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*Board Committee for Groundwater Nitrate Compliance Program

Project Management

John Blacklock, Chief
Administrative Officer
County of Butte

Starlyn Brown, Assistant Chief
Administrative Officer
County of Butte

Eric Miller, Manager
Program Resource & Development
County of Butte

Principal Technical Advisors

Jeffrey Bold, Ph.D., Soil Chemist
Dames & Moore, Sacramento

Graham Fogg, Ph.D., Professor,
Dept. of Land, Air & Water Resources
University of California, Davis

Stewart Oakley, Ph.D., Director
Environmental Laboratory
Dept. Of Civil Engineering
California State University, Chico

Dennis Rolston, Ph.D., Professor,
Dept. Of Land, Air & Water Resources
University of California, Davis

Regulatory Oversight

James Pedri, P.E.
Assistant Executive Officer
Central Valley Regional Water Quality Control Board, Redding

Ronald Dykstra, P.E.
Associate WRC Staff Engineer
Central Valley Regional Water Quality Control Board, Redding

In Response to Order No. 90-126 and Order No. 95-024 of the Central Valley Regional Water Quality Control Board

CHICO URBAN AREA NITRATE COMPLIANCE PLAN

(Program Report & Proposed Implementation Plan for Groundwater Nitrate Compliance in the Chico Urban Area)

A Summary of the Technical Analyses, Conclusions and Recommendations of the Chico Urban Area Groundwater Nitrate Compliance Program.

2000

Executive Summary
CHICO URBAN AREA
NITRATE COMPLIANCE PLAN

Butte County Board of Supervisors
25 County Center Drive
Oroville, CA 95965
2000

Eric Miller, Manager - Program Resource & Development
Butte County Administrative Office
25 County Center Drive
Oroville, CA 95965
(530) 538-7631

EXECUTIVE SUMMARY

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ABSTRACT

The Chico Urban Area Nitrate Compliance Plan (Plan) was prepared in response to the contamination of groundwater in the Chico Urban Area by nitrate, a form of nitrogen, and the subsequent issuance of Prohibition Order No. 90-126 adopted by the Central Valley Regional Water Quality Control Board on April 27, 1990. This prohibition order affects approximately 30,000 residents on 10,000 parcels, and represents nearly 12,000 dwelling units.

The source of nitrate contamination to the shallow aquifer beneath the Chico Urban Area is from the use by residents of on-site septic systems for wastewater disposal. Residential developments with a housing density equivalent of four or more dwelling units per acre contribute concentrations of wastewater nitrate loading that slightly exceed the nitrate maximum contaminant level to groundwater. Federal and State water quality standards indicate that nitrate concentration levels of 45 milligrams per liter or more are considered a threat to drinking water and public health. Approximately 65% of the 12,000 dwelling units affected by Prohibition Order No. 90-126 are located within high density areas and are recommended to be connected to the City of Chico's sewer system. This figure translates to approximately 7,800 dwelling units located in neighborhoods in north Chico (Lassen Avenue corridor), central Chico (the Avenues), and south Chico (Chapman-Mulberry area). These areas represent unincorporated portions of the Chico Urban Area and include single family dwelling units, apartment complexes, and mobile home parks.

The resulting installation of a sewer collection system for these target areas (7,800 dwelling units) is at an estimated capital cost of nearly $71 million dollars, with an average cost of about $9,000 per dwelling unit.

Program financing will be developed and managed by the County and involve combining a portfolio of low interest federal or state loans, local redevelopment agency funds, and available grants. It is proposed that loan re-payment mechanisms will include the formation of assessment districts for areas targeted to receive sewer installation and service. The County is also the lead agency for preparation of related environmental and construction documents in accord with the Plan.

It is proposed that construction of the sewer collection system and implementation of corrective action will occur within three to ten years from the date of adoption of the Plan by the Butte County Board of Supervisors (Board) and the Central Valley Regional Water Quality Control Board. Those parcels to remain unsewered may continue to use on-site waste water disposal systems, with additional monitoring, to ensure their safe and sanitary operation.

When adopted, this Plan will supersede the Nitrate Action Plan which was adopted by the Board and Chico City Council in 1985. It is imperative that the State, County, and City of Chico, maintain a cooperative and focused effort to mitigate and solve the public health threat to groundwater nitrate contamination beneath the Chico Urban Area.

(Abstract - Chico Urban Area Nitrate Compliance Plan)
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QUICK REFERENCE GUIDE

to the

COUNTY OF BUTTE,

CHICO URBAN AREA NITRATE COMPLIANCE PLAN

This intent of this reference guide is to assist the reader in locating pertinent information in the Chico Urban Area Nitrate Compliance Plan (Plan).

DESCRIPTION OF PROJECT AREA & LOCAL GROUNDWATER BASIN

Table 1 provides a quick summary of the project area and important background information as it concerns the groundwater basin beneath the Chico Urban Area. All cited pages refer to the Plan.

Table 1. Description of Project Area & Aquifer (Groundwater Basin)

Population Affected	About 30,000 residents and approximately 12,000 dwelling units on 10,000 parcels. See page 1-1.
Direction of ground water flow	West, south west (east is up gradient). See page 3-8.
Depth to groundwater (shallow aquifer)	Ranges from 0 feet below ground (east side of the Chico Urban Area) to 50 feet below ground. Refer to Appendix A, page A-9. Recharge occurs mainly from direct percolation of surface water.
Depth to groundwater (intermediate aquifer)	Ranges from 0 feet to about 600 feet below ground. Recharge occurs from local streams, leakage from the shallow aquifer, and in the east, direct percolation of surface water. See Appendix A, page A-5.
Depth to groundwater (deep aquifer)	Ranges from 250 feet to about 850 below ground surface. This aquifer is the source of municipal well water utilized by the California Water Service Company. Refer to page A-2 of Appendix A.
Drinking water standards	The Federal EPA standard for nitrate is 45 milligrams per liter (mg/l). See page 2-4 of the Implementation Plan.
Current nitrate levels	Range from less than 10 mg/l to more than 100 mg/l in the Chico Urban Area. One private well reported up to 300 mg/l in the shallow aquifer. See pages 3-8 and 3-10.
Overseeing Regulatory Agency	Central Valley Regional Water Quality Control Board (Redding, California office)

PRIORITY AREAS FOR SEWERING

The priority areas for sewering include high density areas with more than 4 dwelling units per acre and locations where poor soil conditions may inhibit the performance of onsite systems. Figure 4-1 (page 4-4 of the Plan) shows a map of the Chico Urban Area and waste water nitrate loading as expressed in residential dwelling units per acre. Figure 4-2 (page 4-6) shows the locations of neighborhoods having an average density at or above approximately four dwelling units per acre. Figure 4-6 (page 4-11) shows the relative priority of sewering based upon the average residential density.

Table 5-1 on page 5-3 of the Plan shows a break down of the types and number of dwelling units north and south of Lindo Channel, and also the priority areas for sewering. Table 2 below provides summary information on the priority areas to be sewered north and south of Lindo Channel.

Table 2. Priority Areas for Sewering

Total units	Approximately 7,831 units.
# units north of Lindo Channel	Approximately 5,034 units
# units south of Lindo Channel	Approximately 2,797 units
Priority Area "I"	Lassen Avenue corridor between Cussick Avenue and to the Pleasant Valley ditch which is west of Cohasset Road. Includes high density neighborhoods north and south of Lassen Avenue. See also the map shown in Figure 4-2 (pp 4-6). Includes approximately 3,087 units.
Priority Area "II"	Located in the Avenues in neighborhoods west and east of the Esplanade, in general north of 3rd Avenue and as far east as State Highway 99. Refer also to the map shown in Figure 4-2 (pp 4-6). Approximately 930 units.
Priority Area "III"	Located in the Chapman-Mulberry area in neighborhoods south of E. Eighth Street, east of Mulberry and Cypress Streets, north of Silver Dollar Fairgrounds, and west of State Highway 99. Refer also to the map shown in Figure 4-2 (pp 4-6). Approximately 721 units.

ESTIMATED PROGRAM COSTS

Table 3 addresses the total estimated costs to property owners who would connect to sewer in accordance with the Plan. Also refer to Table 5-2 (page 5-5) of the Plan for more explanation of onsite and offsite costs.

Table 3. Costs to Property Owners

Total Units	**7,831 units**
Estimated OFFSITE Costs (within the public right of way, includes the installation of sewer line in front of property)	**Estimated at $28.8 million**
Estimated City Water Pollution Control Plant Capacity Fees, City Sewer Trunk line Fees, & City Sewer Main Fees	**" $18.5 million**
Total ONSITE Costs (includes the decommissioning of septic tank and installation of laterals to sewer line)	**" $23 million**
NET TOTAL PROGRAM COST	**" nearly $70.5 million**
Estimated OFFSITE Cost to Property Owner, per unit	**" $3,680**
Estimated ONSITE Cost to Property Owner, per unit	**" $2,950**
Estimated City Water Pollution Control Plant Capacity, Sewer Trunk line, and Sewer Main Fees, per unit	**" $2,370**
NET Total Average Cost to Property Owner, per unit	**" $9,000**

(SOURCE: These cost figures were updated as part of the Phase 2 Sewer Feasibility study (December, 1998).

Estimated construction costs to abandon a septic tank, install the lateral sewer line from the living unit to the sewer main, to install the sewer main, and pay for City treatment plant capacity, sewer trunk line capacity, and sewer main fees, are approximately $9,000 per unit. The costs of applicable fees charged by the City of Chico need to be examined further. Public financing costs have not yet been determined and will depend upon the type of financing method that is selected.

These costs will be further refined as the financial program is developed.

METHOD OF FINANCING

Table 4 summarizes Butte County's strategies to develop a financial program in accordance with the Plan. The financing of sewer improvements is addressed in Chapter 5, pages 5-8 through 5-13.

Table 4. Method of Financing

Method of Financing for Onsite and Offsite Costs	County will pursue a financing portfolio combination of grants and low-interest loans.
Estimated Service Costs after sewer connection	Monthly sewer service cost is about $9 to $10 per month for a single family dwelling unit.
Method of Loan Re-payment (County)	Through assessment district(s) and use of redevelopment agency funds in priority sewer areas for low income only.
Term of Loan Re-payment (County)	May range from 10 to 20 years, depending on loan structure.
"BOTTOM LINE" Net Cost Impact to Property Owner on a Monthly Basis	Undetermined at this time. Depends on the amount of grant funds received, loan portfolio, and terms.

In reference to Chapter 6, the County is the lead agency that will create a financial program for the construction of onsite and offsite sewer facilities. Financing activities may include provisions for long term loans, imposing liens upon the sale of private property, and/or developing or pursuing grants to those needing financial assistance.

Butte County will pursue financing that will combine grants and low interest loans available through Federal, State and local programs. Methods for the re-payment of loans may include the establishment of assessment districts and also the use of redevelopment agency funds in priority sewer areas. The terms for loan re-payments may range from 10 to 20 years.

I INTRODUCTION

The "Chico Urban Area Nitrate Compliance Plan (Plan)" has been prepared in response to the contamination of groundwater in the Chico Urban Area by nitrate, a form of nitrogen. The discharge from individual septic systems has been cited by the Central Valley Regional Water Quality Control Board (Regional Board) as the primary source of groundwater nitrate contamination that exceeds drinking water standards set by the U.S. Environmental Protection Agency and the State Water Resources Control Board (State Board). Nitrate levels that exceed the standard have been established as a threat to the public health and is subject to regulation.

In 1990, when local corrective action was deemed by the Regional Board to be too slow and inadequate, more formalized enforcement actions were undertaken, resulting in a Prohibition Order that required the abandonment of area septic systems by July of 1995. The issue, which affects over 30,000 residents in the Chico Urban Area, had become increasingly controversial making a timely resolution difficult. The cost of sewering had emerged as a primary concern, especially for those on fixed incomes and limited ability to absorb the cost. Some doubted the adverse health effects of groundwater nitrate, the integrity of test results, or dismissed the issue as a ploy to force unincorporated residents to annex to the City of Chico. Since high nitrate levels were first discovered in 1979, few local issues have held the potential to affect such a large segment of Chico-area residents. The local nitrate problem has spawned numerous studies and regulatory actions, complicated and impacted home sales, worried those on private wells, and generated hours of debate.

Unfortunately, nitrate contamination in the groundwater and soils in the Chico area has resulted with an order from the Regional Board to address and rectify the problem. A tremendous amount of human and financial resources have been spent on this project, which will require further time and capital resources.

This Executive Summary addresses the findings and future work that will be required to correct groundwater nitrate contamination. More detailed information can be found in the Plan. Copies of this plan are available for public review in the Butte County (Chico) Library and also the Meriam Library, 3rd floor, Special Collections Section, on the campus of California State University - Chico. The Plan may also be accessed via the internet at *www.buttecounty.net/cob*. When adopted, this Plan will also supersede the Nitrate Action Plan which was originally adopted by the Butte County Board of Supervisors and City of Chico City Council in 1985.

Property owners are encouraged to read this Plan, to become involved, and to make suggestions.

Protection of the Groundwater Aquifer

An aquifer is an underground formation of rock or sediment which is saturated and sufficiently permeable to transmit economic quantities of water to a well or spring. In places, an aquifer is separated from other aquifers by widespread layers of less permeable sediment such as clay. The Plan refers to such reservoirs of groundwater as the shallow, intermediate, and deep aquifers. The following table describes the properties of the aquifers in the Chico area.

AQUIFER	DESCRIPTION
Shallow Aquifer	An unconfined aquifer which ranges in depth from 0 feet on the east side of the Chico Urban Area to 50 feet below ground surface on the west. The aquifer consists of sand and gravel deposits, and is recharged mainly from direct percolation of surface water.
Intermediate Aquifer	A semi-confined aquifer ranging from 0 feet to about 600 feet below the ground surface. This aquifer consists of older cemented alluvial deposits, unconsolidated sand and gravel deposits, and thick clay layers. Recharge is from local streams, leakage from the shallow aquifer, and in the east, direct percolation of surface water.
Deep Aquifer	For the purposes of this study, the deep aquifer is confined and highly permeable, and consists of sand and course grained gravels approximately 250 to 850 feet below the ground surface. This aquifer is the source of municipal well water collected by the California Water Service.

County Service Area 114

County Service Area (CSA) 114 was created by the Butte County Board of Supervisors in 1988 to provide for the financing of feasibility and planning studies, engineering studies, groundwater well monitoring, and environmental studies related to nitrate compliance in the Chico Urban Area. Current annual CSA 114 charges are $25.90 per assessed parcel. The activities and expenditures of CSA 114 reflect the central mission and scope of authority originally approved and later expanded by the Board of Supervisors and Local Agency Formation Commission in September 1991. All expenditures have been properly authorized by the Board of Supervisors or, with certain smaller expenses, by the Butte County Administrative Office. A map of CSA 114 is provided as Figure 1-1 in the Executive Summary and also in Appendix P of the Plan.

II PURPOSE OF THE EXECUTIVE SUMMARY

This Executive Summary is a companion document to the Chico Urban Area Nitrate Compliance Plan. This document summarizes the key points and findings from each chapter and presents a recommended course of action. The information provided in this Executive Summary has been directly excerpted from the Plan.

The Plan reports the actions taken and those recommended to resolve the groundwater nitrate issue in the Chico Urban Area. The preparation of the scientific studies and engineering analyses which have led to its preparation spanned approximately seven years and involved input and review from state regulatory officials, county staff, independent hydro geologists and soil chemists, members of the affected citizenry, and by a Citizen's Nitrate Advisory Committee representing the public at large who live within CSA 114.

The Plan was prepared in response to Order No. 90-126 (Prohibition Order) and Order No. 95-024 (Deferral of Enforcement) of the Central Valley Regional Water Quality Control Board.

III ADOPTION of the PLAN

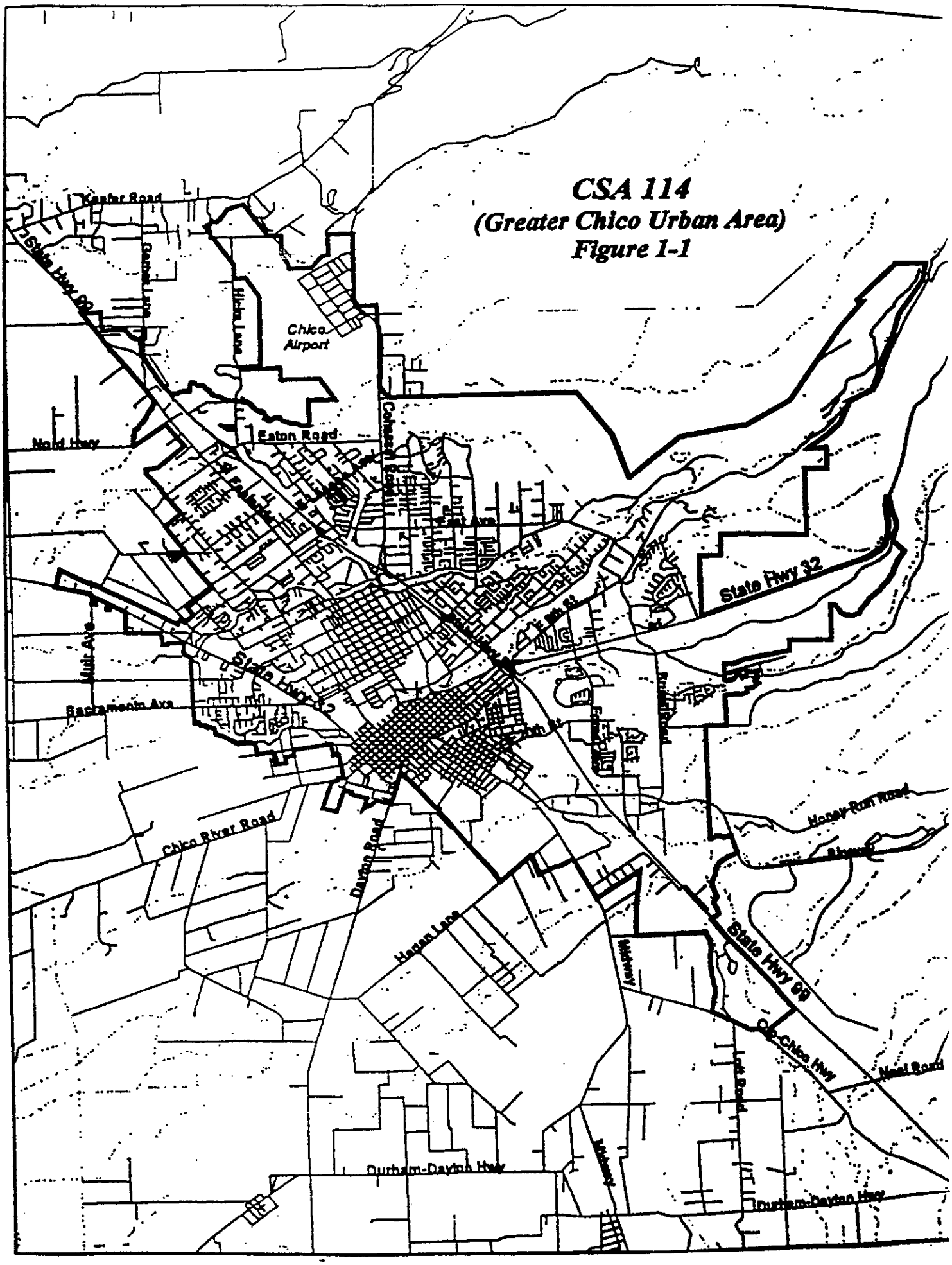
The Plan is intended to function as a structured response to the Regional Water Quality Control Board (Regional Board), an arm of the State Board with jurisdiction over water quality issues in Butte County. Following a period of public review and comment, staff will compile a response to comments, and bring forward the implementation portion of the document to the Butte County Board of Supervisors and the Regional Board for their approval.

IV ORGANIZATION of the PLAN

In order to provide a brief overview, each chapter of the Plan is headed by a "key points" section. These chapters are entitled as follows:

Chapter	Title
1	Introduction and Summary
2	Health Effects and Regulation of Nitrate
3	Scope and Results of the Technical Program
4	Nitrate Elimination, Reduction, and Onsite Compliance
5	Sewer Feasibility, Cost and Program Financing
6	Monitoring Program for On-site Systems
7	Land Use, New Development, and Local Government Jurisdiction
8	Environmental Review and Compliance
9	Implementation Components and Schedule

To assist the reader, key maps and figures have been excerpted from the Plan and are included within this Executive Summary.


CSA 114
(Greater Chico Urban Area)
Figure 1-1
Keefer Road
State Hwy 99
Garner Lane
High Lane
Chico Airport
Eaton Road
Nord Hwy
Cohasset Road
East Ave
State Hwy 32
Muir Ave
State Hwy 99
Sacramento Ave
Chico River Road
Dayton Road
Hegan Lane
Honey Run Road
State Hwy 99
Old Chico Hwy
Neal Road
Durham-Dayton Hwy
Durham-Dayton Hwy

V REVIEW & SUMMARY OF PLAN

V.1 Chapter 1 - Introduction

The preparation of the Plan is in response to the contamination of ground water in the Chico Urban Area by nitrate, a form of nitrogen. The Chico Urban Area represents a total of nearly 85,000 residents, of which approximately 47,000 reside in the incorporated city limits of Chico and the remainder living in unincorporated areas either adjacent to, or surrounded by, the City of Chico. The discharge from individual septic systems has been cited by the Regional Board as the primary source of ground water nitrate concentrations that exceed the drinking water standards set by the United States Environmental Protection Agency and the State Board. Nitrate levels that exceed the standard have been established as a threat to public health and subject to regulation. High nitrate levels were first discovered in private wells in 1979.

For more historical background on nitrate compliance the reader is referred to Chapter 1, pages 1-1 through 1-7, of the Plan. Copies of Prohibition Order No. 90-126 (Order) and Resolution No. 95-024 (Deferral of Enforcement) are provided in Appendices C and D of the Plan.

V.2 Chapter 2 - Health Effects and Regulation of Nitrate

Chapter 2 provides background information on the adverse health effects of excessive nitrate in drinking water, the regulatory entities involved in the oversight of water quality, and the specific Chico-area enforcement actions taken by the State Board and the Regional Board.

Scientific studies provide a basis for the regulation of nitrate in drinking water. Methemoglobinemia (blue-baby syndrome), possible carcinogenic effects, and other health concerns support the basis for nitrate regulation. The health effects of excessive nitrate in drinking water are described in Chapter 2 of the Plan, pages 2-1 through 2-4.

Potential sources of nitrate in ground water include agricultural and domestic fertilizers, animal waste, septic system effluent, and natural sources (refer to Chapter 2, pages 2-4 to 2-7).

Ground water regulation in California is set forth in the Porter-Cologne Water Quality Control Act (State Water Code) and is within the purview of the State Board and Regional Board. Numerous programs and enforcement measures are available to the regulators to ensure the protection of ground water quality (refer to pages 2-7 through 2-10).

<u>Nitrate Action Plan</u>
In response to an order of the Regional Board in 1984 (Resolution 84-074), Butte County and the City of Chico prepared a "Nitrate Action Plan" in 1985 to address the nitrate problem in the Chico Urban Area. This plan was subsequently amended in 1988 by the City and County and incorporated the requirement for Regional Board approval of a sewer time line on all developments of greater than one unit per acre. The amended plan achieved consistency between the County and City on development densities, and incorporated areas in the northwest urban area into the City's sewer service area which were previously excluded from sewer service. A more detailed history of the

Nitrate Action Plan is described on page 2-12. A copy of the Nitrate Action Plan as adopted by Butte County appears as Appendix N. As previously mentioned the adoption of the Nitrate Compliance Plan will supersede the Nitrate Action Plan. However, elements of the Nitrate Action plan (regarding septic tank installation standards) to remain in effect after the adoption of the Nitrate Compliance Plan are shown in Appendix O.

Prohibition Order No. 90-126 and other actions by the Regional Board are intended to enforce the nitrate standard of 45 mg/l as nitrate, and to reduce total nitrate loading to ground water. The Chico Urban Area population of approximately 85,000 residents includes about 35,000 persons residing in approximately 12,000 units which are served by on-site septic systems. These systems include many commercial and other non-residential facilities.

Pages 2-13 through 2-16 of the Plan describes the recent requirements of the Regional Board for the Chico Urban Area. In January 1995 the Regional Board received a verbal progress report from its staff and Butte County, and subsequently adopted Resolution No. 95-024 (attached in Appendix D of the Plan). At the County's request, this resolution deferred enforcement action relative to the Prohibition Order to allow time for the county to complete an implementation plan setting forth in detail local plans for compliance with the groundwater nitrate standards. The Regional Board's deferral of enforcement action is discussed on page 2-13.

Section 2.6 (page 2-17) further explains the role of CSA 114 and its scope of authorized activities. Most of CSA 114's expenditures have been for professional services in research, hydro-geology, soil chemistry, engineering, project management and related activities. Approximately $1.3 million have been spent since 1989. Table 2-2 (page 2-19) summarizes the description of expenditures from 1989 through 1999. A detailed review of CSA 114 expenditures is summarized in Appendix Q.

V.3 Chapter 3 - Scope and Results of the Technical Program

Chapter 3 summarizes the scope and results of a comprehensive technical program of ground water nitrate characterization, hydro geology, and soil chemistry conducted over a four year period. The purpose of the technical program was to define and establish the scope and extent of nitrate contamination, and to provide the technical basis for a resolution that is satisfactory to the County, Regional Board and the public.

Hydrologic studies of the project area have been performed since 1979 when elevated nitrate levels were first discovered in private water supply wells in the Chico Urban Area. Butte County's technical program began in 1992 with an initial nitrate characterization study consisting of the sampling of 119 wells. In 1993 an additional 19 monitoring wells were installed in the shallow aquifer to provide more accurate characterization of the extent and severity of elevated nitrate levels in ground water. The Ground Water Nitrate Study Final Report was completed in early 1994 by Dames and Moore (a national environmental consulting firm with an office in Sacramento, California).

Nitrate concentrations in wells ranged from background levels of 10 mg/l to more than 100 mg/l in

the Chico Urban Area. The depth to ground water ranges from 11 to 45 feet below the ground surface and the direction of ground water flow in the shallow aquifer is west southwest.

The results of the technical program are generally consistent with previous studies. Nitrate concentrations are greatest down gradient from the areas of highest septic tank usage, and an evaluation of all potential nitrate sources strongly supports the conclusion that septic tank discharge is the primary source of ground water nitrate in the Chico Urban Area.

A simplified mass balance equation was used to predict the level of waste water loading that could be sustained without causing exceedance of the maximum contaminant level (the highest level of a contaminant permissible in water in a public water system as set by the U.S. Environmental Protection Agency under the Safe Drinking Water Act). This equation, known as the Hantzsche Equation, estimates nitrate loading to ground water based upon measured factors including rainfall, recharge, denitrification, soil chemistry, and other factors. The Hantzsche Equation was derived by Norman Hantzsche, a registered California professional engineer, and John Finnemore, Ph.D, professor of civil engineering at Santa Clara University (Santa Clara, California).

The Hantzsche Equation (see Section 3.3, page 3-4, and Section 3.4, pages 3-14 through 3-17) was applied to the Chico Urban Area where the input parameters (i.e. rainfall, recharge, denitrification, soil chemistry, population, housing density) could be reasonably measured and/or estimated and the concentration of nitrate in the shallow aquifer could be determined and expressed in acres per equivalent dwelling unit. The findings of the technical program supports that the density limit of four or more dwelling units per acre will exceed the nitrate maximum contaminant level of 45 mg/l. The Hantzsche Equation is further described in Appendix G.

A team of scientists and engineers with expertise in this field was assembled to consult and provide guidance for the Technical Program. The technical team included members from academia (i.e. University of California- Davis, California State University - Chico), the Regional Board, and also Dames and Moore. The qualifications and backgrounds of the technical team members are discussed on page 3-6.

V.4 Chapter 4 - Nitrate Elimination, Reduction, and On-Site Compliance

Chapter 4 delineates those locations within the Chico Urban Area that require sewering (nitrate elimination or nitrate reduction), or no action beyond improved management of on-site systems. The results of the technical program (discussed in Chapter 3) provide the scientific basis for the designation of areas that must sewer to eliminate their nitrate discharge to ground water as well as those areas where existing on-site systems may continue to operate. The proposed actions are intended to reduce overall nitrate loading in the Chico Urban Area to a level which will not cause or perpetuate an excessive level of ground water nitrate.

The areas proposed for sewering have an average overall density of approximately four or more dwelling units per acre, a density which has been found to exceed the capacity of the soil and receiving waters to assimilate nitrogen. Other subareas may be required to connect to the sewer

system based upon the following criteria (from page 4-2):

- prevalence of system failures and/or operational problems
- proximity to proposed or existing sewer service
- equitable distribution costs within a subarea or neighborhood
- inadequate separation from ground water
- poor soils
- average age of on-site systems
- cost advantages versus other ground water protection alternatives

Section 4.2 (pages 4-3 through 4-10) discusses nitrate loading from onsite systems as expressed in residential dwelling units per acre. Figures 4-1, 4-2 and 4-6 (attached to the Executive Summary in pages 9, 10, and 13) translate the results of the technical program to specific Chico Urban Area neighborhoods and subareas. Figure 4-1 expresses waste water nitrate loading from on-site systems in terms of the number of residential dwelling units per acre. Figure 4-2 illustrates all parcels with a sustainable density above the level calculated by the Hantzsche Equation that causes the exceedance of the maximum contaminant level, which is approximately 4 dwelling units per acre.

In many areas of predominantly higher density, such as the Lassen Avenue corridor, a single family dwelling on a large lot may exist in a neighborhood with a high average density. In other cases the occupancy of a given dwelling unit may be substantially under the average, such as a single occupant of a home in the Avenues area. In these instances there is the question of whether or not the large lot or single occupancy should be included in the sewering of the area.

The occupancy of a given dwelling unit may significantly vary over time as the average family moves approximately every seven years. To illustrate the extreme, the specific waste water loading from a single dwelling unit may jump from a lone senior citizen occupant with a very low nitrate output, to a family of five with a relatively high waste water output. Older neighborhoods may naturally undergo a generational transformation with the accompanying increase in families with children.

The issue of fairness and equity is also considered. As extension of the sewer collection system occurs, sewer lines may abut some properties not required to connect by virtue of the other listed criteria for sewering. In this case, that property may benefit from the availability of the sewer main and the option of connecting at any time in the future.

As discussed on page 4-10, it is necessary to use averages to generalize and to avoid attempting to overly refine the analysis. Boundaries for sewering should consider the larger context of long-term waste water loading as well as the fairness and equity of how an otherwise cohesive neighborhood is treated.

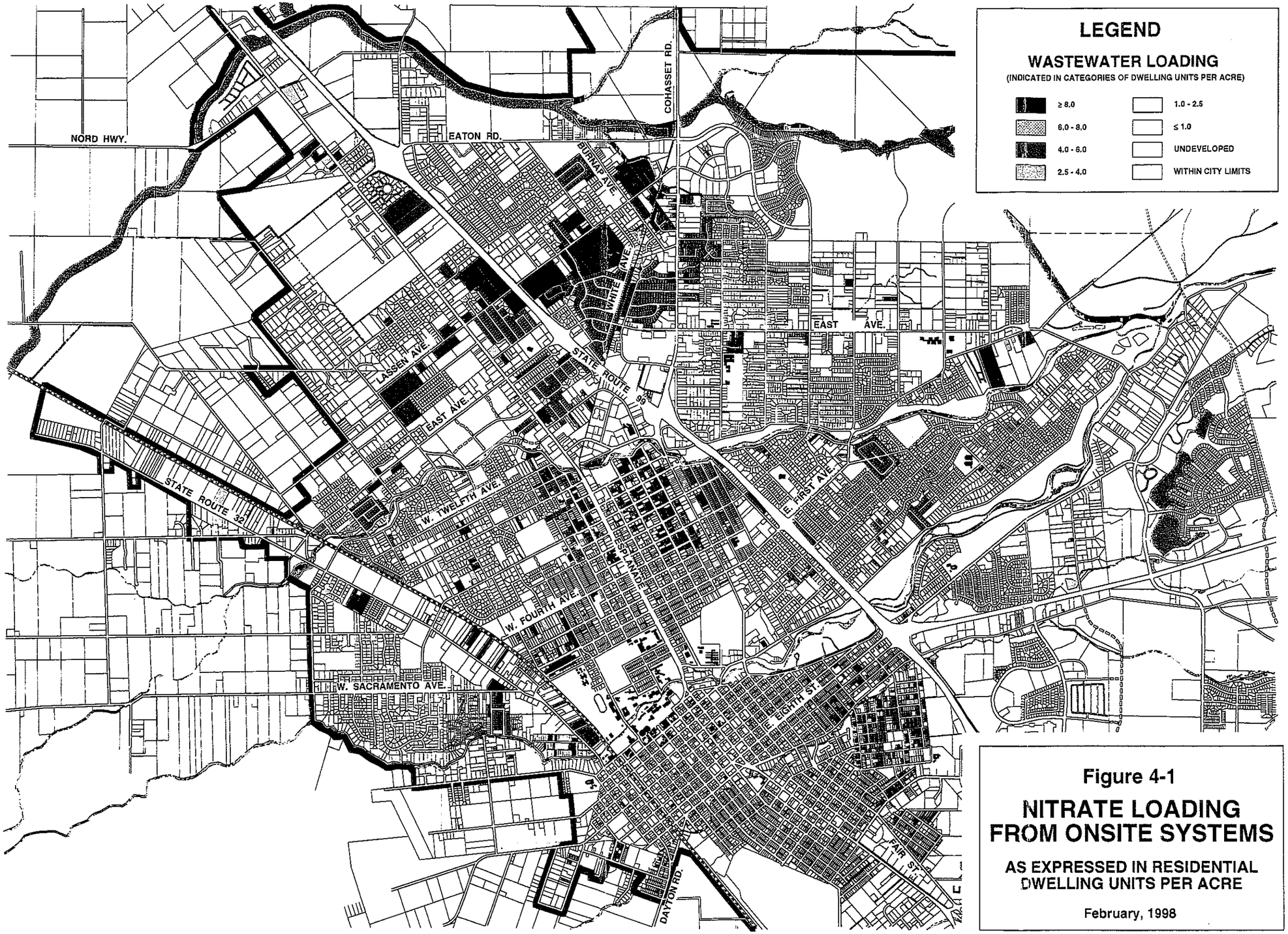


Figure 4-1

NITRATE LOADING FROM ONSITE SYSTEMS

AS EXPRESSED IN RESIDENTIAL DWELLING UNITS PER ACRE

February, 1998

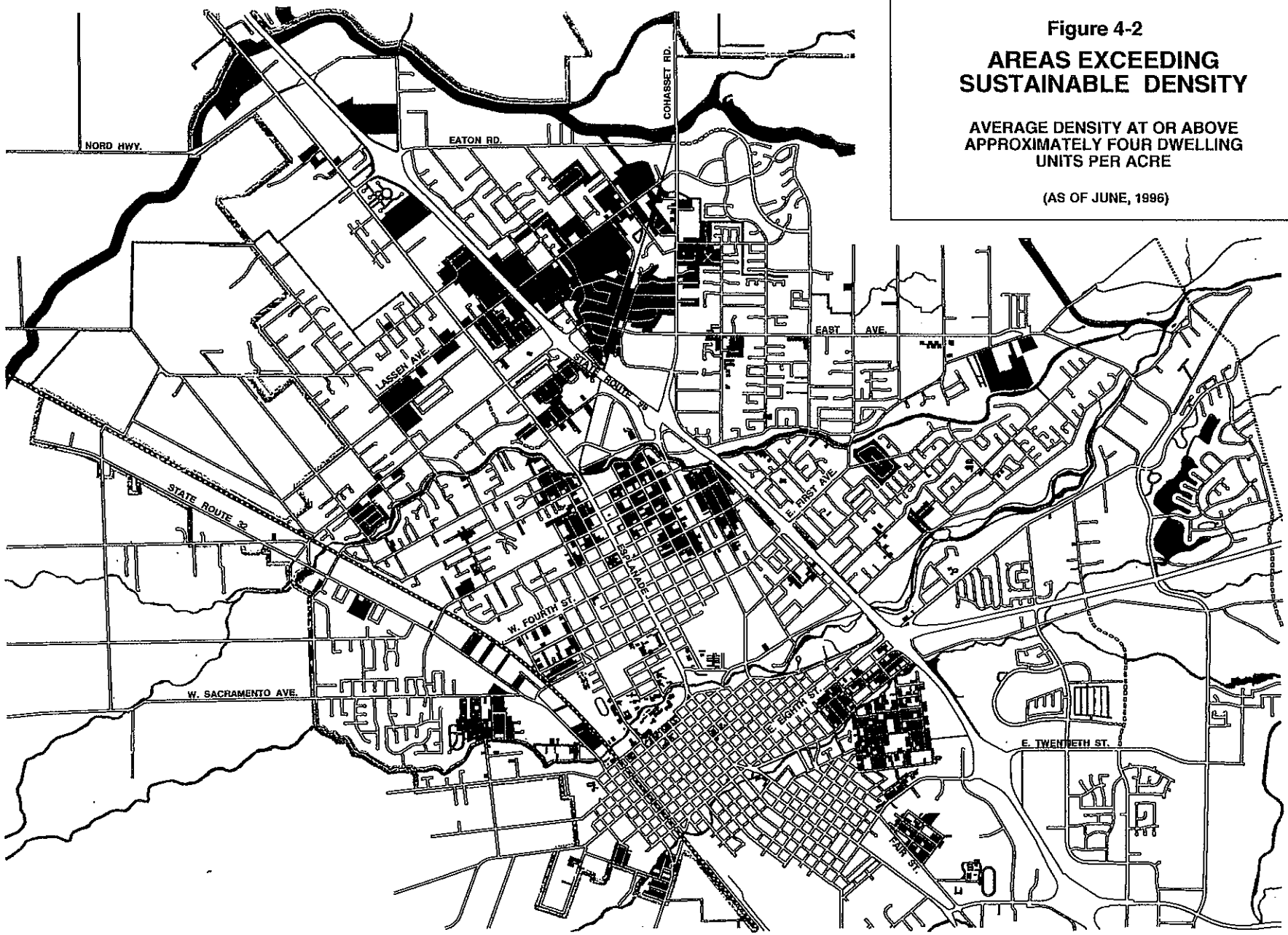


Figure 4-2

AREAS EXCEEDING SUSTAINABLE DENSITY

AVERAGE DENSITY AT OR ABOVE APPROXIMATELY FOUR DWELLING UNITS PER ACRE

(AS OF JUNE, 1996)

Figure 4-6 illustrates the application of the relative priority of sewering based upon average residential density and listed criteria in the Chico Urban Area. Those areas of average density above the calculated limit make up the vast majority of the total units that fall within the high and median priority for sewering. Those areas shown in red indicate housing densities greater than 4 dwelling units per acre which consists of high and medium priority and represent approximately 7,800 dwelling units. Those areas delineated in yellow and orange represent areas of poor soil conditions and potential problems with regard to onsite septage management.

The scope of intended sewering would total approximately 7,800 dwelling units, out of the approximately 12,000 units now using septic systems. Referring to Figure 4-6, those areas categorized as medium to high priority for sewering include the Lassen Avenue corridor (from Cussick Avenue to the Pleasant Valley Ditch which is west of Cohasset Road), the Avenues (south of Lindo Channel in neighborhoods east and west of the Esplanade, in general north of 3rd Avenue and as far east as State Highway 99), and the Chapman Mulberry Area (in neighborhoods south of East Eighth Street, east of Mulberry and Cypress Streets, north of Silver Dollar Fairgrounds and west of State Highway 99).

Section 4.4 (page 4-12) addresses potential nitrate-reducing technologies that can be retrofitted to existing septic systems. These technologies were closely examined but are not recommended for widespread use due to low reliability, high maintenance requirements, and cost. Use of these systems may be further explored.

Section 4.5 (page 4-13) addresses the sewering of non-residential (commercial) systems. These systems are extremely varied in their type and volume of discharge. Some systems may contribute very little to the groundwater nitrate exceedance whereas others may have high waste water usage on a very small lot. The most viable method for dealing with commercial systems will be performed on a case-by-case basis and review of each nitrate loading situation, with consideration of proximity to areas to be sewered.

Section 4.6 (pages 4-13 through 4-16) introduces an on-site program for monitoring those parcels that are not required to be sewered and would retain their onsite septic systems. Section 4.6 discusses how this solution will protect groundwater quality and is consistent with the State Water Code and other adopted State and Regional Board policies for meeting the nitrate maximum contaminant level of 45 mg/l. As mentioned in Section 4.6, approximately 65% of the estimated systems are to be sewered.

V.5 Chapter 5 - Sewer Feasibility, Cost & Program Financing

Chapter 5 summarizes the results of a preliminary sewer feasibility analysis completed in response to both the project's needs and the Regional Boards requirements. The estimated costs of sewering are presented.

In addition to the scope of work required by the Regional Board, the County sought to identify and

preliminarily examine alternative sewer collection methods and the potential for a new waste water treatment plant. The objectives to perform the feasibility study included (from page 5-1):

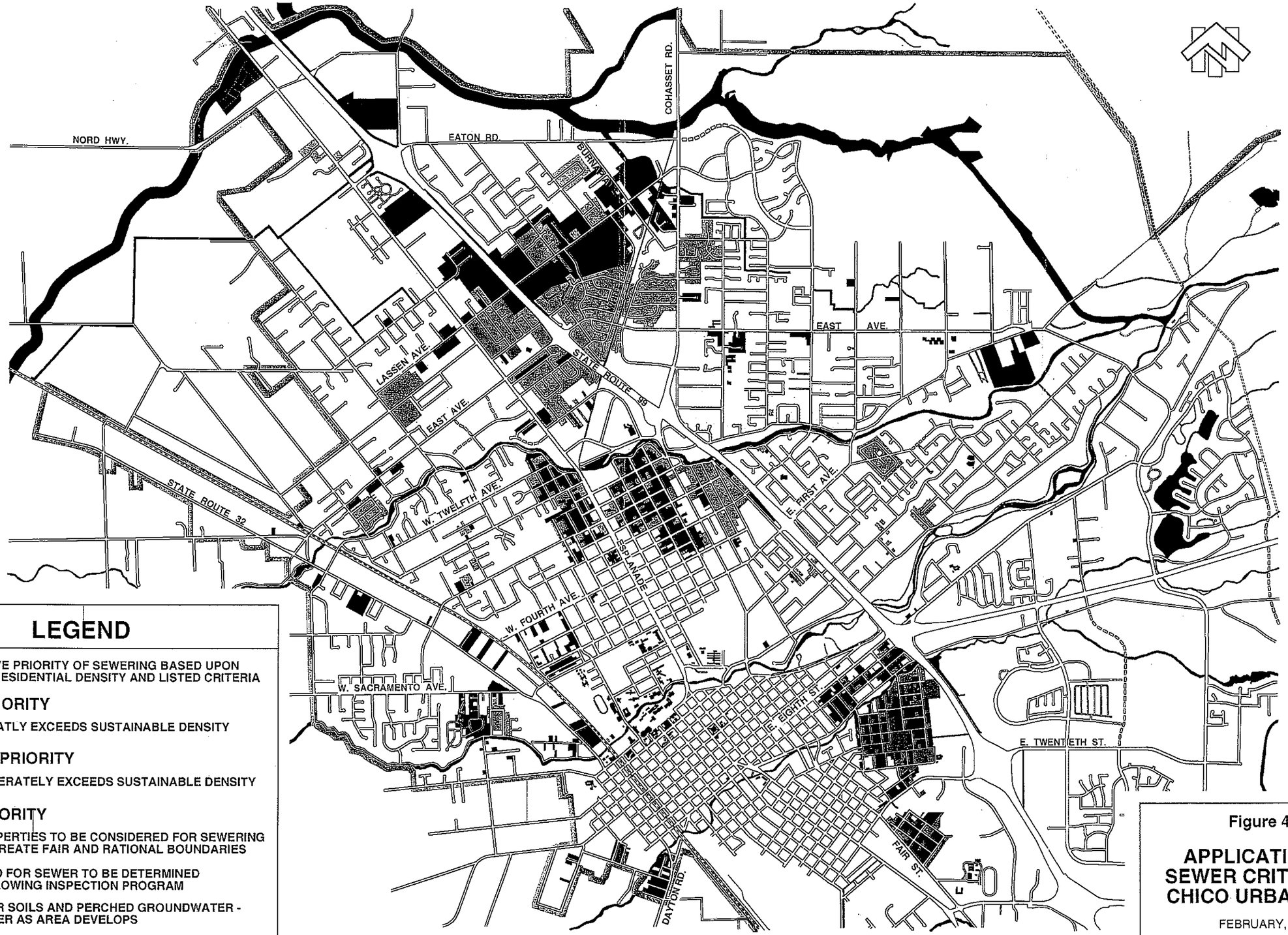
- to identify the range of sewer collection and treatment alternatives potentially available;
- to determine the broad feasibility and approval characteristics of each alternative;
- to examine the operational costs and characteristics of each alternative;
- to provide general cost estimates for on-site sewer laterals (not within public right-of-way);
- to preliminarily meet the requirements of the State Revolving Fund which require the examination of alternatives to a project proposed for funding;
- to identify one or more feasible alternatives to the City of Chico sewer collection system if City sewer service/annexation policies were sufficiently unacceptable to the affected public as to cause rejection of the sewering program; and
- to recommend the most cost-effective alternative for use in the project area.

Three local firms were selected to perform the sewer feasibility analysis.

Northstar Engineering examined the collection of sewage from high-density neighborhoods north of Lindo Channel. In the Lassen Avenue corridor the units are predominately mobile home parks and apartment complexes. These areas have generally been developed more recently than other parts of the Chico Urban Area and lack existing sewers.

Rolls Anderson & Rolls Civil Engineers examined sewage collection in the areas south of Lindo Channel. Their work included the Avenues and Chapman-Mulberry neighborhoods which contain older and more complicated patterns of mixed land uses, smaller lots, and will require more extensive repair to streets, storm drains and utilities. The analysis also included an effort to identify the problems and average costs of providing laterals from the public right-of-way (i.e. road or street) to the individual dwelling unit.

Metcalf & Eddy evaluated the treatment and disposal of waste water both at the existing regional treatment plant operated by the City of Chico, and at a new location northwest of the Chico Urban Area.



LEGEND

RELATIVE PRIORITY OF SEWERING BASED UPON AVERAGE RESIDENTIAL DENSITY AND LISTED CRITERIA

HIGH PRIORITY

- GREATLY EXCEEDS SUSTAINABLE DENSITY

MEDIUM PRIORITY

- MODERATELY EXCEEDS SUSTAINABLE DENSITY

LOW PRIORITY

- PROPERTIES TO BE CONSIDERED FOR SEWERING TO CREATE FAIR AND RATIONAL BOUNDARIES
- NEED FOR SEWER TO BE DETERMINED FOLLOWING INSPECTION PROGRAM
- POOR SOILS AND PERCHED GROUNDWATER - SEWER AS AREA DEVELOPS

Figure 4-6

APPLICATION OF SEWER CRITERIA TO CHICO URBAN AREA

FEBRUARY, 1998

Table 5-1, excerpted from page 5-3, identifies the approximate number of dwelling units per priority area and delineates the types of residential land use.

Table 5-1
SEWER FEASIBILITY STUDY AREAS

	All Dwelling Units (DU'S)	Single Family Residential	Multiple Family Residential	Mobile Home Park Residential	Commercial
Other Subareas					
North of Lindo Channel	5,034	1,040	2,555	1,312	127
South of Lindo Channel	2,797	1,805	817	175	0
Total	7,831	2,845	3,372	1,487	127

The Chico Urban Area is presently served by a central sewer system made up of four components: collection, transport, treatment and disposal. Treatment of the effluent is accomplished at the Water Pollution Control Plant located on River Road, which utilizes an activated sludge process. Disposal of the treated effluent is to the Sacramento River.

The Water Pollution Control Plant is a "regional" facility, intended to serve the population of the greater urban area. As it was constructed in part from federal grant funds, the City of Chico must accept effluent from non-city areas. The effect of this provision is that the City of Chico cannot require annexation to the city as a condition of usage of the treatment plant. Unlike the treatment plant the City has stated that the collection system was not constructed with federal grant funds, and thus is able to impose annexation as a condition of sewer service.

The Regional Board imposed a Cease and Desist Order on the City of Chico which requires certain upgrades to the Water Pollution Control Plant to ensure a reliable 6 million gallon per day (MGD) operation. Approximately 1.5 MGD is required for the connections related to the Prohibition Order. The City of Chico is in the process of expanding the facility's wastewater treatment capacity to 9 MGD. As of December 1999 all operational upgrades have been completed. The completion of remaining construction activities for the water pollution control plant expansion is anticipated by spring 2000.

The engineers estimated the direct construction cost of the conventional gravity collection system by utilizing the same design criteria, unit costs and design and contingency costs used by the City of Chico. Financing the construction of the system will add an increased cost.

The construction cost estimates are intended only as a starting point in an ongoing process of re-estimating the costs as the scope and design of the sewer improvements become more fully known. Indirect costs related to sewer improvements are dependent on future conditions and are difficult to estimate. To cover additional City of Chico fees such as trunk line fees and sewer main fees a contingency was added to the off-site construction cost based upon the estimated number of units

that front existing sewer. The estimated costs are summarized in Table 5-2 (excerpted from Page 5-5.)

Included in off-site collection costs are pipe installation, trench bracing, pavement replacement, installation of sewer manholes and sewer cleanouts as well as the installation of sewer laterals from the sewer main to right of way line. Onsite costs include the abandonment of the septic tank and onsite sewer connection including manholes, pavement replacement and landscape restoration.

Table 5-2
ESTIMATED COST SUMMARY FOR EXTENSION OF THE EXISTING GRAVITY COLLECTION SYSTEM

	NORTH OF LINDO CHANNEL	SOUTH OF LINDO CHANNEL	TOTAL
APPROXIMATE NUMBER OF DWELLING UNITS (DU'S)	5,034	2,797	7,831
OFFSITE COLLECTION (within public right-of-way)	$15,846,000	$12,986,000	$28,832,000
EST. TREATMENT PLANT FEES	$7,113,000	$3,952,000	$11,065,000
EST. CITY SEWER TRUNK LINE CAPACITY FEES	$4,012,000	$2,229,000	$6,241,000
EST. CITY SEWER MAIN FEES	$240,000	$1,008,000	$1,248,000
SUBTOTAL	$27,211,000	$20,175,000	$47,836,000
ONSITE COSTS (tank abandonment & lateral)	$13,263,000	$9,820,000	$23,083,000
TOTAL	**$40,474,000**	**$29,995,000**	**$70,469,000**
AVG. OFFSITE CONSTRUCTION COST PER DWELLING UNIT			$3,682
EST. CITY FEES PER DWELLING UNIT			$2,370
AVG. ONSITE CONSTRUCTION COST PER DWELLING UNIT			$2,948
TOTAL AVERAGE COST			**$9,000**

As previously mentioned, the City of Chico is expanding the Water Pollution Control Plant's treatment capacity from 6 MGD to 9 MGD to allow for the connection of additional units. Pages 5-6 and 5-7 describe the Region Board's directives regarding the City's efforts in correcting deficiencies and expanding the plant.

Prior to the depletion and termination of a Federal Grant Program for funding local waste water projects, local communities typically utilized grant funding for the majority of the projects' cost. The burden of paying for central sewer system now falls on the community. Programs Butte County

will pursue to finance sewer improvements are described below (see also pages 5-8 through 5-13).

TYPE OF PROGRAM	DESCRIPTION
State Revolving Fund	Administered by State Water Resource Control Board. Loans are issued only to public entities, up to $50 million, or 100% of the eligible project. Interest rate is approximately 3%. Repayment period is up to 20 years.
Tax Increment Financing	The Greater Chico Urban Area Redevelopment Project Area (GCUARPA) was formed in 1994 to allow for tax increment financing be available for that portion of sewering costs that benefit properties located within the boundaries of GCUARPA (see Figure 5-1). The tax increment funds available to assist in sewer costs may be limited due to lower than projected tax increment revenue.
Assessment Installments	The City of Chico will finance sewer connection fees as secured by an assessment lien on the property. Interest is charged at the average rate of interest being received by the City's invested funds, plus 2%. Available only to premises within incorporated City limits.
Community Development Block Grant Program (CDBG)	CDBG grants are approved by the State Department of Housing and Community development. CDBG's are available to rural cities/counties to support job creation/retention and business development projects. Sewer and public works projects quality for funding. Parts of the Chapman/Mulberry area and other areas with low income residents may be eligible for the CDBG program. Recipients of CDBG funds must own and occupy their property and meet income qualifications.
Small Communities Supplemental Assistance Program	Up to $40 million may be used to qualifying small needy communities (i.e. have a population of 5,000 or less, or have a reasonably isolated and divisible segment of a larger municipality encompassing 5,000 persons or less).
Development of Local Area Revolving Fund	The County would need to secure a substantial grant to initiate the formation of such a revolving fund.
Assessment Bonds	The County may need to create an assessment district to finance the repayment for loans that are secured. Assessments are not considered to be taxes and are not subject to the 1% limitation for ad valorem taxes as imposed by Proposition 13. Assessments do not require approval by two-thirds majority of qualified voters but are subject to majority protest provisions. (Also refer to Appendix M of the Plan).

Estimated construction costs to abandon a septic tank, install the lateral sewer line from the living unit to the sewer main, to install the sewer main, and pay for treatment plant capacity costs, is approximately $9,000 per unit. Public financing costs have not yet been determined and will depend upon the type of financing method that is selected.

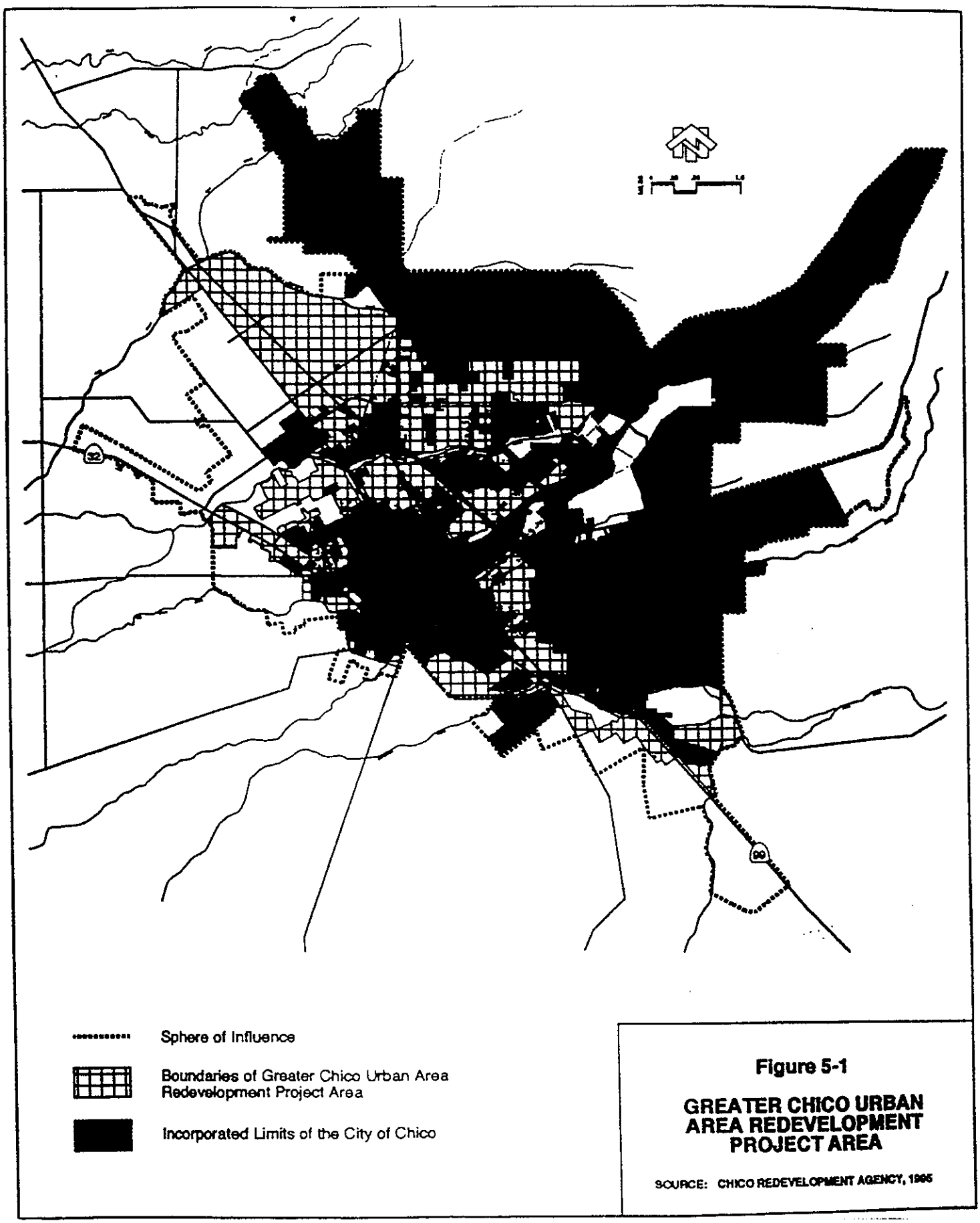


Figure 5-1

GREATER CHICO URBAN AREA REDEVELOPMENT PROJECT AREA

SOURCE: CHICO REDEVELOPMENT AGENCY, 1995

The best financing structure for the Project will utilize a combination of financing mechanisms. The County is highly ranked for State Revolving Fund monies. A source of revenue and the mechanisms to repay such a loan will need to be identified and developed.

V.6 Chapter 6 - Oversight Monitoring Program for On-site Systems

Chapter 6 addresses the continued operation and management of approximately 4,200 units that will continue to utilize on-site septic systems pursuant to the proposed Plan. These onsite systems located in the lower-density areas will adequately protect groundwater quality if properly maintained and operated. Studies performed by Butte County after the adoption of Order 90-126 indicate that dwelling densities of less than 4 homes per acre may not cause exceedance of the groundwater nitrate maximum contaminant level. This conclusion was based upon site specific studies and literature data. In its letter of October 14, 1999, which is provided in Appendix R of the Plan, Regional Board staff has indicated their willingness to request that the Regional Board modify the prohibition to allow the continued use of existing septic systems in these lower density areas.

The Regional Board's letter lays out two options for monitoring parcels that continue to use on-site septic systems: 1) the issuance of a Cleanup and Abatement Order on the County, or 2) the codification of a monitoring program into the County Code combined with a memorandum-of-understanding (MOU) between the County and Regional Board.

The Regional Board's letter states that State Water Code Section 13304 gives the authority to issue a Cleanup and Abatement Order against the County, because it is currently allowing the discharge of wastewater from septic systems where it is causing pollution. A Cleanup and Abatement Order could require the above monitoring program, and also the elimination of standard septic systems, in areas where the Board determines the density of the systems would cause the exceedance of the maximum contaminant level. This density determination would take the Nitrate Compliance Plan into consideration.

The second option includes an MOU and codification of a monitoring program and would reduce the amount of staff and County resources to obtain adequate monitoring.

Regional Board staff has determined that an oversight monitoring program, administered by the County, may be an effective method of water quality assessment and protection for parcels that continue to use on-site waste water systems. The establishment of an oversight program is proposed to monitor these systems pursuant to the State Water Code which authorizes the continued use of on-site systems in lieu of sewering where water quality can be adequately protected. Elements of the oversight monitoring program are presently being developed and considered by County and Regional Board staff. Such elements include:

- A water quality monitoring program for the shallow aquifer including data collection of

groundwater depth, nitrate, coliform and possible other parameters;

- A public education program to educate residents about the groundwater nitrate program and the proper care of their septic systems; and

- A program to report septic tank pumping records and County complaint responses/repairs to Regional Board staff.

As part of the MOU, Regional Board staff would propose that the results of the monitoring be given sufficient time, on the order of 10 to 20 years, to establish that sewering is having the desired effect on groundwater nitrate concentrations before considering any further action in the unsewered areas.

Approximately twenty percent (20%) of the units affected by the Prohibition Order are currently located within the city limits of the City of Chico; this occurrence is largely a result of annexations over the past decade. Regional Board staff has acknowledged that further annexations will occur. At some point, resulting from the combined effects of connecting to sewer or through annexations to the City of Chico, the number of parcels located within the unincorporated portion of the Chico Urban Area will be so few as to render the operation of the monitoring program to be infeasible. It will therefore be proposed that the terms of the MOU be reviewed and renegotiated every ten years and rescinded, if appropriate. Also, as conditions warrant, either the County or Regional Board staff may request reconsideration of any affected provision of the MOU.

By utilizing either the Cleanup and Abatement Order or the MOU coupled with the codification of monitoring requirements, the Regional Board has adequate authority to assure the program would be carried out by the County. The Plan recommends the second option as the preferred public policy for the following reasons:

1) This approach is more flexible than a Cleanup and Abatement Order;
2) The program is not intrusive to property owners; and
3) Funding and codification of an oversight monitoring program is relatively inexpensive and easy to operate, as compared to other management options previously considered.

The policy to implement the MOU and codification of the monitoring program will be considered by the Board of Supervisors upon the finalization and adoption of the Nitrate Compliance Plan.

