setback from top of embankment to disposal device (feet)		

Screen Number	Element	(Explanation) Description	Code	(Description of Codes)
59	Minimum Slope	Minimum slope on parcel (percent)		
60	Maximum Slope	Maximum slope on parcel (percent)		
61	System Slope	Slope in area of disposal device (percent)		
62	Soil Depth	Indicate depth where soil occurred above the soil code		
63	Soils	Soil types present: Multiple entries for different locations or layers.	C	Clay
			CL	Clay Loam
			L	Loam
			S	Sand
			SC	Sandy Clay
			SL	Sandy Loam
			CS	Clayey Sand
			SI	Silt
			DG	Decomposed Granite
			FR	Fractured Rock
			GR	Granite
			SS	Sandstone
			MS	Mudstone
			G	Gravel
			B	Boulders
64	Imperv. Layer Dep	Depth from ground surface to impervious layer or bedrock (feet)		
65	Min. Perc. Rate	Minimum percolation rate encountered (minutes per inch)		
66	Max. Perc. Rate	Maximum percolation rate encountered (minutes per inch)		
		INFORMATION ON OLD SEPTIC SYSTEM WHICH HAS FAILED AND/OR BEEN REPLACED		
68	Old Tank Size	OLD Septic Tank Size (gallons)		
69	Old Disposal Type	OLD Disposal Device (may include combination of two types)	ST	Single trench (including combination of mult
			DT	Dual Trenches (with diversion valve between t
			DP	Dual Seepage Pits, with Diversion Valve
			STA	Addition of area to existing single trench sy
			SU	Sump (for all sewage)
			MD	Mound
			HA	Haulaway
			AB	Absorbtion Bed
			AS	Alternative System
			SP	Seepage Pit
			CF	Capped Fill
			SF	Sand Filter
			PD	Pressure Distribution
			TS	Sand-filled Trench
			CP	Cess Pool

SEPTIC SYSTEM DATABASE: SEPTIC INSTALLATIONS

Screen Element Number	(Explanation) Description	Code	(Description of Codes)
70	Old Disposal AreaSize of OLD Disposal Device, Absorbtion Area (square feet)		
71	Old Disposal DeptDepth of Bottom of OLD Disposal Device (feet below ground surface)		

I

```
11/05/93 (EH7)          COUNTY OF SANTA CRUZ   ALUS 3.0            I-ALPEH725
15:34:56                  ENVIRONMENTAL HEALTH                      ALSEH725
                          PUMPING HISTORY BY APN
                                                         MULT SYST FLAG: 4
      APN: 1              SYSTEM NO: 2   DATE: 3              COMMENTS: 5
SITE ADDR: 6                              USE: 7     TYPE: 8      AREA: 9
--------------------------------------------------------------------------------
     DATE     CAUSE PUMPER  PUMPED   TANK SIZE, MAT, COND   FAIL HILV  GREY W.
     SYSNO   LAST PUMP DATE DISP LOC            OWNER
--------------------------------------------------------------------------------
      11        12     14     16         18      19    20     22   23   24
      2         13            17                 21
```

TYPE APN (SYSNO AND/OR DATE OPTIONAL). THEN PRESS 'ENTER'.
PF7=BACKWARD PF8=FORWARD

11/05/93 EH8
15:35:15

COUNTY OF SANTA CRUZ ALUS 3.0
ENVIRONMENTAL HEALTH
INSPECTIONS BY APN

I-ALPEH730
ALSEH730

APN: 1 SYSTEM NO: 2 SITE ADDR: 3
OP PERM NO: 4 LEVEL: 5 SYS TYPE: 6 OWNER: 7
SYSTEM STATUS: 8 REPAIR POT: 9 LIMIT 1:2:3: 10 a b c MULT SYS: 11

CAUSE STATUS	INITIAL FINAL	SYS RECHECK/RCK	COMPL NO DATE	PROB1 PROB2	REQ1 REQ2	ALEG PROB1 ALEG PROB2	DEPTH SAMPLES	STAFF INSP.NO.
12	14	2	17	19a	20a	19a	21	23
13	15	16	18	b	b	b	22	24
25								
26								

TYPE APN (SYSNO OPTIONAL). THEN PRESS 'ENTER'.

```
04/22/94 EH10            COUNTY OF SANTA CRUZ   ALUS 3.0              I-ALPEH745
17:42:36                     ENVIRONMENTAL HEALTH                        ALSEH745
                                PERMITS BY APN

APN: 1                        OWNER: 2                                  DIST: 3
----------------------------------------------------------------------------------
CD PERMIT TYP INIT DATE APPR DATE STAFF  CONTRACTOR              COMMENTS? 4
   APPLICANT    SYSNO   FINL DATE STAFF  CONSULTANT
----------------------------------------------------------------------------------
1 5  6    7     8        9       10       11                1 2A 2B 3 4 5 6 A
   12          13       14       10       15          COND:         17
                                                        FEE: 18  BED: 19
2  M 94001       94/01/01
                    01                                NUMB. OF PARCELS:  24

3  S 94001  R    94/01/01                             LEVL: 22     TYPE: 23
                    01                                CAUSE: 16

4  W 94001       94/01/01
                    01                                SEAL: 20 LOG: 21
TYPE APN. PRESS 'ENTER'.
PF8 TO SHOW MORE RECORDS FOR THE PARCEL.         PF7=BACKWARD
```

To update
Type "Y" over the desired line number and press enter.

APN	CLASS	ADDRESS	CSA	USE	BD	TYP	DATE	DSIZE	DEPTH	GWMAX	HIS1	DAT1	HIS2	DAT2	HIS3	DAT3
		RIVERSIDE DR.		SR	2				0.0	0.0						
		¥ ARBOR & LOCUST		SR	0	ST			0.0	0.0	XS	7708				
		¥ GLEN ARBOR RD.		SR	0				0.0	0.0						
		IANZANITA AVE.		SR	4	ST	7103	1250	10.0	0.0	N	7103				
		) MANZANITA AVE.		SR	3	DS	8404	1200	6.0	0.0	N	8404				
		) NEWELL CR. RD.		SR	0				0.0	0.0						
				SR	0				0.0	0.0						
		IEWELL CREEK RD.		SR	4	ST	7106	1250	12.0	0.0	N	7106				
		) GLEN ARBOR RD.		SR	0				0.0	0.0						
		) GLEN ARBOR RD		MR	0				0.0	0.0						
		ILEN ARBOR RD		SR	1	ST	7305	1000	10.0	0.0	N	7305				
		WOODLAND DR		SR	0	ST	8005	1200	15.0	0.0	RB	8005				
		WOODLAND DR		SR	0				0.0	0.0	SF	8205				
		WOODLAND DR		SR	1	ST		512	8.0	0.0						
		WOODLAND DR		SR	2	ST	7802	1200	5.0	0.0	PU	8904	INOK	8104	RB	7802
		; HWY 9		SR	0	SU			0.0	0 0	INF	8910	RT	8104		
		) HWY 9		SR	2				0.0	0.0	INM	8103	PUM	8102	INM	7907
		) HWY 9		SR	2	ST	8001	600	10.0	0.0	INOK	8105	RB	8001		
		) HWY 9		VH	0				0.0	0.0	INOK	8101	PU	8101		
		) HWY 9		SR	0				0.0	0.0						
		) HWY 9		SR	2	ST	8705	700	5.0	0.0	RB	8705	INOK	8101		
		.SHADOWBROOK LN		MR	4	ST		500	5 0	0 0						
		SHADOWBROOK LN		MR	3	ST	8902	800	5.0	0.0	RB	8902	SF	8901		
		SHADOWBROOK LN		SR	3	ST	7612	1000	10.0	0.0	RB	7612	SF	7607		
		SHADOWBROOK LN		MR	3	ST	6809	1080	12.0	0.0	INM	8711	SF	8709	RB	6809
		SHADOWBROOK RD		MR	2				0.0	0.0	PU	8108	INOK	8108		
		SHADOWBROOK RD		SR	2				0.0	0 0	PU	8108	INOK	8108		
		SHADOWBROOK LN		SR	2	STSU	7312	1000	10.0	0.0	FW	8801	RT	7707	RB	7312
		WOODLAND DR		SR	1	ST			0.0	0.0	INOK	8910	INOK	8906		
		WOODLAND DR		SR	1	ST	8904	500	10.0	0.0	INF	8905	RA	8904		
		) HWY 9		SR	2	PU	6404		0.0	0.0	RB	6404				
		SHADOWBROOK LN		SR	2		6406		0.0	0.0	INOK	8804	INOK	8106	RB	6406
		SHADOWBROOK LN		SR	3	SP	6406		48.0	0.0	INOK	8804	INOK	8106	RB	6406
		I HWY 9		SR	1				0.0	0.0	RAP	9112	INM	8108		
		DICKENSON AVE		SR	1	ST	7505	500	6.0	0.0	INOK	8102	RB	7505		
		DICKENSON AVE		SR	4	ST			0.0	0.0	INOK	8102	PU	8102		
		DICKENSON AVE		SR	3				0.0	0.0						
		MADRONA DR		SR	3	ST	8508	560	7.0	0.0	RA	8508	INOK	8102	RB	6610
		DICKENSON AVE		SR	2	SP	6407	300	11.0	0.0	N	6407				
		DICKENSON AVE		SR	3	ST	6602	400	8.0	0.0	INOK	8101	PU	7512	N	6602
		DICKINSON AVE		SR	3				0.0	0.0	INOK	8102				
		DICKENSON AVE		SR	3	ST	8708	800	10.0	0.0	PU	9006	RB	8708	INOK	8102
		DICKENSON		SR	3	ST	7608	1000	9.8	0.0	PU	9008	INOK	8101	RA	7608
		WENTE AVE		SR	4				0.0	0.0	INM	7911	RT	7911		
		GLEN ARBOR RD		SR	0	ST	7706	2000	12.0	0.0	PU	8908	RB	7706		
		· GLEN ARBOR RD		SR	3				0.0	0.0	INF	8601				
		& 9305 GLEN ARBOR RD		MR	3	ST	8608	1000	5.0	0.0	RB	8608	RB	7702		
		MANZANITA AVE		SR	0				0.0	0.0	PU	8908				
		GLEN ARBOR RD		SR	3	ST	7509	500	10.0	0.0	RB	7509	INOK	8106	RB	6406
		MADRONE AVE		SR	2	ST	7509	1000	10.0	0.0	RB	8808	RB	6410		
		WENTE ST		MR	6		7401	1200	0.0	0.0	INOK	8102	RB	7401		
		WENTE ST		CM	0	ST	7401	1500	10.0	0.0	INOK	8102	PU	8102		
		RIVERSIDE DR		SR	3	ST	8307	1800	4.0	0.0	PU	8812	RB	8307		
				SR	0				0.0	0.0						
				SR	0				0.0	0.0						

APPENDIX C:

STANDARDS AND PROCEDURES FOR THE REPAIR AND UPGRADE OF SEPTIC SYSTEMS
with Proposed Modifications

INTRODUCTION

This document presents the standards and procedures to be followed in repairing a septic system in Santa Cruz County, including upgrades of existing systems to meet the septic system requirements for building additions and remodels. It is intended for use by contractors, consultants and property owners and applies to residential and commercial properties that are already developed. The requirements, procedures and guidelines contained herein are based on Chapter 7.38 of the Santa Cruz County Code and this document is specifically prepared pursuant to section 7.38.095.E. **Parcels that have new development served by a septic system that was installed according to the requirements in Chapter 7.38 that became effective December 10, 1992, shall be ineligible to utilize the allowances for repairs described in Section 7.38.095.B for the purposes of upgrading the system to allow bedroom additions or additions of more than 250 square feet.** Systems on parcels that were developed after September 16, 1983 must comply with the provisions of the Regional Water Quality Control Board's Basin Plan (Resolution 83-12).

REPAIR PROCEDURES

The process for repairing or upgrading a septic system involves:

1. Design of a septic system that complies with the requirements presented below. If a property owner desires to design their own septic system, they are urged to contact licensed contractors, septic system consultants or the Environmental Health Service (EHS) for information on soil types and water table levels in their area.

2. Submittal of the permit application and design for review by the EHS Specialist. Significant changes may be required in order to meet the requirements specifically applicable to the property. Soils, percolation and winter water table observation tests may be required to receive approval of the permit. Modification of the original design may be required if site conditions warrant changes.

3. **Construction of the system may only begin after approval of the permit is given by the Environmental Health Specialist. 24 hours notice must be given to the Specialist prior to commencing work. Failure to comply may result in issuance of a stop work order and rendering the permit null and void.**

4. Installation of the septic system must be done with inspections by an Environmental Health Specialist including a final inspection and permit sign-off.

Since the septic system design initially proposed by an owner or contractor may differ from the design ultimately approved by the Environmental Health Service, it is recommended that any contract between a property owner and a

contractor reflect that possibility. When getting bids, property owners should make sure that contractors are bidding on the same septic system design (getting bids on an approved septic permit will ensure this).

TYPES OF SYSTEMS AND ALLOWABLE BUILDING IMPROVEMENTS

Six primary types of septic systems are recognized, depending on the history of the system, the characteristics of the property, and the desires of the owner to upgrade the structures. If a parcel cannot meet the requirements for a Standard System, a proposal for a Nonstandard System must be submitted. Additional requirements are also specified for large systems and systems in sandy soils.

1. A Category A, Standard System meets all of the standard requirements and enables building additions limited only by the number of bedrooms for which the septic system is sized, consistent with building and zoning department regulations. No construction may occur over the septic system and/or expansion area.

2. Nonstandard Systems do not meet all the requirements for a standard system, but they do meet the more specialized requirements for the different types of nonstandard systems. Approval of a nonstandard system requires recordation of a notice of nonstandard system on the deed, special operating requirements, and payment of an annual inspection fee to confirm continued satisfactory performance (fee waived for Category C systems). Four types of nonstandard systems are recognized:

   a. A Category B, Alternative System utilizes a specific alternative technology to meet requirements and may enable bedroom and other additions if the proposed system design can accommodate the wastewater peak flow.

   b. A Category C, Limited Expansion System is a permitted system repair that meets all of the requirements for a standard system except for groundwater separation (at distances over 250 feet from a waterbody), or expansion area. Use of a Category C system requires water conservation measures and enables only a one time addition of up to 250 sq.ft. of conditioned space with no bedroom additions, and no increase in the volume of wastewater discharge. Additions will not be approved which encroach on the septic system or any area of the property needed to install a replacement system which meets the requirements for a standard system to the greatest extent possible. As long as the system performs well, no annual inspection fee will be charged.

   c. A Category D, Low-Flow System is a permitted system repair that meets all of the requirements for a standard system except for leachfield area or size of pump chamber for pump up systems. Use of a Category D system requires water conservation measures and enables only a one time addition of up to 250 sq.ft. of conditioned space with no bedroom additions, and no increase in volume of wastewater discharge. Additions will not be approved which encroach on the septic system or any area of the property needed to install a replacement system which meets the requirements for a standard system to the greatest extent possible. An annual inspection fee will be charged on the tax bill.

d. A Category E, Haulaway System is a system that requires that effluent be pumped out on a seasonal or full time basis to prevent failure, and/or ensure that requirements for groundwater separation are met. Use of a haulaway system enables only a one time addition of up to 250 sq.ft. of conditioned space with no bedroom additions or increase in volume of wastewater discharge. An annual inspection fee will be charged on the tax bill.

3. A Category F, Prestandard System is an existing septic system installed prior to 1993 which shows no indication of failure, but which does not meet requirements for a standard system. Without any further upgrade (but with a satisfactory septic pumpers inspection report), such a system enables only a one time addition of up to 250 sq.ft. of conditioned space with no bedroom additions or increase in volume of wastewater discharge. Additions will not be approved which encroach on the septic system or any area of the property needed to install a replacement system which meets the requirements for a standard system to the greatest extent possible.

4. Sandy Soil Systems are those systems located in sandy soils with fast percolation rates 1-5 minutes per inch (MPI). In addition to the other requirements specified, such systems must utilize enhanced treatment which will remove at least 50% of the nitrogen from the effluent. This shall be required for any new system and any system which will serve a bedroom addition, a remodel adding more than 250 square feet, or other expansion of use which will result in an increase in volume or strength of wastewater flow. Such systems will be Category B Alternative Systems and can utilize higher application rates in the leachfield design (see Section II.D).

5. Large Systems are those systems which serve more than 5 residential units or which have peak daily flows greater than 2000 gallons per day. For all new or replacement systems, enhanced treatment providing for at least 50% nitrogen removal will be required. These systems will be considered Category B Alternative Systems and can utilize increased application rates in the leachfield design (see Section II.D.).

I. STANDARD SYSTEM (CATEGORY A)

The requirements for new individual onsite wastewater disposal systems as set forth in Chapter 7.38 of the County Code and in the Water Quality Control Plan for the Central Coast Basin shall be met to the greatest extent possible for all system repairs and upgrades. At a minimum, the following requirements shall be met.

A. SEPTIC TANK REQUIREMENTS

1. Tank Size - For residences of from 1 to 4 bedrooms, tank size shall be 1500 gallons, with an additional 250 gallons per bedroom for each bedroom in excess of 4.

   For commercial or institutional sewage disposal systems, the septic tank volume (independent of any grease traps required) shall be three times (3x) the peak daily flow. When repairing or upgrading commercial or institutional septic systems, the applicant must present at least two years of past water use records and/or a plausible projection of future peak daily wastewater flows.

   Exterior grease traps, sized and installed to conform to EHS policy, shall be required on commercial/institutional facilities discharging grease laden waste. The pumping of grease traps as often as necessary to prevent grease entering the leachfield(s) shall be a condition of any food facility Health Permit.

2. Tank Type - Concrete and polyethylene septic tanks from approved manufacturers are the only septic tanks permitted for tank replacements. Existing, two chambered redwood or fiberglass septic tanks 800 gallons or larger that are in good condition do not require replacement at the time of septic system repair and will be recognized as passing an inspection for loan review purposes. Other tank types may be allowed provided adequate documentation of satisfactory performance is provided.

3. Access to Tank - Septic tanks should be installed within 12 inches of the ground surface when possible. If it is demonstrated that the building sewer pipe cannot be modified and the top of a septic tank must be deeper than 12 inches from the ground surface, the tank shall be modified so as to extend all manholes and covers to a minimum of 12 inches from the ground surface. Material used to extend the manholes and covers shall be of the same material as the septic tank. Septic tanks placed in paved driveways shall be provided with "traffic grade" concrete access manholes with cast iron lids. A cleanout to finished grade shall be provided between the building and the septic tank. 3" or 4" Schedule 40 ABS pipe shall be used to connect the building drains to the septic tank.

4. Setbacks for Tank Installation - Septic tanks shall be installed to conform to the following minimum setback distances:

From Septic Tank To:	**Minimum Distance in Feet:**
Leaching Device	3
Property Line, Easement or Right-of-Way	5
Foundations, Structures, Decks	5
Water Line	10
Stream, Well, Spring, Watercourse	50

B. LEACHFIELD REQUIREMENTS

1. GENERAL - The function of the leachfield is to dispose of the clarified wastewater from the septic tank into the ground. The relevant factors in designing a leachfield are: The depth from the surface of the ground to the water table (especially during the rainy season), the ability of the soil to soak up the water from the leachfield (percolation rate) and, the amount of land available on the subject parcel to install the leachfield. The following subsections list the requirements and procedures to be followed in designing a leachfield.

2. AMOUNT OF LEACHFIELD REQUIRED - Residential
The following table presents the minimum amount of leachfield required for residences per dwelling unit.

LEACHING AREA REQUIREMENTS - SQ. FT.

	PERCOLATION RATE - MPI*:				
	1-5	**6-30**	**31-60**	**61-120**	**MAXIMUM WATER USE (APPROX. GAL/DAY)**
1 Bedroom	**500**	**600**	**900**	**2150**	**215**
2 Bedrooms	**625**	**750**	**1125**	**2700**	**270**
3 Bedrooms	**750**	**900**	**1350**	**3250**	**325**
4 Bedrooms	**875**	**1050**	**1575**	**3750**	**375**
Additional Bedrooms	**125 ea.**	**150 ea.**	**225 ea.**	**550**	**55**

***To the nearest whole MPI (Minutes Per Inch)**

a. Determination of Soil Percolation Rate - The percolation rate range of the soil shall be estimated by the applicant on the application form for the purposes of determining the proposed leachfield area required for the number of bedrooms desired. After the application is made, a field visit to the parcel will be made by the EHS Specialist. A test hole excavation to observe soil texture characteristics (as well as a check for water table level) may be required. If concurrence on the estimated percolation rate range of the soil cannot be achieved among the inspector and the owner/contractor/consultant, a percolation test shall be performed by a licensed consultant or contractor familiar with the Santa Cruz County percolation test requirements. The results of the percolation test shall then be the basis for determining the leachfield area required.

b. Effective Leaching Area - The size of the leachfield is determined by the total of the areas of the trench bottom and sidewalls beneath the leach pipe. Example: A trench that is four feet deep, 1 1/2 feet wide and 50 feet long with the leach pipe on top of 2 1/2 feet of drain rock, has an effective leaching area of 325 sq. ft. There are 6 1/2 sq. ft. (2 1/2 + 1 1/2 + 2 1/2) of leaching area per lineal feet of trench:

6.5 sq. ft. per lineal ft. X 50 ft. = 325 sq. ft.

c. Expansion Area - In order to meet the requirements for a Standard System, a reserve expansion area for future leachfield repairs on the parcel must be designated on the approved plot plan for the septic system design. This expansion area must be capable of accommodating a duplicate of the approved leachfield. No construction of buildings, permanent swimming pools or other permanent structures shall be permitted over the expansion area.

3. AMOUNT OF LEACHFIELD REQUIRED - COMMERCIAL/INSTITUTIONAL

The requirements for existing commercial/institutional establishments shall be determined based on an analysis of peak daily loading rates, using an absorbtion rate of 0.43, 0.36, 0.24 and 0.10 gallons per square feet of leaching area per day for soils percolating in the ranges 1-5, 6-30, 31-60 and 61-120 MPI, respectively. The applicant shall present at least two years of past water use records and a plausible projection of future peak daily wastewater flows if a change in property use which could result in increased wastewater loading is proposed.

For all large systems serving more than 5 residential units or having peak daily flows greater than 2000 gallons per day, enhanced treatment providing for at least 50% nitrogen removal will be required. These systems will be considered Category B Alternative Systems and can utilize increased application rates in the leachfield design (see Section II.D.).

4. LEACHFIELD CONSTRUCTION REQUIREMENTS FOR STANDARD SYSTEMS

Following are the requirements for a Standard Septic System. Owners of parcels that cannot accommodate all of the requirements of this section should refer to the Nonstandard System sections below. Please see Appendix A for a diagram of a standard leachfield.

a. Allowable Soil Percolation Rates

Soils in which the leachfield is constructed must percolate in the range of 1-120 MPI. Please see section B.2.a above for a description of the process to determine percolation rate range.

For systems in sandy soils with percolation rates of 1-5 MPI, enhanced treatment providing for at least 50% nitrogen removal will be required for any new system or any system serving a bedroom addition, a remodel adding more than 250 square feet, or other expansion of use which will result in an increase in volume or strength of wastewater flow. Such systems will be Category B Alternative Systems and can utilize increased application rates in the leachfield design (see Section II.D)

b. Groundwater Separation Below Leachfield

The minimum separation between the bottom of any leaching device and seasonally high groundwater shall be:

5 feet where the leaching device is between 50 and 100 feet from a stream, spring, or other waterbody.

3 feet where the device is over 100 feet from a waterbody.

(At distances greater than 250 feet from a waterbody, a system with groundwater separation below the leachfield less than 3 ft. may be approved as a Category C, Limited Expansion, System provided however that a separation of at least 1 ft. must be maintained for at least 90% of the year. This will be considered a Category C, Limited Expansion System for the purposes of building additions, but will not be subject to annual inspections and an annual fee.)

The definitive determination of depth to groundwater in the area where a leaching device is proposed shall be through observation of depth to groundwater by the EHS Specialist in a test hole excavation (or monitoring well) during the wet weather testing period as described in Section 7.38.120.B. During the rest of the year, the depth to groundwater will be estimated based on observation of test hole excavations and groundwater records maintained by the EHS.

c. Trench Depth

The standard trench depth shall be a maximum of 4 feet from the ground surface (2 1/2 feet maximum effective depth). Parcels with soils that percolate in the range 6-60 MPI may use a deeper trench to a maximum of 6 1/2 feet from the ground surface (5 feet maximum effective depth) if space on the parcel prevents the use of a standard trench depth. Parcels that have surface soils that percolate slower than 60 MPI and deeper soils that percolate faster than 60 MPI may use a deeper trench but shall only receive credit for the area of the trench in the acceptable percolation rate range. However, in all instances where a trench deeper than 4 feet is utilized, the trench shall be as shallow as possible using the maximum lineal feet that can fit on the parcel while still reserving the required expansion area.

d. Credit for Existing Trenches Deeper than Standard Trenches

When upgrading a septic system, credit shall be given for any functioning, existing trenches, as verified by a licensed septic pumper's report, that meet all of the requirements herein, with the possible exception of trench depth. Deeper trenches may be allowed where the soils percolate in the range 6-60 MPI. Where the soils percolate in the range 1-5 MPI, no exception to the 2 1/2 feet effective trench depth for existing trenches shall be given unless treatment for nitrogen removal (such as a sand filter or other approved treatment) is provided. This must be done through the procedures for a Nonstandard System, as described in Section II.

e. Trench Width - Trenches shall be 18" to 36" in width. The trench bottom area plus the areas of the two sidewalls beneath the leach pipe is the effective leaching area (see section B.2.a above).

f. Maximum Slope - The maximum slope where leachfields may be approved is 30%, except that leachfields may be approved on slopes up to 50% under the following conditions: the leach pipe must be buried at least 2 feet, there must be at least 5 feet of soil percolating in the range of 1-120 MPI below the leachfield, and conditions must otherwise be suitable to prevent lateral surfacing of effluent.

g. Minimum Trench Spacing - The minimum spacing between trenches (edge to edge) shall be twice the effective depth to a maximum of 8 feet.

h. Trench Setbacks - The minimum setback requirements between a leachfield and the following are:

Septic tank	3 feet
Property line	5 feet
Foundations/decks	5 feet
Potable water pipe	10 feet
Well	100 feet unless existing system is closer and well is uncontaminated. In no case will a setback less than 50 ft be allowed.
Embankment greater than 67%	2 times the height up to 25 feet; if an impermeable layer is encountered, setback shall be 4 times the height up to 50 ft.
Stream, spring, waterbody	100 feet if space permits but no less than 50 feet
Seasonal drainageway (flows no more than one week after significant rainfall)	25 feet
Swimming pool	10 feet

i. Trench Construction Details
General installation guidelines: The leach trench shall be excavated to the appropriate depth perpendicular to any slope, following the contour of the land so as to maintain the same trench depth for the length of the trench. Any smeared trench sidewalls shall be raked to roughen the surface to enhance percolation. The trench inspection riser pipe shall be placed vertically in the end of the trench and held in place vertically while the clean drain rock is placed in the trench. The top of the bed of rock and the leach pipe shall be leveled using a builders level or transit.

The leach pipe shall be placed on the level rock bed with the holes pointed down and a cap placed over the end of the pipe. When the pipe is level, drain rock shall be brought up to 2" in depth over the drain pipe. The perforated inspection riser pipe shall be cut to the rock level and a section of solid pipe attached to extend through the ground surface. Untreated building paper or straw shall be placed over all of the rock surface of the leachfield. Earth backfill shall be placed over the leachfield 8" - 12" deep, and shall be mounded to ensure drainage away from the trench. If settlement occurs after installation, additional backfill must be added. The inspection riser pipe shall be capped. Any disturbed soils shall be protected from erosion by mulching with straw and seeding with erosion control seed mix.

Additional Construction specifications are as follows:

Maximum length of trench	100 feet
Slope of leach pipe	should be level, but 3" in 100 ft maximum
Rock over pipe	2" thick
Size of Rock	1/2" - 2 1/2" washed drain rock - dirty loads will be rejected
Type of leach pipe	3" or 4" coextruded styrene pipe

j. Trench Bottom Setback to Impermeable Rock or Soil Layer - There shall be at least 5 feet of soil that percolates in the range 1-120 MPI beneath the leachfield if a stream, spring, or cutbank is located within 50 feet, or 3 feet of permeable soil if the horizontal separation is more than 50 feet.

k. Trench Inspection Riser Pipes - Each distinct leach trench shall have a pipe placed vertically in the end of the trench to provide a means of monitoring the water level in the leachfield. The pipe shall be a perforated pipe that transitions to solid pipe at the top of the rock before exiting the ground. The pipe shall be extended to the bottom of the trench and held in place vertically while the rock is placed in the trench. A cap or female adapter with a threaded plug shall be provided at the end of the pipe. Concrete boxes with lids shall be provided around the pipe end where a flush to grade pipe end is desired.

l. Distribution of Effluent to Multiple Trenches - When there is more than one leach trench, an approved effluent distribution box shall be used to distribute effluent to each trench (see Appendix B for details). "Pop-over" distribution is not permitted.

m. Geological Hazards - Where there is local evidence of, or a history of, landslide activity, the EHS Specialist may require a geologic hazards assessment to ensure that any proposed leachfield will not contribute to a slope failure .

n. <u>Sewage Easements</u> - Locations on nearby properties or right-of-ways may be used for sewage disposal for system repairs only, if a recorded easement is obtained according to specifications in Section 7.38.060. No increase in bedrooms shall be approved if an easement is needed for sewage disposal.

o. <u>Leachfield Repairs and Upgrades in Floodplains</u> - Leachfield repairs and upgrades for the purposes of building additions may be permitted for parcels in floodplains. Property owners desiring to construct building additions on parcels in flood plains should determine project feasibility from the Planning Department at an early stage in the project development process.

p. <u>Drainage Improvements</u> - Roof drains and surface runoff shall be directed away from the disposal area so as to reduce soil saturation.

q. <u>Site Restoration and Erosion Control</u> - At the completion of the job, the site must be restored, with proper, stable disposition of excavated material and measures taken to prevent any significant erosion of surfaces disturbed during installation of the system.

5. <u>EFFLUENT PUMPING</u>
When effluent pumping is necessary to deliver the effluent to the leachfield, a 1000 gallon effluent pumping station tank shall be provided. The pump control switches shall be set so that 750 gallons of emergency storage is available during power outages. Pump controls shall also be installed to limit the amount of effluent that can be pumped to the leachfield in one day to 120% of the daily design flow so as to prevent overloading the leachfield after an extended power outage. Any pump up system which has less than 300 gallons storage capacity in the pump chamber shall be considered a Category D, Low-Flow System. A system with 300-750 gallons storage capacity shall be considered a Category C System. A handout is available from EHS that describes the detailed effluent pumping requirements.

6. <u>SEEPAGE PITS</u>
The use of seepage pits to repair or upgrade a septic system for the purposes of bedroom additions shall only be permitted where there is a previously installed seepage pit and all of the soil, groundwater and other setback requirements above are met. However, if there is room to accommodate a standard leachfield, that shall be the preferred leaching device. Seepage pits must meet Basin Plan requirements. On parcels where a seepage pit has not been installed in the past, and standard leachfields cannot be installed, seepage pits may be installed provided they meet the requirements contained in the Regional Board's Basin Plan. In this instance, no bedroom increases shall be approved.

C. WATER CONSERVATION

Water conservation devices are recommended to be installed in any home or building served by an onsite wastewater disposal system. All Category C, D, and E systems are required to install water conservation devices as a condition of any permit issued. See section II.A.1 below for recommendations.

D. GREYWATER DISPOSAL

1. Greywater is defined as any wastewater from washing machines, dishwashers, bathroom lavatory sinks, and/or showers. Greywater may contain pathogens and nuisance substances and shall not be discharged directly onto the ground surface.

2. Greywater shall be discharged to the septic tank system or to an approved disposal device.

3. If the septic system is inadequately sized or performs unsatisfactorily due to surcharge of greywater, the greywater may be discharged to a separate disposal device approved by EHS. If the kitchen sink is connected to the greywater disposal system, a small, two chambered tank shall be provided. The greywater disposal device shall be constructed according to the following minimum requirements:
   - setback from leachfield - 10 feet
   - setback from stream - 25 feet
   - tank size - 3 times expected daily flow
   - leaching device size - 200 sq. ft. sidewall area or as calculated based on loading rate of 1 gal./sq.ft./day; for clotheswashers only, a minimum size of 104 sq. ft. sidewall area (96 cubic foot volume) is allowed.
   - minimum cover - 8 inches
   - maximum depth - 5 feet
   - groundwater separation - 1 foot 90% of the year if stream setback is greater than 100 ft.; 3 ft. if stream setback is between 25 and 100 ft.

4. A minor sewage disposal permit, at a reduced fee, is required for installation of a greywater sump.

E. CURTAIN DRAINS

A permit shall be required for any curtain drain installed within 100 ft of a leachfield. Curtain drains located down gradient from a leachfield must be at least 25 feet from the leachfield. If an impermeable layer is present or soils percolate faster than 1 minute per inch, curtain drains must be located at least 50 feet away. Curtain drains located upgradient of a leachfield must be installed with the bottom of the drain higher in elevation than the top of the leachfield, or must be located at least 25 feet away.

II. NONSTANDARD SYSTEMS

If a parcel cannot meet all of the requirements for a Category A, Standard, System described in Section I above, septic system repairs must be made using a Category C (Limited Expansion) System, a Category D (Low-Flow) System, Category E (Haulaway) System, or a Category B (Alternative) System. All of these are considered Nonstandard Systems. Parcels with Category C, D, or E Systems cannot receive approval for building permits to add more than a one time addition of up to 250 sq. ft. of conditioned floor area that does not increase bedrooms or discharge. Under many circumstances, the conditions which prevent a parcel from meeting requirements may be overcome using an Alternative system and in that case bedroom additions may be allowed (see section II.D). Systems for parcels with soils that percolate faster than 1 MPI or slower than 120 MPI can only be approved if an acceptable proposal is submitted that complies with the requirements in the Alternative Systems section (Section II.D).

Parcels served by nonstandard systems are subject to recordation of a notice of nonstandard system and payment of an annual charge to cover the cost of inspection and monitoring of system performance, as discussed below under Section II.E.

A. CATEGORY C, LIMITED EXPANSION SYSTEMS

Category C, Limited Expansion Systems are conventional systems which meet all requirements except for any one of the following:
- Groundwater separation below the leachfield is between 1 and 3 feet at least 90% of the year and the system is over 250 ft. from a waterbody.
- Less than 100% expansion area is available.

Water conservation measures must be installed, as specified below under Category D Systems. All other Nonstandard system requirements must be met, except that the annual inspection fee will be waived if there is no indication of system problems.

B. CATEGORY D, LOW-FLOW SYSTEMS

Category D, Low-Flow Systems are conventional systems which meet all requirements except for any one of the following:
- Only 50-99% of the required amount of leachfield area can be installed.
- The system requires effluent pumping, but the pump chamber is less than required size.

Owners of parcels that elect to apply for a permit to install a Category D System shall submit a proposal to install as much leachfield as possible that meets the requirements in section I.B.4 above (page C-6). A permit for a Category D system can only be approved if at least 50% of the leachfield required for a Standard system (and no less than 300 sq. ft. of leachfield) can be installed. A proposal for an Alternative system or Haulaway System must be submitted by the owner if less than 50% of the required leachfield can fit on the parcel.

The following water conservation measures and provision for seasonal haulaway shall be made part of all Category D, Low-Flow System proposals.

1. Water Conservation Measures Required - All proposals for Category C and D Systems shall include a requirement to install the water conservation devices described below if they are not already installed. These devices must be installed and inspected prior to permit final signoff.

   a. All toilets shall be 1.6 gallon, or less, flush toilets.

   b. Low flow shower heads of 2.5 gallons per minute, or less, shall be installed in all showers.

   c. Water conservation aerators shall be installed on all lavatory, kitchen sink, and other household faucets.

   d. Garbage grinders shall be removed.

2. Seasonal Haulaway Required as Necessary to Prevent System Failure - All proposals for Category D systems shall include a requirement that the septic tank will be pumped as necessary to prevent any failure or overflow of the septic system. A gate valve on the septic tank effluent pipe is required to be installed prior to final inspection. This valve will prevent wastewater from escaping from the tank and will also prevent groundwater from entering the tank. If the existing septic tank allows groundwater to leak into the tank, a watertight septic tank shall be installed. A violation reinspection fee will be assessed if the system is observed to fail.

C. CATEGORY E, HAULAWAY SYSTEMS

Where less than 50% of the leachfield required in section I.B.2 can be installed on a parcel where the existing wastewater disposal system is failing or intermittently failing, a Category E Haulaway System shall be utilized. Extreme water conservation measures should be utilized by the resident. A watertight holding tank shall be installed if the existing septic tank cannot be made watertight. A holding tank high water warning alarm shall be installed. Any available leaching area may be used for greywater disposal if greywater disposal requirements are met. All blackwater effluent must drain to the holding tank. Blackwater may be discharged to the leachfield during periods when groundwater separation requirements are met. Risers must be installed in the leachfield and in the vicinity of the leachfield to monitor groundwater level. Records of septic tank pumpings must be made available for inspection purposes.

D. CATEGORY B, ALTERNATIVE SYSTEMS

The owner of a parcel that cannot meet the Category A, Standard requirements has the option described above to utilize a Category C, D, or E System. However, if those options are selected, building additions are quite limited due to the limited sewage disposal capacity of the parcel. The resident may incur considerable cost and inconvenience due to the substandard system and the requirement for seasonal haulaway. The Alternative system program permits the use of various wastewater treatment and disposal technologies that are not specifically described in Chapter 7.38 of the County Code. The design, installation and use of alternative treatment and disposal technologies may result in superior wastewater treatment and disposal for that parcel and may, depending on site specific conditions, permit building additions beyond that permitted for other Nonstandard Systems.

The following is a discussion of the alternative technologies currently approved for use in Santa Cruz County. Information is given regarding design and construction requirements for each of these technologies. A listing of the possible applications of each technology is presented subsequently.

1. APPROVED ALTERNATIVE TECHNOLOGIES (Detailed specifications for all these technologies are available in the Environmental Health Office.)

   a. MOUND SYSTEMS
   A mound system consists of a mounded leaching bed constructed above ground that receives effluent distributed over the entire bed by means of pumped pressure distribution piping system. Use of this type of system is suited for gently sloping parcels subject to prolonged periods of shallow groundwater. For septic system repairs or upgrades, the following specifications are required: The minimum mound body fill depth shall be 2 feet below the distribution bed. Minimum depth from the distribution bed to groundwater shall be 3 feet (5 ft. within 25-100 ft. of a waterway). Minimum depth from natural grade to impermeable strata shall be 2 feet.

   b. SAND FILTER
   Sand filters provide treatment of the septic tank effluent in order to maximize the application rate of effluent where leachfields are constructed in slowly percolating soils. Sand filters provide denitrification of septic tank effluent, and their use prior to effluent disposal in rapidly percolating sandy soils reduces nitrate discharge by at least 50%, if designed and operated properly. Increased effluent treatment provided by sand filters also allows a reduction in the required groundwater separation to 1 foot and allows reducing leachfield size by 50% from the requirements for a Standard System.

   c. SHALLOW TRENCH PRESSURE DISTRIBUTION
   A shallow sand filled trench with a pressure distribution system can enhance wastewater disposal where the parcel is characterized by shallow groundwater and/or shallow soils over a substrate that fails to meet the percolation requirements beneath a Standard trench.

   d. OTHER ALTERNATIVE SYSTEMS
   Designs for alternative wastewater treatment and disposal technologies other than those mentioned above may be considered for approval as described in Section 7.38.182 of the County Code.

2. APPROVED APPLICATIONS OF ALTERNATIVE WASTEWATER DISPOSAL TECHNOLOGIES

a. INSUFFICIENT LEACHING AREA
Whenever a parcel cannot accommodate the size of leachfield required by the soils found on the parcel, a sand filter may be used to increase the soil application rate for wastewater loading. The leachfield requirements listed in section I.B.2 may be reduced by 50% when a sand filter is used. Similarly, the application rates for commercial/ institutional properties may be reduced by 50% by the treatment of septic tank effluent with a sand filter (grease traps may also be required for commercial/institutional parcels - see section I.A.1).

b. SOIL PERCOLATION RATES FASTER THAN 6 MPI OR SLOWER THAN 60 MPI
For soils that percolate faster than 6 MPI, sand filter treatment of septic tank effluent may permit the use of new trenches deeper than 4 feet (2 1/2 feet effective depth) up to a maximum of 10 feet effective depth. Use of sand filters or other measures which reduce nitrogen discharge by at least 50% is required for a system upgrade for the purposes of major building additions for all systems in sandy soils that percolate faster than 6 MPI.

For soils percolating 60-120 MPI, the use of a sand filter may permit the use of leachfields sized according to the requirements for 31-60 MPI soils. Additionally, leachfields may be installed deeper than 5 feet effective depth to a maximum of 10 feet effective depth provided that all setbacks are observed and the leachfields are installed as shallow as possible.

Soils that percolate slower than 120 MPI shall not be approved for leaching devices and must propose a haulaway system as described below.

c. SETBACK TO GROUNDWATER UNSUITABLE FOR LEACHFIELDS
Parcels that have gentle slopes and groundwater problems that prevent the use of conventional leachfields may be suitable for mound systems described above. A proposal for a mound system that meets requirements for the design loading rate may enable bedroom and other building additions provided that an area is available for replacement of the mound. Use of a sand filter may also allow building additions with reduced groundwater separation.

E. NONSTANDARD SYSTEM REQUIREMENTS

The approval and use of a nonstandard system is subject to the "Procedures for Approving and Managing Nonstandard Sewage Disposal Systems" (Sewage Policy 16). These procedures are summarized belows:

1. Acknowledgment of Requirements for Use of a Nonstandard System - Prior to approval of the permit application for a nonstandard system, the property owner must sign an Acknowledgment of Requirements for Use of a Nonstandard System prepared by EHS staff, in which the owner acknowledges and agrees to comply with all requirements for use of the nonstandard system, including: limitations on property use and water use, operation and maintenance requirements, recordation of a Notice of Nonstandard System on the property

deed, annual compliance inspections by the County, and payment of an annual service charge on the property tax bill to cover the costs of inspections. The executed Acknowledgement and Requirements are attached as conditions of approval of the permit and continuing use of the system.

2. Notice of Nonstandard System - Once the nonstandard system is installed, the County shall record a Notice of Nonstandard System on the deed for the affected parcel. This will describe the type of system and its limitations (if any) and specify operating conditions, including annual reinspections by EHS of the system. This will replace the past procedure of requiring an operating permit for alternative systems.

3. Annual Inspection Fee - Property owners of Nonstandard systems that require annual reinspections by EHS personnel to insure correct system operation will be subject to an additional CSA 12 service charge on their property tax bill to pay for the cost of the inspections.

III. ENFORCEMENT

If any of the terms or conditions of an approved sewage disposal permit are not observed during the installation or operation of any septic system, and the owner fails to correct the problem after reasonable notice, the following enforcement action(s) may be exercised.

A. VIOLATION REINSPECTION FEE

When a violation of requirements has been duly noticed to the owner of the parcel, any subsequent enforcement visits to the parcel shall cause a violation reinspection fee to be imposed for each visit to the parcel as authorized by Section 7.38.290 of the County Code.

B. NOTICE OF VIOLATION

A notice of violation describing the violation of the standard(s) contained in this document or in Chapter 7.38 of the County Code may be recorded against the parcel until the violation is abated.

C. REVOKING OF CONTRACTOR PERMIT PRIVILEGES

If an individual contractor violates the requirements of this document or Chapter 7.38 of the County Code, a complaint will be filed with the State Contractor's Licensing Board.

Appendix D - Basin Plan Standards for Individual, Alternative and Community Sewage Disposal Systems, California Regional Water Quality Control Board, Central Coast Region the liquid on a lined drying bed, or provide a documented test by a registered Engineer or laboratory that the soils permeability in the disposal area is 10^{-6} cm/sec or less. Two drying beds should be used for the purpose of holding salt/regenerant liquid and boiler blowdown waste. Discharges to beds are alternated to allow sufficient drying time.

6. Drying bed residue from any disposal pond should be disposed at a suitable solid waste disposal site.

7. As an alternative, water softener regenerant and boiler blowdown can be hauled in liquid form to a suitable disposal site, or discharged to the ocean through a suitable outfall.

8. Chemical alternatives for sanitizing footwear to replace salt pans should be investigated by farm operators.

9. If used, salt sanitation pans should be at least 4 inches deep and elevated to prevent contact between salt and water. Salt solution should remain in pans until disposed. Spent salt should be dumped into a sealed container and disposed at a suitable site.

10. Solid waste should be routinely collected and disposed at a suitable site.

Prohibitions

The following activities are prohibited at mushroom farms:

1. Discharge of inadequately treated waste, including leachate, high BOD, high nutrient waste, and contaminated surface water runoff to drainageways, surface waters, and ground waters.

2. Discharge of untreated water softener regenerant and boiler blowdown waste in a manner that pollutes any non-saline surface or ground water.

3. Discharge and/or storage of waste, including spent compost, in a manner promoting nuisance and vector development.

4. Disposal of sludges, salt residues, pesticide residues, and solid waste in a manner not accepted by the Regional Board.

INDIVIDUAL, ALTERNATIVE, AND COMMUNITY DISPOSAL SYSTEMS

On-site sewage disposal systems and other similar methods for liquid waste disposal are sometimes viewed as interim solutions in urbanizing areas, yet may be required to function for many years. On-site systems can be a viable long-term waste disposal method with proper siting, design, construction, and management. In establishing on-site system regulations, agencies must consider such systems as permanent, not interim systems to be replaced by public sewers. The reliability of these systems is highly dependent on land and soil constraints, proper design, proper construction, and proper operation and maintenance.

If on-site sewage treatment facilities are not carefully managed, problems can occur, including:

- odors or nuisance;
- surfacing effluent;
- disease transmission; and,
- pollution of surface and ground waters.

Odors and nuisance can be objectionable and annoying and may obstruct free use of property. Surfacing effluent (effluent which fails to percolate and rises to the ground surface) can be an annoyance, or health hazard to the resident and neighbors. In some cases, nearby surface waters may be polluted.

On-site sewage disposal systems are a potential mechanism for disease transmission. Sewage is capable of transmitting diseases from organisms which are discharged by an infected individual. These include dysentery, hepatitis, typhoid, cholera, and gastro-intestinal disorders.

Pollution of surface or ground waters can result from the discharge of on-site system wastes. Typical problem waste constituents are total dissolved solids, phosphates, nitrates, heavy metals, bacteria, and viruses. Discharge of these wastes will, in some cases, destroy beneficial surface and ground water uses.

Subsurface disposal systems may be used to dispose of wastewater from: 1) individual residences; 2) multi-unit residences; 3) institutions or places of commerce; 4) industrial sanitary sources; and, 5) small communities. All individual and multi-unit residential developments are subject to criteria in this section of the Basin Plan. Commercial, institutional, and industrial developments with a discharge flow rate less than 2500 gallons per day generally are not regulated by waste discharge requirements; therefore, they must comply with these criteria. Community systems must also comply with criteria relating to this subject within the Basin Plan. Community systems are defined for the purposes of this Basin Plan as: 1) residential wastewater treatment systems for more than 5 units or more than 5 parcels; or, 2) commercial, institutional or industrial systems to treat sanitary wastewater equal to or greater than 2500 gallons per day (average daily flow). Systems of this type and size may be subject to waste discharge requirements.

Alternatives to conventional onsite system designs have been used when site constraints prevent the use of conventional systems. Examples of alternative systems include mound and evapotranspiration systems. Remote subdivisions, commercial centers, or industries may utilize conventional collection systems with community treatment systems and subsurface disposal fields for sanitary wastes. Alternative and community systems can pose serious water quality problems if improperly managed. Failures have been common in the past and are usually attributed to the following:

- Systems are inadequately or improperly sited, designed, or constructed.

- Long-term use is not considered.
- Inadequate operation and maintenance.

CORRECTIVE ACTIONS FOR EXISTING SYSTEMS

Individual disposal systems can be regulated with relative ease when they are proposed for a particular site. For new systems, regulations generally provide for good design and construction practices. A more troublesome problem is presented by older septic tank systems where design and construction may have been less strictly controlled or where land development has intensified to an extent that percolation systems are too close together and there is no room left for replacement leaching areas. Where this situation develops to an extent that public health hazards and nuisance conditions develop, the most effective remedy is usually a sewer system. Where soil percolation rates are particularly fast, ground water degradation is possible, particularly increases in nitrate concentrations.

Sewer system planning should be emphasized in urbanizing areas served by septic tanks. A first step would be a monitoring system involving surface and ground waters to determine whether problems are developing. Where septic tank systems in urbanized areas are not scheduled for replacement by sewers and where public health hazards are not documented, septic tank maintenance procedures are encouraged to lessen the probability that a few major failures might force sewering of an area which otherwise could be retained on individual systems without compromising water quality. Often a few systems will fail in an area where more frequent septic tank pumping, corrections to plumbing or leach fields, or in-home water conservation measures could help prevent failure. Improvements of this kind should be enforced by a local septic tank maintenance district or local governing jurisdiction.

A septic tank subjected to greater hydraulic load can fail due to washout of solids into percolation areas and plugging of the infiltrative surface. In some cases, excess wash water could be diverted to separate percolation areas by in-home plumbing changes. Dishwashers, garbage grinders, and washing machines could be eliminated. Water saving toilets, faucets, and shower heads are available to encourage low water use. Water use costs may also be structured to encourage more frugal use of water.

LOCAL GOVERNING JURISDICTION ACTIONS

Disclosure and Compliance of Existing Wastewater Disposal System

Local governing jurisdictions should provide programs to assure conformance with this Basin Plan and local regulations. Inspection programs should assure site suitability tests are performed as necessary, and that tests are in accordance with standard procedures. Inspection should also assure proper system installation. Proper design and construction should be certified by the inspector. Concerned homeowners can be a tremendous asset in assuring proper construction. When a septic system permit is issued by the local agency, a handout specifying proper construction techniques should be made available to the general public. Systems must be inspected by the local agency before covering (backfilling).

Local agencies can use either staff inspectors or individuals under contract with the local government. Either way, a standard detailed checklist should be completed by the inspector to certify compliance.

Site suitability determinations should specify: 1) whether approval is for the entire lot or for specific locations of the lot; 2) if further tests are necessary; and, 3) if alternatives are necessary or available.

Where agency approval is necessary from various departments, final sign-offs should be on the same set of plans.

Home owners should be aware of the nature and requirements of their wastewater disposal system. Plans should be available in city or county offices showing placement of soil absorption systems. Since this is only feasible for new construction, local agencies should require septic system as-built plans as a condition of new construction final inspection. Plans would be kept on file for future use of property owners.

Prospective property buyers should be informed of any enforcement action affecting parcels or houses they wish to buy. For example, a parcel in a discharge prohibition area may be unbuildable for an indefinite period, or a developed parcel may be subject to significant user charges from a future sewer system. Local agencies should have prohibition area terms entered into the county record for each affected parcel. When a prospective buyer conducts a title search, terms of the prohibition would appear in the preliminary title report.

Dual leaching capabilities provide an immediate remedy in the event of system failure. For that reason, dual leachfields are considered appropriate for all systems. Furthermore, should wastewater flows increase, this area can be used until the system is expanded. But system expansion may not be possible if land is not set aside for this purpose. For these reasons, dedicated system expansion areas are also approriate.

To protect this set-aside area from encroachment, the local agency should require restrictions on future use of the area as a condition of land division or building permit approval. For new subdivisions, Covenants, Conditions, and Restrictions (CC&R's) might provide an appropriate mechanism for protecting a set aside area. Future buyers of affected property would be notified of property use restrictions by reading CC&R's.

All on-site system owners need to be aware of proper operation and maintenance procedures. Local governing jurisdictions should mount a continuing public education program to provide home owners with on-site system operation and maintenance guidelines. Basin Plan information should be available at local agency health and building departments.

Local agencies should conduct an on-site system inspection program, particularly in areas where system failures are common or where systems with poor soils are approved. An agency inspector should periodically check each septic tank for pumping need and each system for proper operation. Homeowners should be alerted where evidence of system failure exists. Where nuisance or a potential public health hazard exists, a followup procedure should insure the situation is corrected. On-site systems should be constructed in a location that facilitates system inspection.

Another approach is periodically to mail homeowners a brochure reminding them how to maintain and inspect their on-site system. Homeowners should be notified that they should periodically check their septic tank for pumping need. Homeowners should also be notified of other problems indicative of system failure. Some examples include wet spots in drainfield area, lush grass growths, slowly draining wastewater, and sewage odors.

Many existing systems do not comply with current or proposed standards. Repairs to failing systems should be done under permit from the local agency. To the extent practicable, the local agency should require failing systems to be brought into compliance with Basin Plan recommendations. This could be a condition of granting a permit for repairs.

Land use changes on properties used for commerce, small institutions, or industries should not be approved by the local agency until the existing on-site system meets criteria of this Basin Plan and local ordinances. A land use permit or business license could be used to alert the local agency of land use changes.

On-Site Wastewater Management Plans

On-site wastewater management should be implemented in urbanizing areas to investigate long-term cumulative impacts resulting from continued use of individual, alternative, and community on-site disposal systems. A wastewater disposal study should be conducted to determine the best Wastewater Management Plan that would provide site or basin specific wastewater reuse. This study should identify basin specific criteria to prevent water quality degradation and public health hazards and provide an evaluation of the effects of existing and proposed developments and changes in land use. These plans should be a comprehensive planning tool to specify on-site disposal system limitations to prevent ground or surface water degradation. Wastewater management plans should:

- contain a ground/surface water monitoring program;
- identify sites suitable for conventional septic systems;
- project on-site disposal system demand;
- determine sites and methods to best meet demand;
- project maximum population densities for each subdrainage basin to control degradation or contamination of ground or surface water;
- recommend establishment of septic tank maintenance districts, as needed; and,
- identify alternate means of disposing of sewage in the event of irreversible degradation from on-site disposal systems.

For areas where watershed-wide plans are not developed, conditions could be placed on new divisions of land or community systems to provide monitoring data or geologic information to contribute to the development of a Wastewater Management Plan.

Wastewater disposal alternatives should identify costs to each homeowner. A cost-effectiveness analysis, which considers socioeconomic impacts of alternative plans, should be used to select the recommended plan.

On-site wastewater disposal zones, as discussed in Section 6950-6981 of the Health and Safety Code, may be an appropriate means of implementing on-site Wastewater Management Plans.

On-site Wastewater Management Plans shall be approved by the Regional Board.

Septic Tank Maintenance Districts

It may be appropriate for unsewered community on-site systems to be maintained by local sewage disposal maintenance districts. These special districts could be administered through existing local governments such as County Water Districts, a Community Services District, or a County Service Area.

Septic tank maintenance districts should be responsible for operation and maintenance in conformance with this Water Quality Control Plan. Administrators should insure proper construction, installation, operation, and maintenance of on-site disposal systems. Maintenance districts should establish septic tank surveillance, maintenance and pumping programs, where appropriate; provide repairs to plumbing or leachfields; and encourage water conservation measures.

CRITERIA FOR NEW SYSTEMS

On-site sewage disposal system problems can be minimized with proper site location, design, installation, operation, and maintenance. The following section recommends criteria for all new individual subsurface disposal systems and community sewage disposal systems. Local governing jurisdictions should incorporate these guidelines into their local ordinances. These recommendations will be used by the Regional Board for

Regional Board regulated systems and exemptions.

Recommendations are arranged in sequence under the following categories: site suitability; system design; construction; individual system maintenance; community system design; and local agencies.

Mandatory criteria are listed in the "Individual, Alternative, and Community Systems Prohibitions" section.

Site Suitability

Prior to permit approval, site investigation should determine on-site system suitability:

1. At least one soil boring or excavation per on-site system should be performed to determine soil suitability, depth to ground water, and depth to bedrock or impervious layer. Soil borings are particularly important for seepage pits. Impervious material is defined as having a percolation rate slower than 120 minutes per inch or having a clay content 60 percent or greater. The soil boring or excavation should extend at least 10 feet below the drainfield[1] bottom at each proposed location.

2. An excavation should be made to detect mottling or presence of underground channels, fissures, or cracks. Soils should be excavated to a depth of 4-5 feet below drainfield bottom.

3. For leachfields, at least three percolation test locations should be used to determine system acceptability. Tests should be performed at proposed subsurface disposal system sites and depths.

4. If no restrictive layers intersect, and geologic conditions permit surfacing, the setback distance from a cut, embankment, or steep slope (greater than 30 percent) should be determined by projecting a line 20 percent downgradient from the sidewall at the highest perforation of the discharge pipe. The leachfields should be setback far enough to prevent this projected line from intersecting the cut within 100 feet, measured horizontally, of the sidewall. If restrictive layers intersect cuts, embankments or steep slopes, and geologic conditions permit surfacing, the setback should be at least 100 feet measured from the top of the cut.

5. Natural ground slope of the disposal area should not exceed 20 percent.

6. For new land divisions, lot sizes less than one acre should not be permitted.

System Design

On-site systems should be designed according to the following recommendations:

1. Septic tanks should be designed to remove nearly 100 percent of settleable solids and should provide a high degree of

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[1] "Drainfield" refers to either a leachfield or seepage pit.

anaerobic decomposition of colloidal and soluble organic solids.

2. Tank design must allow access for inspection and cleaning. The septic tank must be accessible for pumping.

3. If curtain drains discharge diverted ground water to subsurface soils, the upslope separation from a leachfield or pit should be 20 feet and the downslope separation should be 50 feet.

4. Leachfield application rate should not exceed the following:

Percolation Rate min./in	Loading Rate g.p.d./sq.ft.
1 - 20	0.8
21 - 30	0.6
31 - 60	0.25
61 - 120	0.10

5. Seepage pit application rate should not exceed 0.3 gpd/sq. ft.

6. Drainfield design should be based only upon usable permeable soil layers.

7. The minimum design flow rate should be 375 gallons per day per dwelling unit.

8. In clayey soils, systems should be constructed to place infiltrative surfaces in more permeable horizons.

9. Distance between drainfield trenches should be at least two times the effective trench depth.[1]

10. Distance between seepage pits (nearest sidewall to sidewall) should be at least 20 feet.

11. Dual disposal fields (200 percent of original calculated disposal area) are recommended.

12. For commercial systems, small institutions, or sanitary industrial systems, design should be based on daily peak flow.

13. For commercial and institutional systems, pretreatment may be necessary if wastewater is significantly different from domestic wastewater.

14. Commercial systems, institutional systems, or domestic industrial systems should reserve an expansion area (i.e. dual drainfields must be installed and area for replacement of drainfield must be provided) to be set aside and protected from all uses except future drainfield repair and replacement.

15. Nutrient and heavy metal removal should be facilitated by planting ground cover vegetation over shallow subsurface drainfields. The plants must have the following characteristics: (1) evergreen, (2) shallow root systems, (3) numerous leaves, (4) salt resistant, (5) ability to grow in soggy soils, and (6) low or no maintenance. Plants downstream of leaching area may also be effective in nutrient removal.

Design for Engineered Systems

1. Mound systems should be installed in accordance with

[1] "Effective trench depth" means depth below the bottom of the trench pipe.

criteria contained in Guidelines for Mound Systems by the State Water Resources Control Board.

2. Evapotranspiration systems should be installed in accordance with criteria contained in Guidelines for Evapotranspiration Systems by the State Water Resources Control Board. Exceptions are:

a. For evapotranspiration systems, each month of the highest precipitation year and lowest evaporation year within the previous ten years of record should be used for design.

b. Systems shall be designed by a registered civil engineer competent in sanitary engineering.

Construction

Water quality problems resulting from improper construction can be reduced by following these practices:

1. Subsurface disposal systems should have a slightly sloped finished grade to promote surface runoff.

2. Work should be scheduled only when infiltrative surfaces can be covered in one day to minimize windblown silt or rain clogging the soil.

3. In clayey soils, work should be done only when soil moisture content is low to avoid smeared infiltrative surfaces.

4. Bottom and sidewall areas should be left with a rough surface. Any smeared or compacted surfaces should be removed.

5. Bottom of trenches or beds should be level throughout to prevent localized overloading.

6. Two inches of coarse sand should be placed on the bottom of trenches to prevent compacting soil when leachrock is dumped into drainfields. Fine sand should not be used as it may lead to system failure.

7. Surface runoff should be diverted around open trenches/pits to limit siltation of bottom area.

8. Prior to backfilling, the distribution system should be tested to check the hydraulic loading pattern.

9. Properly constructed distribution boxes or junction fittings should be installed to maintain equal flow to each trench. Distribution boxes should be placed with extreme care outside the leaching area to insure settling does not occur.

10. Risers to the ground surface and manholes should be installed over the septic tank inspection ports and access ports.

11. Drainfield should include an inspection pipe to check water level.

Additional construction precautions are discussed within the Environmental Protection Agency's Design Manual: On-Site Wastewater Treatment and Disposal Systems.

Individual System Maintenance

Individual septic tanks should be maintained as follows:

1. Septic tanks should be inspected every two to five years to determine the need for pumping. If garbage grinders or dishwashers discharge into the septic tank, inspection should occur at least every two years.

2. Septic tanks should be pumped whenever: (1) the scum layer is within three inches of the outlet device; or (2) the sludge level is within eight inches of the bottom of the outlet device.

3. Drainfields should be alternated when drainfield inspection pipes reveal a high water level.

4. Disposal of septage (solid residue pumped from septic tanks) should be accomplished in a manner acceptable to the Executive Officer. In some areas, disposal may be to either a Class I or Class II solid waste site; in others, septage may be discharged to a municipal wastewater treatment facility.

Community System Design

Community systems should be designed and maintained to accommodate the following items:

1. Capacities should accommodate build-out population.

2. Design should be based upon peak daily flow estimates.

3. Design should consider contributions from infiltration throughout the collection system.

4. Septic tanks should be pumped when sludge and scum levels are greater than 1/3 of the depth of the first compartment.

5. Operation and maintenance should be in accordance with accepted sanitary practice.

6. Maintenance manuals should be provided to system users and maintenance personnel.

7. Discharge should not exceed 40 grams per day total nitrogen, on the average, per acre of total development overlying ground water recharge areas, unless local governing jurisdictions adopt Wastewater Management Plans subsequently approved by the Regional Board.

Local Agencies

Recommendations for local governing jurisdictions:

1. Adopt a standard percolation test procedure.

   The California State Water Resources Control Board Guidelines for Evapotranspiration Systems provides a percolation test method recommended for use to standardize test results. A twelve-inch diameter percolation test hole may be used.

2. Percolation tests should be continued until a stabilized rate is obtained.

3. Percolation test holes should be drilled with a hand auger. A hole could be hand augered or dug with hand tools at the bottom of a larger excavation made by a backhoe.

4. Percolation tests should be performed at a depth corresponding to the bottom of the subsurface disposal area.

5. Seepage pits should be utilized only after careful consideration of site suitability. Soil borings or excavations should be inspected either by permitting agency or individual under contract to the permitting agency.

6. Approve permit applications after checking plans for erosion control measures.

7. Inspect systems prior to covering to assure proper construction.

8. Require replacements or repairs to failing systems to be in conformance with Basin Plan recommendations, to the extent practicable.

9. For new land divisions, protect on-site disposal systems and expansion areas from encroachment by provisions in covenants, conditions, and restrictions.

10. Inform property buyers of the existence, location, operation, and maintenance of on-site disposal systems. Prospective home or property buyers should also be informed of any enforcement action (e.g. Basin Plan prohibitions) through the County Record.

11. Conduct public education programs to provide property owners with operation and maintenance guidelines.

12. Alternative system owners shall be provided an informational maintenance or replacement document by the appropriate governing jurisdiction. This document shall cite homeowner procedures to ensure maintenance, repair, or replacement of critical items within 48 hours following failure.

13. Where appropriate, septic tank systems should be maintained by local septic tank maintenance districts.

14. Wastewater Management Plans should be prepared and implemented for urbanizing and high density areas, including applicable portions of San Martin, San Lorenzo Valley, Carmel Valley, Carmel Highland, Prunedale, El Toro, Shandon, Templeton, Santa Margarita/Garden Farms, Los Osos/Baywood Park, Arroyo Grande, Nipomo, upper Santa Ynez Valley, and Los Olivos/Ballard.

15. Ordinances should be updated to reflect Basin Plan criteria.

Additional Considerations

1. Water conservation and solids reduction practices are recommended. Garbage grinders should not be used in homes with septic tanks.

2. Metering and water use costs should be used to encourage water conservation.

3. Grease and oil should not be introduced into the system. Bleach, solvents, fungicides, and any other toxic material should not be poured into the system.

4. Reverse osmosis unit blowdown should not be discharged to on-site wastewater treatment systems overlying usable ground water. Off-site (factory regeneration) practices are recommended for water softeners.

5. If on-site water softener regeneration is necessary, minimum salt use in water softeners is recommended. This can be accomplished by minimizing regeneration time or limiting the number of regeneration cycles.

Individual, Alternative and Community Systems Prohibitions

Discharges from new soil absorption systems in sites with any of the following conditions are prohibited:

1. Soils or formations contain continuous channels, cracks, or fractures.[1]

2. For seepage pits, soils or formations containing 60 percent or greater clay (a soil particle less than two microns in size) unless parcel size is at least two acres.

3. Distances between trench bottom and usable ground water, including perched ground water, less than separation specified by appropriate percolation rate:

Percolation Rate, min/in	Distance, ft
<1	50[1]
1-4	20[1]
5-29	8
>30	5

4. For seepage pits, distances between pit bottom and usable ground water, including perched ground water, less than separation specified by appropriate soil type:

Soil	Distance, ft.
Gravels[2]	50[1]
Gravels with few fines[3]	20[1]
Other	10

5. Distances between trench/pit bottom and bedrock or other impervious layer less than ten feet.

6. For leachfields, where percolation rates are slower than 120 min/in, unless parcel size is at least two acres.

7. For leachfields, where soil percolation rates are slower than 60 min./in. unless the effluent application rate is 0.1 gpd/ft^2 or less.

8. Areas subject to inundation from a ten-year flood.

9. Natural ground slope of the disposal area exceeds 30 percent.

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[1] Unless a set-back distance of at least 250 feet to any domestic water supply well or surface water is assured.

[2] Gravels - Soils with over 95 percent by weight coarser than a No. 200 sieve and over half of the coarse fraction larger than a No. 4 sieve.

[3] Gravels with few fines - Soils with 90 percent to 94 percent coarse fraction larger than a No. 4 sieve.

10. Setback distances less than:

	Minimum Setback Distance, Feet
Domestic water supply wells in unconfined aquifer	100
Watercourse[1] where geologic conditions permit water migration	100
Reservoir[2] spillway elevation	200
Springs, natural or any part of man-made spring	100

11. While new septic tank systems should generally be limited to new divisions of land having a minimum parcel size of one acre, where soil and other physical constraints are particularly favorable, parcel size shall not be less than one-half acre.

12. Within a reservoir[2] watershed where the density for each land division is less than 2.5 acres for areas without approved Wastewater Management Plans.

13. For individual systems on new land divisions, and commercial, institutional, and sanitary industrial systems without an area set aside for dual leachfields (100 percent replacement area).

14. Commercial, institutional, or sanitary industrial systems not basing design on daily peak flow estimate.

15. Any site unable to maintain subsurface disposal.

16. Any subdivision unless the subdivider clearly demonstrates the use of the system will be in the best public interest, that beneficial water uses will not be adversely affected, and compliance with all Basin Plan prohibitions is demonstrated.

17. Lot sizes, dwelling densities or site conditions causing detrimental impacts to water quality.

18. Any area where continued use of on-site systems constitutes a public health hazard, an existing or threatened condition of water pollution, or nuisance.

Discharges from community subsurface disposal systems (serving more than five parcels or more than five dwelling units) are prohibited unless:

1. Seepage pits have at least 15 vertical feet between pit bottom and highest usable ground water, including perched ground water.

2. Sewerage facilities are operated by a public agency. (If a demonstration is made to the Board that an existing public agency is unavailable and formation of a new public agency is unreasonable, a private entity with adequate financial, legal,

[1] Watercourse - (1) A natural or artificial channel for passage of water. (2) A running stream of water. (3) A natural stream fed from permanent or natural sources, including rivers, creeks, runs, and rivulets. There must be a stream, usually flowing in a particular direction (though it need not flow continuously) in a definite channel, having a bed or banks and usually discharging into some stream or body of water.

[2] Reservoir-A pond, lake, tank, basin, or other space either natural or created in whole or in part by the building of engineering structures, which is used for storage, regulation, and control of water, recreation, power, flood control, or drinking.

and institutional resources to assume responsibility for waste discharges may be acceptable.)

3. Dual disposal systems are installed (200 percent of total of original calculated disposal area).

4. An expansion area is included for replacement of the original system (300 percent total).

5. Community systems provide duplicate individual equipment components for components subject to failure.

6. Discharge does not exceed 40 grams per day of total nitrogen, on the average, per 1/2 acre of total development overlying ground water recharge areas excepting where a local governing jurisdiction has adopted a Wastewater Management Plan subsequently approved by the Regional Board.

In order to achieve water quality objectives, protect present and future beneficial water uses, protect public health, and prevent nuisance, discharges are prohibited in the following areas:

1.

a. Discharges from individual sewage disposal systems are prohibited in portions of the community of Nipomo, San Luis Obispo County, which are particularly described in Appendix A-21.

b. Discharges from individual sewage disposal systems are prohibited for systems proposed to be less than one (1) acre in portions of the community of Nipomo, San Luis Obispo County, which is particularly described in Appendix A-22.

2. Discharges from individual sewage disposal systems within the San Lorenzo Valley north of Henry Cowell State Park shall be managed as follows:

a. Discharges within five major communities are prohibited where the affected area (Class I Area) is defined by the Santa Cruz County Assessor's Parcel Numbers as described in Appendix A-23.

b. To preclude prohibition of discharges outside the Class I Area, the County of Santa Cruz shall act as lead agency in coordinating and establishing a program that will assure the Regional Board that:

° additional systems in these areas will be designed, sized, located, spaced, and constructed in a manner that will protect water quality, protect beneficial uses of water, and prevent nuisance, pollution, and contamination.

° existing systems within specific communities are systematically evaluated and redesigned, resized, relocated, and reconstructed as appropriate to protect and enhance water quality, protect and restore beneficial uses of water, and abate and prevent nuisance, pollution and contamination, where the specific communities (Class II Area) are defined by the Santa Cruz County Assessor's Parcel Numbers as described in Appendix A-24.

° systems within the Class II Area are regularly inspected and maintained in a manner that will protect water quality, protect beneficial uses of water, and prevent nuisance, pollution, and contamination.

3. Discharges from individual and community sewage disposal systems are prohibited effective November 1, 1988, in the Los Osos/Baywood Park area depicted in the Prohibition Boundary Map included as Attachment "A" of Resolution No. 83-13 which can be found in Appendix A-25.

Subsurface Disposal Exemptions

The Board or Executive Officer may grant exemption to prohibitions for: 1) engineered new on-site disposal systems for sites unsuitable for standard systems; and 2) new or existing on-site systems within the specific prohibition areas cited above. Such exemptions may be granted only after presentation by the discharger of sufficient justification, including geologic and hydrologic evidence that the continued operation of such system(s) in a particular area will not individually or collectively, directly or indirectly, result in pollution or nuisance, or affect water quality adversely.

Individual, alternative, and community systems shall not be approved for any area where it appears that the total discharge of leachate to the geological system, under fully developed conditions, will cause: 1) damage to public or private property; 2) ground or surface water degradation; 3) nuisance condition; or, 4) a public health hazard. Interim use of septic tank systems may be permitted where alternate parcels are held in reserve until sewer systems are available.

Requests for exemptions will not be considered until the local entity has reviewed the system and submitted the proposal for Regional Board review. Dischargers requesting exemptions must submit a Report of Waste Discharge. Exemptions will be subject to filing fees as established by the State Water Code.

Engineered systems shall be designed only by registered engineers competent in sanitary engineering. Engineers should be responsible for proper system operation. Engineers should be responsible for educating system users of proper operation and maintenance. Maintenance schedules should be established. Engineered systems should be inspected by designer during installation to insure conformance with approved plans.

Some engineered systems may be considered experimental by the Regional Board. Experimental systems will be handled with caution. A trial period of at least one year should be established whereby proper system operation must be demonstrated. Under such an approach, experimental systems are granted a one year conditional approval.

Further information concerning individual, alternative, or community on-site sewage disposal systems can be found in Chapter 5 in the Management Principals and Control Actions sections.

State Water Resources Control Board Plans and Policies, Discharge Prohibitions, and Regional Board Policies may also apply depending on individual circumstances.

LAND DISTURBANCE ACTIVITIES

Construction, mining, and other soil disturbance activities which may disturb or expose soil or otherwise increase susceptibility of land areas to erosion are difficult to regulate effectively. Construction or timber harvesting may often begin and end with no obvious impairment of stream quality; however, erosion or land slides the following winter may be directly related to earlier land disturbance or tree cutting. Mining and quarrying activities are generally longer in duration.

Under contract with the Regional Board, the California Association of Resource Conservation Districts completed a study entitled, "Erosion and Sediment in California Central Coast Watersheds - A study of Best Management Practices" (Erosion Study), dated June, 1979. This Erosion Study, funded under Section 208 of the Clean Water Act, assesses impacts of erosion and sedimentation on water quality and beneficial uses in non-designated planning areas (San Benito, San Luis Obispo, and Santa Barbara Counties) of the Central Coast Region. This Erosion Study and supporting documents have been used by the Regional Board in developing erosion and sedimentation control policy.

Nonpoint source pollution in the remainder of the Region is addressed by designated planning agencies through their respective Areawide Waste Treatment Management Plans. Designated agencies and the areas affected within this Region include: Association of Bay Area Governments (portions of San Mateo and Santa Clara Counties), Association of Monterey Bay Area Governments (Santa Cruz and Monterey Counties), and Ventura County Board of Supervisors (portion of Ventura County). The policy herein described is compatible with those plans and is within the scope of the Regional Board authority.

The Erosion Study and Areawide Waste Treatment Management Plans identify examples of accelerated erosion resulting from insufficient land management of soil cultivation, grazing, silvaculture, construction, and off-road vehicle activities, as well as wildfires.

Adverse impacts of sediment are identified, in part, as: impairment of water supplies and ground water recharge, siltation of streams and reservoirs, impairment of navigable waters, loss of fish and wildlife habitat, degradation of recreational waters, transport of pathogens and toxic substances, increased flooding, increased soil loss, and increased costs associated with maintenance and operation of water storage and transport facilities. Recommendations based on conclusions of the Erosion Study and practices recommended in Areawide Waste Treatment Management Plans are a means to reduce unnecessary soil

APPENDIX E - DESCRIPTION OF WASTEWATER DISPOSAL METHODS

This section describes the various methodologies of wastewater disposal which will be utilized under the Wastewater Management Plan. The large majority of properties will utilize various types of individual onsite disposal: standard conventional systems, nonconforming systems, alternative systems, and haulaway systems. The Plan also provides for the development of different types of community disposal facilities where needed. The different methods of wastewater disposal are discussed in the following sections. The costs and applicability of different types of systems are summarized in Table 3 of the Plan. Specific requirements and specifications for the individual conventional and alternative systems are presented in the repair standards (Appendix C).

Standard Conventional Systems

Conventional methods of wastewater disposal system repair utilize a septic tank and leachfield. The size of the leachfield and the conditions under which it can be installed are determined by the repair standards. If all requirements can be met, the system is considered a standard conventional system. If all requirements <u>except size requirements</u> can be met, the system can be installed as a nonconforming system, which requires use of water conservation measures and/or a separate greywater disposal system to reduce loading on the primary leachfield. If the other repair requirements for a conventional system cannot be met, county staff will require alternative technologies, conversion to haulaway system, or eventual hookup to a community system.

A conventional system may also include the use of a grinder pump or effluent pump to pump sewage to a more suitable area of the property that cannot be reached by gravity flow. This is commonly used in a repair where the old system was located too close to a stream or in a low lying area subject to high groundwater. Use of a pump-up system requires use of a 1000 gallon backup storage capacity which can be used in the event of a pump failure or power failure. Generally, if a pump is required, the leachfield is installed as a pressure distribution system to provide enhanced effluent distribution. All systems with pumps are subject to more frequent followup inspections (1-3 years, see Table 5).

Prior to development of the Management Plan, conventional systems have been installed quite deep (8-12 feet) in Santa Cruz County. It is now recognized that effluent treatment is limited at such depths, and that disposal capacity can be significantly reduced due to high seasonal groundwater. New requirements implemented in 1992 require the use of shallower systems (4 feet in sandy soils; 6.5 feet in other soils; or more shallow if needed to provide separation from groundwater). It is also expected that shallow systems will reduce nitrogen discharge by approximately 20% (SCCHSA, 1995).

Findings to date indicate that there is a good potential for substantial improvement in wastewater disposal utilizing conventional systems in the Watershed. The majority of existing systems are significantly below the current repair standards, and a large majority can be upgraded to meet those requirements. Based on the information cited in the Preliminary Report (SCCHSA, 1989) and in Appendix H, approximately 90% of the properties in the Watershed can be served by conventional septic systems which either fully meet the requirements for a standard system (70%), or meet the requirements for a nonconforming system status (15-25%).

At current inspection and repair rates, approximately 2-4% of the properties each year will have such a replacement system installed, and that system will be expected to last an average of at least 20 years, with adequate maintenance. During the initial 5-10 years of the current management program, there has been a higher rate of system upgrades, as the worst systems are identified through the survey process and people voluntarily upgrade their systems. The cost for installation of a conventional system meeting the repair requirements for a standard system presently is about $4500. The cost may increase to $5000-7000 if there are difficulties such as slope, trees, embankments, etc. If there is inadequate room on the site, there may be an additional cost of $200 for water conservation devices to reduce the volume of wastewater for compliance with the repair standards for an undersized (nonconforming) system. Operating costs are about $250 every 3-7 years for pumping of the tank.

Nonconforming Systems

There are two types of nonconforming systems: Category C, Limited Expansion Systems, and Category D, Low-Flow Systems. These are conventional systems which meets all the requirements for a standard system except for the following:

- the system has only 50-99% of the required leachfield area (Category D),
- less than 100% of the required reserve expansion area is available (Category C),
- the system has a reduced groundwater separation of 1-3 feet below the leachfield (allowed only at distances greater than 250 feet from a stream, well, or waterbody) (Category C), or
- the system is a pump up system with less than the required 1000 gallons capacity in the pump chamber (Category D).

Use of a nonconforming system requires the use of water conservation measures and annual monitoring for systems with reduced size to ensure adequate performance. (Monitoring is waived for Category C systems if they have no history of problems.) Major remodels or expansion of use are not allowed. With these conditions, it is expected that nonconforming systems provide an acceptable level of wastewater disposal and represent a major improvement over existing substandard systems.

Greywater Systems

Greywater consists of any wastewater not originating from the toilet. Although it can still present a significant health hazard, it contains substantially fewer pathogens, solids, and nutrients than blackwater. The large volume of loading from greywater sources such as the washing machine can present a substantial load on an undersized septic system. Although County policy recommends connection of all greywater to an adequately sized septic system, a separate greywater disposal system can be used under the following circumstances:

- The plumbing is laid out in a way that makes connection to the septic system difficult.
- The existing leachfield is in good condition and can handle most of the sewage flow, but some additional disposal area is needed.
- The existing disposal system may be marginal, but is not failing, and an illegal greywater bypass is discovered.

A permit must be obtained for the installation of a greywater system. The requirements for greywater disposal systems are specified in the repair standards. The minimum system allowed is a 96 cubic foot rock filled sump for the clotheswasher. A typical installation is shown in Figure E-1. If additional fixtures are hooked up the size is determined based on projected loading. Separate disposal of greywater from the kitchen sink drains is discouraged due to the high solid and grease content. If separate disposal is to be used for wastewater from the kitchen sink, the greywater must first pass through a small septic tank.

The reuse of greywater for irrigation is discouraged, although requests to allow such use are becoming more frequent during dry years. The State has also recently adopted regulations to allow greywater irrigation. Such reuse is allowable if there is no storage of greywater, all discharge is made subsurface to non-food plants, and there is no permanent modification of the plumbing. Greywater reuse systems require prior approval and issuance of a repair permit by the County.

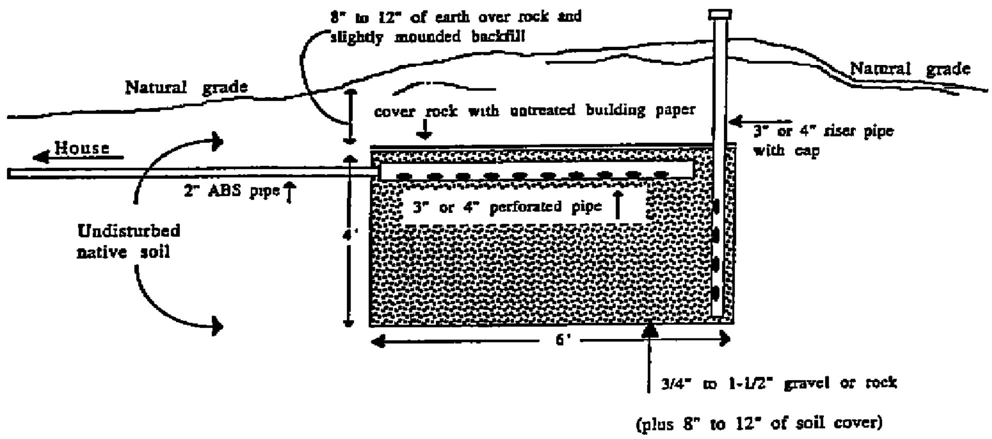
Alternative Systems

For properties which cannot adequately meet the requirements for a standard onsite repair, one option for continued onsite disposal is the use of alternative systems which provide for enhanced treatment or improved disposal of the wastewater. Alternative systems may also allow a bedroom addition or expansion of use which would not otherwise be allowed with a nonconforming or haulaway system. It is expected that 5-10% of the repairs will utilize alternative systems. The use of alternative systems results in greater initial cost, higher annual costs, longer system life, and significantly reduced nitrate and pathogen discharge.

The primary types of systems utilized in Santa Cruz County are mounded bed systems, pressure distribution (p.d.) systems, and sand filters. Mound systems, sand filters, and some p.d. systems utilize periodic, uniform dosing of a sand bed with effluent from a conventional septic tank. Dosing allows the effluent to be spread evenly and dispersed throughout the sand filter media. It also allows oxygen to enter the filter area between dosing, providing for aerobic treatment of the effluent, which is much more efficient than the saturated anaerobic treatment that takes place in a conventional leachfield.

Figure E-1: Typical Greywater Sump (Santa Cruz County)

Sized for approximately two loads of wash per day (the minimum size allowed)



TYPICAL SUMP

Maximum bed depth	=	4'
width	=	4'
length	=	6'

TOTAL CUBIC FEET = 96
(which is equal to 104 square feet of sidewall area and bottom of trench)

Figure E-2: Mounded Bed System (from Balance Hydrologics, 1991)

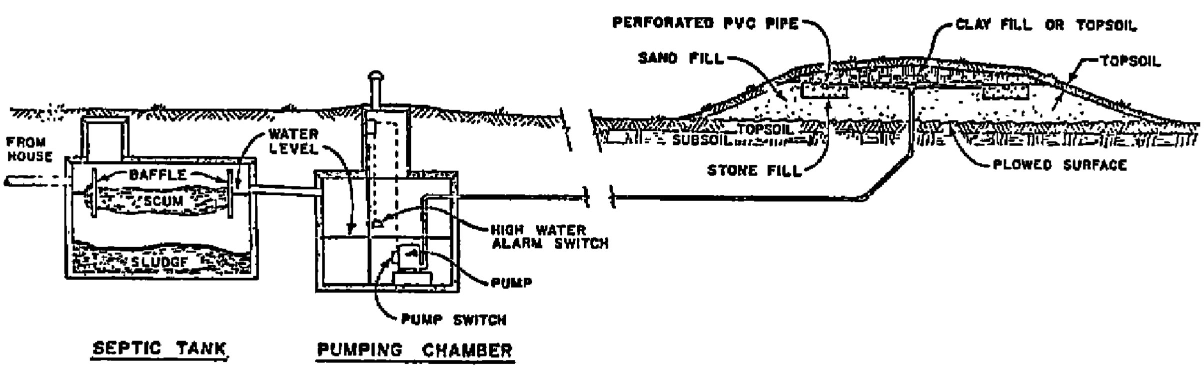


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Figure E-3: Pressure Distribution System (from Larry Walker and Associates, 1984)

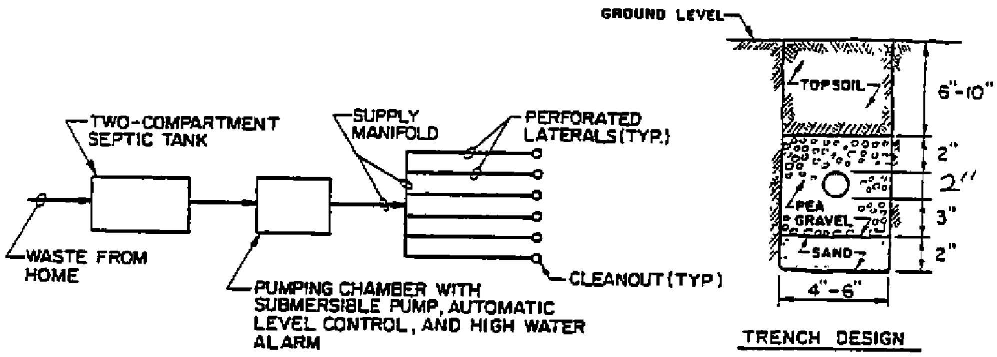
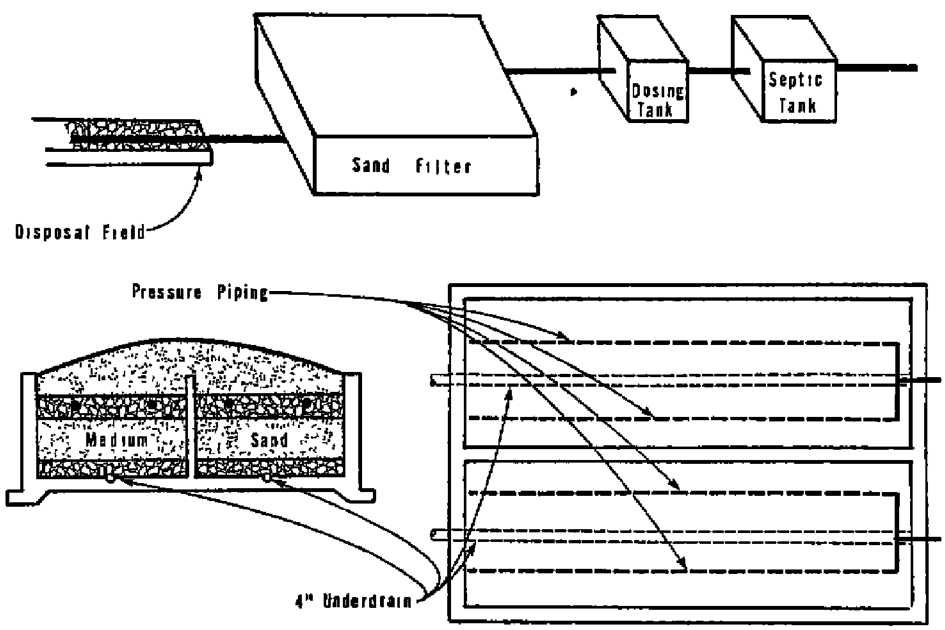


Figure E-4: Intermittent Sand Filter (from ODEQ, 1982)



Dosing and aerobic treatment significantly treats effluent before it is discharged to the soil. Measurements of effluent quality from a number of intermittent sand filter installations has shown an average 10,000-fold decrease in bacteria, 98% reduction of BOD and solids, 40% reduction in total nitrogen, and conversion of 98% of the ammonia to nitrate (ODEQ, 1982). Similar treatment has been reported for mounds (ODEQ, 1982) and might also be expected for pressure distribution systems when used with a sand filled trench.

Effluent treated by a sand filter percolates into soil at rates at least double those of untreated septic effluent (ODEQ, 1982). The higher percolation rates occur because the lower levels of solids, BOD, and bacteria reduces the formation of the biological mat at the soil interface which typically occurs with untreated septic effluent. All of these alternative methods also facilitate more thorough treatment in the soil through shallow, dispersed disposal of the effluent in the upper, biologically active soil zone.

The nitrate which is formed by aerobic treatment in these systems is susceptible to removal through denitrification wherever the downward percolating effluent experiences even transient saturated anaerobic conditions, such as at the bottom of the sand filter, the natural soil interface, or soil horizons with lower permeabilities. Although different researchers have found levels of nitrogen removal varying from 15-75%, a number of studies have cited consistent (40-50%) nitrogen removal from sand filters and dosed systems (ODEQ, 1982; SCCHSA, 1989; Balance Hydrologics, 1991; EPA, 1991). Recent work with recirculating sand and gravel filters has indicated nitrogen removal up to 90%.

Because of their improved level of effluent treatment prior to disposal, these technologies are well suited to situations where standard system requirements cannot be met for groundwater separation, stream setback, soil permeability, soil depth over an impermeable layer, or size of disposal device.

Mounded bed systems are particularly appropriate in areas of high groundwater and gentle slope (less than 12%) (Figure E-2). Mounds elevate the point of effluent discharge to several feet above the ground surface and provide for improved treatment through dosing, aerobic treatment, and filtration through unsaturated material prior to the effluent reaching the groundwater.

Pressure distribution systems are appropriate for disposal on steeper slopes with shallow soil or poor soils (Figure E-3). They provide for more effective effluent distribution through dosing of effluent to shallow disposal trenches. If the trenches are filled mostly with sand under pea gravel, the effluent dosing should provide enhanced treatment as well. In this case trench area may be able to be reduced by as much as 50%, but adequate trench length must be provided to prevent clogging of the sand (using an application rate of 1.2 gpd/sf of sand area). All new or upgraded systems which must utilize a pump to send the effluent to a higher elevation could utilize pressure distribution trenches to provide for improved treatment at little extra cost.

Intermittent Sand filters can be used in many circumstances where a higher quality effluent is needed prior to disposal, such as areas with close proximity to a creek, high groundwater, sandy soils, or clay soils (Figure

E-4). The use of a sand filter also reduces the solids content of the effluent, and can allow use of a conventional leachfield that is 50% of the standard size.

The cost for installation of a mounded bed or pressure distribution system for a repair presently ranges from about $7,500 to $20,000, depending on the circumstances of the site. There is also a higher operating cost for pump maintenance, monitoring, and payment of the annual operating permit fee. The longevity of these alternatives would be expected to be greater than a conventional system due to reduced clogging of the leaching device. Sand filters are currently estimated to cost $5500 in addition to the cost of the disposal system, and have similar operating costs to a mound system. County staff are working on developing a more generic sand filter design that could be installed for a much reduced cost.

Currently in Santa Cruz County, approximately 60 alternative systems have been installed: 25 mounds, 30 pressure distribution systems, and 5 sand filters. Approximately 75% of these systems are located in the San Lorenzo Watershed.

Other alternative technologies are not used to any degree in Santa Cruz County, and their use here would be considered on an case by case basis: engineered fill to mitigate high soil permeability, evapotranspiration/ absorbtion systems, and self-contained treatment units. Other types of alternative onsite systems may be considered in the future for use in the San Lorenzo Watershed. The County is currently conducting a nitrate management study to evaluate the impacts of nitrate release from existing septic systems and evaluate methods for reduction of nitrogen release. This study may result in recommendations to provide for better nitrate removal, particularly in highly permeable sandy soils.

County code requires alternative systems be designed by a registered specialist, who also must supervise their installation. A specialized county staffperson reviews and supervises all alternative system applications. Use of an alternative system also requires that the property owner participate in the nonstandard system program, with an annual fee and special provisions governing maintenance and monitoring of system performance.

Haulaway Systems

Haulaway systems have been used on properties where onsite wastewater disposal cannot take place in conformance with requirements for either conventional disposal or use of alternative technologies. Haulaway systems may involve the haulaway of all wastewater or just the toilet waste (with greywater disposed onsite). Haulaway may be required on a year round basis or just in the winter months when groundwater levels are too high for onsite disposal. Initial capital costs may amount to as much as $3500 for installation of a watertight tank and alarm system. At about $250 per pumping, year round haulaway of all effluent costs about $5400 per year. Winter haulaway would be about $1650 per year. Blackwater only haulaway may cost as little as $500 per year if 0.5 gallon flush toilets are used. Use of a haulaway system requires compliance with operating permit/nonstandard system provisions and payment of an annual charge for inspection.

Haulaway may be used on an interim basis until another method of disposal can be provided, or it may be used on a permanent basis if there is no other feasible alternative. It may particularly be used on isolated substandard lots where connection to an offsite disposal system may not be technically or economically feasible. Currently, about 20 systems in the Boulder Creek area are on permanent full time haulaway, and about 5-10 scattered systems are on winter haulaway. Use of winter haulaway is expected to increase in the future as more problem systems are identified. Where there are concentrations of haulaway systems, such as Boulder Creek, the Management Plan provides for development of offsite community disposal systems, if cost-effective.

The use of a haulaway system presents a significant financial burden on the affected property owner, but allows them continued use of their property. With a haulaway system, there is increased potential for discharge of effluent resulting from inadequate pumping. Effective use of haulaway systems is dependent on adequate monitoring by the property owner and County staff.

Ongoing Maintenance

The adequacy of any type of onsite disposal is dependent on an adequate level of system monitoring and maintenance. This is particularly needed in an area such as the San Lorenzo Watershed where systems are older, and operating under various potential technical constraints. Basic maintenance efforts which should be performed by the property owner include the following:

1. Monitoring the performance of the systems by observing effluent levels in leachfield risers or noticing sluggish drains.
2. Regulating water usage and loading as needed to prevent overloading the system.
3. Having the tank pumped regularly to remove solids every three to seven years as necessary.
4. Switching the diversion valve to alternate leachfields where a dual system is present.
5. Protecting the leachfield area from disturbance or inundation from irrigation or runoff.
6. Pumping the tank to prevent discharge of effluent in the event of system failure.
7. Repairing or upgrading the system promptly when it begins to show signs of failure.
8. Maintenance of drain lines, pumps, and electrical connections if present.