V.7 Chapter 7 - Local Government Jurisdiction, Development & Related Issues

Chapter 7 deals with the need for the County and City of Chico to work cooperatively to address the issues that arise in solving the health and regulatory issues which impact the citizens of the Chico Urban Area. Butte County and the City of Chico have previously cooperated on many issues,

including those related to the nitrate issue. Section 7.1 describes several agreements in the past decade that are germane to the groundwater nitrate issue:

Agreement/ Document	Description
Nitrate Action Plan (1985)	Amended in 1988, this document laid out a plan both entities would undertake to prevent further water quality degradation and to minimize the existing nitrate problem in the Chico Urban Area (See also Appendix N, Plan).
Amended Property Tax Transfer Agreement (1987)	The County and City agreed to the allocation of the local share of property taxes between the two agencies, and the sharing of sales and use of tax revenues generated from within the city limits.
Municipal Affairs Agreement (1987)	This document set forth a larger view of the long term provision of municipal services to the Urban Area fragmented by the many pockets of unincorporated territory. Included was an agreement to pursue the coordination of land use planning and development standards.
Greater Chico Urban Area Redevelopment Project Area (1994)	Allows for tax increment financing to be available for that portion of sewering costs that benefit properties within the redevelopment area (see also Section 5.5 of the Plan).

Annexation Policy

The County and City are currently in negotiations to resolve differences regarding annexation to the City of Chico as a condition of sewer service. It has been a policy of the City Council to require annexation as a condition of connection to sewer facilities, if possible. If annexation is not possible the City requires the property owner to execute an annexation and sewer service agreement before connecting in which the property owner waives the right to protest the property's future annexation to the City at such time the property is annexable.

Citing the greater priority of the community health issue and the difficulty of obtaining a majority of pubic acceptance, County representatives have requested the City to modify its annexation policy. Representatives of the County and City have committed to continuing discussions on these matters. Although the parties have not yet reached an agreement negotiations are still proceeding.

Section 7.4 describes minimum lot sizes and density limits for **new** residential development within the Chico Urban Area. New residential development on septic systems will be limited to areas with a minimum parcel size of 20,000 square feet which equates to approximately two dwelling units per acre. This applies a safety factor to calculated nitrate loading and ensures that long term water quality will be protected and improved.

V.8 Chapter 8 - Environmental Review and Compliance

Chapter 8 discusses the environmental review process required by the California Environmental

Quality Act (CEQA). Implementation of the Plan, as it regards the preparation of the State Revolving Fund Loan application, is subject to CEQA which will require the preparation of an environmental impact report (EIR). Four previous EIRs have addressed the extension of sewers throughout the Chico Urban Area, including the potential growth-inducing impacts and cumulative impacts of sewer extension.

An overview of CEQA, a description of previous environmental documents, and CEQA compliance alternatives, is explained on pages 8-1 through 8-6. The use of a Program Environmental Impact Report is recommended as best focusing on broad policy decisions. The Program EIR provides flexibility and cost-effectiveness, and defers the evaluation of site specific issues until those issues are ready for discussion.

Preparation of the Program Environmental Impact Report for the Plan should begin following initial consideration and endorsement of the proposed plan by the County Board of Supervisors, City of Chico (for applicable components), and the Regional Board. An environmental document is required to complete a facilities plan as part of the State Revolving Fund Loan application package. It is envisioned that the environmental document will address potential issues related to the installation of sewer lines and the decomposing of septic systems. Subsequent environmental documents may address later issues to the extent they are not covered in the original Program EIR.

V.9 Chapter 9 - Plan Components and Schedule

Chapter 9 compiles the various components of the Plan and highlights key decisions and directions. Informational workshops will be held within the Chico community prior to the final consideration of the plan by the Board of Supervisors. In addition to conducting informational neighborhood workshops, the televising of workshop sessions, and the placement of the Plan on the Internet, will be considered to provide every possible opportunity for disseminating information to the public. Copies of the Plan and its supporting technical studies are available for review in the Chico Branch of the Butte County Library and also the Meriam Library on the campus of California State University - Chico. Readers may also access the Plan on the internet at *www.buttecounty.net/cob*.

The component parts of the proposed Plan include (excerpted from page 9-1 and 9-2):

- provision of sewer service to designated areas
- septic systems that will remain in service
- determination and implementation of financing plan components
- implementation of an oversight program to monitor remaining onsite systems and water quality

Phased sewer service will be provided to those areas designated for the elimination of existing septic systems (see Chapter 4). Sewer service will be extended to approximately 7,800 dwelling units within the designated sub-areas, beginning with the area of highest priority. It is contemplated that

the segments of the collection system be designed, constructed, and phased in over a 3 to 10 year period from the time of the adoption of the Plan by the Butte County Board of Supervisors.

A combination of loan programs to assist with financing of sewer improvements best fits the situation. The financing program will emphasize the low-interest State Revolving Loan Fund and probable use of a special assessment district. Further structuring and refinement of a financing program will be necessary following the adoption of the Plan.

A Memorandum of Understanding between the City of Chico and County has been discussed with the objective of resolving annexation and related issues in a manner that will ease public concerns and facilitate completion of the program. The Memorandum of Understanding (described in Section 7.3) sets the stage for this cooperative effort.

Citizens Nitrate Advisory Committee

In November 1995 the first meeting of a Citizens Nitrate Advisory Committee was held. This committee's role and purpose in the Nitrate Compliance Program is as follows (refer to page 9-4):

- To assist in generating and considering alternative approaches, methods, and strategies available to the project team and the community;
- To act as a sounding board in review of analyses and proposals;
- To express the priorities, interests, and values of the affected community;
- To advise the Board of Supervisors, and particularly the Chico area Supervisors, who have been actively involved with the issue on a continuous basis, on the merits of recommended courses of action;
- To assist the project team in an effective plan that is acceptable to the public, the County Board of Supervisors, and the Central Valley Regional Water Quality Control Board.

The membership of the Citizens Nitrate Advisory Committee includes neighborhood representatives, mobile home park owners, mobile home park tenants, property managers, bankers, septic tank service providers, attorneys, engineers, and representatives from a citizens group originally formed in the 1980's to address this issue. Additionally, staff from several County departments, staff from the Regional Water Quality Control Board, and technical consultants attend these meetings. A roster of persons comprising the Citizens Nitrate Advisory Committee is included as Appendix H.

Formal Action of the Regional Water Quality Control Board

The Central Valley Regional Water Quality Control Board will be asked to amend the Prohibition

Order or take other steps as appropriate to approve the Plan. The amendment to the Basin Plan may supersede the existing Prohibition Order and allow for the continued operation of onsite sewage disposal systems as described in Chapter 6.

A preliminary schedule of the actions leading to the adoption of the Plan is shown in Table 9-1 and presented here as page 24.

Table 9-1

PRELIMINARY SCHEDULE FOR ADOPTION OF THE CHICO URBAN AREA NITRATE COMPLIANCE PLAN AND APPROVAL BY THE REGIONAL BOARD

AGENCY	PROPOSED ACTION	PRELIMINARY DATE
Butte County Project Team	Publication of administrative Nitrate Compliance Program Report and Proposed Plan.	October 20, 1996
Butte Co. Nitrate Advisory Comm.	Initial review and discussion of administrative of program report and proposed Plan.	October 24, 1996
Butte County Staff	Review of administrative program report and proposed Plan. Submittal of comments to Project Team.	November, 1996
County Board of Supervisors	Accept staff report as information and direct staff to present Plan to Regional Board.	November 19, 1996
Chico City Staff	Initial staff review of administrative program report and proposed Plan.	November, 1996
Regional Board	Consideration of key elements of Plan in Workshop Session.	December 5-6, 1996
Butte Co. Citizen's Nitrate Advisory Cmte.	Continued review and discussion of administrative program report and proposed Plan.	Through February 1998 and as needed
Butte Co. Staff	Review of Plan (" Plan" as revised per Committee). Submittal of comments to Project Team.	February, 1998
County Board of Supervisors	Accept Plan and direct staff to commence public information efforts and to report back to Board of Supervisors with public comments.	March, 1998
Chico City Council	Receive presentation of Plan by Project Team. Consider relevant City policies and positions. Provide comment to County and direction to City staff.	May, 1998
Butte County Project Team	Submit Plan to public via public education program.	Ongoing
County Board of Supervisors	Accept Plan and staff report. Receive and consider public comment and take actions as appropriate to approve Plan.	Spring 2000
Regional Board	Amendment of Basin Plan/Adoption of MOU with County.	Spring 2000
Butte Co. LAFCo	Approval of extension of sewer service outside of incorporated city limits, and related matters as needed	Spring 2000

VI. Appendices

Attached to the Plan are nineteen appendices which provide additional supporting documentation. A list of the Appendices is shown in the Table of Contents, page v.

VII. Contact Persons - County Project Team

Questions, concerns and comments may be addressed to these persons who are associated with the County's Project Team:

Staff Contacts:	Eric Miller, Manager - Program Resource & Development (530) 538-7631	
	Starlyn Brown, Assistant Chief Administrative Officer (530) 538-7224	
Address:	Butte County Administrative Office	
	25 County Center Drive	
	Oroville, CA 95965	FAX: (530) 538-7120

Board of Supervisor Contacts:	Supervisor Jane Dolan, District 2	(530) 891-2830
	Supervisor Mary Anne Houx, District 3	(530) 891-2800
Address:	Butte County Board of Supervisors	
	25 County Center Drive	
	Oroville, CA 95965	

CHICO URBAN AREA
NITRATE COMPLIANCE PLAN

(PROGRAM REPORT & PROPOSED IMPLEMENTATION PLAN FOR GROUNDWATER NITRATE COMPLIANCE IN THE CHICO URBAN AREA)

A summary of the technical analyses, conclusions and recommendations of the Chico Urban Area Groundwater Nitrate Compliance Program as completed by Butte County Staff and Consultants.

This document is in response to Order No.90-126 (Prohibition Order) and Order No. 95-024 (Deferral of Enforcement) of the Central Valley Regional Water Quality Control Board.

2000

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chapter one

INTRODUCTION AND SUMMARY

1.1 INTRODUCTION

The "Chico Urban Area Nitrate Compliance Plan" addresses the contamination of groundwater in the Chico Urban Area by nitrate, a form of nitrogen. The discharge from individual septic systems has been cited by the Central Valley Regional Water Quality Control Board (Regional Board) as the primary source of groundwater nitrate concentrations that exceed the drinking water standards set by the U.S. Environmental Protection Agency and the State Water Resources Control Board (State Board). Nitrate levels that exceed the standard have been established as a threat to the public health and subject to regulation.

In 1990, when local corrective action was deemed by the Regional Board to be too slow and inadequate, more formalized enforcement actions were undertaken, resulting in a Prohibition Order that required the abandonment of area septic systems by July of 1995. The issue, which affects over 30,000 residents in the Chico Urban Area, had become increasingly controversial making a timely resolution difficult. The cost of sewering had clearly emerged as a primary concern, especially for those of fixed income and limited ability to absorb the cost. Some doubted the adverse health effects of groundwater nitrate, or the integrity of test results, or dismissed the issue as a ploy to force unincorporated residents to annex to the City of Chico. Since high nitrate levels were first discovered in private wells in 1979, few local issues have held the potential to affect such a large segment of Chico-area residents. The local nitrate problem has spawned numerous studies and regulatory actions, complicated and impacted home sales, worried those on private wells, and generated hours of debate.

1.2 NITRATE COMPLIANCE PROGRAM

Following previous unsuccessful attempts to resolve the issue and subsequent imposition of the State's Prohibition Order in 1990, Butte County initiated a concerted effort to analyze the problem and develop the most appropriate and cost-effective solution. Largely discounting previous technical studies whose adequacy or accuracy was in question, and utilizing revenue from County Service Area 114 assessments, the county's Nitrate Compliance Program started fresh. Newly emphasized were the elements of communication among citizen's groups generally in opposition, Regional Board staff, and other involved parties.

This document marks the arrival of a key decision point in this important issue. The scientific studies and engineering analyses have now been completed, alternative solutions and strategies developed and considered, and conclusions and recommendations reached. Herein is a report which includes a summary of key studies, a discussion of possible actions, and a recommended program of actions.

It is hoped that this document will assist the public, the agencies, and the decision-makers in their consideration of these matters. A deliberate attempt has been made to prepare a document that would be readable and understandable by the general public. The nature of the subject matter, however, often

required the use of technical concepts and terminology. To assist the reader, an extensive glossary of terms is set forth in Appendix A. A list of all references cited in this document is contained in Appendix L.

1.3 Report Purposes and Goals

This document reports the actions taken, and those recommended, to resolve the groundwater nitrate issue in the Chico Urban Area. It is intended to function as a structured response to the Regional Board, an arm of the State Board with jurisdiction in Butte County. Following a period of public review and comment, the implementation portion of the document will be brought back to the Butte County Board of Supervisors and the Regional Board for their approval.

Although useful for official consideration and decision-making, this report is also directed to those who currently rely upon such systems and are directly affected. The Butte County Board of Supervisors has assumed the primary responsibility for responding to the State's requirements on behalf of individual septic system owners. It is the County's goal to effectively communicate with the public and to build a fundamental consensus of support for the proposed actions. Above and beyond the County response to the Regional Board, the need for public awareness and understanding of this complex issue compelled the preparation of a full report, so that property owners and residents could be properly informed.

1.4 Organization of the Report

For those who desire merely an overview, each chapter is headed by a "key points" section. A summary of the findings and conclusions from each of the chapters is presented in Section 1.5. A summary of the proposed Implementation Plan is presented in Section 1.6. Those issues or recommendations of further interest can be examined in more detail within the appropriate chapter.

Chapter One, "Introduction and Summary," consists of an introduction, a brief summary of the report's findings, explanations and recommendations, and a listing of the actions proposed to protect local groundwater quality and to comply with the Regional Board's requirements.

Chapter Two, "Health Effects and Regulation of Nitrate," seeks to provide an understanding of the underlying reasons for concern with nitrate in drinking water and the regulatory response, especially in the Chico Urban Area.

Chapter Three, "Scope and Results of the Technical Program," reports on the technical program, the scientific study and analysis of the hydrogeological, soil chemistry, and other technical aspects of the groundwater nitrate issue.

Chapter Four, "Nitrate Elimination, Reduction, and Onsite Compliance," describes a specific approach to determining the extent of sewering and other actions needed to protect local groundwater, based on the results of the technical program.

Chapter Five, "Sewer Feasibility, Cost and Financing," summarizes a feasibility analysis which examines alternative methods of providing sewer service to those areas for which it is recommended, including preliminary cost estimates for the recommended alternative of connection to the existing collection and treatment system operated by the City of Chico.

Chapter Six, "Oversight Monitoring Program for Onsite Systems," discusses a program to oversee the operation and maintenance of onsite wastewater systems in the Chico Urban Area. For the approximately 4,200 dwelling units recommended to continue using septic systems, public oversight administered by the Butte County Division of Environmental Health is a more cost-effective means to protect groundwater than is sewering. An oversight monitoring program is contemplated to minimize or substitute for sewering, in specified circumstances.

Chapter Seven, "Local Government Jurisdiction, Development and Related Issues," addresses the related issues of land use, new development, and annexation to the City of Chico. Although not complete, the city and county have made substantial progress toward consensus on these issues, and a specific approach is described herein.

Chapter Eight, "Environmental Review and Compliance," discusses a method of compliance with the California Environmental Quality Act (CEQA) via a "project Environmental Impact Report". A project Environmental Impact Report enables the consideration of the overall implementation plan without inappropriate attention to details that are not yet known or timely. A Project Environmental Impact Report is described in Section 8.4.

Chapter Nine, "Implementation Components and Schedule," compiles a list of implementation components and presents a proposed schedule, with emphasis on the actions leading to formal agreement by the County of Butte, Regional Water Quality Control Board and City of Chico.

The Appendices section, starting with an extensive glossary, includes copies of many relevant documents for reference and detail.

1.5 SUMMARY OF FINDINGS AND CONCLUSIONS

		SEE REPORT AT SECTION INDICATED BELOW
1.	Numerous scientific studies provide a strong basis for the regulation of nitrate in drinking water. Methemoglobinemia (blue-baby syndrome), possible carcinogenic effects, and other health concerns support the basis for nitrate regulation. The nitrate regulatory level for groundwater contamination in California is 45 mg/l.	**2.1**
2.	Potential sources of nitrate in groundwater include agricultural and domestic fertilizers, animal waste, septic system effluent, and natural sources.	**2.2**
3.	Groundwater regulation in California is set forth in the Porter-Cologne Water Quality Control Act (State Water Code), and is within the purview of the State Water Resources Control Board and Regional Boards. Numerous programs and enforcement measures are available to regulators to ensure the protection of groundwater quality.	**2.3**
4.	The Prohibition Order and other actions by the Regional Board are intended to enforce the nitrate standard and compel a reduction in total nitrate loading to groundwater.	**2.5**
5.	In order to definitively establish the scope and extent of nitrate contamination and provide the technical basis for resolution satisfactory to the regulatory bodies and the public, a comprehensive scientific program has been completed.	**3.3**
6.	The results of the technical program are generally consistent with previous studies, although some differences were found.	**3.3**
7.	An evaluation of all potential nitrate sources strongly supports the conclusion that septic tank discharge is the primary source of groundwater nitrate in the Chico Urban Area.	**3.3**
8.	A simplified mass balance equation was used to predict the level of wastewater loading that could be sustained without causing exceedance of the maximum contaminant level. The technical program results now support a relaxation of density limits from one unit per acre to approximately four units per acre.	**3.4**
9.	The results of the technical program are the scientific basis for the designation of areas that must sewer to eliminate their nitrate discharge to groundwater, and areas where existing onsite systems may continue to operate.	**4.1**
10.	The proposed actions are intended to reduce the overall nitrate loading in the Chico Urban Area to a level which will not cause or perpetuate an excessive level of groundwater nitrate.	**4.1**

		SEE REPORT AT SECTION INDICATED BELOW
11.	The areas proposed for sewering have an average overall density of approximately four dwelling units per acre or more, a density which has been demonstrated to exceed the capacity of the soil and receiving waters to assimilate nitrogen. A much smaller set of properties exhibit other characteristics such as high groundwater or other problems that tip the scales to the alternative of sewering.	**4.2-3**
12.	A potential nitrate-reducing system retrofitted to an existing septic system appeared promising and was closely examined, but is not recommended for widespread use due to low reliability, high maintenance requirements and lack of significant cost savings, although use of these systems can be further explored.	**4.4**
13.	Connection to the City of Chico's existing gravity collection system and sewage treatment plant is the most cost-effective alternative for sewering designated areas.	**5.1**
14.	The average construction cost per dwelling unit and related city connection fees is estimated to be approximately $6,000 plus an additional $2,000 to $3,000 for onsite connection costs and the abandonment of septic tanks.	**5.2**
15.	In the absence of governmental grants, individual residents will bear the burden of paying for sewers through a combination of public and private financing mechanisms intended to allow payment over a 10-20 year period.	**5.5**
16.	Building on the proposed implementation plan components set forth herein, further work and consultation with relevant agencies is needed to develop a detailed sewer financing program.	**5.6**
17.	An oversight monitoring program is necessary to ensure that continued operation of remaining individual onsite systems will protect groundwater quality.	**6.2**
18.	Utilizing CSA 114 is considered the best alternative to fund the oversight monitoring program.	**6.3**
19.	Butte County and the City of Chico have previously cooperated on many issues, including those related to the nitrate issue. It is imperative that every effort be made to further cooperate on the actions recommended herein.	**7.2**

		SEE REPORT AT SECTION INDICATED BELOW
20.	The County and City are currently negotiating in an attempt to resolve substantial differences regarding annexation to the City of Chico as a condition of sewer services. It is the intent of this plan that sewering to achieve water quality will not involve annexation.	**7.3**
21.	Informational workshops will be held within the Chico community prior to final consideration by the Board of Supervisors.	**9.2-3**

1.6 SUMMARY OF PROPOSED PLAN

22.	Public education efforts will assist owners of septic systems in extending the functional life of their systems and ensuring discharge within the parameters of regulatory requirements.	**6.3**
23.	New residential development on septic systems is to be limited to specified areas with a minimum parcel size of 20,000 square feet equivalent to approximately two dwellings per acre.	**7.4**
24.	Over approximately a seven to ten year period, phased sewer service will be extended to approximately 7,800 dwelling units within designated subareas, commencing with the area of highest priority and economic feasibility.	**4.6**
25.	The mechanisms to finance the sewering program have not all been identified or developed. A combination of loan programs to assist with financing the sewer improvements, with emphasis on the low-interest State Revolving Fund loan program and the use of a special assessment district, will be pursued in coordination with any available grants. Further structuring and refinement of a financing program will be necessary following adoption of the Plan.	**5.5**
26.	The Regional Board will be asked to amend the Prohibition Order or take other steps as appropriate to approve the County's Plan.	**9.3**

chapter two

HEALTH EFFECTS AND REGULATION OF NITRATE

This chapter provides background on the adverse health effects of excessive nitrate in drinking water, regulatory structure and authority, and the specific Chico-area enforcement actions taken at the state level.

KEY POINTS

- Scientific studies provide a basis for the regulation of nitrate in drinking water. Methemoglobinemia (blue-baby syndrome), possible carcinogenic effects, and other health concerns support the basis for nitrate regulation.
- Potential sources of nitrate in groundwater include agricultural and domestic fertilizers, animal waste, septic system effluent, and natural sources.
- Groundwater regulation in California is set forth in the Porter-Cologne Water Quality Control Act (State Water Code), and is within the purview of the State Water Resources Control Board and Regional Boards. Numerous programs and enforcement measures are available to the regulators to ensure the protection of groundwater quality.
- The Prohibition Order and other actions by the Regional Board are intended to enforce the nitrate standard and compel a reduction in total nitrate loading to groundwater.

2.1 Health Effects of Excessive Nitrate

The nitrate regulatory level for groundwater contamination in California is identical to that of the Federal Environmental Protection Agency and the World Health Organization. However, the method of expressing the standard varies (see Chapter 3, page 3-5). In the following discussion an attempt has been made to be consistent in referring to the state of California standard of 45 mg/l as nitrate. Some agencies utilize the standard of 10 mg/l as nitrogen, which refers to the amount of elemental nitrogen in the nitrate compound. These two standards, 45 mg/l as nitrate and 10 mg/l as nitrogen are identical.

When nitrate-nitrogen concentrations in water reach excessive levels there can be harmful biological consequences for humans and other organisms which depend on the water. Of course, human health is of primary concern when setting guidelines for acceptable nitrate levels and proper agricultural practices. The United States Environmental Protection Agency established the current drinking water standard based on the human health risks due to nitrate consumption (Kross, 1993). Although there have been studies performed attempting to assess any causal link of nitrate consumption and various illnesses, only methemoglobinemia (also known as infant cyanosis or blue-baby syndrome) has been proven to result from ingestion of water containing high nitrate concentrations above 45 mg/l (Kross, 1993). Other evidence does raise concerns over other potential health effects, and although inconclusive, cannot be summarily dismissed.

Methemoglobinemia (Blue-baby Syndrome)

More commonly known as blue-baby syndrome or nitrogen cyanosis, methemoglobinemia is the primary health problem driving the establishment of the worldwide nitrate standard of 45 mg/l. Blue-baby syndrome is a condition caused by the incorporation of nitrates into blood hemoglobin forming a compound known as methemoglobin. Hemoglobin is responsible for transporting oxygen in the blood. Methemoglobin cannot transport oxygen. When methemoglobin concentration becomes too high a victim of the disease presents symptoms of anoxia (low blood oxygen) including blue coloration of the skin. Young infants are particularly susceptible to the disease because of unique conditions in their immature intestinal tract.

Since 1945, there have been over 2000 cases of infant methemoglobinemia reported in Europe and North America with 7 to 8 percent of the afflicted infants dying (Rail, 1989). Generally, the incidence of methemoglobinemia in the United States is not known and it is not on the list of diseases that must be reported to public health authorities.

There have been few reported fatalities due to methemoglobin in the past quarter century in the United States (Johnson, 1987). This may be linked to nitrates being less toxic than currently believed. However, the absence of reported cases could also be due to the fact that drinking water in the United St ates is of generally good quality, coupled with good public knowledge of its potential adverse effects (Bonrud, 1995), resulting in reduced nitrate exposure.

The lack of apparent cases of methemoglobinemia may also be due to the fact that methemoglobinemia can be misdiagnosed as congenital heart disease because of the similar symptoms of both conditions. Some scientific and medical literature suggests that this misdiagnosis occurs (Comly, 1987; Pangaud, 1991; Kross, 1992). Additionally, some scientific literature suggests that asymptomatic cases of methemoglobinemia may occur, but may manifest themselves in retarded growth or other difficult to diagnose conditions (Terblanche, 1991).

The safety factor used to establish a "safe" level of nitrate in drinking water is one, i.e., no margin of safety. For most health effects, a much higher safety factor of 100 is used (Bouchard, 1992). Thus the established regulatory level for nitrate is unique in having a very low safety factor.

Other Health Concerns Associated with Nitrate

Potential Carcinogenic Effects: Another, albeit chronic, health hazard is the possible formation of carcinogenic nitrosamines. Nitrates in the human body can be converted to nitrites and then to nitrosamines. Many types of nitrosamines are carcinogenic in animals. However, the EPA currently does not classify nitrate as a carcinogen (Bouchard, 1992). Several studies have shown a positive correlation between some cancers and nitrate intake (Terblanche, 1991; Bouchard, 1992; Kross, 1993). However, it is apparently thought that the other confounding factors in these studies do not allow the classification of nitrate as a proven or probable carcinogen.

Stomach and Gastrointestinal Cancer: Although many studies have been performed attempting to link stomach and gastrointestinal cancer to nitrate intake, there is no conclusive evidence that there is a correlation. In fact, two particular studies in the United Kingdom have shown an inverse relationship. Instances of stomach cancer are highest in areas where the groundwater concentration of nitrate is lowest and vice versa (Payne, 1993; Forman et al., 1985). Scientists claim that nitrate represents a potential risk because of nitrosation reactions which, with appropriate substrates present, form N-nitroso compounds which are strongly carcinogenic in animals (Forman, 1985). In other areas of the world such as Columbia, Chile, Japan, Denmark, Hungary, and Italy, similar studies have suggested a correlation, although there still exists no concrete evidence to support this theory (Forman, 1985).

High Blood Pressure: One study has shown an earlier onset of hypertension in communities exposed to nitrate in drinking water in concentrations of 19 to 123 mg/l (milligrams per liter) as nitrate versus communities with essentially nitrate free water (Terblanche, 1991).

Central Nervous System Effects: A study on 39 children whose drinking water contained 108 mg/l nitrate showed impaired responses to visual and hearing stimulation compared to children drinking water containing only 8 mg/l nitrates (Terblanche, 1991). It is interesting to note that in this study the children with impaired responses had methemoglobin blood levels of an average of 5.5%. It is generally thought that levels of less than 10% are of no medical significance (normal range is less than 2% Terblanche, 1991). This study may thus suggest that the margin of safety in the current standard, although potentially avoiding methemoglobinemia, may not be preventing other adverse effects. The concern that elevated methemoglobin levels will result from consumption of water with elevated nitrate levels seems to be reinforced by a study performed in South Africa in 1991. This study showed that the minimum methemoglobin level found in infants consuming water varying in nitrate concentration from approximately 20 mg/l as nitrate to 100 mg/l was approximately twice the accepted upper normal bound (levels of 4 to 5 % vs. the upper normal level of 2%) (Hesseling, 1991).

Birth Defects: Studies in Australia and Canada have shown statistically increased incidence of congenital malformations associated with wells with high levels of nitrates. However, the studies were considered too limited in scope and the range of defects too broad to demonstrate a causal effect. (Terblanche, 1991). In addition, studies on rats showed that transplacental passage of nitrites can occur, causing raised levels of methemoglobin in the fetus and impaired growth (Shuval, 1977).

Other Concerns: The presence of high nitrates in ground water in the Chico Urban Area, coupled with the linkage to septic sources suggests that many shallow ground water wells are receiving a substantial portion of recycled sewage in their water supply. Under the appropriate conditions in the homeowners leach field, most, if not all, disease-causing organisms should be removed before the wastewater reaches any wells. However, the potential for transmission of disease-causing bacteria or virus is always present. This is especially true at the density of systems that are currently present in the Chico Urban Area, coupled with the fact that septic systems often are subject to conditions not addressed in typical designs. One matter is certain: the effluent reaching ground water would not be allowed to be used for ground water recharge under current California regulations for reclaimed water (Title 22), although that is essentially what is occurring in the Chico Urban Area.

There is also concern that the use of septic tanks and leach fields may be contributing toxic organic compounds to the groundwater. For example, studies have shown that compounds such as chlorinated hydrocarbons and aromatic solvents were present in the septic tanks from single family homes in significant concentrations (Kolega, 1989). There is already a serious problem in groundwater in the Chico Urban Area due to perchloroethylene (PCE), primarily thought to be due to chemical dumping from dry cleaners. It would be unfortunate if septic systems in the Chico Urban Area were to add to the existing problem.

2.2 Drinking Water Standards & Sources of Nitrate

The standard for nitrate in drinking water is set at 45 milligrams/liter (mg/l, equivalent to parts per million) as nitrate, by the World Health Organization, the United States Environmental Protection Agency, and the California Department of Health Services (Terblanche, 1991; Bouchard, 1992; Pontius, 1993).

Environmental Protection Agency Regulations

Pursuant to the federal Safe Drinking Water Act, the U.S. Environmental Protection Agency has established the "maximum contaminant level" for nitrate in groundwater. The maximum contaminant level is defined as the "highest level of a contaminant permissible in water in a public water system."

The determining factor in the EPA's decision to set the maximum contaminant level for nitrate at 45 mg/l was the occurrence of methemoglobinemia in infants under six months of age.

The maximum contaminant level reflects the levels at which this condition may occur (Kamrin, 1987). Although the maximum contaminant level for nitrogen was set at 45 mg/l as nitrate, in 1976 the EPA suggested that water having concentrations above 5mg/l as nitrate should not be used for infant feeding (Rail, 1989). This guideline is very conservative and nitrate concentrations below 45 mg/l as nitrate are probably harmless as well. However, because concentrations this low are common, the EPA hopes this guideline will induce people in rural areas to have their wells tested so that severe nitrate contamination is detected and serious health problems are avoided in the future.

Nitrogen is the most abundant element in the atmosphere, composing nearly 80% of the air we breathe (Berner and Berner, 1987). Gaseous nitrogen can be found in many forms, the major ones consisting of Nitrogen (NO_2), Nitrous Oxide (N_2O), Nitric Oxide (NO), Nitrite (NO_2^-), Ammonia (NH_3) (Gaillard, 1995). Some of these gases readily react with rainwater to produce nitrate and ammonium ions in solution. These ions can become part of the soil layer composition, or even enter into a groundwater solution.

The two most important compounds that result from the reaction of these gases and rainwater are nitrate (NO_3^{2-} an anion) and ammonium (NH_4^+, a cation). In the atmosphere, major sources of nitrate include reactions caused by lightning, photochemical oxidation in the stratosphere, chemical oxidation of ammonia, soil production of Nitric Oxide (NO) by microbial processes, and fossil fuel combustion (Gaillard, 1995).

Ammonia in the air comes from fertilizer manufacturing, anaerobic decay of organic matter, bacterial decomposition of excreta, and the burning of coal (Gaillard, 1995). Human activities have a major impact on the levels of these compounds that are found in both rainwater and the atmosphere. Many of the major sources of nitrate and ammonium come from the use and production of fertilizers and the burning of fuels, as listed above.

Nitrogen that leaves the atmosphere can be converted back into elemental nitrogen through the process of denitrification. This often takes place in the soil through the activity of bacteria that reduce the nitrate. Ammonium can undergo the process of nitrification, which is an oxidation reaction that converts it to nitrate. Through this mechanism, the nitrogen in the ammonium ion is released back into the atmosphere (Berner and Berner, 1987). After the conversion from elemental into nitrogenous ions in solutions of rainwater, the nitrogen in these compounds can be exhausted back to the atmosphere by the pathways previously described, thus completing the cycle.

Major Sources of Nitrate in Groundwater

Although there are many sources of nitrogen (both natural and human) that could potentially lead to pollution of the groundwater with nitrates, the human sources most often cause the nitrate to rise to a dangerous level.

Waste materials are one source of nitrate contamination of groundwater. Many local sources of potential nitrate contamination of groundwater exist, such as "sites used for disposal of human and animal sewage; industrial wastes related to food processing, munitions, and some polyresin facilities" (Vomocil, 1987); and "sites where handling and accidental spills of nitrogenous materials may accumulate" (Hallberg and Keeney, 1993, p. 303).

Septic tanks are another source of nitrogen contamination of groundwater. Many areas of the United States and other countries have reported significant contamination of groundwater from septic tanks. Groundwater contamination is usually related to the density of septic systems (Hallberg and Keeney, 1993). In densely populated areas, septic systems can represent a major local source of nitrate to the groundwater. However, septic systems in less populated areas do not pose a significant threat of groundwater contamination.

When natural sources contribute a high concentration of nitrate to the groundwater, it is usually a result of human disturbance. One example of this is the effect of forested areas on the leaching of nitrate to the groundwater. Natural, mature forests conserve nitrogen but human disturbances can lead to nitrate pollution of the groundwater. However, while this is a potential problem for groundwater, forests represent a very small source of nitrogen compared to agriculture (Hallberg and Keeney, 1993).

Non-agricultural Nitrate Sources

One potentially large source of nitrogen pollution of groundwater is the application of nitrogen-rich fertilizers to turfgrass. This occurs on golf courses and in residential areas. There are five fates for this nitrogen once it is applied to turfgrass. It may be:

1) taken up by plants
2) stored in soil
3) lost to atmosphere
4) lost to groundwater
5) lost to runoff (Bocher, 1995)

Many studies have shown that about 30 to 50 percent is taken up by the plant. According to a United States Golfing Association study, only one to two percent of the nitrogen is leached beyond the root zone (Bocher, 1995). This result may occur only when the nitrogen fertilizer is applied carefully and properly. Certain circumstances could lead to more of the nitrogen leaching to the groundwater. Six main factors affect nitrogen leaching:

1) nitrogen rate -	One study showed that at one pound of nitrogen per 1,000 square feet, no leaching occurred.
2) nitrogen source -	Slow-release fertilizers are a nitrogen source that can reduce the chance of leaching.
3) application timing -	In late fall, plants take up less nitrogen and there is a greater chance for leaching to occur.
4) irrigation practices -	The more irrigation that takes place the greater the chances for nitrate leaching.
5) soil texture -	The sandier the soil the more chance for nitrate leaching.
6) age of site -	Younger sites usually have less organic matter and need to be fertilized more, therefore increasing the chance of leaching. (Bocher, 1995)

Agricultural Sources of Nitrate

Nationwide, agriculturally-related activities are one of the most significant sources of nitrate in groundwater. Excessive use of nitrogen-based fertilizers, livestock manure storage, and crop irrigation (leading to nitrate leaching) are primary well contaminants.

The application of nitrogen based fertilizers to crops may result in excess nitrogen in the soil if more

fertilizer is applied than can be taken up by the plants. While unlikely, given the cost and modern farming techniques used to determine the optimum level of fertilizer required, if over fertilization does occur it may result in leaching of nitrates into the groundwater.

Livestock and dairy practices which concentrate animals, particularly feed lots and small grazing pastures, also concentrate animal wastes and potentially lead to groundwater contamination by nitrate. Even small farms can contribute to the problem of excess nitrates because of the high concentrations of manure in barnyard or feedlot areas (Hallberg and Keeney, 1993). Another potential agricultural source of nitrate leaching to the groundwater is the storage of manure. Certain high-density livestock enterprises store manure in piles or as a slurry in lagoons. These practices may result in excessive leaching of nitrates if not properly managed.

2.3 Regulation of Groundwater Nitrate in California

Porter-Cologne Water Quality Control Act (State Water Code)

The Water Code of the State of California (short title-Porter-Cologne Act) is the enabling code for the State Water Resources Control Board and the Regional Water Quality Control Boards. The Water Code requires the Regional Board to develop Basin Plans which contain water quality objectives to maintain beneficial uses of the waters of the State. The code further defines waters of the State to include groundwater.

The Basin Plan for Region 5, by reference, establishes water quality objectives for potable groundwater to be identical to the Department of Health Services maximum contaminant levels. In the case of nitrate, this standard is 45 mg/l as nitrate.

The Water Code also establishes the enforcement actions available to the Board in the event that water quality objectives are exceeded. These enforcement tools include prohibitions of certain types of discharges, Cease and Desist Orders, and Cleanup and Abatement Orders, as well as administrative and judicial civil liabilities (fines).

State Water Resources Control Board and Regional Boards

The State Water Resources Control Board (SWRCB) was created by the Legislature in 1967. The mission of the State Board is to ensure the highest reasonable quality of waters of the state, while allocating those waters to achieve the optimum balance of beneficial uses. The joint authority of water allocation and water quality protection enables the State Board to provide comprehensive protection of California's waters.

The State Board consists of five full-time salaried members, each filling a different specialty position. Board members are appointed to four-year terms by the Governor and confirmed by the Senate.

There are nine Regional Water Quality Control Boards. The mission of the Regional Boards is to develop and enforce water quality objectives and implementation plans which will best protect the beneficial uses of the State's waters, recognizing local differences in climate, topography, geology and hydrology.

Each Regional Board has nine part-time members appointed by the Governor and confirmed by the Senate. Regional Boards develop "basin plans" for their hydrologic areas, issue waste discharge requirements, take enforcement action against violators, and monitor water quality.

The task of protecting and enforcing the many uses of water, including the needs of industry, agriculture, municipal districts, and the environment is an ongoing challenge for the State and Regional Boards.

Programs of the State Board

Numerous State Board activities protect both surface and ground water. Permits are required of all communities and businesses wishing to discharge wastes into State waters. These permits are issued and enforced by the Regional Boards.

Other important programs include the Board's *Waste Disposal to Land Regulations*, waste discharge requirements which are issued by the Regional Boards to control the discharge to land of hazardous and nonhazardous wastes.

The *Toxic Pits Cleanup Act* regulates surface impoundments containing liquid hazardous wastes and requires double-lining and monitoring.

The *Solid Waste Assessment Testing* (SWAT) program detects hazardous waste leakage from solid waste disposal sites.

The *Underground Storage Tank Program* is aimed at finding, preventing, and cleaning up leakage from tanks that contain gasoline and other hazardous substances. The California *Underground Storage Tank Cleanup Fund* was established in 1990 to pay for corrective action and third party liability costs resulting from leaking petroleum underground storage tanks. The fund also pays for direct cleanup of abandoned sites that require prompt action.

The *Spills, Leaks, Investigation, and Cleanup Program* (SLIC) manages sites with pollution from recent or historic surface spills, subsurface releases (such as pipelines), complaint investigations, and all other unauthorized discharges that pollute or threaten to pollute surface or ground water.

The *Aboveground Petroleum Storage Act* protects the public and the environment from spillage of petroleum-derived chemicals stored in thousands of aboveground tanks.

The *Department of Defense and Department of Energy Program* was created to establish procedures to clean up pollution at federal military sites and federal energy sites.

Under the federal *Resource Conservation and Recovery Act* (RCRA), hazardous wastes are tracked from "cradle to grave"; from generation to storage to transport to disposal. The State Board plays an important role through its own authority in the areas of land disposal and ground water monitoring. It also performs water quality-related review work to provide the California Department of Toxic Substances Control, the program's lead agency, with information to guide it in issuing permits to land disposal facilities.

Central Valley Regional Water Quality Control Board

The Central Valley Regional Water Quality Control Board oversees the largest single basin in California, covering 40% of the state. Encompassing virtually all the lands which drain through the Delta and into San Francisco Bay, the Central Valley Region stretches from the Oregon border to Ventura County.

The regional board consists of nine members appointed by the Governor. State law specifies that the board members shall "represent and act on behalf of all the people and shall reside or have a principal place of business within the region." The board's membership consists of the following:

(1) One person associated with water supply, conservation, and production. (Vacant)

(2) One person associated with irrigated agriculture. (Craig Pedersen)

(3) One person associated with industrial water use. (Charles Ahlem)

(4) One person associated with municipal government. (Vacant)

(5) One person associated with county government. (Vacant)

(6) One person from a responsible nongovernmental organization associated with recreation, fish, or wildlife. (Steven Butler, Chair)

(7) Three persons not specifically associated with any of the foregoing categories, two of whom shall have special competence in areas related to water quality problems. (Karl E. Longley, Robert Schneider, Susan Azevedo)

An essential aspect of the Butte County Nitrate Compliance Program has been the participation and close communication among the public, the Board of Supervisors' committee, Regional Board staff, and the County's project team. The involvement of Regional Board staff has greatly contributed to the progress of the County's effort, particularly in representing the regulatory perspective during innumerable debates and discussions regarding very complex issues. This close communication enabled the County to aggressively pursue the facts, evaluate alternatives, and fashion the best solutions possible. Key Regional Board staff members are:

Gary M. Carlton, P.E., Executive Officer (Sacramento)
James C. Pedri, P.E., Assistant Executive Officer (Redding)
Ronald S. Dykstra, P.E., Senior Water Resource Control Engineer (Redding)

Water Quality

Until recently, the quality of groundwater was generally taken for granted. Because it is shielded from the elements, its quality generally is good, although it sometimes contains high levels of dissolved minerals. Groundwater may be very "hard" (high in the minerals calcium and magnesium). Hardness does not pose a health risk but does make household cleaning tasks more difficult. Also, soap lathers less vigorously in hard water than in soft water.

The link between pollution and groundwater is less obvious than it is with surface water, where it is easier to see and monitor the effects. Surface waters may become polluted more quickly and readily, but they are better equipped to handle pollution. The exposure to air and sunlight as a swift-moving stream courses along causes some pollutants to evaporate, while others are consumed or rapidly diluted by aerobic (oxygen-using) bacteria.

Groundwater lacks the natural self-cleansing abilities of streams and rivers. Below grade, there is much less exposure to the atmosphere. The environment is relatively bacteria-free and the temperature relatively constant. As the water inches along, the lack of turbulence allows pollutants to move through the system as a "plume" rather than disperse and become diluted.

It was once believed that soil would filter out all contaminants, and it does filter out many. However, with the introduction of thousands of new chemical compounds into the environment and major advances in detection technology, traces of chemicals have been discovered in wells throughout the state and nationwide. Once a groundwater supply is contaminated, it is difficult and expensive to clean up.

2.4 Use of Onsite Systems in California

Notwithstanding any perception to the contrary, the dependence on individual onsite systems in California is widespread and is increasingly considered a permanent condition. California residents currently utilize approximately 1.1 million onsite systems, primarily conventional septic tank and leach field units. Due to the escalating cost of community sewerage systems, the population trend away from cities, and the regulatory encouragement for disposal to land rather than receiving waters, the use of such systems is increasing.

The primary responsibility for permitting onsite sewage disposal systems lies with county health departments, with the regional boards providing oversight only in rare cases. In general, each regional board establishes minimum guidelines for the use of septic systems in a given area. As long as these standards are adhered to and there is little evidence of system failures, such as surfacing effluent or indications of water contamination, the counties administer their individual programs.

Report of the State TAC for Onsite Sewage Disposal Systems

The State Water Resources Control Board convened a Technical Advisory Committee (TAC) in the early 1990's in response to the 1987 Federal Clean Water Act. The Clean Water Act required specific efforts to address non-point source pollution, of which the Technical Advisory Committee for Onsite Sewage Disposal Systems was one element.

The Technical Advisory Committee was comprised of state regulators, county health officers, private wastewater consultants and academicians, including Dr. Dennis Rolston of the Department of Land, Air and Water Resources at U.C. Davis, who provided valuable services to Butte County's technical team. Also participating was Norman Hantzsche, P.E., of Questa Engineering Corporation, who co-authored

the equation for predicting ground water nitrate subsequently used by the Regional Board in justifying the Chico-area prohibition order. (See section 3.4 for further discussion of the Hantzsche Equation.)

The Technical Advisory Committee recommended five major management strategies to address potential pollution from onsite sewage disposal systems. Recommendations were:

1. Adopt local and regional policies and procedures for onsite disposal systems.
2. Site and design onsite disposal systems to protect groundwater and surface water.
3. Encourage implementation of programs by local agencies to assure adequate system operation and to upgrade deficient systems.
4. Develop an oversight monitoring program where necessary to assure protection of water quality.
5. Develop policies and regulations which provide for the analysis of cumulative impacts from onsite disposal systems.

Use of Onsite Systems in Butte County

Butte County is largely rural in nature, with approximately 54% of the County's 204,260 residents living outside the limits of the incorporated cities of Chico, Paradise, Oroville, Gridley and Biggs. There are over 41,000 onsite systems in the County, the overwhelming majority of which are individual septic tank and leach field systems. Many of the County's onsite systems serve the unsewered communities of Paradise, Durham, Cohasset, and Forest Ranch, as well as the unincorporated portion of the Chico Urban Area.

The primary problem resulting from the use of septic systems in the Chico Urban Area is the contamination of groundwater by nitrate. Most California septic systems are in areas of low development densities, typically single family homes on lots greater than one acre. The Chico Urban Area population of approximately 85,000 includes about 35,000 of which 12,000 units are affected by the Prohibition Order. There are also many commercial and other non-residential facilities served by septic systems in the Chico area. Additionally, the Chico Urban Area has dwelling unit densities of over 15 units per acre and fairly widespread development on the order of 8-10 units per acre. Although septic systems in this area are subject to surface failure, this problem does not appear to be widespread primarily because of the fast percolating soils in the area.

2.5 REGULATORY ACTIONS IN THE CHICO URBAN AREA

Nitrate Action Plan

In response to an order of the Regional Board (Resolution 84-074), Butte County and the City of Chico prepared a "Nitrate Action Plan" in 1985 to address the nitrate problem in the Chico Urban Area. The Nitrate Action Plan addresses density limits on developments in the Chico Urban Area. The plan was subsequently amended in 1988 to establish a proposed sewer time line for affected areas.

Following time extensions granted by the Regional Board, preparation of a draft sanitary sewage plan, storm drainage plan, and financial plan were completed in late 1987. The City of Chico has subsequently adopted the sanitary sewer master plan. The draft financial plan and storm drainage plan have never been adopted.

In response to the plan the City and County have limited installation of new septic systems, banned dry wells used for storm water disposal, have worked to make alternate water supplies available, and have adopted water well ordinances requiring sealing of wells to prevent interconnection of contaminated and uncontaminated aquifers. However, there have been problems and differences concerning interim development density and the provision of sewers to problem areas.

Originally, the City and County adopted different density limitations for new development on septic tanks. The City's version limited new single-family residential development to one dwelling unit per acre and other developments to 375 gallons per acre per day. The County plan limited the density of new subdivisions to three units per acre.

In 1988, the County and City adopted a revised Nitrate Action Plan incorporating the requirement for Regional Board approval of a sewer time line on all developments of greater than one unit per acre. The amended plan achieved consistency between the County and City on development densities, and incorporated areas in the northwest urban area into the City's sewer service area which were previously excluded from sewer service.

Currently, both the County and City administer the Nitrate Action Plan. However, the basin plan amendment is the primary tool that limits development in the urban area and prevents further degradation of the aquifer.

The versions of the Nitrate Action Plan adopted by the County and City are identical except for a final paragraph within the County's plan addressing annexation to the City of Chico. The County's adopted version includes the following paragraph:

> V. Annexation to the City of Chico
> The City of Chico shall not require that property owners be annexed to the City, or agree to waive their rights to protest annexation to the City in order to be connected to the sewer collection system and the water pollution control plant.

A copy of the Nitrate Action Plan as adopted by Butte County appears as Appendix N at the back of this document. Once adopted, the Nitrate Compliance Plan will supersede the Nitrate Action Plan. Elements

of the Nitrate Action Plan (regarding septic tank installation standards in the Chico Urban Area) proposed to remain in effect after the adoption of the Nitrate Compliance Plan are shown in Appendix O.

Regional Board Prohibition Order

Due to the Regional Board's perception that the Nitrate Action Plan was not being implemented in a timely manner, and due to the fact that significant portions of the shallow aquifer were being contaminated and would continue to be contaminated, the Regional Board established a prohibition on individual disposal systems in the Chico Urban Area. The prohibition called for the cessation of the installation of new individual disposal systems after July 1, 1988, and the elimination of existing systems on lots of less than one acre after July 1, 1993.

The order was protested to the State Board which established a review committee to examine the basis for the prohibition. The findings of the committee supported the prohibition. However, the dates contained in the original prohibition were by that time unachievable. Therefore, the order was readopted in 1990 with revised dates of July 1, 1990, and July 1, 1995, respectively. A copy of the Prohibition Order (Regional Water Quality Control Board Order No. 90-126) is included herein as Appendix C.

Recent Requirements of the Regional Board

At its meeting in January 1995, the Regional Board received a verbal progress report from its staff and Butte County, and subsequently adopted Resolution No. 95-024 (attached as Appendix D). At the County's request, this resolution deferred enforcement action relative to the Prohibition Order to allow time for the County to complete an implementation plan setting forth in detail local plans for compliance with the groundwater nitrate standards.

Specifically, Butte County agreed to the following conditions of the Regional Board's deferral of enforcement action:

1. Present summary results of the technical program and the foundational logic underlying the action items set forth in the balance of the plan.

2. Creation of a feasibility plan and cost estimates to address sewering for the purpose of defining sewering costs and methods.

3. Presentation of a plan delineating the areas where sewering is proposed and areas where alternatives to sewering or "no action" is appropriate.

4. Presentation of a plan and implementation schedule for providing sewer service to those areas planned to be sewered.

5. Description of a plan and implementation schedule for the installation and operation of mechanisms for additional nitrate removal by available appropriate technology in those areas where it can be shown that the on-site systems will protect present and future beneficial uses.

6. Present a plan and implementation schedule for establishment of a public entity to oversee the operation and maintenance of onsite wastewater systems.

7. Set forth land use policies and development regulations for the subject area which support and are consistent with each component of the Plan.

8. Develop a program for the training and certification of designers, plan checkers, inspectors, repair and maintenance persons, pumpers and others involved in onsite wastewater processes.

The County has subsequently endeavored to complete the referenced work in accordance with the deferral resolution and has continued to involve Regional Board staff in each effort. The current status of Butte County responses to each of the Regional Board's conditions is summarized in the following Table 2-1.

In considering proposals from Butte County, the Regional Board is itself constrained by applicable provisions of the Porter-Cologne Water Quality Control Act, which state:

> ***Limitations of prohibitions.*** Where it appears that adequate protection of water quality, protection of beneficial uses of water, and prevention of nuisance, pollution, and contamination can be attained by appropriate design, location, sizing, spacing, construction and maintenance of individual disposal systems in lieu of elimination of discharges from such systems, and where an authorized public agency provides satisfactory assurance to the regional board that such systems will be appropriately designed, located, sized, space, constructed, and maintained, such discharges shall be permitted so long as such systems are adequately designed, located, sized, spaced constructed, and maintained.
> —§13282 of the Porter-Cologne Water Quality Control Act
>
> ***Prohibition against specifying manner of compliance; exceptions.*** (a) No waste discharge requirement or other order of a regional board or the state board or decree of a court issued under this division shall specify the design, location, type of construction, or particular manner in which compliance may be had with that requirement, order or decree, and the person so ordered shall be permitted to comply with the order in any lawful manner. . . .
> —§13360 of the Porter-Cologne Water Quality Control Act (relevant portion)

Section 13282 and Section 13360 of the Porter-Cologne Water Quality Control Act appear to provide a statutory vehicle to negotiate the County's response to the Prohibition Order.

Potential Enforcement Actions by the Regional Board.

To date the sole action by the Regional Board has been to establish the basin plan amendment (prohibition) against the use of septic tanks in the Chico Urban Area. This order is not an enforcement action in and of itself, but sets the stage for potential enforcement actions. Should it be necessary to enforce compliance because of, for example, a lack of responsiveness or progress on the part of the

County, termination of the Implementation Plan at public referendum, or failure of an essential component to win voter approval, the Regional Board may choose to proceed with enforcement actions.

The Water Code gives the Regional Board broad authority and mechanisms for enforcement to prevent the degradation of both surface water and groundwater. Failure of a discharger to comply with a prohibition order may be followed by enforcement actions as prescribed by the Water Code and implemented by the Regional Board, Attorney General, and the courts. In this instance, the role of Butte County as the representative of approximately 12,000 individual dischargers would cease and enforcement actions could be taken directly against each discharger.

Enforcement actions authorized by the Water Code fall into two basic categories: those that direct future actions by dischargers and those that address past violations. Actions which generally direct future action include imposition of time schedules (§13300) issuance of Cease and Desist Orders (§13301-13303) and Cleanup and Abatement Orders (§13304). Actions taken to address past violations include administrative civil liability (§13350), and referral to the Attorney General or District Attorney (§13331 and 13305).

The Cleanup and Abatement Order is generally used when there has been a specifically identifiable discharge and discharger, and the contaminated water (groundwater or surface water) can be cleaned up. Although the shallow groundwater in the Chico Urban Area is arguably susceptible to cleanup, a treatment system to accomplish this would likely be exorbitantly expensive. However, it is within the scope of the Water Code and the purview of the Regional Board to require such a cleanup.

If the prohibition order was not complied with, the most likely enforcement scenario is the Cease and Desist Order which is the type of order that has been used in similar circumstances in the past. The largest action of such a type within the Central Valley Regional Water Quality Control Board was the issuance of approximately 900 individual Cease and Desist Orders to the residents of the Town of Cottonwood, Shasta County, in the early 1980's.

Table 2-1
SUMMARY OF RESPONSIVENESS TO REGIONAL WATER QUALITY CONTROL BOARD REQUIREMENTS

Regional Water Quality Control Board Requirement (per Resolution No. 95-024)	**Butte County Response**	**Status**
1. Present summary results of the technical program and the foundational logic underlying the action items set forth in the balance of the plan.	Chapter 3 presents a summary of the technical program as reported in Groundwater *Nitrate Study, Chico Urban Area, Final Report* (Dames & Moore, January, 1994); *Historical Land Use Report* (Heritage Partners, 1993), and *Technical Memorandum, Hydrologic and Soils Investigations, Chico Urban Area* (Dames & Moore, April, 1996)	COMPLETE
2. Creation of a feasibility plan and cost estimates to address sewering for the purpose of defining sewering costs and methods.	Chapter 4 describes the proposed categorization of areas based upon the results of the Technical Program and the refinement of the calculation of the soil's capacity to assimilate nitrate in the Chico Urban Area.	SET FORTH HEREIN
3. Presentation of a plan delineating the areas where sewering is proposed and areas where alternatives to sewering or "no action" is appropriate. Presentation of a plan and implementation schedule for providing sewer service to those areas planned to be sewered.	Chapter 5 addresses the provision of sewer service to designated areas. Implementation of the sewering plan is set forth in Chapter 9.	PROPOSED T HEREIN
4. Describe a plan and implementation schedule for the installation and operation of mechanisms for additional nitrate removal by available appropriate technology within those areas where it can be shown that the on-site systems will protect present and future beneficial uses.	As discussed in Chapter 4, mechanisms for retrofitting to existing systems have not demonstrated the cost-effectiveness and reliability to justify "Nitrate Reduction" on a large scale. A reduction approach is recommended only in exceptional circumstances.	RECOMMENDED ONLY WHERE SEWER INFEASIBLE
5. Present a plan and implementation schedule for establishment of a public entity to oversee the operation and maintenance of onsite wastewater systems.	Chapter 6 details a proposed oversight management program for the 4,200 dwelling units that continue to use onsite systems in County Service Area 114.	PROPOSED HEREIN
6. Set forth land use policies and development regulations for the subject area which support and are consistent with each component of the implementation plan.	Chapter 7 addresses relevant aspects of land use, new development, annexation issues and cooperative actions as needed to support and implement the overall program of implementation.	PROPOSED HEREIN
7. Develop a program for the training and certification of designers, plan checkers, inspectors, repair and maintenance persons, pumpers and others involved in onsite wastewater processes.	A preliminary training and certification program is described in Chapter 6. Input from environmental health and industry experts will guide further development of this program which now operates at California State University - Chico.	CONCEPTUAL PROGRAM PROPOSED HEREIN

The establishment of either of the above two orders sets the stage for administrative or judicial civil liability (fines) for failure to comply. Prior to the issuance of a Cease and Desist Order or a Cleanup and Abatement Order, the Regional Board has no individual discharger against which to initiate liability. The fines for failure to comply with a Cease and Desist Order range from a minimum of $100 per day to a maximum of $1,000 dollars per day (administrative liability) or to a maximum of $10,000 dollars per day under the judicial civil liability process. Failure to comply with a Cleanup and Abatement Order may result in a minimum fine of $500 per day to as much as $15,000 per day if imposed by the court.

Failure to pay an adopted civil liability could result in criminal charges, but would most likely result in a lien being placed on the discharger's property making it effectively unsalable.

2.6 Role of County Service Area 114

County Service Area 114 has played a pivotal part in recent progress in resolving the Chico Urban Area's groundwater nitrate issue. The funds generated by annual assessments on approximately 10,000 parcels have enabled all of the studies and other efforts made during the last five years. A map of CSA 114 is provided in Appendix P.

Scope of Authorized Activities

The Nitrate Action Plan required the County to form a county service area (CSA) implementing the objectives and actions of the Plan. Formation of the CSA was approved by the Local Agency Formation Commission (LAFCo) on November 3, 1988 and by the Board of Supervisors on December 20, 1988. The title given to the CSA was County Service Area 114 (CSA 114).

Initially, CSA 114 was empowered and utilized to finance a nitrate well monitoring program and financing for feasibility and planning studies for possible future actions related to the Nitrate Action Plan. The powers of the CSA were subsequently expanded by LAFCo on June 6, 1991 and by the Board of Supervisors on September 17, 1991 as set forth in Resolution 91-108:

> "5. The types of extended county services to be provided within said area in addition to those authorized by Resolution No. 88-194 adopted by the Board of Supervisors on December 20, 1988, are: sewer service, drainage control and road maintenance, limited to the preparation of detailed engineering studies dealing with the design of wastewater and storm water collection, transportation, disposal and drainage facilities and structures to protect the quality of groundwater in the area."

It is through CSA 114 that funds have been raised to prepare the scientific studies to determine the credibility of the previous assertions regarding the nitrate contamination of the groundwater and its relationship to septic systems in the Chico Urban Area. CSA 114 was also the funding mechanism for the preparation of sewer feasibility studies for three key areas which have been identified as requiring sewer service. Any expansion of powers beyond those currently specified would require review and approval by the Board of Supervisors and LAFCo.

At its inception, CSA 114 included all parcels within the unincorporated area of the Sphere of Influence of the Chico Urban Area. Included within the CSA were tracts of undeveloped land which developed over time. At the time of development, several of these properties were connected to the sewer and developed a permanent solution to drainage. In some cases these properties were annexed to the City of Chico.

In June of 1994 the Board of Supervisors acted to place those parcels within CSA 114 which were connected to sewer and had a permanent solution for drainage into a separate zone of benefit which carried no assessment. The Local Agency Formation Commission, in response to the Board's action, recommended that all parcels which had sewer and a permanent solution to drainage be removed from CSA 114 at the time of annexation to the City of Chico.

At its September 14, 1999 meeting, the Board of Supervisors amended its policy regarding the assessment of parcels within CSA 114. The new policy simplifies the criteria for a parcel to be charged an assessment. Only parcels within CSA 114 that utilize on-site septic systems will continue to be assessed the parcel fee. All parcels that receive sewer service will not be charged the assessment. In accord with Regional Board's staff's letter of August 18, 1999, the storm drainage concern, as addressed in the Nitrate Action Plan, is no longer an issue. The Regional Board's letter and a memorandum from the County Administrative Office which addresses the policy change for the assessment of parcels within CSA 114 is provided in Appendix K.

Summary of Activities and Expenditures

The activities and expenditures of CSA 114 reflect the central mission and scope of authority originally approved and later expanded by the Board of Supervisors and the Local Agency Formation Commission. All expenditures were properly authorized by the Board of Supervisors or, with certain smaller expenses, by the Administrative Office.

Most expenditures have been for professional services in project management, research, hydrogeology, soil chemistry, engineering, and related activities. Other funded activities of note include the study of recirculating trickling filters (RTF), formation of the Greater Chico Urban Area Redevelopment Project and, early on, reimbursement of an agreed share of costs for the Sanitary Sewer Master Plan and Storm Drainage Master Plan.

The potential for statewide application of a successful and cost-effective recirculating trickling filters retrofit to existing septic systems persuaded the State Water Resources Control Board to award a $15,000 state grant to the County for the recirculating trickling filters study. The state's payment from the State Water Resources Control Board's Cleanup and Abatement Fund, was received by the County in June of 1996.

The funds expended from CSA 114 related to formation of the redevelopment project area are committed to be reimbursed from tax increment funds. Further, the Chico Redevelopment Agency has agreed to reimburse CSA 114 for the cost of the sewer feasibility studies. Table 2-2 summarizes the assessments, revenues and expenses through CSA 114 from its 1989 creation.

Table 2-3 summarizes the description of revenues and expenditures through CSA 114 since 1989. This table breaks out total expenditures through CSA 114 since 1989 for revenue spent on environmental monitoring costs, engineering feasibility studies, technical review consultation costs, and planning and project management expenses.

For more detailed information on CSA 114 fund expenditures refer to Tables 1 and 2 in Appendix Q. In this appendix Table 1 describes in greater detail CSA 114 fund expenditures per fiscal year. Table 2 describes in greater detail CSA 114 fund expenditures per project category.

[Refer to the following pages for Tables 2-2 and 2-3].

Table 2-2. Summary of CSA 114 Income & Expenses, 1989 - 1999

Fiscal Year (1)	Assessment per Parcel (2)	Total Assessment Revenue (3)	Interest Earned (4)	Other Receivables (5)	Total Revenue Received (6)	Total Expenditures (7)	Amount Revenue Remaining (8)	Remaining Running Total (9)
1989-90	$9.90	$88,145	$2,236	0	$90,381	$61,000	$29,381	$29,381
1990-91	$5.32	$47,357	$2,102	0	$49,459	$37,588	$11,871	$41,252
1991-92	$25.90	$236,345	$7,346	0	$243,691	$16,838	$226,853	$268,105
1992-93	$4.20	$41,601	$12,601	0	$54,202	$74,294	($20,092)	$248,013
1993-94	$25.90	$263,276	$10,740	0	$274,016	$240,583	$33,433	$281,446
1994-95	$25.90	$249,508	$15,759	0	$265,267	$164,658	$100,609	$382,055
1995-96	$25.90	$250,090	$17,604	0	$267,694	$325,689	($57,995)	$324,060
1996-97	$25.90	$251,442	$21,985	$15,000	$288,427	$91,779	$196,648	$520,706
1997-98	$25.90	$257,614	$33,587	* $35	$291,236	$178,835	$112,401	$633,107
1998-99	$25.90	$257,614	$27,692	*$80	$285,386	$184,914	$100,472	$733,579
TOTALS	**$200.72**	**$1,942,992**	**$151,652**	**$15,115**	**$2,109,759**	**$1,376,178**	**$733,581**	

Notes:

1. The total cumulative assessment amount collected per parcel from fiscal year 1989-90 to fiscal year 1998-99 is $200.72. The anticipated total assessment revenue projected for fiscal year 1999-2000 is approximately $225,744 and represents 8,716 parcels that are not connected to sewer. Refer to Appendix K to examine the policy for the assessment of parcels within CSA 114.

2. * From sale of Draft Plan at $35 each and other related studies.

3. Expenditure records provided by Butte County Auditor's Office.

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Table 2-3. CSA 114, Description & Amounts of Expenditures per Category (1989-1999)

Project Category	Amount Spent ($)	% of Total Expenses
Environmental Monitoring, Studies & Fees [a]	**$311,170**	**23%**
Project Management [b]	**$399,562**	**29%**
Environmental Impact Report & Planning Related Services [c]	**$143,126**	**10%**
Engineering Services & Sewer Feasibility Studies [d]	**$177,719**	**13%**
Technical Review & Special Research [e]	**$84,564**	**6%**
Butte County service costs for agency support [f]	**$253,995**	**18%**
Miscellaneous support services [g]	**$6,042**	**<1%**
TOTAL	**$1,376,178**	**100%**

Legend: Table 2-3. Explanation of CSA 114 Budget Expenditures (1989 - 1999)

(a) Environmental Monitoring, Studies & Fees - Includes well construction and installation, monitoring costs, permit fees, nitrate characterization study, and hydrologic and soils investigations.

(b) Project Management - Includes administration of consultant contracts, preparation of work plans, interfacing with regulatory and local agencies, providing administrative support to County staff, and administering to the Citizens Nitrate Advisory Committee.

(c) Environmental Impact Report (EIR) & Planning Related Services - Includes preparation of sewer and storm drain master plans, City of Chico EIR study, formation of City/County Redevelopment Agency (i.e. Greater Chico Urban Area Redevelopment Project Agency), sewer financing study, and strategic planning.

(d) Engineering Services and Sewer Feasibility Studies - Includes sewer feasibility cost estimates for areas north and south of Lindo Channel and associated engineering related technical memoranda.

(e) Technical Review and Special Research - Includes technical peer review of groundwater monitoring studies, other technical studies, training and seminars.

(f) Butte County service costs - Includes staff time/support from Administrative Office, Auditor's Office, County Counsel, Environmental Health, Development Services & Public Works.

(g) Miscellaneous support services - Includes office supplies, materials for Citizens Nitrate Advisory Committee, printing and mailing costs, legal notices, and public outreach.

chapter three

SCOPE AND RESULTS OF THE TECHNICAL PROGRAM

This chapter summarizes the scope and results of a comprehensive technical program of groundwater nitrate characterization, hydrogeology, and soil chemistry conducted over a four year period. The overall objective of the program was to evaluate the extent to which individual septic systems were contributing to elevated groundwater nitrate. The results of the technical program could then function as the basis for further actions as needed to protect the beneficial uses of groundwater in the Chico Urban Area.

KEY POINTS

- In order to definitively establish the scope and extent of nitrate contamination and provide the technical basis for resolution satisfactory to both the regulatory bodies and the public, a comprehensive scientific program has been completed.
- The results of the technical program are generally consistent with previous studies.
- An evaluation of all potential nitrate sources strongly supports the conclusion that septic tank discharge is the primary source of groundwater nitrate in the Chico Urban Area. (Dames and Moore, 1996, page 25)
- A simplified mass balance equation was used to predict the level of wastewater loading that could be sustained without causing exceedance of the maximum contaminant level. The technical program results now support a relaxation of density limits from one unit per acre to approximately four units per acre. (Dames and Moore, 1996, page 26)

3.1 OVERVIEW

Butte County's technical program commenced in 1992 with an initial nitrate characterization by Metcalf & Eddy (Metcalf and Eddy, 1992), consisting of the sampling and analysis of 119 existing wells. This effort provided updated data and program recommendations for more extensive work to follow.

In September of 1993 a work plan was finalized by the Sacramento office of Dames & Moore, Inc., the hydrogeochemical consultant selected to conduct the bulk of the technical program. A second study phase was implemented with the close consultation of the Technical Team (see page 3-6) consisting of the Regional Board staff, the County, independent hydrogeologists and soil chemists and the public. A central element of the work plan was the installation of 19 monitoring wells in the shallow aquifer to provide more accurate characterization of the extent and severity of elevated groundwater nitrate. Upon completion of the work, Dames & Moore issued the Groundwater Nitrate Study Final Report in early 1994 (Dames and Moore, 1994).

Again, following extensive consultations among members of the Nitrate Study Team, Dames & Moore proceeded with an additional scope of work including; a nitrate source evaluation, further shallow aquifer characterization, and vadose zone characterization. The results of this study phase were set forth in the Technical Memorandum, Hydrologic and Soils Investigations, in April of 1996 (Dames and Moore, 1996).

3.2 Previous Studies

Several investigations were undertaken prior to the Technical Program, which was begun in 1992. Brief descriptions of each of the previous efforts includes:

Department of Water Resources Study, 1983. (California Department of Water Resources, 1984) Groundwater samples collected from 69 private water supply wells in 1979 first indicated elevated nitrate levels in 21 wells in the Chico Urban Area. In 1983, the Department of Water Resources conducted two rounds of groundwater sampling. The Department of Water Resources study concluded that nitrate levels exceeding the maximum contaminant level existed in four areas within the Chico Urban Area as shown in Figure 3-1. This study was the basis of subsequent actions by the Regional Board.

Aqua Resources Study, 1985. (Aqua Resources, 1984) A nitrogen isotope composition study of 22 groundwater samples was conducted by Aqua Resources to attempt to identify the sources of elevated nitrate levels in Chico Urban Area groundwater. The Aqua Resources Incorporated study concluded that much of the nitrate contamination was due to septic systems, including 70 to 90 percent of the nitrate contamination in the northern portion of the Chico Urban Area. However, the study was very controversial and largely discounted by later technical efforts, including those reported in the Dames & Moore Technical Memorandum.

Behnke analysis, 1989. (Behnke, Jerold, 1989) In conjunction with Aqua Resources Incorporated, Dr. Jerold Behnke conducted a nitrogen isotope study, concluding that agricultural operations were primarily responsible for the nitrate concentrations found by Department of Water Resources in 1984. Dr. Behnke suggested that $\delta^{15}N$ values (delta-15-N, a method of determining the source of nitrate, see glossary) were consistently too low to be from septic tanks as a primary source.

State Water Resources Control Board Review Committee evaluation, 1989. (Technical Advisory Committee, SWRCB, 1989)
The State Water Resources Control Board convened a Review Committee to evaluate existing data and determine if it was sufficient to evaluate nitrate sources, what impact the proposed prohibition order would have on existing and future groundwater quality, and what further information was needed. The committee's report confirmed that septic systems were substantially contributing to groundwater nitrate, as were other sources to a lesser degree.

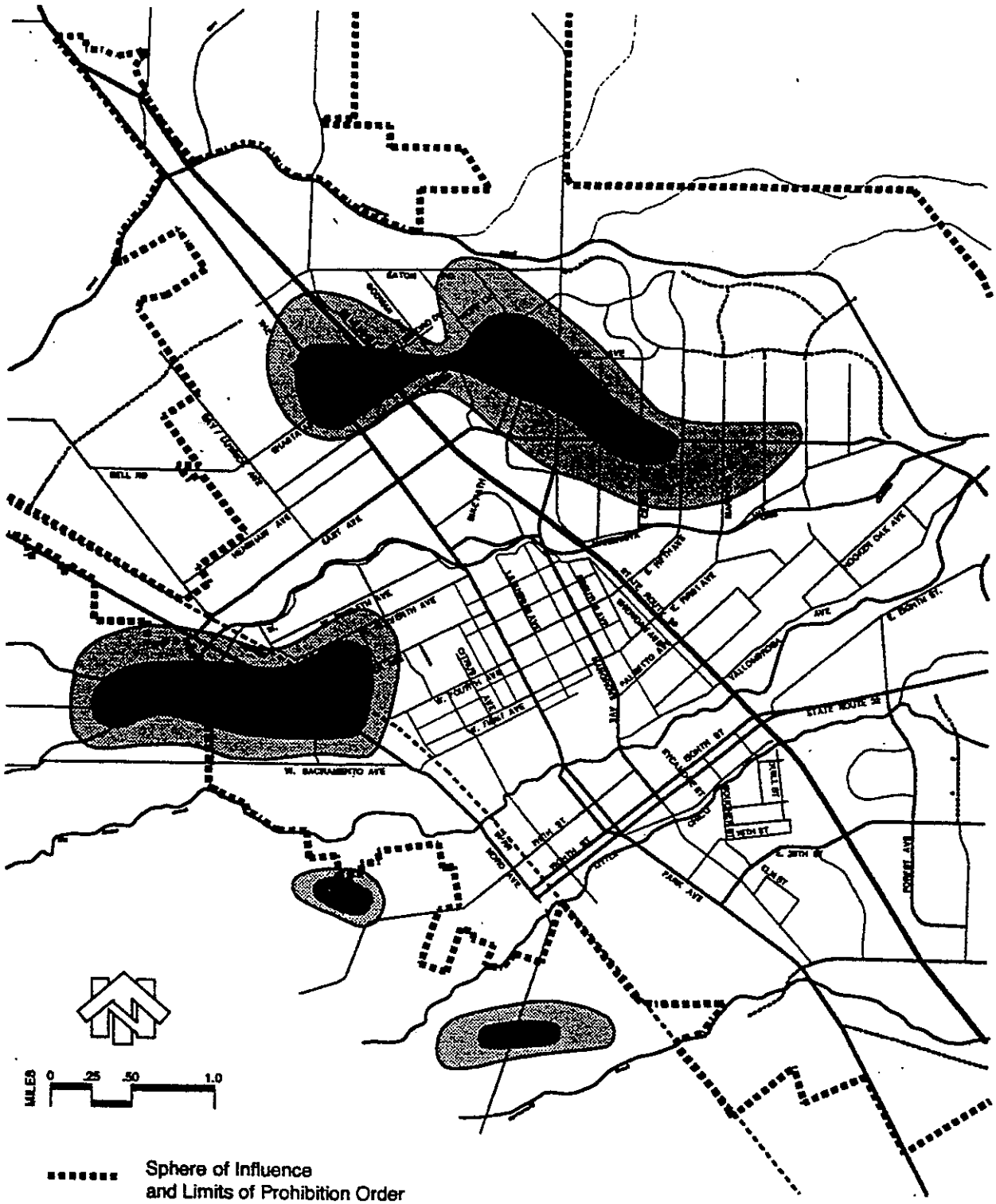


Figure 3-1

NITRATE PLUMES

AS IDENTIFIED BY STATE DEPARTMENT OF WATER RESOURCES, 1984

(DERIVED FROM WATER SAMPLES TAKEN FROM EXISTING WELLS IN SHALLOW AND INTERMEDIATE AQUIFERS, SEE APPENDIX L, REFERENCE NO. 7)

3.3 RECENT TECHNICAL PROGRAM STUDIES

In 1991, a review by Heritage Partners of the previous studies described above indicated that no comprehensive, coordinated and quality assured technical analysis existed with the scope and depth necessary to resolve the substantial controversy regarding the extent and source(s) of groundwater nitrate. With the ability to generate funds via CSA 114 assessments, Heritage Partners and county staff recommended that the County pursue a technical program which would form the basis of further actions.

In order to proceed in a prudent and cost-effective manner, an initial sampling of existing private wells in the shallow and intermediate aquifer was conducted by the Chico office of Metcalf & Eddy. In October of 1992, Metcalf & Eddy issued their Nitrate Characterization Summary Report (Metcalf and Eddy, 1992). The effort and data generated helped to shape the scope and direction of further, more definitive and costly studies.

Hantzsche Equation

The Prohibition Order was based upon the data available to the Regional Board at the time, which pointed to the effluent discharge from septic systems as a major source of elevated levels of groundwater nitrate. Cited in particular was the density of residential dwelling units and the unsuitable hydrogeologic conditions prevalent in the Chico Urban Area. The Regional Board specifically found that the protection of groundwater and beneficial uses could not be achieved with the continued discharge from onsite systems, even under management by an authorized public agency as provided in Section 13282 of the Water Code.

In concluding that the continued discharge from existing onsite systems was causing exceedance of the State standard, the Regional Board relied upon the application of an equation intended to predict the level of nitrate in groundwater. This "Hantzsche/Finnemore Equation" often shortened to "Hantzsche Equation", named for authors Norman Hantzsche and E. John Finnemore, estimates nitrate loading to groundwater based upon measured factors including rainfall/recharge, denitrification, soil chemistry and other factors. This equation is delineated in detail in Hantzsche and Finnemore, 1992 (refer also to Appendix G). This article was published in "Ground Water" a respected peer reviewed Journal. Dr. John Finnemore is a professor of Civil Engineering at Santa Clara University. Norm Hantzsche is a Professional Engineer in California, and principal of Questa Engineering in Point Richmond, California, and designs on-site wastewater treatment systems, both individual and community, as part of his consulting business. Application of the equation to a specific area, where these parameters may be reasonably measured and/or estimated, provides a "critical development density" expressed in acres per equivalent dwelling unit.

The goal of the County's technical program was to refine the parameters of the Hantzsche Equation, as applied to the Chico Urban Area. In so doing, it was hoped that a scientific definition of the sustainable density (i.e. the maximum density that will not cause exceedance of the maximum contaminant level) could be documented, and form the basis for a plan for compliance with water quality objectives.

If the amount of nitrate laden wastewater being discharged to the subsurface can be determined and the amount of rainfall and other recharge that mixes with this wastewater can be estimated, the resultant concentration of nitrate in this mixed water can be estimated. This method is very simple in concept, but somewhat more difficult to apply in practice.

First, the amount of nitrate discharged to the subsurface must be calculated. Fairly definitive knowledge is available regarding the amount of nitrogen that is discharged from septic systems. However, the literature estimates that have been used for this estimate vary by a factor of 2 to 3. In addition, the amount of denitrification that occurs below grade is subject to debate. In the case of the Chico Urban Area, site specific studies have been performed to pin these numbers down further. These studies show that a denitrification rate of 30% is a good estimate (Technical Memorandum, Hydrologic and soils Investigations for the Chico Urban Area, Dames and Moore, page 25, 1996), and that the average per capita production of nitrate is approximately 15 grams per day per capita (Kaplan, O. Benjamin,, Pages 148-149, 1988, State Water Resources Control Board, Identification and Evaluation of Methods for Determining Sources of Nitrate Contamination in Ground Water, page 18, 1994).

Next the amount of dilution water that is available must be estimated. For this study the methodology used was to take a look at the rise in the water level in 19 wells over several seasons. The value that was arrived at using this method was approximately 18 inches per year (Dames and Moore, 1996, pages 14-17) or approximately 2.5 times the amount used in the original calculation upon which the prohibition order relied.

The Hantzsche equation is as follows:

$$Nr = \frac{I \times Nw \times (1-d) + R \times Nb}{(I + R)}$$

Where:	Nr	=	Concentration of nitrate in the shallow groundwater (mg/L)
	I	=	The amount of wastewater entering the subsurface, averaged over the gross developed property acreage (inches/year)
	Nw	=	The concentration of nitrogen in the wastewater (mg/l)
	d	=	The percentage nitrogen loss to the atmosphere due to denitrification (%)
	R	=	The average recharge per year (inches/year)
	Nb	=	The background nitrate content of the recharge (mg/L)

NOTE

Concentrations of nitrate in groundwater can be expressed as the weight of nitrate compound (NO_3 molecules, which consist of one atom of nitrogen and 3 atoms of oxygen, and atomic weight 62 units) or as the amount of nitrogen atom (the one atom of nitrogen, N, in a nitrate molecule contributes 14 units to weight of the molecule). Thus, for a nitrate molecule, the ratio of weight of the molecule (NO_3), to the atom (N) is 62/14, or approximately 4.5. Therefore, a concentration of 1 mg/l of nitrate expressed as the weight of just the Nitrogen (N) in the nitrate compound is equivalent to 4.5 mg/l of nitrate expressed as the total weight of nitrate (NO_3^{2-}).

A useful analogy may be to consider a 20 pound bag of 16-16-16 fertilizer (the first "16" in this designation refers to the percentage of nitrogen of the total weight of the bag). Such a bag contains 20 pounds of a combination of materials, of which approximately 3 pounds is nitrogen (16% times 20 pounds equals approximately three pounds). Therefore, regarding the amount of nitrogen in this bag it is

equivalent to indicate that you have 20 pounds of 16-16-16 fertilizer or 3 pounds of nitrogen. Similarly, 4.5 pounds of nitrate molecules contains 1 pound of nitrogen.

For consistency, all references in this document are to nitrate concentrations expressed as the amount of nitrate compound (NO_3). To convert these concentrations as concentrations of atomic nitrogen, they can simply be divided by 4.5.

Technical Team

A team of scientists and engineers with expertise in this field was assembled in order to consult and provide guidance for the Technical Program. The County was fortunate to receive the professional services and consultations of the following key members of the "technical team".

Dennis Rolston, PhD	Dr. Rolston is a professor in soil science at the University of California at Davis, with extensive experience and publications in groundwater nitrate contamination. He sat on the State Water Resources Control Board Review Committee referenced above, and is recognized as an expert in the field.
Graham Fogg, PhD.	Dr. Fogg is a professor of hydrogeology at U. C. Davis, and is well-published on a wide range of hydrogeological subjects. Together with Dr. Rolston, he provided an ongoing "peer review", or double-check, on the efforts of the County's hydro-geochemical consultant, Dames & Moore.
Jeffrey Bold, PhD.	Dr. Bold is a senior soil chemist at Dames & Moore, and has consulted extensively on groundwater contamination issues including the Koppers plant in Oroville and nitrate contamination in Davis. Dr. Bold was supported by hydrologists and other technicians at Dames & Moore.
Ronald Dykstra, P.E.	Mr. Dykstra is a Senior Water Quality Control Engineer for the Central Valley Regional Water Quality Control Board, with very extensive personal involvement in the Chico nitrate problem on behalf of the Regional Board.
Stewart Oakley, PhD.	Dr. Oakley is a sanitary engineer, wastewater consultant, and professor at California State University, Chico. He has presented many papers regarding wastewater issues and conducted the recirculating trickling filters study described later in this chapter. Dr. Oakley founded and heads the Environmental Laboratory within the College of Engineering and Computer Science at CSUC.

Scope of Technical Studies

The following program of work was conducted by Dames & Moore at the direction of the County and accompanied by the periodic review and discussion of the technical team.

Nitrate Source Evaluation

- Current and historic research on potential sources of nitrogen
- Collection and analysis of surface water, groundwater, animal waste, septic waste inorganic fertilizers, nitrate and delta-15 nitrogen isotope ($\delta^{15}N$) analysis
- Geochemical modeling of nitrogen

Shallow Aquifer Characterization

- Analysis of all samples for field parameters (temperature, conductivity, and pH), nitrate and $\delta^{15}N$
- Measurement of all water levels in all wells

Vadose Zone Characterization

- Modeling rainwater recharge in Chico Urban Area
- Collection and analysis of soil pore liquid samples from lysimeters for nitrate, ammonium and $\delta^{15}N$
- Five soil borings to groundwater adjacent to low-density septic systems, high-density septic systems, and an active almond orchard
- Collection and analysis of soil samples for general chemical parameters, nitrate, ammonium, and total nitrogen

Nitrate Characterization

Dames & Moore conducted the resampling of over 100 existing wells and the installation and testing of 19 new sampling wells. The results were published in their Final Report, Groundwater Nitrate Study, in January of 1994. Based upon this refined and updated nitrate characterization data, the County pursued a study of potential sources of nitrate and the effects of soil chemistry on septic tank effluent. The results, set forth in the Technical Memorandum (Dames and Moore, 1996), confirm that septic tanks are a primary source of groundwater nitrate. However, the studies further indicate that soils in the Chico Urban Area have a higher capacity to assimilate nitrogen than was recognized by the Regional Board. Three rounds of sampling were conducted in December 1993, July 1995, and October 1995. The data generated by these multiple samplings and the evaluation of further data needs prior to each collection, greatly increased the technical team's understanding of the extent and nature of the nitrate contamination.

Groundwater elevation was measured at each sampling. The general direction of groundwater flow, shown in Figure 3-2, (Modified from Dames and Moore, 1996) is a basic factor in reaching eventual conclusions as to nitrate sources. In general, water level elevations are highest in the north and east portions of the Chico Urban Area, and lowest in the west and south. Depth to the water table from the ground surface ranged from approximately 11 to 45 feet below ground surface depending upon location and season.

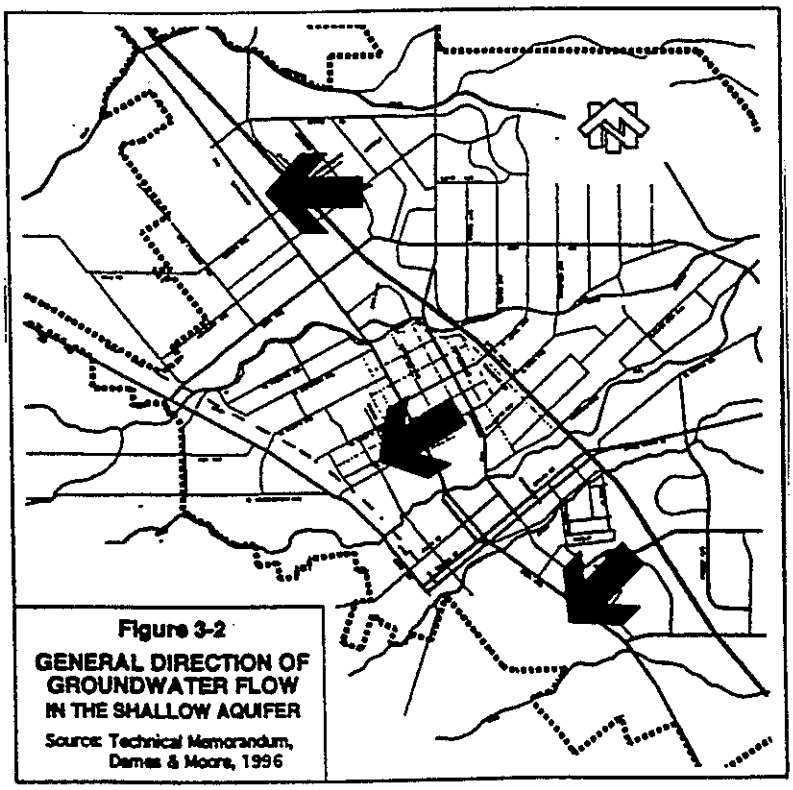


Figure 3-2
GENERAL DIRECTION OF GROUNDWATER FLOW IN THE SHALLOW AQUIFER
Source: Technical Memorandum, Dames & Moore, 1996

Nitrate values at each of these samplings showed a range from background levels of less than 10 mg/L to various readings above 100 mg/L. Figure 3-3 shows nitrate concentrations in the shallow aquifer. One undeniable characteristic is that nitrate concentrations are highest directly down-gradient (westerly)

from the unsewered portions of the Chico Urban Area. Further, concentration is highest down gradient from the greatest number of onsite systems, along the "Lassen Avenue Corridor".

Nitrate concentrations in the intermediate aquifer are shown in Figure 3-4. As with the shallow aquifer, nitrate concentrations are greatest down gradient from the areas of septic tank usage. It is worth noting that these nitrate values represent the conditions at a specific point in time.

The recent efforts in nitrate characterization involved a greater emphasis on wells of known construction, multiple samplings and very careful quality assurance control. Nevertheless, the results of the recent work are generally consistent with past data—continued elevated nitrate levels (above the maximum contaminant level) westerly of the unsewered portion of the Chico Urban Area.

δ15N Isotopic Analysis

One of the more sophisticated methods used to determine the source of nitrates in groundwater is nitrogen isotope comparison. This method is described below.

Nitrogen exists in two primary forms in nature, one form has 7 protons and 7 neutrons, the other 7 protons and 8 neutrons. Therefore the former form has an atomic weight of 14 (7 + 7), and the latter has an atomic weight of 15. In the atmosphere, there is a constant ratio of the two forms. However, when nitrogen from the atmosphere is taken up by plants, or fertilizer is manufactured, or any other assimilation of nitrogen takes place using atmospheric nitrogen, one form tends to be used in the process differentially. In other words, more of one form will be used than is proportional to its natural abundance in the atmosphere, and the difference is measurable.

By studying the different processes that use nitrogen, it is possible to measure these differences, or "signatures", of the different origins of nitrogen compounds. In other words, one process, such as the manufacture of fertilizer, will result in a ratio of the two forms of nitrogen that identifies the source as fertilizer, whereas another process, such as dairy production, will produce a different signature which identifies it as livestock waste.

During the course of the studies that were performed in the Chico Urban Area to determine nitrate sources, both literature values and local site specific values were studied. The information obtained was consistent with the primary source of nitrate in the Chico Urban Area being from septic tanks (Dames and Moore, 1996, page 13).

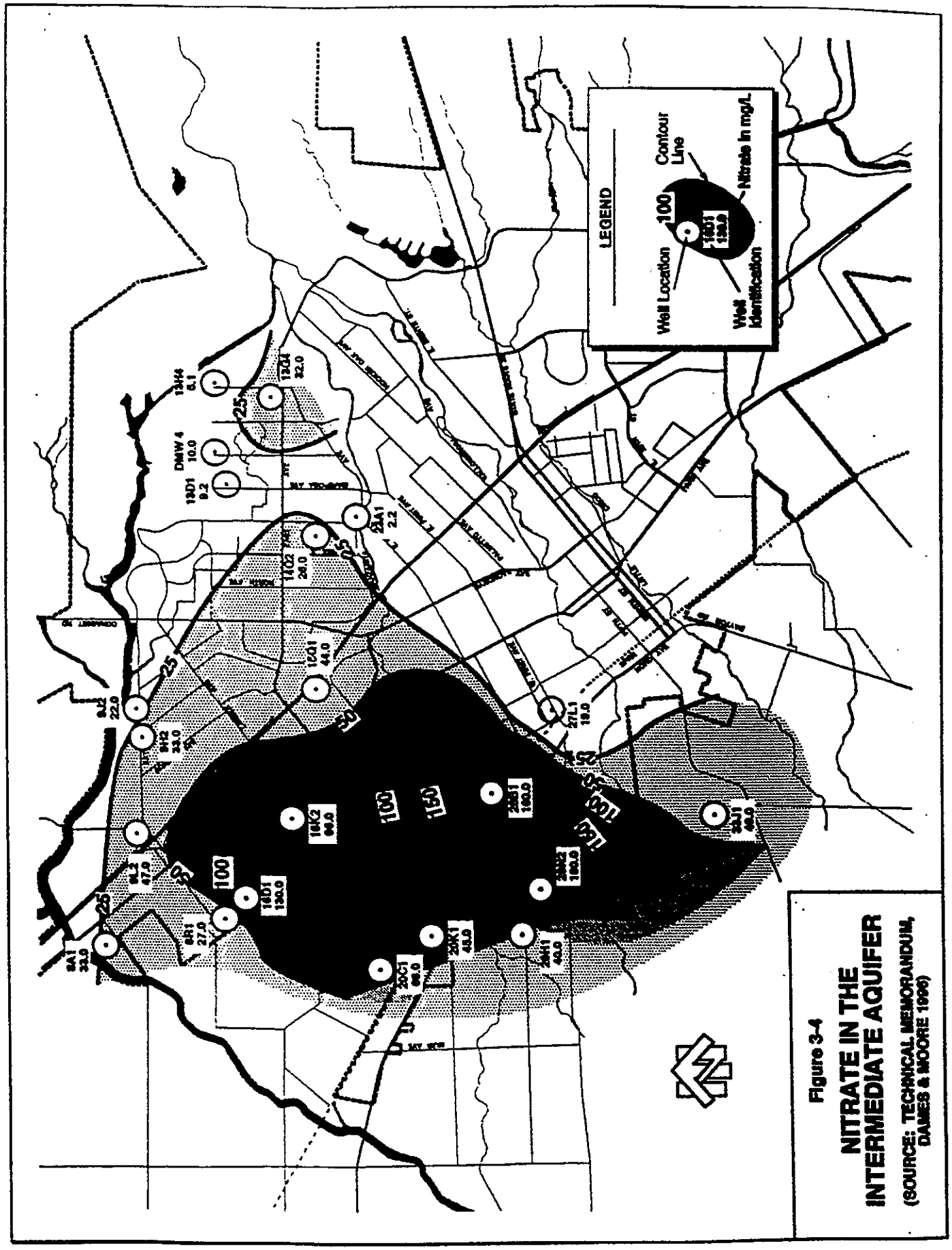


Figure 3-4
NITRATE IN THE INTERMEDIATE AQUIFER
(SOURCE: TECHNICAL MEMORANDUM, DAMES & MOORE 1996)

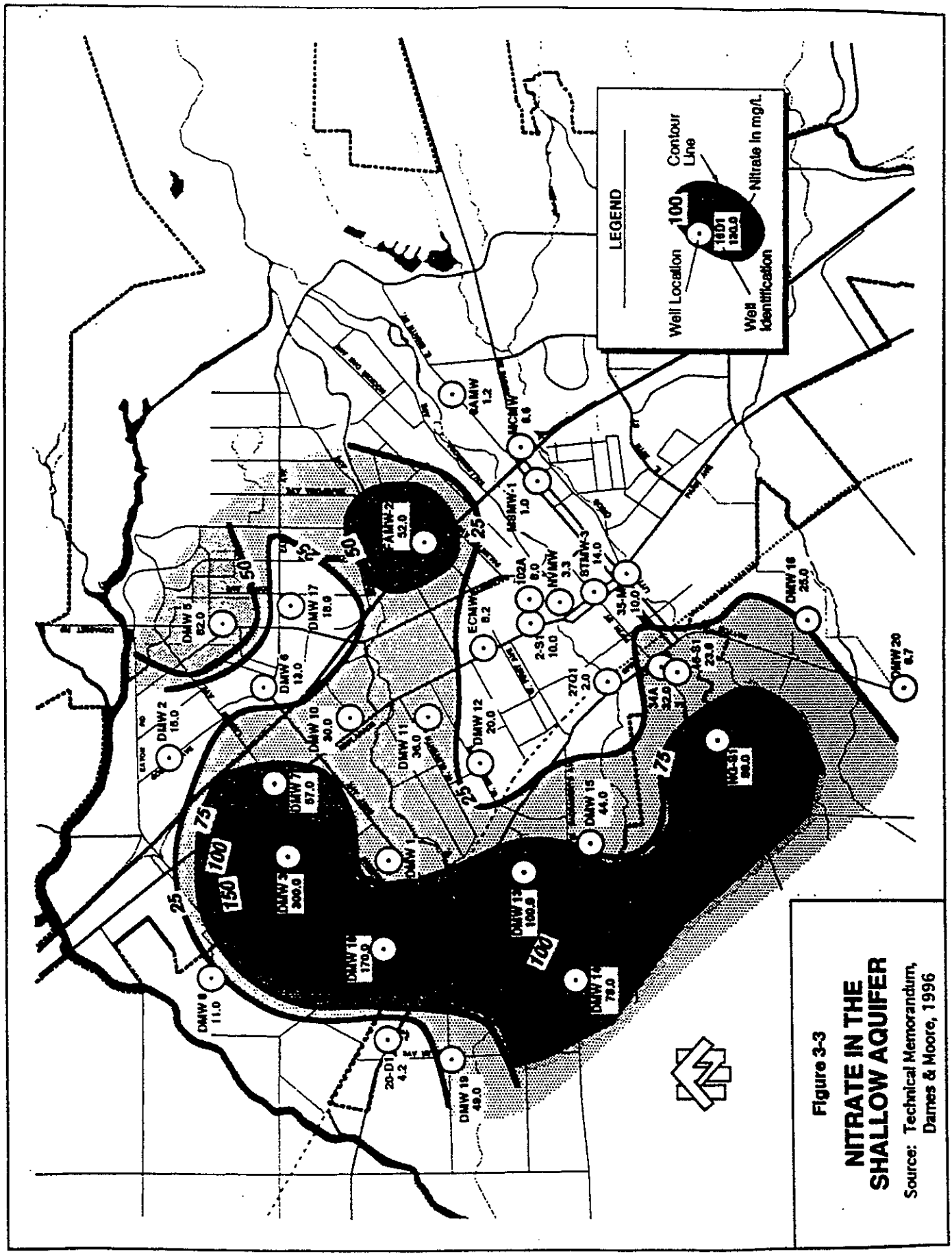


Figure 3-3
NITRATE IN THE SHALLOW AQUIFER
Source: Technical Memorandum, Dames & Moore, 1996

Evaluation of Potential Nitrate Sources

The following were identified as potential sources of nitrate and were evaluated for relative contribution to groundwater:

- Soil Nitrogen
- Background nitrogen in groundwater
- Background contribution from surface water
- Historic animal agricultural sources
- Orchard and crop fertilization
- Industrial nitrogen contribution
- Discharge from septic systems

Soil Nitrogen. Soil nitrogen was not found to be a major source of nitrate. For further discussion see Section 3.4.

Background nitrogen in groundwater. Although somewhat inconsistent, background nitrogen in groundwater upgradient from the Chico Urban Area is shown to average 2.15 mg/l, and is an insignificant source.

Background contribution from surface water. The results of five of six downstream surface water samples suggest that urban runoff to surface water is not a source of nitrogen in the Chico Urban Area. (Dames and Moore, 1996, page 23).

Historic animal agricultural sources. A concerted effort to research potential agricultural sources was conducted, consisting of a review of aerial photographs, interviews with individuals familiar with agricultural operations dating back to the 1920's, and other relevant methods. Although historic animal agricultural land uses with significant nitrogen loading were identified, none were identified that could explain the current nitrate levels. Figure 3-5 represents a summary of the findings of this research.

Regarding area animal operations which were generally terminated by the 1960's, Dr. Bold of Dames & Moore makes the following conclusions regarding historic agricultural land uses (Dames and Moore, 1996, page 8):

- Despite initial high concentrations, the predicted residual nitrogen in soils from poultry manure pile simulations approaches background conditions after 10 years.

- Dairy operations in the Chico Urban Area were so small that manure piles would probably not inhibit plant or crop growth, allowing these areas to recover to background levels in much less than 10 years.

- Cattle grazing does not result in manure piles, and therefore, the residual nitrogen produced by cattle is not a source of nitrogen which could impact groundwater in the Chico Urban Area.

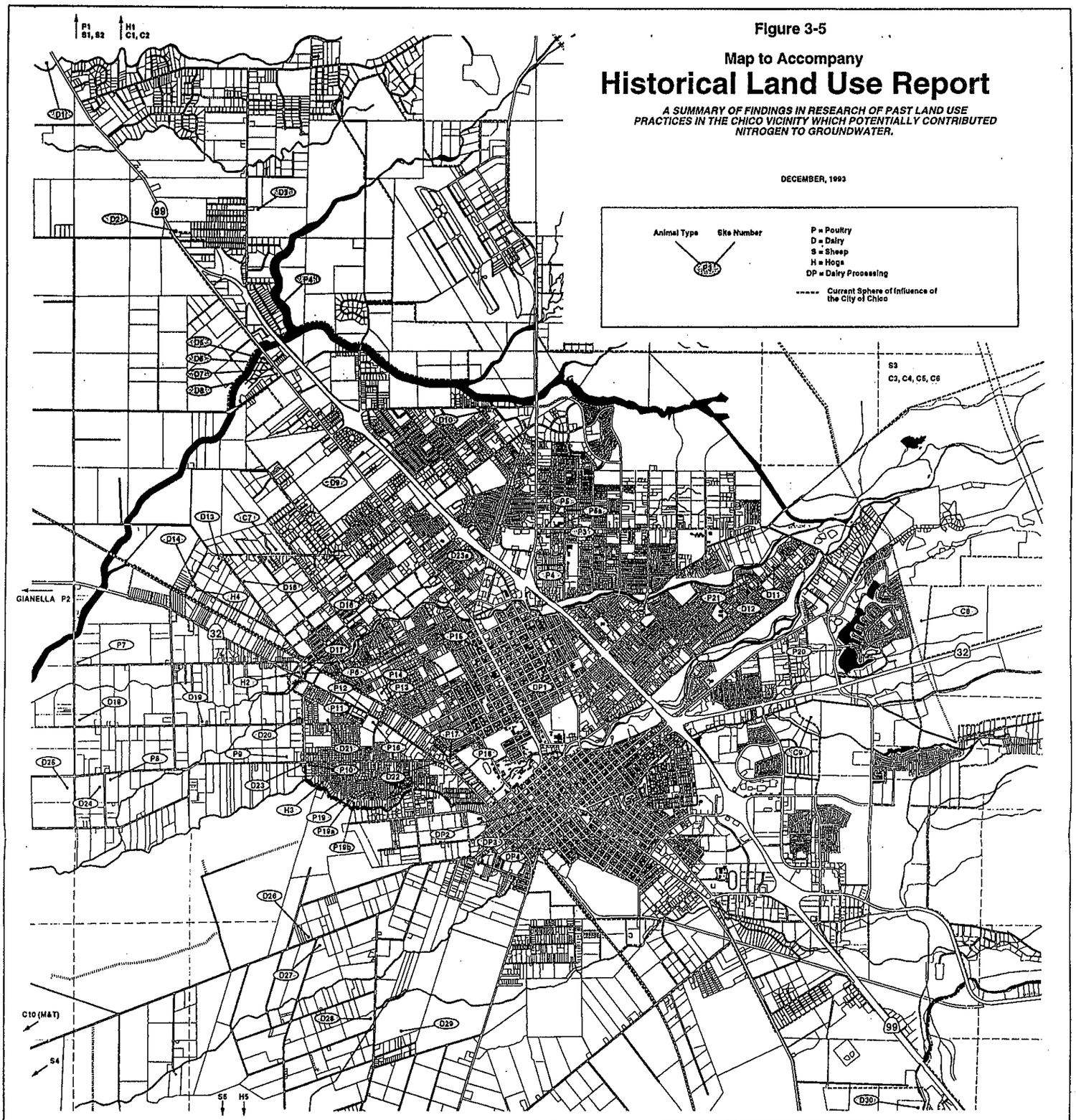


Figure 3-5

Map to Accompany

Historical Land Use Report

A SUMMARY OF FINDINGS IN RESEARCH OF PAST LAND USE PRACTICES IN THE CHICO VICINITY WHICH POTENTIALLY CONTRIBUTED NITROGEN TO GROUNDWATER.

DECEMBER, 1993

DAIRIES AND DAIRY PROCESSING

No.	Name	Location	# of Animals	Operating Years
1	Wade	n. Rock Creek/Hwy. 99	20	1946/7 - 1955
2	Elliott	n. of Our Way/Hwy. 99	20	1930 - 1940
3	Clive Callahan	Garner Lane/Pheasant Run Rd.	20-30	1940's
4	Machado	east of Hwy. 99/s. of Sycamore Ck.	20-25	mid 1940's - late 1950"s
5	Azevedo	Esplanade x-school	15-20	1929 - 1940
5a	leased to Joe Mattos	(same location)	20-25	1940 - 1954
6	Hansen	south of Azevedo	15	early 1930's
7	Troxel	south of Hansen	15	1930 - 1935
8	Enloe	south of Troxel	not given	approx. same
9	Nunes	Esplanade s. of Philadelphia Sq.	30	1935 - 1960
10	Valine	Burnap s. of Eaton Road	30	approx. mid 1950's
11	Vige	Hooker Oak Rd.	6-8	7 - 1935
12	Christianson	Madrone/Hooker Oak Ave.	25	1928 - 1943
13	Amaral/Aguiar/Thomas	Muir Ave.	10-15-20	pre 1922 - late 1930's
14	Stafford	Rodeo Ave.	30-50	1925 - late 1930's (±)
15	Edsen	Nord Ave.	10-15	1940's
16	Soares	Henshaw/Guynn	20	1935 - 1947
17	Derrick	Kennedy/s. of EastW. of Nord	50	1940's
18	Lone Pine Dairy	Meridian Rd. (2nd location)	20-30	1942 - 1948
19	Shaw	Oak Way	20-25	1940 - 1950
20	Swan	Glenwood Ave./n. of Oak Way	15-20	1920's - 1940's
21	McKinnon	Oak Way	15-20	1930 - 1950
22	Nelson	cr. Sacramento Ave./Nord Ave.	10	1941 - mid 1950's
23	Borges (aka Alves)	s.w. cr. Sacramento/Bidwell Ave.	20-25	1948 - 1955
23a	Borges plant	n. Esplanade near White Ave.	n/a	7 - 1960/2
24	Frank Vincent	Dairy Road	20-25	1948 - 1955
25	Model Farm	w. of Meridian/s. of Sacto. Ave.	25-30	1940's - 1950's
26	Mendoza	River Road	40	1950 - 1956
27	Avrit	River Road	100+	1947 - 1993
28	Lone Pine Dairy	Lone Pine Ave. (1st location)	60	1948 - 1965
29	Valine	Crouch Ave. (from Burnap)	30	7 - 1960
30	Camezind	Marybill Ranch Road	40	1964/5 - 1967
30a	Camezind predecessors	Marybill Ranch Road	20	1940 - 1962/4
DP1	Milk Away Dairy	5th Avenue/Mangrove	n/a	1960 - 1984/5
DP2	Quality Dairy	735 W. 5th Street	n/a	1929 - 1973
DP3	Carnation Dairy	W. 7th btwn. Orange & Cherry	n/a	1940 - 1968
DP4	Land O'Gold Dairy	Orange btwn. 6th & 7th	n/a	7 - 1947

SHEEP

No.	Name	Location	# of Animals	Operating Years
1	Roney	north of Keefer Road	acreage ratio	ongoing
2	Carter	north of Keefer Road	acreage ratio	ongoing
3	Brown	north and east of Bidwell Pk.	acreage ratio	1920 - 1950
4	M & T	southwest of urban area	acreage ratio	ceased mid 1950's
5	Llano Seco	south of urban area	acreage ratio	ongoing

POULTRY

No.	Name	Location	# of Animals	Operating Years
1	(unknown)	n. of Meridian	200+	1912 - 1915
2	Gianella	w. of urban area	not stated	pre 1960's
3	Schlaf	present site of NVP mall	250 birds	1958 - 1960
4	Lilligren	present site of NVP mall	500-1,000	1952 - 1958
5	Corliss	East Ave./Cohasset	"considerable"	1950' s
5a	Dupuy	East Ave./North Ave.	"good # of eggs"	1950's
6	Grayball	Kennedy, s. of East Ave.	200-500	1940 - 1946
7	Mitchell	Kennedy Ave.	1,000	1943 - 1944
8	Canfield	Sacramento Ave./Grape Way	10,000 /year	1960 - 1974
9	DeBock	Sacramento Ave. w. of Glenwood	104,000/year	1941 - 1956
10	Adams	Sacramento Ave./ Glenwood Ave.	50/year	1941 - 1960
11	Reynolds	Oak Way near Hwy. 32	200+	1940's
12	Bettencourt	Hwy. 32 opp. Oak Way	200+ / eggs	1950's
13	Mitchell	W. 8th Ave. near SPRR	48,000 total	1943 - 1946
13a	Mitchell predecessor	(same location)	turkeys (unknown #)	1940 - 1943
14	Murphy plant	W. 8th Ave. near SPRR	kill plant	1946 - 1955
15	Mansons plant	W. 8th Ave. near Esplanade	kill plant	1948 - 1955
16	Spellman	Oak Way near Hwy. 32	10,000/year	1940 - 1958
17	(name unknown)	Hwy. 32 near W. Sacramento Ave.	"100's of pigeons"	1950's
18	Mendonca	Hwy. 32 near CSUC	fryers	1950's
19	Heimann	Bidwell Ave.	200	1940 - 1956
19a	(unknown)	east of Heimann	200	1940 - 1955
19b	Jones	near Heimann	100	1941 - 1960
20	Rath	Bruce Rd. near Calif. Park	20,000/year	1954 - 1969
21	Wright	n. of Christiansens (D12)	50 turkeys	1930 - 1940

CATTLE

No.	Name	Location	# of Animals	Operating Years
1	Garner	north of Keefer Road	acreage ratio	multi-generation
2	Roney	north of Keefer Road	acreage ratio	multi-generation
3	Brown	north of Bidwell Park	acreage ratio	1950 - present
4	Bechtel	east of Chico Muni. Airport	acreage ratio	1968 -present
5	Owens	east of Bidwell Park	acreage ratio	7 - present
6	Jesseson	east of urban area	acreage ratio	7 - present
7	Bell	north of Bell Road	50-75	7 - mid 1950's
8	Simmons	east of urban area near Hwy. 32	acreage ratio	7 - present
9	Chico Meat	Humboldt Rd. near El Monte	0 - 1,000/mo.	1910 - 1960
10	M & T	southwest of Chico	acreage ratio	7 - mid 1950's

HOGS

No.	Name	Location	# of Animals	Operating Years
1	Anderson	north of Keefer Road	varied, see p. 14	1930's
2	Allen	Kennedy Ave. s. of East Ave.	6 - 8	1940's
3	Jones	Bidwell Avenue	8 - 10	1941 - 1960
4	Bukesa	Rodeo Avenue	unknown	1940 - 1948/9
5	Llano Seco	southwest of urban area	10,000/yr.	ongoing

Orchard and crop fertilization. The $\delta^{15}N$ values of fertilizer were found to range from 2.4 to 4.33, consistent with other studies of $\delta^{15}N$. Three separate rounds of sampling and analysis of water from the shallow aquifer showed values from 7 to 10, much higher than fertilizer (Dames and Moore, 1996, page 10).

Industrial nitrogen contribution. No current or past industrial land uses which might generate significant amounts of nitrogen were identified (Dames and Moore, 1996, page 1).

Discharge from septic systems. Application of the refined factors of the Hantzsche Equation shows that existing residential densities are discharging levels of nitrate that exceed the soil's ability to assimilate. Areas of elevated nitrate are located generally down-gradient from concentrations of high-density residential development on septic systems. $\delta^{15}N$ values were found to be consistent with septic tank effluent sources, and not consistent with other sources (Dames and Moore, 1996, pages 25 & 26).

3.4 Conclusions as to Nitrate Loading from Onsite Systems

The goal of investigations performed by Dames and Moore, qualified professionals experienced in hydro-geochemical evaluations, was to evaluate all available information on the sources of groundwater nitrate, including information from site investigations. The site work performed by Dames and Moore included drilling, developing, and sampling 19 wells, sampling existing wells, installing and sampling lysimeters at existing leach fields, and performing soil borings accompanied by soil sampling near several leach fields.

Dames and Moore's conclusions regarding the major potential sources of nitrate in shallow groundwater are reiterated, as follows (all page references are to the Technical Memorandum of Dames and Moore, 1996, unless otherwise noted):

- *Soil Nitrogen* - The technical review committee (Rolston, et.al., 1989) concluded that the contribution of soil nitrogen to groundwater is small. The conclusions are supported by several factors. Nitrogen is derived from surface biological activity, not from weathering of soil minerals; therefore nitrate is likely to be present in surface soils, rather than in groundwater. Organic nitrogen produced by plants and animals is relatively immobile, and retained near the soil surface. In natural ecosystems, nitrogen is cycled between the atmosphere and soils, and little is lost below the root zone of plants and trees to groundwater (page 5).

- *Surface Water and Surface Water Runoff* - The results of five of six downstream surface water samples suggest that urban runoff to surface water is not a source of nitrogen in the Chico Urban Area (page 6).

- *Groundwater* - Seven groundwater samples average 2.15 mg/l as nitrogen, which is most likely indicative of background conditions in the intermediate aquifer (page 7). These results, reported in units as the concentration of nitrogen (2.15 mg/l as N), is significantly below the maximum contaminant level of 10 mg/l as nitrogen. When converted to units as concentration of nitrate, these findings equate to 9.68 mg/l as nitrate, which is below the maximum contaminant level of 45 mg/l as nitrate.

- *Past Agricultural Practices* - It is highly unlikely that past agricultural practices contribute significantly to the current shallow aquifer nitrate contamination (page 9).

- *Industrial Sources* - No industrial nitrogen sources have been identified in the Chico Urban area (page 10). No current or historic industrial operation which could be a significant nitrogen source were identified within the Chico Urban Area. No reports of uncontrolled releases of nitrates could be identified within the Chico Urban Area (page 24).

- *Septic Tanks* - Given the location of the high-density residential housing on septic systems and the area of impacted groundwater, septic systems in the Chico Urban Area are definitely the only recent source of nitrogen sufficient to cause the observed nitrate concentration in groundwater (page 11). The large number of currently operating septic systems within the Chico Urban Area indicate that domestic septic effluent is a major source of nitrogen which is still being generated in the north, central, and western portions of the Chico Urban Area (page 24).

  Single and multiple-family dwellings using septic systems for managing wastes are an important source of nitrogen which is impacting groundwater (page 25).

3.5 REFINEMENT OF THE HANTZSCHE EQUATION

As discussed previously, the Hantzsche Equation is useful in predicting groundwater nitrate from septic systems and was applied by the Regional Board in imposing the minimum of one dwelling unit per acre. Based upon the information available at the time, and reasonable estimates made by Regional Board staff, the values for recharge, denitrification and other factors were set, and a substantial safety factor applied.

One of the objectives of Dames and Moore's Technical Memorandum (Dames and Moore, 1996) was to develop better data to refine some of the parameters of the Hantzsche Equation, especially those of denitrification and recharge. It is difficult to obtain site specific information on the remaining parameters of the equation (excepting dwelling occupancy) without extensive and very expensive sampling. Therefore, although some site specific data was available and was consistent with the parameters used in the equation (as noted in the references below), heavier reliance was placed upon literature values for the remaining equation parameters.

Dames and Moore's studies indicated reasonable values for recharge and denitrification of 18 inches per year and 30% respectively (pages 17 and 25). Census data for the Chico Urban Area indicates the average occupancy per dwelling is 2.43 persons. Therefore, the Hantzsche equation (presented on page 3-5 and also in Appendix G) was used with the following parameters:

- The per capita flow to a septic tank is 80 gallons per day (US EPA Publication No. 625/1-80-012, Design Manual for On-Site Wastewater Treatment and Disposal Systems, page 51, 1980; Kaplan, O. Benjamin, Septic Systems Handbook, pages 147-148, 1988, Lewis Publishers).

- There are 2.43 residents per household on average in the Chico Urban Area (US Department of Commerce, Economic & Statistics Administration, Bureau of the Census, Publication No.1990/CPH--114, 1990 Census; personal communication with Butte County Planning Department, October 20, 1997).

- The average rate of discharge of nitrogen per person per day is 15 grams as N (Kaplan, O. Benjamin, Septic Systems Handbook, pages 147-149, 1988, Lewis Publishers; State Water Resources Control Board, Identification & Evaluation of Methods for Determining Sources of Nitrate Contamination in Groundwater, page 18, 1994).

- There is a 20% removal of nitrogen in the septic tank before discharge to the leachfield (Kaplan, O. Benjamin, Septic Systems Handbook, page 148, 1988, Lewis Publishers).

- The denitrification rate in the leachfield is 30% (Technical Memorandum, Hydrologic and Soils Investigations for the Chico Urban Area, page 25, Dames & Moore, April 1996).

- The recharge rate is 18 inches per year (Technical Memorandum, Hydrologic and Soils Investigations for the Chico Urban Area, pages 14-17, Dames & Moore, April 1996).

- The background nitrate concentration is 0.5 mg/l as NO_3 (Technical Memorandum, Hydrologic and Soils Investigations for the Chico Urban Area, page 6, Dames & Moore, April 1996).

- There are 4 dwelling units per acre (value indicated to exceed the nitrate contaminant level, Technical Memorandum, Hydrologic and Soils Investigations for the Chico Urban Area, page 26, Dames and Moore, April 1996.

Using the above (refer also to page 3-5):

$$I = \frac{80 \text{ gal/person - day} \times 2.43 \text{ persons/du} \times 4 \text{ du/acre} \times 365 \text{ days/year}}{43{,}560 \text{ cu ft/acre ft} \times 7.48 \text{ gal/cu ft} \times (1 \text{ ft}/12 \text{ inches})} = 10.45 \text{ inches/year}$$

$$Nw = \frac{15 \text{ g/day} \times 1000 \text{ mg/kg} \times 0.8}{80 \text{ gal/day} \times 3.78 \text{ l/gal}} \quad \text{(assume 20\% reduction in tank)} = 40 \text{ mg/l as N (nitrogen)}$$

Therefore;

$$Nr = \frac{[(10.45 \text{ in/year}) \times (40 \text{ mg/l as N}) \times (4.5\text{g } NO_3/1\text{g N}) \times (1-0.3)] + [18 \text{ in/year} \times 0.5 \text{ mg/l as } NO_3]}{(10.45 \text{ in/year} + 18 \text{ in/year})}$$

$$Nr = 46.6 \text{ mg/l as } NO_3 \text{ (nitrate)}$$

The solution of the equation therefore shows that dwelling densities of four units per acre will slightly exceed the nitrate maximum contaminant level. This is corroborated by Dames and Moore's Technical Memorandum, which states "The impact of single-family dwelling units (DU) at low to moderate densities

(less than 3 to 4 dwelling units per acre) may be attenuated by the relatively high recharge conditions within the Chico Urban Area, and the denitrification which occurs 5 to 15 feet below ground surface underneath septic leach lines (page 26)".

chapter four

NITRATE ELIMINATION, REDUCTION, AND ONSITE COMPLIANCE

The key to a successful resolution of the groundwater nitrate issue lies in identifying a solution or combination of solutions which protect water quality at the lowest possible cost. This chapter, based upon the improved technical information, delineates those areas that require sewering (nitrate elimination), nitrate reduction, or no action beyond improved management of onsite systems.

KEY POINTS

- The results of the technical program are the scientific basis for the designation of areas that must sewer to eliminate their nitrate discharge to groundwater, as well as those areas where existing onsite systems may continue to operate.
- The proposed actions are intended to reduce the overall nitrate loading in the Chico Urban Area to a level which will not cause or perpetuate an excessive level of groundwater nitrate.
- The areas proposed for sewering have an average overall density of approximately four dwelling units per acre or more, a density which has been found to exceed the capacity of the soil and receiving waters to assimilate nitrogen. A much smaller set of properties exhibit other characteristics such as high groundwater or other problems that tip the scales to the alternative of sewering.
- A potential nitrate-reducing system retrofitted to an existing septic system appeared promising and was closely examined, but is not recommended for widespread use due to low reliability, high maintenance requirements and lack of significant cost savings (Oakley, 1996). Use of these systems may be further explored.

4.1 TECHNICAL BASIS FOR IMPLEMENTATION PLAN

As fully discussed in Chapter 2, in concluding that the continued discharge from existing onsite systems was causing exceedance of the State water quality standard, the Regional Board relied upon the application of the Hantzsche Equation to predict the level of nitrate in groundwater. The primary goal of Butte County's technical program was to utilize greatly supplemented data and more accurately establish the appropriate values for each of the factors in the equation, as set forth in Chapter 3.

The significance of the improved technical understanding is that it allows a more highly refined plan for compliance that is not as reliant upon expensive sewer improvements that may be unnecessarily broad in scope.

Objective: Sustainable Nitrate Loading Within the Chico Urban Area

The objective is to structure an effective plan of providing sewers and taking other less costly steps that will, in combination, reduce the overall nitrate loading in the Chico Urban Area to a sustainable level. Such a plan would reduce nitrate loading to a degree that lowers groundwater nitrate levels to below the maximum contaminant level.

Based upon the greater knowledge of the natural processes as previously described, the essential feature of the compliance program is to eliminate those discharges that cumulatively overwhelm the capacity of the soil and receiving waters to assimilate nitrogen and cause exceedance of the State standard of 45 mg/l (as nitrate). In certain cases where this is not feasible or where groundwater protection may be adequately protected by other means, nitrate reduction technologies may be considered.

Providing a central sewage collection, treatment and disposal system is proposed for those areas that, on average, approach or exceed the indicated assimilative capacity. Converted to average density of residential dwelling units per acre, the County proposes to sewer those neighborhoods or subareas that are approximately four dwelling units per gross acre (4 du/ac, gross or greater). These are the areas upon which the preliminary sewer feasibility analysis was based.

Additionally, other subareas may be required to connect to the sewer system based upon a more detailed review of the following criteria:

- Prevalence of system failures and/or operational problems
- Proximity to proposed or existing sewer service
- Equitable distribution of costs within a subarea or neighborhood
- Inadequate separation from groundwater
- Poor soils
- Average age of onsite systems
- Cost advantages vs. other groundwater protection alternatives

Cost-Effective, Targeted Solutions

The pattern of higher density dwellings shown in Figure 4-1 clearly shows three large areas previously identified as the Lassen Avenue Corridor, the Avenues (or Chico Vecino), and the Chapman-Mulberry district. Many other smaller subareas are scattered about the remainder of the Chico Urban Area.

Clearly, these higher density areas more readily lend themselves to cost-effective sewering due to a greater number of properties to share costs. Conversely, the lower the average density translates to generally higher average cost for benefit to water quality.

Standard engineering practice is to apply a safety factor in such circumstances (as was the case with the prohibition order) reducing the allowable density further, perhaps to two or three units per acre. The application of a 50% safety margin, reducing the density limit to two units per acre, would add approximately 3,000 connections. These additional connections, in neighborhoods of 2-4 dwelling units per acre, would typically involve subdivisions of single family homes on parcels of about one quarter acre (±10,000 square feet plus portion of adjacent street) to half-acre lots. Although not specifically estimated, the lesser density and correspondingly greater lengths of sewer mains for each dwelling unit served would likely add significantly to the average cost per sewer connection.

The State Water Code allows the continued discharge from onsite systems that are "adequately designed, located, sized, spaced, constructed, and maintained" (§13282 as set forth at page 2-18). The Water Code further proscribes the specification of the manner of compliance at section 13360 and specifically states that "the person so ordered shall be permitted to comply with the order in any lawful manner...". It is the County's intent to comply with water quality standards through sewering where nitrate elimination is necessary, and through other means where other alternatives are more cost effective, yet adequate for compliance.

4.2 Elimination: Sewering Higher Densities & Designated Areas

Nitrate Loading

In order to translate the results of the technical program to specific Chico Urban Area neighborhoods and subareas, average residential densities in the entire unsewered urban area were determined. As research and compilation was accomplished prior to the completion of the technical program, the density categories were selected to be useful regardless of the eventual findings.