Although many property owners in the Valley have demonstrated their ability to properly take care of their septic system, experience to date has also shown that a significant number of systems are not adequately maintained. A key component of the Management Plan is the promotion of septic system maintenance by monitoring known marginal systems, inspecting regularly for system failures, monitoring pumping and inspection records, and promoting more property owner maintenance through education and direct contacts.

Offsite Disposal

In areas where conditions unsuitable to onsite repair are widespread, the County will evaluate the potential for community offsite disposal systems and develop such facilities where appropriate. Offsite disposal may utilize conventional or alternative systems to dispose of effluent from one or more parcels in nearby areas where soil conditions are suitable for disposal. Offsite disposal facilities may also utilize specialized treatment processes to improve the quality of the effluent prior to disposal. Such "package treatment" systems may be needed to reduce nitrogen release, reduce solids, and/or otherwise alter the quality of the effluent to facilitate soil absorbtion, maximize use of disposal areas, and prevent water quality impacts.

Although sewage may be collected in conventional sewage collection systems, it is more likely that septic tank effluent pumping system will be used. These rely on the continued use of watertight septic tanks to serve individual or small groups of homes and businesses. The treated septic tank effluent is then transported by pumping or gravity flow through small diameter collection lines that are less expensive to install and are more suited to the San Lorenzo Valley's uneven topography. Adequate storage capacity is built into the system to allow several days storage of effluent in the event of a power failure.

Regardless of the method of treatment, the critical factor for community disposal will be to find land disposal areas with low slope, adequate soils, adequate groundwater separation, and large enough size to absorb the quantity of effluent produced by the community. The systems will need to meet Basin Plan standards for community systems, although it is expected that alternative technologies may be the most appropriate. Small sites may be suitable for cluster systems, with disposal of effluent from 2-5 parcels, whereas larger, community sites, would have adequate capacity for disposal of effluent from entire communities. The potential to connect parcels to a community system may be limited in some areas by the availability and proximity of suitable disposal areas and cost of constructing and operating the community system.

Potential cluster and community disposal sites were investigated as a part of the Class II investigations. Although not as many suitable sites were found as was anticipated, there were generally at least several sites found for each community. More sites may become available with the use of alternative technologies, such as mounded bed systems. Preliminary County work has also identified a number of potential sites in Class I areas.

As a part of the Management Plan the County is taking steps to evaluate the feasibility, estimate the cost, and pursue the development of community disposal systems in areas where appropriate. Community disposal facilities may also be used to support limited new development that is needed for redevelopment and revitalization of downtown commercial areas. However, except for such "community uses", it is not anticipated that disposal facilities would be available to serve existing vacant lots that do not meet requirements for new onsite disposal systems. Due to limited disposal capacity, service to existing problem areas will be given the highest priority.

Based on tabulation of site constraints, it has been estimated that community disposal facilities could be appropriate for 5-16% of the developed properties in the San Lorenzo Valley (200 to 800 parcels). The County has conducted engineering feasibility studies of community disposal alternatives for downtown Boulder Creek, Glen Arbor, Brook Lomond, part of Ben Lomond, and part of Felton. Capital cost estimates for these projects are $19,700-$27,400 per parcel. Although the community facilities are technically feasible, it appears that their overall feasibility is limited due to high cost, moderate incremental benefits, and difficulty in utilizing some of proposed disposal areas. The results of the feasibility studies are discussed more fully in Appendix H.

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Appendix F - Complaint Investigation and Enforcement Procedures

POLICY MEMORANDUM

DATE: March 9, 1992

TO: Staff, Environmental Health Service

FROM: Diane Evans, Director of Environmental Health

SUBJECT: **Complaint Procedure, Tracking and Enforcement for Wastewater and Water Quality Complaints**

REFERENCE:

California Health and Safety Code Section 5411, Policy Memoranda Administration- 1, 6, 23 and 24.

CANCELLATION:

This Policy Memorandum supercedes Administration-6 for wastewater and water quality complaints only. Sewage 26 is hereby canceled. All other complaints shall continue to follow the procedures in Administration-6.

PURPOSE:

The purpose of this Policy Memorandum is to establish a distinct procedure for processing, investigating, tracking and enforcing violations of State Health and Safety Code Section 5411 (improper wastewater disposal).

PROCEDURE:

Complaints for the purposes of this Policy Memorandum shall include any reports of surfacing sewage (greywater and/or blackwater) and/or structural problems such as open septic tanks or broken pipes. Complaints shall include all of those reports alleging a violation of State Health and Safety Code Section 5411 made by the public or any member of the Environmental Health staff including District Environmental Health Specialists, Wastewater Disposal Technicians and Environmental Health Aides and, shall be handled in the same uniform fashion described in the procedures below. A flow chart depicting the following process is attached (attachment #1).

FORMS

Complaints received from the public by clerical or professional staff shall be recorded on the Wastewater Disposal Complaint Investigation forms (HSA-59, attachment #2). Any violations observed in the field by Staff shall also be recorded on that same form. For the Land Use Team, the completed forms shall be given to the Land Use Team Program Manager who assigns the complaint to the appropriate staff person, initials the form and forwards the form to the Land Use Clerk for entry into the computerized Septic System Database. The Land Use Clerk shall assign a number (e.g. X92-001) to each complaint and keep a copy in a cumulative 3 ring binder. All complaints are to be entered into the system; even those that prove to be unfounded, or those that can be quickly resolved. When more than one complaint is received for a specific alleged incident, all of the forms shall be stapled together and the notes made on the first form. When there are multiple complaints, it is still very important that all complainants are notified of the progress made to resolve the complaint. Notes regarding contact with each complainant shall be made on each separate form as appropriate.

The Wastewater Management Team members shall enter the violations into the computer using the parcel number within one week of discovery of the problem so that the Wastewater Management Team Program Manager may track progress of resolving these violations.

TRACKING

The Land Use Clerk shall enter the complaint in the mainframe computer Land Use Information System, note which staff member is responsible, enter the status of the complaint as P for pending, note on the form that the complaint has been entered in the computer and then put the form on the desk of the appropriate person. Wastewater Management staff will arrange for a monthly report of all unresolved complaints, by staff member. The report will automatically be prepared monthly by County Information Services and given to the Land Use and Wastewater Management Program Managers who will review the outstanding complaints with the appropriate staff member. An annual report summarizing all of the complaints for each calendar year will be prepared by the Wastewater Management Program.

INVESTIGATION AND ENFORCEMENT-LAND USE TEAM

Complaints given to Land Use team members shall begin with a field verification of the alleged failure within three working days of receipt of the complaint. The staff Specialist may wish to contact the complainant prior to the site visit to obtain clear directions to the site of the surfacing effluent. Each site visit and each phone conversation regarding the complaint shall be summarized and initialed on the complaint form (add extra PHD 28 pages as needed). The exception to this shall occur when a complaint is referred to the Land Use Team from the Wastewater Management Team for enforcement. In this event, wastewater management staff will have observed the violation and Letter No. 1 may be sent immediately as per the procedure described below.

1. SITE VISIT - NO VIOLATION FOUND: At the time of the site visit, the staff Specialist shall record field observations as they exist and perform a Nessler's reagent test on any effluent observed and record the results. When no violation can be confirmed, note the circumstances on the complaint form and contact the complainant, relay the facts and summarize the conversation on the complaint form and note that the matter is resolved). The staff Specialist shall make a total of two

visits to the site if the discharge is intermittent in an attempt to observe the failure prior to bringing closure to the complaint. The completed complaint form is then given to the Land Use Program Manager who initials the complaint as resolved and forwards the form to the Land Use Clerk. The clerk then makes a log entry that the complaint is resolved and files the complaint form under the Parcel APN.

2. SITE VISIT - VIOLATION FOUND: When a violation of Section 5411 is confirmed, notes shall be made describing the problem and an attempt shall be made to discuss the issue with anyone on the premises at the time of the visit. The complaint form asks that the violation type be identified by circling "F" for System Failure (blackwater) or "W" for greywater only. Next to that on the form, the potential for health hazard is identified by circling "H" for High Hazard or "L" for low hazard. Upon returning to the office the next business day, the complainant shall be contacted and advised that the problem has been confirmed and the enforcement procedure shall be described. That will be the extent of contact with the complainant unless the complainant desires further information. This conversation shall be summarized on the complaint form. If the surfacing effluent is located in an area that creates an immediate health hazard to the public ("H"), attempts shall be made to telephone the owner of the property to have the septic tank pumped until the repair can be made.

3. FIRST LETTER: In all cases, the first enforcement letter (attachment #3) shall be sent within three business days of discovery of the violation giving fifteen (15) days (for "L") to begin corrective action or three (3) days (for "H") if an immediate health hazard exists. All enforcement letters will be sent both Certified Mail, return receipt requested, and Proof of Service mail. Staff shall not wait for return receipt cards as many people refuse certified mail. Staff shall be responsible for timely tracking of waiting periods through use of the tickler file or by noting the response due date on calendars, etc. During the enforcement process, staff shall retain the complaint form in a clearly labelled desk file of working complaints so that conversations pertaining to the issue and enforcement events can be summarized on the form as they occur and, so that backup staff, clerical staff or supervisors may readily find and refer to that file in their absence. Backup staff shall enter any activity on the complaint forms on behalf of the absent staff member.

4. SECOND LETTER: If no response to the first letter is received within 15 days (or 3 days for "H") of the mailing of the first enforcement letter, a site visit shall be made forthwith to verify that the violation still exists. The results of the visit shall be summarized on the form and if the violation still exists, **the second enforcement letter** (attachment #4) giving fifteen (15) days (or three days for "H") to respond **shall be sent together with a billing for a violation**

reinspection fee. This will be coordinated with the Accounts Clerk (see Policy Memo Admin. 24 for detailed process). When the Land Use Clerk completes the second letter, the violation will be entered into the Planning Dept. parcel database. This will have the effect of preventing acceptance of any new applications by the Planning Dept. until the problem is resolved.

5. ADMINISTRATIVE HEARING: If there is no response and/or timely progress is still not made, another site visit will be made and the violation verified again. If the problem still exists, the matter will be discussed with the Program Manager and an Administrative Hearing will be scheduled with the Director and a notice of Administrative Hearing together with another violation reinspection fee shall be mailed. The hearing will be conducted in accord with the provisions of Policy Memorandum Administration 1.

6. RESOLUTION: If at any time during the enforcement process the problem is resolved, staff shall so note in the activity section of the complaint form. For entry into the computer record, the complaint form asks for brief descriptions of the problem found and how it was resolved at the bottom of the form. When complete, give the form to the Land Use Program Manager. The Program Manager will enter the appropriate status (RN for resolved no permit needed, RP for resolved with permit or RX for resolved no problem found) and give the form to the Land Use clerk. The Land Use clerk shall then enter the complaint as resolved in the computer, update any other information and file the complaint form in the APN file.

7. NOTIFICATION OF COMPLAINANT: When the complaint is resolved, the complainant(s) shall be contacted and informed of the disposition of the investigation. If the complainant has been contacted previously as described in 1 and 2 above then no further contact is required unless specifically requested by the complainant.

8. RECHECKS: If a complaint is resolved but staff questions future system function for a variety of reasons (such as system function during wet weather, intermittent failure or potential future disconnecting of greywater discharge), a recheck reminder system is available by circling the appropriate item on the complaint form. The form has a question "IS RECHECK NEEDED?" with two options of "ONCE" or "WINTER." If a one time recheck is desired, circle "ONCE" on the form and specify the month number after resolution for recheck in the space allotted. If a recheck during wet weather is desired, then circle "WINTER" and during a wet weather period, the Wastewater Management Team will request from Information Services, a report for all systems requiring winter recheck.

INVESTIGATION AND ENFORCEMENT-WASTEWATER MANAGEMENT TEAM

Wastewater Management team members performing neighborhood surveys shall record violations on form HSA-59 and follow the same procedure outlined above for tracking. All blackwater failures shall immediately be referred to the Land use team for enforcement as described above. Any greywater failures shall be pursued for correction by Wastewater Management team personnel for a period of two to eight weeks depending on degree of threat to public health and/or proximity to a water course.

When a letter is to be sent by Wastewater Management Team members to call the owner's attention to a problem, the Wastewater Management program letter shall be used (attachment #5). When Wastewater Management team members' efforts have not been successful in resolving a problem in a reasonable amount of time, the complaint form will be given to the Wastewater Management Program Manager with the notation that the problem is to be referred to the Land Use team for enforcement. The complaint is then given to the Land Use team Program Manager who designates the appropriate Land Use team member and then gives the form to the Land Use team clerk who changes the responsible staff member in the log and puts the complaint on the desk of the appropriate person.

The recheck system described above may be used by Wastewater Management Team members but all computer data entry shall be done directly by those individuals.

TRANSFER OF COMPLAINTS TO OTHER STAFF

If at any time a complaint is transferred to another staff person, the person currently responsible for the complaint makes a notation on the form that the complaint is to be transferred and then gives the form to the appropriate Program Manager who initials the form and then gives it to the Land Use clerk so that the name of the new responsible person can be entered into the computer.

IMPLEMENTATION:

This Policy shall be observed by all staff when receiving, investigating and enforcing complaints.

EFFECTIVE DATE:

This Policy is effective immediately and shall remain in effect until cancelled or superceded.

Diane Evans

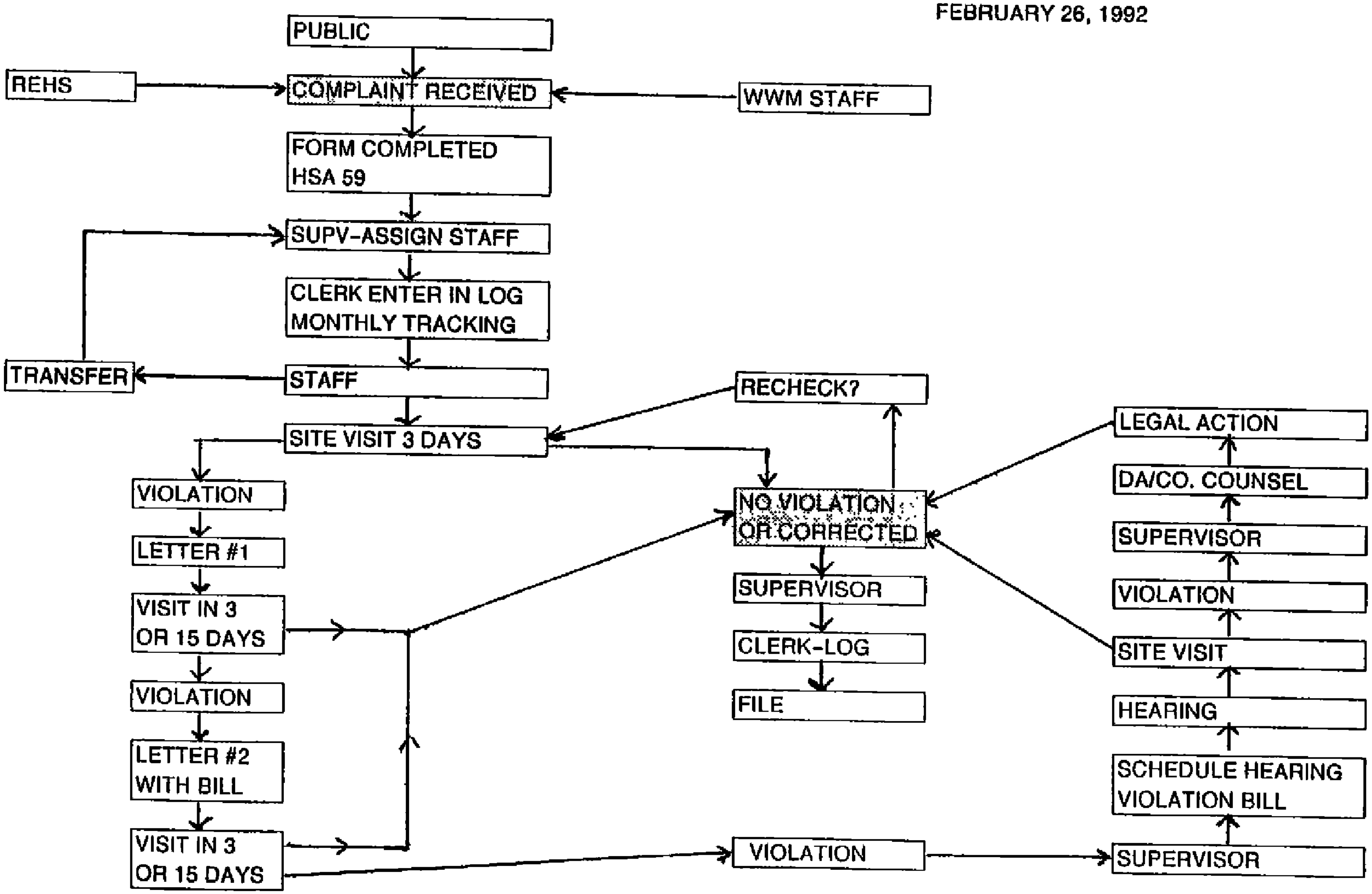
DIANE L. EVANS, R.E.H.S.
Director of Environmental Health

Attachments: Flow Chart, Wastewater Disposal Complaint Investigation Form (HSA-59), Land Use Team Enforcement Letters 1 and 2 (EHS-146 and EHS-177), Wastewater Management Team Enforcement Letter (EHS-178)

ATTACHMENT #1

WASTEWATER COMPLAINT AND ENFORCEMENT PROCESS

FEBRUARY 26, 1992



ATTACHMENT #2

COUNTY OF SANTA CRUZ
ENVIRONMENTAL HEALTH SERVICE
WASTEWATER DISPOSAL COMPLAINT INVESTIGATION

NO.: X____________

STATUS:____________

N:______________________ DATE:__________________ STAFF INVESTIGATOR:____________

DATE RESOLVED:______________ IS RECHECK NEEDED?: ONCE (# MONTHS AFTER_______) OR WINTER

VIOLATION TYPE: F G HAZARD: H L DATE COMPLAINANT CONTACTED:________________

COMPLAINANT:________________ PHONE:____________ ADDRESS:________________________

ADDRESS/LOCATION OF PROBLEM:____

DESCRIPTION OF PROBLEM____

____

____

OWNER:____ PHONE:______________

ADDRESS:____

DATE	ACTIVITY	
		SKETCH OF SYSTEM
·MMARIZE PROBLEM FOUND:		
SUMMARIZE HOW RESOLVED:		

HSA-59 2/92

ATTACHMENT #3

LAND USE PROGRAM

HEALTH SERVICES AGENCY

COUNTY OF SANTA CRUZ

ENVIRONMENTAL HEALTH SERVICE
701 OCEAN STREET, ROOM 312
SANTA CRUZ, CALIFORNIA 95060
(408) 425-2341

CERTIFIED MAIL - RETURN RECEIPT REQUESTED
PROOF OF SERVICE BY MAIL

Date ________________

____

____

____

RE: **Notice To Repair Septic Tank System Assessor's Parcel Number** ____________________

Dear ________________:

An inspection of your property located at ______________________________, Assessor's Parcel Number ______________,on ______________, revealed the following conditions:

____

These conditions constitute a violation of the California Health and Safety Code, Section 5411, and must be corrected.

You are directed to take the following steps within ___ days of the receipt of this letter:

____

We are interested in working with you to ensure that actions will result in a long-term solution that is acceptable and beneficial to both yourself and the County. Please contact our office prior to taking any action to repair or replace any portion of your septic tank system including construction of greywater sumps. For significant work, you will need to submit design plans and apply for a repair permit. Some additional site investigation may be needed to confirm the suitability of the repair. It is important that you and your consultant or contractor consult with us and fully understand the work that is needed prior to finalizing a design or establishing a price for the work.

Should the necessary work not be done, this Department may institute summary abatement procedures and will refer the matter to the District Attorney for appropriate legal action. **By Resolution of the board of Supervisors, a violation reinspection fee will be assessed if reinspection on or after the compliance date noted above reveals that the violation has not been corrected.**

Please contact me as soon as possible at (408) 425-____ between 8:00 and 9:30 a.m., Monday (Tues)through Friday (Thurs). We want to assist you in promptly achieving a satisfactory solution to this problem.

Very truly yours,

Registered Environmental Health Specialist

cc: Program Manager

EHS-146.LTR
(REV. 12/91)

ATTACHMENT #4

LAND USE PROGRAM

HEALTH SERVICES AGENCY

COUNTY OF SANTA CRUZ

ENVIRONMENTAL HEALTH SERVICE
701 OCEAN STREET, ROOM 312
SANTA CRUZ, CALIFORNIA 95060
(408) 425-2341

CERTIFIED MAIL - RETURN RECEIPT REQUESTED
PROOF OF SERVICE BY MAIL

SECOND AND FINAL NOTICE
SEPTIC FAILURE REPAIR ORDER

Date ____________________

____
____
____

RE: NOTICE TO REPAIR SEPTIC TANK SYSTEM ASSESSOR'S PARCEL NUMBER ________

Dear ________________________:

An inspection of your property located at ____________________________, Assessor's Parcel Number __________________________, on __________________, revealed non-compliance with the letter sent to you by Environmental Health Services dated ________________________. This is your second and final notice to correct the conditions noted in the previous letter. Because the violation has not been corrected a violation, reinspection fee will be assessed, and an invoice for this violation reinspection fee is enclosed with this notice. These conditions constitute a continuing violation of Section 5411 of the California Health and Safety Code, and must be corrected. The following steps are to be taken:

1. ____
____

You must contact this office prior to taking any action to repair or replace any portion of your septic tank system. For any significant work, you will need to submit design plans and apply for a repair permit. Some additional site investigation may also be needed to confirm the suitability of the repair.

Compliance with these orders must be accomplished by the _________ day of receipt of this notice. Should the necessary work not be done, this Department may institute summary abatement procedures and will refer the matter to the District Attorney for appropriate legal action. **By Resolution of the Board of Supervisors, a second violation reinspection fee will be assessed if reinspection on or after the compliance date noted above reveals that the violation has not been corrected.** Additionally, the County Building Department has been notified that no permit applications are to be accepted until the problem is resolved.

Please contact me as soon as possible at (408) 425-____ between 8:00 and 9:30 a.m., Monday through Friday. It is imperative that you achieve a speedy and satisfactory solution to this problem.

Very truly yours,

Registered Environmental Health Specialist

Encl: Violation reinspection invoice
cc: Environmental Health Program Manager

EHS-177
(REV. 02/92)

ATTACHMENT 5

WASTEWATER MANAGEMENT PROGRAM

HEALTH SERVICES AGENCY

COUNTY OF SANTA CRUZ

ENVIRONMENTAL HEALTH SERVICE
701 OCEAN STREET, ROOM 312
SANTA CRUZ, CALIFORNIA 95060
(408) 425-2341

CERTIFIED MAIL - RETURN RECEIPT REQUESTED
PROOF OF SERVICE BY MAIL

____

____

____

____

RE: Notice To Repair Septic Tank System Assessor's Parcel Number ____________

Dear ______________:

An inspection of your property located at ____________________________, Assessor's Parcel Number __________, on ____________, revealed the following conditions:

____.

This(se) condition(s) constitute(s) a violation of the California Health and Safety Code, Section 5411, and must be corrected. You are directed to take the following steps within ____ days of the receipt of this letter:

____.

Our inspection of your property and review of file information indicate that there may be significant limitation(s) to proper sewage disposal on your property, and that your sewage disposal system must be carefully managed to take into account the(se) limitation(s):

groundwater at ___ to ___ feet during heavy rains
limited available disposal area
clay soils
old or substandard system

We are interested in working with you to ensure a long-term solution that is acceptable and beneficial to both yourself and the County. If you are unsure of the ability of your septic system to handle the additional wastewater loading, or if you have any questions regarding your system, our office is available to consult with you. For any significant work, including installation of a greywater sump, you will need to apply for a permit and submit a plot plan. Some additional site investigation may be needed to confirm the suitability of a septic system repair or greywater sump installation. It is important that you and/or your consultant or contractor consult with us and fully understand the work that is needed before you finalize a design or accept a bid for the work.

Please contact me as soon as possible at (408) ______ between 8:00 and ____ a.m., Monday through Friday. We want to assist you in promptly achieving a satisfactory solution to this problem. Any significant delay in resolution will result in referral to our enforcement team.

Very truly yours,

____

Environmental Health Aide/Wastewater Disposal Technician

cc: Program Manager

EHS-178.ltr [REV. 2/92]

APPENDIX G

PUBLIC EDUCATION PROGRAM

SAN LORENZO WASTEWATER MANAGEMENT

COUNTYWIDE WASTEWATER MANAGEMENT

INTRODUCTION

The central purpose of the public education program is to improve water quality by improving septic system management by residents. While a greater emphasis is placed on residents of the San Lorenzo Watershed, as a part of the San Lorenzo Wastewater Management Program, much of the program will also be directed to residents throughout rural areas of the county, under the auspices of County Service Area No. 12 (CSA 12). Two approaches will be utilized to provide public education:

1. The first objective is to educate residents regarding the ongoing maintenance and operation of their septic systems. This will be accomplished through site visits, direct mailings, distribution of informational material, and publication of maintenance reminders in the local media.

2. The second objective is to encourage residents to be proactive in managing their systems by increasing their awareness of environmental impacts of wastewater disposal. A series of workshops and visits to public schools and special interest groups as well as articles in the media will address water quality issues and septic system management.

The effectiveness of this program will be measured by an increased installation of ultra-low flow toilets and other water conservation devices, homeowner knowledge and use of inspection risers, and an increased frequency of pumping. This will reduce septic failures and greywater diversions, and also reduce homeowner costs for repairs of septic failures caused by lack of maintenance.

WORKPLAN

Objective: To educate residents regarding the ongoing maintenance and operation of their septic systems.

Tasks:

1. <u>CSA 12A Inspection Program</u>

This program currently consists of septic system inspections of all parcels in the San Lorenzo Watershed with an emphasis in areas with high groundwater, poor soils, and a high incidence of failures. After a review of file information, each house and property is physically examined for greywater diversions and/or septic failures and is evaluated in terms of repair potential. If homeowners are available at the time of inspection, the inspector will discuss system operation and management with them. In particularly bad areas, especially if the system gives an indication of being marginal, a special attempt may be made to contact the homeowner to discuss the system.

If a greywater bypass or septic failure is found, additional information regarding greywater sumps and repair processes is provided and the merits of the repair options (i.e. hookup to septic, greywater sump installation, or septic repair) are discussed.

This program will be expanded to include distribution of brochures regarding the CSA 12A Inspection Program, general septic system management, water conservation and greywater disposal.

2. Site Specific System Monitoring Program

Alternative systems and systems that require continued education and monitoring (i.e. that may be dependant upon strict water conservation) will be assigned to this program. Annual site visits for purposes of inspection and education will be conducted.

3. Direct Mailing

a. Properties with septic tanks that have not been pumped in the last three to seven years will be identified through the database, and the owners will receive a letter recommending inspection and pumping of their tank. A septic system maintenance brochure will accompany the letter. This program will initially focus in problem areas, and will be expanded depending on public response.

b. Owners of properties that have been identified as having poor to marginal septic systems through pumper's reports or inspection programs will receive a septic system maintenance brochure and a letter recommending timely system repair.

4. Distribution of Informational Material

Brochures on greywater and septic system management will be distributed to libraries, hardware stores, and other public places. Press releases with specific reminders on septic system management will be provided to the media on a seasonal basis. An information booth may be provided for appropriate special events.

Objective: To educate watershed residents regarding the environmental impacts of wastewater disposal.

Tasks:

1. Public Meetings/Outreach

   A series of public school visits, meetings with special interest groups, and community workshops will be conducted. The ecology and general water quality of the river will be addressed in conjunction with septic system management.

2. Printed Media

   Press releases will be distributed on a seasonal basis to the Valley Press and the Santa Cruz Sentinel with pumping reminders, tips about water conservation in the rainy season, and water quality of the river. Information will serve as a reminder to encourage residents to proactively manage their systems.

SANTA CRUZ COUNTY HEALTH SERVICES AGENCY
ENVIRONMENTAL HEALTH SERVICE
701 OCEAN STREET, ROOM 312
SANTA CRUZ, CA 95060 (408) 454-2022

SEPTIC SYSTEM USERS MANUAL

This leaflet has been prepared to answer questions about septic systems and to help homeowners manage their septic systems safely. If this leaflet does not give you the information you need, call the Environmental Health Service at 454-2022.

WHY IS MY SEPTIC SYSTEM SO IMPORTANT?

Septic systems allow people in rural areas to dispose of their household sewage in a manner that protects human health and the health of the environment. A system that works properly will deliver wastewater to the soil to be cleaned by natural soil organisms before it is returned to the groundwater table.

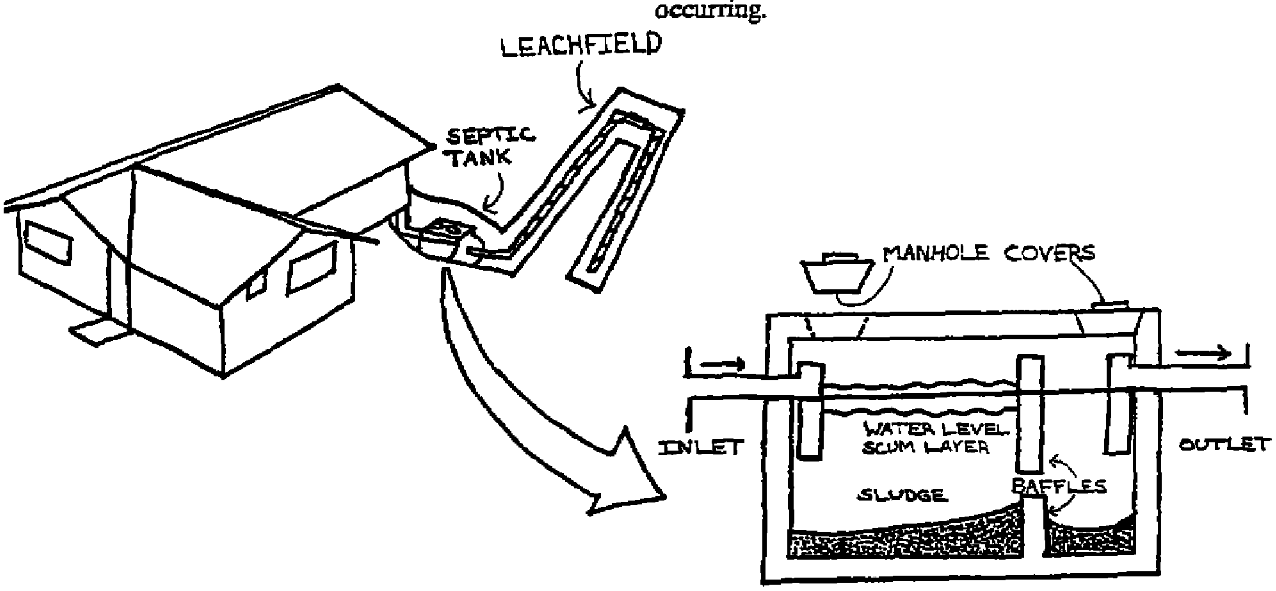
HOW DOES MY SEPTIC SYSTEM WORK?

The drains of your sinks, showers, toilets, and washing machine all feed into the SEPTIC TANK, which is generally located just a few feet outside of the house. The septic tank has a series of baffles that retain solids and grease but allow clarified water to flow into the LEACHFIELD.

The leachfield is the most important and the most sensitive part of your septic system. It is also the most expensive to repair. The leachfield consists of a perforated pipe set into a gravel-filled trench that is usually about two feet wide and two to ten feet deep. Wastewater is distributed through the trench and is absorbed by the soil. As the water percolates downward through the soil it is filtered and cleansed.

If your leachfield was installed or repaired within the last ten years you may have INSPECTION RISERS at the end of each leaching trench. Inspection risers are three inch diameter pipes that extend from the bottom of the trench to the surface of the ground.

Inspection risers are very useful because, by looking into the riser, you can see the level of the wastewater in your leachfield and how well the leachfield is working. The water level in the riser may rise and fall as water is used in the house, flows through the septic tank into the leachfield, and percolates through the soil. When your leachfield is full (saturated), the level of wastewater in your inspection riser is at or close to ground level and a failure may be occurring.



What you always wanted to know about your septic system (but were afraid to ask)

HOW CAN I TAKE CARE OF MY SEPTIC SYSTEM SO I DON'T HAVE PROBLEMS?
The best way to take care of your septic tank is to conserve water, pump the tank regularly to remove grease and solids, monitor the inspection risers if you have them, and don't put extra solids or harmful materials (such as paints, solvents, or grease) into the system.

Conserve Water
Reducing the amount of water that flows into your system helps it to last longer and work better, and makes the soil more effective in treating wastewater. Cut back your indoor water use by installing ultra low flow toilets (1.6 gallons per flush or less) and ultra low flow shower heads. Discontinue use of garbage disposals and put kitchen wastes in the garbage instead of down the sink. Spread out laundry washing over the week rather than doing it all in one day. This will give the leachfield time to absorb the wastewater before adding another load.

Be careful to fix all leaky faucets promptly. Check toilets for leaks by adding a few drops of food coloring to the tank, and wait five minutes (do not flush the toilet). If even a faint suggestion of dye appears in the bowl, the toilet is leaking. A leaking toilet can add over a hundred gallons a day to the septic system and should be turned off immediately. It can be turned on for a few moments to flush but should remain off until it can be repaired.

It is particularly important to conserve water in areas with high groundwater or heavy clay soils. During a wet winter, groundwater levels may rise as much as twenty feet, springs that may have gone dry from the drought will begin to flow, and the ground will be saturated from rainfall. This is the time when a marginal septic system will be most likely to fail because the soil is saturated by rainfall and cannot absorb the additional wastewater. Be sure to check your inspection risers during these times and pump the tank if necessary.

Pump the Tank
Have your septic tank inspected, and pumped if necessary, on a routine basis every three to five years (for a family of four or five). Solids and grease may build up in the tank and infiltrate and clog the leachfield if they are not removed by pumping.

Scientific research has shown that the popularly advertised septic tank additives are generally not effective. Although adding enzymes to the system is not harmful, even the manufacturers of additives agree they are not a substitute for regular tank inspection and pumping.

SEPTIC PUMPING AND MAINTENANCE RECORD

Work Completed	Contractor	Date

Monitor the Inspection Risers
If you have inspection risers in your leachfield it is a good idea to check and record the level of water in them before the rains begin. This will tell you if your leachfield is affected by groundwater or saturated soils. With a measuring tape and a flashlight measure down the inside of the pipe and note the distance from the top of the pipe to the surface of the water. Be sure to clean the tape measure after use.

Check the risers again after a heavy rain, if the level is at or near the surface of the ground you may want to delay any heavy water use in your house (such as clothes washing) until the level in the riser drops.

Groundwater levels may rise and fall fairly rapidly after a storm, so be sure to check and note the time it takes for the level to drop. If the level stays high for more than a few days, there may be problems with the leachfield.

LEACHFIELD RISER MONITORING RECORD

Date	Level	Date	Level	Date	Level

14

HOW WILL I KNOW IF THERE IS A PROBLEM WITH MY SEPTIC SYSTEM?
On the inside of your house, you may notice drains or the toilet operating sluggishly or backing up. You may notice gurgling noises coming from the plumbing vents. On the outside of the house you may find a damp spot on the ground or puddling or ponding of water, and/or a distinct septic smell. Lush plant growth in a leachfield area that is not irrigated may also be a sign of a problem. If you have inspection risers, the water level may be at or near the ground surface.

When groundwater levels rise after a period of heavy rains, or if you have heavy clay soils, the leachfield may become saturated and cause wastewater to backup into the septic tank (causing sluggish or noisy drains) or rise to the surface of the ground (creating a damp spot or puddle). Some of these symptoms may occur intermittently, usually after a heavy rain, and close attention to water use and inspection risers is needed in order to identify a problem.

If the level stays high for more than a few days, the leachfield may be saturated and on the verge of failing. Pump the tank to prevent surfacing effluent and talk with a septic pumper or contractor to determine if the leachfield should be repaired.

WHAT CAN I DO IF I THINK THERE IS A PROBLEM?
Have the septic tank inspected and pumped by a septic tank pumping service. If the outlet from the septic tank to the leachfield is covered by effluent, or if effluent flows from the leachfield back into the tank when the tank is pumped, the leachfield is either blocked or saturated. A saturated leachfield will need to be abandoned and replaced (repaired) by a new leachfield in a different location on your property.

To reduce loading on the system until it can be repaired, be sure there are no leaky fixtures in the house and keep all water use to an absolute minimum. Check all toilets with dye for leaks and turn them off immediately if one is found. Discontinue use of the washing machine (unless you have a separate greywater sump) and keep showers brief.

If there is a puddle of sewage on the ground, it is a health hazard and children and pets should be kept away from the area. Have the tank pumped as necessary to prevent surfacing effluent.
If you system appears to be functioning properly but you suspect that the leachfield's ability to absorb wastewater may be hampered by either clay soils or high groundwater, a GREYWATER SUMP may be installed to reduce loading on the septic system.

WHAT IS A GREYWATER SUMP?
A greywater sump is sometimes used in conjunction with a standard septic system to help extend the life of the leachfield. A sump may be useful in households that wash five or more loads of laundry per week.

A greywater sump is a simple leaching pit that receives wastewater from the washing machine, shower, and/or bathroom sink. Toilet wastes MUST be disposed of in a septic tank and wastes from the kitchen sink have too many solids and grease to be processed effectively by a sump.

Greywater sumps must be at least 120 cubic feet in volume (the size will vary depending on the amount of wastewater it will be receiving), filled with drain rock, and covered with roofing paper and a layer of soil. A brochure describing greywater sumps and the necessary steps to obtaining a permit can be obtained from the County Department of Environmental Health. A permit is required to ensure that the sump is properly located and installed.

WHAT DO I DO IF MY SEPTIC SYSTEM NEEDS REPAIRING?
If you think your system needs a repair, contact our office (454-2022) between 8:00 and 9:30 a.m. and speak to your district Environmental Health Specialist. The district specialist will discuss repair standards such as setbacks, leachfield size, and other information that may aid you in evaluating the selecting contractor's bids. The specialist will also tell you how to get started on the permit process. A permit is needed for ANY septic system repair except for minor plumbing.

Our office has a list of licensed septic contractors, most of which can also be found in the yellow pages of the phone book. It is a good idea to have your septic permit approved prior to getting bids so they are based on an approved design. Otherwise, changes in the design during the permit process may alter the bid. It is important that the repair be done properly in order to protect public health and give you good long-term service.

WHAT ARE THE ENVIRONMENTAL IMPACTS OF SEPTIC SYSTEMS?

A system that is properly designed and maintained will contribute clear water, nitrate, and very small amounts of salts to the groundwater supply. Nitrate migrates with groundwater to nearby streams and the river and may encourage algae to grow, which can be both good and bad. Small invertebrates that are the main food source for fish and other wildlife need algae for food and habitat but too much algae may be unsightly and adversely affect swimming areas. Decomposing algae may also impart a moldy taste to the water. When the water is used to supply drinking water needs, as is the case with the San Lorenzo River, it must be treated to reduce odor before distribution.

Nitrate in very high concentrations is also toxic to humans and can render a water source unfit for human use. Current septic system repair and new system standards are designed to ensure that nitrate in groundwater and surface water never reach dangerous levels.

A failing septic system will allow large amounts of viruses and bacteria to contaminate the surface of the ground and any nearby surface waters. People and animals contacting the contaminated area are susceptible to infection from the viruses and bacteria. Children, the elderly, and people with depressed immune systems are much more likely to experience problems than healthy adults.

Allowing greywater to flow onto the surface of the ground is also hazardous even if biodegradable soaps are used. Viruses and bacteria are present and the pH and absorptive capacity of the soil can be damaged. In dry years the problems can become worse because of the lack of flushing action from rains.

All wastewater, including greywater, must be disposed of under the surface of the ground in a approved disposal system. Discharging wastewater to the surface of the ground, or to surface waters, creates a public health hazard and is a violation of the California Health and Safety Code.

****

Greywater irrigation (particularly above ground irrigation) is a risky way to conserve water. For example, if a small adult were to press the palm of her hand into grass that had been irrigated with greywater, she would pick up roughly 30 viruses on her hand and have a 30% chance of being infected. Children, the elderly, and people with depressed immune systems are even more likely to experience health problems from contact with greywater.

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COUNTY SERVICE AREA 12: COUNTYWIDE SEPTIC SYSTEM MAINTENANCE AND SAN LORENZO VALLEY WASTEWATER MANAGEMENT

There are approximately 22,000 septic systems in the rural areas of Santa Cruz County. Successful use of these systems requires that they be properly maintained to protect public health and prevent water pollution. In order to promote better septic system management and maintenance in these areas, County Service Area 12 (CSA 12) was established in 1989 by the County Board of Supervisors. A small fee is collected with each property tax bill in CSA 12.

The funds raised from CSA 12 are used to pay for permanent facilities for the disposal of septic tank sludge at the City of Santa Cruz Sewage Treatment Plant. Regular pumping of accumulated solids in septic tanks is a very important part of maintenance and is dependent upon a suitable location for disposal.

The funds are also used for monitoring water quality impacts of septic systems, public education about septic system maintenance and maintaining a computerized record keeping system of pumping, inspections, and repairs.

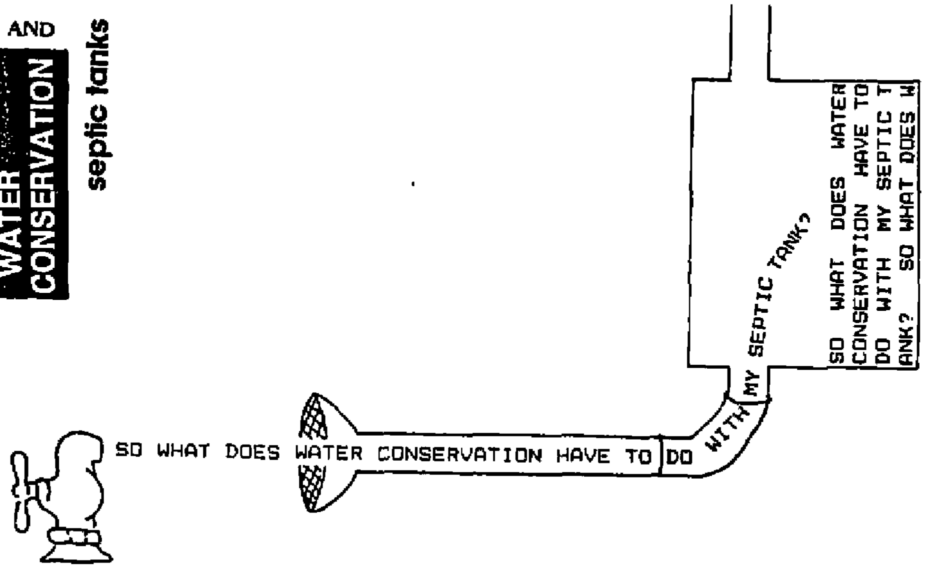
The San Lorenzo River watershed area has an even greater need for proper septic system management than the rest of the county. The area has a very high density of septic systems and any pollution from septic failures will impact the San Lorenzo River, which is used for water supply and recreation. Because of these potential problems, some areas of the Valley are subject to wastewater discharge prohibitions imposed by the State since 1982.

The County has implemented a comprehensive wastewater management program for the San Lorenzo Watershed to address these concerns. This program provides for regular water quality testing, inspection and evaluation of all septic systems approximately once every six years, and special public education efforts. The program is funded through a special zone, CSA 12A. An additional service charge is billed to developed parcels in this zone.

The inspection and public education programs will result in a general upgrading of septic systems in many areas of the San Lorenzo Valley, as well as enhanced management by homeowners.

For more information contact the Environmental Health Service at 454-2022.

WATER CONSERVATION AND septic tanks



SANTA CRUZ COUNTY - HEALTH SERVICES AGENCY
Environmental Health Division

July 1986

COUNTY OF SANTA CRUZ
HEALTH SERVICES AGENCY
ENVIRONMENTAL HEALTH SERVICES
701 OCEAN STREET, ROOM 312
SANTA CRUZ, CA. 95060

SAVINGS FROM INSTALLING WATER CONSERVING TOILET AND SHOWERHEAD

	Annual Costs (2 person household)
WATER AND ELECTRIC COSTS FOR CONVENTIONAL FIXTURES	$ 214.39
WATER AND ELECTRIC COSTS FOR WATER CONSERVING FIXTURES+	98.19
SAVINGS ON WATER AND ELECTRIC BILLS	$ 116.20
TOILET AND SHOWERHEAD REPLACEMENT COSTS	32.46*
TOTAL ANNUAL SAVINGS FROM WATER CONSERVING FIXTURES	$ 83.74

+ Water and electric savings and fixture replacement costs are calculated for the replacement of conventional fixtures with Eljer (1 gallon flush) toilet and Microphor 2.1 gallon per minute showerhead.

* Purchase price of fixtures and installation amortized at 10% interest over 15 years.

How does water conservation affect my septic tank?

Reducing the amount of water which goes into your septic tank improves the bacteriological processing of your household wastewater and prolongs the life of your leach field.

A perfectly sound septic system will malfunction if it is overloaded. Water conservation can make almost any septic system work better, and for homeowners who cannot enlarge their septic tanks or leach fields due to small lots or poor soils, water conservation may turn failing systems into functioning ones.

What can I do to conserve?

There are two kinds of water conservation: active and passive. Active conservation involves a change in habits, such as taking shorter showers and washing clothes only when you have a full load. Passive conservation, however, is achieved by restricting the water flow by installing low-flush toilets, low-flow showerheads, and faucet aerators.

How much water could I save?

A conventional toilet uses five gallons of water with every flush and accounts for 40% of indoor household water use. Simply by installing a one gallon low-flush toilet and a low-flow showerhead, which uses two gallons per minute rather than the conventional four gallons per minute, a family of four could save nearly 45,000 gallons of water per year. That would reduce the daily amount of water going into the septic tank by about 50%!

How much is this going to cost me?

When you conserve water, you do more than just reduce the size of your water bills. Since you use less hot water, your energy bills also decrease. In fact, within about two years of installing water conserving fixtures, a household of two people can save about $250 in water and energy bills, enough to pay off the initial cost of the devices. All future savings from lower water and energy bills are yours to keep.

Furthermore, better wastewater treatment and lower wastewater volume through water conservation can reduce the maintenance costs of your septic system and save you hundreds, even thousands of dollars.

How do I know what type of fixtures to buy?

Not all low-flow fixtures on the market will perform as desired. The following brands of low-flush toilets have been approved for use in California: Eljer, Ifo, Microphor, and Thetford. Others that are ANSI Standard and I.A.M.P.O. approved will also meet County Building Codes. A list of approved fixtures is on file with the County Environmental Health Department.

Will I have to modify my plumbing?

Most of these water conserving fixtures are easily installed without plumbing modifications. However, careful installation is very important to insure that the devices work properly. To insure that your plumbing is properly sized and vented, it is recommended that the installation be made by a qualifed person.

Why can't I just put washers in my faucets?

Experience has shown that the water reduction achieved from putting washers in faucets and toilet dams in conventional toilets is not enough to correct most septic system overloading. Replacing conventional toilets with one gallon, or less, low-flush toilets, replacing existing showerheads with showerheads with a flow of 2.0 gallons per minute, or less, and fitting faucets with aerators is generally the most efficient and cost-effective way of reducing the daily amount of water going into your septic system.