Figure 4-1 shows dwelling unit densities divided into seven categories of density, as follows:

- Vacant properties
- Densities at or below 1 dwelling unit per acre (du/ac)
- Average densities greater than 1 du/ac to 2.5 du/ac
- Average densities greater than 2.5 du/ac to 4 du/ac
- Average densities greater than 4 du/ac to 6 du/ac
- Average densities greater than 6 du/ac to 8 du/ac
- Average densities in excess of 8 du/ac

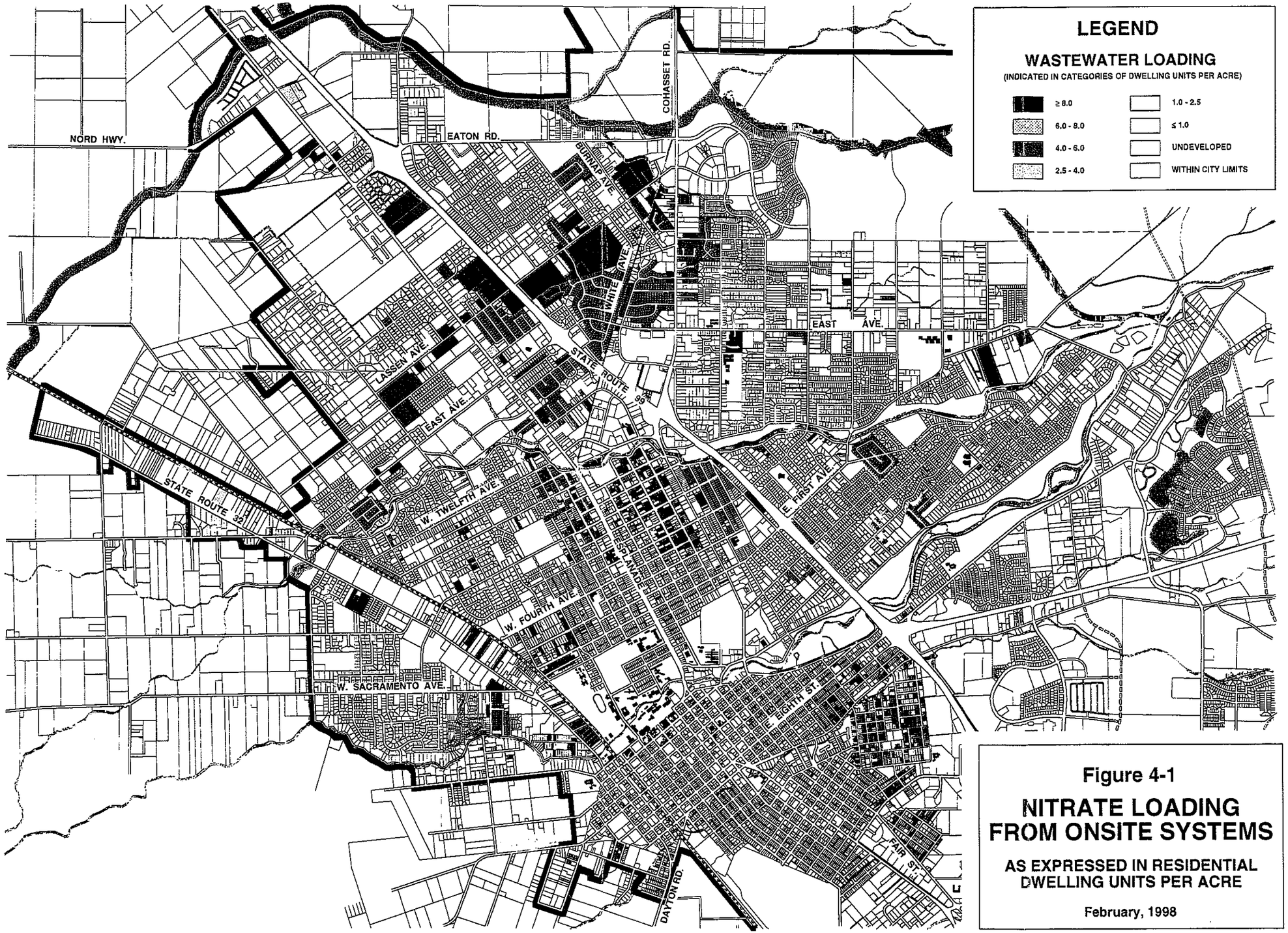


Figure 4-1

NITRATE LOADING FROM ONSITE SYSTEMS

AS EXPRESSED IN RESIDENTIAL DWELLING UNITS PER ACRE

February, 1998

Figure 4-2 illustrates all densities above the level calculated by the refined Hantzsche Equation, approximately four units per acre, to cause exceedance of the maximum contaminant level.

There is an assumption inherent in the determination of a density below which exceedance of the maximum contaminant level will not occur: that onsite sewage disposal systems are properly located, designed and maintained. Several of the following criteria are applied to the determination.

Prevalence of System Failures and/or Operational Problems

In order to ascertain what trends or characteristics might be revealed, a review was conducted by Heritage Partners of all repair permits for onsite systems issued from 1992 through June, 1995. In this 4 ½ year period, nearly 400 permits for replacements and repairs were issued by the Butte County Environmental Health Department. The department had categorized these permits at the time of issuance based upon the nature of the work, such as "failure," leach line replacement, and similar descriptions.

The permit files were individually examined and the key data recorded. Table 4-1 charts the repair permit data. The Environmental Health Department's Chico-area field inspectors indicated certain areas are problematic. Plotting the location of the permits as shown on Figure 4-4 confirms a subtle, yet identifiable concentration of replacements and repairs trending toward the east along the interface of the alluvial valley soils and the shallower, less forgiving soils east of State Highway 99. Yet no major localized problem areas appear during the period examined.

Poor Soils and Separation from Groundwater

The perceptions of the Environmental Health staff are partly explained by a review of soil types and areas of known high groundwater. As shown in Figure 4-5, the northeast area is characterized by soils which are poorly suited to onsite systems (Butte County Health Department). Additionally, an area north of Bidwell Park, generally east of Crister Avenue and running parallel to Hooker Oak Avenue toward the east, has experienced severe problems and numerous failures. The soils in this area have caused perched groundwater conditions and surfacing of septic system effluent. Surface water samples showed high levels of fecal coliform, an indicator of extensive failures.

This neighborhood petitioned for sewer service in July, 1996 and the City of Chico quickly responded in preparing engineering designs. As of November 1997, more than half of the neighborhood's households have connected to sewer. Though the entire neighborhood is now sewerable, just under half of the households are still using septic systems. For individual property owners, the City also extended ten-year financing of sewer connection fees.

Average Age of Existing Onsite Systems

As stated, a review of the records for repair permits issued for Chico-area septic systems generally shows a geographic trend involving soils. A further correlation of repair problems to the age of the system was found to be significant. Of the 397 repair permits issued from 1991 to mid-1995, covering systems originally installed from before 1960 to date, approximately 75% of repairs were to a system at least 25 years old.

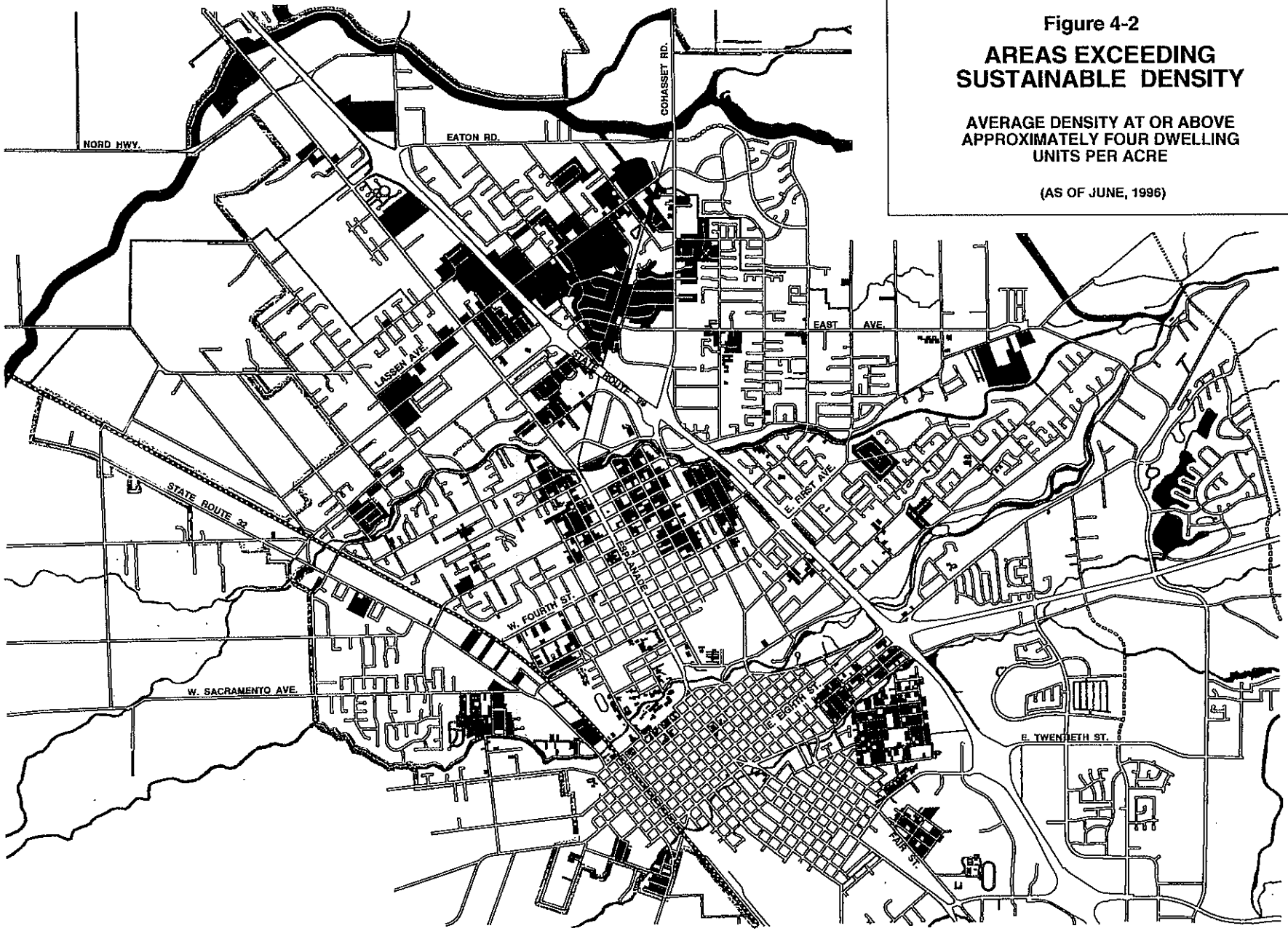


Figure 4-2

AREAS EXCEEDING SUSTAINABLE DENSITY

AVERAGE DENSITY AT OR ABOVE APPROXIMATELY FOUR DWELLING UNITS PER ACRE

(AS OF JUNE, 1996)

Table 4-1

SEPTIC SYSTEM REPAIRS IN THE CHICO URBAN AREA 1991-1995

A COMPILATION OF PERMIT DATA FOR REPAIRS TO EXISTING SEPTIC SYSTEMS
FROM RECORDS OF BUTTE COUNTY ENVIRONMENTAL HEALTH DEPARTMENT OF JANUARY 1, 1991 THROUGH JUNE 15, 1995

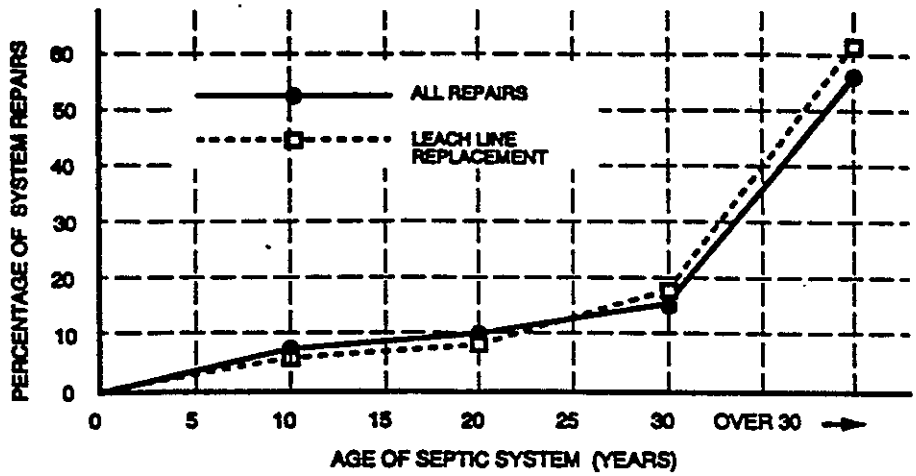
REPAIR TYPE	DECADE OF ORIGINAL SYSTEM INSTALLATION							LAND USE TYPE			
	TOTAL	BEFORE 1960	1960'S	1970'S	1980'S	1990 - 6/1995	NO INFO	MFR	SFR	MHP	NO INFO
ALL REPAIRS - UNITS	397	228	60	40	32	7	30	53	321	18	5
ALL REPAIRS - %	100%	57%	15%	10%	8%	2%	8%	13%	81%	5%	1%
FAILED SYSTEM	25	19	0	0	1	1	0	3	20	2	0
REPLACE LEACH LINE	195	120	35	18	14	1	7	21	171	3	0
ADD LEACH LINE	64	27	12	16	8	1	0	14	46	4	0
REPLACE TANK	11	7	2	1	1	0	0	0	10	1	0
DESTROY TANK	59	35	8	2	3	3	8	9	49	0	1
CONNECT TO SEWER	37	26	4	1	3	1	2	5	32	0	0

MFR - Multiple Family Residential
SFR - Single Family Residential
MHP - Mobile Home Park

Two items of particular interest are revealed by the above data. First, approximately one-half of all repairs are for replacement of leach lines, indicating the vulnerability of the leach line to clogging due to roots or tank solids. Second, there appears to be a direct correlation between the incidence of failures and other problems, and the age of the system. Figure 4-3 charts this apparent correlation for both leach line replacement and for all repairs. Although it does not alter the indicated trend, it should be noted that the data may blur the distinction between "replace" and "add" leach line, since many leach line additions are made due to slow drainage or other operational problems in the existing leach line.

Figure 4-3

RELATIONSHIP OF RATE OF REPAIR TO AGE OF SEPTIC SYSTEM



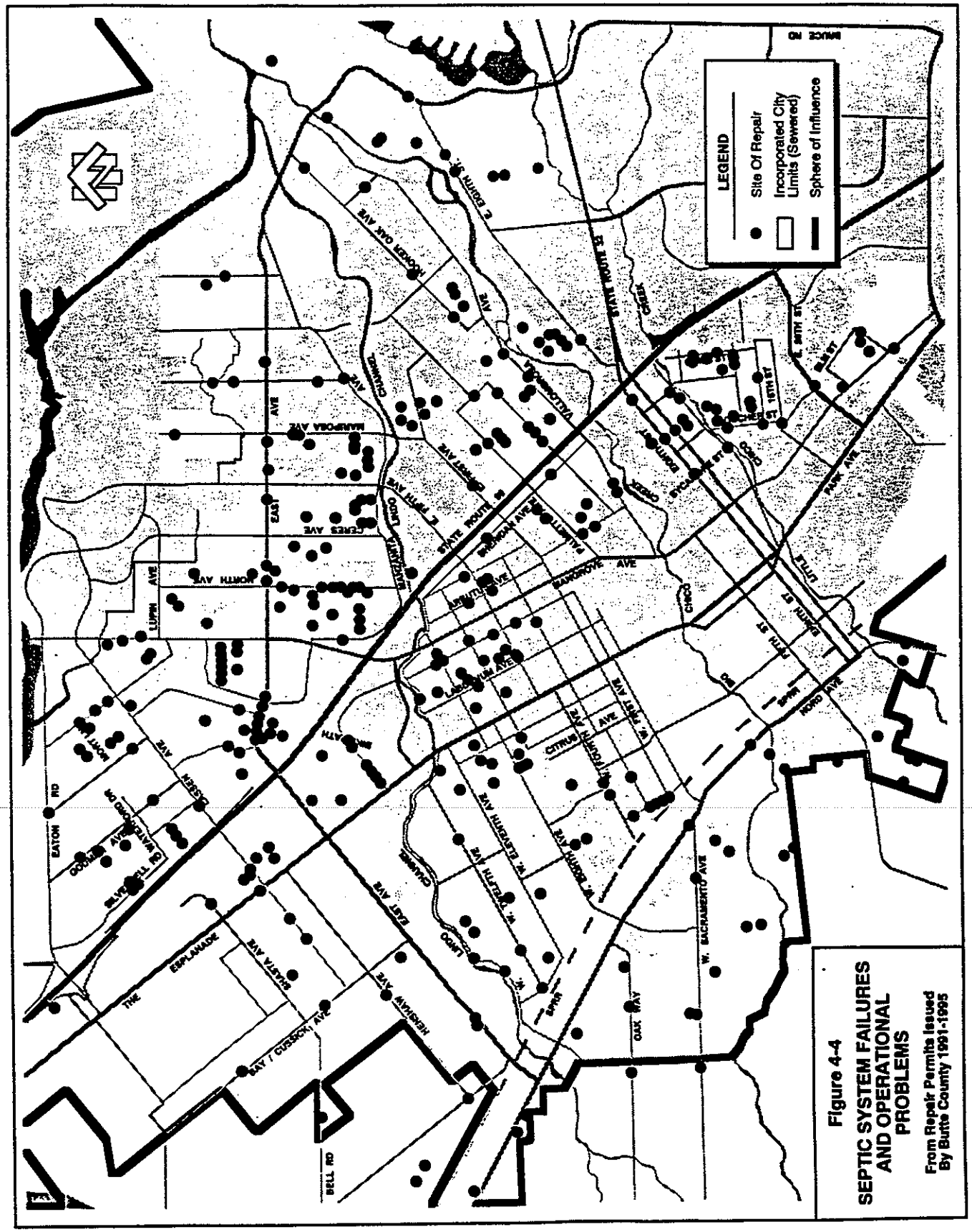


Figure 4-4
SEPTIC SYSTEM FAILURES AND OPERATIONAL PROBLEMS
From Repair Permits Issued By Butte County 1991-1995

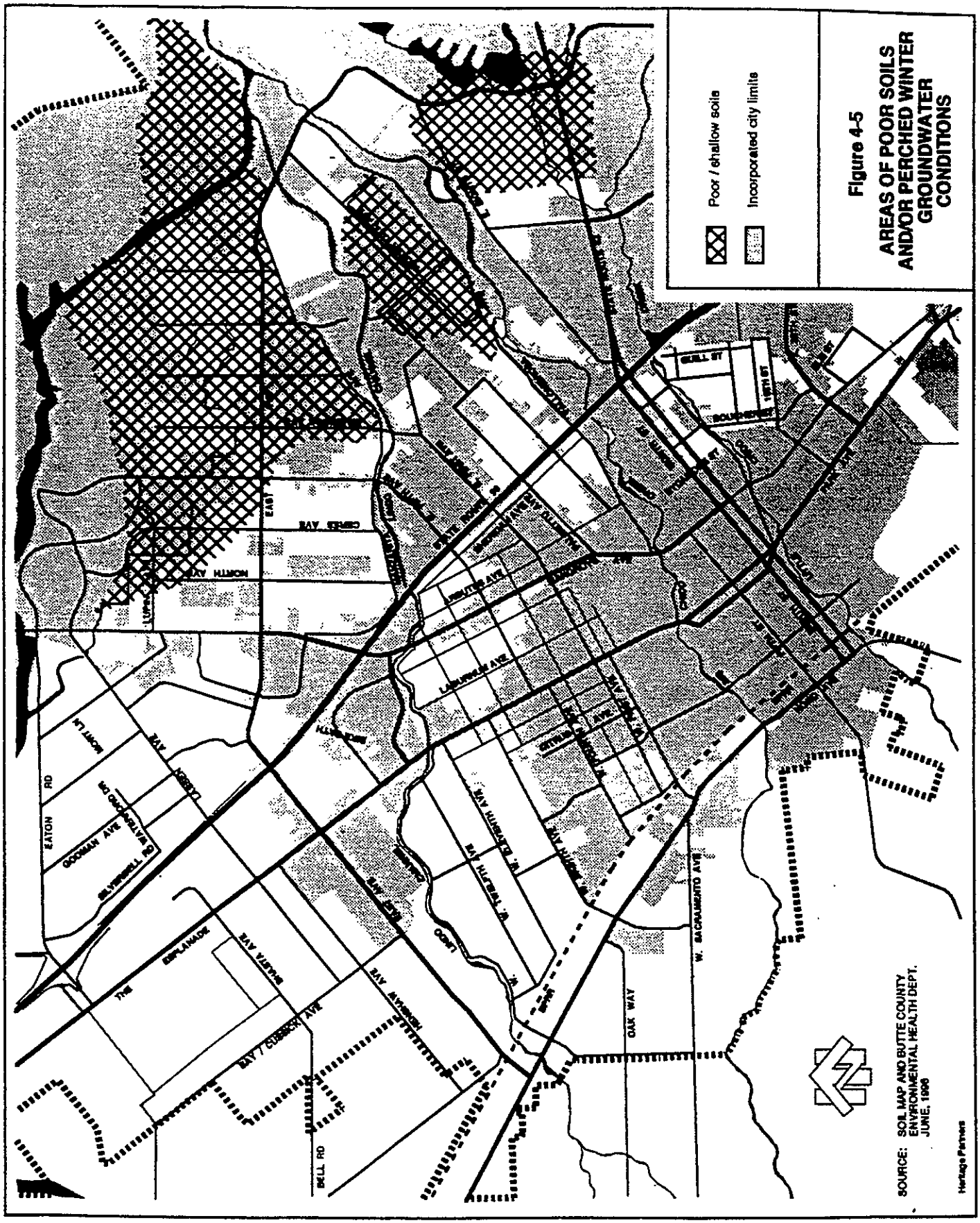


Figure 4-5
AREAS OF POOR SOILS AND/OR PERCHED WINTER GROUNDWATER CONDITIONS

Rational Boundaries and Equitable Cost Distribution

In many areas of predominantly higher density, such as the Lassen Avenue Corridor, a single family dwelling on a large lot may exist in a neighborhood with a high average density. In other cases the occupancy of a given dwelling unit may be substantially under the average, such as a single occupant of a home in the Avenues area. In these instances, there is the question of whether or not the large lot or single occupancy should be included in the sewering of the area.

The occupancy of a given dwelling unit may significantly vary over time, as the average family moves approximately every seven years. To illustrate the extreme, the specific wastewater loading from that dwelling unit may jump from a lone senior citizen occupant with a very low nitrate output to a family of two adults and three children with a relatively high wastewater output

Larger trends may also occur over time, as is often seen in older neighborhoods that may naturally undergo a generational transformation with the accompanying increase in families with children. The neighborhood characterized by low per-unit occupancy in 1996 may be home to many young families within five or ten years.

The issue of fundamental fairness and equity must also be brought to bear. As extension of the sewer collection system occurs, sewer lines may abut some properties not required to connect by virtue of the other listed criteria for sewering. Nevertheless, that property may benefit from the availability of the sewer main and the option of connecting at any time in the future.

In view of these realities, it is necessary to use averages to generalize to some degree and to avoid attempting to overly refine the analysis. Boundaries for sewering must be rational in the larger context of long-term wastewater loading as well as the essential fairness and equity of how an otherwise cohesive neighborhood is treated.

4.3 Application of Sewer Criteria to Chico Urban Area

Figure 4-6 illustrates the application of the above criteria to the Chico Urban Area. Those areas of average density above the calculated limit make up the vast majority of the total units that fall within high and medium priority for sewering. Those areas shown in red and pink indicate housing densities greater than 4 dwelling units per acre which consists of high and medium priority and represent approximately 7800 dwelling units. Those areas delineated in yellow represent areas of poor soil conditions and potential problems with regard to septage management.

Added to this total are the northeasterly areas where poor soils and/or high groundwater may make these locations inappropriate for septic systems. The soils generally north of East Avenue appear to be extremely marginal due to slow percolation rates and inadequate separation from the high seasonal groundwater elevations. Although it is likely that a percentage of systems in these areas are performing without noticeable problems, it is also likely that systems in these areas are adding septic tank effluent directly to groundwater.

The scope of intended sewering would thus total approximately 7,800 dwelling units, out of the approximately 12,000 dwelling units that now use on-site septic systems.

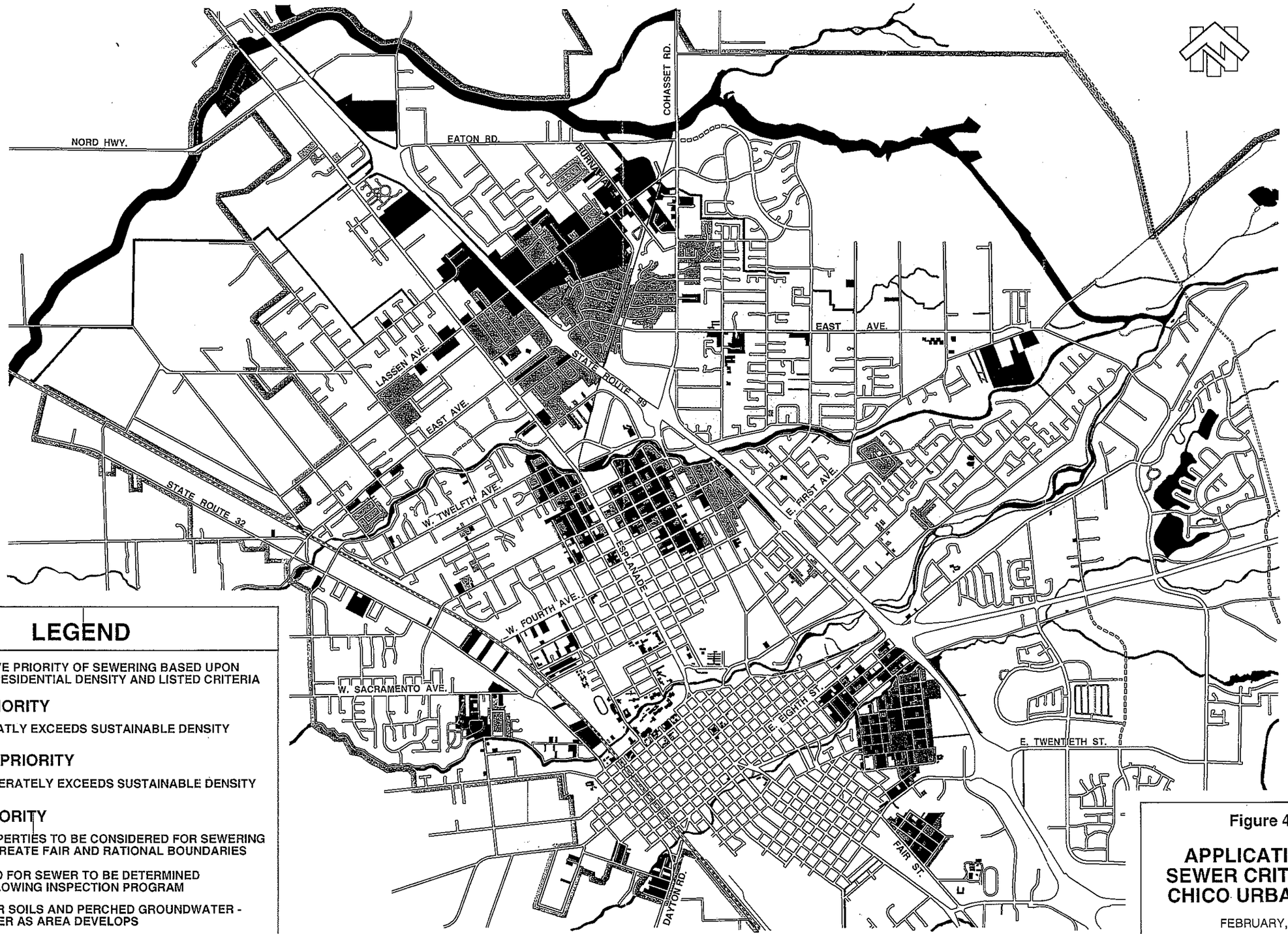


Figure 4-6

APPLICATION OF SEWER CRITERIA TO CHICO URBAN AREA

FEBRUARY, 1998

4.4 REDUCTION: RETROFIT TECHNOLOGIES FOR ONSITE SYSTEMS

Reduction of the amount of nitrogen discharged to the subsurface using onsite treatment technologies would allow compliance with the prohibition in certain cases. The two factors that must be addressed to determine whether a technology is acceptable under the prohibition are the amount of reduction that can be obtained and the initial nitrogen loading prior to treatment. Obviously the cost of the technology determines whether or not it is preferable to sewering.

For areas of moderate to high densities with hundreds to thousands of dwelling units there is no apparent proven method of nitrate reduction that closely approaches the cost efficiency of sewering. For developments that are fairly dense, remote from a sewer connection, and do not consist of more that a few hundred units (mobile home parks for example) there are some onsite solutions that may be cost effective. These include package aeration systems, sand filter systems, and potentially an improved retrofit sand filter technology investigated by the County as described below.

Recirculating Trickling Filters

During the initial phases of the technical review initiated by the County, the County embarked on the study of a technology that could potentially be used for removing nitrogen from individual systems at a moderate cost (Oakley, 1996). The recirculating trickling filter (RTF) consisted of the retrofit of an existing septic tank with a small recirculating fixed film reactor. The purpose of the reactor was to nitrify the effluent from the septic tank and then return it to the tank where denitrification would hopefully take place. Denitrification would remove nitrogen from the septic tank system in the form of nitrogen gas.

Six systems were installed, with partial grant funding supplied by the State, and monitored for one to two years. Several of the systems demonstrated good nitrogen removal. Unfortunately, removal was not consistent, nor did the systems work well at four out of the six locations. Reasons for lack of performance were numerous, including inadequately sized reactors, inadequately sized tanks, potentially leaky tanks, shock loads to the systems (one system stopped removing nitrogen because of a dose of carpet cleaning solution that was discharged to the system), and significant operational requirements to maintain higher nitrogen removal. Unfortunately, many of the problems causing lack of performance are probably indicative of conditions in the urban area and will preclude the use of these systems in an economic manner.

In addition, the cost of the system for an individual home, assuming that the home septic tank is replaced, is probably in the range of $5,000 to $10,000 when all costs are considered (materials, installation, engineering, power consumption, monitoring, and operating district overhead). This cost does not compare favorably with sewering at $8,000 to $9,000 per dwelling (Rolls, Anderson, and Rolls and NorthStar Engineering, 1998) when the unproved state of the retrofit technology is considered.

The retrofit technology also has some aesthetic problems that would make public acceptance difficult. Significant odors were reported at one location. Further, the system must generally be above grade and can create an obstacle in some yards, depending on the location of the septic system. This characteristic, added to the fact that significant onsite monitoring and the necessary backyard intrusion by district personnel would result, makes acceptance by individual homeowners doubtful.

4.5 Non-Residential Systems

One issue that must be incorporated into the final scope of sewering of the higher density residential systems is that of commercial, industrial, and other non-residential systems. These systems are extremely varied in their type and volume of discharge. Some systems may contribute very little to groundwater nitrate exceedance, whereas others may have high wastewater usage on a very small lot. In addition, some commercial systems will produce non-domestic wastes which must be disposed of in the septic tank. Currently, the Environmental Protection Agency defines septic tank leachfield systems that have the capacity to serve more than 20 persons, discharge more than the equivalent of approximately 500 gallons per day, or receive non-domestic wastes, as regulated injection wells (40 CFR [Code of Federal Regulations] 144 & 146) Owners of such wells must provide notification to the Federal Environmental Protection Agency.

In light of the above information, the only prudent and viable method for dealing with commercial systems appears to be a case-by-case review of each nitrate loading situation, with consideration of proximity to areas to be sewered.

4.6 Compliance: Meeting the Maximum Contaminant Level

The proposed Nitrate Compliance Plan would sewer approximately 65% of the estimated 12,000 dwelling units and allow the remainder to continue to use existing septic systems under the oversight of a monitoring program administered by the County. This section discusses how this solution will protect groundwater quality and is consistent with the State Water Code and other adopted State and Regional Board policies.

Resolution 68-16 Statement of Policy with Respect to Maintaining High Quality of Waters in California

This policy, sometimes referred to as the "non-degradation policy," basically states that waters should not be degraded from background quality unless the degradation is of overall benefit to the people of the state, and that in no case may discharges take place that cause or contribute to the exceedance of a water quality objective. Resolution 68-16 is set forth in full as Appendix J at the end of this document.

Plan Consistency

According to the best available scientific and engineering estimates, the proposed Plan will reduce nitrates in the shallow aquifer in the Chico Urban Area to below the regulatory level of 45 mg/l. Nitrates will still be added to the subsurface, which will cause some degradation to take place, but the degradation will be in conformance with Resolution 68-16 in that a significant cost burden on approximately 40% of the homeowners will be reduced. Any septic system will cause some degradation of groundwater above background levels.

In addition, the recharge of the shallow aquifer provided by these septic systems is in conformance with §13282 and §13283 of the Water Code, Resolution 71-1, and Central Valley Regional Board Basin Plan Policy, as shown below.

Water Code §13280 Prohibiting Disposal Systems

Section 13280 reads as follows: "A determination that discharge of waste from existing or new individual disposal systems or from community collection and disposal systems which utilize subsurface disposal should not be permitted shall be supported by substantial evidence in the record that discharge of waste from such disposal systems will result in violation of water quality objectives, will impair present or future beneficial uses of water, will cause pollution, nuisance, or contamination, or will unreasonably degrade the quality of any waters of the state."

PLAN CONSISTENCY

This code section must be interpreted to mean that some degradation of groundwater from septic systems is expected and allowed, as long as the degradation is not unreasonable. Such an interpretation is consistent with Resolution 68-16 which calls for the preservation of the background quality of waters of the state, unless degradation can be shown to be a benefit to the people of the state.

The reasonableness of any degradation is a matter of judgment. The fact that the proposed Plan should reduce nitrate concentration to below the maximum contaminant level, and that the cost of this solution is in excess of $60 million leads to the judgment that the remaining degradation is reasonable. The aquifer water quality will be adequate for all current beneficial uses and a significant amount of recharge water will be supplied to the subsurface.

Water Code §13282 (Individual Disposal Systems)

This section states, "If it appears that adequate protection of water quality, protection of beneficial uses of water, and prevention of nuisance, pollution, and contamination can be attained by appropriate design, location, sizing, spacing, construction, and maintenance of individual disposal systems in lieu of elimination of discharges from systems, and if an authorized public agency provides satisfactory assurance to the Regional Board that the systems will be appropriately designed, located, sized, spaced, constructed, and maintained, the discharges shall be permitted so long as the systems are adequately designed, located, sized, spaced, constructed, and maintained."

PLAN CONSISTENCY

It seems clear from the reading of this statute that the legislature intended that septic systems remain in service as long as a local entity could assure that no undue degradation of waters occurs. The proposed Plan will comply with this section of the Water Code.

Water Code §13283 Alternatives to Disposal

This section states "In reviewing any determination that discharge of waste from existing or new individual disposal systems should not be permitted, the State Board shall include a preliminary review of possible alternatives necessary to achieve protection of water quality and present and future beneficial uses of water, and prevention of nuisance, pollution, and contamination, including, but not limited to, community

collection and waste disposal systems which utilize subsurface disposal, and possible combinations of individual disposal systems, community collection and disposal systems which utilize subsurface disposal, and conventional treatment systems." (emphasis added)

PLAN CONSISTENCY

This is precisely the alternative that is proposed by the County—a combination of a conventional collection and treatment system coupled with a sustainable number of managed onsite systems.

Region 5 Basin Plan Wastewater Reuse Policy

This policy "encourages the reclamation and reuse of wastewater..." and requires as part of a Report of Waste Discharge "an evaluation of reuse and land disposal options as alternative disposal methods. Reuse options should include consideration of the following, where appropriate, based on the quality of the wastewater and the required quality for the specific reuses: industrial and municipal supply, crop irrigation, landscape irrigation, ground water recharge ..." (emphasis added)

PLAN CONSISTENCY

According to this policy, if the County were to attempt to build its own wastewater treatment plant to handle the 7,800 dwellings proposed to be sewered, examination of recharge methods would be required before a discharge to surface waters would be allowed. A reduced and appropriate groundwater recharge will continue under the County's proposed scenario.

It should be noted that the City of Chico's plan for expansion to 9 mgd from 6 mgd using an outfall to the Sacramento River came under close scrutiny and considerable opposition from local environmental groups. Their objection was that disposal options other than river disposal should be considered, including recharge to groundwater, an alternative that is appropriately utilized for the remaining onsite systems in the proposed Plan.

Alternatives and Interim Measures for Difficult Sewer Connections

As the Plan proceeds through more detailed sewer engineering design processes, it is likely that some subareas will be identified which are infeasible or overly problematic to connect within the time frame or by the method set forth. In such cases, alternative measures must be identified which are feasible and yet meet the underlying objectives of compliance with the discharge criteria.

A sewer line capacity problem which prevents the timely connection of a multifamily land use, for example, should be evaluated as to the projected length of delay, possible adjustments to the construction or connection schedule to minimize nitrate discharge, permanent or interim improvements to existing onsite disposal system(s), and similar potential solutions.

Where the connection of an outlying discharger, such as a mobile home park, is at a distance from other connections and is determined to have an unacceptable effect on construction or financing of that phase, alternatives should be identified and evaluated.

chapter five

SEWER FEASIBILITY, COST & FINANCING

This chapter summarizes the results of a preliminary sewer feasibility analysis completed in response to both the project's needs and the Regional Board's requirements, and presents the estimated cost of sewering. The characteristics and availability of various financing alternatives are examined, followed by conclusions and recommendations.

KEY POINTS

- Connection to the City of Chico's existing gravity collection system and sewage treatment plant is the best and most cost-effective alternative for sewering designated areas.
- The average cost per equivalent dwelling unit is estimated to be approximately $6,000 plus $2,000 - $3,000 for onsite connection and abandonment of septic tank.
- The termination of the Federal grant program for sewer projects results in the requirement for property owners to pay for sewers through a combination of financing mechanisms intended to allow payment over a 10-20 year period.
- To address the plan's components set forth herein, further work and consultation with relevant agencies is needed to develop a detailed sewer financing program.

5.1 Summary of Sewer Feasibility Analysis

As described in section 2.5, the Regional Board adopted Resolution No. 95-024 in January 1995, which deferred enforcement of the Prohibition Order to allow the County additional time to complete a plan for compliance with the order. The resolution was conditional in that it required the County to complete a sewer feasibility study for those subareas likely to require sewering. Regional Board Resolution No. 95-024 appears as Appendix D.

Objectives of the Sewer Feasibility Study

In addition to the scope of work required by the Regional Board, the County sought to identify and preliminarily examine alternative sewage collection methods and the potential for a new waste water treatment plant. The County's objectives in completing this broader scope of work were as follows:

- to identify the range of sewage collection and treatment alternatives potentially available;
- to determine the broad feasibility and approval characteristics of each alternative;

- to examine the operational costs and characteristics of each alternative;
- to provide generalized cost estimates for onsite sewer laterals (not within public right-of-way);
- to preliminarily meet the requirements of the State Revolving Fund which require the examination of alternatives to a project proposed for funding;
- to identify one or more feasible alternatives to the City of Chico wastewater collection system if City sewer service/annexation policies were sufficiently un-acceptable to the affected public as to cause rejection of the sewering program; and
- to recommend the most cost-effective alternative for use in the project area.

Engineering Team & Scope of Work

Three local firms were selected to jointly perform the sewer feasibility analysis. Their selection was based on local knowledge of affected neighborhoods, existing and master-planned sewer facilities and project experience and capability to complete the work. The project was divided into individual scopes of work, with coordination and review between consultants.

NorthStar Engineering examined the collection of sewage from higher-density neighborhoods north of Lindo Channel. In the Lassen Avenue Corridor the units are predominantly mobile home parks and apartment complexes. These areas have generally been developed more recently than other parts of the Chico Urban Area, and lack existing sewers. Although work within the public right-of-way for mobile home parks and apartment complexes is relatively straightforward, the piping within the complexes themselves is more complex.

Rolls, Anderson & Rolls examined sewage collection in the areas south of Lindo Channel, and provided schematic analysis of onsite sewer laterals for typical single family home sites. Their work included the Avenues (Chico Vecino) and Chapman-Mulberry neighborhoods which contain older, more complicated patterns of mixed land uses, smaller lots and will require more extensive repairs to streets, storm drains and utilities. Their scope of work also included an effort to identify the problems and average costs of providing laterals from the public right-of-way to the individual dwelling unit.

Metcalf & Eddy evaluated the treatment and disposal of wastewater, both at the existing regional treatment plant operated by the City of Chico, and at a new location generally northwest of the Chico Urban Area. Tasks included a review of the scope and cost allocation of the City of Chico's pending expansion of the Water Pollution Control Plant (WPCP) on River Road, an overview of available technologies and opportunities for a new treatment plant, and a comparison of the merits of various alternatives.

Existing dwelling unit densities had previously been determined for the unsewered portion of the Chico Urban Area, and the technical program was advanced enough to enable the engineering team to define

specific properties. Table 5-1 sets forth the unit counts and delineates between types of residential land use. Approximately 7,800 units were included, with nearly two-thirds located within the previously identified "priority areas" as discussed in Section 4.3.

Lindo Channel was used as the dividing line for the individual scopes of work as the two areas would likely be served by different collection systems.

Table 5-1
Sewer Feasibility Study Areas

	All dwelling Units (DU'S)	Single Family Residential	Mulitple Family Residental	Mobile Home Park Residential	Commercial
Other Subareas					
North of Lindo Channel	5,034	1,040	2,555	1,312	127
South of Lindo Channel	2,797	1,805	817	175	0
TOTAL	7,831	2,845	3,372	1,487	127

Current Sewage Treatment and Disposal in the Chico Urban Area

The Chico Urban Area is presently served by a central sewer system made up of four components: collection, transport, treatment and disposal. Each of the components is owned and operated by the City of Chico. Treatment of the effluent is accomplished at the Water Pollution Control Plant located on River Road, which utilizes an activated sludge process. Disposal of the treated effluent is to the Sacramento River.

The Water Pollution Control Plant is a "regional" facility, intended to serve the population of the greater urban area. As it was constructed in part with federal grant funds, the City of Chico must accept effluent from non-city areas. The effect of this provision is that the City of Chico cannot require annexation to the city as a condition of usage of the treatment plant. Unlike the treatment plant the City has stated that the collection system was not constructed with federal grant funds, and thus is able to impose annexation as a condition of sewer service.

Although the logic and practicality of an existing regional treatment plant would appear to easily outweigh any advantages of a second plant within the same urban area, the issue is more complex than it first appears. Advances in plant design since the Water Pollution Control Plant was upgraded in the early 1970's may yield a lower operating cost. The location of the plant may require a greater transport cost, particularly from the northern end of the Chico Urban Area. Lastly, deficiencies in plant operations and capacity in the existing facility provide incentives to consider a new subregional plant.

The Regional Board imposed a Cease and Desist Order on the City of Chico, requiring certain upgrades to the Water Pollution Control Plant to ensure a reliable 6.0 mgd operation. The Water Pollution Control Plant is at its permitted capacity and the City has been directed to identify a program for expansion of the plant to accommodate area growth. Since approximately 1.5 mgd is required for the connections related to the Prohibition Order, such plant expansion is necessary prior to implementation of this alternative.

The Metcalf & Eddy report identifies and evaluates a list of potential wastewater treatment alternatives which may be available to meet the needs of this project.

Alternative Methods of Sewer Collection

Several methods of sewage collection were examined to determine an initial level of potential utility and cost effectiveness based upon experience in other locales. The initial list of alternatives and their early disposition was as follows:

GRINDER PUMPS/PRESSURE OR VACUUM SYSTEM. Of the initial list of alternatives, grinder pumps/pressure systems and vacuum systems were eliminated without extended analysis due to operational characteristics that were judged of little advantage in this application.

STEP/STEG SYSTEM. The Septic Tank Effluent Pump/Gravity (STEP/STEG) method was examined further, based upon the potential cost savings experienced in other situations.

CONVENTIONAL GRAVITY. Conventional gravity collection is the design utilized by the existing City of Chico system and is the most widely used system nationwide.

The Septic Tank Effluent Pump/Gravity pressure systems hold the potential for shallower installation, greater flexibility in avoiding utility conflicts, and substantially reduced construction cost. This method retains the septic tank as a means of settling the solids out of the effluent, and as a housing for the installation of a submersible pump. Effluent (minus the solids) is then pumped through small diameter plastic pipe. In instances where the topography is sloped, the pump may be eliminated and the effluent discharged via gravity to the collection system.

Consultation with design engineers experienced in the Septic Tank Effluent Pump/Gravity systems and with system operators and regulators with direct operational and maintenance experience, revealed two significant risks or disadvantages to the use of the Septic Tank Effluent Pump. First, the septic tank/pump tank must be watertight and constructed with a level of uniformity to facilitate pump installation, operation and maintenance. It was strongly advised, even by committed advocates of the Septic Tank Effluent Pump, that existing septic tanks should be replaced by a new tank intended for that purpose. Secondly, although initial construction costs are significantly less than initial costs of conventional gravity collection, ongoing costs to operate, service and maintain the Septic Tank Effluent Pump systems is substantially greater. Further, the Septic Tank Effluent Pump systems are projected to experience a life expectancy significantly less than that of conventional systems.

The recommendation of the project team is to base the collection system on conventional gravity flow, using the Septic Tank Effluent Pump or other pressurized segments where particularly appropriate due to local conditions.

5.2 ESTIMATED COST OF THE COLLECTION SYSTEM

The engineers estimated the direct construction cost of the conventional gravity collection system by utilizing the same design criteria, unit costs and design and contingency costs used by the City of Chico. Financing the construction of the system will add an increased cost.

These construction cost estimates are intended only as a starting point in an ongoing process of re-estimating the costs as the scope and design of the sewer improvements become more fully known. Indirect costs related to sewer improvements are dependent on future conditions and difficult to estimate. In an attempt to ensure conservative cost estimates that protect the affected citizenry, a contingency factor is included in the estimated off-site construction costs. The estimated costs are summarized below in Table 5-2.

Included in off-site collection costs are pipe installation, trench bracing, pavement replacement, installation of sewer manholes and sewer cleanouts as well as the installation of sewer laterals from the sewer main to right of way line. Onsite costs include the abandonment of the septic tank and onsite sewer connection including manholes, pavement replacement and landscape restoration.

Table 5-2
ESTIMATED COST SUMMARY FOR EXTENSION OF THE EXISTING GRAVITY COLLECTION SYSTEM
(Source: Phase 2 Sewer Feasibility Study, December 1998)

	NORTH OF LINDO CHANNEL	SOUTH OF LINDO CHANNEL	TOTAL
APPROXIMATE NUMBER OF DWELLING UNITS (EDU'S)	5,034	2,797	7,831
OFFSITE COLLECTION (within public right-of-way)	$15,846,000	$12,986,000	$28,832,000
EST. TREATMENT PLANT FEES	$ 7,113,000	$ 3,952,000	$11,065,000
EST. CITY SEWER TRUNK LINE CAPACITY FEES	$4,012,000	$ 2,229,000	$6,241,000
EST. CITY SEWER MAIN FEES	$240,000	$1,008,000	$1,248,000
SUBTOTAL	$27,211,000	$20,175,000	$47,836,000
ONSITE COSTS (tank abandonment & lateral)	$13,263,000	$9,820,000	$23,083,000
TOTAL	**$40,474,000**	**$29,995,000**	**$70,469,000**
AVG. OFFSITE TREATMENT PLANT COST PER DWELLING UNIT			$3,682
EST. CITY FEES PER DWELLING UNIT			$2,370
AVG. ONSITE CONSTRUCTION COST PER DWELLING UNIT			$2,948
TOTAL AVERAGE COST			**$9,000**

These costs will be further refined as the financial program is developed.

5.3 TREATMENT PLANT ISSUES

The City of Chico has corrected deficiencies in the Water Pollution Control Plant in accordance with directives of the Regional Board. The City also expanded the plant's treatment capacity from 6.0 mgd to 9.0 mgd to enable the connection of additional units. The recommendation to utilize the Water Pollution Control Plant for treatment and disposal of wastewater flows generated by the Nitrate Compliance Program is based upon the assumption that the upgrading and expansion of the Water Pollution Control Plant will be completed in the time frame established by the Regional Board.

Operation of the Water Pollution Control Plant Under Waste Discharge Requirements

On June 24, 1994, the Regional Board adopted Order No. 94-175 adopting waste discharge requirements (WDR's) for the City of Chico's wastewater treatment facility. The WDR's, in part, set forth the following:

1. Specified a maximum allowable average dry weather discharge rate of 6.0 million gallons per day (mgd) (average dry weather flow).

2. Established effluent limitations for 5 constituents Biochemical Oxygen Demand (BOD), total suspended solids, settleable solids, chlorine residual, and total coliform organisms.

3. Directed the City to implement necessary programs and controls to ensure that incompatible wastes were not introduced into the treatment facility.

4. Required the City to submit an updated industrial waste survey or a plan and time schedule for completing such survey. City was to also submit a report summarizing the annual updates of the industrial waste surveys as required in their previous permit.

5. Required the City, whose waste flow had been increasing or was projected to increase, to establish when flows would reach hydraulic and treatment capacities.

Cease and Desist Order for Discharge Violations

During the winter of 1994, Chico experienced significant problems with operation of the treatment plant. The City was able to avoid serious violations of waste discharge requirements by diverting flows to emergency storage ponds. However, since the ponds were of limited capacity, serious effluent violations could have occurred if the problems had persisted.

Due to these problems, the Regional Board required the City to prepare a capacity study and analysis of the situation. The analysis submitted by the City identified several causes of the problems experienced at the plant. Additionally, the capacity study and facilities plan indicated that several of the unit processes at the treatment plant were either deficient or lacked redundancy to assure reliable treatment of 6.0 mgd. Continued plant operations threatened to violate Biochemical Oxygen Demand and suspended solid requirements during heavy flows or in the case of malfunctioning equipment.

At their meeting of October 27, 1995, the Regional Board found the following:

- The City had not submitted an update of the plant industrial waste survey or a plan for accomplishing such an update within the required 180 days following adoption of the Waste Discharge Requirements.

- The City had not completely complied with the provision which required adoption of programs and controls to ensure that incompatible wastes were not introduced to the treatment facility.

- The City's self-monitoring reports showed numerous violations of effluent coliform limitations.

- The City's capacity analysis showed that further violations of waste discharge requirements were threatened if plant improvements were not constructed.

Based on these findings, the Regional Board issued Cease and Desist Order No. 95-251 requiring the City to cease and desist from violating waste discharge requirements and ordering the City to implement a number of tasks delineated within the Order.

Included within the tasks was the requirement for an April 1, 1997 beginning date for improvement construction and an April 1, 1999 date for completion of construction. In January 1998 the City of Chico completed the design of the Water Pollution Control Plant Facility Plan improvements. In December 1997 the City awarded the construction contract to begin work on the project.

On June 20, 1997 the Regional Board issued Cease and Desist Order No. 97-099 which extended the compliance date for start of construction to December 31, 1997, and the compliance date for the commencement of operations to December 31, 1999. Construction began in March 1998 and as of December 1999 all operational upgrades have been completed. The completion of remaining construction activities for the water pollution control plant expansion is anticipated by spring 2000.

Expansion of Plant Capacity and Projected Connection Fees

The City of Chico is currently financing the Water Pollution Control Plant upgrade and expansion via user fees. The City operates the Water Pollution Control Plant as an enterprise fund, with the projected cost of capacity improvements allocated to each connection. As part of the City's plant expansion, the estimated costs have been updated and increased from $500 to $1,414. For purposes of this analysis, it was assumed that the Water Pollution Control Plant Capacity Fee was $1,400 per dwelling unit. These cost figures will be updated as the County's financial loan application documents are prepared.

5.4 Summary and Allocation of Costs

The preliminary sewer feasibility analysis and cost estimate has provided an initial level of alternatives and cost estimates. Additional specificity will be required as the project proceeds. The most fundamental questions relevant to this stage of a large and complex project have been addressed so that a direction may be established and further work performed in an efficient and cost-effective manner.

A determination by the Regional Board that a project is feasible in terms of cost is made relative to the average per capita income of the community. Current estimates of cost to sewer are affordable according to the Regional Board. When engineering design is completed, and a bid document cost estimate is available, the feasibility of sewering can be revisited if the current estimate is found to be excessively low.

The sewer feasibility study revealed a range of costs to serve varying neighborhoods, depending upon proximity to existing sewer lines, capacity of existing lines, trench depth and other design considerations. The estimated cost of sewering a particular subarea might vary substantially from another, despite the fact that each area receives precisely the same benefit.

It is the recommendation of both the Citizen's Nitrate Advisory Committee and the project team to proceed with a financial program that allocates offsite cost on the basis of average cost, since that most accurately reflects the benefit to individual properties.

5.5 Financing of Sewer Improvements

Prior to the depletion and termination of the federal grant program for funding of local wastewater projects, local communities seeking to install centralized sewage systems typically utilized grant funding for the majority of the cost. Today the grant program has been replaced by a structure of state revolving funds and the burden of paying for central sewer systems now falls to the community. Programs which may be available to assist with financing of sewer improvements are described below.

State Revolving Fund Loan Program

The following information describes the State Revolving Fund.

Purpose	To provide state and federal loan funds to plan, design, and construct municipally owned waste water treatment works. The program provides low interest loans for 100% of the eligible project. The interest rate is one-half the most recent sale of state general obligation bonds. The repayment period is up to 20 years.
Limitations	Currently, loans are issued only to public entities with the authority to operate, maintain, and construct sewage treatment facilities.
Authorized by	Municipal Wastewater Treatment Construction Grant Amendments of 1987 (P.L. 100-4) and as authorized under the Clean Water Bond Law of 1984.
Type of Assistance	Funding: Loans, 1989 fiscal year—$160 million.

Tax Increment Financing (Greater Chico Urban Area Redevelopment Project)

Tax increment financing may be available for that portion of sewering costs that benefit properties located within the boundaries of the Greater Chico Urban Area Redevelopment Project Area. This redevelopment project area was formed in 1994 by the Chico Redevelopment Agency with the specific intent to assist in the financing of sewer improvements, among other significant infrastructure needs in the Chico Urban Area. The Greater Chico Urban Area Redevelopment Project includes substantial unincorporated portions of the Chico Urban Area, which were included at the direction and approval of the Butte County Board of Supervisors for this purpose.

Key objectives directly related to groundwater quality include the following:

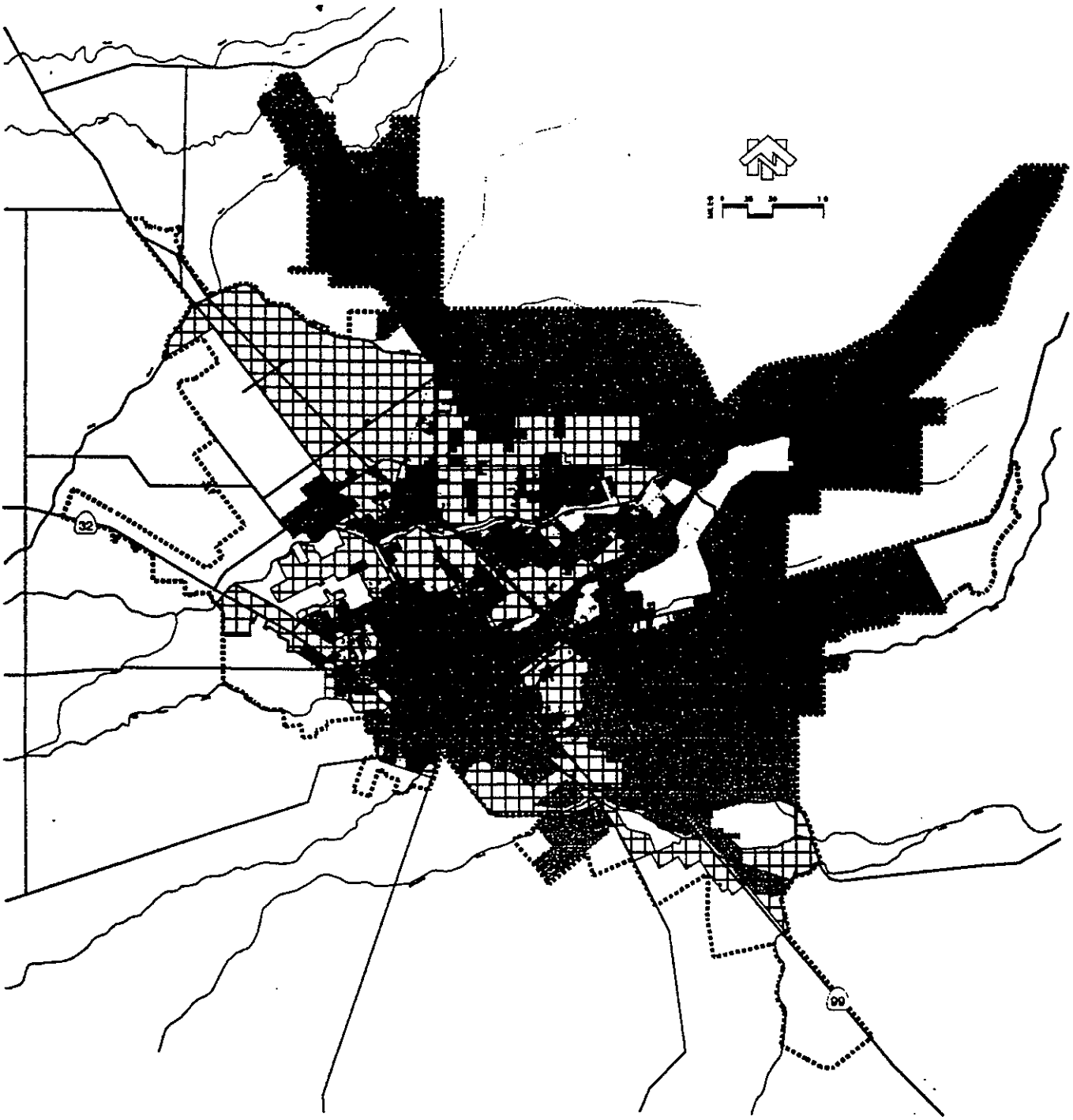
- Construct and install new or improved sewer facilities, sewer mains and trunk lines, water pollution control plant facilities, or other sewer facilities necessary to replace septic systems that are currently contributing to groundwater pollution.

- Construct storm drainage systems and other drainage facilities necessary to prevent flooding and water contamination of surface streams, watercourses, and groundwater aquifers.

Priority projects (those most directly related to blight) include the following related to groundwater quality:

- install sewer trunk lines and mains
- expand the wastewater treatment plant to accommodate the increase in flows from the removal of septic tanks
- install laterals (to qualified parties of low and moderate income)

Figure 5-1 shows the expanse of the Greater Chico Urban Area Redevelopment Project Area, which covers the vast majority of areas with higher average dwelling unit densities. Although the project area includes most affected neighborhoods, the tax increment funds available to assist in sewer costs may be quite limited due to lower than projected tax increment revenue. The Chico Redevelopment Agency has commissioned an analysis of tax increment projections to determine why receipts are lower than projections made at the time of formation.



Sphere of Influence

Boundaries of Greater Chico Urban Area Redevelopment Project Area

Incorporated Limits of the City of Chico

Figure 5-1

GREATER CHICO URBAN AREA REDEVELOPMENT PROJECT AREA

SOURCE: CHICO REDEVELOPMENT AGENCY, 1995

Assessment Installments (City of Chico)

The City of Chico offers a program which provides for assessment installments in lieu of payment of Water Pollution Control Plant capacity fees, trunkline capacity fees, sewer main installation fees, and sewer lateral installation fees. The program is available only to properties within the incorporated city limits. A description of the program is as follows:

Purpose	To facilitate connection to the sewer system by providing an alternate means of financing the various City of Chico sewer fees ordinarily due at the time of connection.
Limitations	Available only to premises within the incorporated city limits.
Authorized by	Chico Municipal Code §3.82
Type of Assistance	Enables the financing of City sewer fees as secured by an assessment lien on the property. Interest is charged at the average rate of interest being received by the City's invested funds, plus two percent.

Community Development Block Grant Program

Several low income residents that live within the proposed sewer sub-areas may be eligible for the Community Development Block Grant (CDBG) program. A summary of the Community Development Block Grant program is as follows:

Purpose	Provides grant funds to rural cities and counties to support job creating/job retaining businesses and development projects. Grant funds are awarded for two purposes: loans to businesses that show a financial need and grants to jurisdictions for infrastructure improvements supporting business development. Jobs must principally benefit persons of low-to-moderate income.
Limitations	The Small Cities Program is a federal pass-through program to the state of California from the Department of Housing and Urban Development. Set aside funds are limited to 30% of HUD's annual appropriation to the state, averaging $6 million annually. Community Development Block Grant funds may be used for the following: land acquisition and onsite improvements, construction of a building, renovation/ restoration, machinery/equipment, inventory, supplies, materials, working capital, small business incubators, and water, sewer, roads offsite improvements. Recipients of CDBG funds must own and occupy their property and meet income qualifications.
Authorized by	The director of the Department of Housing and Community Development approves each grant under the Economic Development Set aside after a recommendation by the Economic Development Advisory Committee.

Type of Assistance	Funding: Grants to communities; loans to businesses, $6 million annually. Range: $100,000 to $600,000 Loans are below prime, no points or fees, long-term and deferred, if appropriate. Infrastructure grants are for publicly owned improvements.

Locally, Community Development Block Grant funds may be available to eligible households within the target income group, for sewer improvements within the Chapman/Mulberry and other areas.

Small Communities Supplemental Assistance Program

The Small Communities Supplemental Assistance Program is described as follows:

Purpose	Provide $40 million to be used for state supplemental grants to qualifying small, needy communities that will receive regular state and federal grants. The total amount of federal and state assistance is limited to a maximum of 97.5% of the project costs. Projects will be recommended for a pollution study and placement on the clean water grant priority list by the regional boards where a public health or water pollution problem exists.
Limitations	1) A community must have a population of 5,000 or less, or have a reasonably isolated and divisible segment of a larger municipality encompassing 5,000 persons or less. 2) A $2.5 million total cost limit to projects eligible to receive supplemental assistance. The cost may exceed this limit if the state board finds that a higher-cost project is the most cost-effective solution to a documented public health hazard or water quality problem.
Authorized by	Chapter 15 (commencing with section 13999) of Division 7 of the Water Code and as authorized under the Clean Water Bond Law of 1984.
Type of Assistance	Grants, $40 million. Range: 0 to $2.5 million.