WATER CONSERVING FIXTURES

MFGR	FIXTURE	COST
ELJER	1.0 gal.toilet	$ 165
IFO	"	190
THETFORD	"	325
MICROPHOR	0.5 gal.toilet	339
MICROPHOR	2.0 gallon per minute showerhead	12

(These are examples of approved fixtures and is not meant to be an exhaustive list.)

WATER SAVING TIPS

1. Keep a bottle of drinking water in the refrigerator--running the water from the faucet until cold will waste a gallon.

2. Turn the hot water off while you shave, and turn the cold water off while you brush you teeth. Shaving with a running faucet uses about 5 gallons.

3. If you have variable size load settings on your washing machine, use them. Otherwise, wait until you have a full load before using your washing machine. The average machine uses 50 gallons per load. It is better never to do more than one load in a day. More than that could overload the system.

4. Put a stopper in your sink or use a dishpan when you wash dishes. Washing with running water uses 10 gallons per meal.

5. Take showers instead of baths. With a low-flow showerhead, a shower uses only 1/3 the water of an average bath.

6. Above all: THINK before you turn on the tap.

What About

Greywater

County Service Area #12

SANTA CRUZ COUNTY HEALTH SERVICES AGENCY

ENVIRONMENTAL HEALTH SERVICE

701 Ocean Street, Room 312

Santa Cruz, CA 95060 (408)

This leaflet has been prepared to answer questions about greywater use and to help homeowners manage their septic systems safely. If this leaflet does not give you the information you need, call the Environmental Health Service at 425-2341.

All household wastewater that comes from sinks, showers, and washing machines is called "greywater". Although greywater does not include toilet wastes, it is a form of sewage. Greywater is sometimes diverted from the waste water line by homeowners and used for landscape irrigation instead of fresh water. Homeowners also disconnect and divert greywater to reduce the amount of waste water going into the septic system. *Both of these practices can create significant health hazards if not done properly.* Greywater is sewage, often contains disease causing bacteria and viruses, and cannot legally be discharged to the surface of the ground. Greywater that is allowed to spill onto the surface of the ground may create nuisance conditions and be a source of disease. Laundry water typically has a fecal bacteria level that is ten times greater than the standard for safe body contact.* If discharge occurs close to a stream, greywater can pollute surface waters with bacteria and viruses, soaps, detergents, salts, and other contaminants.

The following are factors to take into account when considering the use or diversion of greywater:

USE WATER CONSERVATION BEFORE IRRIGATING WITH GREY WATER

All of the following water saving methods are much safer and more effective than attempting to conserve water through greywater irrigation: ultra low flow toilets, ultra low flow shower heads, prompt repair, maintenance of all plumbing fixtures, and good water use and conservation habits. To save outdoor water, heavy mulching, drip irrigation (or other low volume irrigation), and drought tolerant plants are recommended.

*Bacterial concentrations in greywater from shower or bath water can reach 400,000 fecal coliforms and 3,000,000 total coliforms/100 ml of water. Washing machines can range from a low count of 2000 FC/100 ml to 10,000,000 FC/100 ml of water. In addition to bacteria, 60 virus units can be found per 1,000,000 FC bacteria. There are roughly 200 enteric virus/liter of undisinfected greywater from shower/bath and 3000 virus/liter from washing machines.

Landscape irrigation with greywater that employs mini-leachfields (or other below ground distribution) around shrubs and trees can be useful when there is a need to conserve fresh water. However, this should be considered only during times of severe water shortage and only after every other method of indoor and outdoor water conservation has been employed.

Greywater irrigation (particularly above ground irrigation) is a risky way to conserve water. For example, if a small adult were to press the palm of her hand into grass that had been irrigated with greywater, she would pick up roughly 30 viruses on her hand and have a 30% chance of being infected. Children, the elderly, and people with depressed immune systems are even more likely to experience health problems from contact with greywater.

The Santa Cruz County Department of Environmental Health recommends that greywater be used for irrigation only with certain safeguards:

- **Greywater MUST be applied subsurface by mini-leachfields or other underground distribution methods. The California Health and Safety Code defines all waste waters, regardless of source, as sewage and specifically prohibits their discharge where a threat to public health or nuisance might be created. It is unlawful to dispose of sewage by any other means except by an approved plumbing and drainage system.**

- **Use greywater from only the bathroom sink, shower/tub, or the clothes washer. If possible, use only the water from the rinse cycle of the washer. Greywater from the wash cycle or from the kitchen sink is not suitable for reuse. This water contains large amounts of soap, detergents, solids, and other contaminants which can harm soils and plants.**

- **NEVER use water from the washer load that has been used to wash soiled diapers. This water contains fecal wastes and must be disposed of in the septic system or sewer.**

- **Greywater should not be used for irrigation of food crops due to the possibility of contaminating the crop with bacteria or disease organisms. Only ornamental trees and shrubs may be irrigated with greywater.**

- **Because soaps and salts contained in greywater may damage some plants and soils, advice should be obtained from the University of California Agricultural Extension Office or similar expert source.**

- **Care should be taken to insure that the greywater can easily be redirected to the septic system or sewer if anyone in the home becomes ill, if diapers are washed, or problems with the subsurface greywater system occurs.**

REDUCE LOADING ON THE SEPTIC SYSTEM WITHOUT DIVERTING GREYWATER ONTO THE GROUND

Indoor water conservation is the most effective and inexpensive way to reduce loading on your septic system. Ultra low flow toilets and showerheads can save hundreds of gallons of water a week. Prompt attention to leaks (a leaking toilet can add up to two hundred gallons of water a day to the septic system) and maintenance can extend the life of just about any leachfield. For homeowners who may have problems enlarging their leachfields due to small lots or poor soils, water conservation may be the best way to improve their waste water disposal.

Disconnecting the laundry or shower from the septic system and allowing it to flow onto the surface of the ground (in order to reduce loading on the septic system) is an unsanitary and unhealthy way to solve a problem that can be easily handled through water conservation and/or use of a greywater sump.

It may be acceptable to disconnect greywater from the septic system only if it is discharged underground in an approved disposal system. Homeowners in unincorporated areas, who have room to expand leaching areas, may install a separate greywater sump or leachfield. A permit from Environmental Health is required, and staff is available for consultation regarding design and construction. A brochure containing specific information about design, construction, and obtaining a permit is available from our office.

A GUIDE TO

GREYWATER

SUMPS

County Service Area #12

SANTA CRUZ COUNTY HEALTH SERVICES AGENCY

ENVIRONMENTAL HEALTH SERVICE

701 Ocean Street, Room 312

Santa Cruz, CA 95060 (408) 454-2022

EHS-175 [3/94]

This leaflet will assist you in obtaining a permit and installing a greywater sump. If you have further questions, please call the Environmental Health Service at 454-2022.

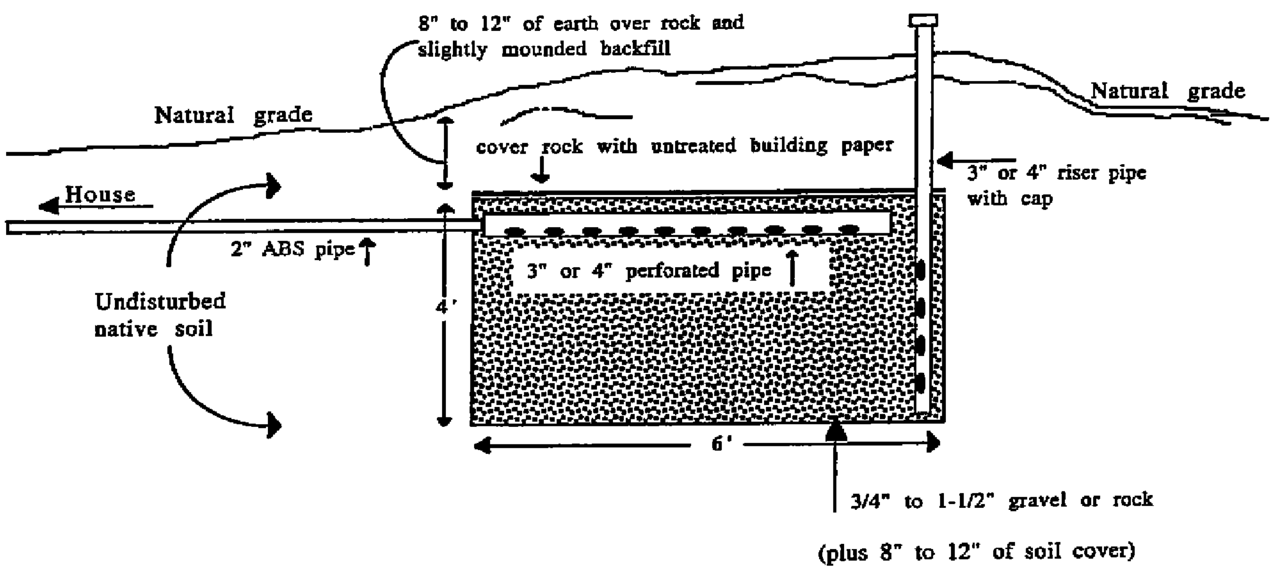
GREYWATER SUMP

Greywater is defined as any wastewater that comes from a clotheswasher, dishwasher, sink, or shower. Although greywater does not include toilet wastes, it does contain virus and bacteria and must be properly disposed of to prevent health hazards.

A greywater sump is a rock filled trench that collects and disposes of wastewater from the washing machine, shower, and/or bathroom sink. Toilet wastes MUST remain in the septic tank. Wastewater from the kitchen sink MUST also remain in the septic tank because of the large amounts of organic material it contains. A greywater sump can be used to reduce loading on a septic system that has inadequate leaching capacity.

SUMP/ABSORPTION BED

Sized for approximately two loads of wash per day (the minimum size allowed)



TYPICAL SUMP

Maximum bed depth = 4'

width = 4'

length = 6'

TOTAL CUBIC FEET = 96
(which is equal to 104 square feet of sidewall area and bottom of trench)

These dimensions can be altered as needed as long as the total trench depth below the ground surface does not exceed 5 feet. Shallow narrow trenches preferred.

There are three steps to properly completing a greywater sump. 1) Determine its location and size; 2) Apply for and obtain an approved permit from our office; and, 3) Install the sump and obtain a final inspection by our office.

1) LOCATING AND SIZING THE SUMP

The size of the sump depends on the amount of wastewater and the ability of the soil to absorb water. County wastewater disposal codes requires that a sump have (for washing machine effluent only) a total volume of at least 96 cubic feet. The sump size for other sources of wastewater must be calculated based on the amount of daily water use of the household. For average draining soils allow one square foot of combined sidewall and trench bottom per gallon of wastewater loading per day. Call our office for assistance in properly sizing the sump if needed.

Distance from:

- septic tank — 3 feet
- leachfield — 10 feet
- property line — 5 feet
- foundation — 5 feet
- water line (pipe) — 10 feet
- well — 100 feet
- embankment >67% — twice the height of the embankment up to 25 feet.
- stream — 50 feet
- drainage way — 25 feet

When determining the proper location for the sump, the following standards and minimum setbacks must be met:

Other standards:

- geologic hazard — a sump CANNOT be placed in a location where it may contribute to geologic instability
- groundwater separation — vertical distance below the sump to groundwater must be at least 1 foot if the sump is at least 100 feet from a stream, creek, spring, or other body of water. If the sump is less than 100 feet, a 3 foot groundwater separation is required.
- minimum cover — 1 foot
- maximum depth from surface — 5 feet

2) SUBMITTING AN APPLICATION

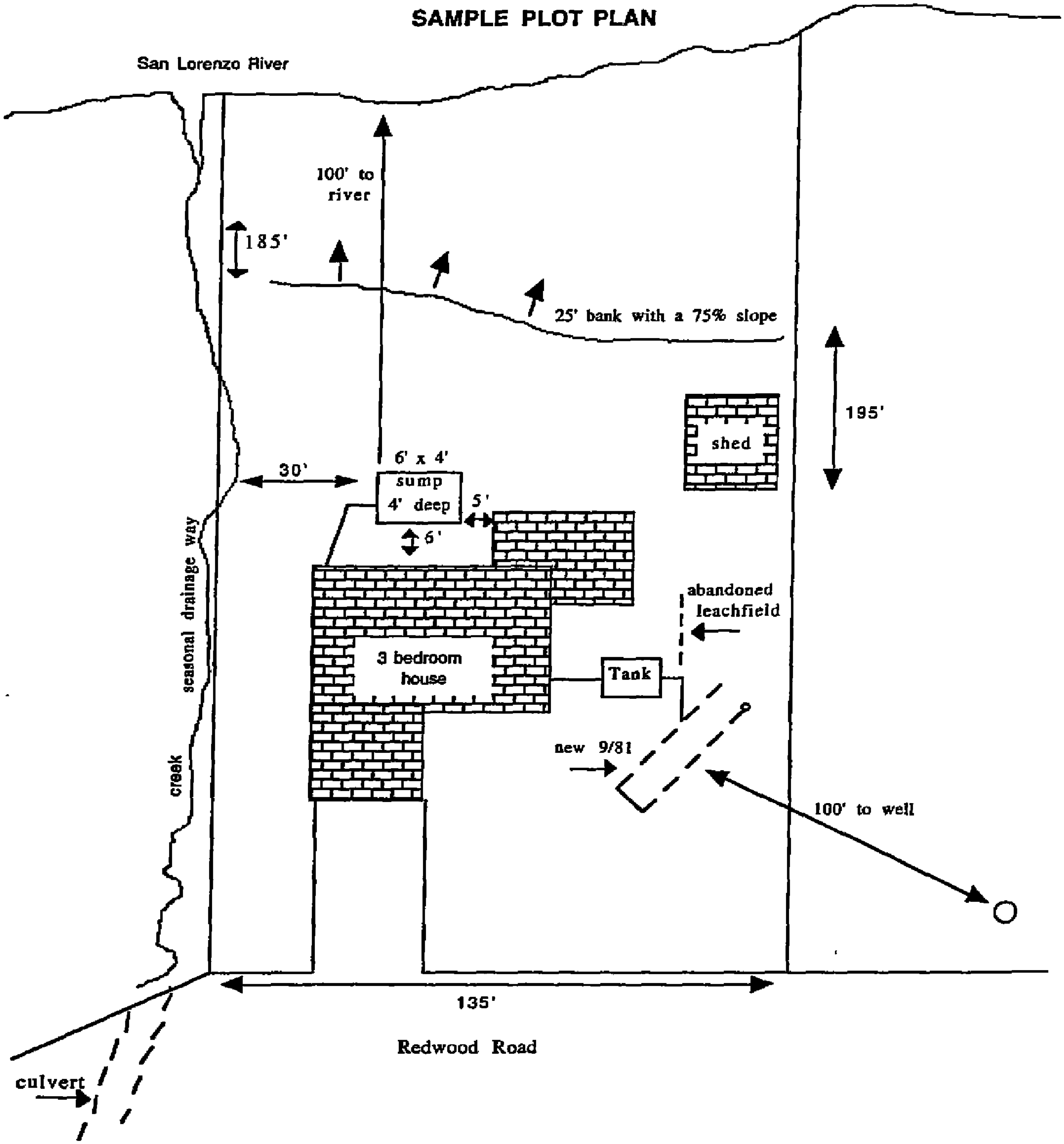
A plot plan must be submitted with an application form and a nonrefundable fee is charged at this time. The following information must be included on the plot plan (see back page):

- Assessor's Parcel Number & name of the property owner
- Property lines and adjacent streets, footprint of the house, garage, other structures
- Existing septic system, however much is known
- Large trees, fences, etc.
- Wells, streams, drainage ways, springs
- Indicate all setback distances as described above

3) INSTALLATION & APPROVAL

Once the district Registered Environmental Health Specialist (REHS) has reviewed and approved the application and the permit is issued, work may begin on the sump. You must notify the REHS 24 hours prior to beginning the work. When the sump is filled and plumbed, but not yet covered, the REHS will visit the site to approve and sign off the installation.

SAMPLE PLOT PLAN



5/94

Appendix H

Projected Wastewater Disposal Improvements

for Specific Areas of the San Lorenzo Valley

SUMMARY

This appendix identifies the types of wastewater disposal improvements that will ultimately be needed to bring disposal systems into compliance with the Management Plan repair standards. The evaluation focuses on the areas of the San Lorenzo Watershed that are believed to have the most significant problems. This analysis considers two potential approaches for the most problematic parcels: 1) use of improved onsite system upgrades and increased management pursuant to the new repair standards and procedures, and 2) development of community disposal systems. The types of individual systems which would be needed are tabulated by area and an analysis of the expected costs of individual system upgrade and management is presented. Areas which could potentially benefit from community disposal systems are also identified and the procedures and costs for developing those systems are discussed.

The initial basis for this analysis was the information in the County database and files regarding site constraints, repair standards and procedures, past system performance, and recent system upgrades. Constraints have been evaluated for a total of 8520 parcels, including all the previously designated Class I and Class II areas and surrounding unclassified areas in the San Lorenzo Valley. This analysis estimates the number and type of onsite system upgrades expected to eventually take place over the next 20 years under the current management plan standards and procedures. Some of these upgrades have already taken place under the management program, others will not occur until the existing systems begin to show signs of failure, the owner voluntarily upgrades, or upgrade is required as a condition of a remodel or property transfer.

Approximately 94% of the parcels are projected to utilize conventional septic system upgrades; 77% of the total are expected to fully meet the repair requirements for standard systems; 17% are expected to meet the requirements utilizing nonconforming systems with a higher level of management. The remaining 525 parcels will require individual alternative systems, haulaway systems, cluster systems, or community disposal systems. Approximately 200 of the 525 parcels requiring nonconventional improvements are in scattered locations that are clearly not suitable for connection to community disposal systems and should be served by individual alternative systems, haulaway systems, or in some circumstances cluster systems.

The remaining 325 parcels which will likely require nonconventional upgrades are located in relatively flat, densely developed, localized areas within Boulder Creek, Felton, Ben Lomond, Glen Arbor, and Brook Lomond. These areas could be well suited for community disposal systems if offsite disposal locations can be found that are technically and economically feasible for use. If nearby nonconforming systems are included in the service areas, up to 750 systems could potentially be served by community disposal systems, if such systems are found to be more cost-effective than individual system upgrades

and management.

Feasibility studies have already been performed for community disposal in Boulder Creek, Brook Lomond, Ben Lomond, Glen Arbor, El Solyo Heights and Felton. Projects to serve these areas have been found to be technically feasible (Questa, 1991; Questa, 1994). However, without grant funding, the projects appear to be unaffordable and the much higher cost does not appear to be justified by the relatively low level of incremental improvement over upgrade and improved management of individual disposal systems. Under these current circumstances, the County will continue to implement improved onsite wastewater disposal pursuant to the standards and procedures of the management plan. If circumstances change so that community projects in these areas become economically feasible and necessary for community development and water quality protection, projects will be pursued in the future. Community disposal projects will also be considered for other areas of the watershed, as appropriate.

The breakdown of parcels expected to utilize individual standard upgrades, nonstandard upgrades, or potential community disposal is summarized by area in Table H-1. A detailed discussion of recommendations and the specific conditions in each area is presented in the latter half of this appendix. Other areas of the Valley will be evaluated as surveys of those areas are completed and soil and groundwater information is available. The results will be presented in regular status reports on Plan implementation.

Table H-1: Breakdown of Projected Disposal Improvements: Numbers of Parcels (Note: Numbers are rounded and may not add up. See other notes below.)

AREA	TOTAL PARCELS	STANDARD UPGRADES (a)		NONSTANDARD UPGRADE Noncon-forming (b)		NONSTANDARD UPGRADE Altern./ Haulaway (c)		POTENTIAL COMMUNITY DISPOSAL (d)	
Greater Kings Creek	760	512	67%	183	24%	63	8%	0	0%
Greater Boulder Creek	760	476	63%	194	26%	87	11%	200	26%
Ben Lomond	790	605	77%	147	19%	39	5%	60	8%
Glen Arbor (Class I & II)	470	322	69%	101	21%	47	10%	160	34%
Felton (Class I)	820	533	65%	175	21%	111	14%	250	30%
Brook Lomond (Class II+)	80	34	43%	22	27%	24	30%	80	100%
Other Areas (e)	4800	4080	85%	576	12%	144	3%	0	0%
TOTALS	**8480**	**6562**	**77%**	**1397**	**16%**	**515**	**6%**	**750**	**9%**

Notes:

a - The number of parcels which can fully meet repair requirements for a standard conventional septic system. This includes systems which would utilize effluent pumps to dispose of effluent on a part of the property that meets requirements.

b - The number of parcels which would be expected to utilize a nonconforming system which does not fully meet standard requirements due to reduced leachfield size (50-99%), reduced groundwater separation (1-3 feet) where the system is located over 250 feet from a stream, inadequate expansion area, or inadequate pump chamber size for pump up systems. Water conservation, restrictions on remodels, and an annual inspection fee are required.

c - The number of parcels that are expected to require either an individual alternative system, cluster system, winter haulaway, full haulaway, or community disposal system. An annual inspection fee and other restrictions are required.

d - The subset of parcels which would generally require a nonstandard upgrade which could be effectively served by community disposal systems, if found to be cost effective for that area.

e - Other Areas includes all parcels in and around: San Lorenzo Park, San Lorenzo Woods, Riverside Grove, Forest Springs, Zayante, Lompico, Mt. Hermon, Forest Lakes, Paradise Park, Lower Zayante, and additional parcels around the primary areas covered in this table.

Sources of Information: Figures for individual onsite upgrades were derived from Tables H-4, H-5, H-7, H-8, and H-9, except for Brook Lomond and Other Areas where estimates were made from Table H-2 and recent system upgrades. Figures for potential community disposal systems include the total service areas as presented in the feasibility study by Questa Engineering (1994).

WASTEWATER DISPOSAL LIMITATIONS AND IMPROVEMENT OPTIONS

The methodology for evaluating the long-term wastewater disposal needs for individual areas of the San Lorenzo Watershed has been summarized in Section 3.4 of the Wastewater Management Plan. The evaluation utilizes parcel specific information on site conditions, septic system performance, and recent upgrades. This information has been developed from the County's permit records, inspection records, and additional soil and groundwater investigations.

This approach differs significantly from the work presented by Montgomery Engineers in 1982. In their Valleywide Facilities Plan, they drew boundaries around community areas, analyzed average conditions throughout the area, and developed conclusions that were then applied to all parcels in that area, particularly in their designated Class I areas. The current Wastewater Management Plan uses a parcel specific analysis to evaluate how each parcel will ultimately comply with Plan objectives and standards. If a significant concentration of problematic parcels is identified, then those problematic parcels will be grouped together and a community solution for those parcels will be pursued. The majority of parcels will be upgraded using individual systems, as had been proposed for the Class II areas of the Valley.

Tabular information regarding site conditions, system characteristics, and inspection results is summarized by area in Table H-2. As indicated by this table, high groundwater is the most widespread constraint which limits the use of conventional septic systems in the San Lorenzo Watershed. Other significant constraints are stream setback, clay soil, and small lot size. These are not as significant as groundwater, in that many of these can be overcome by design, proper location of the septic system, and/or flow reduction. These four constraints were selected for further detailed analysis by area. Other potential constraints, such as slope and depth to bedrock, have not been noted to affect more than 1% of the parcels in the database and have not been included in the area evaluations. They will however be taken into account in the site specific designs where they are encountered.

Tables H-4, H-5, H-7, H-8, and H-9 (in the latter part of this document) present a detailed analysis of the number of parcels affected by the primary constraints for each area, and a projection of the types of upgrades which will ultimately be utilized under the Management Plan standards and procedures. This information is summarized for the four primary areas in Table H-3. The analysis is based on information in the database, which is derived from file records, soil and groundwater investigations, and extrapolations of information from nearby parcels which would be expected to have similar conditions. For each constraint or combination of constraints, several potential alternative disposal methodologies are identified, based on the repair standards (Appendix C and Table 2 of the Management Plan). The specifications and suitabilities of each alternative technology are summarized in Table 3 of the Management Plan and discussed in Appendix E.

An estimate of the proportion of parcels expected to utilize a particular solution has been made for each group of constraints. These proportions are estimated based on the types of systems that would be allowed for the particular constraint, combined with an analysis of the actual types of improvements used in recent repairs. Adjustments have been made for the changes in the standards that are proposed to be implemented upon adoption of the Management Plan. A more detailed explanation of the tables follows Table H-3.

Figure H-1 shows the generalized locations of the communities that are addressed in this evaluation. Figures H-2 through H-6 are generalized maps of the areas that have been evaluated. These show information on groundwater depth, clay soil, and areas where there are concentrations of site constraints which limit the use of conventional septic system improvements. These areas were the subject of further analysis for feasibility of community disposal systems. The delineation of potential service areas is also shown.

TABLE H-2: SUMMARY OF INFORMATION IN PARCEL DATABASE

DATA ELEMENTS	TOTAL AREA SUMMARY		Greater Kings Creek		Boulder Creek		Felton		Ben Lomond		Glen Arbor	
Developed Parcels (Systems) in Database	9586		802		1029		1821		990		928	
Systems with Parcel Size Information	9544	100%	799	100%	1004	98%	1821	100%	989	100%	924	100%
- Parcels less than 15,000 sq. ft.	5498	57%	535	67%	601	58%	962	53%	575	58%	528	57%
- Parcels less than 7,500 sq. ft	2211	23%	238	30%	242	24%	333	18%	217	22%	91	10%
- Parcels less than 5,000 sq. ft.	805	8%	70	9%	78	8%	63	3%	74	7%	22	2%
Records with Leachfield Information	5653	59%	494	62%	477	46%	1110	61%	505	51%	605	65%
- Leachfields Meeting Standards for Size	4329	45%	361	45%	368	36%	879	48%	416	42%	461	50%
Records with Age of System	5555	58%	437	54%	434	42%	946	52%	546	55%	628	68%
- Systems Installed 1986-1993	1710	18%	144	18%	187	18%	284	16%	204	21%	181	20%
- Systems Installed 1980-1985	1037	11%	113	14%	79	8%	172	9%	105	11%	87	9%
- Systems Installed Before 1980	2808	29%	180	22%	168	16%	490	27%	237	24%	360	39%
Systems with Stream Setback Information	1945	20%	219	27%	207	20%	546	30%	137	14%	121	13%
- Stream Setback less than 250 ft.	1920	20%	217	27%	204	20%	536	29%	134	14%	119	13%
- Stream Setback less than 100 ft.	743	8%	63	8%	46	4%	209	11%	46	5%	37	4%
- Setback less than 100 ft, but undeter.	587	6%	117	15%	104	10%	166	9%	21	2%	17	2%
- Stream Setback less than 50 ft.	186	2%	12	1%	7	1%	61	3%	6	1%	6	1%
- Stream Setback less than 25 ft.	30	0%	0	0%	2	0%	9	0%	1	0%	0	0%
Systems with Groundwater Information	2417	25%	327	41%	528	51%	663	36%	301	30%	209	23%
- Groundwater less than or equal to 3 ft	396	4%	21	3%	44	4%	153	8%	60	6%	49	5%
- Groundwater 3-6 feet below grade	736	8%	105	13%	121	12%	230	13%	115	12%	85	9%
- Groundwater 6-10 feet below grade	1006	10%	189	24%	338	33%	204	11%	115	12%	67	7%
Systems with Soil Information	3618	38%	567	71%	251	24%	711	39%	290	29%	353	38%
- Soils with Significant Clay Content	1427	15%	134	17%	27	3%	148	8%	44	4%	30	3%
- Sand	1508	16%	241	30%	70	7%	267	15%	162	16%	241	26%
Systems with Slope Information	906	9%	352	44%	61	6%	15	1%	8	1%	79	9%
- Slope greater than 30%	138	1%	29	4%	45	4%	1	0%	1	0%	13	1%
- Slope greater than 50%	75	1%	4	0%	44	4%	0	0%	0	0%	5	1%
Systems with Info. on Depth to Bedrock	273	3%	153	19%	23	2%	22	1%	3	0%	5	1%
- Depth less than 10 feet	102	1%	27	3%	14	1%	14	1%	0	0%	5	1%
- Depth less than 5 feet	28	0%	1	0%	4	0%	5	0%	0	0%	5	1%
Class I Parcels	2466	26%	466	58%	536	52%	738	41%	587	59%	139	15%
Class II Parcels	2788	29%	0	0%	0	0%	705	39%	83	8%	299	32%
Class II-C Parcels	920	10%	0	0%	0	0%	119	7%	47	5%	42	5%
Repair Actions, Jan. 1986 - Dec., 1993	2893	30%	375	47%	368	36%	489	27%	315	32%	253	27%
Systems with Tank Pumping, 1988-1993	4899	51%	418	52%	601	58%	933	51%	585	59%	540	58%
Year Parcels Surveyed for Failures			1986		1987-88		1989,91-92		1987,89-91		1990-91	
- Number of Parcels Surveyed	6273	65%	708	88%	695	68%	1434	79%	755	76%	659	71%
- Number of Leachfield Failures	182	3%	52	7%	25	4%	28	2%	10	1%	6	1%
- Number of Greywater Bypasses	477	8%	77	11%	47	7%	119	8%	53	7%	12	2%
- Number of Systems Performing OK	5233	83%	503	71%	567	82%	1228	86%	671	89%	636	97%

TABLE H-2: cont.

DATA ELEMENTS	Lompico		Zayante		Forest Springs		Brookdale		San Lorenzo Park		Riverside Grove	
Developed Parcels (Systems) in Database	461		297		545		359		86		161	
Systems with Parcel Size Information	460	100%	296	100%	545	100%	358	100%	86	100%	159	99%
- Parcels less than 15,000 sq. ft.	374	81%	172	58%	310	57%	154	43%	59	69%	117	73%
- Parcels less than 7,500 sq. ft	194	42%	84	28%	111	20%	57	16%	28	33%	65	40%
- Parcels less than 5,000 sq. ft.	105	23%	29	10%	29	5%	17	5%	8	9%	13	8%
Records with Leachfield Information	335	73%	174	59%	274	50%	211	59%	55	64%	120	75%
- Leachfields Meeting Standards for Size	266	58%	147	49%	213	39%	157	44%	38	44%	94	58%
Records with Age of System	351	76%	190	64%	287	53%	222	62%	46	53%	112	70%
- Systems Installed 1986-1993	110	24%	56	19%	111	20%	57	16%	13	15%	36	22%
- Systems Installed 1980-1985	51	11%	39	13%	68	12%	56	16%	12	14%	28	17%
- Systems Installed Before 1980	190	41%	95	32%	108	20%	109	30%	21	24%	48	30%
Systems with Stream Setback Information	37	8%	131	44%	52	10%	116	32%	33	38%	48	30%
- Stream Setback less than 250 ft.	37	8%	131	44%	51	9%	115	32%	33	38%	48	30%
- Stream Setback less than 100 ft.	14	3%	69	23%	32	6%	71	20%	29	34%	33	20%
- Setback less than 100 ft, but undeter.	7	2%	13	4%	1	0%	6	2%	0	0%	7	4%
- Stream Setback less than 50 ft.	2	0%	15	5%	5	1%	13	4%	17	20%	21	13%
- Stream Setback less than 25 ft.	0	0%	5	2%	0	0%	2	1%	4	5%	4	2%
Systems with Groundwater Information	14	3%	16	5%	35	6%	26	7%	32	37%	29	18%
- Groundwater less than or equal to 3 ft	1	0%	0	0%	0	0%	2	1%	22	26%	19	12%
- Groundwater 3-6 feet below grade	3	1%	2	1%	5	1%	3	1%	9	10%	3	2%
- Groundwater 6-10 feet below grade	6	1%	7	2%	12	2%	13	4%	1	1%	4	2%
Systems with Soil Information	117	25%	142	48%	138	25%	100	28%	42	49%	87	54%
- Soils with Significant Clay Content	27	6%	37	12%	16	3%	14	4%	24	28%	47	29%
- Sand	12	3%	24	8%	36	7%	36	10%	2	2%	3	2%
Systems with Slope Information	16	3%	91	31%	16	3%	14	4%	70	81%	61	38%
- Slope greater than 30%	0	0%	4	1%	5	1%	2	1%	22	26%	11	7%
- Slope greater than 50%	0	0%	0	0%	4	1%	0	0%	8	9%	2	1%
Systems with Info. on Depth to Bedrock	0	0%	1	0%	1	0%	10	3%	18	21%	9	6%
- Depth less than 10 feet	0	0%	1	0%	0	0%	5	1%	16	19%	9	6%
- Depth less than 5 feet	0	0%	1	0%	0	0%	1	0%	5	6%	0	0%
Class I Parcels	0	0%	0	0%	0	0%	0	0%	0	0%	0	0%
Class II Parcels	460	100%	253	85%	382	70%	47	13%	76	88%	144	89%
Class II-C Parcels **	87	19%	130	44%	297	54%	7	2%	60	70%	49	30%
Repair Actions, Jan. 1986 - Dec., 1993	172	37%	74	25%	192	35%	91	25%	43	50%	63	39%
Systems with Tank Pumping, 1988-1993	222	48%	128	43%	311	57%	167	47%	47	55%	103	64%
Year Parcels Surveyed for Failures	1994		1994		1992		1993		1993		1993	
- Number of Parcels Surveyed					389	71%	269	75%	76	88%	119	74%
- Number of Leachfield Failures					6	2%	8	3%	2	3%	3	3%
- Number of Greywater Bypasses					38	10%	36	13%	1	1%	11	9%
- Number of Systems Performing OK					326	84%	196	73%	73	96%	79	66%

TABLE H-2: cont.

DATA ELEMENTS	San Lorenzo Woods		Pasatiempo		Paradise Park		Mount Hermon		Lower Zayante	
Developed Parcels (Systems) in Database	115		1064		249		496		185	
Systems with Parcel Size Information	115	100%	1061	100%	249	100%	495	100%	183	99%
- Parcels less than 15,000 sq. ft.	63	55%	337	32%	240	96%	412	83%	59	32%
- Parcels less than 7,500 sq. ft	29	25%	23	2%	230	92%	245	49%	24	13%
- Parcels less than 5,000 sq. ft.	10	9%	10	1%	173	69%	90	18%	14	8%
Records with Leachfield Information	70	61%	769	72%	121	49%	247	50%	86	46%
- Leachfields Meeting Standards for Size	51	44%	547	51%	76	31%	186	38%	69	37%
Records with Age of System	67	58%	799	75%	119	48%	274	55%	97	52%
- Systems Installed 1986-1993	21	18%	175	16%	34	14%	71	14%	26	14%
- Systems Installed 1980-1985	5	4%	124	12%	33	13%	48	10%	17	9%
- Systems Installed Before 1980	41	36%	500	47%	52	21%	155	31%	54	29%
Systems with Stream Setback Information	47	41%	80	8%	25	10%	113	23%	33	18%
- Stream Setback less than 250 ft.	47	41%	77	7%	25	10%	113	23%	33	18%
- Stream Setback less than 100 ft.	25	22%	13	1%	12	5%	41	8%	3	2%
- Setback less than 100 ft, but undeter.	7	6%	52	5%	9	4%	39	8%	21	11%
- Stream Setback less than 50 ft.	6	5%	5	0%	2	1%	8	2%	0	0%
- Stream Setback less than 25 ft.	1	1%	1	0%	0	0%	1	0%	0	0%
Systems with Groundwater Information	21	18%	151	14%	8	3%	23	5%	34	18%
- Groundwater less than or equal to 3 ft	13	11%	10	1%	0	0%	0	0%	2	1%
- Groundwater 3-6 feet below grade	5	4%	35	3%	1	0%	6	1%	8	4%
- Groundwater 6-10 feet below grade	3	3%	27	3%	0	0%	8	2%	12	6%
Systems with Soil Information	41	36%	478	45%	56	22%	176	35%	69	37%
- Soils with Significant Clay Content	21	18%	130	12%	6	2%	21	4%	6	3%
- Sand	2	2%	234	22%	29	12%	110	22%	39	21%
Systems with Slope Information	58	50%	25	2%	0	0%	36	7%	4	2%
- Slope greater than 30%	4	3%	1	0%	0	0%	0	0%	0	0%
- Slope greater than 50%	8	7%	0	0%	0	0%	0	0%	0	0%
Systems with Info. on Depth to Bedrock	2	2%	24	2%	2	1%	0	0%	0	0%
- Depth less than 10 feet	2	2%	9	1%	0	0%	0	0%	0	0%
- Depth less than 5 feet	1	1%	5	0%	0	0%	0	0%	0	0%
Class I Parcels	0	0%	0	0%	0	0%	0	0%	0	0%
Class II Parcels	76	66%	0	0%	0	0%	81	16%	0	0%
Class II-C Parcels	36	31%	0	0%	0	0%	46	9%	0	0%
Repair Actions, Jan. 1986 - Dec., 1993	39	34%	223	21%	52	21%	108	22%	36	19%
Systems with Tank Pumping, 1988-1993	47	41%	485	46%	50	20%	164	33%	98	53%
Year Parcels Surveyed for Failures	1993		1993				1991-92		1994	
- Number of Parcels Surveyed	50	43%	653	61%			466	94%		
- Number of Leachfield Failures	1	2%	26	4%			15	3%		
- Number of Greywater Bypasses	10	20%	15	2%			58	12%		
- Number of Systems Performing OK	30	60%	566	87%			358	77%		

Table H-3 Total Number of Parcels with Constraints And Expected Types of Onsite System Upgrades

For Major Communities:
Felton, Glen Arbor, Ben Lomond, Boulder Creek, Kings Creek

Primary Constraint	Secondary Constraint STREAM SETBACK 25–50 FT			50–100 FT			100–250 FT			over 250 FT		
GROUNDWATER <3 FT	3			6			55			184		
	90%	Pu	3	75%	WH	5	75%	WH	41	30%	NC	55
	5%	H	0	25%	M	2	25%	M	14	45%	WH	83
	5%	M	0							25%	M	46
3–6 FT	7			40			104			364		
	90%	Pu	6	10%	NC	4	30%	S	31	50%	S	182
	10%	MPF	1	65%	Pu	26	35%	NC	36	40%	NC	146
			0	5%	WH	2	20%	WH	21	5%	WH	18
				20%	MPF	8	15%	MPF	16	5%	MPF	18
6–10 FT	7			164			58			201		
	90%	Pu	6	40%	S	66	80%	S	46	90%	S	181
	10%	PF	1	30%	Pu	49	20%	NC	12	10%	NC	20
				20%	NC	33						
				10%	PF	16						
Over 10 ft	11			183			348			1241		
	90%	Pu	10	90%	S	165	90%	S	313	90%	S	1117
	10%	MPF	1	10%	NC	18	10%	NC	35	10%	NC	124
CLAY SOIL	95											
	10%	S	10									
	70%	NC	67									
	10%	PF	10									
	10%	H	10									
PARCEL SIZE <5000 SQ FT	183											
	80%	NC	146									
	10%	F	18									
	10%	H	18									
5000–7500 SQ FT	337											
	70%	S	236									
	30%	NC	101									

Shaded blocks are parcels with limited constraints.

Summary	Number	%	Actual Upgrades 1986–1993
Total Parcels	3591		490
Standard Systems	2346	65%	56%
Nonconforming Systems	797	22%	34%
Pump Up Systems	100	3%	7%
Alternative Systems	150	4%	2%
Haulaway Systems	198	5%	1%

1986–93 upgrade figures are for Class I parcels only.

- First number indicates the number of parcels with that constraint or combination of constraints. All parcels are accounted for once in this table: under the major constraint(s) for that parcel.
- Percentages are estimates of the extent to which a particular alternative will be utilized on parcels with that general constraint or combination of constraints (see narrative).
- Numbers on right are calculated estimates of the number of parcels utilizing that alternative,

POTENTIAL ALTERNATIVES:

S – Standard, Conventional Septic System
NC – Nonconforming System, Reduced Size, and/or Reduced Groundwater Separation (over 250' from a stream)
Pu – Pump Up System (to another disposal area on the parcel)
F – Sand Filter
P – Pressure Distribution System
M – Mounded Bed System
H – Full-time Haulaway
WH – Winter Haulaway

Where there are concentrations of parcels requiring nonstandard upgrades, community disposal systems may be the best alternative, if feasible.
A more detailed explanation of the table is presented on the following page.

Explanation of Constraint Tabulations by Area (Tables 4, H-3 - H-5, H-7 - H-9)

Following is a more detailed description of the contents of the above listed tables. Table 4 (H-3), which tabulate the totals for all areas, is used as an example. These tables show the following information:
- the number of parcels affected by shallow groundwater, minimal setbacks from streams, clay soil, and small parcel size.
- the types of improvements which will likely be required to comply with repair standards, given the presence of those constraints.
- a tabulation of the total parcels expected to require the various types of disposal system improvements, including a tally of the actual upgrades completed in the Class I areas from 1986-1993, as compared to the proposed repair standards.

All parcels are accounted for only once in the table. If a parcel has more than one set of constraints, it is only listed under the most significant constraint type. Parcels with groundwater less than 10 feet and/or stream setbacks less than 250 feet are listed under stream and groundwater constraints, even though they may also be affected by clay soil or small parcel size. The shaded parcels are those with few constraints to standard conventional onsite system use.

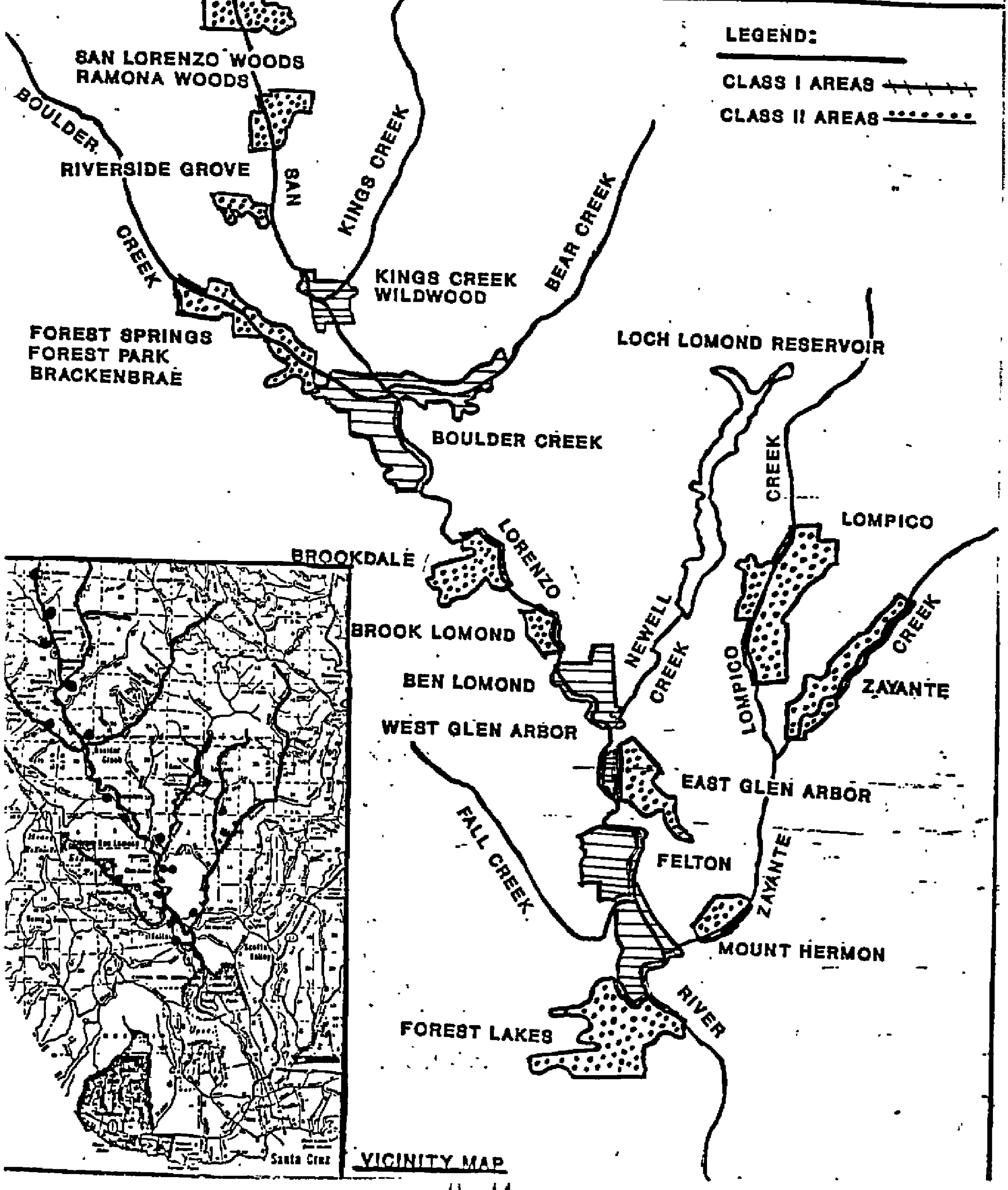
The total number of parcels affected by a particular constraint or combination of constraints is indicated at the top of each cell. For example, for all areas, 40 developed parcels have winter groundwater levels that are between 3 and 6 feet from the surface and have existing disposal systems that are between 50 and 100 feet from a stream.

Below the numbers of parcels in each category are letters which indicate the types of system improvements which would be acceptable for those constraints, with a percentage which estimates the expected occurrence of each type of system improvement. The percentages are set estimates and the number of parcels is calculated from those percentages and from the number of parcels in that category.
<u>It is important to note that the calculated number of parcels are rounded, and do not necessarily add up exactly.</u>
For example, on the same group of 40 parcels with groundwater 3 to 6 feet below the surface and stream setback between 50 and 100 feet, it is estimated that:
- 10% would utilize nonconforming systems which had less than the standard amount of leachfiled area as a result of needing to use very shallow trenches to meet the groundwater setback of 5 feet.
- 65% would utilize an effluent pump to dispose of the effluent to a location on the parcel more than 100 feet from the stream where the required groundwater setback is only 3 feet. (Probably half of these would use standard trenches and half would use nonconforming trenches.)
- 5% would utilize winter haulaway to comply with groundwater separation requirements during the winter. This option would only be allowed if none of the other options were available for that particular parcel.
- 20% would utilize an alternative system (mound, sand filter, or pressure distribution system) to meet the requirements for enhanced treatment in close proximity to a stream and or groundwater. The proportion of parcels expected to utilize alternative systems is generally low due to the current high cost of such systems. It is expected that the proportion will increase by at least 10% over what is indicated in this table by reducing the cost of alternatives, providing low cost financing for alternative systems, and providing more incentives/requirements for alternative system use.
- No standard systems would be utilized with these constraints, unless an effluent pump were used.

The actual numbers of parcels expected to utilize each onsite alternative is indicated for each constraint type and is totalled in the lower right side of the table. Full-time haulaway and winter haulaway are combined.

Information on constraints for each parcel is taken from the parcel database for planning purposes. However, because of the extrapolations and generalizations made, actual site conditions and the type of system improvements required must be determined at the time of system repair.

Figure H-1 AREAS OF SAN LORENZO VALLEY



EVALUATION OF COMMUNITY DISPOSAL ALTERNATIVES

The County has conducted feasibility studies of alternatives for wastewater disposal in the areas identified as having widespread occurrence of parcels that cannot meet repair requirements for a standard system. These studies specifically looked at potential alternatives for community wastewater disposal facilities, as compared to onsite system upgrades and management. This work has provided the basis for identifying and developing the most feasible approach for each area.