Development of Local Area Revolving Fund

The County may wish to consider initiation of a revolving fund to assist in the financing of improvements for that portion of the population who would experience hardship. The County would need to secure a substantial grant to initiate the formation of such a revolving fund.

Assessment Bonds

California law provides for a broad range of financing mechanisms involving the use of assessment bonds, notably including the Improvement Act of 1911, the Municipal Improvement Act of 1913, and the

Improvement Bond Act of 1915. Assessments are not legally considered to be taxes and are not subject to the one percent limitation for ad valorem taxes as imposed by Proposition 13. Assessments do not require approval by a two-thirds majority of qualified voters but are subject to majority protest provisions.

Appendix M presents a brief report on the availability and use of assessment bonds in California as provided by a law firm specializing in municipal finance.

5.6 Creation of Financing Program

The best financing structure will utilize a combination of mechanisms. A finance team has been formed to facilitate the creation and development of a strategy to accompany the Plan. The need for interaction between the County, the City of Chico, and the State Board's Division of Clean Water Programs is ongoing.

The County is highly ranked for the State Revolving Fund monies which are anticipated to be the cornerstone of a successful financing program. Revenues to repay such a loan will need to be identified and developed.

The need to procure grant funding to help defray on-site costs for low income residents is also an important component to consider. Without grant funding assistance many residents may not have the ability to readily connect to sewer. Funding programs for both property owners (i.e. owner occupied) and renters should be considered.

chapter six

OVERSIGHT MONITORING PROGRAM FOR ON-SITE SYSTEMS

This chapter addresses the continued operation and management of approximately 4,200 units that will continue to use on-site septic systems pursuant to the proposed Plan. Onsite systems located in lower-density areas will adequately protect groundwater quality if properly operated and maintained. Studies performed by Butte County after the adoption of Prohibition Order No. 90-126 indicate that dwelling unit densities of less than 4 homes per acre may not cause exceedance of the groundwater nitrate maximum contaminant level. This conclusion was based upon site specific studies and literature data. In its letter of October 14, 1999, which is provided in Appendix R, Regional Board staff indicated their willingness to request that the Regional Board modify the prohibition order to allow for continued use of existing septic systems in these lower density areas.

KEY POINTS

- An oversight monitoring program administered by the County is needed to ensure that continued operation of remaining individual onsite systems will safeguard the public health, protect groundwater quality, and avoid the expense and community disruption of substantially expanded sewering in the Chico Urban Area.
- A water quality monitoring program for the shallow aquifer shall be developed which will include data collection of groundwater depth, nitrate, coliform, and possible other parameters.
- Public education efforts are necessary to educate residents about the groundwater nitrate program and the proper care of septic systems.
- The oversight monitoring program shall report County complaint responses and repairs, and septic tank pumping records, to Regional Board staff.
- The County will codify the oversight monitoring program into the Butte County Code and implement a memorandum-of-understanding between the County and Regional Board.
- It is proposed that the monitoring program be given sufficient time, on the order of 10 to 20 years, to establish that sewering is having the desired effect on groundwater nitrate concentrations before considering any further action in the unsewered areas.

6.1 Summary of Septic Tank Regulatory Oversight

The Porter Cologne Water Quality Control Act became law in 1969 and established conditions for prohibition of the discharge of sanitary wastewater from individual onsite systems. Prior to that, water law gave the state the authority to regulate such systems. However, in the 1950's, the agency responsible for water pollution control at the time, the Water Pollution Control Board, waived the filing of reports of waste discharge for individual systems in counties that had developed an adequate ordinance. The Board still reserves the right to issue waste discharge requirements on an individual basis where there is a threat to water quality.

Septic tank systems became regulated through local ordinance and on a county or city jurisdiction basis as a means to address public health problems caused by failing systems. Septic tank ordinances also provided a process for waste water approvals for new structures. To insure the protection of public health, septic tank ordinances have historically been the responsibility of a Health Officer. Butte County Ordinance 699 adopted February 27, 1961 as Chapter 19 of the Butte County Code governs septic tanks within the unincorporated area. Under the Ordinance, sanitary sewage disposal is required (Section 19-3) and it is the Health Officer's duty to enforce the Ordinance (Section 19-16). Similar to other regulatory law, the Health Officer may enter premises at reasonable hours to enforce the regulations (Section 19-16). Denied access is subject to court review of an inspection warrant request or similar document. Denied access is extremely rare because the public generally supports the need to safely dispose of sewage.

6.2 Need for Oversight

Where properly designed and installed at low densities, and when appropriately operated and maintained, onsite sewage disposal systems in the Chico Urban Area should continue to provide safe and cost-effective service without causing groundwater pollution. In the Clean Water Act of 1977 (PL 95-217) Congress demonstrated the realization that conventional centralized wastewater collection and treatment systems are not necessarily the appropriate solution for all small communities and unsewered suburban areas. Congress also recognized that septic systems can be a viable and satisfactory, long-term method of wastewater treatment if they are properly designed, installed, operated and maintained.

Many experienced environmental health professionals, engineers and septic tank pumpers agree that individual septic systems are typically under-maintained. System deficiencies such as leaking tanks or broken pipe fittings may contribute to subsurface pollution without indication that anything is wrong. In the absence of plumbing backups, odors or surfacing effluent, these conditions may exist for an extended period. Users of septic systems that are experiencing slow drainage or other symptoms may be disappointed to learn that the condition of their system has deteriorated beyond the point of easy repair thus requiring the installation of new leach lines or similar major expense. The long-term useful life of a septic system can best be protected through a periodic inspection and pumping of the septic tank.

The Regional Board has indicated that to avoid substantially expanded sewering beyond that recommended herein, oversight would be required. Regional Board Staff indicated that they would propose an oversight monitoring program for those systems that are slated to remain unsewered indefinitely. This proposal would be acted upon by the Regional Board as part of a revised area basin plan amendment.

Development of an Oversight Monitoring Program

In developing the oversight monitoring program several organizational structures have been considered including the formation of a wastewater management district, a community services district, a new county service area, or possibly utilize CSA 114 with expanded authority. These alternatives were reviewed with regards to the following: ease of formation and cost of ongoing operations; assurances that the oversight monitoring program would not be intrusive to property owners; and, assurances that property owners would not hastily be required to implement sewer connections without further consideration.

Developing the oversight monitoring program for parcels within CSA 114 is also a challenge because the status of parcels continues to change. For example, upon the initial formation of CSA 114 in 1988 all parcels within the CSA were originally located in the unincorporated territory of the Chico Urban Area. Any parcel that did not have sewer service, or have a permanent solution to storm drainage, was assessed the annual CSA 114 parcel fee. To achieve a zero assessment the parcel had to meet both sewer and storm drainage requirements identified in the original Nitrate Action Plan.

In its letter dated August 18, 1999 (which is provided in Appendix K and also referred to in Chapter 2, Section 2.6 "Role of CSA 114") Regional Board staff informed the County that the provisions in the Nitrate Action Plan relating to storm drainage could be relaxed. This determination was based upon the County's recent studies which ruled out the possibility of significant nitrate contributions to ground water from surface sources.

Coupled with this acknowledgment from the Regional Board was the County's finding that at least twenty percent (20%) of the parcels which were originally included within CSA 114 at the time of its formation have annexed to the City of Chico. Many parcels continue to annex and as of November 1999 the City of Chico Community Development Department stated that up to 30 annexations are currently being organized for future consideration.

In researching the oversight monitoring program, County officials tracked parcels within CSA 114 that had either connected to sewer, annexed to the City of Chico, or both. Staff also developed an inventory of parcels, located in both incorporated and unincorporated territories of the Chico Urban Area, that had connected to a permanent storm drainage system.

At its September 14, 1999 meeting the Board of Supervisors revised its policy regarding CSA 114 parcels that are assessed an annual parcel fee. The Board adopted a policy to not assess any parcel that had connected to sewer. Further, since the storm drainage requirement was relaxed by the Regional Board, there was no longer a need to either assess parcels, or keep parcels within CSA 114 that do not have a permanent solution for storm drainage. In response to this change in policy, the CSA 114 tax roll was updated and the parcel fee on over 1,200 parcels which were confirmed to be receiving sewer service was reduced to zero. These parcels are located in both the incorporated and unincorporated portions of the Chico Urban Area. The financial effect of this change is a net annual decrease in revenue to CSA 114 of approximately $32,000 for fiscal year 1999/2000.

In the future, areas to be annexed to the City of Chico will be detached from CSA 114 upon verification that they are served by sanitary sewer. The CSA 114 tax roll database will be updated and revised annually to reflect the additional parcels which connect to sewer.

Because of the ever changing status of parcels that connect to sewer or parcels that annex to the City of Chico, and due to the abatement of the storm drainage requirement by the Regional Board, a monitoring program to oversee parcels that remain on septic systems was accepted by Regional Board staff. The description of the oversight monitoring program is explained in greater detail in Section 6.3.

City of Chico Involvement with Onsite Systems

As a result of many annexations since the formation of CSA 114 in 1988, the Butte County Division of Environmental Health estimates that 2,000 to 2,500 units that utilize on-site septic systems are located within the City of Chico (jurisdictional boundaries as of January 1999). It is estimated that at least 800 to

1,100 of these units are located in areas that are proposed to be sewered. The absolute total number of units located within the City that are affected by the Prohibition Order is still being determined.

Connection to the sewer system upon annexation is not required by the City of Chico. Sewer connection occurs only when the property owner applies for sewer service, whether voluntarily or due to system failure. In many cases, property owners have petitioned for annexation for non-sewer reasons, such as a desire for specific city services.

The Butte County Division of Environmental Health is the local agency responsible for the permitting and installation of septic systems, regardless of whether a system is located within the City's or County's jurisdiction. Sewage disposal failures are the responsibility of Environmental Health within the unincorporated area and the City within its jurisdiction. All unsewered parcels within CSA 114 are subject to Prohibition Order No. 90-126 whether or not they are located in the City of Chico or the unincorporated portion of the Chico Urban Area.

6.3 DESCRIPTION OF THE OVERSIGHT MONITORING PROGRAM

In its October 14, 1999 letter, the Regional Board outlines two options for monitoring septic systems within the Prohibition Order area: 1) the issuance of a Cleanup and Abatement Order against the County, or 2) the codification of a monitoring program into the County Code combined with a memorandum-of-understanding (MOU) between the County and the Regional Board.

The Regional Board's letter states that State Water Code Section 13304 gives the authority to issue a Cleanup and Abatement Order against the County, because it is currently allowing the discharge of wastewater from septic systems where it is causing pollution. A Cleanup and Abatement Order could require the above monitoring program, and also the elimination of standard septic systems, in areas where the Board determines the density of the systems would cause the exceedance of the maximum contaminant level. This density determination would take the Nitrate Compliance Plan into consideration.

The second option includes an MOU and codification of a monitoring program and would reduce the amount of staff and County resources to obtain adequate monitoring.

Regional Board staff has determined that an oversight monitoring program, administered by the County, may be an effective method of water quality assessment and protection for parcels that continue to use on-site waste water systems. The establishment of an oversight program is proposed to monitor these systems pursuant to the State Water Code which authorizes the continued use of on-site systems in lieu of sewering where water quality can be adequately protected. Elements of the oversight monitoring program are presently being developed and considered by County and Regional Board staff. Such elements include:

- A water quality monitoring program for the shallow aquifer including data collection of groundwater depth, nitrate, coliform and possible other parameters;
- A public education program to educate residents about the groundwater nitrate program and the proper care of their septic systems; and

- A program to report septic tank pumping records and County complaint responses/repairs to Regional Board staff. This program would not initiate intrusive routine inspections of each and every parcel. Data developed and provided through the program would be utilized to gauge future monitoring and oversight needs.

As part of the MOU, Regional Board staff would propose that the results of the monitoring be given sufficient time, on the order of 10 to 20 years, to establish that sewering is having the desired effect on groundwater nitrate concentrations before considering any further action in the unsewered areas.

Approximately twenty percent (20%) of the units affected by the Prohibition Order are currently located within the City limits; this occurrence is largely a result of annexations over the past decade. Regional Board staff acknowledges that further annexations will occur. At some point, resulting from the combined effects of connecting to sewer or through annexations to the City of Chico, the number of parcels located within the unincorporated portion of the Chico Urban Area will be so few as to render the operation of the monitoring program to be infeasible. It will therefore be proposed that the terms of the MOU be reviewed and renegotiated every ten years and rescinded, if appropriate. Also, as conditions warrant, it is proposed that either the County or Regional Board staff may request reconsideration of any affected provision of the MOU. It would be the responsibility of the City to petition the County for participation in the County's monitoring program or to develop its own program that is acceptable to the Regional Board.

By utilizing either the Cleanup and Abatement Order or the MOU coupled with the codification of monitoring requirements, the Regional Board has adequate authority to assure the program would be carried out by the County. County staff recommends pursuit of the second option as the preferred public policy for the following reasons:

1) This approach is a more flexible and cooperative approach than a Cleanup and Abatement Order process;

2) The program is not intrusive to property owners; and

3) Funding and codification of an oversight monitoring program is relatively inexpensive and functionally simple to implement and operate, as compared to other management options previously considered. Funding is currently available through CSA 114 to implement the program.

The policy to implement the MOU and codification of the monitoring program will be considered by the Board of Supervisors upon the finalization and adoption of the Nitrate Compliance Plan. The policy will be coordinated with CEQA requirements.

It is proposed that implementation of the oversight monitoring program be administered by the Butte County Division of Environmental Health. As of this writing it is envisioned that the current CSA 114 revenue stream will be sufficient to cover all operational costs associated with the oversight monitoring program.

6.4 Design and Operating Standards for Onsite Systems

Design Standards

Design standards for both conventional and non-conventional onsite systems will be reviewed in response to the following:

- Any widespread design problems identified during the monitoring; and
- If minimum County standards enforced by the County Division of Environmental Health are determined to be inadequate to protect water quality.

Design standards would be developed for the use of any onsite systems intended for those situations where conventional systems are inappropriate due to site conditions or other factors, including those intended as nitrogen reduction systems. Monitoring of experimental designs already authorized for installation would continue. A list of proposed design standards for Chico Urban Area septic tanks is shown in Appendix O.

Operating Standards

All systems in the Chico Urban Area not connected or not slated to be connected to the sewer system will be monitored in accord with the provisions of the County's monitoring program. The type and frequency of monitoring will depend on provisions of the MOU.

Area-wide monitoring parameters may include coliform, Total Suspended Solids (TSS), or Biochemical Oxygen Demand, (BOD), being discharged to leach fields and total nitrogen content of effluent. It is anticipated that a network of groundwater monitoring wells will be sampled and analyzed on a scheduled basis commencing several years after a substantial portion of the areas to be sewered have actually connected to the sewer system. Groundwater monitoring will consist primarily of coliform and nitrate monitoring. There are approximately two dozen shallow wells of known construction that can be used for this monitoring program.

Monitoring standards must also include a quality assurance/quality control (QA/QC) program to assure that samples are taken, stored, and analyzed properly. There are many such QA/QC programs available to assist in the establishment of a program.

6.5 Survey of Existing Systems

Door to door surveys are not proposed at this time. Possible future survey needs would be established based upon data developed by a monitoring program. If a survey program became necessary the purpose would be to document the condition of existing onsite systems, to identify deteriorating onsite systems so that corrective action can be taken before more serious and costly problems occur, and to locate and document sources of public health problems or water pollution.

6.6 TRAINING AND CERTIFICATION OF ONSITE PERSONNEL

Training and certification programs for all personnel who design, install, maintain, inspect, or pump septic systems will be encouraged. California State University - Chico (CSUC), in conjunction with the California Onsite Wastewater Association (COWA), has received funding through the State's 319(h) program to develop a training center at the CSUC campus.

Training courses have already commenced and courses to be offered or required include:

1. Soil morphology and identification
2. Basic system hydraulics
3. Design standards for alternative systems
4. System inspection for potential failure
5. Proper sample collection techniques

Soil morphology classes are currently taught at several locations in California and Oregon. The California Environmental Health Association recently held such a course in the San Francisco Bay Area. In addition, the many professional contacts provided by California Onsite Wastewater Association can be utilized as well as the Town of Paradise which is actively involved in providing many of the above training courses.

6.7 WASTE DISCHARGE REQUIREMENTS

The authority to require waste discharge requirements for the remaining onsite systems in the Chico area is set forth in §13260(a)(1) of the State Water Code, which reads:

> 13260. (a) All of the following persons shall file with the appropriate regional board a report of the discharge, containing the information which may be required by the regional board:
>
> > (1) Any person discharging waste, or proposing to discharge waste, within any region that could affect the quality of the waters of the state, other than into a community sewer system.

It is anticipated that the MOU and monitoring program will supplant the need for Waste Discharge Requirements.

6.8 SUPERSEDENCE OF NITRATE ACTION PLAN

In Section 2.5 (page 2-12) a summary was given of the Nitrate Action Plan which was adopted in 1985. In short, the Nitrate Action Plan addresses density limits on those developments that utilize septic systems within the Chico Urban Area. The Nitrate Action Plan was further amended in 1988 to establish a time line to sewer all parcels, less than one acre in size, within the Chico Urban Area. As it is indicated in Section 2.5 the Nitrate Compliance Plan will supersede the Nitrate Action Plan once it is adopted by the Board of Supervisors.

Several elements of the Nitrate Action Plan are germane to the Nitrate Compliance Plan and will be incorporated herein. A copy of the Nitrate Action Plan is provided in Appendix N. The elements from this plan to be retained under the Nitrate Compliance Plan include septic tank installation standards which are shown in Appendix O. Upon the adoption of the Nitrate Compliance Plan, the Butte County Division of Environmental Health will recommend that the Board rescind the Nitrate Action Plan and adopt in ordinance form those septic tank installation standards to be retained for the Chico Urban Area.

chapter seven

LOCAL GOVERNMENT JURISDICTION, DEVELOPMENT & RELATED ISSUES

This chapter deals with the need for the County and City of Chico to work on a cooperative basis to address the issues that arise in solving the health and regulatory issues which impact the citizens of the Chico Urban Area. In addition to the need to coordinate the planning, financing and construction of sewer infrastructure as discussed in previous sections, the agencies will need to address such issues as annexation policies, land use planning and development regulations.

KEY POINTS

- Butte County and the City of Chico have previously cooperated on many issues, including those related to the nitrate issue. It is imperative that every effort be made to further cooperate on the actions recommended herein.
- The County and City are currently in negotiations to resolve differences regarding annexation to the City of Chico as a condition of sewer service.
- New residential development on septic systems will be limited to areas with a minimum parcel size of 20,000 square feet, equivalent to approximately two dwelling units per acre.

7.1 County and City Jurisdiction and Cooperation

The County of Butte and City of Chico share jurisdiction over the growth and development of the Chico Urban Area. Historically, this joint responsibility has given rise to both cooperation and disagreement, and the nitrate issue has been no exception. The public's stake in the issues at hand compel the resolution of matters upon which City and County interests and approach may diverge.

The two agencies have resolved many difficult issues in recent years. Among other successes, agreement has been reached on strengthening the "green line" to limit development into agricultural soils to the west, on adoption and implementation of the Nitrate Action Plan, a resolution of property tax and sales tax allocation, and the cooperative formation of the Greater Chico Urban Area Redevelopment Project. As the County's plan for compliance with water quality objectives has taken shape, the need for resolution of area wide land use and infrastructure planning issues, as well as issues related to annexation has become clear.

The recommended alternative of utilizing the City's sewer collection and treatment system gives rise to questions of interest to both agencies and the public at large. Opportunities for further coordination and

cooperation arise with the prioritization of redevelopment funds and related financing mechanisms, annexation policies, and expansion of the wastewater treatment plant.

Existing County and City Agreements Relevant to Nitrate Compliance

The County of Butte and the City of Chico have negotiated several milestone agreements in the past decade that are germane to the groundwater nitrate issue.

NITRATE ACTION PLAN (1985, 1988 {amended}). These joint documents laid out a plan of action which both entities would undertake in order to prevent further water quality degradation and to minimize the existing nitrate problem in the groundwater beneath the Chico Urban Area.

AMENDED MASTER PROPERTY TAX TRANSFER AGREEMENT (1987). This document settled a dispute regarding property tax and sales tax allocations. The issue was generated by the proposed annexation of the North Valley Plaza Mall to the City of Chico, a significant generator of sales tax revenue to the County. The litigation and political rancor that characterized the period prior to the settlement of this issue and the related Municipal Affairs Agreement marked a low point in relations between the two agencies.

In entering into this agreement, County and City agreed to the allocation of the local share of property taxes between the two agencies, and the sharing of sales and use tax revenues generated from within the city limits.

MUNICIPAL AFFAIRS AGREEMENT (1987). Accompanying the above agreement on tax revenues, this document set forth a larger view of the long-term provision of municipal services to the urban area fragmented by many pockets of fully urbanized yet unincorporated territory. Included was an agreement to pursue coordination of land use planning and development standards and the joint formation of an urban area-wide redevelopment project.

GREATER CHICO URBAN AREA REDEVELOPMENT PROJECT (1994). Citing groundwater nitrate contamination as the leading "blight condition" requiring the use of redevelopment funding mechanisms, the County and City cooperated in the formation of this cross-jurisdictional redevelopment project area. (Refer to section 5.5 for further discussion of the Greater Chico Urban Area Redevelopment Project.)

Opportunities for Further Cooperation Between City and County

In an era of shrinking revenues available to California counties and cities, the City of Chico and County of Butte have each sought to identify efficiencies in the provision of public infrastructure and services. The differing nature of their responsibilities, revenue sources, territory and constituencies, however, leads to varying perspectives on a range of common issues. Further complicating the relationship is the state's reallocation of local property tax revenues, mandated programs that are unfunded, and the threat that federal programs and their associated costs will be shifted down to local government.

The components of the proposed Plan substantially affect the entire urban area and both local agencies. Opportunities for further cooperation between the County and the City include the following:

OVERSIGHT OF SEPTIC SYSTEMS. The incorporated area contains up to 1,500 annexed properties that are served by septic systems. Many of these systems serve single family dwellings which are not proposed for sewering. As annexations occur over time, the number of such systems can be expected to increase.

PROVISION OF PUBLIC INFRASTRUCTURE. The County and City currently coordinate street and storm drainage improvements and various other infrastructure-related programs as well as the cross-jurisdictional redevelopment project. Implementation of the proposed plan and resolution of the nitrate issue may expand such opportunities for coordinated actions. Construction of the collection system will impact both County and City streets in a variety of ways that will need to be addressed by the two agencies.

LAND USE PLANNING. The City has recently completed a comprehensive update of the Chico General Plan, which is the foundational document for development of the City and its sphere of influence. Until this update, which enacted fundamental changes to the general plan previously in place, the County and City general plans closely conformed to each other. County and City staffs have begun a review to determine where areas of inconsistency may exist.

DEVELOPMENT STANDARDS AND IMPACT FEES. With certain exceptions, the development standards and regulations of the two agencies are compatible. Further alignment may be considered to ensure that development of the unincorporated area is not substantially at variance with the long-term inclusion of these areas within the city limits. Development impact fees have been adopted fairly consistently by both County and City with few exceptions.

7.2 ANNEXATION POLICY

City of Chico Policy Regarding Annexation as a Condition of Sewer Service

It has been the policy of the City Council (Title 15, Water and Sewers, of the Chico Municipal Code), to require annexation as a condition of connection to sewer facilities, if possible. If annexation is not possible, the city requires the property owner to execute an annexation and sewer service agreement before connecting. The requirement for mandatory annexation to the City of Chico appears to be strongly opposed by a number of property owners affected by the Prohibition Order. Proposed annexations of large segments of the Chico Urban Area have historically caused significant debate and keen interest in the public forum.

Annexation Law and the Local Agency Formation Commission

The Butte County Local Agency Formation Commission (LAFCo) is established pursuant to the Cortese-Knox Local Government Reorganization Act of 1985 as set forth in California Government Code

§56000, et seq. It consists of seven commissioners drawn from the Butte County Board of Supervisors (2 members), the five incorporated cities in the county (2 members), representatives of special districts in the county (2 members), and one member from the public at large.

The primary purpose of the Butte County LAFCo is "to encourage the orderly growth and development of local agencies within the County, in accordance with the policies and procedures established by the State Legislature..." LAFCo has the authority and responsibility for the following:

- Approve or disapprove all proposals for formation of new local public agencies (with the exception of school districts);
- Development and determination of the appropriate sphere of influence for each local public agency within the County of Butte
- Change of boundaries of existing local agencies;
- Consolidation of existing local agencies;
- Reorganizations or other changes in organization of local agencies; and
- Studies of local public agencies' operations to determine appropriate organization and scope.

LAFCo is specifically charged with encouraging the efficient and economic delivery of public services, while protecting other important state interests such as the preservation of agricultural and open-space lands.

Government Code §56133 was amended by the California Senate (SB 807, Senate Agriculture and Water Resources Committee) on October 7, 1999. This legislation allows, if certain conditions are met, a LAFCo to authorize a city or special district to extend services outside of its jurisdictional boundaries and outside its sphere of influence to respond to an existing or threatened public health or safety threat to the residents of the affected territory.

Effective January 1, 2000, state law (Assembly Bill 1555, Longville) was amended to establish a modified process when the annexation involves an "island of unincorporated territory." Under this new law "islands" can be annexed without consideration of a protest or City Council hearing. For the purposes of this special process, the territory proposed for annexation must meet the following criteria:

- The "island" does not exceed 75 acres in size.
- The entire "island" is included in the annexation.
- The "island" is surrounded, or substantially surrounded, by the City to which annexation is proposed.

- The "island" is substantially developed or developing based on consideration of public utility service, public improvements and physical development.

- It is not prime agricultural land.

- The "island" will benefit from annexation or is receiving benefits from the annexing City.

According to the City of Chico Community Development Department (November 1999 memo to City Council), there are approximately 65 "islands of unincorporated territory," ranging in size from a single parcel of 5500 square feet to several hundred parcels in an area exceeding 100 acres. Of these "islands" at least 60 meet the criteria above and could be annexed with the modified process. Approximately 7 of these "islands" include areas that are proposed to be sewered as part of the Nitrate Compliance Plan and the majority of these are located south of Lindo Channel.

Current City policy is to provide assistance to residents and landowners requesting annexation. Should the City of Chico pursue annexation of "unincorporated islands," an amendment of City policy would be required. As of February 2000 the Chico City Council has not yet officially considered the new law regarding the annexation of "islands."

7.3 Proposed Memorandum of Understanding Between County and City

Citing the greater priority of the community health issue and the difficulty of obtaining majority public acceptance, County representatives have requested the City to modify its annexation policy. An ad-hoc committee of the Chico-area Supervisors, City Council members and staff have met to discuss annexation and related issues. The County representatives have expressed the objective of relieving the owners of residential property affected by the Prohibition Order of the annexation requirement. In turn, City representatives have stated their concerns regarding development within the unincorporated portion of the Chico Urban Area, and the logic and public benefit of achieving a community within a single local government jurisdiction.

Discussion of Issues and Draft Provisions

Although it must be emphasized that the parties have not yet reached agreement, negotiations are currently proceeding. The representatives of the County and City have committed to continuing discussions on these matters. The process should be facilitated by completion of the Nitrate Compliance Plan, which may provide further perspective to all participants and assist in problem-solving. The continued good faith efforts of City and County representatives will allow progress on these issues to continue along with the consideration and refinement of the Nitrate Compliance Plan.

The Butte County Local Agency Formation Commission may need to consider and approve certain of these provisions, as well as the full Board of Supervisors and City Council.

7.4 WASTEWATER DISPOSAL REQUIREMENTS FOR NEW DEVELOPMENT

As previously described in Chapter 3, the threshold density which will not cause exceedance of the maximum containment level for nitrate in groundwater beneath the Chico Urban Area has been calculated at approximately four dwelling units per acre. This calculated density is absent an engineering safety factor, however, which is typically applied as standard engineering practice in similar situations. Additional protection for existing dwellings will be afforded by the establishment of a program to monitor onsite systems (see Chapter 6).

Minimum Lot Sizes and Density Limits for New Development

In considering the proposed Nitrate Compliance Plan, the Regional Board will be asked to consider the reasonableness of expanded sewering of existing units, the decreased feasibility and increased cost of sewering lower density neighborhoods, and the effectiveness of alternative measures proposed by the County. These factors may be persuasive for existing systems. However, the Regional Board may view new development served by onsite systems within the Chico Urban Area as an unnecessary contribution to degradation of the aquifer.

Reflecting the County's emphasis on the most cost-effective alternatives, a dual standard for residential density is proposed. The allowable density for ***existing*** dwelling units on septic systems, based on acceptable nitrate loading and fully addressed in Chapter 4, is approximately four units per acre. As previously discussed, this density will ensure compliance with the maximum contaminant level for nitrate in groundwater when combined with the other measures, but further development to this density may tend to perpetuate high nitrate loading, due to the lack of an engineering safety factor.

In view of the foregoing, and in pursuit of good land use practice and cooperation with the City of Chico, ***new*** residential development within the Chico Urban Area will have a minimum parcel size of 20,000 square feet if it is to be served by a conventional septic system and a density of approximately two dwelling units per acre. This applies a reasonable safety factor to calculated nitrate loading and ensures that long-term water quality will be protected and improved.

chapter eight

ENVIRONMENTAL REVIEW AND COMPLIANCE

This chapter discusses the environmental review process required by the California Environmental Quality Act as it pertains to the proposed Nitrate Compliance Plan and the component elements contained herein. The scope and nature of these components require an environmental impact report that addresses both the initial decisions regarding these components and the long term effects of the overall program on the environment, and later specific actions such as the installation of sewer lines.

KEY POINTS

- To meet compliance with its State Revolving Fund loan application to finance the installation of sewers, the County must prepare an environmental document that is subject to the provisions of the California Environmental Quality Act.
- Four previous environmental impact reports have addressed the extension of sewers throughout the Chico Urban Area, including the potential growth-inducing impacts and cumulative impacts of sewer extension.
- The California Environmental Quality Act provides several alternative methods that may be appropriate for the proposed Nitrate Compliance Plan. Among these are the Program Environmental Impact Report (EIR), Staged EIR, Master EIR and Project EIR. The Project EIR has been deemed the most appropriate form of full-scope environmental impact report for the project. Utilizing the concept of "tiering" upon previous environmental documentation, the Project EIR will assess the environmental effects of all aspects of the project as it is currently defined.
- Subsequent environmental analysis may be necessary only if there are significant changes in the project description or in the environmental setting, or if components of the project not fully defined at this time warrant further detailed analysis. The appropriate form of environmental analysis may include a Supplemental EIR, Subsequent EIR, Supplement to an EIR, Focused EIR, or Initial Study/Mitigated Negative Declaration.

8.1 REQUIREMENTS OF THE CALIFORNIA ENVIRONMENTAL QUALITY ACT

The California Environmental Quality Act (CEQA) is the body of state law which encourages the protection of all aspects of the physical environment and requires an analysis of all potential environmental benefits. While other state laws address single-topic environmental issues, (e.g., many provisions of the State Water Code), CEQA is a very broad environmental law pertaining to all discretionary activities proposed to be carried out or approved by public agencies, unless an exemption applies.

According to CEQA Guidelines sections 15002, 15086 and 15087, the objectives of CEQA are:

- To disclose to decision-makers and the public the significant environmental effects of proposed activities,
- To identify ways to avoid or reduce environmental damage,
- To disclose to the public reasons for agency approvals of projects with significant environmental effects,
- To foster interagency coordination in the review of projects, and
- To enhance public participation in the planning process.

Following an initial process of evaluating the potential effects of a proposed project, CEQA may require the preparation of an environmental impact report (EIR). An EIR is a public informational document used in the planning and decision-making process to assess the environmental effects related to the planning, construction and operation of a project. It identifies measures to avoid or reduce possible environmental damage, and disclose significant impacts that cannot be avoided. An EIR must also address growth-inducing impacts, effects found not to be significant, and significant cumulative effects.

As the informational document on the environmental effects of a project, the contents of an EIR and comments relative to its adequacy are to be considered by the decision-making body to balance the project's benefits against its unavoidable environmental effects or risks.

8.2 Previous Environmental Documents

The California Environmental Quality Act encourages the "tiering" of environmental impact reports, which streamlines the preparation of an EIR by allowing an agency to focus on the issues which are ripe for decision and to exclude those issues already decided or not yet ripe (Guidelines §15385). Several recent Environmental Impact Reports have been prepared which address elements of the currently proposed Nitrate Compliance Plan. To the extent these environmental impact reports remain relevant and accurate, they may be used as the "first-tier" in the environmental process, enabling an Environmental Impact Report for the proposed Nitrate Compliance Plan to concentrate- on environmental effects not previously disclosed.

The following sections summarize previous Environmental Impact Reports which address the general environmental effects of providing sewer service throughout the Chico Urban Area, particularly the growth-inducing and cumulative effects of such sewer service.

<u>EIR for the Adoption of the Sanitary Sewer and Storm Drainage Master Plans</u>

Prepared in 1991 under the direction of the City of Chico and representatives of Butte County, this EIR specifically addressed, among other components, the expansion of the sewer service area to include the entire Chico Urban Area. Preparation of the sanitary sewer and storm drainage master plans were originally called for in the 1985 Nitrate Action Plan.

Project components addressed in the Environmental Impact Report consisted of:

- Adoption of the Chico Urban Area draft sanitary sewer master plan, as detailed in Final Report: Sanitary Sewer Master Plan, City of Chico, dated December 20, 1985 (Brown and Caldwell 1985), and expansion of the city sewer service area to be identical with the Chico Sphere of Influence;

- Adoption of the Chico Urban Area draft storm drainage master plan, as detailed in Preliminary Storm Drainage Master Plan, City of Chico/Butte County, dated August 13, 1987 (Brown and Caldwell 1987);

- Approval of a proposed annexation of approximately 521 acres located northwest of the Chico city limits; and

- Approval of proposed general plan amendments to the City of Chico General Plan and the Butte County General Plan to change the land use designations for all currently undeveloped, unincorporated lands located north of the Lindo Channel from Low-Density (1-6 dwelling units per acre [du/ac]), Medium-Density (7-13 du/ac), and High-Density (14-20 du/ac) Residential to Low Density Residential (1-4 du/ac).

The purpose of the sewer and storm drainage master plans was to identify and organize those improvements that would be necessary to serve the buildout of the Chico Sphere of Influence, and to provide solutions to existing system deficiencies. Both of these plans were prepared in accordance with the previously adopted Nitrate Action Plan.

The Northwest Environmental Impact Report concluded that growth-inducing impacts would occur, because adoption of the sanitary sewer master plan would remove a major constraint to growth. The potential growth-inducing impacts identified in that EIR included changes in the rate of growth, in population density, and in the patterns of land use.

EIR for the Greater Chico Urban Area Redevelopment Project

This 1993 programmatic Environmental Impact Report was prepared for the formation of the redevelopment project area, the primary purpose of which is to construct improvements to ameliorate the groundwater contamination in the Chico Urban Area. The redevelopment project's first goal is to "construct and install new or improved sewer facilities, sewer mains and trunk lines, water pollution control plant facilities, or other sewer facilities necessary to replace septic systems that are currently contributing to groundwater pollution."

City of Chico General Plan EIR

The Environmental Impact Report for the Chico General Plan was certified by the City Council in late 1994, following numerous public hearings. Covering a comprehensive update of the Chico General Plan, this EIR presents a thorough overview of the environmental effects of buildout of the General Plan Area. The Environmental Impact Report concluded that impacts on groundwater quality from implementation of the General Plan would be less than significant. Under the General Plan it is assumed that new development exceeding density limits set in the Nitrate Action Plan will connect to the sanitary sewer. It is also assumed that parcels with failed septic systems will connect to sanitary sewer if facilities are readily available.

EIR for Chico Water Pollution Control Plant Expansion

The Environmental Impact Report covering the Chico Water Pollution Control Plan Expansion was certified by the Chico City Council in November, 1995. It assessed the impacts of the proposed expansion of the Water Pollution Control Plant (WPCP) from a rated and permitted capacity of 6.0 mgd to approximately 9.0 mgd.

8.3 CEQA COMPLIANCE ALTERNATIVES

The California Environmental Quality Act allows several approaches to a large and complex project such as the one described herein. The fundamental characteristic of the approach to CEQA compliance involves the assessment of "big picture" aspects such as the broad policy decisions; the cumulative effects of the project added to other past, present and expected future projects; and any growth-inducing effects of the project. As indicated in the summary of previous environmental documents, much of this assessment and disclosure may have already occurred. A review of each of these documents must be conducted to determine the extent to which California Environmental Quality Act requires updated or expanded assessments of these components.

Potential environmental effects of the proposed Nitrate Compliance Plan components that have not undergone review and disclosure in previous documents include such aspects as the adoption of new or amended regulations for siting, design, maintenance and operation of onsite systems and the potential amendment of land use and development regulations.

The following sections discuss the alternatives for preparation of an Environmental Impact Report for the proposed Nitrate Compliance Plan.

Program Environmental Impact Report

Authority:	14 CCR 15168
Purpose:	To allow general analysis of the broad environmental effects of an agency program or series of actions with the acknowledgment that specific

environmental review of program components will occur when those components are fully developed and proposed for implementation.

Applicable Projects: Projects composed of a series of actions are:

- related geographically
- logical parts in a chain of contemplated actions
- connected as part of a continuing program
- carried out under same authorizing statute or regulatory authority and have similar environmental impacts that can be mitigated in similar ways

Discussion: The Program Environmental Impact Report is well suited to the proposed Nitrate Compliance Plan since it highlights consideration of broad policy alternatives and provides a focus on cumulative impacts at an early stage of decision-making. This type of Environmental Impact Report typically contains a more general discussion of impacts, alternatives, and mitigation measures than is required of a project Environmental Impact Report. The Program Environmental Impact Report is used by a wide variety of agencies for evaluation of regional or community-wide impacts in a manner that saves time and money for review of subsequent projects.

Master Environmental Impact Report

Authority: Public Resources Code §21156-21158.5

Purpose: To enable first-tier environmental analysis pursuant to a detailed statutory process which provides agencies with greater certainty regarding ability to withstand legal challenges to tiered documents.

Applicable Projects:

- general plan (including individual elements and amendments)
- specific plan
- project consisting of smaller, phased projects
- regulation to be implemented by subsequent projects
- project pursuant to or furthering a redevelopment plan
- state highway or transit project subject to multiple review or approvals

Discussion: The Master Environmental Impact Report is the newest type of first-tier Environmental Impact Report, created by the legislature in 1993 with the intent of streamlining the California Environmental Quality Act process. The procedures for use of a Master Environmental Impact Report for subsequent projects are very detailed and complex and are generally restricted to five years from the date of preparation, limiting its usefulness for the Nitrate Compliance Plan.

Staged Environmental Impact Report

Authority:	14 CCR 15167
Purpose:	To assess the environmental effects of large-scale capital improvement projects that are approved in stages.
Applicable Projects:	Applicable to large projects that: • involve many years of planning • require numerous discretionary approvals from several government agencies, some of which would be required before detailed project plans would be formulated • require several approvals, one which is scheduled to occur more than two years before construction will begin
Discussion:	The Staged Environmental Impact Report is very similar to a Program Environmental Impact Report, but specifically contemplates subsequent environmental documentation. The use of a Staged Environmental Impact Report may be less appropriate in its handling of non-capital improvement components for the Nitrate Compliance Plan.

Project Environmental Impact Report

The Project EIR is the most common form of EIR and is intended to examine environmental impacts of a specific project. The EIR addresses all aspects and phases of a project, including planning, construction, and operation.

8.4 Use of the Project EIR

Because most of the components of the proposed project are clearly defined, it has been determined that the Project EIR is the most appropriate form of environmental impact report for use in addressing the potential environmental effects of all components of the proposed project. The Project EIR will build, or "tier," upon previous environmental documentation pertinent to the project.

Preparation of the environmental impact report for the proposed Nitrate Compliance Plan should begin as early as possible in the planning process to allow environmental considerations to affect project design, but late enough to provide meaningful assessment. In particular, the EIR should be based on as detailed and complete a project description as is possible.

The EIR will be prepared following initial consideration and endorsement of the Nitrate Compliance Plan by the Butte County Board of Supervisors, the City of Chico City Council (for applicable components), and the Regional Water Quality Control Board. This will enable the Board of Supervisors to identify,

and the EIR to assess, the "preferred plan" among other possible alternatives. The certification of the EIR by the Board of Supervisors will accomplish two key undertakings:

(1) Certification of the EIR enables the Board to take action on the project, and;

(2) Certification of the EIR and its submittal to the State Water Resources Control Board enables the State to approve the County's State Revolving Fund loan application.

8.5 Supplemental Environmental Documents and Processes

It is the County's intent that the proposed Project EIR address as much of the ultimate plan as possible, reducing the likelihood that subsequent environmental analyses will be required. Nonetheless, by its nature certain elements of the proposed project, such as detailed construction drawings, are not available for analysis. Thus, as the Nitrate Compliance Program proceeds, further environmental analysis may be necessary. As components become more detailed and further discretionary decisions are necessary, associated issues may become ripe for analysis. These subsequent project components and activities within the larger project will be examined to determine whether or not further environmental analysis pursuant to CEQA is required.

The need for subsequent environmental analysis will be based on a variety of factors, including but not limited to significant changes in the project description or project environment, or the discovery of significant project components that are revealed following completion of the original Project EIR. Similarly, the appropriate form of subsequent environmental analysis will be based on a variety of factors, including the extent of the changes, and may include a Supplemental EIR, Subsequent EIR, Supplement to an EIR, Focused EIR, or an Initial Study/Mitigated Negative Declaration. Subsequent environmental analysis would be limited to those issues not previously addressed in the Project EIR.

chapter nine

IMPLEMENTATION COMPONENTS AND SCHEDULE

This chapter compiles the various recommended components of the overall Nitrate Compliance Plan and highlights the key decisions and directions. An approach to building public awareness and consensus is discussed, followed by a plan of action for formal approval. A preliminary schedule of actions is presented in both narrative and chart form. Key deadlines and dates are suggested.

KEY POINTS

- Informational workshops were held within the Chico community prior to final consideration by the Board of Supervisors. The Citizen's Nitrate Advisory Committee has provided valuable input to the project team on behalf of the affected public.
- Over approximately a seven to ten year period, phased sewer service will be extended to approximately 7,800 dwelling units within designated subareas.
- A combination of loan programs to assist with financing of sewer improvements will best fit the situation, with emphasis on the low-interest State Revolving Fund and probable use of a special assessment district. Further structuring and refinement of a financing program will be necessary following adoption of the Nitrate Compliance Plan.
- A Memorandum of Understanding between the City of Chico and the County has been discussed, with the objective of resolving annexation and related issues in a manner that will ease public concerns and facilitate completion of the program.
- The Regional Board will be asked to amend the Prohibition Order or take other steps as appropriate to approve the County's Nitrate Compliance Plan.

9.1 REVIEW OF RECOMMENDED COMPONENTS

Each of the components recommended herein represents a sizable undertaking by the County of Butte and CSA 114 over the next decade. Following is a brief review of the component parts of the Nitrate Compliance Plan.

Provision of Sewer Service to Designated Areas

Sanitary sewer service will be provided to those areas designated for elimination of existing septic systems as set forth in Chapter 4. Extension of the City of Chico collection system and treatment of wastewater via the City's existing Water Pollution Control Plant is the recommended alternative. Financing of sewer improvements is anticipated to involve a substantial loan from the State Revolving Fund, with the resulting debt to be repaid with proceeds from assessments on benefited properties and other available sources as discussed in Chapter 5.

The size of the sewering project necessitates a phased approach, with segments of the collection system designed and constructed over approximately a seven to ten year period. The initial phase is expected to provide sewer service to the Lassen Avenue Corridor to eliminate a substantial quantity of wastewater impacting the greatest concentration of nitrate.

Determination and Implementation of Financing Plan Components

As previously stated, a basic plan for financing the sewer improvements is necessary to implement the Plan. Development of the sewer financing components will require close consultation with the Division of Clean Water Program of the State Water Resources Control Board (State Revolving Fund), the Chico Redevelopment Agency (tax increment, housing set-aside), the City of Chico (Water Pollution Control Plant capacity fees, sewer service fees), a team of municipal finance professionals and County staff.

The process of qualifying for a low-interest loan from the State Revolving Fund requires many steps that are integral to an overall financing program. Preparation of a facilities plan consisting of a project report, environmental impact report, draft revenue program, and related documents, all must be completed and approved by the Board of Supervisors prior to receiving a preliminary loan commitment from the State.

Implementation of County Service Area 114 for Management of Onsite Systems

To date, CSA 114 has functioned effectively as a vehicle for funding the technical studies and activities to carry out the Nitrate Compliance Program. With adoption of the Nitrate Compliance Plan, CSA 114 revenue will be utilized to implement an oversight monitoring program to oversee approximately 4,200 dwelling units that continue using onsite septic systems. In addition to setting up the oversight monitoring program, which will be codified in the Butte County Code, the County will enter into agreement with the Regional Board to ensure that the monitoring program be given sufficient time to establish that sewering is having the desired effect on groundwater nitrate concentrations (refer to Chapter 6).

Adoption of Memorandum of Understanding with City of Chico

The City of Chico and the County of Butte will need to work together on a cooperative basis to address the health and safety issue which impacts the citizens of the Chico Urban Area. The successful adoption of the Memorandum of Understanding described in Section 7.3 sets the stage for this cooperative effort.

9.2 Public Information and Outreach

The subject matter of the Nitrate Compliance Plan is complex and has cost implications to property owners. A lengthy history of public interest and debate make it extremely important to conduct informational workshops within the Chico community. Since the release of the Draft Plan in March 1998, County Administrative Office staff have conducted no fewer than seven public workshops within the Chico community. These workshops have individually attracted as many as 120 persons. One of

these workshops included a special work session with the local print, radio and television media (April 1998) and another included a presentation to the Chico City Council (May 1998). Venues for conducting these workshops and public meetings have included the Chico Elks Lodge, Butte County Library (Chico Branch), Canyon Oaks Country Club, Chico Junior High School, and City of Chico Council Chambers.

In general, all workshops have been supported by the County's engineers and public health experts, and several were also supported and attended by the County's local elected officials and Citizens Nitrate Advisory Committee members. Specific civic groups that sponsored a public workshop included the League of Women Voters, Chico Association of Realtors, Citizens Advisory Committee, and the North Valley Property Owners Association. To promote several of these workshops the County funded, through CSA 114, advertisements in the Chico Enterprise-Record, the Chico News & Review, and also sent flyers to prospective organizations. Many of these organizations also promoted the workshops through their own newsletters. Staff has also made presentations to environmental engineering students at California State University - Chico (CSUC) and at training seminars sponsored by the Northern California Wastewater Training Center which is based at CSUC.

As a result of these workshops County staff created several fact sheets and a brochure which addresses frequently asked questions and other general information (Appendix S). Staff from the Administrative Office also maintains a log of persons (i.e. "customers") who have inquired about the Nitrate Compliance Program and to date more than 100 customers have been provided information. The majority of these inquiries relate to the buying and selling of real estate. Many customers desire to know when the sewer connections will occur and at what cost. Other customers simply wish to compare the costs of connecting to sewer versus revamping an on-site septic system.

Other groups contacted by County staff include the Cussick Avenue Neighborhood Council, TEAM Chapman, the Mobile Home Property Owners Association, and the Chico Chamber of Commerce. The scheduling of workshops for these civic groups will be done at their pleasure. In addition, County staff will organize presentations on a smaller scale for other community, neighborhood, and service groups. It is anticipated that the Nitrate Compliance Program will generate more interest once cost figures are finalized (refer to Chapter 5) and once the proposed construction schedule is released for the public's consideration. The preparation of an environmental impact report (refer to Chapter 8) will also allow for public review and input.

Additional outreach measures, such as the televising of workshop sessions, will be considered to provide every possible opportunity to disseminate information to the public. Copies of the Nitrate Compliance Plan and sewer feasibility studies have been added to the resource sections already in place for the Nitrate Compliance Program in the Chico Branch of the Butte County Library and Meriam Library on the campus of California State University, Chico. The County has also made the Plan available for review via the internet (refer to *www.buttecounty.net/cob*).

Outreach - Butte County Division of Environmental Health

The Butte County Division of Environmental Health has participated in a monitoring and public education program since November 1984 (refer to Nitrate Action Plan, Appendix N). The County and State Department of Water Resources monitor a combined total of 28 wells for the shallow zone waters of the Chico Urban Area.

The County Health Officer periodically sends notification to local physicians in the County informing them of the nitrate problem in the Chico Urban Area and alerting them to be aware of methemoglobinemia symptoms. The Health Department will continue to advise residents that they have their wells tested and to obtain an alternative source of drinking water for infants if their wells show a nitrate level in excess of 45 mg/l. In accordance with the proposed oversight monitoring program (refer to Chapter 6) the Health Department will implement a program to educate residents about the groundwater nitrate program and the proper care and maintenance of septic systems.

Citizen's Nitrate Advisory Committee

On November 16, 1995, the first meeting of a Citizen's Nitrate Advisory Committee was held. The committee's role and purpose in the Nitrate Compliance Program is as follows:

- To assist in generating and considering alternative approaches, methods and strategies available to the project team and the community;
- To act as a sounding board in review of draft analyses and proposals;
- To express the priorities, interests and values of the affected community;
  To advise the Board of Supervisors, and particularly the Chico-area
- Supervisors who have been actively involved with the issue on a continuous basis, on the merits of recommended courses of action;
- To assist the project team in drafting an effective Plan that is acceptable to the public, the Butte County Board of Supervisors, and the Central Valley Regional Water Quality Control Board.

Since their first meeting, the Citizens Nitrate Advisory Committee has met regularly to receive technical data and to provide their input and ideas.

In view of the many facets of the issue, there was a deliberate attempt to diversify the membership of the committee to provide representation of the many affected stakeholders. The membership includes neighborhood representatives, mobile home park owners, mobile home park tenants, property managers, bankers, septic tank service providers, attorneys, engineers, and representatives from a citizen group originally formed in the 1980's to address this issue. Additionally, staff from several County departments, staff from the Regional Water Quality Control Board, and technical consultants attend these meetings.

The intent of the committee is to receive the value of many viewpoints in crafting a final solution to bring forward to the full community. A list of the membership of the Citizen's Nitrate Advisory Committee is provided in Appendix H.

Key issues debated among the committee members included the oversight of remaining onsite sewage disposal systems, the extent of sewering and the financing of improvements in such a way as to minimize hardship on property owners and tenants.

9.3 AGENCY CONSIDERATION, PUBLIC HEARINGS, AND ACTION

Implementation of this program will require formal approvals by the Butte County Board of Supervisors and the Central Valley Regional Water Quality Control Board and, where appropriate, the Chico City Council. These approvals will be preceded by careful consideration and discussion, review by staff for compliance with applicable law, preparation of specific resolutions and ordinances, and both informal and formal public meetings.

Prior to submitting the draft Plan to the public for review, the Plan was submitted to the Board of Supervisors in March 1998. Following a presentation of the recommendations contained within the document, the Board accepted the document as a draft and directed staff to submit the Plan to the public and the Regional Board for their review. The Plan is being brought back before the Board of Supervisors in the spring of 2000 for final consideration and adoption.

Workshop Session and Formal Actions of the Regional Board

The members of the Central Valley Regional Water Quality Control Board often utilize workshop sessions for purposes of presentations and discussion. It is anticipated that one or more such sessions will be utilized by the Regional Board for the purpose of hearing presentations and proposals and receiving staff reports and recommendations. Further, the Board may wish to direct staff to amend the Basin Plan and similar pending state actions. Supplemental information may then be prepared, along with the final documents in anticipation of formal action.

The Regional Board was presented with the essential elements of the technical study and proposed draft Plan on December 6, 1996. Regional Board staff reviewed the history of the issue and prior actions by the Regional Board. County representatives described the extensive efforts and expense involved in the technical program and analyses, as well as the fundamental scope and direction of the draft Plan. Following the presentation and discussion, the Regional Board endorsed the County's efforts and expressed its satisfaction with the proposed actions.

Formal Actions

Subsequent to the workshop session with the Regional Board, the County should be prepared to move forward on the preparation of formal documents and to conduct public meetings or hearings as needed.

Upon completion of the foregoing, the Regional Board may be prepared to take formal actions to finalize the program, including:

- Amendment of the Basin Plan - This action will formally supersede the existing Prohibition Order and allow the continued operation of onsite sewage disposal systems as described in Chapter 6.

The Basin Plan Amendment is expected to include the following:

1. Rescind the previous Basin Plan amendment (Prohibition).

2. Delineate areas to be sewered.

3. Establish mechanism for modifying areas to be sewered using input from future engineering design.

4. Provide the County guidance for future septic tank system approvals within the Basin Plan Amendment area.

5. Provide guidance for development of the oversight monitoring program to monitor parcels that continue using on-site septic systems.

6. Include the memorandum-of-understanding between the County and Regional Board to identify future monitoring of the shallow aquifer, codification of the oversight monitoring program in the Butte County Code, and a time certain element, which may range from 10 to 20 years, to establish that sewering is having the desired effect on groundwater nitrate concentrations.

A preliminary schedule of the actions leading to adoption of the Nitrate Compliance Plan is presented in Table 9-1.

Table 9-1

PRELIMINARY SCHEDULE FOR ADOPTION OF THE IMPLEMENTATION PLAN AND APPROVAL BY THE REGIONAL BOARD

AGENCY	PROPOSED ACTION	PRELIMINARY DATE
Butte County Project Team	Publication of administrative draft Nitrate Compliance Program Report and Proposed Implementation Plan.	October 20, 1996
Butte Co. Nitrate Advisory Comm.	Initial review and discussion of administrative draft of program report and proposed Implementation Plan.	October 24, 1996
Butte County Staff	Review of administrative draft program report and proposed Implementation Plan. Submittal of comments to Project Team.	November, 1996
County Board of Supervisors	Accept staff report as information and direct staff to present Plan to Regional Board.	November 19, 1996
Chico City Staff	Initial staff review of administrative draft program report and proposed Implementation Plan.	November, 1996
Regional Board	Consideration of key elements of draft Implementation Plan in Workshop Session.	December 5-6, 1996
Butte Co. Citizen's Nitrate Advisory Committee.	Continued review and discussion of administrative draft program report and proposed Implementation Plan.	Through February 1998 and as needed
Butte Co. Staff	Review of Draft Implementation Plan ("Draft Nitrate Compliance Plan" as revised per Committee). Submittal of comments to Project Team.	February, 1998
County Board of Supervisors	Accept Plan and direct staff to commence public information efforts and to report back to Board of Supervisors with public comment.	March, 1998
Chico City Council	Receive presentation of Draft Plan by Project Team. Consider relevant City policies and positions. Provide comment to County and direction to City staff.	May, 1998
Butte County Project Team	Submit Plan to public via public education program.	Ongoing
County Board of Supervisors	Accept Plan and staff report. Receive and consider public comment & take actions as appropriate to approve Plan.	Spring, 2000
Regional Board	Amendment of Basin Plan/Adoption of MOU with County.	Spring, 2000
Butte Co. LAFCo	Approval of extension of sewer service outside of incorporated city limits, and related matters as needed.	Spring, 2000

APPENDIX A

GLOSSARY

A

acre-foot. A volume of water that covers one acre to a depth of one foot. Equivalent to 43,560 cubic feet or 325,829 gallons.

activated sludge. The suspended solids, mostly microorganisms, present in the aeration tank of a sewage treatment plant. See activated sludge process.

activated sludge process. A form of secondary treatment of sewage that utilizes microorganisms in well-aerated wastewater to treat the wastewater.

adsorption. The process by which chemicals are held on the surface of a mineral or soil particle.

aeration. The addition of air (oxygen) to wastewater to maintain the dissolved oxygen content of the water at the level required to maintain the treatment process.

aerobic. Requiring oxygen; in environmental science, the application is to bacteria that require oxygen for growth. Compare anaerobic.

alluvial. Describes unconsolidated material such as sand, gravel, and silt which has been deposited by flowing water.

aquifer. An underground formation of rock or sediment which is saturated and sufficiently permeable to transmit economic quantities of water to a well or spring. In places, an aquifer is separated from other aquifers by widespread layers of less permeable sediment such as clay.

aquitard. A low-permeability underground formation.

amines. A family of compounds related to ammonia (NH_3).

ammonia. A chemical compound having the formula NH_3.

ammonification. A process carried out by bacteria in which organic compounds are degraded or mineralized with the release of ammonia (NH_3) into the environment.

ammonium. A chemical compound with the formula NH_4^+ which is strongly adsorbed to soils and rarely detected below five feet below ground surface. Ammonium may be converted to nitrate through the process termed nitrification.

anaerobic. Pertaining to conditions of little or no free oxygen, and describing microorganisms that possess the ability to live without oxygen. Anaerobic conditions may exist in deeper portions of the vadose zone, where the soil is saturated, or where the ground surface is paved. Compare aerobic.

anion. A negatively charged ion.

anthropogenic. Created by man. As used, septic tank effluent and agricultural fertilizers are examples of anthropogenic sources of groundwater nitrate.

Aqua Resources Incorporated. A consulting firm who conducted a Chico-area nitrogen isotope composition study in 1985.

ARI. See Aqua Resources Incorporated.

artificial recharge. The deliberate addition of water to an aquifer, commonly by injection well or infiltration.

assimilative capacity. The ability of the soil to effectively degrade and/or disperse nitrate and other forms of nitrogen. The effective measure of the assimilative capacity for nitrate in groundwater is 45 mg/l of NO_3-N, which is the maximum contaminant level.

B

background concentration. The level of a chemical substance due to natural processes alone.
BCDEH. Butte County Department of Environmental Health.
best management practices. Techniques and practices that are accepted as the most effective and practical means to control pollutants or otherwise conserve water resources.
bgs. Below ground surface.
biochemical oxygen demand. A measurement of the strength of a wastewater in terms of its organic content.
blank. A quality control sample that is processed to detect contamination from extraneous sources.
blue-baby syndrome. See methemoglobinemia.
BMPs. See best management practices.
BOD, BOD_5. See biochemical oxygen demand.
breccia. A course-grained rock composed of angular broken rock fragments cemented together.

C

California Environmental Quality Act of 1970. An act that requires public agency decision makers to consider the environmental impacts of a proposed plan.
capital costs. Costs of construction and equipment. Capital costs are usually fixed, one-time expenses. Compare operating and maintenance costs.
carcinogen. A substance which tends to produce cancer in a living organism.
cation. A positively charged ion.
CEQA. See California Environmental Quality Act of 1970.
Chico Urban Area. The area affected by the state's prohibition order, located within the Chico Sphere of Influence line, including both incorporated and unincorporated area.
chlorination. The application of chlorine to water, generally for the purpose of disinfection.
Coliform Bacterial Group. The coliform group consists of several types of bacteria. Fecal coliforms are a subgroup of this group used extensively to indicate animal, including human, pollution of natural waters. Fecal coliform do not cause disease in general, but since these bacteria reside in the intestinal tract of warm blooded animals, they are good indicators of the amount of pollution in water that may be attributed to animals or humans. Such pollution represents a clear potential danger that disease causing organisms are present.
cone of depression. The depression or drop in water level near a well, resulting from the pumping of that well.
confined aquifer. An aquifer in which ground water is confined or overlain by an impermeable or semi-permeable formation. Compare unconfined aquifer, semi-confined aquifer.
contaminant. Any physical, chemical, biological, or radiological substance or matter that has an adverse effect on air, water, or soil.
cyanosis. See methemoglobinemia.

D

deep aquifer. In the Chico area, and for purposes of this study, a deep aquifer is a confined, highly permeable aquifer of black sand and/or course grained gravels, approximately 250 to 850 feet below ground surface. This aquifer is the source of municipal well water by California Water Service, and many higher yielding agricultural wells.

degradation. Chemical or biological breakdown of a complex compound into simpler compounds.
d^{15}N (delta-15-N). The ratio of the two naturally occurring isotopes of nitrogen. This is expressed as a ratio of ^{15}N:^{14}N multiplied by 1000.
denitrification. The biochemical conversion of dissolved nitrate and nitrite nitrogen in soil or water to nitrogen gas (N_2) or nitrous oxide gases (NO, N_2O)
denitrifying bacteria. Soil bacteria which, in anaerobic conditions, break down nitrates and nitrites in the soil, with evolution of nitrogen gas.
Department of Toxic Substances Control. The California state agency overseeing the cleanup of volatile organic compounds, but not groundwater nitrate, in the Chico area.
Department of Water Resources. The California state agency responsible for management of the water resources of the state, in cooperation with other agencies.
design flow. The flow of wastewater that a treatment facility is built to process efficiently, commonly expressed in millions of gallons per day (MGD).
DHS. See Department of Health Services.
diffusion. The movement of suspended or dissolved particles from an area of higher concentration to an area of lower concentration as the result of random movement of individual particles.
dissolved oxygen. The amount of molecular oxygen (O_2) dissolved in water.
DO. See dissolved oxygen.
DTSC. See Department of Toxic Substances Control.
du, See dwelling unit.
dwelling unit. An individual residence, whether a house, apartment or mobile home.
DWR. See Department of Water Resources.

E

EC. See electrical conductivity.
EDU. See dwelling unit equivalent.
effluent. Water or other liquid flowing from a reservoir, basin, or treatment plant.
EIR. See environmental impact report.
electrolysis. The decomposition of a chemical compound by an electric current.
Electrical conductivity. The relative power of different substances of carrying an electric current, the conducting power of pure copper being taken as a standard.
environmental impact report. A public, informational document prepared on behalf of a public agency which addresses the effects of a project on the environment.
EPA. The U.S. Environmental Protection Agency.
equivalent dwelling unit. See dwelling unit equivalent.

F

fanglomerates. Cemented alluvium.
feasibility study. A detailed technical, economic and/or legal review of a specific proposed project intended to identify all potential costs, benefits and problems.
fecal coliform. A type of bacteria whose natural habitat is the colon of warm-blooded mammals, including man.
filtration. The process of removing particulate matter from water by passing it through a porous medium.

force main. A sewer pipe that operates under pressure.
fresh water. Water that contains less than 1,000 mg/l total dissolved solids.

G

gpcd, GPCD. See gallons per capita per day.
gallons per capita per day. An expression of the average rate of domestic and commercial water usage per person per day..
GCUARPA. See Greater Chico Urban Area Redevelopment Project Area.
geophysical log. A detailed description of all underground features discovered during the drilling of a well, including types of formations encountered and their physical characteristics.
gpd. Gallons per day, a measure of flow.
gradient, down/up gradient. The general slope or inclination of the surface of a groundwater basin. Down gradient is in the direction of slope, or flow, of groundwater.
gray water. Wastewater other than sewage, such as sink, shower, or washing machine drainage.
Greater Chico Urban Area Redevelopment Project Area. That portion of the Chico Urban Area designated for redevelopment, including the improvement of public infrastructure such as sanitary sewers, storm drainage, and streets, through the use of available financing mechanisms intended to reduce the cost of such improvements to the citizenry.
groundwater, ground water. Water occurring beneath the earth's surface. For the most part, ground water occurs not as underground lakes or streams but as water within the pore spaces of sediments such as sand and gravel.
groundwater basin. An interconnected permeable geologic formation capable of storing a significant groundwater supply.
groundwater plume. A volume of contaminated groundwater that extends downward and outward from a specific source; the shape and movement of the mass of the contaminated water is affected by the local geology, materials present in the plume, and the flow characteristics of the area groundwater.
groundwater velocity. The rate of water movement through openings in rock or sediment.
grout. A mixture typically of cement and bentonite clay used to seal a well from possible surface contamination.

H

hardpan. A layer on or beneath the soil surface, usually composed of clay particles, sand, gravel or calcium carbonate, that is compacted and relatively impermeable.
hemoglobin. The protein in red blood cells that carries oxygen absorbed in the lungs to the body tissues.
hydraulic conductivity. A measure of the rate at which water can move through a permeable medium.
hydraulic gradient. The slope of the water table at a particular point.
hydrologic cycle. The natural process by which water cycles from the atmosphere to the earth (via precipitation), and back to the atmosphere again (via evaporation and other processes).
hydrology. The study of the occurrence, distribution, circulation, and characteristics of natural waters of the earth.
hydrostratigraphic units. A stratigraphic interval below the groundwater table distinguished by unique hydrogeologic and geologic properties.

I

impermeable. Describes material or soil that does not allow, or allows only with great difficulty, the movement or passage of water. Compare permeable.
incorporated area. The area within the city limits of the City of Chico. Compare unincorporated area.
increment. See tax increment.
infiltration. The flow of water downward from the land surface into and through the upper soil layers. Also, the entrance of groundwater into septic tanks or sewer pipes.
infiltration and inflow. The entrance of groundwater into septic tanks or sewer pipes, typically through defective pipe joints or cracked pipe sections.
influent. Water or other liquid flowing into a reservoir, basin, or treatment plant.
injection well. A well used to inject or reinject fluids underground.
inorganic. Describes material that is of mineral origin. Specifically, describes chemical compounds that do not contain carbon and hydrogen. Compare organic.
interceptor. A relatively large pipe line that conveys municipal wastewater to a treatment plant.
intermediate aquifer. In the Chico area, a semi-confined aquifer ranging from 0 feet to approximately 600 feet bgs, composed mostly of cemented older alluvial deposits, unconsolidated sand and gravel deposits, and thick clayey layers. Recharge is from local streams, leakage from the shallow aquifer and, in the east, directly from surface percolation.
ion. An electrified atom or group of atoms, having either a positive or negative charge.
isotopes. Forms of an element with differing atomic masses due to variable numbers of neutrons.

JK

Kjeldahl nitrogen. The amount of nitrogen contained in organic material, a combination of organic nitrogen and ammonia nitrogen, as determined by a method developed by Johann Kjeldahl of Denmark (1849-1900).

L

lagoon. A pond used for the stabilization and decomposition of organic materials in wastewater.
total suspended solids. A measure of the amount of particulate matter that is suspended in a water sample, obtained by filtering a water sample of known volume.
land application. A method for the disposal of treated and disinfected wastewater in which it is sprayed over the ground to remove nutrients and promote the growth of vegetation.
landfill. A facility in which solid waste from municipal or industrial sources is disposed.
lateral. See sewer lateral.
leachate. The liquid that results from water collecting contaminants as it passes through waste materials.
leach field, drain field. The area of land into which a septic system drains.
lead agency. As used in California environmental law the public agency which has the principal responsibility for carrying out or approving a project, and which directs the environmental review of that project.
lift station. A pumping facility which raises municipal sewerage to a higher elevation to allow for further gravity flow.
loading capacity. The greatest amount of chemical materials or thermal energy that can be added to a stream or aquifer without exceeding established water quality standards.

M

mass balance. An approach used to estimate pollutant releases to the environment. If the input mass and output mass are known and the chemical reactions within the process are considered, the difference between the known mass in and known mass out is considered to be the amount lost to the environment.

mass spectrometer. A sensitive device used for the analysis of organic materials in environmental samples.

maximum contaminant level. The highest level of a contaminant permissible in water in a public water system as set by the U. S. Environmental Protection Agency under the Safe Drinking Water Act.

MCL. See maximum contaminant level.

methemoglobinemia. A disease, typically in infants, caused by the incorporation of nitrates into blood hemoglobin forming a compound known as methemoglobin. When methemoglobin concentration becomes too high a victim of the disease presents symptoms of anoxia (low blood oxygen) including blue coloration of the skin. Young infants are particularly susceptible to the disease because of unique conditions in their immature intestinal tract.

microbiology. The study of microorganisms.

mg/l, mg/L. See milligrams per liter.

mgd, MGD. Million gallons per day, a measure of flow.

milligrams per liter. A measure of concentration of a dissolved substance. A concentration of 1 mg/l means that one milligram of a substance is dissolved in each liter of water. For practical purposes, this unit of measurement is equivalent to parts per million, or ppm.

mineralization. The conversion of an organic material to an inorganic form by microbial decomposition.

mitigation. Actions taken to lessen the actual or foreseen adverse environmental impact of a project or activity.

modeling. Use of mathematical equations to simulate and predict real events and processes.

monitoring well. A well used either to collect water samples for purposes of water quality testing, or to measure groundwater levels.

MOU. Memorandum of Understanding.

msl. Mean sea level, used as a standard index to compare surface water and groundwater levels.

municipal waste. Waste originating from a community. May be composed of domestic (sewage) and industrial wastewater.

N

National Pollutant Discharge Elimination System. Established under the Clean Water Act of 1972, the Act provides for regulation and monitoring of municipal and industrial waste discharges through a permit system.

N_2. The gaseous form of nitrogen which makes up over 78% of the earth's atmosphere.

NH_3. See ammonia.

NH_4^+. See ammonium.

nitrate. A chemical compound having the formula NO_3^- which can cause methemoglobinemia in infants.

nitrification. The two-step process by which ammonium is oxidized and converted into nitrate by

microorganisms occurring primarily in surface soils.

nitrite. An oxidized nitrogen molecule with the chemical formula NO_2^-, which is formed from nitrate by microbial action in soil, water, or the human digestive tract.
nitrogen cyanosis. See methemoglobinemia.
nitrogen cycle. The continuous process of conversion of nitrogen from one form to another through a combination of biological, geological, and chemical transformations, whereby N_2 in the atmosphere is converted to forms usable by biota and ultimately returning to the atmosphere as N_2.
nitrogen fixation. The process by which specialized microorganisms chemically reduce atmospheric nitrogen (N_2) to amino acids and protein.
nitrosamines. A large and diverse family of synthetic and naturally occurring compounds, almost all of which are carcinogenic.
NO_2^-. See nitrite.
NO_3^-. See nitrate.
nonpoint source. A source of pollution that does not have a single point of origin. Pollution from a farmer's field or from urban street runoff falls in this category. Compare point source.
non-potable. Describes water that may contain objectionable pollution, contamination, minerals, or infective agents and is considered unsafe or unsuitable for drinking. Compare potable.
NPDES. See National Pollutant Discharge Elimination System.
NPS. See nonpoint source.

O

onsite wastewater management district. An entity formed to perform basic functions to ensure the proper operation and management of onsite systems. Typical functions include development of regulations for design, installation and operation; inspections; records maintenance; and enforcement.
operation and maintenance costs. The costs of operating a system such as a treatment plant or other facility. These costs are ongoing expenses, such as for repair or for employee salaries. Compare capital costs.
O & M costs. See operations and maintenance costs.
organic. Describes material that originates from plant or animal sources. Specifically, describes chemical compounds containing carbon and hydrogen. Compare inorganic.
organic nitrogen. The predominant form of nitrogen in non-agricultural soils.
outfall. The location where wastewater is released from a point source into a receiving body of water.
OWMD. See onsite wastewater management district.
oxidation pond. A pond into which sewage is placed to allow decomposition or mineralization by aerobic microorganisms.

P

parts per million. A measure of concentration of a dissolved substance. Compare milligrams per liter.
pathogen. A microorganism capable of causing disease.
percolation. The slow seepage of water into and through the ground.
permeability. The ease with which water and other fluids migrate through geological strata.

Compare impermeability.

permeable. Describes material or soil that allows the movement or passage of water through it. Compare impermeable.
P. Phosphorus.
pH. A measure of the acidity of a solution. The pH of pure water is 7, which is taken to represent neutrality on the pH scale. A pH below 7 indicates acidity and a pH in excess of 7 indicates alkalinity.
plume. The area occupied by a groundwater contaminant after it has begun to spread, through diffusion or other forces, away from its point of origin.
point source. A stationary source or fixed facility from which pollutants are discharged. Compare non-point source.
pollutant. Any substance introduced into the environment that adversely affects the usefulness of a resource.
pore space. The space between mineral grains in a porous medium.
potable. Describes water that is safe and satisfactory for drinking and cooking. Compare non-potable water.
potentiometric surface. The level to which water will rise in a well that penetrates an aquifer. In an unconfined aquifer, equivalent to the water table.
POTW. See publicly owned treatment works.
ppm. See parts per million.
precipitation. Atmospheric moisture, such as rain or snow, that falls to earth.
primary treatment. Initial stage of treatment of wastewater, primarily consisting of removal of settleable solids.
prohibition order. The 1990 order of the regional board requiring, in general, the abandonment of septic tanks in the Chico Urban Area due to nitrate contamination of groundwater.
publicly owned treatment works. Facilities for the treatment of domestic sewage that are owned and operated by a public body, typically a municipal government.
public water system. A system for the provision to the public of piped water intended for human consumption. Such system must have at least 15 service connections, or regularly serve an average of at least 25 individuals daily for at least 60 days out of the year.
purge water. The contents of a well discarded prior to extracting a sample, so as to accurately represent the contents of the aquifer at that point.

Q

QA/QC. See quality assurance/quality control.
quality assurance/quality control. All methods and procedures used to obtain accurate and reliable results from environmental sampling and analysis. Includes rules for when, where, and how samples are taken; the storage, preservation and transport of samples; and the use of blanks, duplicates, and split samples.

R

raw sewage. Wastewater that has not undergone any treatment for the removal of pollutants.
receiving waters. Bodies of water that receive runoff or wastewater discharges, such as streams, rivers, and lakes.
recharge. Process by which precipitation or applied water seeps or percolates into the

groundwater system.
reclaimed water. Wastewater that has been treated and brought to a level of water quality that makes it suitable for further beneficial use.
Regional Water Quality Control Board. One of nine regional boards in California responsible for the protection of water resources, including groundwater.
remedial action plan. A formal plan of action for cleanup of a contaminated site.
reservoir. A natural or man-made holding area used to store, regulate, or control water.
residence time. The amount of time a specified volume of liquid or gas spends in a certain device. As used, the residence time for sewage undergoing treatment is the amount of time a specified volume of sewage stays in the septic tank or treatment facility.
runoff. That part of precipitation, snow melt, or irrigation water that drains or flows off the land into streams or other surface waters.
RWQCB. See Regional Water Quality Control Board.

S

Safe Drinking Water Act. An Act passed by Congress in 1974 that establishes a cooperative program among local, state, and federal agencies to insure safe drinking water for consumers. It authorizes EPA to set drinking water standards (including maximum contaminant levels), and provides special protection to sole source aquifers.
salinity. The relative concentration of dissolved salts in water.
sampling variability. Differences among replicate samples taken to determine the level of a constituent in a larger whole.
sand filter. See recirculating sand filter and intermittent sand filter.
sanitary sewer. A pipe or network of pipes used to transport domestic, commercial, or industrial wastewater.
sanitary survey. An onsite inspection to assess the performance of onsite systems and the environmental conditions associated with their use.
saturated zone. The area below the water table where all open spaces are filled with water. Compare unsaturated zone.
secondary treatment. A stage of wastewater treatment wherein bacteria are used to break down organic materials and significantly reduce biochemical oxygen demand.
semi-confined aquifer. An aquifer that is partially confined or overlain by a formation of low permeability through which water can pass slowly. Compare confined aquifer, unconfined aquifer.
sewer collection system. The series of pipes connecting individual buildings to the headworks of a treatment plant.
sewer lateral. The portion of the sewer piping connecting a building waste disposal system and a sewer main or trunk line.
sewer mains, sewer main lines. A sewer pipe of intermediate size which connects a system of sewer laterals to a trunk line.
shallow aquifer. In the Chico area, an unconfined aquifer of limited storage capacity ranging from 0 feet bgs on the eastern side of the Chico Urban Area, to approximately 50 feet bgs on the west, consisting primarily of alluvial sand and gravel deposits. Recharge is mainly from direct surface percolation.
sludge. A general term used to designate a thick suspension of waste products having the consistency of paste or soft mud, such as the particulate waste collected during the treatment of sewage.
sole source aquifer. An aquifer that supplies 50 percent or more of the drinking water for an

area.
spreading basin, spreading grounds. A man-made basin or series of basins designed to retain water for the purpose of recharging groundwater supplies.
static water level. The elevation or level of water in a well when the pump is not operating.

stratigraphy. The study of the origin and chronological successions of the earth's crust, including its structure and composition.
surface water. All water naturally open to the atmosphere, including rivers, streams, lakes, reservoirs, etc.
SWRCB. State Water Resources Control Board.

T

TDS. See total dissolved solids.
tertiary treatment. An advanced stage of wastewater treatment designed to remove nutrients or other constituents remaining after secondary treatment.
Title 22. That portion of the California Administrative Code which requires that producers of drinking water regularly monitor their wells and other sources of supply for various chemical constituents.
TKN. See Kjeldahl nitrogen.
topography. The detailed description of the surface features of an area, especially elevation and slope.
total dissolved solids. All of the dissolved solids in a sample of water, measured by evaporating the sample and weighing the residue.
Total Kjeldahl nitrogen. See Kjeldahl nitrogen.
Total N. See Total Kjeldahl Nitrogen.
total suspended solids. A measure of the amount of particulate matter that is suspended in a water sample, obtained by filtering a water sample of known volume.
transmissivity. The rate at which water is transmitted through an aquifer.
TDS. See total dissolved solids.
trunkline, trunk line. A relatively large diameter sewer pipe connecting a system of sewer mains to the treatment plant. In the City of Chico system, any public sewer pipe which has a diameter equal to or greater than fifteen inches.
TSS. See total suspended solids.

U

unconfined aquifer. An aquifer that does not have confining formations or layers. Compare confined aquifer, semi-confined aquifer.
unincorporated area. Areas of the County of Butte not within the limits of an incorporated city. Further, that portion of the Chico Urban Area not within the limits of the City of Chico.
unsaturated zone. The area between the land surface and water table in which pore spaces are not completely filled with water. Also known as the vadose zone. Compare saturated zone.
USGS. United States Geological Survey.

V

vadose zone. See unsaturated zone.
VOC. Volatile organic compound.

W

wastewater. The used water and solids that are the result of domestic or industrial uses of water Includes municipal waste or sewage.

wastewater collection system. See sewer collection system.

Water Pollution Control Plant. The sewer treatment plant operated by the City of Chico and located on River Road southwest of Chico.

water supply system. A facility designed for the distribution of potable water, typically including storage tanks and a network of pipes.

water table. The elevation or level of ground water. The upper surface of the saturated zone in an unconfined aquifer.

watershed. The land area that drains into a stream. An area that contributes runoff to a specific body of water. Same as drainage basin, hydrologic basin.

well. A bored, drilled, or driven shaft, or a dug hole, whose purpose is to reach underground water supplies.

WPCP. See Water Pollution Control Plant.

XYZ

APPENDIX B

APPENDIX B

SUMMARY OF KEY STATE AND REGIONAL BOARD RESOLUTIONS AND PROVISIONS OF THE STATE WATER CODE

Resolution 68-16.
Policy for maintaining waters at the highest quality possible consistent with the maximum benefit to the people of the State. Sometimes referred to as the "non-degradation" policy.

Resolution 88-63.
Policy for Drinking water aquifer designation. All groundwaters are considered drinking water aquifers unless they can be shown to meet one of three very stringent requirements. All Chico aquifers are considered drinking water aquifers under this Policy.

13240 & 13241.
Boards are required to establish Basin Plans for all areas within their regions (Basin Plans formulate beneficial uses, or the uses of water which are a benefit to the people of the State), with water quality objectives to assure protection of beneficial uses. Region 5 Plan designates nitrate in drinking water objective at 45 mg/l nitrate.

13243.
Board may prohibit discharge or certain types of discharge in certain areas.

13260.
Any person discharging waste that may affect the quality of waters of the state must file a report of waste discharge.

13261.
Establishes Board Authority to implement administrative civil liability (administrative monetary penalty) for failure to submit a report of waste discharge when a person is notified of the requirement to submit such a report.

13263.
Requires Board to promulgate waste discharge requirements for any one discharging waste. The requirements must implement the Basin Plan.

13267.
Gives Board authority, in implementing basin plan, to require technical reports from any person discharging waste.

13289.
Establishes conditions that must be met to prohibit discharge from septic systems. Basic requirement is substantial evidence that septics are causing or will cause impact to beneficial uses.

13301.
Establishes Board authority to implement Cease and Desist Order for violation of prohibition (sections 13243 and 13289).

13304.
Establishes Board authority to issue a Cleanup and Abatement Order when waste has been discharged. Technically this section could be used against operators of septic systems. However, it has apparently never been used for this purpose.

13350.
Allows Board to invoke a civil monetary penalty for violation of a Cease and Desist or Cleanup and Abatement Order.

APPENDIX C

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

ORDER NO. 90-126

REVISION OF THE WATER QUALITY CONTROL PLAN,
SACRAMENTO RIVER BASIN 5A, BY THE ADDITION OF PROHIBITION
OF WASTE DISCHARGE FROM INDIVIDUAL DISPOSAL SYSTEMS
IN THE CHICO URBAN AREA
BUTTE COUNTY

The California Regional Water Quality Control Board, Central Valley Region, (hereafter Board) finds that:

1. The Board adopted a Water Quality Control Plan, 2nd Edition, (hereafter Basin Plan) for the Sacramento Basin 5A.

2. The Basin Plan contains areas or communities where the discharge of waste from individual disposal systems is prohibited.

3. The California Water Code (hereafter Water Code), Article 3, Chapter 4, Division 7, defines criteria for such prohibition areas (Section 13240, et seq.). Article 5, Chapter 4, Division 7 of the Water Code specifies criteria for regulation of the discharge of waste from individual disposal systems (Section 13280, et seq.).

4. The Chico Urban Area contains approximately 68,000 residents, of which one-half utilize individual systems for disposal of domestic wastes. Surface drainage is to Big Chico and Little Chico Creeks and the Lindo Channel, tributaries to the Sacramento River.

5. The beneficial uses of these creeks and the Sacramento River include municipal, industrial, and agricultural supply; recreation; esthetic enjoyment; navigation; ground water recharge; freshwater replenishment; hydroelectric power generation; and preservation and enhancement of fish, wildlife, and other aquatic resources.

6. The beneficial uses of ground water are domestic, industrial, and agricultural supply.

7. The soil to which the majority of individual disposal systems are discharging consists of Vina loams and Vina fine sandy loams which percolate rapidly. Shallow ground water is generally found at 15 to 20 feet minimum depth, and ground water flow is westerly. Many individual domestic wells in the area tap into this shallow aquifer.

8. The development density of the urban area served by septic tanks ranges from less than one unit per acre to as high as approximately 20 units per acre. Areas that underlie high nitrate concentrations in ground water generally contain developments of three units per acre or greater.

9. As a result of some private wells that tested at high nitrate levels in the late 1970s, Butte County contracted with the Department of Water Resources (DWR) to perform an assessment of the problem. The conclusion of the DWR study was that several areas of high nitrates existed and that septic tanks were a major source of nitrate contamination. A private consulting firm hired by the County subsequent to the DWR study confirmed these results. In addition, improperly abandoned wells exist in the urban area which may provide a pathway for nitrates to directly enter ground water.

10. These studies showed there are two major areas of high nitrate levels, as well as some minor areas, and that these areas were in urban and agricultural/urban land use zones. Of the approximately 129 wells that have been tested by the County or its consultants as of October 1988, 42 (or 33 %) indicated nitrate concentrations above the State Department of Health Services' maximum contaminate level of 45 mg/l (as NO_3) at least once, and another 23 (or 18%) indicated concentrations between 30 and 45 mg/l at least once. Nitrate concentrations in some wells exceeded 200 mg/l or four times the State standard.

11. The area of concern lies within the limits of the City of Chico or the adjacent unincorporated area of Butte County, as delineated on the attached map.

12. The City of Chico and Butte County adopted a Nitrate Action Plan on 5 March 1985 to address the high nitrate contamination of the shallow aquifer. Only a portion of the items in the Nitrate Action Plan have been implemented, some after passage of original deadlines. Several critical action items have yet to be implemented. It also appears that the local entities lack the commitment to force elimination of the discharge of waste from individual disposal systems in the urban area.

13. The basin planning process has been certified as a "functional equivalent" to the California Environmental Quality Act requirements for preparing environmental documents and is, therefore, exempt from those requirements (Public Resources Code, Section 21000, et seq.), in accordance with Section 15108 of the State EIR Guidelines (California Code of Regulations, Title 14, Division 7, Chapter 3).

14. Pursuant to Section 13280 and 13281 of the Water Code, the Board finds the continued discharge of waste from individual disposal systems will result in violation of water quality objectives, will impair beneficial uses of ground water, and will cause a condition of pollution. These will occur due to unsuitable hydrogeologic conditions and the existing urban land use, which includes dwelling densities of up to 20 dwelling units per acre.

15. Adequate protection of water quality and beneficial uses cannot be attained by continued use of individual systems, even under management of an authorized public agency as provided in Section 13282 of the Water Code.

16. On 27 October 1988, at California State University, Chico, Laxson Auditorium, after due public notice, the Board conducted a public hearing at which evidence was received pursuant to Section 13281 of the Water Code concerning the discharges of wastes from individual disposal systems, and impacts of these discharges on water quality and public health. Order No. 88-177 was adopted at this meeting.

17. On 20 October 1989, the State Water Resources Control Board adopted Order No. 89-95. This order approved Regional Board Order No. 88-177, in its entirety except for its original compliance dates. It is appropriate to amend these dates because of the time that has elapsed between adoption of Regional Board Order No. 88-177 and State Board Order No. 89-95.

18. On 27 April 1990, after due public notice, the Board conducted a public hearing at which testimony was received concerning the adoption of new compliance dates for the Basin Plan revision and amendment for the Chico Urban Area.

IT IS HEREBY ORDERED that:

1. The discharge of waste within the Chico Urban Area, as currently defined and delineated on the attached map, from individual disposal systems installed after 1 July 1990 is prohibited. An exemption to this prohibition may be granted by the Executive Officer after presentation by the proposed discharger of geologic and hydrologic evidence that leaching system disposal will not, individually or collectively, result in pollution or nuisance.

2. The discharge of waste within the Chico Urban Area, as currently defined and delineated on the attached map, from individual systems is prohibited after 1 July 1995. An exemption to this prohibition may be granted whenever the Board finds that the continued operation of individual sewage disposal systems in a particular area will not, individually or collectively, directly or indirectly, adversely affect water quality. The discharge to individual systems in a particular area will be considered for exemption by the Board, if it can be demonstrated that costs to connect to a sewer system will be inordinately high, relative to beneficial uses protected and an adequate level of environmental protection can be achieved by alternative means.

3. Individual systems producting less than 334 gallons per day per acre (one dwelling unit per acre equivalent) are exempt from the above prohibitions.

4. The Water Quality Control Plan, 2nd Edition, is revised by the addition of this prohibition. This amendment shall not take effect until approved by the State Water Resources Control Board.

I, WILLIAM H. CROOKS, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of an Order adopted by the California Regional Water Quality Control Board, Central Valley Region, on 27 April 1990.

WILLIAM H. CROOKS, Executive Office

RSD:tch

Attachment

APPENDIX D

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

RESOLUTION NO. 95-024

DEFERRAL OF ENFORCEMENT ACTION
REGARDING BOARD ORDER NO. 90-126 (BASIN PLAN AMENDMENT)
FOR
CHICO URBAN AREA
BUTTE COUNTY

WHEREAS, the Board, on 27 April 1990 adopted Order No. 90-126 prohibiting the discharge of waste from individual systems in the Chico Urban Area after 1 July 1995. The purpose of the prohibition was to eliminate the discharge of nitrogen from septic tanks to ground water in the Urban Area. The nitrogen from approximately 12,000 individual disposal systems was determined to be the major source of nitrate in ground water resulting in an exceedance of the maximum contaminant level (MCL) specified for drinking water; and

WHEREAS, the State Water Resources Control, after a public hearing and workshop, approved Board Order No. 90-126 on 19 July 1990; and

WHEREAS, Butte County has formed County Service Area 114 to investigate compliance with the prohibition, including additional investigations to refine knowledge of nitrogen discharges to ground water; and

WHEREAS, Butte County has completed the following: installed and sampled 19 new shallow wells and resampled most of the wells originally sampled for nitrate; performed a historical search for past agricultural practices that may have contributed to nitrate loading; established a pilot test for an on-site nitrogen removal technology, partially funded by State Board cleanup and abatement funds; and formed a redevelopment agency to provide funding for sewering or operation of other nitrogen removal systems; and

WHEREAS, the County is currently in the process of gathering additional information, including: analyzing well samples for Nitrogen 15 concentration (a nonradioactive isotope) to determine possible sources of nitrogen in ground water (the concentration of Nitrogen 15 and Nitrogen 14 varies depending on the source of nitrogen); and placing lysimeters at varying depths in several operating leachfields in the Urban area to determine a site specific value for nitrogen removal in the soil; and

WHEREAS, to date, Butte County has expended substantial funds on its efforts, and is continuing to spend the funds necessary to complete the implementation plan: Therefore, be it

RESOLVED, that the Regional Board will defer enforcement action until 30 December 1996 if a draft implementation plan is submitted to staff by 1 July 1995 and a

RESOLUTION NO. 95-024
CHICO URBAN AREA
BUTTE COUNTY

final Implementation plan is completed by 30 January 1996. The implementation plan must include the following elements:

1. A detailed report of the results of the technical program, and the conclusion regarding nitrate loading estimates from all sources and the potential nitrate transformations in the vadose zone.

2. A feasibility plan and cost estimate to address sewering. The plan must include areas A, B, and C shown on the attached map. In addition, a cost estimate only shall be prepared for sewering all areas that have caused nitrate to exceed the maximum contaminant level. The Board understands that the feasibility analysis and cost estimates are for the purpose of better defining sewering costs and methods, and does not reflect a final determination of areas to be sewered.

3. A plan delineating the areas where sewering is proposed, and areas where alternatives to sewering or "no action" is appropriate.

4. A plan and implementation schedule for providing sewer service to those areas planned to be sewered.

5. A plan and implementation schedule for the design, installation, and management of on-site alternative nitrogen removal mechanisms. This plan must demonstrate to the satisfaction of the Regional Board that the on-site systems will protect present and future beneficial uses.

6. A plan and implementation schedule for establishment of a public agency to be responsible for the proper design, location, sizing construction and maintenance of such systems in the Chico Urban Area.

7. A plan for the establishment of land use policies and development regulations for the Chico Urban Area which support and are consistent with all other sections of the implementation plan.

8. A program for the training and certification of designers, plan checkers, inspectors, repair and maintenance persons, pumpers and any others involved in the operation of on-site systems in the Chico Urban Area; and be it further

RESOLVED, that the Executive Officer bring this matter before the Board for enforcement action if the above implementation plan is not being diligently pursued.

RESOLUTION NO. 95-024
CHICO URBAN AREA
BUTTE COUNTY

I, WILLIAM H. CROOKS, Executive Officer, do hereby certify the foregoing is a full, true, and correct copy of a Resolution adopted by the California Regional Water Quality Control Board, Central Valley Region, on 27 January 1995.

WILLIAM H. CROOKS, Executive Officer

RSD:djc

AMENDED 1/27/95

APPENDIX E

STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 92-49
(As Amended on April 21, 1994)

POLICIES AND PROCEDURES
FOR INVESTIGATION AND
CLEANUP AND ABATEMENT OF
DISCHARGES UNDER WATER CODE
SECTION 13304

WHEREAS:

1. California Water Code (WC) Section 13001 provides that it is the intent of the Legislature that the State Water Resources Control Board (**State Water Board**) and each Regional Water Quality Control Board (**Regional Water Board**) shall be the principal state agencies with primary responsibility for the coordination and control of water quality. The State and Regional Water Boards shall conform to and implement the policies of the Porter-Cologne Water Quality Control Act (Division 7, commencing with WC Section 13000) and shall coordinate their respective activities so as to achieve a unified and effective water quality control program in the state;

2. WC Section 13140 provides that the State Water Board shall formulate and adopt State Policy for Water Quality Control;

3. WC Section 13240 provides that Water Quality Control Plans shall conform to any State Policy for Water Quality Control;

4. WC Section 13304 requires that any person who has discharged or discharges waste into waters of the state in violation of any waste discharge requirement or other order or prohibition issued by a Regional Water Board or the State Water Board, or who has caused or permitted, causes or permits, or threatens to cause or permit any waste to be discharged or deposited where it is, or probably will be, discharged into the waters of the state and creates, or threatens to create, a condition of pollution or nuisance may be required to clean up the discharge and abate the effects thereof. This section authorizes Regional Water Boards to require complete cleanup of all waste discharged and restoration of affected water to background conditions (i.e., the water quality that existed before the discharge). The term waste discharge requirements includes those which implement the National Pollutant Discharge Elimination System;

5. WC Section 13307 provides that the State Water Board shall establish policies and procedures that its representatives and the representatives of the Regional Water Boards shall follow for the oversight of investigations and cleanup and abatement activities resulting from discharges of hazardous substances, including:

   a. The procedures the State Water Board and the Regional Water Boards will follow in making decisions as to when a person may be required to undertake an investigation to determine if an unauthorized hazardous substance discharge has occurred;

   b. Policies for carrying out a phased, step-by-step investigation to determine the nature and extent of possible soil and ground water contamination or pollution at a site;

   c. Procedures for identifying and utilizing the most cost-effective methods for detecting contamination or pollution and cleaning up or abating the effects of contamination or pollution;

   d. Policies for determining reasonable schedules for investigation and cleanup, abatement, or other remedial action at a site. The policies shall recognize the danger to public health and the waters of the state posed by an unauthorized discharge and the need to mitigate those dangers while at the same time taking into account, to the extent possible, the resources, both financial and technical, available to the person responsible for the discharge;

6. "Waters of the state" include both ground water and surface water;

7. Regardless of the type of discharge, procedures and policies applicable to investigations, and cleanup and abatement activities are similar. It is in the best interest of the people of the state for the State Water Board to provide consistent guidance for Regional Water Boards to apply to investigation, and cleanup and abatement;

8. WC Section 13260 requires any person discharging or proposing to discharge waste that could affect waters of the state, or proposing to change the character, location, or volume of a discharge to file a report with and receive requirements from the Regional Water Board;

9. WC Section 13267 provides that the Regional Water Board may require dischargers, past dischargers, or suspected dischargers to furnish those technical or monitoring reports as the Regional Water Board may specify, provided that the burden, including costs, of these reports, shall bear a reasonable relationship to the need for the reports and the benefits to be obtained from the reports;

10. WC Section 13300 states that the Regional Water Board may require a discharger to submit a time schedule of specific actions the discharger shall take in order to correct or prevent a violation of requirements prescribed by the Regional Water Board or the State Water Board;

11. California Health and Safety Code (HSC) Section 25356.1 requires the Department of Toxic Substances Control (DTSC) or, if appropriate, the Regional Water Board to prepare or approve remedial action plans for sites where hazardous substances were released to the environment if the sites have been listed pursuant to HSC Section 25356 (state "Superfund" priority list for cleanup of sites);

12. Coordination with the U.S. Environmental Protection Agency (USEPA), state agencies within the California Environmental Protection Agency (Cal/EPA) (e.g., DTSC, Air Resources Control Board), air pollution control districts, local environmental health agencies, and other responsible federal, state, and local agencies: (1) promotes effective protection of water quality, human health, and the environment and (2) is in the best interest of the people of the state. The principles of coordination are embodied in many statutes, regulations, and interagency memoranda of understanding (MOU) or agreement which affect the State and Regional Water Boards and these agencies;

13. In order to clean up and abate the effects of a discharge or threat of a discharge, a discharger may be required to perform an investigation to define the nature and extent of the discharge or threatened discharge and to develop appropriate cleanup and abatement measures;

14. Investigations that were not properly planned have resulted in increases in overall costs and, in some cases, environmental damage. Overall costs have increased when original corrective actions were later found to have had no positive effect or to have exacerbated the pollution. Environmental damage may increase when a poorly conceived investigation or cleanup and abatement program allows pollutants to spread to previously unaffected waters of the state;

15. A phased approach to site investigation should facilitate adequate delineation of the nature and extent of the pollution, and may reduce overall costs and environmental damage, because: (1) investigations inherently build on information previously gained; (2) often data are dependent on seasonal and other temporal variations; and (3) adverse consequences of greater cost or increased environmental damage can result from improperly planned investigations and the lack of consultation and coordination with the Regional Water Board. However, there are circumstances under which a phased, iterative approach may not be necessary to protect water quality, and there are other circumstances under which phases may need to be compressed or combined to expedite cleanup and abatement;

16. Preparation of written workplans prior to initiation of significant elements or phases of investigation, and cleanup and abatement generally saves Regional Water Board and discharger resources. Results are superior, and the overall cost-effectiveness is enhanced;

17. Discharger reliance on qualified professionals promotes proper planning, implementation, and long-term cost-effectiveness of investigation, and cleanup and abatement activities. Professionals should be qualified, licensed where applicable, and competent and proficient in the fields pertinent to the required activities. California Business and Professions Code Sections 6735, 7835, and 7835.1 require that engineering and geologic evaluations and judgements be performed by or under the direction of registered professionals;

18. WC Section 13360 prohibits the Regional Water Boards from specifying, but not from suggesting, methods that a discharger may use to achieve compliance with requirements or orders. It is the responsibility of the discharger to propose methods for Regional Water Board review and concurrence to achieve compliance with requirements or orders;

19. The USEPA, California state agencies, the American Society for Testing and Materials, and similar organizations have developed or identified methods successful in particular applications. Reliance on established, appropriate methods can reduce costs of investigation, and cleanup and abatement;

20. The basis for Regional Water Board decisions regarding investigation, and cleanup and abatement includes: (1) site-specific characteristics; (2) applicable state and federal statutes and regulations; (3) applicable water quality control plans adopted by the State Water Board and Regional Water Boards, including beneficial uses, water quality objectives, and implementation plans; (4) State Water Board and Regional Water Board policies, including State Water Board Resolutions No. 68-16 (Statement of Policy with Respect to Maintaining High Quality of Waters in California) and No. 88-63 (Sources of Drinking Water); and (5) relevant standards, criteria, and advisories adopted by other state and federal agencies;

21. Discharges subject to WC Section 13304 may include discharges of waste to land; such discharges may cause, or threaten to cause, conditions of soil or water pollution or nuisance that are analogous to conditions associated with migration of waste or fluid from a waste management unit;

22. The State Water Board has adopted regulations governing discharges of waste to land (California

Code of Regulations (CCR), Title 23, Division 3, Chapter 15);

23. State Water Board regulations governing site investigation and corrective action at underground storage tank unauthorized release sites are found in 23 CCR Division 3, Chapter 16, in particular Article 11 commencing with Section 2720;

24. It is the responsibility of the Regional Water Board to make decisions regarding cleanup and abatement goals and objectives for the protection of water quality and the beneficial uses of waters of the state within each Region;

25. Cleanup and abatement alternatives that entail discharge of residual wastes to waters of the state, discharges to regulated waste management units, or leaving wastes in place, create additional regulatory constraints and long-term liability, which must be considered in any evaluation of cost-effectiveness;

26. The Porter-Cologne Water Quality Control Act allows Regional Water Boards to impose more stringent requirements on discharges of waste than any statewide requirements promulgated by the State Water Board (e.g., in this Policy) or than water quality objectives established in statewide or regional water quality control plans as needed to protect water quality and to reflect regional and site-specific conditions.

THEREFORE BE IT RESOLVED:

These policies and procedures apply to all investigations, and cleanup and abatement activities, for all types of discharges subject to Section 13304 of the Water Code.

I. The Regional Water Board shall apply the following procedures in determining whether a person shall be required to investigate a discharge under WC Section 13267, or to clean up waste and abate the effects of a discharge or a threat of a discharge under WC Section 13304. The Regional Water Board shall:

A. Use any relevant evidence, whether direct or circumstantial, including, but not limited to, evidence in the following categories:

1. Documentation of historical or current activities, waste characteristics, chemical use, storage or disposal information, as documented by public records, responses to questionnaires, or other sources of information;

2. Site characteristics and location in relation to other potential sources of a discharge;

3. Hydrologic and hydrogeologic information, such as differences in upgradient and downgradient water quality;

4. Industry-wide operational practices that historically have led to discharges, such as leakage of pollutants from wastewater collection and conveyance systems, sumps, storage tanks, landfills, and clarifiers;

5. Evidence of poor management of materials or wastes, such as improper storage practices or inability to reconcile inventories;

6. Lack of documentation of responsible management of materials or wastes, such as lack of manifests or lack of documentation of proper disposal;

7. Physical evidence, such as analytical data, soil or pavement staining, distressed vegetation, or unusual odor or appearance;

8. Reports and complaints;

9. Other agencies' records of possible or known discharge; and

10. Refusal or failure to respond to Regional Water Board inquiries;

B. Make a reasonable effort to identify the dischargers associated with the discharge. It is not necessary to identify all dischargers for the Regional Water Board to proceed with requirements for a discharger to investigate and clean up;

C. Require one or more persons identified as a discharger associated with a discharge or threatened discharge subject to WC Section 13304 to undertake an investigation, based on findings of I.A and I.B above;

D. Notify appropriate federal, state, and local agencies regarding discharges subject to WC Section 13304 and coordinate with these agencies on investigation, and cleanup and abatement activities.

II. The Regional Water Board shall apply the following policies in overseeing: (a) investigations to determine the nature and horizontal and vertical extent of a discharge and (b) appropriate cleanup and abatement measures.

A. The Regional Water Board shall:

1. Require the discharger to conduct investigation, and cleanup and abatement, in a progressive sequence ordinarily consisting of the following phases, provided that the sequence shall be adjusted to accommodate site-specific circumstances, if necessary:

a. Preliminary site assessment (to confirm the discharge and the identity of the dischargers; to identify affected or threatened waters of the state and their beneficial uses; and to develop preliminary information on the nature, and vertical and horizontal extent, of the discharge);

b. Soil and water investigation (to determine the source, nature and extent of the discharge with sufficient detail to provide the basis for decisions regarding subsequent cleanup and abatement actions, if any are determined by the Regional Water Board to be necessary);

c. Proposal and selection of cleanup and abatement action (to evaluate feasible and effective cleanup and abatement actions, and to develop preferred cleanup and abatement alternatives);

d. Implementation of cleanup and abatement action (to implement the selected alternative, and to monitor in order to verify progress);

e. Monitoring (to confirm short- and long-term effectiveness of cleanup and abatement);

2. Consider, where necessary to protect water quality, approval of plans for investigation, or cleanup and abatement, that proceed concurrently rather than sequentially, provided that overall cleanup and abatement goals and objectives are not compromised, under the following conditions:

a. Emergency situations involving acute pollution or contamination affecting present uses of waters of the state;

b. Imminent threat of pollution;

c. Protracted investigations resulting in unreasonable delay of cleanup and abatement; or

d. Discharges of limited extent which can be effectively investigated and cleaned up within a short time;

3. Require the discharger to extend the investigation, and cleanup and abatement, to any location affected by the discharge or threatened discharge.

4. Where necessary to protect water quality, name other persons as dischargers, to the extent permitted by law;

5. Require the discharger to submit written workplans for elements and phases of the investigation, and cleanup and abatement, whenever practicable;

6. Review and concur with adequate workplans prior to initiation of investigations, to the extent practicable. The Regional Water Board may give verbal concurrence for investigations to proceed, with written follow-up. An adequate workplan should include or reference, at least, a comprehensive description of proposed investigative, cleanup, and abatement activities, a sampling and analysis plan, a quality assurance project plan, a health and safety plan, and a commitment to implement the workplan;

7. Require the discharger to submit reports on results of all phases of investigations, and cleanup and abatement actions, regardless of degree of oversight by the Regional Water Board;

8. Require the discharger to provide documentation that plans and reports are prepared by professionals qualified to prepare such reports, and that each component of investigative and cleanup and abatement actions is conducted under the direction of appropriately qualified professionals. A statement of qualifications of the responsible lead professionals shall be included in all plans and reports submitted by the discharger;

9. Prescribe cleanup levels which are consistent with appropriate levels set by the Regional Water Board for analogous discharges that involve similar wastes, site characteristics, and water quality considerations;

B. The Regional Water Board may identify.... investigative and cleanup and abatement activities that the discharger could undertake without Regional Water Board oversight, provided that these investigations and cleanup and abatement activities shall be consistent with the policies and procedures established herein;

III. The Regional Water Board shall implement the following procedures to ensure that dischargers shall have the opportunity to select cost-effective methods for detecting discharges or threatened discharges and methods for cleaning up or abating the effects thereof. The Regional Water Board shall:

A. Concur with any investigative and cleanup and abatement proposal which the discharger demonstrates and the Regional Water Board finds to have a substantial likelihood to achieve compliance, within a reasonable time frame, with cleanup goals and objectives that implement the applicable Water Quality Control Plans and Policies adopted by the State Water Board and Regional Water Boards, and which implement permanent cleanup and abatement solutions which do not require ongoing maintenance, wherever feasible;

B. Consider whether the burden, including costs, of reports required of the discharger during the investigation and cleanup and abatement of a discharge bears a reasonable relationship to the need for the reports and the benefits to be obtained from the reports;

C. Require the discharger to consider the effectiveness, feasibility, and relative costs of applicable alternative methods for investigation, and cleanup and abatement. Such comparison may rely on previous analysis of analogous sites, and shall include supporting rationale for the selected methods;

D. Ensure that the discharger is aware of and considers techniques which provide a cost-effective basis for initial assessment of a discharge.

1. The following techniques may be applicable:

   a. Use of available current and historical photographs and site records to focus investigative activities on locations and wastes or materials handled at the site;

   b. Soil gas surveys;

   c. Shallow geophysical surveys;

   d. Remote sensing techniques;

2. The above techniques are in addition to the standard site assessment techniques, which include:

   a. Inventory and sampling and analysis of materials or wastes;

   b. Sampling and analysis of surface water;

   c. Sampling and analysis of sediment and aquatic biota;

   d. Sampling and analysis of ground water;

   e. Sampling and analysis of soil and soil pore moisture;

   f. Hydrogeologic investigation;

E. Ensure that the discharger is aware of and considers the following cleanup and abatement methods or combinations thereof, to the extent that they may be applicable to the discharge or threat thereof:

1. Source removal and/or isolation;

2. In-place treatment of soil or water:

   a. Bioremediation;

   b. Aeration;

   c. Fixation;

3. Excavation or extraction of soil, water, or gas for on-site or off-site treatment by the following techniques:

   a. Bioremediation;

   b. Thermal destruction;

   c. Aeration;

   d. Sorption;

   e. Precipitation, flocculation, and sedimentation;

   f. Filtration;

   g. Fixation;

   h. Evaporation;

4. Excavation or extraction of soil, water, or gas for appropriate recycling, re-use, or disposal;

F. Require actions for cleanup and abatement to:

1. Conform to the provisions of Resolution No. 68-16 of the State Water Board, and the Water Quality Control Plans of the State and Regional Water Boards, provided that under no circumstances shall these provisions be interpreted to require cleanup and abatement which achieves water quality conditions that are better than background conditions;

2. Implement the provisions of Chapter 15 that are applicable to cleanup and abatement, as follows:

   a. If cleanup and abatement involves corrective action at a waste management unit regulated by waste discharge requirements issued under Chapter 15, the Regional Water Board shall implement the provisions of that chapter;

   b. If cleanup and abatement involves removal of waste from the immediate place of release and discharge of the waste to land for treatment, storage, or disposal, the Regional Water Board

shall regulate the discharge of the waste through waste discharge requirements issued under Chapter 15, provided that the Regional Water Board may waive waste discharge requirements under WC Section 13269 if the waiver is not against the public interest (e.g., if the discharge is for short-term treatment or storage, and if the temporary waste management unit is equipped with features that will ensure full and complete containment of the waste for the treatment or storage period); and

c. If cleanup and abatement involves actions other than removal of the waste, such as containment of waste in soil or ground water by physical or hydrological barriers to migration (natural or engineered), or in-situ treatment (e.g., chemical or thermal fixation, or bioremediation), the Regional Water Board shall apply the applicable provisions of Chapter 15, to the extent that it is technologically and economically feasible to do so; and

3. Implement the applicable provisions of Chapter 16 for investigations and cleanup and abatement of discharges of hazardous substances from underground storage tanks; and

G. Ensure that dischargers are required to clean up and abate the effects of discharges in a manner that promotes attainment of either background water quality, or the best water quality which is reasonable if background levels of water quality cannot be restored, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible; in approving any alternative cleanup levels less stringent than background, apply Section 2550.4 of Chapter 15, or, for cleanup and abatement associated with underground storage tanks, apply Section 2725 of Chapter 16, provided that the Regional Water Board considers the conditions set forth in Section 2550.4 of Chapter 15 in setting alternative cleanup levels pursuant to Section 2725 of Chapter 16; any such alternative cleanup level shall:

1. Be consistent with maximum benefit to the people of the state;
2. Not unreasonably affect present and anticipated beneficial use of such water; and
3. Not result in water quality less than that prescribed in the Water Quality Control Plans and Policies adopted by the State and Regional Water Boards.

IV. The Regional Water Board shall determine schedules for investigation, and cleanup and abatement, taking into account the following factors:

A. The degree of threat or impact of the discharge on water quality and beneficial uses;

B. The obligation to achieve timely compliance with cleanup and abatement goals and objectives that implement the applicable Water Quality Control Plans and Policies adopted by the State Water Board and Regional Water Boards;

C. The financial and technical resources available to the discharger; and

D. Minimizing the likelihood of imposing a burden on the people of the state with the expense of cleanup and abatement, where feasible.

V. The State and Regional Water Boards shall develop an expedited technical conflict resolution process so when disagreements occur, a prompt appeal and resolution of the conflict is accomplished.

CERTIFICATION

The undersigned, Administrative Assistant to the Board, does hereby certify that the foregoing is full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on June 18, 1992, and amended at a meeting of the State Water Resources Control Board held on April 21, 1994.

Maureen Marché

Maureen Marché

Administrative Assistant to the Board

9/6/6

APPENDIX F

STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 88- 63

ADOPTION OF POLICY ENTITLED
"SOURCES OF DRINKING WATER"

WHEREAS:

1. California Water Code Section 13140 provides that the State Board shall formulate and adopt State Policy for Water Quality Control; and,

2. California Water Code Section 13240 provides that Water Quality Control Plans "shall conform" to any State Policy for Water Quality Control; and,

3. The Regional Boards can conform the Water Quality Control Plans to this policy by amending the plans to incorporate the policy; and,

4. The State Board must approve any conforming amendments pursuant to Water Code Section 13245; and,

5. "Sources of drinking water" shall be defined in Water Quality Control Plans as those water bodies with beneficial uses designated as suitable, or potentially suitable, for municipal or domestic water supply (MUN); and,

6. The Water Quality Control Plans do not provide sufficient detail in the description of water bodies designated MUN to judge clearly what is, or is not, a source of drinking water for various purposes.

THEREFORE BE IT RESOLVED:

All surface and ground waters of the State are considered to be suitable, or potentially suitable, for municipal or domestic water supply and should be so designated by the Regional Boards[1] with the exception of:

1. <u>Surface and ground waters where:</u>

   a. The total dissolved solids (TDS) exceed 3,000 mg/L (5,000 uS/cm, electrical conductivity) and it is not reasonably expected by Regional Boards to supply a public water system, or

b. There is contamination, either by natural processes or by human activity (unrelated to a specific pollution incident), that cannot reasonably be treated for domestic use using either Best Management Practices or best economically achievable treatment practices, or

c. The water source does not provide sufficient water to supply a single well capable of producing an average, sustained yield of 200 gallons per day.

2. Surface waters where:

a. The water is in systems designed or modified to collect or treat municipal or industrial wastewaters, process waters, mining wastewaters, or storm water runoff, provided that the discharge from such systems is monitored to assure compliance with all relevant water quality objectives as required by the Regional Boards; or,

b. The water is in systems designed or modified for the primary purpose of conveying or holding agricultural drainage waters, provided that the discharge from such systems is monitored to assure compliance with all relevant water quality objectives as required by the Regional Boards.

3. Ground water where:

The aquifer is regulated as a geothermal energy producing source or has been exempted administratively pursuant to 40 Code of Federal Regulations, Section 146.4 for the purpose of underground injection of fluids associated with the production of hydrocarbon or geothermal energy, provided that these fluids do not constitute a hazardous waste under 40 CFR, Section 261.3.

4. Regional Board Authority to Amend Use Designations:

Any body of water which has a current specific designation previously assigned to it by a Regional Board in Water Quality Control Plans may retain that designation at the Regional Board's discretion. Where a body of water is not currently designated as MUN but, in the opinion of a Regional Board, is presently or potentially suitable for MUN, the Regional Board shall include MUN in the beneficial use designation.

The Regional Boards shall also assure that the beneficial uses of municipal and domestic supply are designated for protection wherever those uses are presently being attained, and assure that any changes in beneficial use designations for waters of the State are consistent with all applicable regulations adopted by the Environmental Protection Agency.

The Regional Boards shall review and revise the Water Quality Control Plans to incorporate this policy.

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1 This policy does not affect any determination of what is a potential source of drinking water for the limited purposes of maintaining a surface impoundment after June 30, 1988, pursuant to Section 25208.4 of the Health and Safety Code.

CERTIFICATION

The undersigned, Administrative Assistant to the Board, does hereby certify that the foregoing is a full, true, and correct copy of a policy duly and regularly adopted at a meeting of the State Water Resources Control Board held on May 19, 1988.

Maureen Marche'
Administrative Assistant to the Board

APPENDIX G

APPENDIX ___

The Hantzsche/Finnemore Equation

The Hantzsche/Finnemore Equation is a formula for predicting concentrations of nitrate in groundwater from the discharge of septic tank effluent. The formula uses the amount of nitrogen discharged from the septic tank (it is assumed that all forms of nitrogen leaving the septic tank are converted to nitrate in the leach field) and the amount of dilution that is available from rainfall to reduce the concentration of nitrate in soil moisture as it makes its way to groundwater.

Simply put, the equation averages the concentration of nitrogen in septic tank effluent and in percolating rainwater to calculate the nitrogen concentration in groundwater. The formula also makes use of the fact that nitrate can be converted to nitrogen gas in the soil beneath the septic tank leachfield, and this gas can then migrate to the atmosphere, thus reducing the amount of nitrogen that contaminates groundwater. Conversion of nitrate to nitrogen gas is known as denitrification. See Figure 1 for a schematic representation of the process.

The Hantzsche formula is as follows:

$$Nr = \frac{I \times Nw \times (1-d) + R \times Nb}{(1 + R)}$$

Where:

Nr = Concentration of Nitrate in the Shallow Groundwater (mg/L)

I = The amount of wastewater entering the susurface, averaged over the gross developed property acreage (inches/year)

Nw = The concentration of nitrogen in the wastewater (mg/l)

d = The percentage nitrogen loss to the atmosphere due to denitrification (%)

R = The average recharge per year (inches/year)

Nb = The background nitrate content of the recharge (mg/l)

To use the formula one must know or be able to estimate the amount of nitrate or total nitrogen in septic tank effluent, the amount of rainfall that percolates to the subsurface, and the amount of denitrification that takes place in the soil. Much of the work that Dames and Moore has performed over the last two years has focused on obtaining site specific values from the Chico Urban Area for these variables. These studies have resulted in the following values (Values used in issuing the original prohibition are shown in parentheses-note that in some cases much more liberal values have been used in the current analysis)

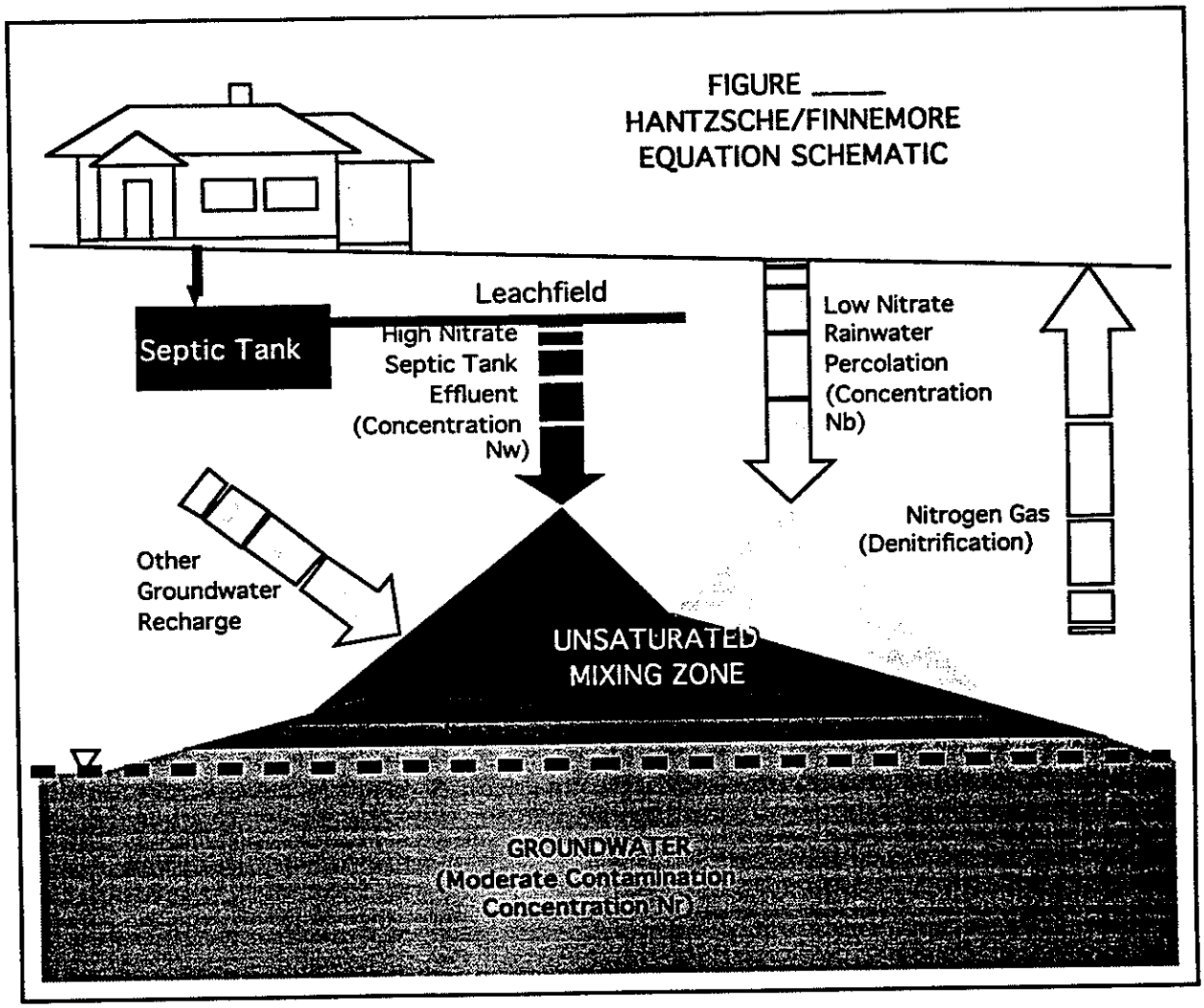
R = 18 inches per year (Formerly used approximately 9 inches per year

Nw = 40 mg/l (Formerly used 40 mg/l)

d = 30% (Formerly used 25%)

The resultant density that can be developed and not cause the exceedance of the nitrate contaminant level of 45 mg/l is approximatly 3 to 4 units per acre as illustrated in the accompanying Figure 2. This figure is a grapical illustration of the solutions to the equation with the above estimated variable values.

Note that this use of the above equation probably overstates the nitrogen concentration of most of the aquifer, because mixing that takes place with cleaner water deep in the aquifer and reduces the nitrate concentration further. Note also, however, that there is no safety factor for errors in our assumptions about the equation variables, so resultant nitrate concentraions could be higher if for instance, nitrogen discharge from the septic tank is higher than we assumed.



APPENDIX H

Members of the

Citizens Nitrate Advisory Committee

Cal Bachman

Elva Boone

Vivian Browning

Gene Damschen

Anita Domenichini

Thomas Edgar

Jim Goodwin

Elliott Johnson

Ned Kirkham

Martha Moyer

John Miller

Dan Shedd

Bill Sheridan

Peter Tichinin

Rick Timmons

Barbara Vlamis

*Ted Hubert

ex officio members:

Supervisor Jane Dolan

Supervisor Mary Anne Houx

*In Memoriam

Appendix I

CEQA Guidelines

Article 11. Types of EIRs

Title 14. California Code of Regulations

Chapter 3. Guidelines for Implementation of the California Environmental Quality Act

Article 11. Types of EIRs

Sections 15160 to 15170

(Note: Newly revised language is underlined; deleted language is stricken through. The numbered sections have been adopted by the Secretary of Resources as part of the California Code of Regulations. The discussions after each section are provided by the Governor's Office of Planning and Research; they are not in the California Code of Regulations.)

15160. General

This article describes a number of examples of variations in EIRs as the documents are tailored to different situations and intended uses. These variations are not exclusive. Lead Agencies may use other variations consistent with the Guidelines to meet the needs of other circumstances. All EIRs must meet the content requirements discussed in Article 9 beginning with Section 15120.

Note: Authority cited: Sections 21083 and 21087, Public Resources Code; Reference: Sections 21061, 21100, and 21151, Public Resources Code.

15161. Project EIR

The most common type of EIR examines the environmental impacts of a specific development project. This type of EIR should focus primarily on the changes in the environment that would result from the development project. The EIR shall examine all phases of the project including planning, construction, and operation.

Note: Authority cited: Sections 21083 and 21087, Public Resources Code; Reference: Sections 21061, 21100, and 21151, Public Resources Code.

15162. Subsequent EIRs and Negative Declarations

(a) When an EIR has been certified or a negative declaration adopted for a project, no subsequent EIR shall be prepared for that project unless the lead agency determines, on the basis of substantial evidence in the light of the whole record, one or more of the following:

(1) Substantial changes are proposed in the project which will require major revisions of the previous EIR or negative declaration due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects;

(2) Substantial changes occur with respect to the circumstances under which the project is undertaken

which will require major revisions of the previous EIR or Negative Declaration due to the involvement of new significant environmental effects or a substantial increase in the severity of previously identified significant effects; or

(3) New information of substantial importance, which was not known and could not have been known with the exercise of reasonable diligence at the time the previous EIR was certified as complete or the Negative Declaration was adopted, shows any of the following:

(A) The project will have one or more significant effects not discussed in the previous EIR or negative declaration;

(B) Significant effects previously examined will be substantially more severe than shown in the previous EIR;

(C) Mitigation measures or alternatives previously found not to be feasible would in fact be feasible, and would substantially reduce one or more significant effects of the project, but the project proponents decline to adopt the mitigation measure or alternative; or

(D) Mitigation measures or alternatives which are considerably different from those analyzed in the previous EIR would substantially reduce one or more significant effects on the environment, but the project proponents decline to adopt the mitigation measure or alternative.

(b) If changes to a project or its circumstances occur or new information becomes available after adoption of a negative declaration, the lead agency shall prepare a subsequent EIR if required under subsection (a). Otherwise the lead agency shall determine whether to prepare a subsequent negative declaration, an addendum, or no further documentation.