The following areas have been evaluated for community disposal projects:
- Central and Southern Boulder Creek
- Brook Lomond
- Ben Lomond (a portion)
- Glen Arbor
- El Solyo Heights
- Felton (south central portion)

During the preparation of the feasibility studies, the county utilized the assistance of an engineering consultant to:
- delineate the areas needed to be served,
- identify all alternatives which should be considered,
- evaluate the technical feasibility of each alternative,
- estimate the projected costs, and
- identify the preferred alternative.

Specific tasks of these studies are described below.

Background Data and Service Areas

Environmental Health staff assembled considerable background information relative to site conditions and system performance in the areas to be evaluated. This includes:
- soil and groundwater information from monitoring wells and permit records,
- lot-by-lot septic system survey information, - water quality data from monitoring wells and streams draining the areas,
- maps of soils and geology of surrounding areas,
- maps of problem areas for which wastewater disposal alternatives are needed,
- preliminary identification of potential wastewater disposal sites.

The consultant reviewed the available information for accuracy and adequacy, and identified any additional technical work and fieldwork needed. The consultant performed a reconnaissance field inspection of the study areas and potential wastewater disposal sites. They delineated service areas based upon site information and the repair standards.

Wastewater Characteristics

Service Area - The areas requiring use of community disposal facilities and/or nonconventional wastewater disposal alternatives will be identified. Alternative service area boundaries may also be identified, depending on the nature (and capacity) of the recommended alternative and the potential need to serve new uses within the commercial centers. The potential to serve additional parcels will also be considered if there is adequate capacity and there are economies of scale which would make community disposal as cost-effective as conventional onsite disposal.

Wastewater Flows - Estimates of daily and peak sewage flows were developed based on average water use figures and land uses in each area. Separate determinations were also be made of potential wastewater flows from vacant parcels which could be developed as a result of construction of a wastewater disposal project. Projected flow volumes took into account the potential for increased flows that would result from a project, as well as the potential for flow reduction through water conservation.

Potential Alternatives

Various wastewater disposal alternatives that might be applicable to the different areas were identified and described. Alternatives that were considered included:
- Use of a septic tank effluent pumping system to pump effluent to localized community cluster systems (conventional leachfields, mounded bed systems, shallow pressure dosed trenches, or other suitable disposal systems).
- Use of a package treatment plant with land disposal of effluent.
- Use of sand or pea gravel filters for treatment.
- Potential for use of constructed wetlands.
- Seasonal spray disposal of treated effluent.
- Use of winter haulaway systems and/or individual onsite sewage disposal (including use of non-conventional systems).
- Use of nonconforming systems with increased inspection and management.
- Surface and subsurface drainage improvements to improve onsite system performance.

Evaluation of Feasibility

A technical and cost analysis of alternatives identified above was prepared for comparative purposes. For each alternative, the following factors were discussed:
- Engineering feasibility
- Environmental impact
- Community acceptability
- Compliance with regulations including Basin Plan requirements
- Costs: Construction costs, on lot property owner costs, and operation and maintenance costs were estimated for each alternative. This included estimates for cost of environmental impact mitigation and/or compliance with regulations.

The results of the feasibility studies are contained in two reports by Questa Engineering: Boulder Creek Wastewater Feasibility Study (1991) and San Lorenzo Valley Community Wastewater Feasibility Studies (1994). The general analysis and conclusions are summarized in the following section, and more specific findings are presented for each area in the subsequent sections.

GENERAL COMPARISON OF ONSITE AND OFFSITE DISPOSAL OPTIONS

The feasibility studies evaluated wastewater disposal options for the approximately 750 parcels with significant constraints to conventional onsite disposal that are located in Boulder Creek, Brook Lomond, Ben Lomond, Glen Arbor, and Felton. The list of potential disposal alternatives was generalized to two alternatives: 1) improved onsite disposal, and 2) community disposal with sewage collection and offsite disposal. General aspects of these are summarized below.

Improved Onsite Disposal

Under this alternative, systems would be upgraded in conformance with the repair standards and procedures described in Appendix C. Taking into account the constraints for these areas, Questa projected that the following types of improvements would result:

- Standard System Upgrades (including minor repairs) (150 parcels (20%), average capital cost of $2,500, average annual operations cost of $70). These systems would fully meet the requirements for a standard system. Bedroom additions and additions over 250 square feet would be allowed.

- Nonconforming System Upgrades (300 parcels (40%), average capital cost of $4,500, average annual operations cost of $150). These parcels would not fully meet standard system requirements due to high groundwater and/or small parcel size; remodels would be limited to a one time addition of up to 250 square feet and no bedroom additions would be allowed. A notice of nonstandard system would be recorded on the deed and an annual inspection charge of approximately $75 would be charged.

- Alternative Systems (150 parcels (20%), capital cost of $20,000, average annual operations cost of $325). Using alternative technologies such as mounds or sand filters, most of these systems would be able to meet standards to allow major remodels and bedroom additions. They would also have a lower operating cost than haulaway systems. A notice of nonstandard system would be recorded on the deed and an annual inspection charge of approximately $150 would be charged.

- Haulaway Systems (150 parcels (20%), average capital cost of $2,300, average annual operation cost of $1,725). These parcels would not even meet requirements for nonconforming systems due to very high groundwater, clay soils, and/or very small parcel size. Year round or seasonal haulaway of effluent would be required. Remodels would be limited to a one time addition of up to 250 square feet and no bedroom additions would be allowed. A notice of nonstandard system would be recorded on the deed and an annual inspection charge of approximately $150 would be charged.

The onsite alternative would also include close system management by the property owner and supervision by the County through annual inspections of all nonstandard systems.

Community Offsite Disposal

Under this alternative, each of the 750 parcels would have a septic tank connected to a small diameter sewer system which would convey the effluent to a gravel filter or package treatment plant at a remotely located community leachfield. Advance secondary treatment would be provided, with nitrogen removal to reduce nitrogen concentrations to meet drinking water standards (5-10 mgN/L) prior to disposal. Projected per parcel costs of these projects range from $19,700 to $26,800, with annual operating costs of $636 to $876 per parcel. Costs for each area are summarized in Table H-3b. It is anticipated that the projects would be constructed and operated by the County, with financing provided through low cost loans through the State Revolving Fund.

Comparison of Alternatives

Each alternative has been evaluated according to several factors, as discussed below:

- Engineering Feasibility - Both alternatives appear to be feasible. The technologies and approaches for onsite management have been utilized in the County with good success for several years. The technologies for community disposal have also been utilized successfully in other areas. Additional site specific work and geotechnical evaluations would be needed to fully confirm the suitability of the proposed community disposal sites.

- Environmental Impact and Water Quality Protection - Short term impacts from construction of both alternatives should be easily mitigated. Both alternatives will result in a significant reduction in septic system failures, with resultant improvements in bacteriologic quality and public health. Improved onsite management has already reduced the number of failures in these areas from approximately 75 per year to less than 15 per year. Community systems would probably reduce the frequency of sewage overflows to less than 10 per year, however, the use of collection systems can create the potential for overflows of much larger volume, resulting from line breaks and malfunctions of pump stations. Nitrate discharge from the affected parcels to ground water and surface water would be reduced for both alternatives: 20-30% for onsite improvements, and 40-80% for community treatment and disposal. However, the use of community disposal systems would concentrate the disposal of wastewater in several locations, one of which is in a primary groundwater recharge area for the designated "sole-source aquifer" which is a major water source for the San Lorenzo Valley. This potential impact would need further evaluation, and possibly greater mitigation through more complete treatment before disposal.

- Flexibility, Reliability, Regulatory Compliance, and Restrictions on Property Use - Improved onsite sewage disposal would result in a higher level of reliability than current substandard disposal methods. Although it would bring all parcels into compliance with repair requirements, 60% of the parcels would be served by either nonconforming systems or haulaway systems. Both of these require a higher level of oversight by the property owner and the County, and both result in continued restriction on property use. Use of community disposal systems would provide a higher level of reliability and compliance with the Regional Board's Basin Plan standards. It would also allow expansion of uses and development of vacant commercial parcels.

- Cost - The costs of the two alternatives are compared in Table H-3a.

Community disposal is significantly more expensive than improved onsite disposal, except for the case of haulaway systems, for which the annual operation costs are much greater than the operations cost for a community disposal system. Alternative systems have an equivalent or lower capital cost, but their annual operation costs are less than half of the operation cost of community disposal. Community disposal does not appear to be affordable without outside grant funding (Questa, 1991). Grant funding may be available for some commercial areas where economic development grants are available. But most of the parcels to be served are residential, with mean incomes too high to qualify for any of the grants available to small rural communities.

- Cost-Effectiveness - Protection of water quality and public health should be the primary factor in determining the most appropriate project. However, cost becomes a strong secondary factor when the difference in amount of water quality protection is low and the difference in cost is high. Bacteriologic water quality and public health impact is related primarily to the number of sewage failures. Figure H-1a shows a plot of the expected reduction in number of failures as compared to cost under different alternatives for the Boulder Creek Class I area (611 parcels). The Management Plan has already significantly reduced failures. Only some additional benefit would be gained from community offsite disposal or increased use of alternative systems. The difference between the alternatives in relation to nitrate levels in the River is expected to be low. It is estimated that 5% of the summer nitrate load in the River comes from the 750 parcels considered in this feasibility study SCCHSA, 1992). Improved onsite disposal will reduce this contribution to 3.5-4%, while community systems with nitrogen removal will reduce it to 1-3%, resulting in nitrate levels in the River declining to 96-98% of their current levels. Under current funding options, the benefits of community disposal over improved onsite disposal do not seem to justify the significantly higher costs.

- Community Acceptance - Improved onsite wastewater management has already had good community acceptance. Many people have been willing to voluntarily upgrade their system. Although acceptance may decline slightly as the standards are tightened up further as proposed in the Management Plan, the approach is expected to continue to be well accepted by a large majority of the community. Community disposal projects are not currently well accepted by the community. Reasons for disfavor include: concern over environmental impacts of collection systems and disposal sites, relatively high cost, lack of a perceived need for offsite disposal, and potential growth inducement. A few community members favor such projects in order to revitalize commercial areas, allow development of undevelopable lots, reduce the financial impacts of haulaway systems or expensive alternative systems, and/or provide the "best long term solution" for wastewater disposal in the San Lorenzo Valley. A minority of community members would like to see the whole Valley sewered.

General Recommendations

Based on the above discussion, it is recommended that the proposed community disposal projects not be pursued at this time, primarily due to a limited cost to benefit ratio. Projects could be pursued at a future time if grant funding becomes available or if there is a community desire to develop a project to serve a more limited area, such as the commercial center of downtown Boulder Creek. Community disposal projects will also be considered for other areas of the Watershed where such projects might be more suitable.

Use of Nonconforming Systems

There has been some consideration to modifying the onsite disposal option to limit the number of nonconforming systems allowed and requiring more use of alternative systems. This could be accomplished by limiting the conditions under which nonconforming systems are allowed, or limiting the size of building addition which would be allowed. In evaluating the use of nonconforming systems, the following points should be taken into account:

1. Under the proposed standards and current financing options, it is estimated that approximately 40% of the parcels in the community areas will ultimately use nonconforming systems and 4% will use alternative systems. It is further estimated that 75% of the nonconforming systems will be nonconforming due to reduced groundwater separation, 15% will be nonconforming due to inadequate disposal area and 5% will have inadequate expansion area.

2. Nonconforming systems must still meet the primary requirements for water quality protection: stream setback and separation from groundwater. The exceptions allowed for nonconforming systems are mitigated by other conditions:
   a. With a nonconforming system, the groundwater setback may be reduced from 3 feet to 1 foot at distances greater than 250 feet from a stream, spring or well. This represents a great improvement over existing systems which are frequently submerged in groundwater during the winter. The literature indicates that 250 feet is adequate distance for removal of pathogens even under saturated conditions. This is supported by findings for the San Lorenzo Valley.
   b. Under current regulations, a Nonconforming system may have only 30-99% of the required disposal area or less than 100% expansion area. The reduced area is mitigated by the requirement for water conservation devices, which can easily reduce water usage to less than 50% of the design flow. Annual inspections for these types of nonconforming systems are required to ensure the systems are not being overloaded.

3. If the standard requirements for water quality protection cannot be met, a nonconforming system will not be allowed, and an alternative or haulaway system will be required. In that situation, the additional cost of an alternative system provides very significant benefits for water quality protection and improved operation. However, alternative systems should not necessarily be required where a conventional gravity system would function well without significant water quality impact. Most alternative systems are more complex and have pumping systems. Thus they may actually be more

susceptible to malfunction or overflow than a nonconforming system. A blanket requirement for use of alternative systems instead of nonconforming systems for repairs would have little projected effect on the reduction of failures, as shown in the Alternative System option in Figure H-1a.

4. Nonconforming systems are meant to serve existing uses, not new or expanded uses. If a large remodel or bedroom addition is proposed, then the septic system must be upgraded to fully meet the requirements for either a standard conventional system or an alternative system. On the other hand, the County believes that each property owner should be allowed to do a minor remodel and minor addition to their home even if their septic system cannot fully meet standard requirements. This maintains property values and living conditions in the neighborhoods and allows the property owner a reasonable use of their property. Allowing remodels also helps promote upgrades of substandard systems to at least the level of a nonconforming system, providing significant improvement in the method of wastewater disposal. Currently, additions of up to 250 square feet are allowed with a nonconforming system.

In order to more tightly regulate the use of nonconforming systems, it is recommended that the minimum acceptable disposal area be increased from 30% to 50%. It is also recommended that a further incentive to use of alternative systems be provided by offering low cost loans through a local program financed primarily from State Revolving Fund. This could probably be expected to increase the proportion of alternative systems to 20-25%.

Table H–3b
San Lorenzo Valley Community Wastewater Feasibility Studies
Summary of Alternative Costs

Area	Number of Parcels	Onsite System Alternative			Community Sewer Alternative		
		Total Capital Cost (x1000)	Capital Cost /Parcel	Monthly Operat. Cost /Parcel	Total Capital Cost (x1000)	Capital Cost /Parcel	Monthly Operation Cost /Parcel
Boulder Creek	184	$1,600.8	$8,700	$37.00	$4,912.0	$26,700	$57.00
Brook Lomond	75	$731.2	$9,750	$42.00	$2,850.8	$27,400	$73.00
Ben Lomond	52	$543.4	$10,500	$38.00	$2,385.7	$45,900	$61.00
Glen Arbor	157	$1,572.5	$10,000	$42.00	$3,495.9	$22,300	$67.00
Combined Project	284	$2,847.1	$10,025	$41.00	$6,956.7	$25,500	$53.00
El Solyo Heights	51	$534.9	$10,500	$43.00	$1,368.1	$26,800	$61.00
Felton	193	$1,983.5	$10,300	$45.00	$3,808.6	$19,700	$64.00

Source: Questa Engineering Corp., 1994

Figure H-1a

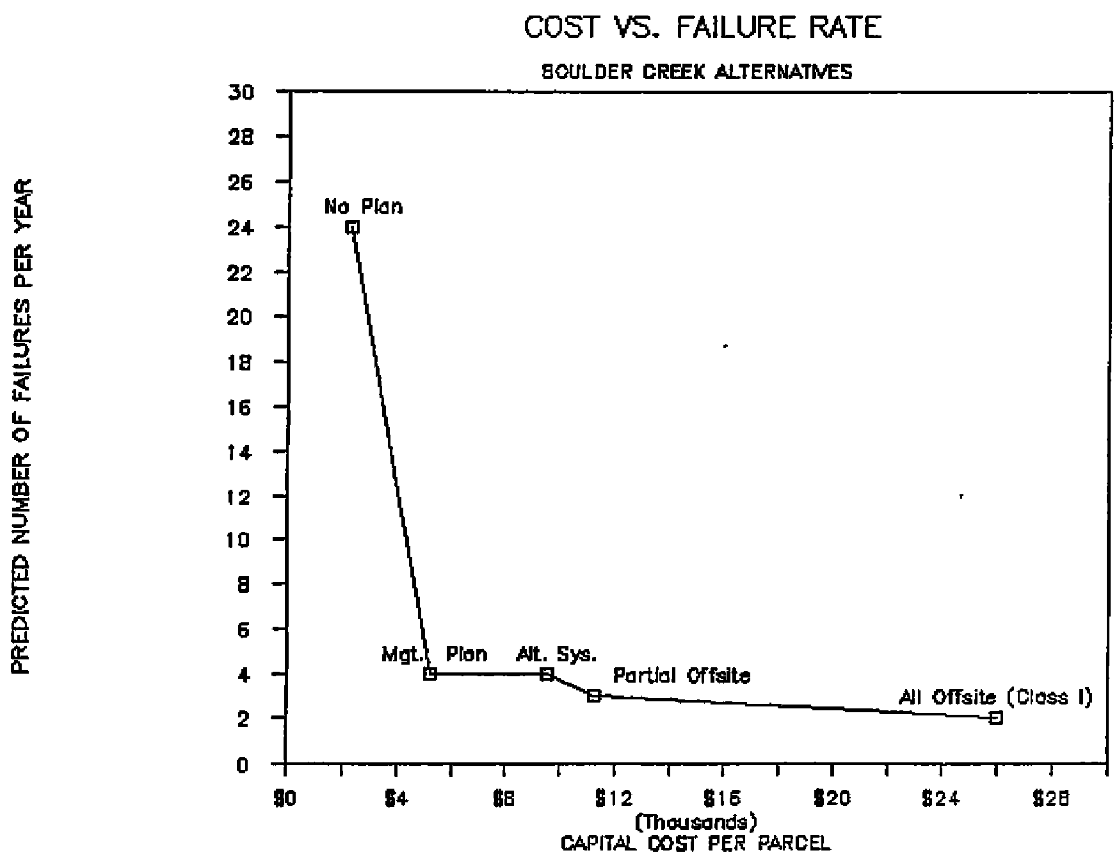
Comparison of Alternative Wastewater Management Options for Boulder Creek Class I Area

Capital Costs and Predicted Failure Rates

METHOD	COST/LOT for Method	ALTERNATIVES: All Offsite	Partial Offsite	Increased Alt. Sys.	Proposed Mgt. Plan	No Plan
		(Number of Parcels Using Indicated Method)				
Community Offsite	$26,000	611	184	0	0	0
Standard System	$4,500	0	290	366	366	100
Nonconforming Sys.	$4,500	0	120	0	170	200
Alternative System	$20,000	0	12	205	35	0
Haulaway	$1,500	0	5	40	40	20
Total Cost (x1000)		$15,886	$6,877	$5,807	$3,172	$1,380
Average per parcel		$26,000	$11,255	$9,504	$5,191	$2,259
Failures/year (est.)		2	3	4	4	24

Notes on Projected Failure Rates:

- Failure rate for No Plan is the failure rate observed in 1987, prior to Plan implementation.
- Failure rate for Proposed Management Plan is the rate observed in 1992-93.
- Failure rate for Increased Alternative Systems is not expected to be lower, due to pump failures.
- Failure Rate for All Offsite Disposal is half of the spill rate for the Santa Cruz Sewer System.
- Failure rate for Partial Offsite is estimated to be between Mgt Plan and All Offsite.



RECOMMENDATIONS BY AREA

The following sections discuss the constraints and current performance of wastewater disposal systems in each area. Recommendations and strategies for making system improvements are described. This analysis primarily addresses the former Class I areas and surrounding areas, which have been previously identified as the most problematic areas in the San Lorenzo Watershed. Similar analysis and recommendations for other areas will be presented in future status reports and incorporated in the Management Plan as the areas are evaluated under the wastewater management program.

Greater Kings Creek

The greater Kings Creek area includes 800 developed parcels in the neighborhoods of Wildwood, Redwood Grove, River Rights, Lower Kings Creek, Sunbeam Woods, Blue Ridge, Madrona and Sequoia Drives, Lower Two Bar Creek, and Juanita Woods. About 65% of the parcels were included in the Kings Creek/Wildwood Class I area and the remainder are unclassified. This was the first area to be surveyed under the current program. The survey took place during the period of April 2 to May 15, 1986, with approximately 700 (90%) of the parcels surveyed. This was the wettest period that occurred during the first five years of the management program (1986-91), with a total annual rainfall amount almost 50% above the normal amount. About 15 boreholes were drilled at various locations in the study area to better determine soil and groundwater conditions. Information for this area is presented in Table H-2, Table H-4, and Figure H-2.

Site conditions in this area are quite variable. Most of the parcels have soils with a significant clay content, although the amount of clay only appears to be particularly problematic in a few areas, consisting of about 10% of the parcels. At least 45% of the parcels experience winter groundwater less than 10 feet from the surface, but less than 5% have persistent groundwater less than 3 feet from the surface. Other potential constraints in some areas are presence of steep slopes, shallow depth to bedrock, and close proximity to streams. Small lot size is also a significant constraint, with 21% of the parcels less than 6,000 square feet in size.

During the survey in 1986, 7% of the surveyed parcels were found to have sewage failures, and 11% were found to have greywater bypasses, with the other 82% of the systems performing satisfactorily. The problems tended to be concentrated in neighborhoods with small parcels, clay soils, and old systems. A higher failure rate (22%) was found in the unclassified areas than in the Class I area (14%).

The potential for cluster systems in the Kings Creek area was investigated, but there were no particularly favorable sites for combined disposal of effluent, and individual onsite repairs were determined to be most suitable. Only two systems could not be satisfactorily repaired and were placed on partial winter haulaway requirements. About 50% of the repair actions in the Kings Creek area during the recent study period resulted from the survey efforts. The repair compliance rate for Kings Creek is similar to overall rates for the Watershed, with all but 16% of the repair actions made since January 1986 resulting in systems which meet the current repair requirements for a standard system. A recheck of repaired systems during March of 1991 showed all but 10% performing well. Stronger repair procedures and increased use of alternative systems in repairs will prevent the continued occurrence of inadequately repaired systems.

The analysis contained in Table H-4 indicates that up to 65 parcels will ultimately require alternative or haulaway systems and 180 parcels will likely utilize nonconforming systems. Many of these parcels are found in two general areas: the Madrona Drive area (with small lots and clay soils) and the Kings Creek Road area (with clay soils and high groundwater). The remaining parcels that probably cannot meet requirements for a standard repair are scattered throughout the study area.

The lack of any large undeveloped area that is particularly favorable for sewage disposal in or around the Kings Creek area limits the technical feasibility of a community disposal system with nearby disposal. This was confirmed during the earlier Class I and II studies conducted in 1981-84. It is possible that some limited use of small cluster systems may be feasible. This will be further evaluated on a case by case basis when individual repairs are required.

The prognosis is good for ongoing onsite wastewater disposal in the greater Kings Creek area. Despite the presence of significant potential constraints to septic system functioning, over 80% of the systems were found to be performing without any sign of failure during the wet winter of 1986. Most of the failing systems could be adequately upgraded using conventional systems. During the wet winter of 1993, the overall failure rate was down to 1.7%.

Table H-4 GREATER KINGS CREEK
Number of Parcels with Constraints
And Expected Types of Onsite System Upgrades

Primary Constraint	Secondary Constraint STREAM SETBACK 25–50 FT	50–100 FT	100–250 FT	over 250 FT
GROUNDWATER				
<3 FT	2 90% Pu 2 5% H 0 5% M 0	0 75% WH 0 25% M 0	8 75% WH 6 25% M 2	12 30% NC 4 45% WH 5 25% M 3
3–6 FT	4 90% Pu 4 10% MPF 0 0	26 10% NC 3 65% Pu 17 5% WH 1 20% MPF 5	24 30% S 7 35% NC 8 20% WH 5 15% MPF 4	59 50% S 30 40% NC 24 5% WH 3 5% MPF 3
6–10 FT	3 90% Pu 3 10% PF 0	53 40% S 21 30% Pu 16 20% NC 11 10% PF 5	6 80% S 5 20% NC 1	12 90% S 11 10% NC 1
Over 10 ft	3 90% Pu 3 10% MPF 0	94 90% S 85 10% NC 9	92 90% S 83 10% NC 9	191 90% S 172 10% NC 19
CLAY SOIL	53 10% S 5 70% NC 37 10% PF 5 10% H 5			
PARCEL SIZE				
<5000 SQ FT	45 80% NC 36 10% F 5 10% H 5			
5000–7500 SQ FT	71 70% S 50 30% NC 21			

Shaded blocks are parcels with limited constraints.

Summary

	Number	%
Total Parcels	758	
Standard Systems	468	62%
Nonconforming Systems	183	24%
Pump Up Systems	44	6%
Alternative Systems	33	4%
Haulaway Systems	30	4%

– First number indicates the numer of parcels with that constraint or combination of constraints. All parcels are accounted for once in this table: under the major constraint(s) for that parcel.
– Percentages are estimates of the extent to which a particular alternative will be utilized on parcels with that general constraint or combination of constraints (see narrative).
– Numbers on right are calculated estimates of the number of parcels utilizing that alternative,

POTENTIAL ALTERNATIVES:

S – Standard, Conventional Septic System
NC – Nonconforming System, Reduced Size, or Reduced Groundwater separation (over 250' from a stream)
Pu – Pump Up System (to another disposal area on the parcel)
F – Sand Filter
P – Pressure Distribution System
M – Mounded Bed System
H – Full-time Haulaway
WH – Winter Haulaway

Where there are concentrations of parcels requiring nonstandard upgrades, community disposal systems may be the best alternative, if cost-effective and affordable.

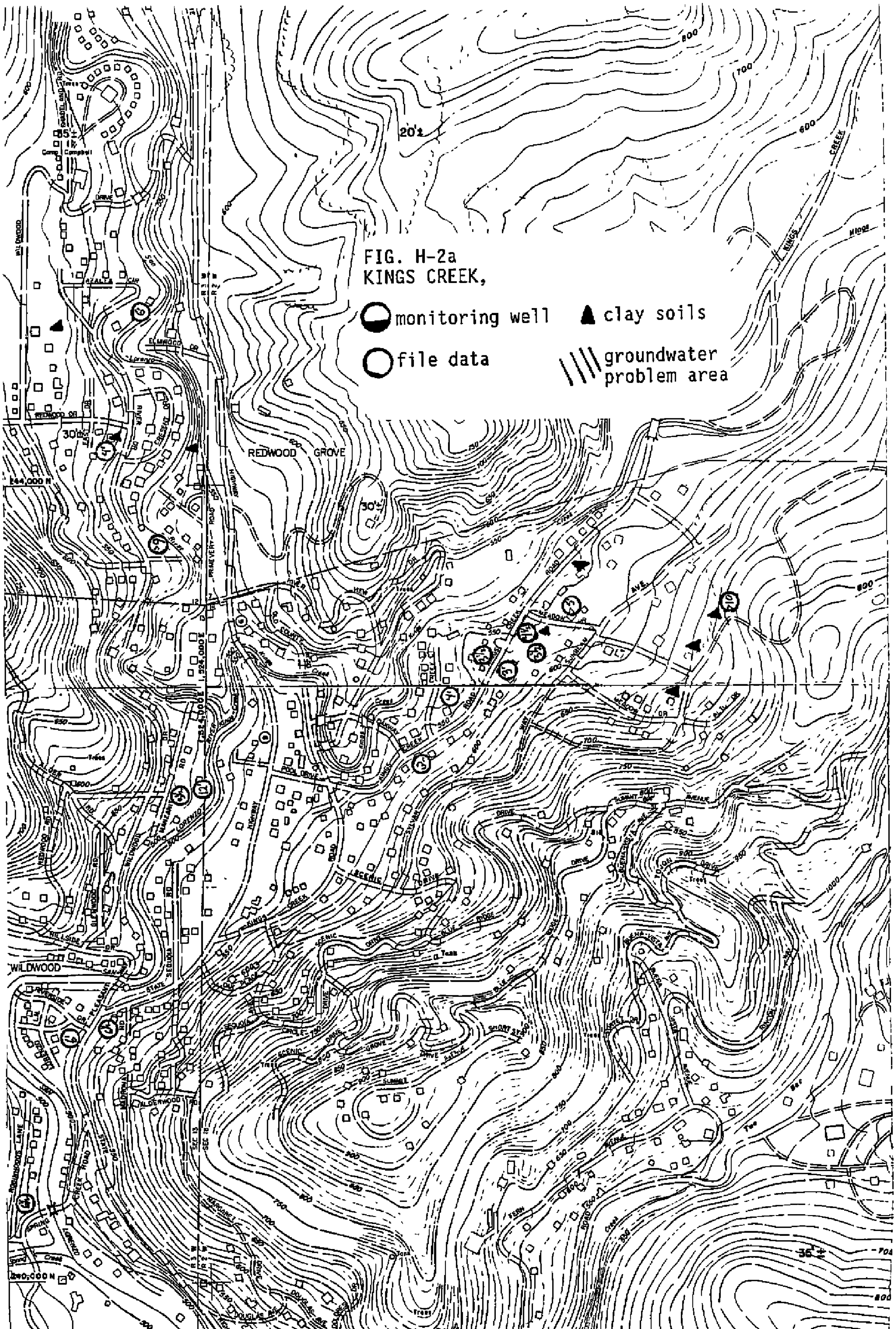


FIG. H-2a
KINGS CREEK,
monitoring well
clay soils
file data
groundwater problem area
REDWOOD GROVE
WILDWOOD
KINGS CREEK

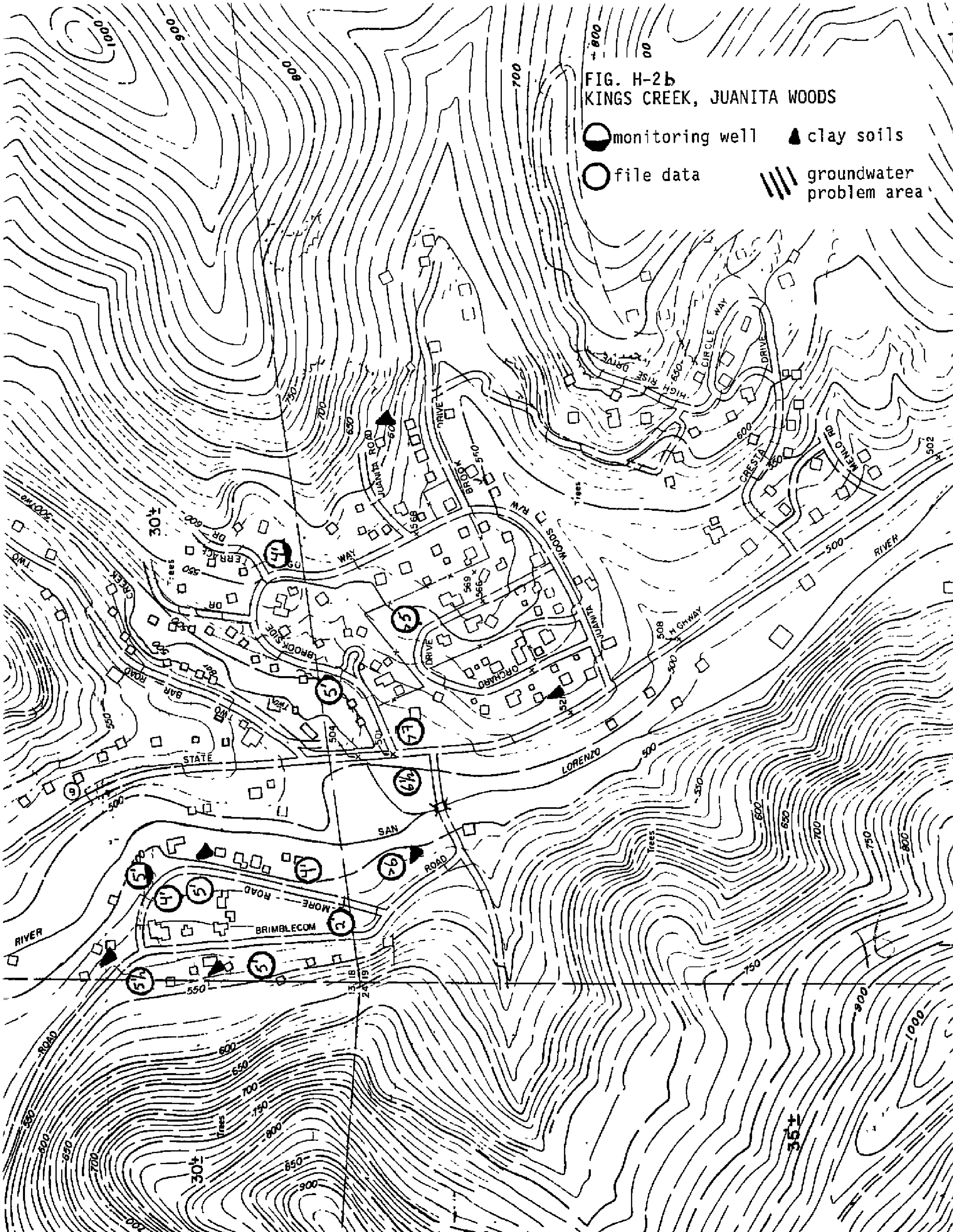


FIG. H-2b
KINGS CREEK, JUANITA WOODS
monitoring well
clay soils
file data
groundwater problem area

Boulder Creek

The Boulder Creek area includes the developed areas centered around downtown Boulder Creek, and extending a short distance up the valleys along Bear Creek, Boulder Creek, and the San Lorenzo River. As delineated for this project, the greater Boulder Creek area includes 800 parcels, about 80% of which are in the designated Boulder Creek Class I area and the remainder are unclassified. Information for Boulder Creek is available from the database, from the survey program, and from special soil and groundwater investigations conducted in the main town area. The available data is summarized in Table H-2 and H-5. Groundwater data is shown in Figure H-3.

Most of the Boulder Creek area consists of relatively deep, permeable alluvial and colluvial soils, with some localized areas of clay soils. The area receives substantial subsurface flow from the adjacent mountains, and the toe of the slopes and adjacent flat areas are subject to high groundwater and spring activity. To determine the extent of high groundwater, about 20 boreholes were constructed in the town area during 1986. This work was expanded in 1988 by the construction of eight monitoring wells (20 feet deep) and 13 soil borings in the immediate downtown area, to determine the depth of bedrock, level of groundwater, and extent of localized clay layers.

The work that was done indicated that the groundwater problems do exist but not to the extent originally expected. Although most parcels in the developed town of Boulder Creek experience winter groundwater levels less than 10 feet from the surface, groundwater persists at levels less than 3 feet from the surface on fewer than 5% of the parcels. These parcels are mostly concentrated in a three block area downtown and west of Highway 9 (Figure H-3a). Much of this same area is also underlain by a dense clay lens. A secondary area of high seasonal groundwater is located at the southern end of town. Winter groundwater levels in most of the other areas were found to be over 6 feet deep.

No indications of cumulative bacterial contamination of groundwater were found, although nitrate levels are significantly elevated. At some locations nitrate levels in the perched saturated zones occasionally exceed drinking water standards. Although State policy recognizes this shallow groundwater as useable groundwater, these shallow zones are not currently used for domestic water supply. Moreover, these shallow zones could not legally be tapped in the future, due to the required setbacks between wells and septic systems, and the requirement to seal off the top 50 feet of a well. Consideration could be given to enacting a specific prohibition against wells in the areas with excessive nitrate levels.

Groundwater underlying Boulder Creek probably contributes nitrate to the San Lorenzo River. In addition, there have been repeated instances of septic system failure, with discharge of untreated effluent to roadside areas and eventually to the River. During the early period of the management program, the River downstream from Boulder Creek had the highest incidence of contamination by sewage of any area in the watershed. Conditions have improved significantly during recent years.

In the winter of 1987, 460 parcels in the Boulder Creek area were surveyed for failures, and in 1988, an additional 90 parcels in the area were surveyed. Of all the parcels surveyed during both years, 24 parcels (4%) were found to have surfacing sewage, and 40 (7%) had greywater bypasses. In addition, 18 systems in the immediate downtown area have been required to use haulaway systems for a number of years. The haulaway systems are all located in the area with very high groundwater and clay soil discussed above. During the survey, 85% of the parcels in the Boulder Creek area were observed to be performing adequately.

All but 20% of the recent repair actions in Boulder Creek resulted in systems that met the current repair requirements for a standard system. In the wet period of March 1991, reinspection of systems repaired as a result of the survey showed 90% to be performing satisfactorily. The occurrence of persistent problems was 1% (10% of the original 11% of the total systems). These persistent problems will be addressed by implementation of long term solutions for Boulder Creek. In 1993, the overall failure rate (including greywater bypasses) was down to 1.3% (from 11%).

Based on the information presented in Table H-5, it is expected that at least 63% of the parcels in the Boulder Creek area can be upgraded using standard systems. Virtually all the estimated 300 parcels requiring nonstandard solutions are limited by high groundwater, with additional constraints on some parcels of clay soil, small lot size, and proximity to streams. Most of these would be expected to eventually utilize nonconforming systems, mounded bed systems, sand filters, pressure distribution systems, winter haulaway systems, or connection to a community disposal system. Approximately 100 of the parcels requiring nonstandard solutions are located in scattered locations which could not benefit from a community disposal system. The remainder could potentially be served by a community system. Up to 45 of the parcels in the immediate downtown area will require either connection to a community disposal system or use of haulaway systems, due to the particularly severe constraints on those parcels.

A feasibility study was completed for a community sewage disposal project to serve approximately 105 developed parcels and 15 undeveloped parcels in the downtown business core area (Questa, 1991). A followup study addressed the South Boulder Creek area (Questa, 1994). The tentative service areas (Figure H-3b,c) were developed to include the problem parcels in and around the downtown core and to provide sewage disposal capacity needed to allow new uses and expansion of existing uses in that immediate area, consistent with the recently adopted Town Plan.

The following alternatives were considered but not recommended:

1. Onsite Repairs and Haulaway Systems - Under this alternative, properties would continue to be served by individual sewage disposal systems: conventional systems, alternative systems, or haulaway systems, depending on site constraints. Average annual costs for the 80 parcels served would be $1750 (assuming 8% amortization of capital costs over 20 years; capital and O&M costs from Questa (1991)). If State Revolving Funds could be obtained for this option (at 3% interest over 20 years for a $20,000 alternative system), annual costs could be as low as $1670 per parcel. This alternative could eliminate septic failures, but was initially considered less desirable because it might not achieve full compliance with Regional Board orders and it would not allow any new uses in the commercial area.

2. Use of Local Mound Systems - This alternative would utilize mound systems on available vacant lots to dispose of sewage from 24 parcels. Annual cost per parcel could be $3000 (assuming 3% financing could be obtained from the State Revolving Fund). This alternative was rejected because it would only serve half the problem parcels, and there was significant community objection to locating disposal areas in the middle of town.

3. Treatment Plant with Local Leachfields - This alternative had a similar cost and service capacity as alternative 2. Although it was technically superior to Alternative 2, it was rejected for the same reasons.

4. Collection, Treatment, and Disposal at the Harmon Site - This alternative would provide for the collection, treatment, and disposal of effluent for 80 parcels at a site immediately uphill from the town. Annual cost per connection was estimated to be $2175 (capital and O&M figures from Questa (1991), assuming 3% financing of capital costs over 20 years). Although this project would serve all the problem parcels at a cost slightly less than the preferred alternative, it had limited excess capacity to serve marginal parcels or new uses.

A preferred project was identified based on the work of Questa and several public meetings. This project would have the following features:
- All properties will have shared or individual septic tanks, with collection of effluent by small diameter sewers and septic tank effluent pumping (STEP) units.
- Sewage will be transmitted by 3 pump stations through a 20,000 linear foot 4 inch transmission line up State Highway 236 to the Boulder Creek Country Club (Figure H-3d).
- Effluent treatment will be provided by an upgraded plant currently operated by County Service Area No. 7 (CSA 7). Improved treatment would provide for 75% reduction in effluent nitrogen levels (final effluent quality of 5 mg/L total N).
- Effluent disposal would be by subsurface disposal in leachfields.
- Another option would be to provide effluent treatment at a new treatment plant which would serve Boulder Creek only and which would be located down closer to the disposal area. This option had a lower capital cost and a higher operation cost than using the existing treatment plant.
- A further alternative would provide for replacement of the existing CSA 7 plant with a new plant to serve both Boulder Creek and CSA 7 which would produce an effluent that met Title 22 standards, allowing golf course irrigation 8 months of the year. Irrigation has been found to result in at least 90% nitrogen removal. This would increase capital costs by less than 1%.

Capital costs for the preferred project are estimated to be $3,397,600, or $29,040 per connection. With inclusion of approximately 80 parcels in the South Boulder Creek area, the cost per connection dropped to $26,700 (Table H-6). Monthly operation and maintenance costs are estimated to be $57 per connection. If a State Revolving Fund loan was the only source of financing (at 3% for 20 years), the total annual cost per connection would be $2480. The consulting engineer has indicated that without some kind of grant financing, this is not an affordable project (Questa, 1991).

Potential grant funding might come from economic development grants to facilitate expansion of business opportunities in the downtown area. A citizen committee evaluated various funding mechanisms to finance a variety of capital improvement projects in the San Lorenzo Valley, including community sewage disposal projects. However, they were not able to identify any readily available funds. At this time, it is not expected that a project will be pursued unless the funding situation changes. Additionally, if there is adequate community interest, possibly spurred by economic development grants, a smaller project for just the commercial district could be pursued at the Harmon site.

In the absence of a community disposal project, the County will continue to actively promote improved onsite disposal systems, as well as frequent inspections of the area. Soils are generally permeable in most areas and there is good potential for use of alternative systems. Vacant lots in both the downtown area and the South Boulder Creek area could be used to provide sewage disposal for surrounding properties. This might be able to support some expanded use of developed properties.

Table H-5 **GREATER BOULDER CREEK**

Number of Parcels with Constraints And Expected Types of Onsite System Upgrades

Primary Constraint	Secondary Constraint STREAM SETBACK: 25-50 FT			50-100 FT			100-250 FT			over 250 FT		
GROUNDWATER	0			0			10			39		
<3 FT	90%	Pu	0	75%	WH	0	75%	WH	8	30%	NC	12
	5%	H	0	25%	M	0	25%	M	3	45%	WH	18
	5%	M	0							25%	M	10
3-6 FT	0			8			34			136		
	90%	Pu	0	10%	NC	1	30%	S	10	50%	S	68
	10%	MPF	0	65%	Pu	5	35%	NC	12	40%	NC	54
			0	5%	WH	0	20%	WH	7	5%	WH	7
				20%	MPF	2	15%	MPF	5	5%	MPF	7
6-10 FT	3			100			20			73		
	90%	Pu	3	40%	S	40	80%	S	16	90%	S	66
	10%	PF	0	30%	Pu	30	20%	NC	4	10%	NC	7
				20%	NC	20						
				10%	PF	10						
Over 10 ft	1			35			45			137		
	90%	Pu	1	90%	S	32	90%	S	41	90%	S	123
	10%	MPF	0	10%	NC	4	10%	NC	5	10%	NC	14
CLAY SOIL	8											
	10%	S	1									
	70%	NC	6									
	10%	PF	1									
	10%	H	1									
PARCEL SIZE	49											
<5000 SQ FT	80%	NC	39									
	10%	F	5									
	10%	H	5									
5000-7500 SQ FT	59											
	70%	S	41									
	30%	NC	18									

Shaded blocks are parcels with limited constraints.

Summary

	Number	%
Total Parcels	757	
Standard Systems	437	58%
Nonconforming Systems	194	26%
Pump Up Systems	39	5%
Alternative Systems	42	6%
Haulaway Systems	45	6%

- First number indicates the numer of parcels with that constraint or combination of constraints. All parcels are accounted for once in this table: under the major constraint(s) for that parcel.
- Percentages are estimates of the extent to which a particular alternative will be utilized on parcels with that general constraint or combination of constraints (see narrative).
- Numbers on right are calculated estimates of the number of parcels utilizing that alternative,

POTENTIAL ALTERNATIVES:

S - Standard, Conventional Septic System

NC - Nonconforming System, Reduced Size, or Reduced Groundwater separation (over 250' from a stream)

Pu - Pump Up System (to another disposal area on the parcel)

F - Sand Filter

P - Pressure Distribution System

M - Mounded Bed System

H - Full-time Haulaway

WH - Winter Haulaway

Where there are concentrations of parcels requiring nonstandard upgrades, community disposal systems may be the best alternative, if cost-effective and affordable.