(c) Once a project has been approved, the lead agency's role in project approval is completed, unless further discretionary approval on that project is required. Information appearing after an approval does not require reopening of that approval. If after the project ~~was~~ is approved, any of ~~prior to the occurrence of~~ the conditions described in ~~S~~subsection (a) occurs, a ~~the~~ subsequent EIR or negative declaration shall only be prepared by the public agency which grants the next discretionary approval for the project, if any. In this situation no other responsible agency shall grant an approval for the project until the subsequent EIR has been certified or subsequent negative declaration adopted.

(d) A subsequent EIR or subsequent negative declaration shall be given the same notice and public review as required under Section 15087 or Section 15072. A subsequent EIR or negative declaration shall state where the previous document is available and can be reviewed.

Note: Authority cited: Public Resources Code Sections 21083 and 21087; Reference: Section 21166, Public Resources Code; *Bowman v. City of Petaluma* (1986) 185 Cal.App.3d 1065; *Benton v. Board of Supervisors* (1991) 226 Cal.App.3d 1467; and *Fort Mojave Indian Tribe v. California Department of Health Services et al* . (1995) 38 Cal.App.4th 1574.

Discussion: This section implements the requirements in Section 21166 of CEQA which limit preparation of a subsequent EIR to certain situations. This section provides interpretation of the three situations in which the statute requires preparation of a subsequent EIR. These interpretations are necessary to add certainty to the process.

This section also clarifies that a subsequent EIR may be prepared where a negative declaration had previously been adopted. Further, a subsequent negative declaration may be adopted where none of the situations described in subsection (a) have occurred.

Subsections (b) and (c) explain which agency would have responsibility for preparing a subsequent

EIR under different circumstances. A subsequent EIR must, of course, receive the same circulation and review as the previous EIR.

Fund for Environmental Defense v. Orange (1988) 204 Cal. App. 3d 1538, contains a discussion of the application of §15162 and §15163. The Court in *Bowman v. Petaluma* (1986) 185 Cal. App. 3d 1065 distinguished requirements for a subsequent EIR from the threshold required for initial EIR preparation, saying "whereas §15064 (§21151 PRC) requires an EIR if the initial project may have a significant effect on the environment, §15162 (§21166 PRC) indicates a quite different intent, namely, to restrict the powers of agencies by prohibiting them from requiring a subsequent or supplemental EIR unless "substantial changes" in the project or its circumstances will require major revisions to the EIR. §15162 (§21166 PRC) comes into play precisely because in-depth review has already occurred, the time for challenging the sufficiency of the original EIR has long since expired, and the question is whether circumstances have changed enough to justify repeating a substantial portion of the process.

15163. Supplement to an EIR

(a) The Lead or Responsible Agency may choose to prepare a supplement to an EIR rather than a subsequent EIR if:

(1) Any of the conditions described in Section 15162 would require the preparation of a subsequent EIR, and

(2) Only minor additions or changes would be necessary to make the previous EIR adequately apply to the project in the changed situation.

(b) The supplement to the EIR need contain only the information necessary to make the previous EIR adequate for the project as revised.

(c) A supplement to an EIR shall be given the same kind of notice and public review as is given to a draft EIR under Section 15087.

(d) A supplement to an EIR may be circulated by itself without recirculating the previous draft or final EIR.

(e) When the agency decides whether to approve the project, the decision-making body shall consider the previous EIR as revised by the supplemental EIR. A finding under Section 15091 shall be made for each significant effect shown in the previous EIR as revised.

Note: Authority cited: Sections 21083 and 21087, Public Resources Code; Reference: Section 21166, Public Resources Code.

Discussion: This section provides a short-form method where only minor additions or changes would be necessary in the previous EIR to make that EIR apply in the changed situation. The section also provides essential interpretations of how to handle public notice, public review, and circulation of the supplement.

A supplement to an EIR may be distinguished from a subsequent EIR by the following: a supplement augments a previously certified EIR to the extent necessary to address the conditions described in section 15162 and to examine mitigation and project alternatives accordingly. It is intended to revise the previous EIR through supplementation. A subsequent EIR, in contrast, is a complete EIR which focuses on the conditions described in section 15162.

15164.

Addendum to an EIR or Negative Declaration

(a) The lead agency or responsible agency shall prepare an addendum to a previously certified EIR if some changes or additions are necessary but none of the conditions described in Section 15162 calling for preparation of a subsequent EIR have occurred.

(b) An addendum to an adopted negative declaration may be prepared if only minor technical changes or additions are necessary or none of the conditions described in Section 15162 calling for the preparation of a subsequent EIR or negative declaration have occurred.

(c) An addendum need not be circulated for public review but can be included in or attached to the final EIR or adopted negative declaration.

(d) The decision making body shall consider the addendum with the final EIR or adopted negative declaration prior to making a decision on the project.

(e) A brief explanation of the decision not to prepare a subsequent EIR pursuant to Section 15162 should be included in an addendum to an EIR, the lead agency's findings on the project, or elsewhere in the record. The explanation must be supported by substantial evidence.

Note: Authority cited: Public Resources Code Sections 21083 and 21087; Reference: Section 21166, Public Resources Code; *Bowman v. City of Petaluma* (1986) 185 Cal.App.3d 1065; and *Benton v. Board of Supervisors* (1991) 226 Cal.App.3d 1467.

Discussion: This section is designed to provide clear authority for an addendum as a way of making minor corrections in EIRs and negative declarations without recirculating the EIR or negative declaration.

15165. Multiple and Phased Projects

Where individual projects are, or a phased project is, to be undertaken and where the total undertaking comprises a project with significant environmental effect, the Lead Agency shall prepare a single program EIR for the ultimate project as described in Section 15168. Where an individual project is a necessary precedent for action on a larger project, or commits the Lead Agency to a larger project, with significant environmental effect, an EIR must address itself to the scope of the larger project. Where one project is one of several similar projects of a public agency, but is not deemed a part of a larger undertaking or a larger project, the agency may prepare one EIR for all projects, or one for each project, but shall in either case comment upon the cumulative effect.

Note: Authority cited: Sections 21083 and 21087, Public Resources Code; Reference: Sections 21061, 21100, and 21151, Public Resources Code; *Whitman v. Board of Supervisors* , (1979) 88 Cal. App. 3d 397.

Discussion: This section follows the principle that the EIR on a project must show the big picture of what is involved. If the approval of one particular activity could be expected to lead to many other activities being approved in the same general area, the EIR should examine the expected effects of

the ultimate environmental changes. This section is consistent with the *Whitman* decision cited in the note interpreting CEQA.

15166. EIR as Part of a General Plan

(a) The requirements for preparing an EIR on a local general plan, element, or amendment thereof will be satisfied by using the general plan, or element document, as the EIR and no separate EIR will be required, if:

(1) The general plan addresses all the points required to be in an EIR by Article 9 of these Guidelines, and

(2) The document contains a special section or a cover sheet identifying where the general plan document addresses each of the points required.

(b)Where an EIR rather than a Negative Declaration has been prepared for a general plan, element, or amendment thereto, the EIR shall be forwarded to the State Clearinghouse for review. The requirement shall apply regardless of whether the EIR is prepared as a separate document or as a part of the general plan or element document.

Note: Authority cited: Sections 21083 and 21087, Public Resources Code; Reference: Sections 21003, 21061, 21083, 21100, 21104, 21151, and 21152, Public Resources Code.

Discussion: A separate section is provided to authorize combining the general plan document with the EIR. This section allows the use of the general plan document as the EIR if the document contains a special section or a cover sheet identifying where each of the points required in an EIR may be found. This section also identifies the special requirement for an EIR on a general plan to be submitted to the State Clearinghouse for review as a project of areawide, regional, or statewide significance as provided in Section 15207.

15167. Staged EIR

(a) Where a large capital project will require a number of discretionary approvals from government agencies and one of the approvals will occur more than two years before construction will begin, a staged EIR may be prepared covering the entire project in a general form. The staged EIR shall evaluate the proposal in light of current and contemplated plans and produce an informed estimate of the environmental consequences of the entire project. The aspect of the project before the public agency for approval shall be discussed with a greater degree of specificity.

(b) When a staged EIR has been prepared, a supplement to the EIR shall be prepared when a later approval is required for the project, and the information available at the time of the later approval would permit consideration of additional environmental impacts, mitigation measures, or reasonable alternatives to the project.

(c) Where a statute such as the Warren-Alquist Energy Resources Conservation and Development Act provides that a specific agency shall be the Lead Agency for a project and requires the Lead Agency to prepare an EIR, a Responsible Agency which must grant an approval for the project before the Lead Agency has completed the EIR may prepare and consider a staged EIR.

(d) An agency requested to prepare a staged EIR may decline to act as the Lead Agency if it

determines, among other factors, that:

(1) Another agency would be the appropriate Lead Agency; and

(2) There is no compelling need to prepare a staged EIR and grant an approval for the project before the appropriate Lead Agency will take its action on the project.

Note: Authority cited: Sections 21083 and 21087, Public Resources Code; Reference: Section 21003, Public Resources Code.

Discussion: The staged EIR was developed as a device to deal with the problem of a large development project which would require many years for planning, engineering, and construction but would need a number of approvals from public agencies before the final plans for the project would be available. Where those final plans would not be available, the Lead Agency preparing an EIR for one of the early approvals would have difficulty providing enough information about the project to evaluate the effects of the entire project as would otherwise be required.

The device of the staged EIR provides a special relaxation of the requirement for the EIR on a development project to examine the entire project in detail. To make up for this lack of detail with the early approval, the section requires preparation of a supplement with later approvals when additional information becomes available. The section also allows this device to be used in the troublesome situation where an agency with limited control over the project is asked to grant the first approval for the project long before the normal Lead Agency would be called upon to act. The Responsible Agency needs some document to use in order to comply with CEQA. At the same time, due to its limited control over the project, it would not be a prime candidate for being Lead Agency. This approach allows the Responsible Agency to do a limited EIR examining the effects of its approval but noting in a general way the larger scope of the project and the general environmental effects expected.

15168. Program EIR

(a) General. A program EIR is an EIR which may be prepared on a series of actions that can be characterized as one large project and are related either:

(1) Geographically,

(2) A logical parts in the chain of contemplated actions,

(3) In connection with issuance of rules, regulations, plans, or other general criteria to govern the conduct of a continuing program, or

(4) As individual activities carried out under the same authorizing statutory or regulatory authority and having generally similar environmental effects which can be mitigated in similar ways.

(b) Advantages. Use of a program EIR can provide the following advantages. The program EIR can:

(1) Provide an occasion for a more exhaustive consideration of effects and alternatives than would be practical in an EIR on an individual action,

(2) Ensure consideration of cumulative impacts that might be slighted in a case-by-case analysis,

(3) Avoid duplicative reconsideration of basic policy considerations,

(4) Allow the Lead Agency to consider broad policy alternatives and programwide mitigation measures at an early time when the agency has greater flexibility to deal with basic problems or cumulative impacts, and

(5) Allow reduction in paperwork.

(c) Use with Later Activities. Subsequent activities in the program must be examined in the light of the program EIR to determine whether an additional environmental document must be prepared.

(1) If a later activity would have effects that were not examined in the program EIR, a new Initial Study would need to be prepared leading to either an EIR or a Negative Declaration.

(2) If the agency finds that pursuant to Section 15162, no new effects could occur or no new mitigation measures would be required, the agency can approve the activity as being within the scope of the project covered by the program EIR, and no new environmental document would be required.

(3) An agency shall incorporate feasible mitigation measures and alternatives developed in the program EIR into subsequent actions in the program.

(4) Where the subsequent activities involve site specific operations, the agency should use a written checklist or similar device to document the evaluation of the site and the activity to determine whether the environmental effects of the operation were covered in the program EIR.

(5) A program EIR will be most helpful in dealing with subsequent activities if it deals with the effects of the program as specifically and comprehensively as possible. With a good and detailed analysis of the program, many subsequent activities could be found to be within the scope of the project described in the program EIR, and no further environmental documents would be required.

(d) Use with Subsequent EIRs and Negative Declarations. A program EIR can be used to simplify the task of preparing environmental documents on later parts of the program. The program EIR can:

(1) Provide the basis in an Initial Study for determining whether the later activity may have any significant effects.

(2) Be incorporated by reference to deal with regional influences, secondary effects, cumulative impacts, broad alternatives, and other factors that apply to the program as a whole.

(3) Focus an EIR on a subsequent project to permit discussion solely of new effects which had not been considered before.

(e) Notice with Later Activities. When a law other than CEQA requires public notice when the agency later proposes to carry out or approve an activity within the program and to rely on the program EIR for CEQA compliance, the notice for the activity shall include a statement that:

(1) This activity is within the scope of the program approved earlier, and

(2) The program EIR adequately describes the activity for the purposes of CEQA.

Note: Authority cited: Sections 21083 and 21087, Public Resources Code; Reference: Section 21003, Public Resources Code; *County of Inyo v. Yorty* , (1973) 32 Cal. App. 3d 795.

Discussion: The program EIR is a device originally developed by federal agencies under NEPA. Use of this approach was recommended for CEQA in the court decision of *County of Inyo v. Yorty* cited in the note.

The detailed description of the permissible uses of this document are provided in an effort to encourage its use. The program EIR can be used effectively with a decision to carry out a new governmental program or to adopt a new body of regulations in a regulatory program. The program EIR enables the agency to examine the overall effects of the proposed course of action and to take steps to avoid unnecessary adverse environmental effects.

Use of the program EIR also enables the Lead Agency to characterize the overall program as the project being approved at that time. Following this approach when individual activities within the program are proposed, the agency would be required to examine the individual activities to determine whether their effects were fully analyzed in the program EIR. If the activities would have no effects beyond those analyzed in the program EIR, the agency could assert that the activities are merely part of the program which had been approved earlier, and no further CEQA compliance would be required. This approach offers many possibilities for agencies to reduce their costs of CEQA compliance and still achieve high levels of environmental protection.

15169. Master Environmental Assessment

(a) General. A public agency may prepare a Master Environmental Assessment, inventory, or data base for all, or a portion of, the territory subject to its control in order to provide information which may be used or referenced in EIRs or Negative Declarations. Neither the content, the format, nor the procedures to be used to develop a Master Environmental Assessment are prescribed by these Guidelines. The descriptions contained in this section are advisory. A Master Environmental Assessment is suggested solely as an approach to identify and organize environmental information for a region or area of the state.

(b) Contents. A Master Environmental Assessment may contain an inventory of the physical and biological characteristics of the area for which it is prepared and may contain such additional data and information as the public agency determines is useful or necessary to describe environmental characteristics of the area. It may include identification of existing levels of quality and supply of air and water, capacities and levels of use of existing services and facilities, and generalized incremental effects of different categories of development projects by type, scale, and location.

(c) Preparation.

(1) A Master Environmental Assessment or inventory may be prepared in many possible ways. For example, a Master Environmental Assessment may be prepared as a special, comprehensive study of the area involved, as part of the EIR on a general plan, or as a data base accumulated by indexing EIRs prepared for individual projects or programs in the area involved.

(2) The information contained in a Master Environmental Assessment should be reviewed periodically and revised as needed so that it is accurate and current.

(3) When advantageous to do so, Master Environmental Assessments may be prepared through a joint exercise of powers agreement with neighboring local agencies or with the assistance of the appropriate Council of Governments.

(d) Uses.

(1) A Master Environmental Assessment can identify the environmental characteristics and constraints of an area. This information can be used to influence the design and location of individual projects.

(2) A Master Environmental Assessment may provide information agencies can use in initial studies to decide whether certain environmental effects are likely to occur and whether certain effects will be significant.

(3) A Master Environmental Assessment can provide a central source of current information for use in preparing individual EIRs and Negative Declarations.

(4) Relevant portions of a Master Environmental Assessment can be referenced and summarized in EIRs and Negative Declarations.

(5) A Master Environmental Assessment can assist in identifying long range, areawide, and cumulative impacts of individual projects proposed in the area covered by the assessment.

(6) A Master Environmental Assessment can assist a city or county in formulating a general plan or any element of such a plan by identifying environmental characteristics and constraints that need to be addressed in the general plan.

(7) A Master Environmental Assessment can serve as a reference document to assist public agencies which review other environmental documents dealing with activities in the area covered by the assessment. The public agency preparing the assessment should forward a completed copy to each agency which will review projects in the area.

Note: Authority cited: Sections 21083 and 21087, Public Resources Code; Reference: Section 21003, Public Resources Code.

Discussion: The Master Environmental Assessment was developed as a way of providing a data base for use with later EIRs. If an agency prepared a Master Environmental Assessment, the agency could reduce the amount of work necessary to prepare later EIRs. The environmental setting would have been fully analyzed, and the likely environmental effects in the area could be anticipated. Thus, the Master Environmental Assessment could help focus initial studies as well as EIRs.

15170. Joint EIR-EIS

A Lead Agency under CEQA may work with a federal agency to prepare a joint document which will meet the requirements of both CEQA and NEPA. Use of such a joint document is described in Article 14, beginning with Section 15220.

Note: Authority cited: Sections 21083 and 21087, Public Resources Code; Reference: Sections 21083.5 and 21083.7, Public Resources Code.

Discussion: This section identifies the joint EIR-EIS as a special type of EIR. This special treatment is appropriate because many unusual steps would be required in order to meet the requirements of NEPA as well as CEQA. These steps may include formal scoping hearings, publication of notice in the Federal Register, and public review of the final EIR-EIS. This section also clearly establishes the validity of this joint document.

CEQA

The California Environmental Quality Act

A copy of Adobe's PDF viewer can be obtained free of charge.

Title 14. California Code of Regulations

Chapter 3. Guidelines for Implementation of the California Environmental Quality Act

Overview of the California Environment Review and Permit Approval Process: Introduction

Article 1	General	§§15000-15007
Article 2	General Responsibilities	§§15020-15025
Article 3	Authorities Granted to Public Agencies by CEQA	§§15040-15045
Article 4	Lead Agency	§§15050-15052
Article 5	Preliminary Review of Projects and Conduct of Initial Study	§§15060-15065
Article 6	Negative Declaration Process	§§15070-15075
Article 7	EIR Process	§§15080-15097
Article 8	Time Limits	§§15100-15112
Article 9	Contents of Environmental Impact Reports	§§15120-15132
Article 10	Considerations in Preparing EIRs and Negative Declarations	§§15140-15153
Article 11	Types of EIRs	§§15160-15170
Article 11.5	Master Environmental Impact Report	§§15175-15179.5
Article 12	Special Situations	§§15180-15190
Article 13	Review and Evaluation of EIRs and Negative Declarations	§§15200-15209
Article 14	Projects Also Subject to the National Environmental Policy Act (NEPA)	§§15220-15228
Article 15	Litigation	§§15230-15233
Article 16	EIR Monitor	§ 15240
Article 17		§§15250-

APPENDIX J

STATE WATER RESOURCES CONTROL BOARD

RESOLUTION NO. 68-16

STATEMENT OF POLICY WITH RESPECT TO
MAINTAINING HIGH QUALITY OF WATERS IN CALIFORNIA

WHEREAS the California Legislature has declared that it is the policy of the State that the granting of permits and licenses for unappropriated water and the disposal of wastes into the waters of the State shall be so regulated as to achieve highest water quality consistent with maximum benefit to the people of the State and shall be controlled so as to promote the peace, health, safety and welfare of the people of the State; and

WHEREAS water quality control policies have been and are being adopted for waters of the State; and

WHEREAS the quality of some waters of the State is higher than that established by the adopted policies and it is the intent and purpose of this Board that such higher quality shall be maintained to the maximum extent possible consistent with the declaration of the Legislature;

NOW, THEREFORE, BE IT RESOLVED:

1. Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.

2. Any activity which produces or may produce a waste or increased volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained.

3. In implementing this policy, the Secretary of the Interior will be kept advised and will be provided with such information as he will need to discharge his responsibilities under the Federal Water Pollution Control Act.

BE IT FURTHER RESOLVED that a copy of this resolution be forwarded to the Secretary of the Interior as part of California's water quality control policy submission.

CERTIFICATION

The undersigned, Executive Officer of the State Water Resources Control Board, does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on October 24, 1968.

Dated: October 28, 1968

Kerry W. Mulligan
Executive Officer
State Water Resources
Control Board

2/2/2

Appendix K

Amendment to the policy regarding the assessment of parcels within County Service Area 114

CHIEF ADMINISTRATIVE OFFICE

COUNTY OF BUTTE

25 COUNTY CENTER DRIVE
OROVILLE, CALIFORNIA 95965-3380
Telephone: (530)-538-7631 Fax: (530)-538-7120

JOHN S. BLACKLOCK
CHIEF ADMINISTRATIVE OFFICER

MEMBERS OF THE BOARD

R. J. BEELER
JANE DOLAN
MARY ANNE HOUX
CURT JOSIASSEN
FRED C. DAVIS

MEMORANDUM

TO: Mike Crump, Director, Public Works
Stu Edell, Manager - Land Development, Public Works
Tom Reid, Director, Environmental Health
Mike Huerta, Supervising EHS, Environmental Health
Tom Parilo, Director, Development Services
Paula Leasure, Executive Officer, LAFCO
Rob MacKenzie, Chief Deputy County Counsel

FROM: Eric Miller, Manager - Program Resource & Development

SUBJECT: Amendment to the policy regarding the assessment and retention of parcels within County Service Area (CSA) 114

DATE: September 15, 1999

At its September 14, 1999 meeting the Board of Supervisors amended its policy regarding the assessment of parcels within CSA 114. This new policy simplifies the criteria for a parcel to be charged the current parcel fee of $25.90. Simply put, only parcels within CSA 114 that utilize septic systems (i.e. those parcels not served by a sanitary sewer system) will continue to be assessed the $25.90 fee. All parcels within CSA 114 that receive sewer service will be placed into Zone 2 which carries no assessment. The storm drainage concern, as addressed in the Nitrate Action Plan, is now a moot point. I have provided the following background information for your convenience:

A. Background

The Nitrate Action Plan adopted by the County of Butte, City of Chico, and accepted by the Regional Water Quality Control Board (Regional Board), included restrictions on the types and amounts of storm water runoff discharged to the subsurface.

The Nitrate Action Plan required the establishment of a County Service Area (CSA) to provide funding for (1) the development of engineering, financing and feasibility plans to provide sanitary sewers and storm drainage facilities to properties located within the CSA, and (2) administrative costs related to the purpose of the CSA.

CSA 114 was formed by the County in December 1988 and originally included all unincorporated property within the Chico Sphere of Influence. All parcels which were not sewered and which were not served by a permanent storm drainage facility were to remain within this CSA (CSA 114).

The annual assessment amount for parcels not meeting the sewer and storm drainage requirements is $25.90. At a June 1994 Board meeting, the Board of Supervisors directed that parcels within CSA 114 which met the sewer and storm drainage requirements be placed into a separate zone of benefit (Zone 2) which carries no assessment. At this meeting the Board established two zones of benefit for CSA 114 with Zone 2 to include all parcels that have connected to both sanitary sewer and also to a permanent storm drainage facility.

B. Change in Regional Board Policy

As a result of discussions with Regional Board staff over the last two months, Regional Board staff have agreed that they will not object if County and City policy makers wish to forgo implementation of those provisions of the Nitrate Action Plan that are related to storm water drainage. That decision was memorialized in a letter dated August 18, 1999 and is attached herewith.

C. Recommendations and Action Taken by the Board

Now that the Regional Board staff has agreed to relax its position regarding storm water drainage, the Board of Supervisors agreed to amend the following policies regarding the assessment of parcels within CSA 114:

- Parcels within CSA 114 and proposed to be annexed to the City of Chico should remain within CSA 114 only if they are not sewered (parcels utilizing septic systems shall remain in CSA 114 and be placed in Zone 1);

- Parcels within CSA 114 that have been annexed to the City and are sewered should remain in CSA 114 and be placed within Zone 2 which carries no assessment;

- Parcels within CSA 114 that are located in the unincorporated portion of the Chico Urban Area and are sewered should remain in CSA 114 and be placed within Zone 2 which carries no assessment.

The approach to place the parcels into Zone 2 instead of detaching them from the CSA was recommended for the following reasons:

- The County can act immediately and economically when the Board considers CSA budgets on September 28, 1999. Correction to the property tax bill assessments can be implemented for FY 1999-2000.

- The County and citizens of CSA 114 would avoid significant costs in processing detachments from the CSA. If this strategy were implemented, the removal of the assessment could not go into effect until FY 2000/2001 at the soonest. This process requires the preparation of maps, legal descriptions, and fees chargeable by the State Board of Equalization, LAFCO, and local agencies.

Prior to the Board's action on September 14, approximately 9,946 parcels within Zone 1 formed the

basis of the CSA 114 operating budget. Over the past several months, and with the assistance of City and County Public Works staff, I have been able to verify that approximately 1,230 of these parcels meet the sewer connection criterion and these parcels were recommended to be moved into Zone 2. The net figure of approximately 8,716 parcels within CSA 114 now remains in Zone 1 and will continue to be assessed. The database for Zone 1 will continue to be updated as more parcels connect to sewer, or as additional information is provided that indicates that a given parcel is still utilizing an on-site septic system.

D. Nitrate Action Plan

Administrative Office staff did not recommend that the Board amend the Nitrate Action Plan at this time to delete those provisions to storm drainage. Instead it was proposed that a statement is included in the Nitrate Compliance Plan at the time of its final adoption which makes it clear that the Nitrate Compliance Plan supersedes the Nitrate Action Plan. It is my intention to bring the Nitrate Compliance Plan back to the Board for final adoption in late fall. I have been working with Tom Reid to identify those provisions of the Nitrate Action Plan that should be incorporated into the final document.

E. Notice to LAFCO

When a request for annexation to the City of Chico has been considered by LAFCO, the Administrative Office has previously requested that the parcel(s) to be annexed remain within CSA 114 if they are not sewered and/or they do not have a permanent solution for storm drainage. This request will now be revised to reflect the Board's new policy adopted on September 14, 1999.

I will keep you apprised of additional developments regarding the finalization of the Nitrate Compliance Plan. If you have any questions in the meantime please feel free to call me.

Attachment: Letter from Regional Board

cc: Starlyn Brown, Assistant Chief Administrative Officer
Janice Fratallone, Auditor's Office
Carl Evans, Auditor's Office
Ron Dykstra, Regional Board

EAM

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California Regional Water Quality Control Board
Central Valley Region
Steven T. Butler, Chair

W n H. Hickox
Secretary for Environmental Protection

Gray Davis
Governor

Redding Branch Office
Internet Address: http://www.swrcb.ca.gov/~rwqcb5
415 Knollcrest Drive, Suite 100, Redding, California 96002
Phone (530) 224-4845 • FAX (530) 224-4857

BUTTE COUNTY
ADMINISTRATIVE OFFICE

AUG 1 9 1999

OROVILLE, CALIFORNIA

18 August 1999

Ms. Starlyn Brown, City of Oroville
Assistant Chief Administrative Officer
25 County Center Drive
Oroville, CA 95965

NITRATE ACTION PLAN, BOARD ORDER NO. 90-126, AND STORM WATER MANAGEMENT IN THE CHICO URBAN AREA, CHICO, BUTTE COUNTY

The Nitrate Action Plan adopted by the City of Chico and Butte County restricts the types and amounts of storm water runoff that may be discharged to the subsurface. This restriction was implemented due to the potential for nitrate discharge to groundwater from surface sources. However, additional studies by Butte County have all but ruled out the possibility of significant surface sources. In addition, the County is in the process of implementing a compliance plan to significantly reduce nitrate contamination from septic systems. Therefore, we do not object if the City and County wish to forgo implementation of those provisions in the Nitrate Action Plan relating to storm drainage, as those provisions will be superceded by compliance with Order No. 90-126.

The City and County should note that any subsurface discharge must be designed and managed properly to prevent potential contamination of groundwater, especially from petroleum compounds and heavy metals. If you have any questions, please contact me at (530) 224-4858 or the letterhead address.

Ronald S. Dykstra, P.E.
Associate WRC Staff Engineer
Shasta Cascade Watershed

RSD:tch

cc: Mr. Tom Lando, City of Chico City Manager, Chico

APPENDIX L

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APPENDIX M

ASSESSMENT BONDS

Definition and Purpose

Assessments are charges imposed upon land that receives a special benefit from a public improvement. The governing body of the issuer of bonds payable from assessments ("assessment bonds") identifies the area of land that will receive the special benefit and establishes an "assessment district." An assessment district is not a separate legal entity that can act independently of the legislative body that creates it--there is no separate governing board of the district; it cannot sue or be sued. It is not a special district akin to a sanitary district, water district or public utility district.

Assessments have a principal amount and, if not paid when levied, have a Principal payment schedule and bear Interest. Property owners may pay the full amount of their assessment in cash within 30 days after it is levied. To the extent assessments are not paid in cash, assessment bonds are issued and the bond proceeds are combined with any assessments paid in cash to finance the public improvements. The assessment bonds are then payable from the periodic payments on the assessments that were not paid when levied.

Many of the types of facilities or improvements that can be financed with assessment bonds may also be financed with Mello-Roos bonds issued through community facilities districts. See "Types of Financing Instruments -- Mello-Roos Bonds (Community Facilities Districts)."

Legal Authority; Issuers

California has many laws that permit assessment districts to be established to finance public improvements. Some of the laws combine the authority to issue bonds with the procedures necessary to establish the assessment district in the same statute. Other laws only specify the procedures necessary to establish the assessment district and incorporate by reference another statute for the issuance of the assessment bonds.

Three statutes are primarily used in assessment district financing in California and are discussed in detail in this subchapter. They are:

-- the Improvement Act of 1911 (Streets and Highways Code Sections 5000 et seq., the "1911 Act"), which authorizes the issuance of bonds and specifies a procedure for establishing assessment districts;

-- the Municipal Improvement Act of 1913 (Streets and Highways Code Sections 10000 et seq., the "1913 Act"), which specifies a procedure for establishing assessment districts only; and

-- the Improvement Bond Act of 1915 (Streets and Highways Code Sections 8500 et seq., the "1915 Act"), which authorizes the issuance of bonds only.

In addition, all assessment district proceedings (unless they are specifically exempted) must comply with the provisions of two other statutes: the Special Assessment Investigation, Limitation and Majority Protest Act of 1931 (Streets and Highways Code Sections 2800 et seq., the "Majority Protest Act") and the provisions for Notice of Special Assessment and Foreclosure Proceedings (Streets and Highways Code Sections 3100 et seq., the "Notice and Foreclosure Provisions").

Charter cities and counties may enact their own procedural ordinances for assessment district financings. However, all proceedings by a chartered city or county to construct or acquire a public improvement must comply with Article XVI, Section 19, of the California Constitution, which incorporates certain of the limitations included in the Majority Protest Act.

Assessments are not subject to the one percent maximum Ad Valorem tax limitation imposed by Article XIIIA of the California Constitution and are not taxes within the meaning of Article XIIIA, Section 4. Thus, a two-thirds vote of the qualified electors of the assessment district is not required to levy assessments or issue bonds. Assessments are also not subject to the appropriations limit of Article XIIIB.

Table 3-7-1 lists the various statutes that authorize assessment districts to be established, specifies whether those statutes also authorize bonds to be issued and, if so, specifies the type of bonds authorized.

A list of some of the various entities that are authorized to establish assessment districts and issue assessment bonds is contained in Table 3-7-2. A reference to the statute that authorizes an entity to establish an assessment district is also provided.

TABLE 3-7-1

STATUTES AUTHORIZING ASSESSMENTS, ASSESSMENT DISTRICTS AND THE ISSUANCE OF ASSESSMENT BONDS

NAME OF STATUTE	CODE REFERENCE	PROCEDURE FOR ASSESSMENTS AND DISTRICTS	AUTHORIZES ASSESSMENT BONDS	TYPE OF BONDS AUTHORIZED
Improvement Act of 1911	Streets & Highways Code §§5000 et seq.	1911 Act	Yes	1911 or 1915 Act
Municipal Improvement Act of 1913	Streets & Highways Code §§10000 et seq.	1913 Act	No	
Improvement Bond Act of 1915	Streets & Highways Code §§8500 et seq.		Yes	1915 Act
Park Playground Act of 1909	Government Code §§38000 et seq.	1911 or 1913 Act	No	
Street Opening Act of 1903	Streets & Highways Code §§4000 et seq.	1911 or 1913 Act	Yes	1911 or 1915 Act
Pedestrian Hall Law of 1960	Streets & Highways Code §§11000 et seq.	1911 or 1913 Act	Yes	1911 or 1915 Act
Street Lighting Act of 1915	Streets & Highways Code §18000	SELF CONTAINED[1]	No	
Street Lighting Act of 1931	Streets & Highways Code §18301	SELF CONTAINED[1]	No	
Municipal Lighting Maintenance District Act of 1927	Streets & Highways Code §18600	SELF CONTAINED[1]	No	

TABLE 3-7-1 continued

NAME OF STATUTE	CODE REFERENCE	PROCEDURE FOR ASSESSMENTS AND DISTRICTS	AUTHORIZES ASSESSMENT BONDS	TYPE OF BONDS AUTHORIZED
Highway Lighting District Act	Streets & Highways Code §19000	SELF CONTAINED[1]	No	
Tree Planting Act of 1931	Streets & Highways Code §§22000 et seq.	SELF CONTAINED[1]	No	
Landscaping & Lighting Act of 1972	Streets & Highways Code §§22500 et seq.	SELF CONTAINED[1]	Yes	1915 Act
Vehicle Parking Law of 1943	Streets & Highways Code §§31500 et seq.	1911 or 1913 Act	Yes	1911 or 1915 Act
Parking District Law of 1951	Streets & Highways Code §§35100 et seq.	SELF CONTAINED[1]	Yes	SELF CONTAINED[2]
Parking District Law of 1951 for refunding to eliminate parking meters	Streets & Highways Code §§35450 et seq.	1911 Act	Yes	1911 Act
Parking & Business Improvement Area Law of 1979	Streets & Highways Code §§36500 et seq.	SELF CONTAINED[1]	No	

[1] The statute authorizes the levy of assessments and does not incorporate the procedures of the 1911 or 1913 Acts to establish the district, but contains specific procedures to establish the district within it.

[2] The statute authorizes the issuance of bonds but not under the 1911 or 1915 Acts.

TABLE 3-7-2

ENTITIES AUTHORIZED TO
LEVY ASSESSMENTS UNDER THE 1911 ACT OR THE 1913 ACT
AND TO ISSUE BONDS UNDER THE 1911 ACT OR THE 1915 ACT

ENTITY	STATUTORY AUTHORITY	BOND ACT
California Water Districts	Water Code §36455	1911 or 1915 Act
Cities	Streets & Highways Code §5005; 1003	1911 or 1915 Act
City Maintenance Districts	Streets & Highways Code §5820	1911 Act
Community Rehabilitation Districts	Government Code §53374	Self contained[1]
Community Service Districts	Government Code §61710 61712	Self contained[1]
Community Service District Improvement Districts	Government Code §61712	Self contained[1]
Counties	Streets & Highways Code §5005; 10003	1911 or 1915 Act
County Drainage Districts	Water Code §56100	1911 or 1915 Act
County Maintenance Districts	Streets & Highways Code §5835	1911 Act
County Sanitation Districts	Health & Safety Code §4771	1911 or 1915 Act
County Water Districts and their Improvement Districts	Water Code §§31501, 31502, 31503	1911 or 1915 Act

TABLE 3-7-2 continued

ENTITY	STATUTORY AUTHORITY	BOND ACT
County Waterworks Districts	Water Code §55386	1911 or 1915 Act
Crossing Guard Maintenance Districts	Government Code §55559	Self contained[1]
Drainage Districts	Water Code §56100	1911 or 1915 Act
Water Conservation Districts	Water Code §74507	Self contained[1]
Geologic Hazard Abatement Districts	Public Resources Code §26587	1915 Act
Irrigation Districts	Water Code §23600	Self contained[1]
Irrigation District Distribution Districts	Water Code §23533	Self contained[1]
Irrigation District Improvement Districts	Water Code §23910	[1]
Joint Municipal Sewage Disposal Districts	Public Utilities Code §§12921, 13010	1911 or 1915 Act
Levee Districts	Water Code §70230	1911 Act
Local Hospital Districts	Health & Safety Code §§32240, 32243	[1]
Maintenance Districts	Streets & Highways Code §5820;10107; 10108	1911 or 1915 Act

TABLE 3-7-2 continued

ENTITY	STATUTORY AUTHORITY	BOND ACT
Mosquito Abatement or Vector Control Districts	Health & Safety Code §2291.4	[1]
Municipal Utility Districts	Public Utilities Code §§12921, 13010	1911 or 1915 Act
Municipal Water Districts and their Improvement Districts	Water Code §71820	1911 or 1915 Act
Pest Abatement Districts	Health & Safety Code §§2823, 2872	[1]
Project Areas of Redevelopment Agencies	Health & Safety Code §33800	1911 or 1915 Act[2]
Reclamation Districts	Water §39060; 50000; Gov't §38901	
Resource Conservation Districts	Public Resources Code §9964	1911 or 1915 Act
Sanitary Districts	Health & Safety Code §6541	1911 or 1915 Act
Water Districts	Water Code §§36455; 71820	1911 or 1915 Act
Zones of County Water Agencies	Water Code §§55385-55408	1911 or 1915 Act

[1] Although the entity may levy assessments, both the procedure to establish the district and the provisions for the bonds are contained in the statute. Neither 1911 Act nor 1915 Act bonds are authorized.

[2] Bonds may be issued to pay obligations of the Agency incurred before July 1, 1978.

Projects Which May Be Financed

The public improvements that are authorized to be financed by assessments levied under the 1911 Act and the 1913 Act are listed below. Many of the entities shown on Table 3-7-2 that are authorized to levy assessments are authorized by their enabling statute to finance public improvements in addition to those public improvements authorized by the 1911 Act and the 1913 Act. Therefore, this list is not exhaustive. Furthermore, sewer and water service, connection and capacity charges may be financeable, as well as **Costs of Issuance**, **Credit Rating** costs and **Credit Enchancement** costs.

Improvements authorized by the 1911 Act. The 1911 Act authorizes assessments for the following types of improvements:

- grading and paving of streets and roads;
- construction of sidewalks, parks, bridges, tunnels, subways or viaducts;
- sanitary sewers and related facilities;
- storm drains and related facilities;
- street lighting facilities and electrical and telephone service facilities;
- pipes and hydrants for fire protection;
- breakwaters, levies and other flood or erosion protection;
- wells, pumps, dams, reservoirs, pipes and other domestic water supply facilities;
- tanks, mains, pipes, and other domestic or industrial gas supply facilities;
- bomb or fallout shelters;
- wharves, piers, docks and other navigation facilities; and
- retaining walls, ornamental vegetation, land stabilization and all other work auxiliary to any of the above.

Improvements authorized by the 1913 Act. The 1913 Act authorizes assessments for the following types of improvements:

- water supply facilities;
- electric power supply facilities;

-- gas supply facilities;

-- lighting facilities;

-- transportation facilities designed to serve an area of not to exceed three square miles and designed to operate on rails or similar devices; and

-- any of the improvements mentioned in the 1911 Act and certain other assessment district acts.

Any public improvement financed by assessment bonds issued under either the 1911 Act or the 1913 Act must be constructed on public property or on a right-of-way for public use. There are two exceptions to this general rule. Work on private property may be undertaken only for purposes of grade adjustment and to remedy a geologic hazard.

Maintenance districts may be formed to maintain and operate any or all of the public improvements authorized to be constructed in the 1911 Act or the 1913 Act. The special assessment tax for maintenance districts is levied and collected in the same manner as the general tax levy. The special assessment tax authorized for maintenance districts is an Ad Valorem tax and as such is subject to the limitations of Article XIII A and Article XIII B of the California Constitution.

Acquisition of improvements. The definition of "improvement" in the 1911 Act includes construction, repair and reconstruction. Improvements can be acquired under the 1911 Act if the acquisition is incidental to other acquisitions or improvements and are limited to the following:

-- land, rights-of-way or easements;

-- sewage disposal facilities;

-- drainage systems or facilities; and

-- payment of any assessment previously imposed on any parcel within a proposed new assessment district.

Acquisitions under the 1913 Act are authorized. However, the work, facility, improvement or appliance must be in existence and installed in place on or before the date the resolution of intention is adopted. No such requirement exists for the 1911 Act.

Process for Approval -- Establishing Assessment Districts and Levying Assessments

1911 Act. Public improvements constructed under the 1911 Act must be completed and in place before an assessment is levied or

assessment bonds can be issued. The procedures for establishing an assessment district and levying an assessment under the 1911 Act are as follows:

-- An assessment district may be initiated by:

  - the owners of more than 60% in area of the property to be assessed,

  - a health officer, or

  - the governing body.

-- Before any work is ordered, the governing body must have plans, specifications, and an estimate of the cost of the work.

-- A resolution of intention must be adopted that contains, among other things, a description of the work and the time and place where all persons that object to the proposed improvement may appear before the governing body to protest the improvement. A protest hearing does not need to be held if a petition is signed by 100% of the property owners.

-- The resolution of intention must be published no later than 10 days after adoption and no less than 10 days before the protest hearing.

-- A notice of improvement must be posted on the streets of the assessment district and must be mailed to each property owner. Posting and mailing the notice of improvement is not necessary if a protest hearing is not required.

-- The protest hearing must be held unless the protest petition is unanimous.

-- If a protest is made against the proposed work and if protests are made by the owners of more than 1/2 of the area to be assessed for the improvements, no further assessment district proceedings may be taken for one year unless the protests are overruled by an affirmative vote of 4/5 of the governing body. If no protests are made or if the protests have been overruled, the governing body may order the work to be done. If no public hearing is required, the governing body may order the work to be done immediately upon adoption of the resolution of intention.

-- Before the contractor completes the work, the engineer must create an assessment diagram that is delivered to the superintendent of streets (or the county engineer) who estimates the benefit from the improvement to be received by each parcel.

-- When the contractor has completed the work, the superintendent of streets (or county engineer) will make the assessment to cover the amount due the contractor for the completed work.

-- A notice of an "appeal" hearing is published, posted and mailed.

-- An appeal may be taken with respect to

- the poor performance of the work,
- the omission of the work,
- the illegal inclusion in the contract of a portion of the work,
- the assessment diagram,
- the assessment, or
- the assessment proceedings.

-- An appeal may be made to the governing body to correct certain errors or informalities in the assessment proceedings may be corrected. The decisions of the legislative body taken at the noticed hearing are final. Once the legislative body confirms the assessment, the superintendent of streets (or county surveyor) must attach a warrant to the assessment. The warrant authorizes the contractor or his successors in interest to collect the assessments. Assessments may be collected by the superintendent of streets or the county surveyor if the governing body so provides by ordinance.

-- The warrant, assessment and assessment diagram must be recorded. Upon the recording of the notice of assessment, the assessment lien attaches.

-- Once the warrant is delivered to the contractor, the contractor may collect the assessments and must mail a statement to each property owner. Assessments are due within 30 days from the date the notice is mailed.

-- After the 30-day cash payment period has elapsed, the contractor must file a statement of all cash payments received on the assessment. If assessment bonds are to be issued to represent the unpaid assessments, no payment may be accepted after the statement referred to above has been filed, and the tax collector is thereafter responsible for collecting amounts due on the assessment. If assessment bonds are not to be issued to represent the unpaid assessments, an action may be brought to collect the assessments. Unpaid assessments bear interest from the day the contractor's statement of paid and unpaid assessments is filed.

-- If assessment bonds are issued, they may be delivered to the contractor or his successors in interest as final payment for the work. In the alternative, the governing body may sell the bonds (at Par and without advertising for bids) to any public agency authorized to purchase them. The purchase price is then paid to the contractor or his successors in interest in lieu of delivery of the bonds and in full payment for the work.

1913 Act. The procedures for creating an assessment district and levying assessments under the 1913 Act are similar to those under the 1911 Act. However, improvements constructed under the 1913 Act do not need to be completed before an assessment is levied and assessment bonds are issued. As a result, the assessments levied pursuant to the 1913 Act are based upon estimated costs. The contractor is paid from the proceeds of the sale of the bonds instead of having the bonds delivered to him. The tax collector collects the cash assessments (rather than the contractor) as well as the periodic payments on assessments not paid initially in cash, and unpaid assessments bear interest from the date assessment bonds are issued.

All assessment proceedings. As stated above, all assessment district proceedings are subject to the Majority Protest Act and the Notice and Foreclosure Provisions, except that charter cities and counties must comply with Article XVI, Section 19, of the California Constitution rather than the Majority Protest Act. The requirements of these provisions are very detailed and precise, and a full description of them is beyond the scope of this discussion. Only a very brief summary is included here.

The Majority Protest Act establishes a procedure for giving notice and holding a public hearing that essentially parallels the procedures contained in the 1911 Act and the 1913 Act, contains a limitation on the assessment that can be levied against a parcel of land and establishes a procedure for a majority protest against the assessment. The Majority Protest Act also provides for a number of exemptions.

The Notice and Foreclosure Provisions require that an assessment boundary map and assessment diagram be created according to the detailed specifications in the statute and filed with the county recorder. A notice of assessment in the form prescribed by the statute must also be recorded. The assessment lien becomes effective only upon the recordation of the notice of assessment in the office of the county recorder. Whenever assessment proceedings are abandoned, the resolution abandoning the proceedings must be filed with the county recorder.

Assessments that are not paid become delinquent and subject the property on which the assessment lien is placed to foreclosure proceedings to recover the delinquent assessments. Notice of any pending foreclosure proceedings must be given as provided by the Notice and Foreclosure Provisions. This notice is in addition to any other notice that may be required by the statutes that authorize the assessment districts.

Process for Approval -- Issuing Assessment Bonds

1911 Act bonds. Under the 1911 Act, an assessment bond may be issued for the amount of each unpaid assessment of $150 or more on a particular parcel. The **Security** for each assessment bond issued under the 1911 Act is a particular parcel of property and the amount of each bond represents the total unpaid assessment on that parcel of property. Thus, one assessment bond may be issued in the amount of $1,500 and another may be issued in the amount of $200. Assessments under $150 may be collected upon the tax roll if the legislative body so determines.

1911 Act assessment bonds must be dated the 31st day after the warrant is recorded. The governing body may provide for assessments to **Mature** in other than equal annual amounts and may provide for the classification of assessments into different maturities so that some assessments mature over a shorter period of time than others.

Under the 1911 Act, the treasurer of the governing body issues the assessment bonds and (unless the governing body sells the bonds to a public agency) delivers them to the contractor or the contractor's successors in interest. The contractor must arrange for the bonds issued to him to be sold, or must accept payment over time on the assessments as a bondholder. Where the contractor intends to sell the bonds, any bond **Discount** must be estimated and included in the contractor's bid. Because the contractor usually arranges for the sale of the bonds to an underwriter before the bid is submitted, there is no competitive sale of the bonds.

The **Interest Rate** on 1911 Act bonds is specified in the resolution of intention which is adopted before the contract bids are received. Some governing bodies establish a maximum interest rate until the contractor's bid is received so that a market discount is not created.

1915 Act bonds. The governing body may establish the Denomination and the Dated Date of assessment bonds to be issued under the 1915 Act. Unlike under the 1911 Act, a 1915 Act bond is not issued in the specific amount of the assessment on a specific parcel of land and the Security for a 1915 Act bond is the aggregate of the liens on all the parcels within the assessment district.

1915 Act bonds must Mature in equal annual Principal installments unless the governing body specifies otherwise.

1915 Act bonds are customarily sold on a Negotiated basis. The resolution of intention generally specifies a maximum Interest Rate; and the final interest rate is established at the time the resolution authorizing the issuance of bonds is adopted.

Certain determinations regarding 1915 Act assessment bonds must be stated in the resolution of intention. These are as follows:

-- whether the governing body will obligate itself to cure any deficiency that may occur in the bond redemption fund from available moneys;

-- whether a two percent delinquent penalty may be charged per month on the amount of a delinquent assessment; and

-- whether the assessment bonds may be refunded and under what conditions the refunding may occur. (The legislative body may provide protection against early redemption of bonds by determining not to issue refunding bonds for a specific period, not to exceed 10 years after the date of issuance of the assessment bonds.)

Limitations on Terms of Bonds

1911 Act assessment bonds are subject to the following limitations:

-- The maximum stated Interest Rate is 12% per year.

-- Interest is required to be payable on January 2 and July 2; principal on January 2.

-- Bonds may be sold at a Discount.

-- Property owners may prepay the entire outstanding assessment at any time upon payment of a Premium to the bondholder.

-- The maximum Maturity is 24 years.

-- The bonds must be Serial bonds.

1915 Act assessment bonds are subject to the following limitations:

-- One year's **Capitalized Interest** may be funded.

-- The maximum stated **Interest Rate** is 12% per year.

-- **Variable Interest Rate Bonds** are permitted.

-- Interest is required to be payable March 2 and September 2; principal on September 2.

-- Property owners may prepay assessments at any time with a **Premium**.

-- The maximum **Maturity** is 39 years.

-- Certain amounts may be collected each year to reimburse the issuer for the expenses of collection and administration and for reserves.

Method of Repayment and Security Features

Each 1911 Act bond is payable from and secured by the lien of an assessment on a particular parcel of land, whereas 1915 Act bonds of a single issue are secured on **Parity** by all of the assessments for the improvements financed by the issue. 1915 Act bonds may also have a **Reserve Fund** for the benefit of bondholders.

Assessments that are not paid when due become delinquent and subject the property upon which the assessment is levied to sale for payment of the delinquent assessment installments, to judicial foreclosure or to the provisions for sale of property for nonpayment of general taxes. Legislation is pending that would eliminate the applicability of the "tax sale" provisions.

Delinquent assessments accrue penalties under the 1911 Act at the rate of two percent per month for assessment bonds and under the 1915 Act at either the same rate or the rate established for general taxes (currently 10% per year). The first month's penalty under the 1911 Act may be kept by the tax collector as a cost of servicing the delinquency.

Property upon which there are assessment liens may be subdivided. The 1911 Act and the 1915 Act contain provisions by which the remaining unpaid assessment can be apportioned among the subdivided lots in accordance with the benefits received. Costs associated with the procedure to reapportion the assessment may be included in the amended assessment. Under the 1911 Act, any subdivision of land that secures a bond must be approved by the bondholder and new assessment bonds will be issued to the bondholder.

Generally, assuming the ratio of the value of the land to the amount of the assessment is sufficiently high, no additional Security such as Bond Insurance or a Letter of Credit is required for assessment bonds. In certain circumstances, primarily where land is undeveloped and the assessments are high, a letter of credit may be required as additional security until such time as the property is developed and sold to the general public. Only rarely are assessment bonds insured and generally under similar conditions as those stated above for a letter of credit.

Special Federal Tax Considerations

Assessment bonds may under certain circumstances be Private Activity Bonds, the interest on which is taxable. The Internal Revenue Code of 1986 (the "Code") provides that bonds are private activity bonds if (i) more than 10% of bond proceeds are used in the trade or business of a nongovernmental person (the "trade or business test") and (ii) more than 10% of the payments of principal or interest on the bonds are derived from or secured by property that is used in the trade or business of a nongovernmental person (the "security interest test"). Each assessment district proceeding that includes property owners who do not constitute the general public (e.g., commercial enterprises, businesses or "developer districts") must be analyzed to determine whether the "trade or business test" or the "security interest test" applies. These issues must be analyzed with particular care where there is only one property owner, such as a developer.

Security interest test. The Code provides that "revenues from generally applicable taxes are not treated as payments for purposes of satisfying the security interest test." The Code distinguishes between generally applicable taxes and "special charges imposed on persons satisfying the [trade or business] use test." Assessments are likely to be treated as special charges and not as generally applicable taxes. Thus, assessment installment payments made by persons who use public improvements financed with assessment bonds in their trade or business (that is, who use the public improvements differently from the general public) will be treated as payments satisfying the "security interest test." Where commercial entities or businesses do not use the public improvements differently from the general public, their assessment installment payments will not satisfy the "security interest test" and should not be a problem.

The "security interest test" may also be satisfied (creating a problem) where there are public improvements constructed or acquired with assessment district financings and there are no commercial or business properties in the assessment district. For example, even if an entire assessment district is comprised of owner-occupied residential properties, if assessment bond proceeds are used to pay the costs of installing utility lines owned by a private utility and the private utility will refund a portion of such cost to the legislative body, the

refunds constitute payments that may satisfy the "security interest test." Because both the "security interest test" and the "trade or business test" may be met in this instance, assessment bond proceeds used to pay for the costs of installing private utilities need to be reviewed carefully to be certain that the payments made by private utilities do not exceed 10% of the principal of or interest on the assessment bonds.

Trade or business test. The tax status of assessment bonds is generally determined by examining the ultimate use of the public improvements financed with the proceeds of the assessment bonds.

Three criteria can be used to determine whether assessment bond proceeds will be treated as governmentally used and not as used in the "trade or business" of a commercial entity or business:

-- the facilities are designed to serve members of the general public in the governmental unit on an equal basis;

-- the ultimate ownership and operation of the facilities is with persons other than the developers (e.g., the governmental unit); and

-- <u>development of the land within the district for sale and occupation by the general public proceeds with reasonable speed.</u>

The third criterion was recently added by the legislative history of the Tax Reform Act of 1986 and is troublesome because it is inconsistent with earlier rulings that indicated that the "trade or business test" depends upon expectations about the use of the property (and therefore the use of the public improvements) at the time the assessment bonds are issued.

Until there is clarification of this third criterion by private letter rulings or treasury regulations, where a developer plans to retain ownership of some (or all) of the property within an assessment district upon which the public improvements are constructed, or where property within an assessment district is being developed for sale to a small number of commercial or industrial entities who use the improvements differently than the general public, the "trade or business test" may be satisfied. Where the improvements are generally available to the public and are owned and maintained by the governmental unit, it appears that the "trade or business test" will not be satisfied. Where the improvements are essentially used only by a commercial entity, even though they may be nominally dedicated to the governmental unit, it appears that the "trade or business test" will be satisfied.

Private loan test. In addition to the "trade or business test" and the "security interest test", the Code states that bonds are private activity bonds if the lesser of (1) 5% of the bond proceeds or

(2) $5,000,000 is used to make or finance loans to nongovernmental persons. The "private loan test" may be satisfied by direct or indirect loans. Assessment bond proceeds are generally treated as being indirectly loaned to the property owners for federal income tax purposes, but the Code contains an exception to the "private loan test" where assessment bond proceeds are available equally to business and nonbusiness property owners, and where the assessment bond proceeds are used for specific essential governmental functions.

Policy Considerations

The decision to issue assessment bonds may involve a number of competing policy considerations. Many of the types of improvements that may be financed with assessment bonds may also be financed with general obligation bonds or revenue bonds such as water and sewer revenue bonds. Financing improvements with assessment bonds results in the direct beneficiaries of the improvements paying the cost of those improvements. As an overall strategy for financing certain types of improvements, this may be fair. On the other hand, if similar improvements for other parts of the issuer's jurisdiction were financed with bonds which spread the cost of those improvements more widely, it may be appropriate to finance new improvements of the same type in the same way as before.

Second, once the decision to use assessment bonds has been made, the determination of the method for spreading the assessments is an important decision, especially if some landowners object to the assessment proceeding.

Finally, assessment proceedings often are considered in connection with new development within the jurisdiction of the issuer and the question arises as to whether the issuer should determine that it is appropriate to support or encourage the development or the developer.

APPENDIX N

AMENDED
NITRATE ACTION PLAN
CHICO SPHERE OF INFLUENCE
Butte County/City of Chico

Amended Final Draft approved by Intergovernmental Committee and Chico Issues Committee 7/18/88

I. PROBLEM STATEMENT

Nitrate levels exceeding the 45 mg/l drinking water standard have been found in shallow domestic well water in certain unincorporated areas within and adjacent to the Chico Sphere of Influence (as adopted by the Butte County Local Agency Formation Commission) and adjacent areas as shown on the attached "Exhibit '1' To Amended Nitrate Action plan - Chico Sphere of Influence - Butte County/City of Chico". Such high nitrate levels can cause Methemoglobinemia in infants less than six months of age. The excessive nitrate concentration indicates that existing or potential widespread water quality problems exist in and adjacent to the Chico Sphere of Influence groundwater. Presently, only the shallow zone aquifer is affected. Septic tank disposal of domestic wastes and urban storm water run-off have been listed as the most contributory and controllable sources of nitrates. Other sources also contribute to the total nitrate levels, but they are less controllable.

II. ACTION PLAN GOAL

To prevent the further degradation and to minimize the existing nitrate problem in the groundwater of the Chico Sphere of Influence, shown as Areas "A", "B", "C" and "E" on Exhibit "1" and adjacent areas shown as Area "D" on Exhibit "1", and as defined in Section IV. below.

III. OBJECTIVES AND IMPLEMENTATION

A. Completed Objectives and Implementation Actions

1. The City of Chico Sanitary Sewer Master Plan (hereinafter referred to as Sewer Master Plan) for the Chico Sphere of Influence has been prepared by the City and County.

2. The City of Chico/Butte County Storm Drainage Master Plan (hereinafter referred to as Storm Drainage Master Plan) for the Chico Sphere of Influence has been prepared by the City and County.

3. City and County have established standards for new water wells.

N-1

a. Butte County has adopted an ordinance to require adequate sealing for all new water wells and special strata sealing to prevent interconnection of contaminated and uncontaminated aquifers. The ordinance prohibits the construction of drainage wells, and, further, provides for the destruction of abandoned water wells and existing drainage wells as other approved drainage systems become available.

The ordinance became effective on August 2, 1984, and is being enforced by the County Division of Environmental Health.

b. The City has adopted the County's standards and assigned enforcement to the County Division of Environmental Health by adoption of Chapter 15.08 of the Chico Municipal Code.

4. City and County have established standards and conditions for issuance of permits for temporary leach field type storm drainage systems[1] with criteria which regulate when such a system may be used.

5. County has implemented the following monitoring and education program:

a. Beginning November 1, 1984, the Environmental Health Division of the county initiated a monitoring program for the shallow zone waters of the area. Twenty-two wells are monitored every six months. In addition, the Department of Water Resources monitors six wells as part of its ongoing program. The monitoring program, over a period of time, will help evaluate the effectiveness of the Action Plan.

b. The County Health Officer has sent notification to physicians in the county informing them of the high nitrate problem in the shallow zone water in the Chico area and asking them to be on the look out for Methemoglobinemia symptoms.

c. The Health Department will continue an educational program advising residents that they may have their wells tested and to obtain an alternative source of drinking water for infants if their wells show a nitrate level in excess of 45 mg/l.

[1] Temporary leach field type storm drainage systems are those which dispose of storm water by any means other than into a natural drainage channel or public storm drainage system.

B. Objectives and Implementation Actions To Be Completed

1. City and County will review existing land use designations and development densities within the Chico Sphere of Influence and agree upon a Unified Land Use Designation and Development Density Plan[2] by December 31, 1988.

2. City and county will develop financing plans and timetables by December 31, 1989, for the construction and extension of:

   a. The sewer and storm drainage facilities as set forth in the Sewer and Storm Drainage Master Plans to replace existing septic tanks, drainage wells and temporary leach field type storm drainage systems.

   b. Water mains to high nitrate areas which do not have a public water system which meets the nitrate levels prescribed by the State Safe Drinking Water Act.

3. City and County will continue to seek available grants or low interest loans for sewer, storm drainage and/or water facilities.

4. City and County will continue to pursue the feasibility of an urban area redevelopment project area to assist in financing of sewers, storm drainage systems and water systems.

5. County will establish for the 1988-89 fiscal year a County Service Area as follows:

   a. The County Service Area will include all unincorporated property within the Chico Sphere of Influence and Area "D" except property which is connected to the City's sewer system and which is also served by permanent storm drainage facilities which deliver the storm drainage to a natural drainage channel.

   b. The purposes of the County Service Area shall be to provide funding for (1) the development of engineering and financing plans for providing sanitary sewers and storm drainage facilities to the properties included within the County Service Area and (2) administrative costs related to the purpose of the County Service Area.

[2] Currently there are minor differences between the General Plans which have been adopted by the City and County for the Chico Sphere of Influence. Further, the development density set by zoning, in some instances, is not consistent with the General Plan land use designation.

6. The Regional Water Quality Control Board will consider adopting PROHIBITION ORDERS to eliminate the use of septic tanks in certain areas within the Chico Sphere of Influence and Area "D" within a specified period of time.

IV. STANDARDS

A. Requirements for Private Sewage Disposal Systems

1. General Provisions

   a. Areas "A", "B", "C", "D" and "E" as set forth below and generally outlined on Exhibit "1" are more specifically delineated on a map on file in the City of Chico Community Services Department and the Butte County offices of the Division of Environmental Health and the Director of Public Works.

   b. The densities of development in each of the Areas as set forth herein will serve as general guidelines. Actual density of development will be stated as an equivalent of units per acre based upon soil conditions, etc. The determination of the equivalent units per acre will be made by the Butte County Division of Environmental Health in accordance with sewage disposal requirements for development as set forth in Appendix VII of the Butte County Improvement Standards for Subdivisions, Parcel Maps and Site Improvements pursuant to Chapter 20 of the Butte County Code.

   c. The concurrence of the Regional Water Quality Control Board will be required for any private sewage disposal system which will produce a sewage application rate in excess of 1000 gallons per day.

   d. Notwithstanding anything hereinabove to the contrary, pursuant to "California Regional Water Quality Control Board Central Valley Division Resolution #85-095 concerning the Nitrate Action Plan, Greater Chico Area, Butte County," the California Regional Water Quality Control Board reserves the right to review any City or County subdivisions which could adversely affect groundwater.