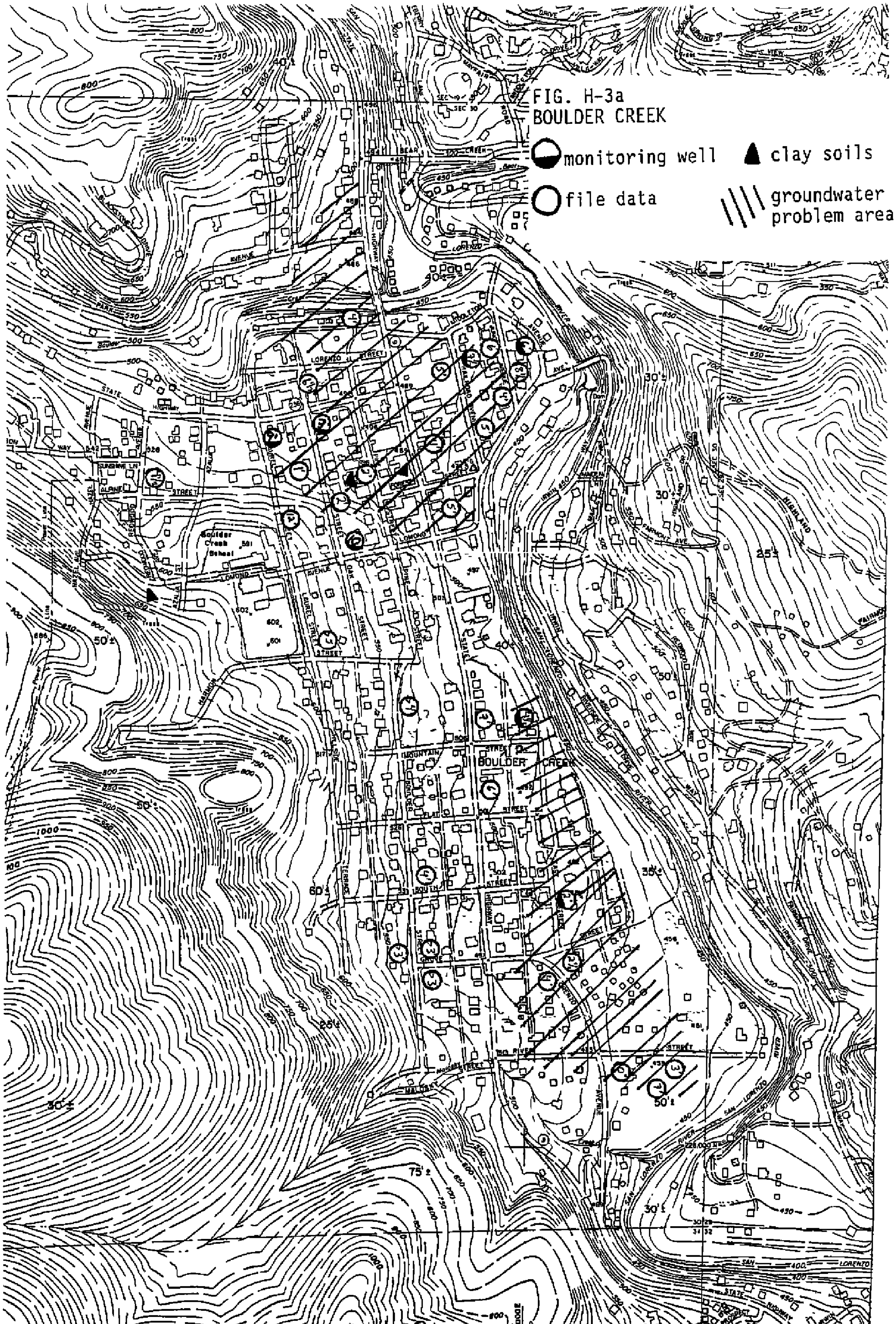
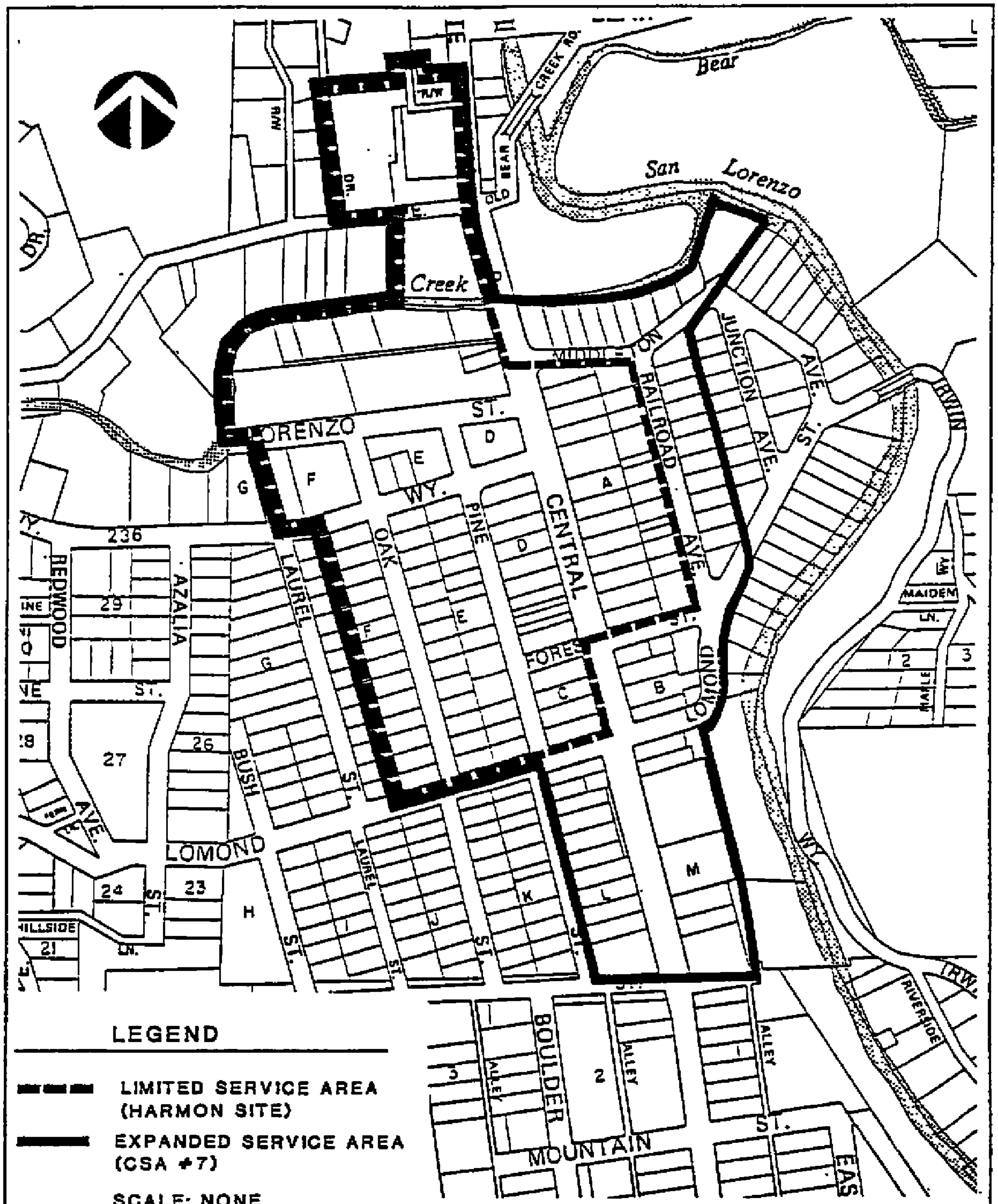


FIG. H-3a
BOULDER CREEK
monitoring well
clay soils
file data
groundwater problem area
BOULDER CREEK



Questa Engineering Corporation Point Richmond, California	BOULDER CREEK WASTEWATER FEASIBILITY STUDY PROPOSED SEWER SERVICE AREAS	Figure H-3b

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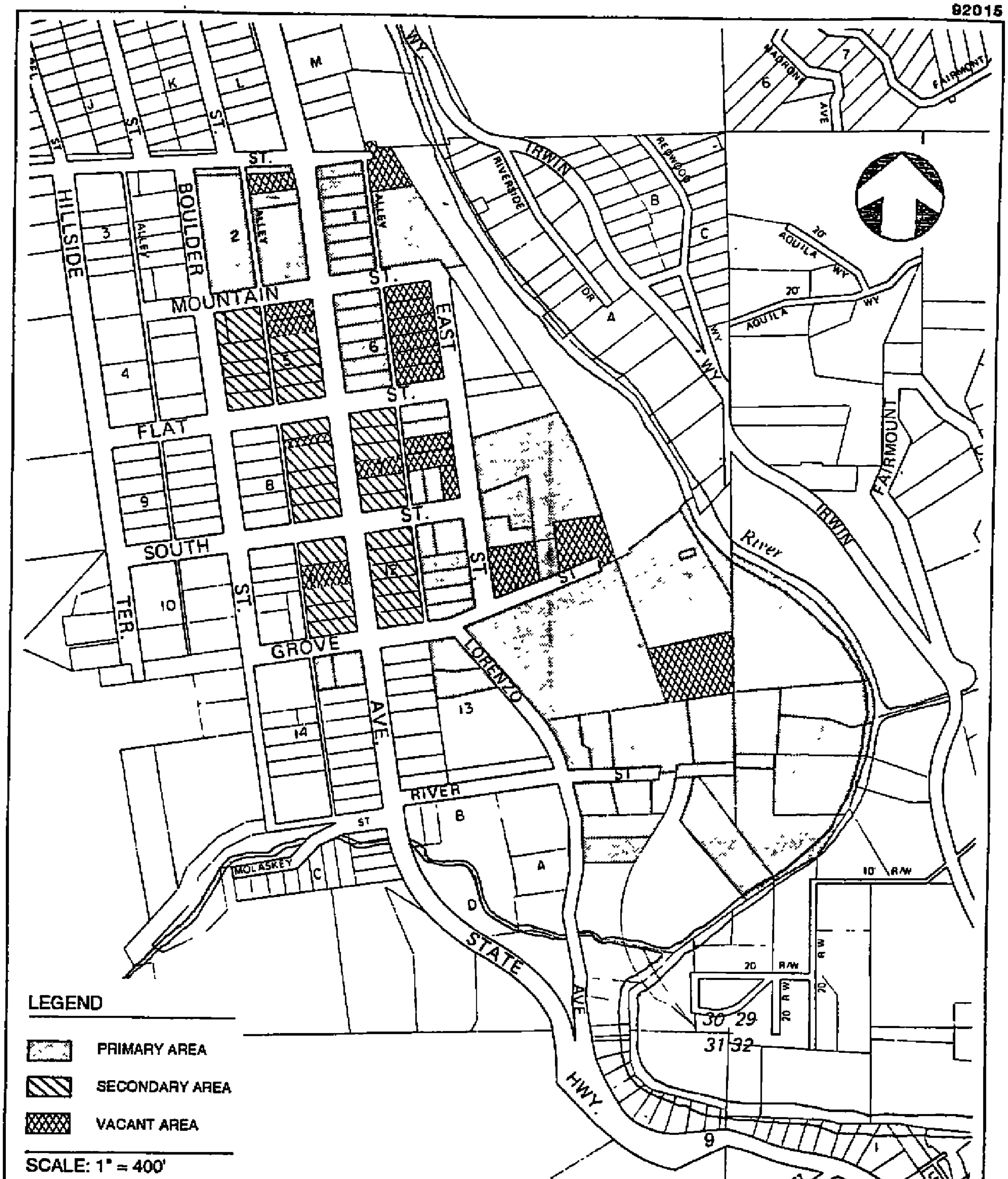
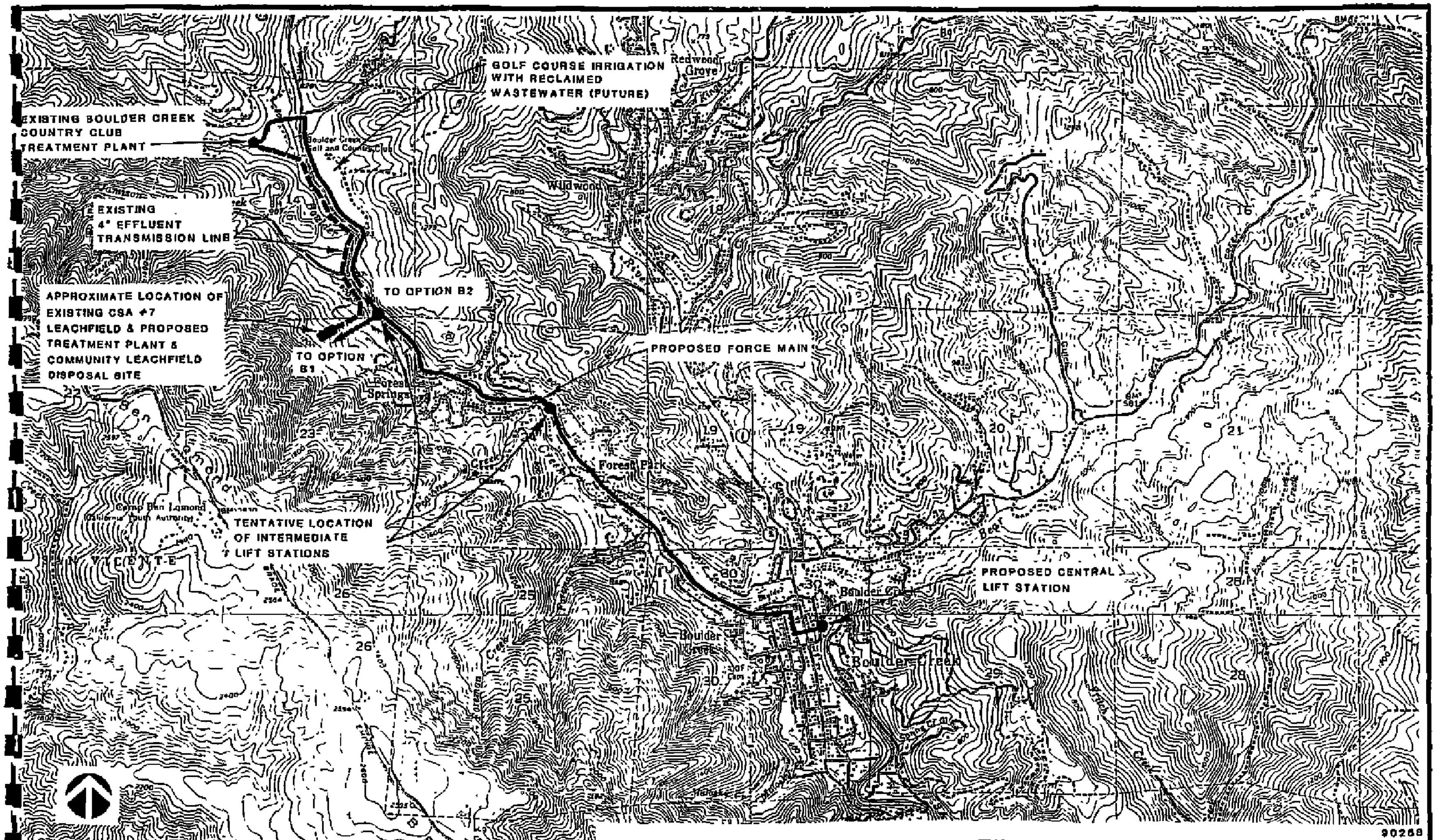


QUESTA ENGINEERING, INCORPORATED POINT RICHMOND, CALIFORNIA	SOUTH BOULDER CREEK WASTEWATER FEASIBILITY STUDY PROPOSED SEWER SERVICE AREA	FIGURE H-3c



Questa Engineering Corporation Point Richmond, Calif.	COMMUNITY WASTEWATER FACILITY FOR EXPANDED SERVICE AREA (ALT. B) CSA #7 TREATMENT AND DISPOSAL	Fig. H-3d

TABLE H-6

BOULDER CREEK STUDY AREA
PROJECT COST SUMMARY

ALTERNATIVE	COMMUNITY DISPOSAL TO CSA #7-NEW PACKAGE PLANT ALTERNATIVE #3A		COMMUNITY DISPOSAL TO CSA #7-EXISTING PLANT ALTERNATIVE #3B	
Collection System	**Primary Service Area**	**Total Service Area**	**Primary Service Area**	**Total Service Area**
CAPITAL COSTS: • Pre-Treatment • Effluent Collection Piping • Transmission Line • Treatment • Lift Station • Disposal (including land)	 484,600 997,500 997,500 321,300 320,000 430,800	 526,600 1,149,000 997,500 424,900 320,000 551,300	 484,600 997,500 1,425,000 91,800 320,000 430,800	 526,600 1,149,000 1,425,000 121,400 320,000 551,300
Sub-Total	3,551,700	3,969,300	3,749,700	4,093,300
Engineering & Administration (20%)	710,300	793,900	749,900	818,700
Total Capital Cost	4,262,000	4,763,200	4,499,600	4,912,000
ANNUAL O & M COST: • O & M Cost - Haul-Away • O & M Cost - Others	 124,900	 141,600	 111,700	 125,100
Total O & M Cost	124,900	141,600	111,700	125,100
PRESENT WORTH: • Capital Cost • Present Worth O & M Cost - Haul-Away • Present Worth O & M Cost - Others	 4,262,000 - 1,182,000	 4,763,200 - 1,340,000	 4,499,600 - 1,057,000	 4,912,000 - 1,183,900
Total Present Worth	5,444,000	6,103,200	5,556,600	6,095,900
UNIT COST: • Average Capital Cost Per Connection • Average O & M Monthly Cost/Connection • O & M Monthly Cost/Haul-Away	 26,100 64 -	 25,887 64 -	 27,600 57 -	 26,700 57 -

Ref.: 92015T.72B

Ben Lomond

The Ben Lomond area includes 780 developed parcels, including 610 developed parcels in the designated Ben Lomond Class I area. Characteristics are summarized in Table H-2 and H-7. In addition to file records, information has been provided by soil and groundwater investigations (15 boreholes) and system inspections during 1989 through 1991. Although this was a relatively dry period, efforts were made to conduct surveys during the wettest months, particularly in the areas known to have high groundwater.

Based on the current analysis, there are not any predominant constraints to septic system performance in most of the Ben Lomond area. Much of the area is underlain by well drained alluvial soils. There is one localized area where there is seasonal high groundwater less than 3 feet from the surface, and some pockets of clay soil. File records indicate less than 8% occurrence of significant past problems over the past 20 years. The recent surveys revealed a very low failure rate of 1% sewage failures and 7% greywater bypasses. A representative sample of all the repairs made in the Ben Lomond Class I area from January 1986 through June 1989 revealed that all but 10% resulted in systems that met the current repair requirements for a standard system. Total failure rates in 1993 were down to 0.5%. Historically, the water quality in Ben Lomond has been the best of any developed area in the Watershed. The area is well suited for continued use of onsite disposal systems.

Only 41 parcels (5%) are expected to utilize nonconventional disposal systems, with 144 (18%) expected to utilize nonconforming systems (Table H-7). Much of this is due to elevated groundwater. There is one residential area several blocks north of the commercial district that has a concentration of approximately 60 of these potentially problematic parcels (Figure H-4a). This is also the area where a significant number of failures were found during the survey. Successful repairs have been made by pumping effluent to higher levels on the property where there is greater groundwater separation. Most of the parcels are generally large enough to accommodate alternative systems.

A possible community disposal option to serve these properties was evaluated by Questa Engineering (1994) (Figure H-4b). Effluent would be collected and pumped 13,000 ft. to a disposal location in the sand hills above Hihn Road southwest of town (Figure H-4c). Advanced secondary treatment with nitrogen removal would be provided. If this project were combined with a project for Glen Arbor, the capital cost would be $25,500. For the reasons discussed previously under general recommendations, it is recommended that a community disposal system for Ben Lomond not be pursued at this time.

Table H-7 BEN LOMOND
Number of Parcels with Constraints
And Expected Types of Onsite System Upgrades

Primary Constraint	Secondary Constraint STREAM SETBACK: 25-50 FT			50-100 FT			100-250 FT			over 250 FT		
GROUNDWATER	0			0			6			21		
<3 FT	90%	Pu	0	75%	WH	0	75%	WH	5	30%	NC	6
	5%	H	0	25%	M	0	25%	M	2	45%	WH	9
	5%	M	0							25%	M	5
3-6 FT	0			0			12			48		
	90%	Pu	0	10%	NC	0	30%	S	4	50%	S	24
	10%	MPF	0	65%	Pu	0	35%	NC	4	40%	NC	19
			0	5%	WH	0	20%	WH	2	5%	WH	2
				20%	MPF	0	15%	MPF	2	5%	MPF	2
6-10 FT	0			8			14			55		
	90%	Pu	0	40%	S	3	80%	S	11	90%	S	50
	10%	PF	0	30%	Pu	2	20%	NC	3	10%	NC	6
				20%	NC	2						
				10%	PF	1						
Over 10 ft	4			48			92			366		
	90%	Pu	4	90%	S	43	90%	S	83	90%	S	329
	10%	MPF	0	10%	NC	5	10%	NC	9	10%	NC	37
CLAY SOIL	14											
	10%	S	1									
	70%	NC	10									
	10%	PF	1									
	10%	H	1									
PARCEL SIZE	27											
<5000 SQ FT	80%	NC	22									
	10%	F	3									
	10%	H	3									
5000-7500 SQ FT	73											
	70%	S	51									
	30%	NC	22									

Shaded blocks are parcels with limited constraints.

Summary

	Number	%
Total Parcels	788	
Standard Systems	599	76%
Nonconforming Systems	144	18%
Pump Up Systems	6	1%
Alternative Systems	16	2%
Haulaway Systems	23	3%

- First number indicates the numer of parcels with that constraint or combination of constraints. All parcels are accounted for once in this table: under the major constraint(s) for that parcel.
- Percentages are estimates of the extent to which a particular alternative will be utilized on parcels with that general constraint or combination of constraints (see narrative).
- Numbers on right are calculated estimates of the number of parcels utilizing that alternative,

POTENTIAL ALTERNATIVES:

S - Standard, Conventional Septic System
NC - Nonconforming System, Reduced Size, or Reduced Groundwater separation (over 250' from a stream)
Pu - Pump Up System (to another disposal area on the parcel)
F - Sand Filter
P - Pressure Distribution System
M - Mounded Bed System
H - Full-time Haulaway
WH - Winter Haulaway

Where there are concentrations of parcels requiring nonstandard upgrades, community disposal systems may be the best alternative, if cost-effective and affordable.

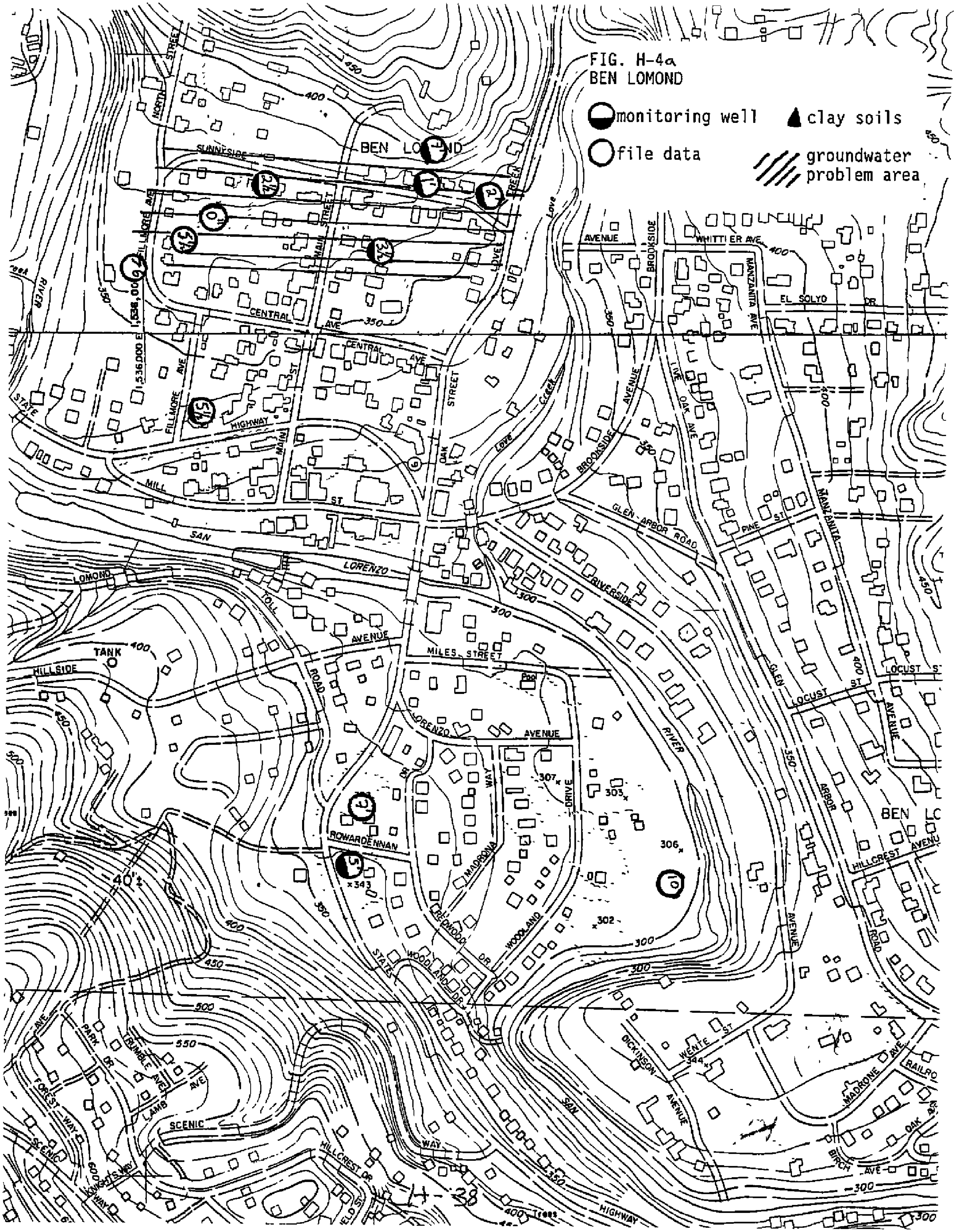


FIG. H-4a
BEN LOMOND
monitoring well
clay soils
file data
groundwater problem area
BEN LOMOND
SUNNYSIDE
NORTH STREET
MAIN STREET
FILLMORE AVE
CENTRAL AVE
LOVE STREET
WHITTIER AVE
BROOKSIDE AVENUE
MANZANITA AVE
EL SOLYO DR
STATE HIGHWAY
MILL ST
OAK STREET
LIVE OAK AVE
GLEN ARBOR ROAD
PINE ST
SAN LORENZO RIVER
RIVERSIDE
TOLL ROAD
LOMOND
HILLSIDE
TANK
MILES STREET
Pool
LORENZO AVENUE
LOCUST ST
ROWARDENNAN
MADRONA WAY
WOODLAND DRIVE
REDWOOD DR
GLEN ARBOR ROAD
HILLCREST AVENUE
WENTE ST
DICKINSON AVENUE
MADRONE AVE
RAILROAD
BIRCH AVE
PARK DR
TRUMBLE AVE
LAMB AVE
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1,538,000 E
H-28

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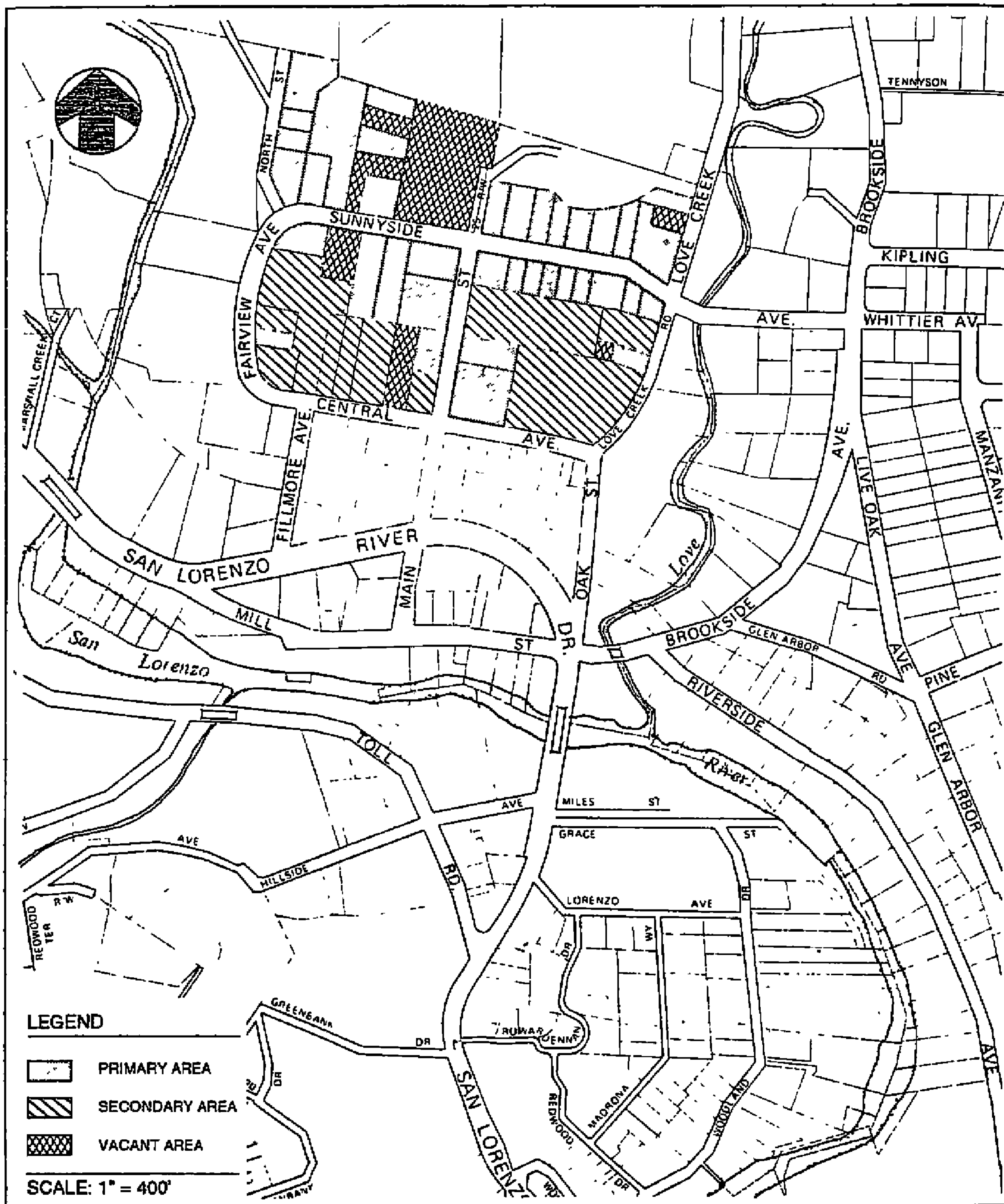
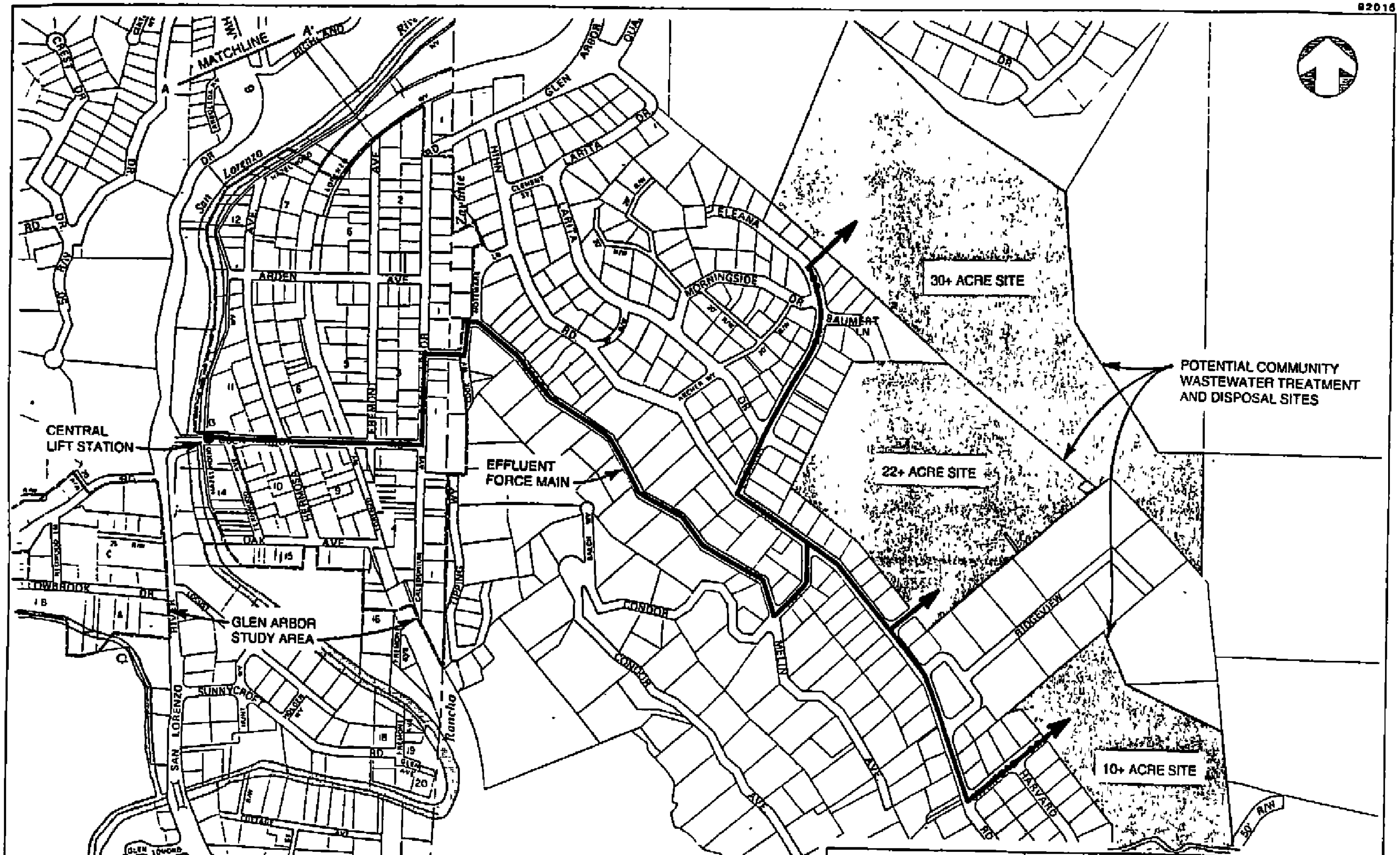


QUESTA ENGINEERING, INCORPORATED POINT RICHMOND, CALIFORNIA	BEN LOMOND WASTEWATER FEASIBILITY STUDY PROPOSED SEWER SERVICE AREA	FIGURE H-46



Questa Engineering Corporation
Point Richmond, California

Ben Lomond/GLEN ARBOR WASTEWATER FEASIBILITY STUDY
COMMUNITY WASTEWATER FACILITY ALTERNATIVE 2

Figure H4c

Glen Arbor

The Glen Arbor area is located immediately south of Ben Lomond, mostly on the east side of the River. The area includes almost 500 parcels, 30% of which are in the designated Glen Arbor Class I area, and 63% are in East Glen Arbor Class II area. Of the Class II parcels, only 15% could not be upgraded to meet Class II repair standards (CH2MHill, 1984). File data on groundwater has been supplemented by 5 additional groundwater monitoring wells. The area was surveyed for failures during 1990 and 1991.

The Glen Arbor area consists of three different zones. The upland areas are underlain by Santa Margarita sandstone, with excessively well drained soils and only very limited occurrence of groundwater less than 10 feet deep. Below this area are relatively steep slopes, some exceeding 50%, with shallow, well drained soils and little groundwater. The lower area is the Class I area, which occurs on generally well drained alluvial soils of the river terrace. There are a few pockets of clay soil, and widespread occurrence of shallow seasonal groundwater perched over bedrock. An estimated 30% of the parcels in the Class I area (8% of the parcels in the Glen Arbor area) have groundwater less than 3 feet from the surface for periods during the winter.

Much of the lower portion of Glen Arbor has a reputation as a septic system problem area due to high groundwater and some pockets of clay soil. During late winter and early spring months there previously have been occurrences of bacterial contamination from wastewater in the River downstream from Glen Arbor. Although the systems perform well in the upland (Class II) areas, the effluent discharge to the highly permeable sandy soils contributes to elevated nitrate levels in the River (SCCHSA, 1992).

In recent years a number of repairs utilizing shallow systems, mound systems, or pressure distribution systems have been used to successfully repair past problems in the lower Glen Arbor area. There is good potential to correct most problems in the lower (Class I) area using those types of systems. The parcels in the upper area would be able to continue use of conventional onsite systems. The impacts of nitrate discharge are expected to be mitigated by the current limitation on lot size for new development, and the requirement for more shallow systems when repairs take place (SCCHSA, 1992). More work is being done to investigate potential alternative designs to promote more nitrate removal in those sandy soils.

During the survey of Glen Arbor, a low failure rate of 2% was observed. This has been further confirmed by rechecks during the wet periods of 1992 and 1993. However, due primarily to seasonal presence of shallow groundwater, it is expected that up to 50 parcels in the Glen Arbor area may require use of nonconventional systems and 100 will utilize nonconforming systems (Table H-8). These parcels are generally concentrated in the lower flats (Fig H-5a).

A feasibility study was conducted to evaluate the potential for use of a community disposal system to serve the 160 parcels in the lower Glen Arbor area, the area of concentrated problems (Questa, 1994) (Figure H-5b). Effluent would be collected and pumped 6,000 ft. to a disposal location in the sand hills above Hihn Road southwest of town (Figure H-4c). Advanced secondary treatment with nitrogen removal would be provided. If this project were combined with a project for Ben Lomond, the capital cost would be

$25,500. If the project were constructed for the 160 parcels in Glen Arbor alone, the cost would be $22,300 per parcel, somewhat more expensive than an individual alternative system.

Although the project would include nitrogen removal, it would result in an increase in the nitrogen load to the Quail Hollow groundwater basin, which is a major water source for the San Lorenzo Valley and a part of the Santa Margarita sole source aquifer. Although there would be advantages of increased groundwater recharge, additional treatment and cost might be required for disposal to this location.

Given the cost and potential impacts of community disposal, it is recommended that community disposal not be pursued for lower Glen Arbor at this time. There seems to be good potential for improved onsite disposal and effective use of individual alternative systems.

Table H-8 GREATER GLEN ARBOR
Number of Parcels with Constraints
And Expected Types of Onsite System Upgrades

Primary Constraint	Secondary Constraint STREAM SETBACK 25-50 FT			50-100 FT			100-250 FT			over 250 FT		
GROUNDWATER			1			2			9			28
<3 FT	90%	Pu	1	75%	WH	2	75%	WH	7	30%	NC	8
	5%	H	0	25%	M	1	25%	M	2	45%	WH	13
	5%	M	0							25%	M	7
3-6 FT			2			2			14			41
	90%	Pu	2	10%	NC	0	30%	S	4	50%	S	21
	10%	MPF	0	65%	Pu	1	35%	NC	5	40%	NC	16
			0	5%	WH	0	20%	WH	3	5%	WH	2
				20%	MPF	0	15%	MPF	2	5%	MPF	2
6-10 FT			0			0			9			29
	90%	Pu	0	40%	S	0	80%	S	7	90%	S	26
	10%	PF	0	30%	Pu	0	20%	NC	2	10%	NC	3
				20%	NC	0						
				10%	PF	0						
Over 10 ft			0			3			5			240
	90%	Pu	0	90%	S	3	90%	S	5	90%	S	216
	10%	MPF	0	10%	NC	0	10%	NC	1	10%	NC	24
CLAY SOIL			6									
	10%	S	1									
	70%	NC	4									
	10%	PF	1									
	10%	H	1									
PARCEL SIZE			27									
<5000 SQ FT	80%	NC	22									
	10%	F	3									
	10%	H	3									
5000-7500 SQ FT			52									
	70%	S	36									
	30%	NC	16									

Shaded blocks are parcels with limited constraints.

Summary	Number	%
Total Parcels	470	
Standard Systems	318	68%
Nonconforming Systems	101	21%
Pump Up Systems	4	1%
Alternative Systems	18	4%
Haulaway Systems	29	6%

- First number indicates the numer of parcels with that constraint or combination of constraints. All parcels are accounted for once in this table: under the major constraint(s) for that parcel.
- Percentages are estimates of the extent to which a particular alternative will be utilized on parcels with that general constraint or combination of constraints (see narrative).
- Numbers on right are calculated estimates of the number of parcels utilizing that alternative,

POTENTIAL ALTERNATIVES:

S - Standard, Conventional Septic System
NC - Nonconforming System, Reduced Size, or Reduced Groundwater separation (over 250' from a stream)
Pu - Pump Up System (to another disposal area on the parcel)
F - Sand Filter
P - Pressure Distribution System
M - Mounded Bed System
H - Full-time Haulaway
WH - Winter Haulaway

Where there are concentrations of parcels requiring nonstandard upgrades, community disposal systems may be the best alternative, if cost-effective and affordable.

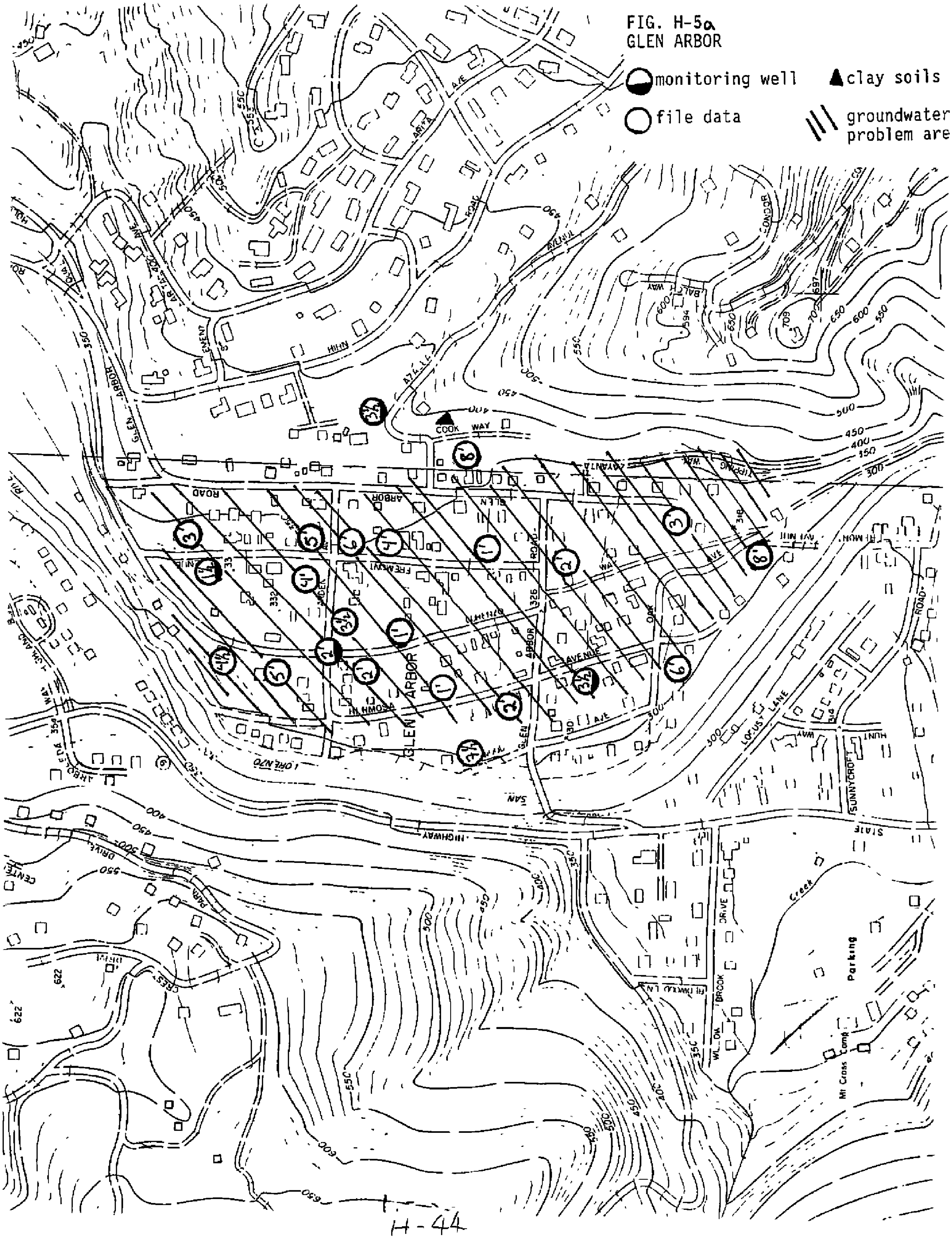
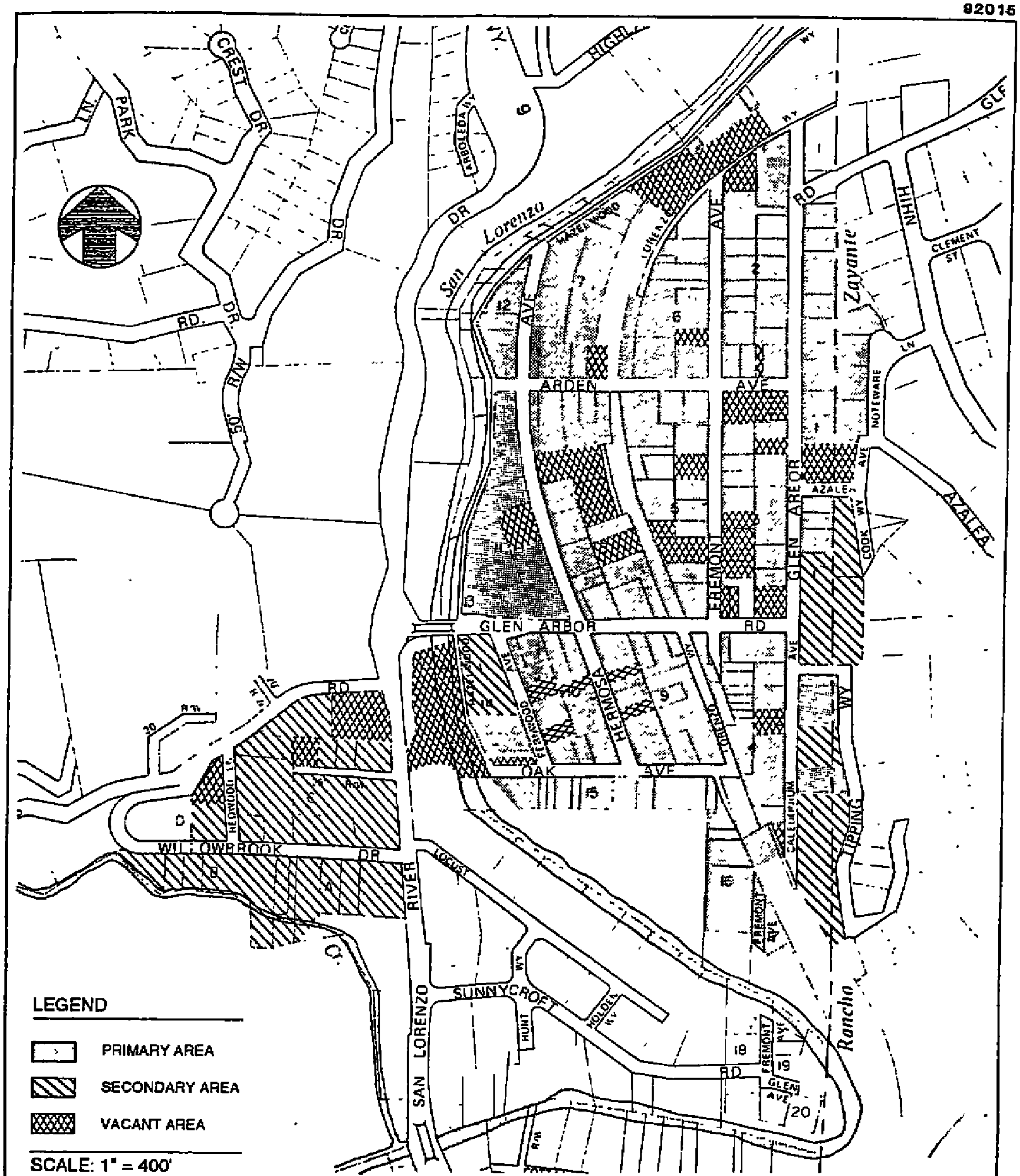


FIG. H-5a
GLEN ARBOR
monitoring well
clay soils
file data
groundwater
problem are
GLEN ARBOR ROAD
GLEN ARBOR AVE
COOK WAY
FREMONT
HERMOSA
LORENZO
AVENUE
OAK
LOCUST LANE
SUNNYCROFT
HUNT
STATE HIGHWAY
WILLOW BROOK DRIVE
CONDOR
BALCH WAY
ARBOR
SAN
Creek
Parking
Mt Cross Camp

92015



QUESTA ENGINEERING, INCORPORATED
POINT RICHMOND, CALIFORNIA

GLEN ARBOR WASTEWATER
FEASIBILITY STUDY
PROPOSED SEWER SERVICE AREA

FIGURE
H-5b

Felton

The Felton area includes 820 developed parcels, most of which are designated as Class I. This does not include the Class II parcels or unclassified areas of South Felton, which are discussed under the Forest Lakes area. Twenty boreholes were placed in the Felton area to check soils and monitor groundwater levels during the current study to supplement the considerable file data on groundwater (Figure H-6a). Most of the area was surveyed for failures in the summer, fall, and winter of 1991. El Solyo Heights, at the north end of the Class I area, was surveyed in 1989. Failure rates were moderate (7.5%, including greywater bypasses). Once these problems had been corrected, failure rates in 1993 had dropped to 0.6%.

There has not been any unusual incidence of septic system problems in most of the Felton area. However, two small creeks, Shingle Mill and Bull Creeks, have dense development very close to their banks and have occasionally shown indications of sewage contamination from failures. During the past five years, repair rates in Felton have been relatively low (3% per year) and the proportion of compliance with current standard system repair requirements for a representative sample of repairs has been high (94%) (SCCHSA, 1989).

Much of the Felton area is situated on a broad alluvial flat, with additional development extending up the adjacent hillsides. The primary constraints to septic system performance are high groundwater, and in some areas small lot size. There are also some areas of moderately clayey soils. It is estimated that 110 parcels could ultimately require nonconventional systems, with 175 utilizing nonconforming systems, due primarily to lack of compliance with requirements for seasonal groundwater separation and setback to streams (Table H-9). Most of these parcels are concentrated in two residential areas at the base of the slopes extending south from Bull Creek (Figure H-6a) and in the El Solyo Heights area. Although parcel sizes in this area are often small, there are a number of vacant parcels in contiguous ownership providing good potential for use of mound system for individual systems or cluster systems. The lack of documented failures or water quality to date indicates that soil conditions are such in this area that adequate water quality protection could also be maintained by through use of nonconforming systems with higher levels of inspection and management.

A possible community disposal option to serve 200 parcels in south central Felton was evaluated by Questa Engineering (1994) (Figure H-6b). Effluent would be collected and pumped 1500-2000 ft. to potential disposal locations west of town (Figure H-6c). Advanced secondary treatment with nitrogen removal would be provided. The capital cost would be $19,700. Although two disposal locations appear to be technically suitable, one location is on State Park lands and the other is on vineyard land. Both property owners have expressed opposition to using their land for sewage disposal. Because of cost and other limitations, it is recommended that community disposal not be pursued now for the Felton parcels.

El Solyo Heights is a separate neighborhood located at the north end of the Felton Class I area. It is sometimes identified as a separate community because it appears to have a more difficult set of constraints, and because it was surveyed as a distinct area in 1989. The area includes about 80 developed parcels. Ninety-three percent of these parcels are designated Class I. Development here is relatively new, with most of it occurring in the late 1960's and early 1970's.

Much of the El Solyo area experiences high groundwater, clay soils, shallow depth to bedrock, moderate slopes, and presence of cuts and fills. Although the file information on groundwater is limited, if it is extrapolated to the whole area, up to 12% of the parcels might be expected to have winter groundwater less than 3 feet, with 20% having groundwater at 3 to 6 feet. At least 25% of the parcels have soils with significant clay content. It is estimated that 16% of the parcels have shown indications of past problems.

A survey of El Solyo was conducted during the wettest portion of 1989, with rechecks performed each winter since then. The survey focussed on the expected problem areas and covered 53% of the parcels. Of the surveyed parcels, 13% had sewage failures and 8% had greywater bypasses. Correction of these problems has required use of alternative systems, disposal on adjacent vacant lots, reconstruction of curtain drains, and in some cases, requirement of winter haulaway. There is good potential for additional use of mounded beds or pressure distribution systems to repair existing systems on the numerous vacant parcels located in the area. This is an area which will continue to be watched closely by County staff to ensure the systems are performing adequately, and to require further improvements as needed.

A community disposal system to serve 50 parcels in El Solyo Heights was also considered in the recent feasibility study (Questa, 1994) (Figure H-6d). Sewage would be collected, treated and discharged on State Park lands to the south, at a cost of $26,800 per parcel (Figure H-6e). State Parks and the school district have expressed opposition to this proposal. Another option being considered for this area is the use of drainage improvements to reduce soil saturation and improve suitability for onsite disposal. Feasibility and cost of this approach are currently being evaluated on a preliminary basis. It is recommended that improved use of onsite systems be promoted for El Solyo, with the potential use of drainage improvements, if that proves to be cost-effective.

Table H-9 FELTON

Number of Parcels with Constraints And Expected Types of Onsite System Upgrades

Primary Constraint	Secondary Constraint STREAM SETBACK 25–50 FT			50–100 FT			100–250 FT			over 250 FT		
GROUNDWATER	0			4			22			84		
<3 FT	90%	Pu	0	75%	WH	3	75%	WH	17	30%	NC	25
	5%	H	0	25%	M	1	25%	M	6	45%	WH	38
	5%	M	0							25%	M	21
3–6 FT	1			4			20			80		
	90%	Pu	1	10%	NC	0	30%	S	6	50%	S	40
	10%	MPF	0	65%	Pu	3	35%	NC	7	40%	NC	32
			0	5%	WH	0	20%	WH	4	5%	WH	4
				20%	MPF	1	15%	MPF	3	5%	MPF	4
6–10 FT	1			3			9			36		
	90%	Pu	1	40%	S	1	80%	S	7	90%	S	32
	10%	PF	0	30%	Pu	1	20%	NC	2	10%	NC	4
				20%	NC	1						
				10%	PF	0						
Over 10 ft	3			3			114			305		
	90%	Pu	3	90%	S	3	90%	S	103	90%	S	275
	10%	MPF	0	10%	NC	0	10%	NC	11	10%	NC	31
CLAY SOIL	14											
	10%	S	1									
	70%	NC	10									
	10%	PF	1									
	10%	H	1									
PARCEL SIZE	35											
<5000 SQ FT	80%	NC	28									
	10%	F	4									
	10%	H	4									
5000–7500 SQ FT	82											
	70%	S	57									
	30%	NC	25									

Shaded blocks are parcels with limited constraints.

Summary

	Number	%
Total Parcels	820	
Standard Systems	525	64%
Nonconforming Systems	175	21%
Pump Up Systems	8	1%
Alternative Systems	41	5%
Haulaway Systems	70	9%

- First number indicates the numer of parcels with that constraint or combination of constraints. All parcels are accounted for once in this table: under the major constraint(s) for that parcel.
- Percentages are estimates of the extent to which a particular alternative will be utilized on parcels with that general constraint or combination of constraints (see narrative).
- Numbers on right are calculated estimates of the number of parcels utilizing that alternative,

POTENTIAL ALTERNATIVES:

S – Standard, Conventional Septic System
NC – Nonconforming System, Reduced Size, or Reduced Groundwater separation (over 250' from a stream)
Pu – Pump Up System (to another disposal area on the parcel)
F – Sand Filter
P – Pressure Distribution System
M – Mounded Bed System
H – Full-time Haulaway
WH – Winter Haulaway

Where there are concentrations of parcels requiring nonstandard upgrades, community disposal systems may be the best alternative, if cost-effective and affordable.

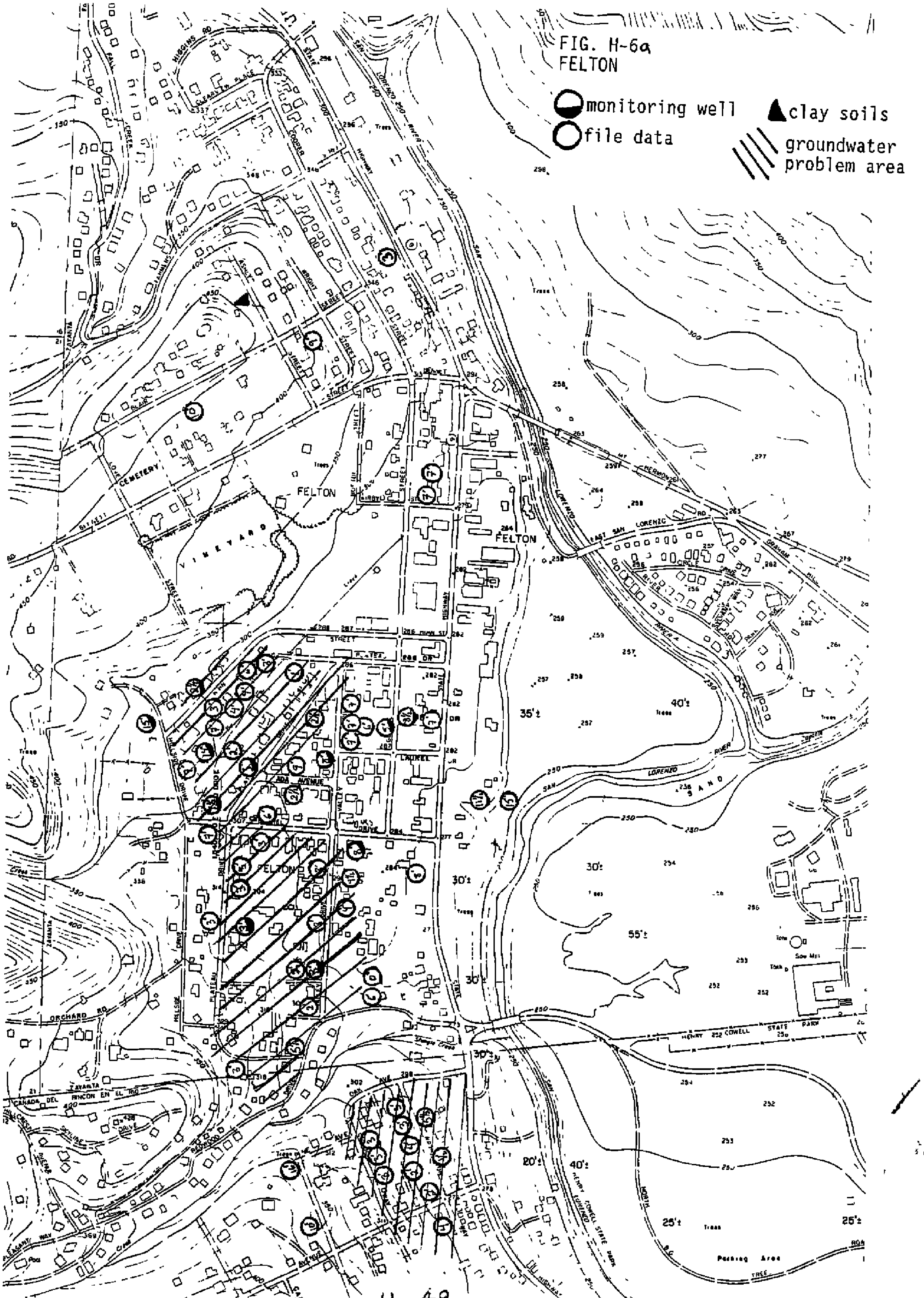


FIG. H-6a
FELTON
monitoring well
file data
clay soils
groundwater problem area

H-49

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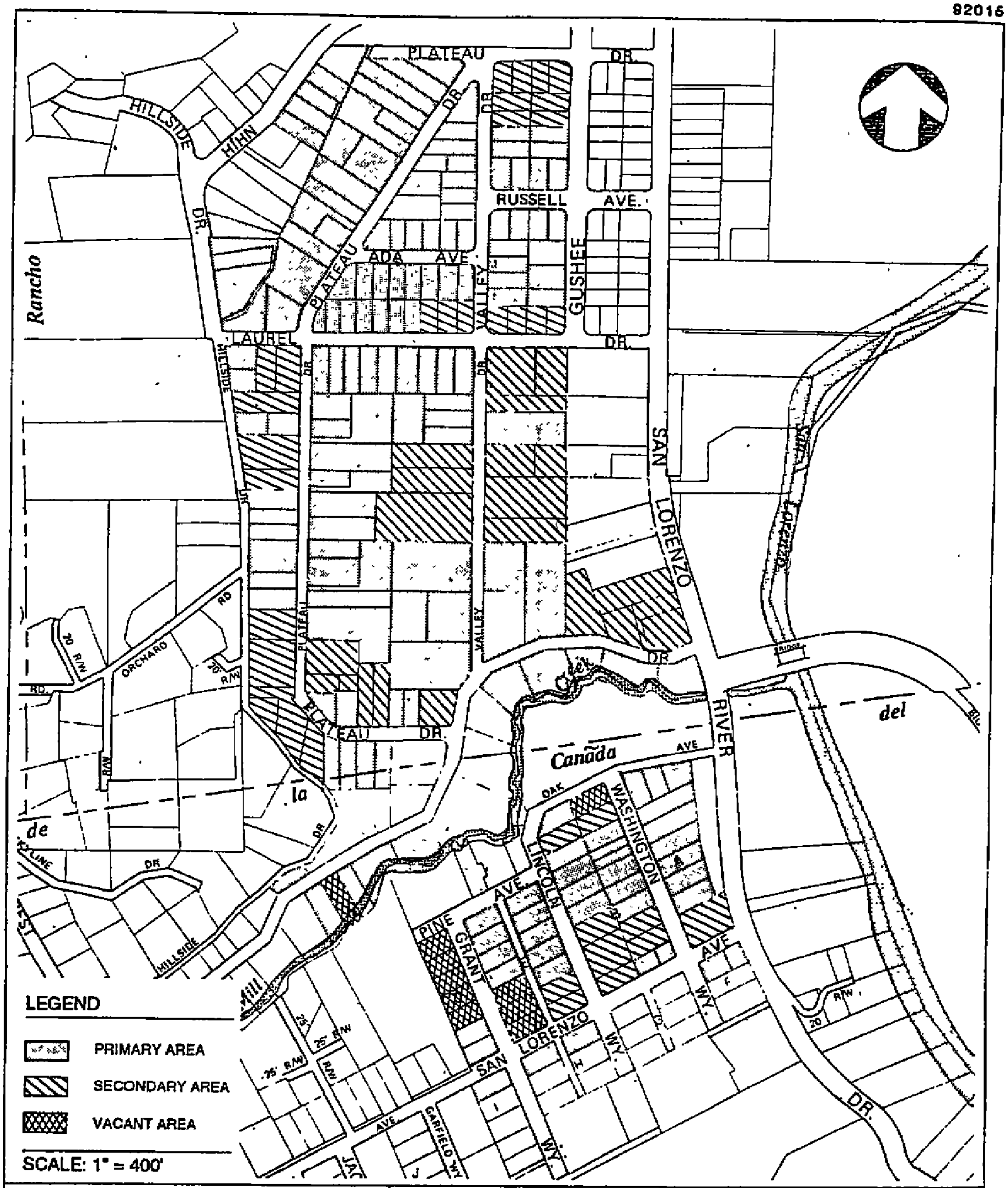
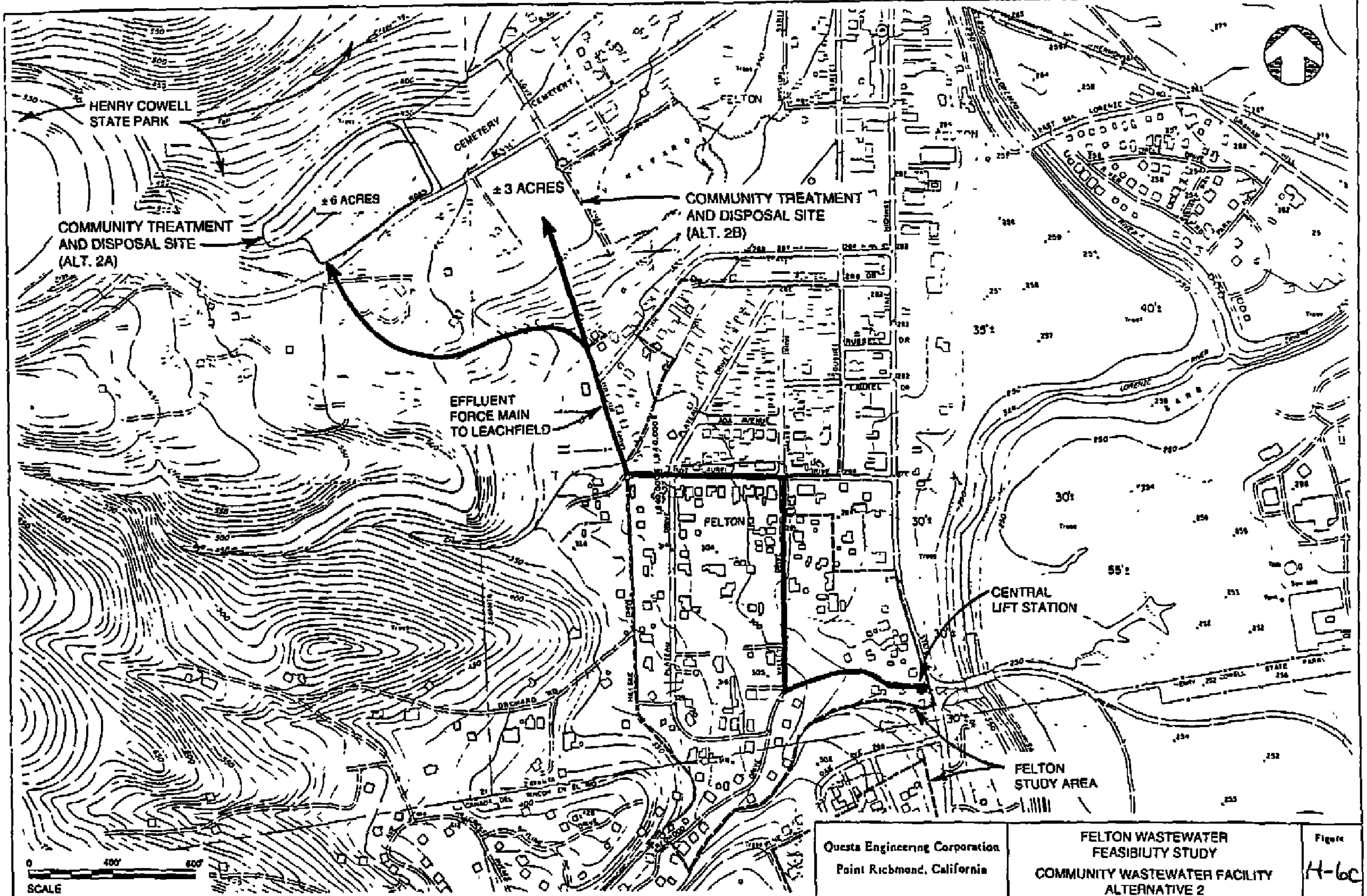
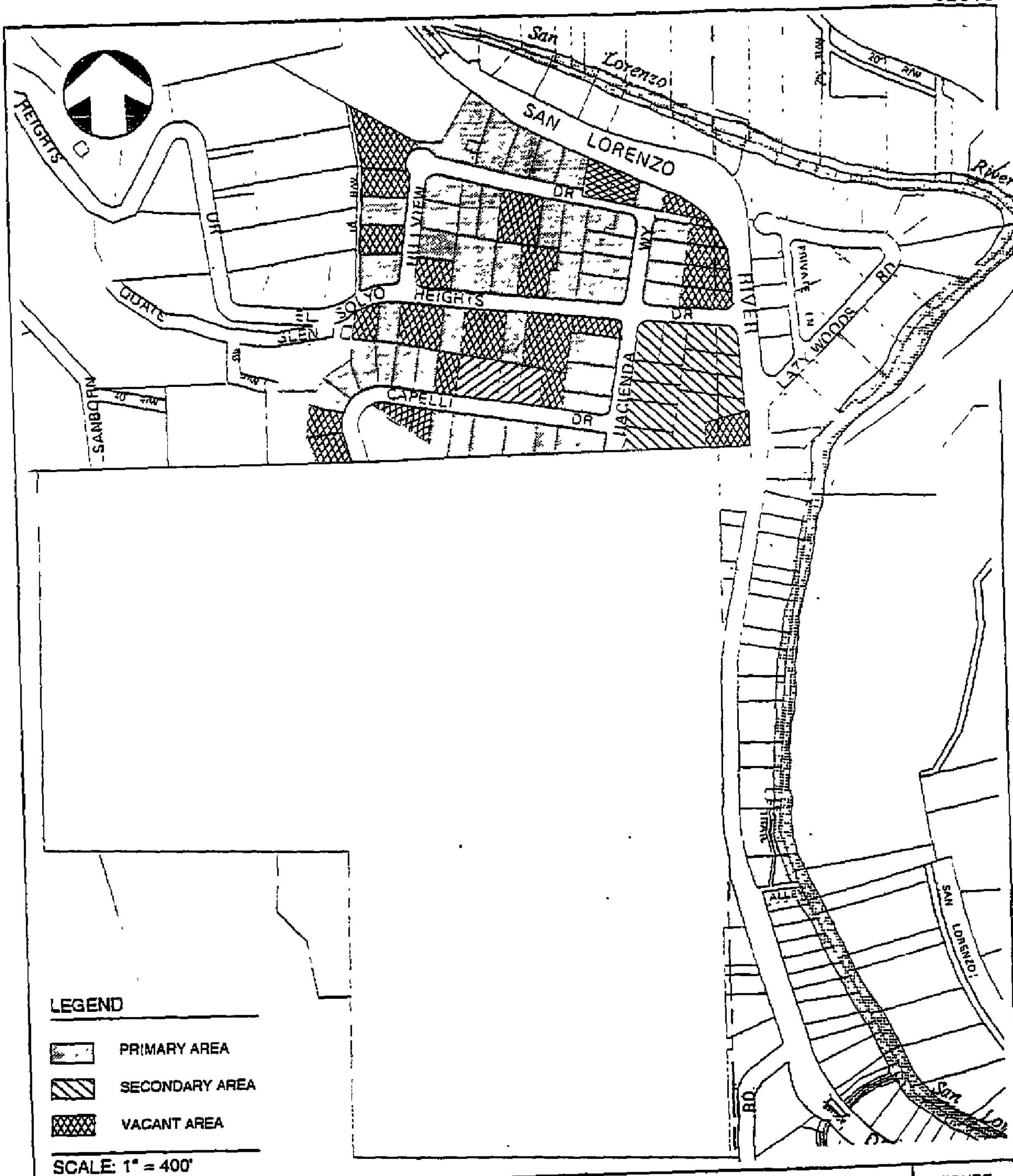


QUESTA ENGINEERING, INCORPORATED POINT RICHMOND, CALIFORNIA	FELTON WASTEWATER FEASIBILITY STUDY PROPOSED SEWER SERVICE AREA	FIGURE H-6b

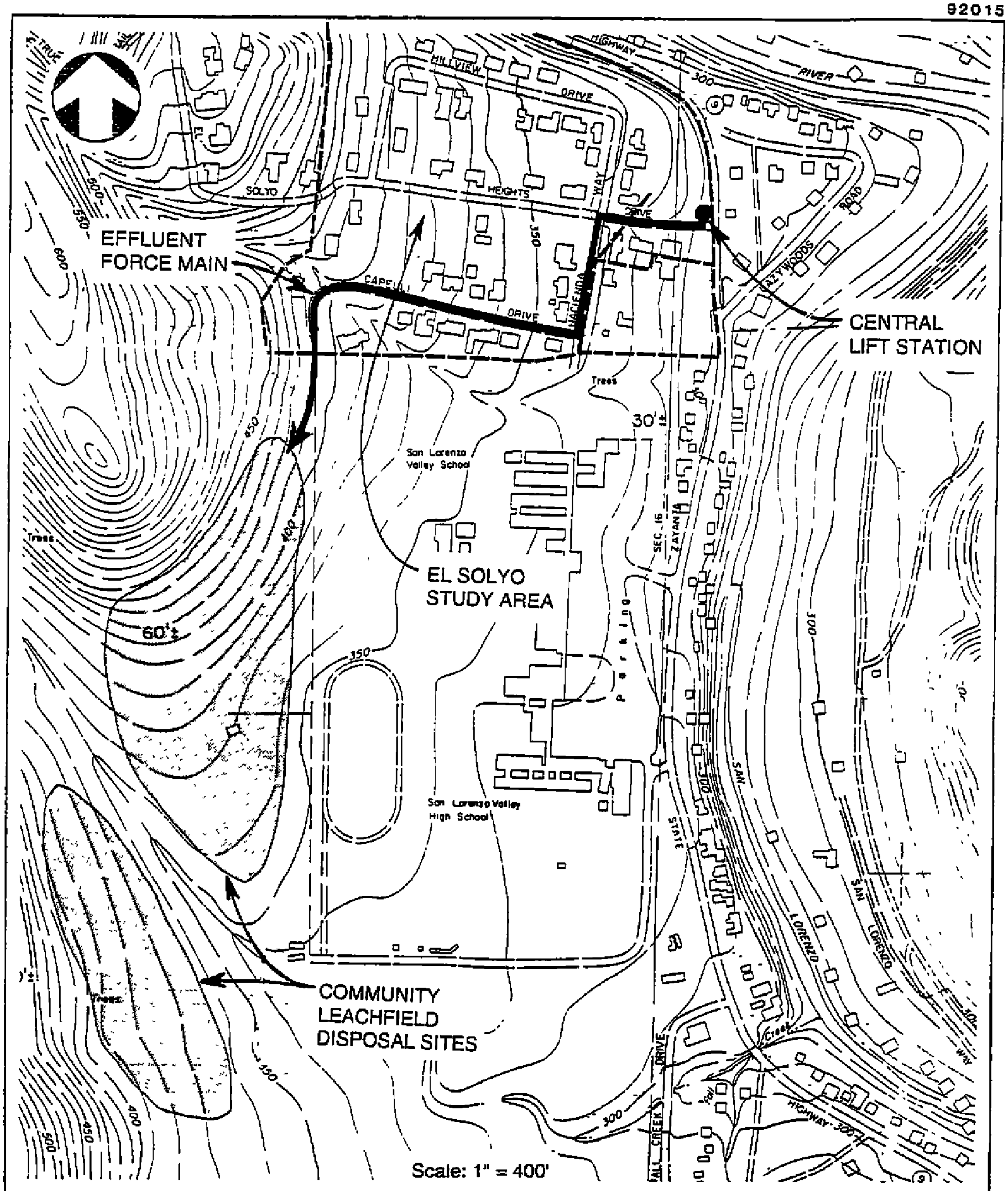


Questa Engineering Corporation Point Richmond, California	FELTON WASTEWATER FEASIBILITY STUDY COMMUNITY WASTEWATER FACILITY ALTERNATIVE 2	Figure H-6C

92015



QUESTA ENGINEERING CORPORATION POINT RICHMOND, CALIFORNIA	EL SOLYO WASTEWATER FEASIBILITY STUDY PROPOSED SEWER SERVICE AREA	FIGURE H-6d



QUESTA ENGINEERING, INCORPORATED POINT RICHMOND, CALIFORNIA	EL SOLYO WASTEWATER FEASIBILITY STUDY COMMUNITY WASTEWATER FACILITY ALTERNATIVE 2	FIGURE H-6e

Brook Lomond

The Brook Lomond area is a small community located between Ben Lomond and Brookdale, consisting of about 120 developed parcels (Figure H-7). Seventy-five percent of the parcels are in the designated Brook Lomond Class II area, and the remainder are unclassified. The information for this area that is contained in Table H-10, was derived from file records, past groundwater investigations conducted by HEA in 1982, and survey and groundwater investigations conducted under the current program.

This area has permeable alluvial soils with high groundwater, and some areas of clay soil. CH2MHill estimated that most of the area had winter groundwater at about 1.5 feet (1984). All but 2 of the Class II parcels were determined to be unsuitable for onsite disposal and were projected to be connected to the Class I sewer. A review of file information and construction of boreholes under the current program has indicated that groundwater levels are not uniformly as high as indicated in the Class II report, but groundwater does probably occur at less than 10 feet throughout the area. If file records are extrapolated, it is estimated that up to 30% of the parcels may have groundwater less than 3 feet and 40% may have groundwater at 3 to 6 feet.

The high groundwater levels in Brook Lomond appear to be affecting system performance on some parcels, but are not creating problems for most of the area, probably as a result of the good permeability of most of the soils. Half of the parcels in this area were surveyed for failures in 1987 in the expected worst parts of the Class II areas and the unclassified areas. Of the parcels surveyed, 6% were found to be failing, and 10% were found to have greywater bypasses. The file records for all systems indicate a relatively low past problem rate of only 8%. During the Class II investigations, 88% of the property owners indicated no problem with their systems. Except for low to moderate increases in nitrate levels in groundwater (up to approximately 3.5 mg-N/L), there are not indications of any other contamination of either surface or groundwater (SCCHSA, 1989; HEA, 1983).

Except for the repair actions associated with the survey, there have been few repair actions in this area since 1985, providing a limited database for evaluation of the repair potential. For all but one of the leachfield failures encountered, a shallow (less than 3 feet) leachfield addition or replacement was installed. Due to the gentle slopes, good soil permeability, moderate parcel sizes, and presence of vacant lots, there would also be good potential for future installation of mounded bed systems and cluster systems in this area, if needed. This area could be suited for a community system, if that is more cost-effective than individual solutions. Due to the lack of current water quality impacts, this area also seems to be suitable for use of nonconforming systems.

Various disposal options to serve 75 parcels in Brook Lomond were evaluated by Questa Engineering (1994) (Figure H-7b). Under the community disposal option, effluent would be collected and pumped 17,000 ft. to a disposal location in the sand hills above Hihn Road east of Glen Arbor (Figure H-4c). Advanced secondary treatment with nitrogen removal would be provided. If this project were combined with a project for Glen Arbor, the capital cost would be $25,500 per parcel. The cost-effectiveness of drainage improvements are also being evaluated for this area. At this time, it is not recommended that community disposal be pursued for Brook Lomond. Improved onsite disposal should be pursued, with the additional option of drainage improvement if that is cost-effective.

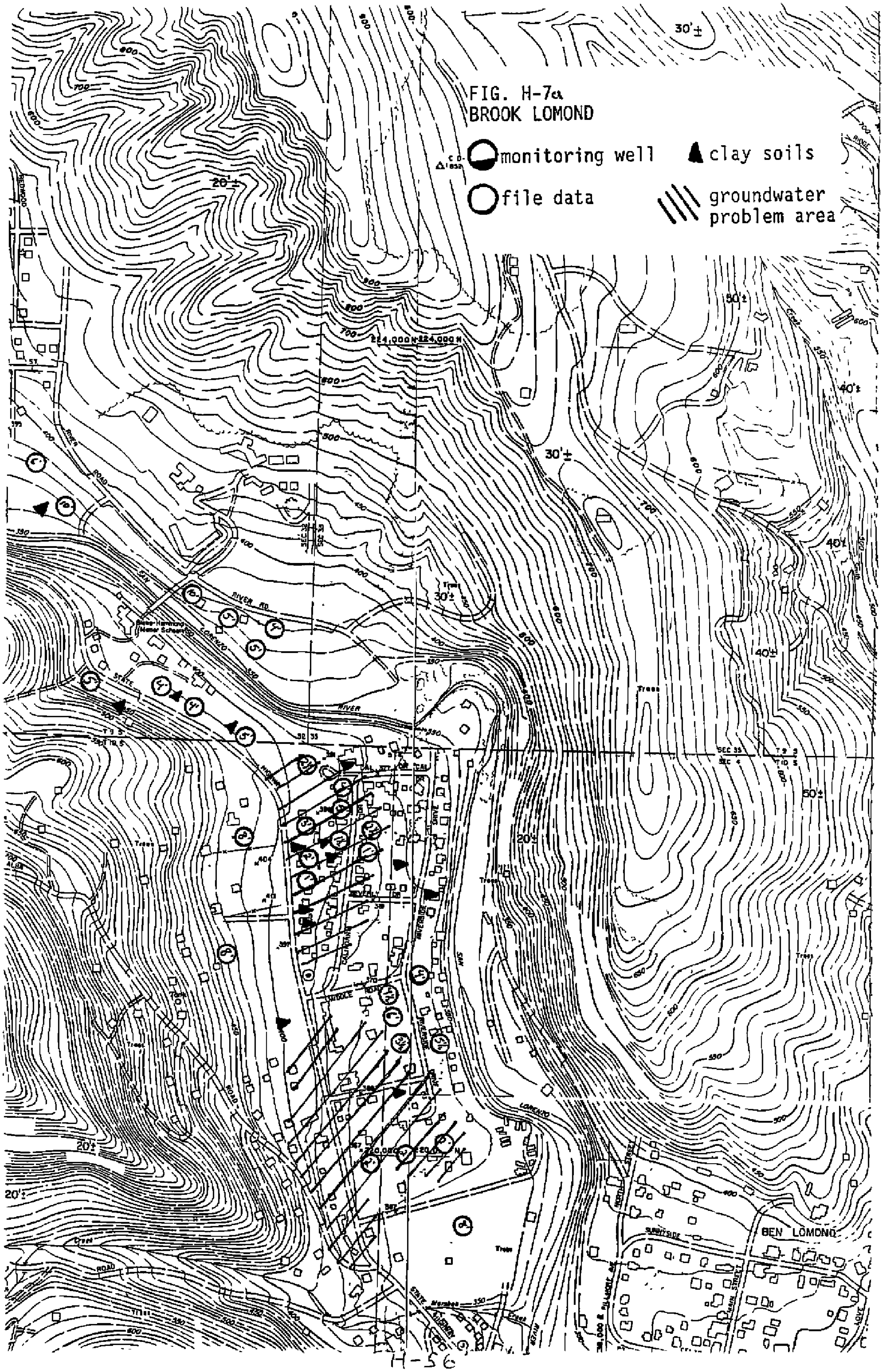
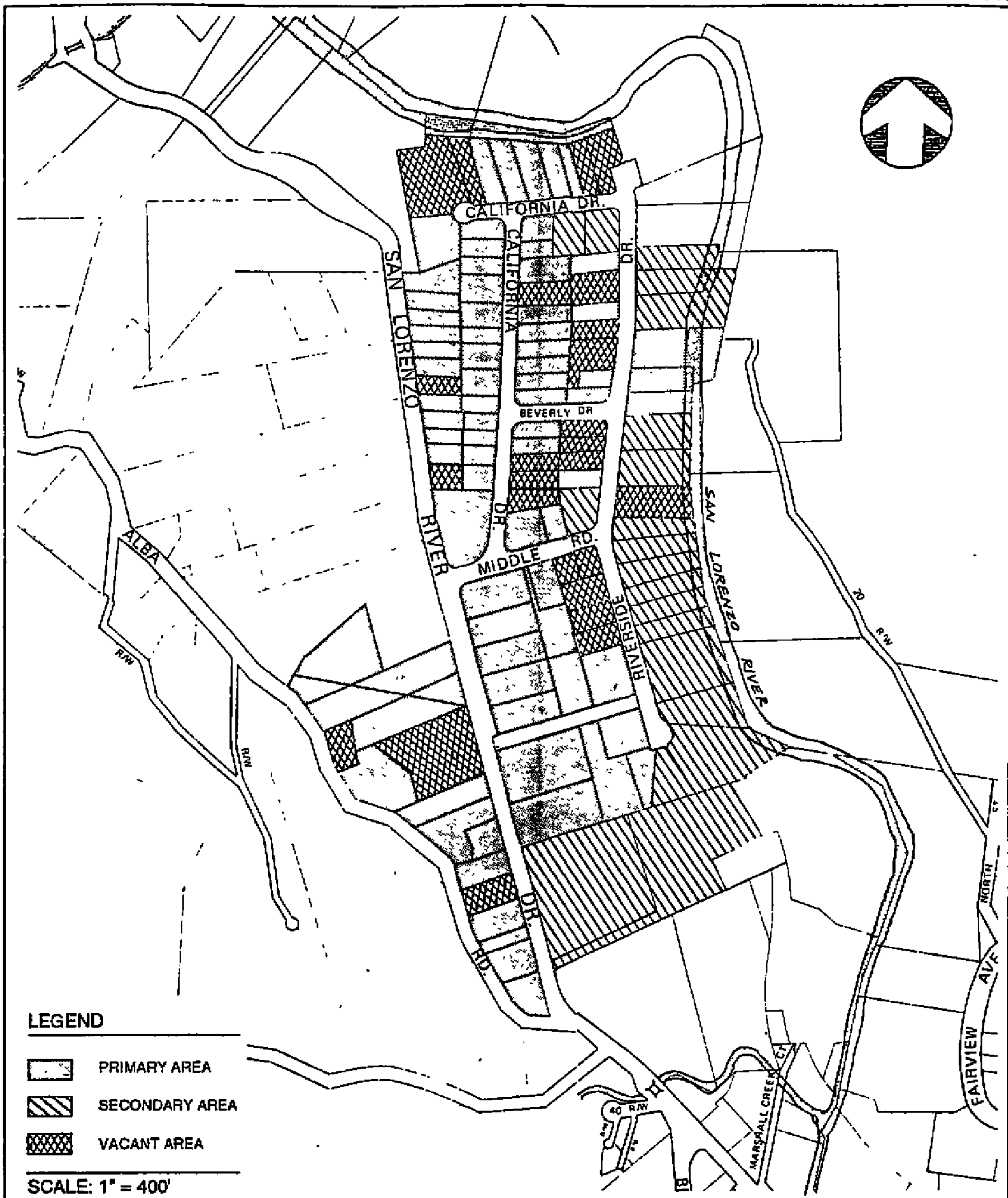


FIG. H-7a
BROOK LOMOND
monitoring well
clay soils
file data
groundwater problem area
BEN LOMOND

92016



QUESTA ENGINEERING, INCORPORATED POINT RICHMOND, CALIFORNIA	BROOK LOMOND WASTEWATER FEASIBILITY STUDY PROPOSED SEWER SERVICE AREA	FIGURE H-7b

Table H-10. BROOK LOMOND, Class II
Number of Parcels with Constraints
And Expected Types of Onsite System Upgrades

Primary Constraint	Secondary Constraint: STREAM SETBACK 25–50 FT	50–100 FT	100–250 FT	over 250 FT
GROUNDWATER <3 FT	0 90% Pu 0 5% H 0 5% M 0	0 75% WH 0 25% M 0	2 75% WH 2 25% M 1	19 30% NC 6 45% WH 9 25% M 5
3–6 FT	1 90% Pu 1 10% MPF 0 0	17 10% NC 2 65% Pu 11 5% WH 1 20% MPF 3	5 30% S 2 35% NC 2 20% WH 1 15% MPF 1	29 50% S 15 40% NC 12 5% WH 1 5% MPF 1
6–10 FT	0 90% Pu 0 10% PF 0	3 40% S 1 30% Pu 1 20% NC 1 10% PF 0	0 80% S 0 20% NC 0	4 90% S 4 10% NC 0
Over 10 ft	0 90% Pu 0 10% MPF 0	0 90% S 0 10% NC 0	0 90% S 0 10% NC 0	0 90% S 0 10% NC 0
CLAY SOIL	0 10% S 0 70% NC 0 10% PF 0 10% H 0			
PARCEL SIZE <5000 SQ FT	0 80% NC 0 10% F 0 10% H 0			
5000–7500 SQ FT	3 70% S 2 30% NC 1			

Shaded blocks are parcels with limited constraints.

Summary	Number	%
Total Parcels	83	
Standard Systems (A)	23	28%
NC Category C Systems	17	20%
NC Category D Systems	6	7%
Pump Up Systems (A)	13	15%
Alternative Sys (B)	11	14%
Haulaway Systems (F)	13	16%

- First number indicates the numer of parcels with that constraint or combination of constraints. All parcels are accounted for once in this table: under the major constraint(s) for that parcel.
- Percentages are estimates of the extent to which a particular alternative will be utilized on parcels with that general constraint or combination of constraints (see narrative).
- Numbers on right are calculated estimates of the number of parcels utilizing that alternative,

POTENTIAL ALTERNATIVES:

S – Standard, Conventional Septic System
NC – Nonconforming System, Reduced Size, or Reduced Groundwater separation (over 250′ from a stream)
Pu – Pump Up System (to another disposal area on the parcel)
F – Sand Filter
P – Pressure Distribution System
M – Mounded Bed System
H – Full-time Haulaway
WH – Winter Haulaway

Where there are concentrations of parcels requiring nonstandard upgrades, community disposal systems may be the best alternative, if cost-effective and affordable.

Forest Lakes

The Forest Lakes area is located immediately south of Felton. For the purposes of discussion, the greater Forest Lakes area includes the 700 developed parcels that are in the designated Class II area of Forest Lakes and an additional 270 unclassified parcels located in South Felton around Forest Lakes that have generally similar site conditions, but larger lot sizes. Information from the Class II investigations and file information has been entered in the database and is summarized in Table H-2 as a part of the Felton area. This area was surveyed in 1990-91 and 6 boreholes were placed in the area as part of the current study.

About 20% of the parcels were determined to be unable to meet the Class II repair standards (CH2MHill, 1984). The primary constraints were small lots, and localized pockets of high groundwater and very dense clay soils. Conditions are quite variable over very short distances. Several cluster sites with a total capacity to serve 20-40 houses as well as a large community disposal site were identified (CH2MHill, 1984). During the recent survey in the winter of 1990-91, 500 parcels were surveyed in the areas most likely to have problems. Two percent had system failures and 13% had greywater bypasses.

Except for a few difficult lots, there have not been unusual repair problems in this area. The repair rate for the last five years has been quite low (10%), with at least 90% of the repairs able to meet current repair requirements for a standard system. There has been no indication of wastewater contamination in Gold Gulch, the stream that drains most of the area. There is good potential for continued use of onsite systems, with some use of alternative or cluster systems as may be needed for a few lots. Due to the scattered occurrence of problem parcels, community collection and disposal does not appear to be a reasonable alternative for those lots.

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Santa Cruz County Health Services Agency (SCCHSA), 1989, Preliminary Report, An Evaluation of Wastewater Disposal and Water Quality in the San Lorenzo River Watershed.

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APPENDIX I

WATER QUALITY SAMPLING PROGRAM – SAN LORENZO WATERSHED

Station Number	Location (Map at end)	Type of Sampling (Explained on last page)					
		Weekly	Monthly	Bathing	Nitrogen	Algae	Groundwater
349	SLR @ WATERMAN GAP		M		N	C,J	
3435	SLR @ FERN DR., S.L. WOODS			B			
310	KINGS CR @ HWY 9	W	M				
300	SLR ABOVE TWO BAR CR		M				
290	TWO BAR CR @ SLR		M				
273	BEAR CR @ SCOUT CAMP			B			
271	BEAR CR NEAR SLR		M				
268	SLR BELOW BEAR CR				N		
2590	BOULDER CR @ MELISSA LN				N		
2581	BOULDER CR @ JAMESON CR				N		
2580	BOULDER CR ABOVE BRACKENBRAE				N		
251	BOULDER CR @ HWY 9		M		N		
2499	SLR BELOW BOULDER CR			B	N		
249	SLR @ LOMOND ST BRIDGE			B			
245	SLR @ RIVER ST	W	M		N	J	
241	SLR @ PACIFIC ST., BROOKDALE			B	N		
225	SLR @ LARKSPUR ST				N		
200	SLR @ GUNTHER				N	J	
181	SLR @ BEN LOMOND DAM			B			
180	SLR ABOVE LOVE CR	W	M		N		
160	SLR ABOVE NEWELL CR				N		
158	NEWELL CR BELOW DAM				N		
154	NEWELL CR @ RANCHO RIO				N		
150	NEWELL CR @ SLR		M		N		
149	SLR @ HIGHLANDS PARK			B			
140	SLR @ MT CROSS BRIDGE		M		N		
0762	ZAYANTE CR @ ZAYANTE		M				
07528	LOMPICO CR @ CARROL AVE		M				
0749	ZAYANTE CR BELOW LOMPICO CR				N		
073S	MCENERY RD SPRING				N		
07145	BEAN CR ABOVE GRAZING AREA				N		
0711	LOCKHART GULCH @ BEAN CR				N		
07109	BEAN CR BELOW LOCKHART GULCH				N		
07106	BEAN CR @ MT. HERMAN RD		M		N		
071	BEAN CR ABOVE ZAYANTE CR				N		
070	ZAYANTE CR @ SLR		M		N		
060	SLR @ BIG TREES	W	M	B	N	C,J	
050	SHINGLE MILL CR @ SLR		M				
0332	SOUTH FORK GOLD GULCH @ DAM			B			
030	GOLD GULCH @ SLR, HWY 9		M				
025	SLR @ RINCON				N	J	
022	SLR @ SYCAMORE GROVE	W	M	B	N	C,J	
01149	CARBONERA CR BELOW		M				
	SCOTTS VALLEY (2 locations)		M				
0121	BRANCIFORTE CR @ ISBEL DR		M				
003	RIVERMOUTH @ TRESTLE	W	M	B			

APPENDIX I (continued)

Station Number	Location (Map at end)	Type of Sampling (Description below) Weekly	Monthly	Bathing	Nitrogen	Algae	Groundwater
Q3	QUAIL HOLLOW WELL 3		M				G
Q4	QUAIL HOLLOW WELL 4		M				G
Q5	QUAIL HOLLOW WELL 5		M		N		G
Q8	QUAIL HOLLOW WELL 8		M				G
OLY 1	OLYMPIA WELL NO. 1				N		G
K3	KAISER WELL 3				N		G
KC3	SUNBEAM, KINGS CREEK		M				G
BC1	JUNCTION AVE., BOULDER CREEK		M		N		G
BC3	OAK ST. / HWY 236, BOULDER CR.		M		N		G
BC6	OAK ST/LOMOND ST, BOULDER CR.		M		N		G
BC7	LAUREL ST., BOULDER CREEK		M		N		G
BL2	RIVERSIDE DR, BROOK LOMMOND		M		N		G
BL3	SUNNYSIDE AVE. BEN LOMOND		M				G
BL4	FILLMORE AVE. BEN LOMOND		M				G
BL5	RIVERSIDE DR, BROOK LOMOND		M				G
BL6	CALIFORNIA DR. BROOK LOMOND		M				G
GA1	LORENZO WAY, GLEN ARBOR		M		N		G
GA4	NOTEWARE, GLEN ARBOR		M		N		G
GA5	HIHN RD, GLEN ARBOR		M		N		G
CH1	CHAPARRAL CORRAL, FELTON		M		N		G
F2	VALLEY, FELTON		M				G
F3	PLATEAU, FELTON		M				G
F4	LAUREL, FELTON		M				G
F6	PLATEAU, FELTON		M				G
F7	PLATEAU, FELTON		M				G

SAMPLING PROGRAM SUMMARY

Weekly Sampling: 6 stations; pH, temperature, dissolved oxygen, electro–conductivity turbidity, fecal coliform, nitrate at 2 stations.

Monthly Sampling: 22 stations; pH, temperature, dissolved oxygen, electro–conductivity turbidity, fecal coliform, nitrate, streamflow.

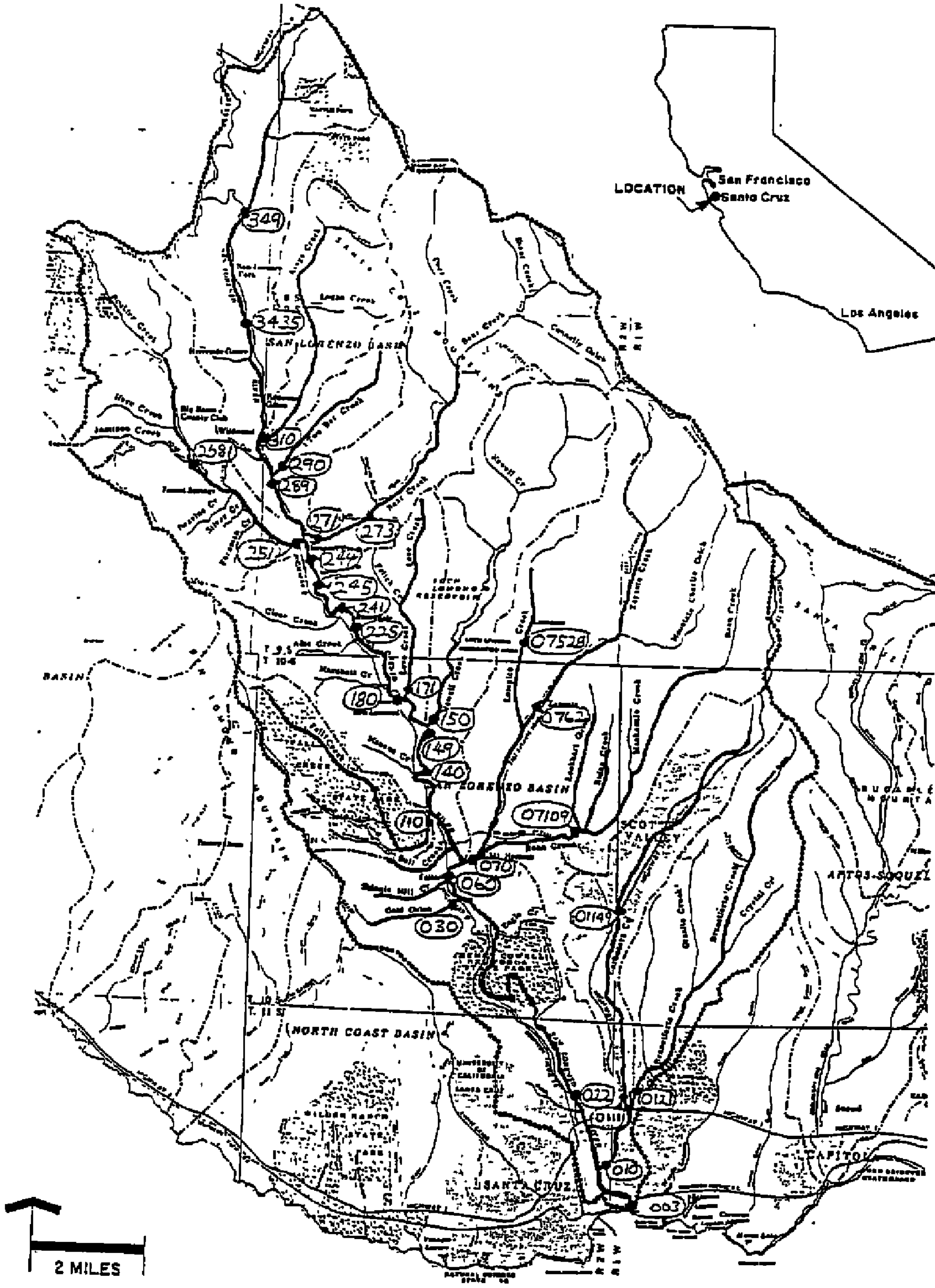
Bathing Area Sampling: 8 stations (May to September); fecal coliform.

Nitrogen Sampling: 35 stations; quarterly sampling; pH, temperature, dissolved oxygen, electro–conductivity, turbidity, streamflow, nitrate, ammonia, nitrite, Kjeldahl nitrogen.

Algae Sampling: C – County sampling biweekly: algae coverage, enumeration of growth on artificial substrates (substrates discontinued in 1992).
J – 205j Contract sampling biweekly–monthly: algae coverage, actinomycetes, taste and odor, light, etc. (1990–92).

Groundwater Sampling: Taken from shallow groundwater monitoring wells or water supply wells.

San Lorenzo River Watershed Study Area and Major Water Quality Sampling Locations.



<u>Appendix J - San Lorenzo Nitrate Management Plan</u> - Summary and Plan

SAN LORENZO NITRATE MANAGEMENT PLAN

(PHASE II FINAL REPORT)

February 1995

1 SUMMARY

1.1 Study Purpose

The County of Santa Cruz and the Regional Water Quality Control Board have worked to develop a wastewater management plan for the San Lorenzo River Watershed. As a part of that effort, the agencies have sought to evaluate the impacts of nitrogen release from onsite sewage disposal and other sources and develop recommendations for reduction of nitrate levels in ground water and surface water of the watershed. To further these efforts, the State Water Resources Control Board provided Federal Clean Water Act funds to the County of Santa Cruz to conduct the following activities:

- investigate the extent to which increased nitrate in waters of the San Lorenzo River Watershed is causing water quality degradation and limiting beneficial uses of surface water and groundwater;
- determine the primary sources of increased nitrate;
- identify and evaluate technical measures to control the release of nitrogen; and
- develop a nitrate management plan based on technical issues as well as institutional and financial concerns.

The findings and recommendations of the study will be incorporated into the County's San Lorenzo Wastewater Management Plan, planning policies, and other appropriate programs.

1.2 Study Elements

The study had the following components:

1. Measure growth of algae and other biological activity in the River to determine the extent to which that activity is related to nitrate.
2. Measure current nitrate levels in surface water, shallow groundwater and deep groundwater in critical areas of the Watershed.
3. Conduct field surveys to identify and quantify potential nitrate sources: homes on septic systems, fertilized area, stables, etc.
4. Using monitoring results, and information from other studies develop a nitrogen budget which quantifies the primary sources of nitrate in the Watershed.
6. Identify and evaluate potential nitrate control measures for the sources identified in the San Lorenzo Watershed.
7. Measure the effectiveness of various control measures for nitrogen reduction:
   a. Shallow leachfields for onsite disposal systems in sandy soils.
   b. Intermittent sand filter and recirculating gravel filter for existing onsite disposal systems (funded separately with Basin Planning funds).
   c. Use of litter and other control measures to reduce nitrate discharge from a horse stable in sandy soils (funded separately with Basin Planning funds).

8. Develop a nitrate objective for the San Lorenzo River.
9. Develop a nitrate management plan to achieve that objective, taking into account technical, institutional , and financial considerations.

1.3 Severity of Impacts

1. Summer nitrate concentrations in the San Lorenzo River at Felton have averaged 0.42 mg-N/L from 1976 through 1993. This is almost four times greater than historic levels (from the early 1960's), and seven times greater than the nitrate objective established by the Regional Board which reflects estimated predevelopment levels. Nitrate levels during the summer months are of the greatest concern, as that is the time of greatest potential biostimulation and impact on beneficial uses.

2. The current summer load of nitrate nitrogen in the River at Big Trees is 36 pounds per day. An estimated 85% of this is from non-natural sources and is comparable to the direct discharge of untreated sewage from 500 homes.

3. The City of Santa Cruz, which utilizes the River to provide 60% of the water supply for 85,000 people, has experienced periodic taste and odor problems in drinking water from the River since 1976. The presence of various organic compounds in the water also presents problems for City water treatment, resulting in the formation of disinfection by-products. It is likely that these problems are increased to some extent by elevated nitrate levels which can contribute to increased biological growth (algae, actinomycetes, etc.).

4. Although no conclusive relationship between nitrate concentrations and degree of impact on the City's water supply has been established, City officials are concerned that the discharge of nitrate and other pollutants could jeopardize this primary water supply, and/or require very expensive treatment measures to make it safe to continue to use.

5. At current nitrate concentrations in the River, there do not appear to be any adverse impacts on fishery resources, and impacts on recreation are low.

6. Nitrate levels in the Quail Hollow groundwater basin, part of a designated sole source water supply aquifer in the San Lorenzo Watershed, have increased 4-10 times above natural levels, to 3.6 mg-N/L, which is more than 30% of the drinking water standard. Although levels climbed inexplicably higher in 1986, they declined and have remained generally stable since then. However, water purveyors are concerned that a similar increase in nitrate could occur again, jeopardizing the water supply. To prevent this, water purveyors believe new nitrate sources should be controlled and existing discharges should be reduced.

7. Nitrate concentrations in shallow perched groundwater in close proximity to septic systems in the Boulder Creek area exceed drinking water standards at times. Although this is a potential violation of State policies, it does not seem to present any significant threat to water supplies or to the River. This water cannot be tapped by water supply wells and 95% of the nitrate in the shallow alluvial aquifers is removed by natural processes as

the groundwater migrates to the River during the dry months.

1.4 Primary Nitrate Sources

1. An estimated 84% of the current nitrate load in the River results from human activities in the watershed. Calculations of relative contributions to present summer nitrate levels in the lower River (at Felton) are as follows:

- Septic Systems in sandy areas	38%
- Septic Systems in non-sandy areas	19%
- Natural sources in sandy areas	12%
- Sewer discharge from B.C. Country Club	10%
- Scotts Valley nitrate plume	9%
- Livestock and stables	6%
- Natural sources in non-sandy areas	4%
- Landscaping/fertilizer use	2%

2. Approximately 67% of the nitrate in the River during the summer comes from areas underlain by sandy soils of the Santa Margarita Sandstone. A septic system in sandy soils contributes 10-15 times as much nitrate to the River as a septic system in less permeable soils. Nitrogen reduction efforts will be most effective in sandy areas.

3. Nitrate levels increased significantly during rapid development of the watershed through the 1970's, but subsequent increases have been low to insignificant. This lack of a significant increase is due to lower rates of development and implementation of County growth management programs, land use policies, and wastewater disposal regulations for protection of water quality. Without those policies, it is estimated that increased development in a ten year period would result in 40% increase in current nitrate levels. With current policies in place, that increase would be limited to 5%.

1.5 Potential Control Measures

The cost and effectiveness of potential technical measures to reduce current nitrate levels have been evaluated in this report. Following is a summary of some of the control measures, the amount they would reduce nitrate discharge from that particular source, and the annual cost per pound of nitrate-nitrogen removed from the River during the summer (July - September):

1. Shallow leachfields for septic system repairs: 20% reduction: $231/yr/lb-N.
2. Sand filter for septic system treatment: 50% reduction: $1566.
3. Enhanced septic system denitrification system: 75% reduction: $2506
4. Sewage collection and treatment: 75% reduction: $3284
5. Sewage reclamation at Boulder Creek Country Club: 90% reduction: $122.
6. Improved manure management at stables: 65% reduction: $250

These and other measures are presented in more detail in Tables 8 and 11.

1.6 Nitrate Objective

The current nitrate objective may reflect natural background conditions, and could probably not be attained without eliminating all development and disturbance from the watershed. However, development of a new numeric nitrate objective is not recommended at this time. A single number would not address the wide temporal and spatial fluctuation of nitrate levels in the River and its tributaries. Additionally, there does not appear to be a particular threshold level of nitrate, above which impacts on beneficial uses increase significantly. In place of a numeric nitrate objective, it is recommended that the nitrate management plan be based on an attainable and reasonable objective for nitrogen reduction, with a recommended set of cost-effective measures to attain that reduction.

During the past 10-15 years, the County has already implemented measures that have limited increases in nitrate discharge. It is recommended that further measures be implemented to prevent any increase in existing nitrate levels and to promote a moderate (15-30%) reduction in nitrate levels in the River over the next 10-25 years. This objective represents a balance between costs and benefits. Accomplishing this objective will reduce nitrate to the level that occurred in the early 1970's before taste and odor became a significant problem in the City water supply. This objective will improve the security of surface and groundwater supplies and will probably provide some improvement in recreational use and aesthetics of the River.

Recommended Objective: Implement nitrogen control measures for existing and proposed uses in the San Lorenzo River Watershed to ultimately reduce mean nitrate levels to 30% below 1976-94 levels. Develop and implement cost-effective measures specified in the Nitrate Management Plan which will reduce nitrate delivery by at least 50% for all new and expanded uses in sandy soils and any other large sources of nitrate which release more than 200 pounds of nitrogen per year. Expand the requirement for 50% reduction to all existing septic systems in sandy soils when reduction measures become cost-effective.

1.7 Recommended Nitrate Management Plan

The recommended nitrate management plan provides for implementing the most cost-effective measures to achieve the desired level of nitrate reduction. The plan provides for limiting increased nitrate release from new or expanded development in sandy soils, and gradually reducing nitrate discharge from existing sources as public and private funds become available and reduction technology improves. Table 11 shows some of the potential approaches for reducing nitrate levels. Implementation of the recommended policies will provide for a 15-20% reduction in current nitrate levels over the next 10 years, with a further reduction of 10% in the following 10 years. The following measures are recommended (the schedule for implementation is shown in parentheses):

Wastewater Disposal

1. Maintain the existing requirement of a one acre minimum parcel size for new development served by septic systems in the San Lorenzo Watershed (Ongoing)

2. Implement improved wastewater disposal management through the San Lorenzo Wastewater Management Plan (Ongoing).

3. Complete ongoing efforts to improve treatment procedures at Boulder Creek Country Club Treatment Plant to reduce nitrate discharge by using wastewater reclamation on the golf course. (To be implemented by July, 1995.)

4. Maintain the new requirement for shallow leachfields for new and repaired septic systems (less than 4 feet in sandy areas, and 4-6.5 feet in other areas). (Ongoing)

5. Implement enhanced technology for at least 50% nitrogen removal for septic system in sandy soils:
   a. Require septic systems serving new or expanded uses in sandy soils to install enhanced treatment measures which will reduce nitrogen discharge by at least 50%. (Expected implementation by August, 1995; existing systems to be upgraded at the time of major remodels (projected rate of 1.2% (20 systems) per year).)
   b. Encourage the use of nitrogen removal methods for any onsite disposal system which will use a nonstandard system. (Estimated 20 upgrades per year.)
   c. Continue to evaluate new onsite wastewater disposal technology for nitrogen reduction to identify more cost-effective measures. Require higher levels of nitrogen removal if measures become available that are more cost-effective than sand filters.
   d. Apply for State revolving funds and other funds to develop a funding source to assist property owners in repairing their systems to provide enhanced treatment. (Expected implementation July, 1996, with an estimated 40-100 upgrades per year thereafter.)
   e. When more cost-effective technology and/or funding assistance becomes available, require all onsite system repairs in sandy areas to utilize enhanced treatment for nitrogen removal. (Estimated implementation January 1997, with upgrades of 2.7% (40 systems) per year.)

6. Require all large onsite disposal systems which serve more than 5 residential units or dispose more than an average of 2000 gallons per day to utilize enhanced treatment to reduce nitrate discharge by at least 50%. Installation of such measures for existing systems shall be required at the time of system repair or upgrade. (Estimated 1-2 upgrades involving approximately 5000 gallons per day per year.)

7. Require all new or revised waste discharge permits and all new development projects in the San Lorenzo Watershed to include nitrogen control measures consistent with this Nitrate Management Plan.

Livestock Management

8. Continue to work with stable owners and develop a new ordinance requiring practices to reduce nitrate discharge: cover manure piles, maintain manure piles and paddock areas at least 50-100 ft from streams or drainageways, direct drainage away from paddock areas, and provide other measures as necessary to reduce discharge of nitrate, sediment, and contaminants. (Ongoing, with new ordinance by January, 1996)

Land Use Regulations

9. Maintain current density restrictions requiring 10 acres per parcel for new land divisions and other protective measures for groundwater recharge areas.

10. Maintain current regulations on erosion control, land clearing, and riparian corridor protection.

11. Do not approve new land use projects within the San Lorenzo Watershed which will increase the discharge of nitrate to groundwater or surface water by more than 10 pounds of nitrogen per acre per year from the project area.

Ongoing Monitoring

12. Monitor the Scotts Valley nitrate plume, and identify potential ongoing sources of nitrate. Work with the City of Scotts Valley and property owners for reduction of nitrate discharge from Scotts Valley, if feasible. (Ongoing monitoring, implementation of potential control measures in 2000, if necessary and feasible).

13. Continue to monitor nitrate levels in surface and groundwater. Reevaluate implementation of more stringent control measures if summer nitrate levels in the River have not declined by at least 15% by 2010. (Ongoing monitoring, reevaluation in 2010).

8 NITROGEN MANAGEMENT PLAN

This study has produced information on the current levels of nitrate in the San Lorenzo Watershed, the impacts of elevated nitrate levels, the sources of that nitrate, and the cost and effectiveness of potential control measures. This information can now be used to recommend an objective for nitrogen control and identify the most appropriate measures to attain that objective.

8.1 Nitrogen Objective

Implementation of nitrogen control measures must be guided by an overall objective for protecting water quality and water quality dependent uses in the San Lorenzo Watershed. The primary objective must be to prevent any threats to such beneficial uses to the greatest extent feasible. Following is a discussion of the background for establishing a nitrogen objective, and the recommendation for an objective based on the findings of this study.

8.1.1 Background and Relevant Policies

The State Water Code provides for the establishment of water quality objectives which "are necessary for the reasonable protection of beneficial uses and for the prevention of nuisance" (Basin Plan). The State and Regional Boards are empowered to establish such objectives. They are also required to take into account technical and economic feasibility of attaining the objective when they establish it.

The Regional Board's Basin Plan originally set a blanket nitrogen objective of 1.0 mg-N/L for all surface waters in the Central Coast Region. In 1983, the Board began establishing specific objectives for each water body and adopted a nitrate objective for the San Lorenzo River of 0.25 mg/L as nitrate. (This is equivalent to 0.06 mg-N/L as nitrogen.) This objective was set to reflect nitrate measurements taken in the 1950's, and to promote a reduction of perceived impacts on beneficial uses. Santa Cruz County staff had cited instances of potential nuisance algae growth and early signs of possible eutrophication in some reaches of the River near Ben Lomond and Boulder Creek (Butler, 1978). In retrospect, those conditions were probably related to the extreme conditions of the 1975-77 drought, and have not been confirmed since that time.

Since 1986, County staff has expressed concern that the specific numeric objective is unrealistic and unattainable. In 1986, the Regional Board also directed their staff to reevaluate the nitrogen objective for the San Lorenzo River. Regional Board staff have been awaiting the completion of this study. Based on the current work, it is now apparent that the current objective could only be attained if all human influences were removed from the Watershed, or 100% mitigated.

In addition to the specific objective for the San Lorenzo River, the Basin Plan also contains the provision that waters shall not contain biostimulatory substances (including nitrate) in concentrations that promote excessive aquatic growth that would adversely affect beneficial uses.

There are two other State policies which have bearing on setting objectives for nitrogen reduction in the San Lorenzo Watershed:

- The "Anti-Degradation Policy" provides that waters of the State shall be maintained at the highest quality unless it is shown that changes will be consistent with maximum benefit to people of the state and will not unreasonably affect present and future beneficial uses. Regional Board staff has indicated that this policy would preclude allowing nitrate levels in the River to increase or allowing nitrate to continue at its current, elevated level.
- The "Sources of Drinking Water Policy" states that all surface water and ground water must be maintained suitable for municipal or domestic water supply unless the water source could not support a single well producing 200 gallons per day, or the water could not be economically treated for domestic use. Regional Board staff has indicated that perched groundwater in areas such as Boulder Creek should be considered to be drinking water, and that measures should be taken to reduce nitrate levels in those waters to meet drinking water standards. However, County staff does not believe that these waters could be tapped by a well meeting current standards for a 50 foot sanitary seal and 100 ft setback from septic systems.

In developing a new nitrate objective for the San Lorenzo Watershed, there are several approaches that could be taken:

1. Develop new numeric objectives which would be feasibly attainable, which would reflect the varying conditions and different nitrate levels in different parts of the Watershed, and which would also reflect the significant fluctuation in mean values from year to year. This would be a very complicated and problematic task.
2. Develop or expand on the existing narrative objective which calls for general protection of beneficial uses. This is probably too general and difficult to apply to specific projects.
3. Develop a performance based objective which establishes targets for nitrogen control or reduction and which includes specific management measures to achieve that target. This is the recommended approach.

8.1.2 Recommended Objective

The establishment of nitrogen control objective for the San Lorenzo Watershed should be based on the following overall goals:

1. Prevent any long-term increase in nitrate levels in water supply aquifers.
2. Reduce nitrate concentrations in water supply aquifers to less than 3 mg-N/L, if feasible, to provide an adequate cushion of safety.
3. Prevent any long term increase in nitrate load in the River or its tributaries. Require nitrogen control for new uses and reduce nitrogen discharge from existing uses in order to prevent any net increase.
4. Reduce current nitrate levels in the River and its tributaries enough to reduce impacts on recreation and water supply.
5. Obtain nitrogen reduction through economically feasible, cost-effective methods which represent a balance between cost and nitrogen reduction. Efforts must focus on the most significant sources of nitrogen, which can be controlled most cost-effectively.
6. Implement nitrogen reduction measures for existing sources over time, as other improvements are made, in order to keep the incremental cost of nitrogen control as low as possible. There is latitude for a gradual

reduction over time in that levels normally vary by almost 50% from year to year, as a result of changes in hydrologic conditions and other factors unrelated to the nitrate sources.

Two potential sets of nitrogen control measures have been considered, as indicated in Tables 10 and 11. The moderate reduction scenario, which includes the use of shallow leachfields, would be expected to accomplish most of the objectives listed above and would result in lowering nitrate levels in the River by about 18%. This would prevent any further impacts on beneficial uses, and would provide about a 20% reduction in groundwater nitrate levels, but would probably not be expected to eliminate current impacts or threats to beneficial uses of the River.

A higher level of nitrogen reduction should be considered, which would provide for a 50% reduction in all major nitrogen sources. This would reduce nitrate levels in the lower River by 30%, to approximately the levels which occurred in the 1970's, before the River had significant taste and odor problems. This would provide better protection for both surface and ground water supply. It would also be expected to reduce growth of microalgae in the River to some extent, providing benefits to recreation use by limiting sliminess of rocks and water murkiness during the summer.

Unfortunately, existing technology for reducing nitrogen discharge from individual septic systems is relatively costly, at $8000 (over $850 per year), and its performance for individual residences is inconsistent. County staff believes that the significant cost for retrofitting an existing septic system with nitrogen control is too great relative to the amount of benefit provided by the additional reduction of nitrate in the River. It is recommended that 50% nitrate reduction for individual systems be maintained as a goal, but that requirement of this measure be deferred until technology can be developed with greater cost-effectiveness, on the order of $500 per pound of summer nitrate reduced. This deferral is consistent with the requirement that the Regional Board consider cost and technology in developing water quality objectives.

<u>Recommended Objective:</u> **Implement nitrogen control measures for existing and proposed uses in the San Lorenzo River Watershed to ultimately reduce mean nitrate levels to 30% below 1976-94 levels. Develop and implement cost-effective measures specified in the Nitrate Management Plan which will reduce nitrate delivery by at least 50% for all new and expanded uses in sandy soils and any other large sources of nitrate which release more than 200 pounds of nitrogen per year. Expand the requirement for 50% reduction to all existing septic systems in sandy soils when reduction measures become cost-effective.**

The measures necessary to attain this objective are listed in Table 12 and specified in Section 8.2. They are summarized below:
- Require use of shallow disposal systems wherever possible for upgrade of existing systems throughout the watershed.
- Develop and require use of cost-effective nitrogen control measures that will provide at least 50% nitrogen reduction for all new septic systems and septic system upgrades in sandy soils.
- Improve wastewater treatment at Boulder Creek Country Club (CSA-7) for nitrogen removal or wastewater reclamation on the golf course.
- Require improved manure management practices at stables and other livestock

areas.
- Require improved treatment for at least 50% nitrogen removal during the upgrade of all large sewage disposal systems in the Watershed.

It is expected that full implementation of these recommendations will take place over a 25 year period, with the majority of the reduction to take place in the first ten years (see Table 11). By the end of the implementation period the following reductions in nitrate loading and resulting nitrate concentrations would be expected (ranges are shown for those locations affected by individual septic system in sandy areas to indicate the range between implementation of 20% reduction and 50% reduction for existing systems):

Upper River above Boulder Creek:	13% reduction;	0.12 mg-N/L
Boulder Creek:	72% reduction;	0.26 mg-N/L
River above Ben Lomond:	42% reduction;	0.13 mg-N/L
Lower Zayante Creek:	27-33% reduction;	0.44-0.38 mg-N/L
River at Felton:	18-34% reduction;	0.34-0.28 mg-N/L

Further reductions in summer nitrate in the lower River of up to 9% will occur if nitrate delivery from Scotts Valley diminishes, as expected.

8.2 Management Measures

The recommended nitrate management plan consists of a variety of specific actions organized under the headings of waste management, land use regulation, livestock management, and land use regulation. The plan includes both maintenance of existing, ongoing activities and recommendations for new efforts. For each management action, the following elements are described:
- Specific description of action and implementing mechanisms.
- Expected benefits including nitrate reduction and other benefits.
- Responsible agency and assisting entities.
- Timing for implementation.

8.2.1 Wastewater Disposal

1. Maintain the Requirement of One Acre Minimum Lot Size for New Development Served by Onsite Sewage Disposal - This requirement applies to any new development on existing lots of record in the San Lorenzo Watershed area (with a possible exception only for necessary community uses if impacts are mitigated).
   Benefits - Reduces cumulative impacts of wastewater disposal and new development. Provides for dilution of nitrate and limits total amount of loading possible. Prevents underlying groundwater from exceeding drinking water standards.
   Responsible Agencies - Santa Cruz County Environmental Health (Board of Supervisors).
   Timing - Ongoing since 1983.

2. Implement the San Lorenzo Wastewater Management Plan - This program provides for regular inspection of all onsite disposal systems in the watershed, upgrade of failing systems to meet current repair standards,

and improved maintenance and management of systems.
Benefits -Reduces impacts of wastewater disposal and provides mechanism for implementation of improved nitrate control practices during system repairs.
Responsible Agencies - Santa Cruz County Environmental Health (Board of Supervisors), assisted by the Regional Water Quality Control Board.
Financing - Current annual cost of $463,000 financed by County Service Area service charges on all affected properties (47%), County General Fund (20%), Repair Permit fees (17%), and grants (16%).
Timing - Ongoing since 1986.

3. Resume Wastewater Reclamation at Boulder Creek Country Club (CSA-7) - The County should complete its efforts to make treatment plant improvements to allow reclamation of wastewater on the golf course. This provides for removal of at least 90% of the nitrogen in the Country Club wastewater 8 months of the year.
Benefits - Will greatly reduce summer nitrate levels in Boulder Creek and River north of Ben Lomond. Reclamation will reduce use of groundwater and surface water for irrigation.
Responsible Agencies - Santa Cruz County Public Works Department (Board of Supervisors), with oversight by the Regional Water Quality Control Board and the State Department of Health Services.
Financing - Projected capital cost of $300,000 to be paid by property owners connected to system.
Timing - Efforts are underway in 1991; implementation expected in 1995.

4. Require Shallow Leachfields for New Development and System Repairs - In 1993 the County's septic ordinance was amended to limit maximum leachfield depth to 4 feet wherever site conditions will allow, particularly in sandy soils. Variances are allowed in non-sandy soils if site conditions are inadequate, but are only allowed in sandy soils if impacts are mitigated in other ways, such as through installation of a sand filter.
Benefits - Expected nitrate reduction of 20%. Provides for improved wastewater treatment.
Responsible Agencies - Santa Cruz County Environmental Health (Board of Supervisors).
Timing - Ongoing implementation since March 1993.

5. Require Enhanced Nitrate Removal in Sandy Soils - The following measures should be taken by the County to provide for the use of enhanced nitrogen removal methods:
   a. Develop a requirement for enhanced treatment providing at least 50% nitrogen removal using sand filters, geomembranes, zeolite filters, or other nitrate removal measures for new and expanded systems in sandy soils (sand, loamy sand, and sandy loams).
   b. Encourage the use of nitrogen removal methods for any onsite disposal system which will use a nonstandard system. (Estimated 20 upgrades per year)
   c. Evaluate new onsite wastewater disposal technology for nitrogen removal to identify more cost-effective methods. Require measures that provide more than 50% reduction if those become more cost-effective.
   d. Seek State Revolving Funds or other funds to develop a funding source

to assist property owners repairing their systems to provide enhanced treatment.

e. When more cost-effective technology and/or funding assistance becomes available, require all onsite system repairs in sandy soils to utilize enhanced treatment for nitrogen removal (estimated 40 systems upgraded per year).

Benefits - Will reduce nitrate discharge from individual systems by 50-75% (30-55% more than shallow systems).
Responsible Agencies - Santa Cruz County Environmental Health (Board of Supervisors).
Timing - Amend ordinance to begin implementing requirements for new systems and upgrades in 1995; expanded implementation expected by 1997, if cost-effective.

6. Require Enhanced Treatment During Upgrade of Large Sewage Disposal Systems - Require all large sewage disposal systems which serve more than 5 residential units, dispose more than an average of 2000 gallons per day, or produce more than 100 pounds of nitrogen per year to utilize enhanced treatment to reduce nitrate discharge by 50% or more. This would be required at the time of system upgrade or repair. For discharges smaller than 4000 gpd this requirement could be waived by the County if site conditions were such that significant nitrate delivery to surface or groundwater was not expected.
Benefits - Will reduce nitrate discharge from large systems by 50-75%. Nitrogen removal is much more cost-effective for large systems. Treatment will also allow the discharger to significantly reduce the amount of disposal area needed.
Responsible Agencies - Santa Cruz County Environmental Health (Board of Supervisors).
Timing - Amend ordinance to begin implementing requirements for new systems and upgrades in 1995.

7. Require Nitrogen Control In the Issuance of New or Revised Waste Discharge Permits - The Regional Water Quality Control Board should limit the discharge of nitrogen consistent with the provisions of this nitrate management plan for waste discharge permits or orders that it revises or issues for discharges within the San Lorenzo Watershed. Such orders should include adequate monitoring requirements to confirm compliance with Plan targets.
Benefits - Will ensure compliance with this Plan by all large dischargers under jurisdiction of the Regional Board.
Responsible Agencies - Central Coast Regional Water Quality Control Board.
Timing - Implement requirements in April, 1995, upon adoption by the Regional Board of the San Lorenzo Wastewater Management Plan and the Nitrate Management Plan.

8.2.2 Livestock Management

8. Require Runoff Control, Manure Management and other Measures to Control Discharge of Nitrate and Fecal Matter for New and Existing Stables or Livestock Operations - The following measures should be implemented through operator education, use permit conditions, and through implementation of new ordinance requirements:

a. Maintenance of a separation of 50-100 feet between watercourses and livestock and manure stockpiles, unless other measures are taken to prevent contamination.
b. Stockpiling collected waste material on concrete, baserock, or other impermeable surfaces to prevent percolation.
c. Covering manure stockpile areas with tarps or roofs to prevent percolation and runoff of wastes.
d. Provision of roof gutters, ditches, and runoff control structures to keep rainfall and runoff away from paddock and manure stockpile areas, and prevent runoff of wastes to surface water.
e. Construction of grass-lined ditches and/or ponds as needed to contain and treat contaminated runoff.

Additional measures should also be considered:

f. Surfacing paddock areas with baserock or other low-permeabilitiy surfacing to reduce percolation of nitrate.
g. Regular placement of litter to absorb wastes, with regular removal of litter and wastes to a suitable stockpile area.
h. Roofing stable and paddock areas to reduce runoff and percolation.
i. Operation of programs for regular removal of stockpiled manure for composting, mushroom growing, fertilization, or other uses which will not contribute to nitrogen discharge.

Since 1992, County staff have worked with large stable owners to implement improved manure management and other measures for water quality protection. Considerable improvement has occurred with a significant investment of County staff time. However, additional problems remain (particularly with smaller operations) and County authority to require specific measures is unclear. An ordinance should be prepared with the participation of local livestock organizations which will incorporate the recommendations listed above under 8 and 9 for livestock management and water quality protection. In the meantime, County staff should continue efforts for education of livestock owners and enforcement of water quality protection through the Health and Safety Code.

Benefits - Reduces nitrate discharge by 70%. Reduces sedimentation and contamination by *Cryptosporidium* and other pathogens.
Responsible Agencies - Santa Cruz County Environmental Health, Planning Department, Zoning Administrator, Planning Commission, Board of Supervisors, City of Scotts Valley.
Timing - Ongoing implementation through education and permit review for new operations. Ordinance requirements to be developed in 1995, with adoption in 1996.

8.2.3 Land Use Regulation

9. Maintain Minimum Parcel Size Requirement and Other Protective Measures for Groundwater Recharge Areas. The County General Plan currently requires a ten acre minimum parcel size for any new lots created in designated groundwater recharge areas. Policies also prohibit approval of any new land use in recharge areas which could cause significant water quality degradation of the underlying aquifers.
Benefits - This reduces nitrate discharge from new development and provides protection of water supply aquifers, particularly where existing

development densities are so high that severe degradation would result if past development trends continued. Also promotes groundwater recharge, reduces land disturbance and erosion, and protects unique biotic resources.
Responsible Agencies - Planning Department, Planning Commission, Board of Supervisors, City of Scotts Valley.
Timing - Ongoing since 1978.

10. Maintain Measures to Prevent Excessive Land Clearing, Require Erosion Control, and Protect Riparian Corridors. - The County's erosion control ordinance restricts clearing of areas over 1 acre and requires mulching, revegetation and erosion control for all land disturbing projects. The County also requires protection of all areas within 50 feet of a perennial stream, within 30 feet of an intermittent stream or wetland, and within any riparian woodland.
Benefits - This reduces nitrate discharge from new development and clearing activities and protects the capability of riparian corridors to very significantly reduce nitrate in groundwater entering the streams. Undisturbed riparian corridors reduce nitrate discharge to streams by up to 90%. Also reduces land disturbance and erosion, and protects unique biotic resources.
Responsible Agencies - Planning Department, Planning Commission, Board of Supervisors.
Timing - Ongoing since 1980.

11. Review All New Large Development Applications to Ensure Substantial New Nitrate Discharges are Not Approved. - Environmental Review and discretionary review of new development proposals, particularly those located in sandy areas, should assess projected nitrate discharge from proposed projects and ensure incorporation of suitable mitigation measures to prevent any increase in nitrate discharge to groundwater or surface water of more than 10 pounds of nitrogen per acre per year from the project area.
Benefits - Prevents significant increase in nitrate discharge, and allows other proposed control measures to bring about an overall reduction in current nitrate loads.
Responsible Agencies - Planning Department, with consultation from Environmental Health, Zoning Administrator, Planning Commission, Board of Supervisors, City of Scotts Valley.
Timing - Ongoing.

8.2.4 Ongoing Monitoring

12. **Monitor Nitrate Plume Originating from Scotts Valley and Seek Additional Nitrate Control Measures if Necessary** - Monitor the occurrence of elevated nitrate levels in the Camp Evers area and determine if nitrate levels will continue to be elevated after the area has been sewered. If levels continue high, identify sources and work with the City and property owners to reduce nitrate discharge if feasible.
Benefits - Complete elimination of nitrate discharge from Scotts Valley would reduce nitrate levels in the River by 9%.
Responsible Agencies - County Environmental Health (monitoring) and City of Scotts Valley (if action is needed).
Timing - Ongoing monitoring, implementation of control measures in 2000,

if necessary and feasible.

13. Monitor Effectiveness of Nitrate Management Plan - Continue to monitor nitrate levels in surface and groundwater to measure the overall effectiveness of the Plan. Measure nitrogen discharge from specific control measures to determine the effectiveness of individual measures. Consider implementation of more stringent control measures if mean summer nitrate levels in the River at Felton have not declined by at least 15% by 2010.
    Benefits - Will measure success of programs and provide information to support more stringent controls if necessary.
    Responsible Agencies - County Environmental Health .
    Timing - Ongoing monitoring, reevaluation by 2010, if necessary.

TABLE 12: POTENTIAL ACTIONS FOR NITROGEN REDUCTION
Effects on Summer Nitrate Levels at Big Trees In the Next Ten Years

APPROACH	In Effect or Recommended	EFFECTS ON SUMMER NITRATE LEVELS: % CHANGE FOR ACTION	CUMM. % CHANGE	MEAN NO3-N CONC mg-N/L	MEAN NO3-N LOAD lbs-N	ANNUALIZED COST: PER PARCEL/ UNIT	NUMBER PARCELS/ UNITS	COST PER LB-N REDUCED
BASELINE								
Current Conditions, Policies	Ongoing	-	-	0.42	3240	-	-	
10 Yrs Growth, Current Policies	Ongoing	5%	5%	0 44	3397	-	-	
10 Yrs Growth, Relaxed Policies		40%	40%	0.59	4542	-	-	
REDUCTIONS								
CSA 7 Upgrade to Reclamation	In Progress	-9%	-4%	0 40	3106	$182	250	$122
Improved Manure Management	Recom.	-4%	-8%	0.39	2976	$75	500	$250
ONSITE DISPOSAL IMPROVEMENTS								
Use of Shallower Leachfields *	Ongoing	-5%	-13%	0 36	2814	$51	3000	$231
- Repair Large Systems (80% N red)*	Recom.	-2%	-15%	0.36	2749	$362	250	$283
Enhanced Treatment (50% N removal)								
- New Systems in Sandy Soils	Recom.	-1%	-15%	0.36	2744	$861	56	$1,566
- Major Remodels in Sandy Soils *	Recom.	-3%	-17%	0.35	2689	$861	175	$1,566
- Repairs in Sandy Soils *	Pend.	-6%	-21%	0 33	2566	$861	375	$1,566
- New Systems in Nonsandy Soils		-1%	-16%	0.35	2707	$861	1050	$22,963
- Major Remodels in Nonsandy Soils *		-2%	-18%	0.34	2655	$861	1310	$22,963
- Repairs In Nonsandy Soils *		-4%	-20%	0.34	2594	$861	2835	$22,963
ALTERNATIVE TREATMENT								
Higher Treatment (75% N removal)								
- New Systems in Sandy Soils		-1%	-14%	0.36	2772	$1,930	56	$2,506
- Major Remodels in Sandy Soils *		-4%	-18%	0 34	2641	$1,930	175	$2,506
- Repairs in Sandy Soils *		-9%	-27%	0 31	2360	$1,930	375	$2,506
- New Systems in Nonsandy Soils		-2%	-29%	0 30	2297	$1,930	1050	$30,000
- Major Remodels in Nonsandy Soils *		-2%	-32%	0.29	2218	$1,930	1310	$30,000
- Repairs in Nonsandy Soils *		-5%	-34%	0 28	2126	$1,930	2835	$30,000
Zeolite Filters for Sandy Soil Systems *		-15%	-23%	0 32	2496	$620	600	$662

NOTES

* For approaches marked with an asterisk, implementation will continue for an additional 25 years, resulting in total nitrate reductions of 250% of the amount indicated

Projected rates of new development: 0.4% per year in sandy soils, 1% per year in nonsandy soils
Based on actual rates of development, 1983-1990 (SCCPD, 1990)

Projected rates of major remodel (addition of bedroom and/or more than 250 square feet) 1.2% per year.
Projected rate is 2 times the observed rate during 1992-94, a time of greatly reduced building activity

Projected rates of septic system repair are 2 7% per year, based on current repair rates

Costs and estimates of nitrate reduction are taken from Table 8.

The cummulative percentage reduction takes into account that some measures are not necessarily additive.
For example, if enhanced treatment or zeolite filters were used, this reduction would be provided instead of the shallow system reduction

Zeolite Filters are still an unproven technology Actual costs may be significantly higher.

Appendix K - Regional Board Resolution 95-04: Basin Plan Amendment

STATE OF CALIFORNIA
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL COAST REGION

RESOLUTION NO. 95-04

ADOPTING AMENDMENTS TO THE WATER QUALITY CONTROL PLAN AND REQUESTING APPROVAL FROM THE STATE WATER RESOURCES CONTROL BOARD TO RESCIND ON-SITE SYSTEM PROHIBITION AND ADD WASTEWATER MANAGEMENT PLAN FOR THE SAN LORENZO RIVER WATERSHED, SANTA CRUZ COUNTY

WHEREAS:

1. The California Regional Water Quality Control Board, Central Coast Region (Regional Board), adopted the Water Quality Control Plan, Central Coastal Basin, (Basin Plan), on March 14, 1975.

2. The Regional Board periodically revises and amends the Basin Plan.

3. In response to extreme environmental conditions found in the San Lorenzo River Watershed, the excessive number of failing septic systems, and water quality degradation, the Regional Board adopted Resolution 82-10.

4. Resolution 82-10 recognized the difficulties associated with on-site wastewater disposal and addressed the problem in two ways. First, five communities within the watershed were designated as "Prohibition Zones." These five areas were referred to as "Class I" areas. Discharge of wastewater from on-site systems was prohibited as of July 1, 1986 and off-site wastewater disposal solutions were to be implemented. Second, other areas of the watershed were labeled "Class II." In Class II areas, the County of Santa Cruz was to implement a program to manage on-site wastewater disposal .

5. The "Draft Wastewater Management Plan for the San Lorenzo River Watershed, County of Santa Cruz, Health Services Agency, Environmental Health Service", February 1995 and "Draft San Lorenzo Nitrate Management Plan, Phase II Final Report", February 1995, County of Santa Cruz, Health Services Agency, Environmental Health Service (Wastewater Management Plan) is a satisfactory mitigation of Regional Board Resolution 82-10.

6. The United States Congress Coastal Zone Act Reauthorization Amendments (CZARA, Section 6217 (g)) require states to "restore and protect" coastal waters. The Pajaro River and Llagas Creek are subject to CZARA, Section 6217 (g)).

7. The Regional Board has determined the Basin Plan requires further revision and amendment.

8. Drafts of the proposed amendment have been prepared and distributed to interested persons and agencies for review and comment.

9. Regional Board staff has followed appropriate procedures to satisfy the environmental documentation requirements of both the California Environmental Quality Act of 1977 (PL 92-500 and PL 95-217). The Regional Board finds adoption of these amendments will not have a significant adverse effect on the environment.

10. Regional Board staff consulted with the Department of Fish and Game regarding potential impacts of proposed Basin Plan revisions on fish and wildlife resources, and the threatened and endangered plants and animal species. The draft amendment has been revised in response to comments by Department of Fish and Game staff. The Department of Fish and Game has made determination of "no jeopardy" pursuant to the California Endangered Species Act.

11. Due notice of public hearing was given by advertising in newspapers of general circulation within the Region.

12. On April 14, 1995 in Salinas, California, the Regional Board held a public hearing and heard and considered all public testimony.

THEREFORE BE IT RESOLVED:

1. Based on the draft Basin Plan amendment, the environmental checklist, accompanying written documentation, and public comments received, the Regional Board finds that there is no substantial evidence in the record that adoption of the proposed Basin Plan amendment will have a significant adverse effect on the environment.

2. The environmental document prepared by Regional Board staff pursuant to Public Resources Code Section 21080.5 is hereby certified. Following approval of the revised Basin Plan by the State Board, the Executive Officer shall file a Notice of Decision with the State Clearinghouse.

3. Based on the approval and adoption of Resolution 95-04, the Board shall rescind Resolution 82-10.

4. The Basin Plan amendment shown on Attachment "A" is approved. The amendments will not take effect until approved by the State Board and the Office of Administrative Law.

5. Upon approval, the State Board is requested to transmit the amendment to the California Office of Administrative Law and the U.S. Environmental Protection Agency for approval.

I, ROGER W. BRIGGS, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of the resolution adopted by the California Regional Water Quality Control Board, Central Coastal Region, on April 14, 1995.

Roger Briggs

Executive Officer

RESOLUTION 95-04
ATTACHMENT A
PROPOSED BASIN PLAN AMENDMENTS

The following Basin Plan amendment is proposed. (Note new language is shown in **bold**, existing language is shown in plain text, and deleted language is ~~struck out~~.)

1. Revise the November 17, 1989 Basin Plan, Chapter Four, page 11 as follows:

Individually owned septic tank leachfield systems in the San Lorenzo Valley~~are being studied closely~~ **have been inspected and monitored from 1986 through 1994.** ~~to identifyp~~Problem areas **have been identified** and ~~determine~~ the suitability of these problem areas for the continued use of septic systems **has been determined as documented in the County of Santa Cruz, Environmental Health Services reports (1) Preliminary Report, An Evaluation of Wastewater Disposal And Water Quality In The San Lorenzo Watershed, September, 1989, (2) Final Project Report, Boulder Creek Wastewater Feasibility Study, October, 1991; and (3) Final Project Report, San Lorenzo Valley Community Wastewater Feasibility Studies, September, 1994.** Alternatives ~~will be proposed and evaluated~~ **have been evaluated and solutions proposed** to reduce septic system problems and to respond to this Plan's discharge prohibition in certain areas of the valley. **Solutions are contained in the "Draft Wastewater Management Plan for the San Lorenzo River Watershed, County of Santa Cruz, Health Services Agency, Environmental Health Service", February 1995 and "Draft San Lorenzo Nitrate Management Plan, Phase II Final Report", February 1995, County of Santa Cruz, Health Services Agency, Environmental Health Service (Wastewater Management Plan).** ~~Specific design criteria for conventional and modified septic systems will be developed as part of on going county studies~~ **The Wastewater Management Plan documents standards and conditions that shall be met for the protection and enhancement of beneficial uses.**

Implementation of the Wastewater Management Plan precludes the Regional Board from reestablishing the discharge prohibition.

2. Revise the November 17, 1989 Basin Plan, Chapter Four, pages 53-54 as follows:

Discharges from individual sewage disposal systems within the San Lorenzo **River Watershed** ~~Valley north of Henry Cowell State Park~~ shall be managed as follows:

a. Discharges ~~within five communities are prohibited~~**shall be allowed,** ~~where the affected area (Class I Area) is defined by the Santa Cruz County Assessor's Parcel Numbers as described in Appendix A-23~~ **providing the County of Santa Cruz, as lead agency, implements the "Draft Wastewater Management Plan for the San Lorenzo River Watershed, County of Santa Cruz, Health Services Agency, Environmental Health Service", February 1995 and "Draft San Lorenzo Nitrate Management Plan, Phase II Final Report", February 1995, County of Santa Cruz, Health Services Agency, Environmental Health Service (Wastewater Management Plan) and assures the Regional Board that areas of the San Lorenzo River Watershed are serviced by wastewater disposal systems to protect and enhance water quality, to protect and restore beneficial uses of water, and to abate and prevent nuisance, pollution, and contamination..**

b. ~~To preclude prohibition of discharges outside the Class I Area, the County of Santa Cruz, shall act as lead agency in coordinating and establishing a program that will assure the Regional Board that:~~

~~additional systems in these areas will be designed, sized, located, spaced, and constructed in a manner that will protect water quality, protect beneficial uses of water, and prevent nuisance, pollution, and contamination.~~

~~existing systems within specific communities are systematically evaluated and redesigned, resized, relocated, and reconstructed as appropriate to protect and enhance water quality, to protect and restore beneficial uses of water, and abate and prevent nuisance, pollution and contamination, where the specific communities (Class II Area) are defined by the Santa Cruz County Assessor's Parcel Numbers as described in Appendix A-24.~~

~~systems within the Class II Area are regularly inspected and maintained in a manner that will protect water quality, protect beneficial uses of water, and prevent nuisance, pollution, and contamination.~~

In fulfilling the responsibilities identified above, the County of Santa Cruz shall submit annual reports beginning on January 15, 1996. The report shall state the status and progress of the Wastewater Management Plan in the San Lorenzo River Watershed. The County of Santa Cruz annual report shall document the results of:

1. **Existing Disposal System Performance Evaluations,**
2. **Disposal System Improvements,**
3. **Inspection and Maintenance of On-site Systems,**
4. **Community Disposal System Improvements,**
5. **New Development and Expansion of Existing System Protocol and Standards,**
6. **Water Quality Monitoring and Evaluation,**
7. **Program Administration Management, and**
8. **Program Information Management.**

The report shall also document progress on each element of the Nitrate Management Plan, including:

1. **Parcel Size Limit,**
2. **Wastewater Management Plan Implementation,**
3. **Boulder Creek Country Club Wastewater Treatment Plant Upgrade,**
4. **Shallow Leachfield Installation,**
5. **Enhanced Wastewater Treatment for Sandy Soils,**
6. **Enhanced Wastewater Treatment for Large On-site Disposal Systems,**
7. **Inclusion of Nitrogen Reduction in Waste Discharge Permits,**
8. **Livestock and Stable Management,**
9. **Protection of Groundwater Recharge Areas,**
10. **Protection of Riparian Corridors and Erosion Control,**
11. **Nitrate Control for New Uses,**
12. **Scotts Valley Nitrate Discharge Reduction, and**
13. **Monitoring for Nitrate in Surface and Ground Water,**