2. Area "A" as delineated on Exhibit "1" - Land within the Chico Sphere of Influence but outside the Sewer Service Area of the City of Chico[3] with land use densities not

[3] As defined in Section 15R.36.010 of the Chico Municipal Code.

exceeding one unit per acre[4] and where future sewer service is not proposed (Exception: Parcels for which applications for creation had been filed as of 2/23/88 may be developed at up to three units per acre[5]).

a. Development on septic tanks will be allowed.

b. In the case of a school site within Area "A", City and County approval will be required.

3. Area "B" as delineated on Exhibit "1" - Land within the Chico Sphere of Influence and the Sewer Service Area of the City of Chico.

a. Interim development on septic tanks will be allowed only subject to the following:

(1) Density not exceeding one unit per acre, except that parcels for which applications for creation had been filed as of 2/23/88 may be developed at up to three units per acre, subject to conditions b.(1) through b.(5) below.

(2) For parcels for which application for creation is filed after 2/23/88, density not exceeding three units per acre, subject to conditions b.(1) through b.(6) below.

b. Conditions

(1) Sanitary sewer service is not available (i.e., not within 250 feet of the boundary of the project area[6]).

(2) Sewer laterals, trunklines and mains shall be installed within the boundary of the project area and to a point where the above is planned to connect to the sewer system.

(3) All required Water Pollution Control Plant Fees, Trunkline Capacity Fees and Sewer Main Installation Fees have been paid.

[4] Equivalent to a 334 gallon per day per acre maximum sewage application rate.

[5] Equivalent to a 1000 gallon per day per acre maximum sewage application rate.

[6] "Boundary of the project area" means the limits of all property involved in the development including parcel limits and all adjacent street's.

N-3

(4) Property owner shall execute a written agreement to be recorded against the property, agreeing not to protest any sanitary sewer assessment levied pursuant to an assessment district or service area and also agreeing to connect such development to the sewer system as part of said district or service area, all at such owner's sole cost and expense.[7]

(5) If trunklines and/or mains are required to be installed, property owner(s) shall establish a County Service Area, homeowners association or other process acceptable to the City and County for the purpose of maintaining the sewer trunklines and mains until connected to the sewer system.

(6) For any lot created by application filed after 2/23/88, the property owner(s) shall obtain a written commitment from the City specifying when sewer service will be available to the project. This commitment, which will be subject to (a) and (b) below, will allow the developer to proceed with the early stages of development prior to the time the sewer can be extended. The timeline for sewer service shall be subject to the concurrence of the Regional Water Quality Control Board.

(a) The City will not make a commitment until the developer has submitted approved plans, specifications and a method of financing for the extension of the sewer to the project.

(b) Any lots developed on septic tanks must be connected to the sewer system as soon as it is extended.

4. Area "C" as delineated on Exhibit "1" - Land within the Chico Sphere of Influence, outside the Sewer Service Area of the Chico of Chico but proposed for future sewer service.

a. Upon adoption of this Nitrate Action Plan, the City will amend its Code to include Area "C" within its Sewer Service Area.

b. Interim development on septic tanks will be allowed only subject to the following:

[7] The above is subject to the appropriate public entity finding by resolution that a sanitary sewer assessment district or service area is necessary in order to protect the public health.

(1) Density not exceeding one unit per acre, except that parcels for which applications for creation had been filed as of 2/23/88 may be developed at up to three units per acre, subject to conditions c.(1) through c.(5) below.

(2) For parcels for which application for creation is filed after 2/23/88, density not exceeding three units per acre, subject to conditions b.1 through b.6 below.

c. Conditions

(1) Sanitary sewer service is not available (i.e., not within 250 feet of the boundary of the project area).

(2) Sewer laterals, trunklines and mains shall be installed within the boundary of the project area and to a point where the above is planned to connect to the sewer system.

(3) All required Water Pollution Control Plant Fees, Trunkline Capacity Fees and Sewer Main Installation Fees have been paid.

(4) Property owner shall execute a written agreement to be recorded against the property, agreeing not to protest any sanitary sewer assessment levied pursuant to an assessment district or service area and also agreeing to connect such development to the sewer system as part of said district or service area, all at such owner's sole cost and expense.

(5) If trunklines and/or mains are required to be installed, property owner(s) shall establish a County Service Area, homeowners association or other process acceptable to the City and County for the purpose of maintaining the sewer trunklines and mains until connected to the sewer system.

(6) For any lot created by application filed after 2/23/88, the property owner(s) shall obtain a written commitment from the City specifying when sewer service will be available to the project. This commitment, which will be subject to (a) and (b) below, will allow the developer to proceed with the early stages of development prior to the time the sewer can be extended. The timeline for sewer service shall be subject to the concurrence of the Regional Water Quality Control Board.

(a) The City will not make a commitment until the developer has submitted approved plans, specifications and a method of financing for the extension of the sewer to the project.

(b) Any lots developed on septic tanks must be connected to the sewer system as soon as it is extended.

5. Area "D" as delineated on Exhibit "1" - Land outside the Chico Sphere of Influence and the Sewer Service Area of the City of Chico but which may be considered for future sewer service.

Development on septic tanks will be allowed only under the following conditions:

a. Density conforms to zoning in effect at the time of development or does not exceed one unit per acre, whichever results in the lower density.

b. Property owner shall execute a written agreement to be recorded against the property, agreeing not to protest any sanitary sewer assessment levied pursuant to an assessment district or service area and also agreeing to connect such development to the sewer system as part of said district or service area, all at such owner's sole cost and expense.

6. Area "E" as delineated on Exhibit "1" - Land within the Chico Sphere of Influence but outside the Sewer Service Area of the City of Chico with land use densities not exceeding one unit per acre where future sewer service may be proposed. (Exception: Parcels for which application for creation had been filed as of 2/23/88 may be developed at up to three units per acre).

a. Development on septic tanks will be allowed.

b. Property owner shall execute a written agreement to be recorded against the property, agreeing not to protest any sanitary sewer assessment levied pursuant to an assessment district or service area and also agreeing to connect such development to the sewer system as part of said district or service area, all at such owner's sole cost and expense.

7. Bidwell Park as delineated on Exhibit "1"

To the extent that the City can provide sewer service within this area, sewer will be required. For areas which cannot be sewered, septic tank systems may be installed subject to all requirements of the County Division of Environmental Health.

B. Requirements for Drainage Systems

1. Within Areas "A", "B", "C", "D" and "E" as delineated on Exhibit "1", temporary leach field type storm drainage systems may be allowed when the City or County Director of Public Works determines it is not feasible to connect the project storm drainage to a natural stream or a public storm drainage system. Within the unincorporated area, permits for temporary leach field type storm drainage systems, if approved, shall be issued by the Butte County Division of Environmental Health, in accordance with standards adopted by Butte County. Within the City, permits for temporary leach field type storm drainage systems, if approved, shall be issued by the Director of Public Works in accordance with standards adopted by the City of Chico.

2. As a condition of approval of a permit for temporary leach field type storm drainage systems, property owners shall be required to:

   a. Install all drainage facilities to the boundary of the project area to a point where the facilities are planned to connect to a future public storm drainage system in accordance with the Storm Drainage Master Plan.

   b. Pay all required fees so that connection can be made to the public storm drainage facilities when said facilities have been installed.

   c. Execute a written agreement to be recorded against the property, agreeing not to protest any storm drainage assessment levied pursuant to an assessment district or service area and also agreeing to connect such development to the storm drainage system as part of said district or service area, all at such owner's sole cost and expense. *8

*8 The above is subject to the appropriate public entity finding by resolution that a storm drainage assessment district or service area is necessary in order to project the public health.

C. Requirements for Water Systems

Property owners within AReas "A", "B", "C", "D", "E" and Bidwell Park as delineated on Exhibit "1" shall be required to connect to a water source which is acceptable to and approved by the Butte County Division of Environmental Health.

V. Annexation to the City of Chico

The City of Chico shall not require that property owners be annexed to the city or agree to waive their rights to protest annexation to the city in order to be connected to the sewer collection system and the water pollution control plant.

APPROVED BY

COUNTY OF BUTTE

BY_____ Date 10/18/88

CITY OF CHICO

BY_____ Date 10/24/88

REGIONAL WATER QUALITY CONTROL BOARD

BY_____ Date_____

Appendix O

Proposed Septic Tank Installation Standards for the Chico Urban Area

APPENDIX "O"

The following standards are recommended to be retained from the Nitrate Action Plan and are hereby incorporated within the Nitrate Compliance Plan. The septic tank installation standards for the Chico Urban Area are proposed to be adopted in ordinance form.

Proposed Septic Tank Installation Standards - Chico Urban Area
(Standards Retained from Nitrate Action Plan, 1985 & its 1988, 1994 and 1995 Amendments)

I PROBLEM STATEMENT

Nitrate levels exceeding the 45 mg/l drinking water standard have been found in shallow domestic well water in certain unincorporated areas within and adjacent to the Chico Sphere of Influence (as adopted by the Butte County Local Agency Formation Commission). The principal identified area is Stanley Park southwest of the Chico Sphere of Influence. Stanley Park was identified as Area "D" within the original Nitrate Action Plan. Area "D" was removed from the plan by the Board of Supervisors on November 14, 1995. This revision provided area boundary conformance between the Nitrate Action Plan and Prohibition Order No. 90-126.

Such high nitrate levels can cause methemoglobinemia in infants less than six months of age. The excessive nitrate concentration indicates that existing water quality problems exist in and adjacent to the Chico Sphere of Influence groundwater. Septic tank disposal of domestic wastes has been identified as the most contributory and controllable sources of nitrates.

II STANDARDS

A. Requirements for Private Sewage Disposal Systems

1. General Provisions

a. The densities of development will be stated as a dwelling unit equivalent per acre. The determination of the equivalent units per acre will be based upon concurrence by the Regional Water Quality Control Board. Regional Board staff state that although 3 to 4 units per acre may result in water contamination below maximum drinking water standards, provision of a safety factor and control of groundwater degradation may indicate a gross area density allowance of 2 dwelling units per acre for new development.

b. The concurrence of the Regional Water Quality Control Board will be required for any private sewage disposal system which will produce a sewage application rate in excess of 1000 gallons per day.

c. To provide for development of a comprehensive solution to alleviate Chico Urban Area nitrates, limited studies of nitrate reduction technology for individual wastewater systems may be approved. Such approvals will provide data for the control of nitrate contamination within limited contaminated areas found to be impractical for provision of sewers. Approvals will be subject to the following provisions.

(1) Approvals are subject to confirmation by the Regional Water Quality Control Board that the installation will not conflict with the Basin Plan regulations or policies.

(2) Sites approved for nitrate reduction technology systems shall be selected in accordance with a Board of Supervisors authorized study that considers data collecting needs, individual hardships, and funding.

(3) For each installation the County may require an approved engineered plan prepared at the expense of the participating property owner. In addition to any County specified installation inspections, the property owner shall provide engineering certification that the system was installed in accordance with the engineered plans.

(4) For each installation the County may require a recorded agreement that assigns expenses related to use and maintenance to the property owner of record and that carries with transfer of the property ownership.

2. Septic Tank Conditions - Land within the Chico Sphere of Influence

Interim development on septic tanks will be allowed only subject to the following:

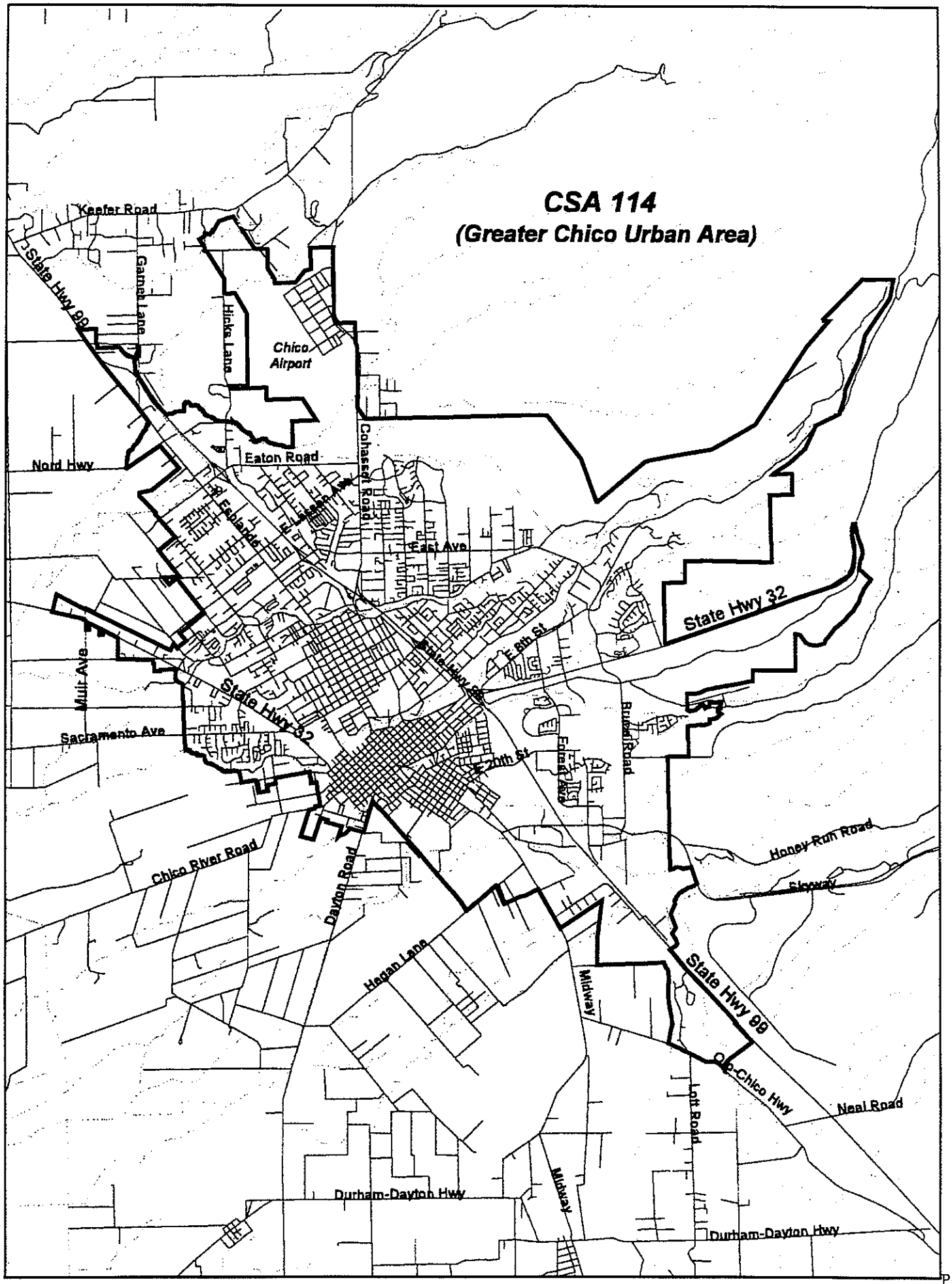
(1) Sanitary sewer service is not available (i.e. not within 250' from the boundary of the property).

(2) Except for construction on parcels of a size acceptable to the Regional Water Quality Control Board for the proposed wastewater flow, trunk lines and mains shall be installed to a point where the above is planned to connect to the sewer system.

(3) Within areas to be sewered, development completed in accordance with (1) and, (2) above may be considered interim.

(4) Within areas to be sewered, a County Ordinance amendment will be considered to require the construction of sewer laterals and/or public sewer lines adjacent to the property for future sewer connection. The Ordinance amendment will require specific criteria.

APPENDIX P


CSA 114
(Greater Chico Urban Area)
Keefer Road
State Hwy 99
Garnet Lane
Hicks Lane
Chico Airport
Cohasset Road
Eaton Road
Nord Hwy
Esplanade
East Ave
State Hwy 32
E 8th St
Muir Ave
Sacramento Ave
E 20th St
Bruce Road
Chico River Road
Dayton Road
Honey Run Road
Skyway
Hegan Lane
Midway
State Hwy 99
Old Chico Hwy
Neal Road
Lott Road
Durham-Dayton Hwy

APPENDIX Q

APPENDIX "Q"
SUMMARY OF CSA 114 FUND EXPENDITURES PER FISCAL YEAR

Tables 1 and 2 are provided as background information for Chapter 2, Section 2.6, Role of County Service Area 114. Table 1 describes in greater detail CSA 114 fund expenditures per fiscal year. Table 2 describes in greater detail CSA 114 fund expenditures per project category. Information presented in the categories below are best estimates based upon the records of the Butte County Auditor's Office.

Table 1. Summary of CSA 114 Fund Expenditures per Fiscal Year

Fiscal Year	Firm/ Contractor/ Study	Total Amount Spent ($)
1989-90	Sanitary Storm Drain & Sewer Master Plan (Jones & Stokes Assc.)	$45,000
	Sewer Financing Study (Bartle & Wells)	16,000
	SUBTOTAL EXPENSES 1989-90	**$61,000**
1990-91	City/ County Redevelopment Agency study- GCUARPA - (Burns & Watry)	$33,380
	Environmental Impact Report (contracted by City of Chico, County share)	3,804
	County Administration charges	405
	SUBTOTAL EXPENSES 1990-91	**$37,589**
1991-92	Environmental Impact Report - Heritage Partners	$8,000
	County Administration charges	401
	Strategic Planning - Heritage Partners	8,437
	SUBTOTAL EXPENSES 1991-92	**$16,838**
1992-93	Engineering Services - Metcalf & Eddy, Inc.	$29,200
	Project Management - Heritage Partners	24,628
	County Auditor charges	401
	Legal Notices, Chico Enterprise-Record, Paradise Post, Oroville Mercury	65
	Storm Drain & Sewer Master Plan-(County prorata share) City of Chico	15,983
	County Administration charges	4,018
	SUBTOTAL EXPENSES 1992-93	**$74,295**
1993-94	Project Management - Heritage Partners	$77,030
	Planning support/ accounting services -GCUARPA- Davis Hammon & Comp	2,718
	County Administration charges for support services	12,088
	Ground water nitrate study - Dames and Moore	140,476
	Report preparation - LAFCO	40
	Well Installation permit - Butte County Environmental Health	3,790

Fiscal Year	Firm/ Contractor/ Study	Total Amount Spent ($)
1993-94	Engineering Services, well installation - NorthStar Engineering	4,441
	SUBTOTAL EXPENSES 1993-94	**$240,583**
1994-95	Project Management - Heritage Partners	$79,941
	Ground water nitrate study - Dames and Moore	68,429
	County Administration charges for support services	11,607
	Technical Review & Consultation - Dr. Graham Fogg	2,102
	Technical Review & Consultation - Dr. Dennis Rolston	2,578
	SUBTOTAL EXPENSES 1994-95	**$164,657**
1995-96	Project Management - Heritage Partners	$70,283
	Sewer Feasibility Study - Rolls, Anderson & Rolls	28,334
	County Administration charges	17,728
	Ground water nitrate study - Dames and Moore	90,210
	Technical study & review - CSU Chico	62,380
	Sewer Feasibility Study - Metcalf & Eddy	33,672
	Sewer Feasibility Study - NorthStar Engineering	22,805
	Planning Support - LAFCO consultation - Braitman & Associates	245
	Environmental fees - Butte County Environmental Health	32
	SUBTOTAL EXPENSES 1995-96	**$325,689**
1996-97	County administration charges	$10,918
	Sewer feasibility study - NorthStar Engineering	9,912
	Technical study & review - CSU Chico	7,462
	Planning support & consultation - Braitman & Associates	325
	Technical review & consultation - Dr. Dennis Rolston	618
	Waste Discharge Requirement permit (unsewered parcels) - RWQCB	3,000
	Storm Drain & Sewer Master Plan (County prorata share) - City of Chico	4,784
	Project Management - Heritage Partners	28,810
	Project Management - Honeycutt & Associates	23,958
	Tech. study & review - (Dr. Dennis Rolston) Regents of Univ. of California	1,200

	Environmental fees (6/30/97) - Butte County Environmental Health	792
	SUBTOTAL EXPENSES 1996-97	**$91,779**
1997-98	County charges - Administration, County Counsel, Auditor, other depts.	$90,816
	Sewer feasibility/engineering - Rolls Anderson & Rolls, NorthStar Engineering	38,559
	Planning Support - Davis Hammon, Braitman & Associates	317
	Project Management - Honeycutt & Associates, County Program Manager	43,320
	Technical Review, training, research	1,757
	Miscellaneous - Printing, mailing, office supplies, public notices	4,066
	SUBTOTAL EXPENSES 1997-98	**$178,835**
1998-99	County charges - Administration, County Counsel, Auditor, other depts.	$105,549
	Sewer feasibility/engineering - Rolls Anderson & Rolls, NorthStar Engineering	15,237
	Planning/EIR support - R.Chafin, Braitman & Associates	4,093
	Project Management - County Program Manager	51,592
	Technical review, training, research - CSUC mapping, finance seminars	6,467
	Miscellaneous - Printing, mailing, office supplies, notices/outreach	1,976
	SUBTOTAL EXPENSES 1998-99	**$184,914**
	GRAND TOTAL EXPENSES 1989-1999	**$1,376,178**

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APPENDIX "Q" (continued)
SUMMARY OF CSA 114 EXPENDITURES PER PROJECT CATEGORY

Table 2 describes in greater detail CSA 114 fund expenditures per project category including: project management, planning and preparation of environmental impact reports, technical review and special studies, City of Chico expenses, County administrative expenses, preparation of environmental monitoring documents, permits, and monitoring costs, and engineering services. The total CSA 114 fund expenditures from 1989 through 1999 is $1,376,178. Information presented below is based upon best estimates that are summarized from records provided by the Butte County Auditor's Office.

Table 2. Summary of CSA 114 Fund Expenditures per Project Category

Fiscal Year	Project Category & Firm/ Contractor	Total Amount Spent ($)
	ENVIRONMENTAL STUDIES, MONITORING & FEES	
1993-94	Ground water nitrate study - Dames and Moore	$140,476
	Well permit fees - Butte County Environmental Health	3,790
	Well installation - NorthStar Engineering	4,441
1994-95	Ground water nitrate study - Dames and Moore	68,429
1995-96	Ground water nitrate study - Dames and Moore	90,210
	Well permit fee - Butte County Environmental Health	32
1996-97	Waste Discharge Requirement permit fee (unsewered parcels) - RWQCB	3,000
	Local agency env. health fee - Butte County Environmental Health	792
1997-98	No expenses in this category during this time period.	na
1998-99	No expenses in this category during this time period.	na
	ENVIRONMENTAL STUDIES, MONITORING & FEES - SUBTOTAL	**$311,170**
	PERCENT (%) OF GRAND TOTAL FUND EXPENDITURES	**23%**
	PROJECT MANAGEMENT	
1992-93	Heritage Partners	$24,628
1993-94	Heritage Partners	77,030
1994-95	Heritage Partners	79,941
1995-96	Heritage Partners	70,283
1996-97	Heritage Partners	28,810
	Honeycutt & Associates	23,958
1997-98	Honeycutt & Associates	6,420
	Manager - Program Resource & Development (County staff)	36,900

1998-99	Manager - Program Resource & Development (County staff)	51,592
	PROJECT MANAGEMENT - SUBTOTAL	**$399,562**
	PERCENT (%) OF GRAND TOTAL FUND EXPENDITURES	**29%**
	ENVIRONMENTAL IMPACT REPORT & PLANNING RELATED	
1989-90	Sanitary Storm Drain & Sewer Master Plan - Jones & Stokes	$45,000
	Sewer Financing Study - Bartle & Wells	$16,000
1990-91	City/ County Redevelopment Agency formation (GCUARPA) - Burns & Watry	$33,380
	Environmental Impact Report (contracted by City of Chico, County prorata share)	3,804
1991-92	Environmental Impact Report - Heritage Partners	8,000
	Strategic Planning - Heritage Partners	8,437
1992-93	Storm Drain & Sewer Master Plan (County prorata share) - City of Chico	15,983
1993-94	Planning support, Redevelopment Agency (GCUARPA) - Davis Hammon & Co.	2,718
	Planning support, LAFCO Report preparation	40
1995-96	Planning support, LAFCO consultation, Braitman and Associates	245
1996-97	Planning support, LAFCO consultation, Braitman and Associates	325
	Storm Drain & Sewer Master Plan (County prorata share) - City of Chico	4,784
1997-98	Planning support, LAFCO consultation, Braitman and Associates	193
	Review of GCUARPA documents - accounting, Davis Hammon & Company	124
1998-99	Planning support, LAFCO consultation, Braitman and Associates	538
	Contract EIR support (Development Services Dept.), R. Chafin	3,555
	ENVIRONMENTAL IMPACT REPORT & PLANNING - SUBTOTAL	**$143,126**
	PERCENT (%) OF GRAND TOTAL FUND EXPENDITURES	**10%**
	ENGINEERING SERVICES & SEWER FEASIBILITY STUDIES	
1992-93	Sewer feasibility - Metcalf and Eddy, Inc.	$29,200
1995-96	Sewer feasibility south of Lindo Channel - Rolls, Anderson & Rolls	28,334
	Sewer feasibility north of Lindo Channel - NorthStar Engineering	33,672
	Sewer feasibility (NECSAD) - Metcalf and Eddy, Inc.	22,805
1996-97	Sewer feasibility study - NorthStar Engineering	9,912
1997-98	Phase 2 feasibility update, south of Lindo Channel - Rolls, Anderson & Rolls	16,527
	Phase 2 feasibility update, north of Lindo Channel - NorthStar Engineering	22,032

1998-99	Sewer feasibility and engineering services - Rolls, Anderson & Rolls	$7,017
1998-99	Sewer feasibility and engineering services - NorthStar Engineering	8,220
	ENGINEERING SERVICES & FEASIBILITY STUDIES- SUBTOTAL	**$177,719**
	PERCENT (%) OF GRAND TOTAL FUND EXPENDITURES	**13%**
	TECHNICAL REVIEW & SPECIAL RESEARCH STUDIES	
1994-95	Technical review & consultation - Dr. Graham Fogg	$2,102
	Technical review & consultation - Dr. Dennis Rolston	2,578
1995-96	Technical study & research - CSU Chico	62,380
1996-97	Technical study and review - CSU Chico	7,462
	Technical review & consultation - Dr. Dennis Rolston	618
	Technical review/ related fees (Dr. Dennis Rolston) - UC Regents	1,200
1997-98	UC Extension - assessment district public financing (County staff)	1,757
1998-99	California Debt & Investment Advisory Commission, bond sale course	711
	Mapping services - CSU Chico	2,262
	Legal research - Remy, Thomas & Moose	3,494
	TECHNICAL REVIEW & SPECIAL RESEARCH STUDIES - SUBTOTAL	**$84,564**
	PERCENT (%) OF GRAND TOTAL FUND EXPENDITURES	**6%**
	COUNTY ADMINISTRATIVE CHARGES & SUPPORT SERVICES	
1990-91	County administration charges	$405
1991-92	County administration charges	401
1992-93	County Auditor charges	401
	County administration charges	4,018
1992-93	Legal notices to local newspapers	65
1993-94	County support services & administration	12,088
1994-95	County support services & administration	11,607
1995-96	County support services & administration	17,728
1996-97	County support services & administration	10,918
1997-98	County support services & administration (Administrative Office, Auditor, County Counsel, Environmental Health)	85,016
	County administrative support - Anderson & Associates	5,800

1998-99	County support services & administration (Administrative Office, Auditor, County Counsel, Environmental Health)	103,038
1998-99	County administrative support - Anderson &Associates	2,511
	COUNTY SERVICES -SUBTOTAL	**$253,996**
	PERCENT (%) OF GRAND TOTAL FUND EXPENDITURES	**18%**
	MISCELLANEOUS SUPPORT SERVICES	
1997-98	Photocopying - Kinko's and Administrative Office	$3,866
	Refreshments/supplies - Citizens Nitrate Advisory Committee meetings	200
1998-99	Legal ads/notices - Chico Enterprise-Record	129
	Photocopying - Kinko's and Administrative Office	1,834
	Refreshments/supplies - Citizens Nitrate Advisory Committee meetings	13
	MISCELLANEOUS - SUBTOTAL	**$6,042**
	PERCENT (%) OF GRAND TOTAL FUND EXPENDITURES	**< 1%**
	GRAND TOTAL CSA 114 FUND EXPENDITURES 1989-99	**$1,376,178**

Appendix R

Letter (10/14/99) from the Regional Board regarding the oversight monitoring program

California Regional Water Quality Control Board

Central Valley Region

Steven T. Butler, Chair

Redding Branch Office
Internet Address: http://www.swrcb.ca.gov/~rwqcb5
415 Knollcrest Drive, Suite 100, Redding, California 96002
Phone (530) 224-4845 • FAX (530) 224-4857

Vi on H. Hickox
Secretary for Environmental Protection

Gray Davis
Governor

BUTTE COUNTY
ADMINISTRATIVE OFFICE

OCT 18 1999

OROVILLE, CALIFORNIA

14October 1999

Ms. Starlyn Brown,
Assistant Chief Administrative Officer
Butte County
25 County Center Drive
Oroville, CA 95965

PROHIBITION ORDER 90-126 AND COMPLIANCE PROGRAM

This letter is in response to our meeting of 16 June 1999, and subsequent conversations. These discussions have related to two primary topics; 1) possible alternatives regarding the Regional Board staff request to establish an on-site system monitoring program for those areas retaining septic systems in the Chico Urban Area and 2) the fact that many homes regulated by the prohibition have been annexed to the City of Chico since the prohibition was adopted. We understand that approximately 20 percent of the units affected by the Prohibition Order are currently located within the City limits. Future annexations will certainly cause this percentage to climb.

Regional Board Order No. 90-126 prohibits use of on-site systems within the Chico Urban Area after 1 July 1995, due to nitrate contamination of groundwater from these systems. This deadline was modified by Resolution No. 95-024, which extended the compliance date to 30 January 1996 to allow the County to complete a prohibition implementation plan.

Studies performed by Butte County after the adoption of Order 90-126 indicate that dwelling densities of less than four homes per acre may not cause exceedance of the groundwater nitrate maximum contaminant level. This conclusion was based upon site specific studies and literature data. Regional Board staff has indicated their willingness to request that the Board modify the prohibition to allow the continued use of existing septic systems in lower density areas. This potential modification was conditioned by staff on the formation of an on-site management district, to allow inspection and maintenance of the areas remaining on septic systems, as well as more stringent density restrictions for new construction . We have informally presented the concept of this modification to our Board on several occasions, and they have indicated their willingness to consider this modification.

You have recently requested our consideration of an alternate plan to allow the continued use of septic systems in areas of lower density development. Your proposed option involves eliminating the requirement for the on-site management district, and its authority to conduct on-site inspections. You propose to substitute a water quality monitoring program, coupled with other water quality protection tasks, such as a septic tank pumper reporting program and a public education program.

We believe that a monitoring program, with other relevant tasks, may be an effective method of water quality assessment and protection in lieu of on-site system management. Any such program should have the following elements, at a minimum:

1. Quarterly monitoring for groundwater depth in approximately 40 shallow groundwater monitoring wells, the exact number to be determined by Regional Board Staff and the County.

2. Annual, or possibly Semi-Annual, monitoring of the above wells for nitrate and Total Kjehldahl nitrogen, coliform, electrical conductivity, and possibly other parameters.

3. A public education program to educate residents about the groundwater nitrate program and the proper care of their septic systems.

4. A program to report septic tank pumping records and County complaint response/repairs to Regional Board Staff.

Whether the program would actually perform its intended function, and therefore whether we would allow it in place of an on-site management program, depends on two primary considerations: 1) whether staff can be assured that the program is adequately protective of water quality and 2) whether we have adequate authority to assure that the program will be carried out by the County.

Two potential options that would provide staff with adequate assurance that these tasks would be carried out are; 1) issuance of a Cleanup and Abatement Order (C&A) against the County requiring this reporting as a part of the C&A, or 2) codification of the monitoring requirements into the County Code, with a memorandum of understanding between the Regional Board and the Board of Supervisors. The MOU would stipulate the issuance of the C&A if the Code section was modified without Regional Board approval, or if the requirements of the code were not implemented. These two options are explained more fully below.

Section 13304 of the Water Code states:

"13304. Cleanup and Abatement.

(a) Any person who has discharged or discharges waste into the waters of this state in violation of any waste discharge requirement or other order or prohibition issued by a regional board or the state board, or who has caused or permitted, causes or permits, or threatens to cause or permit any waste to be discharged or deposited where it is, or probably will be, discharged into the waters of the state and creates, or threatens to create, a condition of pollution or nuisance, shall upon order of the regional board, clean up the waste or abate the effects of the waste, or, in the case of threatened pollution or nuisance, take other necessary remedial action, including, but not limited to, overseeing cleanup and abatement efforts. "

After consultation with our staff counsel, we believe code section 13304 gives us the authority to issue a cleanup and abatement order against the County, because it is currently allowing the discharge of

wastewater from septic systems; hence, the County is permitting the discharge of waste into a water of the State where it is causing pollution. Therefore, it appears that Section 13304 provides adequate guarantees the alternative of monitoring could be instituted and enforced. A Cleanup and Abatement Order would require the above monitoring program as well as the elimination of standard septic systems in areas where the Board determines the density of the systems will cause exceedance of the MCL. This density determination would utilize the County's Nitrate Compliance Plan.

The second option, an MOU and codification of the monitoring, would reduce the amount of staff and County resources to obtain adequate monitoring. As a part of the MOU, Board Staff would also propose that the results of the monitoring be given sufficient time, on the order of 10 to 20 years, to establish that sewering is having the desired effect on groundwater nitrate concentrations before considering any further action in the unsewered areas.

As noted, Board staff realizes that further annexations will occur. At some point the small number of parcels remaining in the unincorporated portions of the prohibition area will render County management of the monitoring plan infeasible. Therefore, we would also propose that the terms of the MOU be reviewed and renegotiated every ten years and the MOU rescinded, if appropriate. In addition, we would propose that should conditions warrant, either the County or Regional Board staff may request reconsideration of any affected provision of the MOU.

With either the C&A or the MOU coupled with codification of monitoring requirements, it appears that the Regional Board has adequate authority to assure the program would be carried out by the County.

You should note that we have been informed that several members of the State Legislature are of the opinion that the Regional Boards are not being sufficiently aggressive in pursuing enforcement action against polluters. The legislature has considered taking the step of withholding funds from our agency until such time as we implement additional enforcement action against dischargers currently in violation of Board Orders. As the deadline for compliance with Board Order No. 90-126 occurred over four years ago, the Chico Urban Area is an obvious target for increased enforcement.

In addition, as we have previously indicated, the fact that a Cal Water Service well was taken out of production last year due to high nitrate concentrations reinforces the need for timely compliance with Order No. 90-126.

As a consequence of this current concern of the legislature, and the apparent degradation of portions of the deeper aquifer, it behooves all of us to move forward as quickly as possible to implement Order 90-126.

If you have any questions, please contact me at (530) 224-4845 or at the letterhead address.

JAMES C. PEDRI, P.E.
Assistant Executive Officer
Shasta Cascade Watershed

Appendix S

Public Information Materials
Frequently Asked Questions
Minutes from 10/28/99 Public Meeting

COST:

Estimated construction costs to abandon a septic tank, install the lateral sewer lines, pay applicable fees, and install the sewer main, are about $9,000 per unit. Connection to the City of Chico's existing sanitary sewer system and the regional water pollution control plant is the most cost-effective alternative for sewering designated areas. Public financing costs have not yet been determined and will depend upon the type of financing method selected.

FINANCE METHOD:

Butte County will pursue financing that will combine grants and low interest loans available through Federal, State and local programs. Methods for the re-payment of loans include the possible establishment of assessment districts, and also the use of redevelopment agency funds in priority sewer areas. The terms for loan re-payments may range from 10 to 20 years.

NOTE TO COMMERCIAL FACILITIES:

If you have used your septic system for the disposal of wastes other than sewage, you may be required to ensure that your wastewater has not endangered soil or ground water quality. Pretreatment may be required in order to safely dispose to municipal sewer. Contact the City of Chico Public Works Department at 895-4883 to determine if your discharge is subject to an industrial waste permit.

FOR MORE INFORMATION

Copies of the Draft Chico Urban Area Nitrate Compliance Plan and related studies are available for review at these locations:

Butte County Library-Chico Branch
1108Sherman Avenue
Chico, CA
891-2761

Meriam Library
3rd Floor, Special Collections Section
California State University-Chico
400 West 1st Street
Chico, CA
898-6342

Butte County Environmental Health
Main Street
(City Municipal Center, 1st floor)
Chico, CA
891-2727

Butte County Administrative Office
25 County Center Drive
Oroville, CA 95965
538-7631

ON THE INTERNET

Visit the Butte Environmental Council (BEC) web site at *www.becnet.org/ChicoNitrate*

For information regarding the scheduling of neighborhood workshops please call 538-7631

Special acknowledgement to USEPA Region 9 for their assistance in printing this brochure.

ANSWERS TO COMMON QUESTIONS

CHICO URBAN AREA NITRATE COMPLIANCE PROGRAM

Butte County Administrative Office
25 County Center Drive
Oroville, CA 95965
(530) 538-7631

CHICO URBAN AREA NITRATE COMPLIANCE PROGRAM

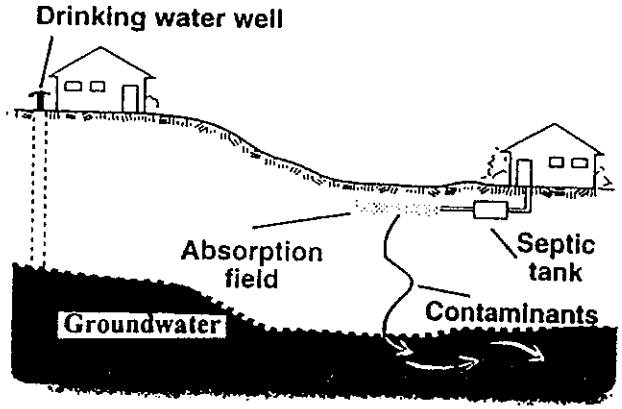
On March 24, 1998 the Butte County Board of Supervisors released for public information the Draft Chico Urban Area Nitrate Compliance Plan. The Draft Plan addresses the management of wastewater from approximately 12,000 dwelling units within the Chico Urban Area that are currently using onsite wastewater disposal systems (also called septic systems.)

WHY:

Nitrate contamination of groundwater was first detected in local private wells through water testing by the State Department of Water Resources in 1979. Of special concern was the exceedance of the national maximum contaminant level for nitrate in drinking water, which is 45 milligrams per liter. Public health concerns related to high nitrate levels, if ingested by humans, include blue-baby syndrome, high blood pressure, birth defects and carcinogenic effects.

Through recent detailed scientific groundwater hydrology studies performed in the mid 1990's, which included the sampling and analysis of more than 100 wells over a 3 year period, it was determined that the primary origin of elevated levels of nitrate contamination was septic systems. Nitrate values ranged from background levels of less than 10 milligrams per liter to over 100 milligrams per liter.

The California Regional Water Quality Control Board is the lead enforcement agency requiring the mitigation of groundwater nitrate contamination within the Chico Urban Area. That agency has adopted a prohibition order restricting the use of septic systems in the Chico Urban Area.



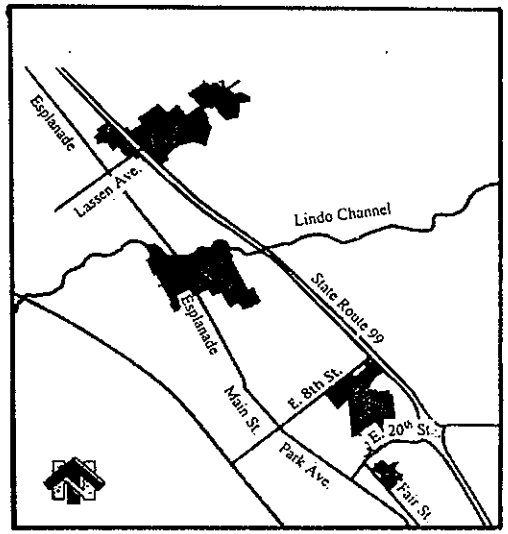
Septic System graphic © National Small Flows Clearinghouse.

WHO:

The Nitrate Compliance Program affects about 30,000 residents living on nearly 10,000 parcels within the Chico Urban Area. Approximately 7,800 dwelling units are proposed to be connected to the local sewer system. The remaining 4,200 dwelling units would continue to use onsite wastewater disposal systems, with additional monitoring to ensure safe and sanitary operation.

WHERE:

Primary areas identified in the Plan to be connected to sewer generally include Lassen Avenue (between Cussick Avenue and west of Cohasset Road); the Avenues (in general, west of the Esplanade between W. 12th Avenue and W. 7th Avenue, east of the Esplanade between Lindo Channel and E. 4th Avenue west of State Hwy 99); and the Chapman Mulberry area (between E. 8th Street and E. 23rd Street, east of Fair Street and west of State Highway 99). *Call 538-7631 for more details.*



WHEN:

The project is a phased program lasting from 3 to 10 years, depending upon the location of a designated area and its proximity to existing sewer.

RESPONSES TO QUESTIONS
APRIL 21, 1998 CITIZENS ADVISORY COMMITTEE
(revised October 1998)

The following responses to questions asked during the April 21, 1998 meeting of the Citizens Advisory Committee were prepared by staff at the Butte County Administrative Office with assistance from staff of the Butte County Division of Environmental Health and the State Regional Water Quality Control Board (Redding office).

1) If some foods have higher nitrate concentrations than the maximum contaminant level (MCL) which is 45 milligrams per liter (mg/l) as nitrate, then what is the problem with respect to the septic wastewater's exceedance of the MCL?

Response: According to the State Water Resources Control Board, the average nitrate consumption for adults is 100 mg per day as nitrate, assuming that drinking water is relatively uncontaminated with nitrate (in other words most of the nitrate consumption is due to solid food intake). If the drinking water contains 50 mg/l nitrate, which is higher than the federal MCL of 45 mg/l nitrate, nitrate consumption would be doubled (risk analyses generally assume a consumption of 2 liters per day of water, 2 liters multiplied by 50 mg/l is 100 mg). For the case of an infant under 3 to 6 months who receives little solid food and consumes water contaminated with 50 mg/l nitrate from formula, water could be a primary and substantial source of nitrate.

Additionally, it is possible for one to modify their "solid food diet" to limit or minimize nitrate ingestion. However, one may not be able to easily change their source of water supply.

2) If groundwater nitrate contamination is really such a public health threat, why doesn't the State make everybody connect to an alternative water supply (i.e. to Cal Water Service)?

Response: No agency in the State has the authority to require hook-up to a public water supply for individual residences. In addition, hook-up to Cal Water would not solve the underlying problem that the shallow aquifer is being rendered non-potable because of septic tank use. The Regional Water Quality Control Board's objective is to make sure that the aquifer is drinkable for any citizen who wishes to use it for that purpose.

Analysis of Cal Water Service wells has shown elevated concentrations of nitrate although most well concentrations do not approach the MCL. The elevated nitrate in the Cal Water Service wells may be due to septic tank effluent. Septic tank usage has been shown to be the major contributor to the shallow aquifer nitrate contamination therefore it is logical to assume that septic tanks are also a major contributor to any deep aquifer contamination.

3) How long will it take for the shallow aquifer to purge or cleanse itself of the nitrate problem? If it takes 20 to 30 years, then why allow any wells at all in the shallow aquifer?

Response: Twenty to 30 years is a reasonable estimate for the aquifer to show improvement in accordance with what we know about groundwater velocity in the Chico Urban Area. This analysis could be complicated by the existence of a reservoir of unoxidized nitrogen in the shallow urban soil (stored as ammonium) which the data indicates may be present in some areas. As indicated in answer #2, no agency has the authority in California to prevent the installation of a well by an individual homeowner. In February 1988 the minimum well seal depth for wells drilled within high nitrate areas was increased from 20 feet to 80 feet based upon recommendations of the State Water Resources Control Board.

4) What is the "bottom line" cost per month to the property owner (or annual/ semi-annual payments on a property tax billing)?

Response: As of May 1998 the County has not formulated its financial portfolio to finance the Nitrate Compliance Program. The County is on the high priority list to receive a loan from the State Water Resources Control Board revolving loan program. The entire program cost is estimated at nearly $71 million which includes the sewering of 7,800 dwelling units in the high priority neighborhoods (i.e. Lassen Avenue, the Avenues, Chapman-Mulberry area). One method to re-pay a state loan is by creating an assessment district (or series of assessment districts).

The *average estimated construction* cost to sewer these 7,800 units is approximately $4,700 per dwelling unit for off-site costs (installation to a sewer line in the public right-of-way, with City sewer trunk line capacity fees and sewer main fees addressed), and $2,950 for on-site costs (abandonment of the existing septic system and installation of sewer laterals). City water pollution control plant capacity fees are approximately $1,400 per unit. These total costs are approximately $9,050 per unit and do not include the public financing costs (bond counsel, financial advisor, etc..) for setting up assessment districts.

The estimated construction costs were analyzed in a Phase 2 sewer feasibility report (1998 update). As mentioned above, the cost "averaging" assumed that approximately 7,800 dwelling units would connect to sewer. However, this figure is a moving target since several property owners have elected to connect to sewer right away (i.e. due to septic system failures or for other reasons to connect) which means that the basis of 7,800 units is decreasing over time.

Net "bottom line" costs to the property owner may either be higher or lower than the $9,050 figure depending on whether a public financing plan addresses these areas as one discrete area (i.e. one large assessment district area) or multiple discrete areas (applying more than one assessment district area which would affect the benefit/cost spread). Current interest rates for the state's revolving loan fund range from 2.6% to 3.0% and terms are calculated at simple interest (compounded annually).

Re: April 21, 1998 Citizens Advisory Committee meeting

The state revolving loan fund applies to off-site construction costs though staff understands it may be possible to apply a portion of the on-site construction costs to the loan package.

In the table below are *example* payment installments a property owner might pay should the County utilize a state revolving loan to fund on-site and off-site construction costs. For general comparison purposes the loan amounts were calculated using the amounts of $6,000 and $10,000:

Loan Amount	Interest Rate	Term (years)	Est. Payment (if month)	Est. Payment (if annual)
$6,000	2.6%	20	* $32	$385
$6,000	3.0%	20	* $33	$399
$6,000	7.0%	20	* $46.50	$558
$10,000	3.0%	20	* $55.50	$665
$10,000	7.0%	20	* $77.50	$930

Notes:
* Plus monthly sewer service maintenance fee of about $10 per month per single family dwelling. Annual maintenance fee (i.e. from County Auditor/ Assessor may be $15 per year).

- The $10,000 loan amount represents a scenario for the purpose of seeing potential cost impacts to the property owner.
- The 7% interest rate was used to see how payments may fluctuate if the County ended up using market rates from institutional investors (a more conservative approach).

The County will also pursue federal or state grants to help finance off-site and on-site costs. Community Development Block Grants may be utilized for financing on-site construction costs but these grants may be limited to low income neighborhoods only.

The County is currently in the process of retaining the services of a financial advisor who will be utilized to create the loan package. As mentioned above, public financing costs have not yet been determined and will depend upon the financing method that is selected.

5) Identify members of the Citizens Nitrate Advisory Committee. Who are they, where do they live, and who do they represent?

Response: A roster of the Citizens Nitrate Advisory Committee (Committee) is attached. The Committee is an informal ad-hoc committee (i.e. not a Brown Act committee) with members

assembled by Supervisor Jane Dolan and Supervisor Mary Anne Houx. Supervisor Dolan and Supervisor Houx serve as ex-officio members. The majority of the Committee members reside within CSA 114 and own properties currently served by on-site septic systems. The Committee members include retirees, bankers, attorneys, engineers, property managers, realtors, business owners, and property owners. Committee meetings are usually held monthly and are regularly attended by staff from the Butte County Administrative Office, Butte County Environmental Health, Regional Water Quality Control Board, and more recently, the City of Chico.

6) Explain potential health dangers. What are the risks of drinking nitrate laden water exceeding 45 mg/l? Will it hurt healthwise, if we don't implement this program?

Response: Nitrogen in the form of nitrate usually reaches the groundwater and is very mobile because of its solubility and anionic form. Nitrates can move within groundwater with minimal transformation. High concentrations of nitrates (above 45 mg/l) can be hazardous, especially to infants, the elderly, and dialysis patients. In addition to the current statewide and national standard of 45 mg/l as nitrate, the World Health Organization also conforms to this number and has even considered lowering the standard.

Nitrogen cyanosis, or "blue baby syndrome," is the primary health problem driving the establishment of the worldwide nitrate standard of 45 mg/l. This syndrome is a condition caused by the incorporation of nitrates into blood hemoglobin forming a compound known as methemoglobin which precludes the transport of oxygen in the blood. When methemoglobin concentration becomes too high a victim of the disease presents symptoms of anoxia (low blood oxygen) including blue coloration of the skin. Young infants are particularly susceptible to the disease because of unique conditions in their immature intestinal tract.

Other health concerns associated with nitrate include potential carcinogenic effects, including stomach and gastrointestinal cancer, high blood pressure, birth defects, and effects on the central nervous system.

Referring to answer #2, ignoring the potential problems associated with groundwater nitrate contamination is not a viable solution. The State Water Resources Control Board is required by law to protect the waters of the state. The presence of high nitrates in groundwater in the Chico Urban Area, coupled with the linkage to septic sources suggests that many shallow groundwater wells are receiving a portion of recycled sewage in their water supply.

According to the Nitrate Compliance Plan (page 2-3, Health Effects and Regulation of Nitrate), the effluent reaching groundwater would not be allowed to be used for groundwater recharge under current California regulations for reclaimed water (Title 22). There is also concern that the use of septic tanks and leach fields may be contributing toxic organic compounds to the groundwater.

Further, the presence of nitrate in local groundwater is an indicator that the quality of the shallow aquifer is degrading and may pose a threat to the deeper aquifer which provides to many resident's their local drinking water supply.

7) Are you going to destroy my back yard when installing the sewer line?

Response: This is a common question by affected property owners as the high priority areas for sewering include many neighborhoods with mature landscaping. Those contracting to de-commission the septic tanks and/ or to install on-site sewer laterals will be charged to minimize damage to sidewalks, the landscape, and other home improvements (to structures such as patios, etc...). Efforts will be taken to *work around and avoid* the house footprint and landscaped areas as much as possible. The installation of a sewer line to a dwelling generally creates less disruption to property than the repair or replacement of a septic tank system.

8) Explain or confirm. The new sewer collection systems needs to be constructed to accommodate the capacity of the Chico Urban Area (in case additional connections occur in the long term future).

Response: The City of Chico is presently in the process of upgrading the regional sewage treatment plant from 6 million gallons per day (MGD) to 9 MGD. The connection of the 7,800 dwelling units in response to Prohibition Order No. 90-126 may amount to 1.5 MGD which can be accommodated by the sewage treatment plant.

However, not all infrastructure to *collect and transport* this wastewater volume to the sewage treatment plant is in place. It is proposed that the sewage collection system be constructed in accordance with the City of Chico's Sewer Master Plan to accommodate short term and long term sewer connection needs.

9) Explain that other chemicals are dumped into the septic system (i.e. household cleansers, poisons, detergents). These all eventually contribute to groundwater contamination and pollution. Does the State or Federal EPA have any data on this?

Response: Any material other than household sanitary waste should not be discharged to the septic tank, but often are. These materials include solvents, household cleaners, paints, medications, and others. Some studies have found significant concentrations of organic materials such as solvents in the groundwater beneath areas utilizing septic systems. According to a 1980 U.S. EPA report, residential water use by activity includes toilet (35%), laundry (22%), bathing (20%), kitchen (10%) and miscellaneous (13%).

MEMBERS of the CITIZENS NITRATE ADVISORY COMMITTEE
(revised October 1998)

Name	Affiliation
Cal Bachman	local engineer
Elva Boone	property owner (retired) - (resigned from Committee effective June 1998)
Vivian Browning	represents the Citizens Against Un-needed Sewer Enforcement (CAUSE)
Gene Damschen	mobile home park business owner
Anita Domenicini	owns a septic tank installation and service business
Tom Edgar	local attorney
Jim Goodwin	Chico Chamber of Commerce
Elliott Johnson	retired professor, Chico State University
Ned Kirkham	retired banker (resigned from Committee effective August 1998)
Martha Moyer	property owner, represents Mobile Home Property Owners Association
John Miller	represents local property management company
Dan Shedd	represents local property management company
Peter Tichinin	represents local real estate industry
Rick Timmons	local banker
Barbara Vlamis	represents Butte Environmental Council

ex-officio members
Supervisor Jane Dolan, District 2
Supervisor Mary Anne Houx, District 3

County Staff
Starlyn Brown, Assistant Chief Administrative Officer
Eric Miller, Program Manager
Tom Reid, Director, Butte County Division of Environmental Health

State Staff -Regional Water Quality Control Board
Ron Dykstra, Water Resource Control Engineer

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MINUTES FROM PUBLIC MEETING – October 28, 1999

Chico Urban Area Nitrate Compliance Program
Initial Public Scoping Session for the Proposed Environmental Impact Report (EIR)

Location: The meeting was held in the Durst Theater (Room 505) of the Chico Junior High School, 280 Memorial Way, in Chico, on Thursday, October 28, 1999.

Time: The meeting began at 5:30 p.m. and concluded at 7:20 p.m.. Many citizens lingered until nearly 8:00 p.m. asking questions of staff and the panelists.

Panelists: Starlyn Brown, Assistant Chief Administrative Officer; Eric Miller, Program Manager; Randy Chafin, Environmental Coordinator; Tom Reid, Director, Butte County Environmental Health (BCEH); Mike Huerta, Supervisor, BCEH; Mike McEnespy, NorthStar Engineering; Mike Byrd, Rolls Anderson & Rolls Civil Engineers

Shirley Quackenbush, Clerical Assistant, also attended. Supervisor Jane Dolan and Supervisor Mary Anne Houx also fielded several questions from persons in the audience.

Purpose: The purpose of the meeting was to provide a general overview of the Nitrate Compliance Program and to solicit comments and concerns from citizens that guide the preparation of the proposed EIR.

Attendance: At least 80+ people

After general welcoming remarks from Starlyn Brown, Eric Miller gave a 20 minute overview of the Nitrate Compliance Program and the County's application to the State Revolving Fund Loan Program. Randy Chafin followed with an overview of the requirements of the California Environmental Quality Act (CEQA) and the EIR process.

Questions and Responses

Question #1): What can people do to prevent nitrates from reaching the groundwater?

Response: Tom Reid and Eric Miller responded that as part of the proposed solution to address the Prohibition Order the County would implement an aggressive public outreach program to inform citizens of the proper care and maintenance of their septic systems. Nitrates will continue to be a natural by-product of waste water generation. It is important that septic system users take proper care of their systems.

Question #2): Discuss a scenario where a property owner has rebuilt their leach field/septic system, but falls within a proposed sub-area to be sewered.

Response: Mr. Reid responded that, though a parcel may have recently upgraded or improved its septic system, the parcel is still recommended to be connected to sewer according to the provisions of the Prohibition Order. A healthy and functioning septic system does not change the nitrate compliance program.

Question #3): How many wells in the Chico Urban Area exceed the maximum contaminant level for nitrate?

Response: Mr. Reid and Mr. Miller responded that at least 100 wells were sampled during recent groundwater monitoring studies in the early and mid 1990s. Staff will research the historical data to determine the number of wells that exceeded the maximum contaminant level for nitrate.

Question #4): Are any persons in the Chico Urban Area currently drinking from wells that exceed the maximum contaminant level?

Response: Mr. Reid responded that this is probably occurring. Those who are elderly, or infants younger than 6 months old , are more susceptible to health problems related to nitrates. He explained that the County Health Department sends news releases to physicians and the local medical community to alert them of special findings or potential problems.

Question #5): The outflow from the sewage treatment plant smells. What effect will additional sewage from this project have on that situation?

Response: Mr. Reid explained it is assumed that the local waster water treatment plant is functioning properly. Mr. Miller commented that the treatment plant is undergoing a 3 million gallon per day (3 MGD) capacity expansion to increase operations from 6 MGD to 9 MGD. It is estimated that the 7,800 dwelling units which are targeted for sewer connections will generate 1.5 MGD for which the plant has capacity.

Question #6): Will additional environmental studies be required?

Response: Randy Chafin responded that while it is the County's intention to address as much of the ultimate project as possible in this EIR, there may be project elements that come to light later that will require subsequent analysis. If so, we will build upon this EIR, rather than commissioning a new EIR.

Question #7): How long will the EIR be valid?

Response: Mr. Chafin responded that there is not a set time limit for the validity of an EIR. The project description section of the EIR will clearly state that the project will be completed in phases over a period of years. Changes in the project or changes in the environment would be the main reasons for a finding that the EIR is no longer valid. If such a determination were made subsequent studies would probably be sufficient to make the analysis valid.

Question #8): What effect will a reduction in the project scope have on the validity of the EIR?

Response: Mr. Chafin responded that the EIR would remain valid for a reduction in project scope, but would have to be supplemented if the project was increased in scope.

Question #9): What alternatives are there to the installation of and connection to sewer lines?

Response: Mr. Reid responded that on-site septic systems might be possible in some high density areas and in remote areas where the connection to sewer may be infeasible.

Question #10): Explain more about the SRF loan application and timeline for repayment.

Response: Mr. Miller explained that one approach the County will pursue is preparation of a State Revolving Fund (SRF) loan application to finance off-site construction costs and city fees. The origin of funds is through the Federal Clean Water Act and the State of California Water Resources Control Board administers the disposition of the funds. In our situation, Butte County is the agent that will prepare the loan application and submit it to the State. The State acts as "the banker" and the County as the applicant must repay any loan that is authorized. The individual property owners do not directly work with the State. The County may have up to twenty years to repay the loan. Current SRF program lending rates vary from 2.5% to 3.0% which is computed annually (simple interest).

Question #11): Is the prohibition a mandate or a law?

Response: Mr. Miller explained that the Regional Water Quality Control Board (Regional Board) actually issued an order to correct the groundwater nitrate contamination. Through the State Water Code the Regional Board has the authority to issue cease and desist orders on the individual property owners. The Regional Board can also impose a clean-up and abatement order on the County to correct the groundwater contamination problems. The Regional Board has authority to implement the clean-up and then bill the County for the work.

Question #12): Can citizens do anything to prevent annexation to the City of Chico?

Response: Supervisor Houx reported that she and Supervisor Dolan have regularly met with City policy makers regarding this issue. There are about 4800 households in the unincorporated area that may be affected by the current annexation policy. The Board members have requested that the City relax this policy for those residents who are affected by the Prohibition Order and who must connect to sewer. The Board members will continue to work with the City officials on this issue. County citizens should voice their concern so that the City Council knows how the citizens feel about being annexed (i.e. without "voluntarily annexing").

Supervisor Dolan commented that if you are a tenant in a mobile home park, and the property owner has already annexed to the City, then there is nothing the individual can do.

Question #13): How can the state actually prohibit the installation of new septic systems?

Response: Mr. Reid reported that the Regional Board's order prohibits units that use septic systems that exceed maximum density requirements (approximately four or more *existing* units per acre). No more than two *new* units per acre, that are on septic systems, can be built in the Chico Urban Area.

Question #14): How did this problem occur? Why did the planning department allow such high density building/development? It does not seem fair that current homeowners should be responsible to pay for this problem. The organization that allowed the development should be responsible for paying the bills. Also, has it been proved that individual septic systems that are at fault?

Response: Supervisor Dolan explained that most of the neighborhoods involved are located in the oldest areas of the Chico Urban Area. It was also commented that many of these homes were built 25 to 50 years ago and at that time it was not uncommon practice to utilize septic systems for managing waste water. The County is trying to minimize the costs to homeowners. She also reported that the technical hydrological studies have proved that the septic systems are the source of the problem.

Question #15): If you have a deep well, over 200 feet, could the drinking water still be affected by the nitrate contamination?

Response: Mr. Reid explained that nitrates usually are found in the shallow aquifer (beneath the ground surface to about 50 feet). In most cases nitrates do not reach the 200-ft level but it was commented that Cal Water Service had reported high nitrate level in one of their deep aquifers. The Regional Board would have to study individual cases but you also have to realize that while high nitrate levels may not affect one's drinking water, it could affect and contaminate a neighbor's drinking water.

Question #16): It seems that the County is addressing the solution and not the problem. How can the County do a better job of preventing nitrates from contaminating ground water? Can't we do more to educate the people on how to take care of their septic system to try and eliminate this contamination?

Response: It was agreed that there should be more outreach to the general public regarding the use and care of their septic systems. Starlyn Brown stated that the County will look into this and try to be more proactive on the issue and possibly do public information announcements through the local newspapers. Mr. Reid explained the general public must understand that there are two types of contamination of the ground water through septic systems, bacterial and chemical. Bacterial contamination is more common and can be controlled by the proper use and care of the septic system. Chemical contamination, such as nitrate contamination, is also attributed to many other factors (i.e. soil, geology, density, etc...) and is not necessarily controlled by just proper maintenance.

Mr. Reid also addressed the issue of nitrate reduction by sand filters. There is experimentation with sand filters, however, for the individual homeowner it is not a cost viable solution because they are large and intrusive systems (in some cases they may take up the entire back yard) and require a lot of maintenance. These systems are really a last resort in situations where it is not convenient to connect to sewer.

Question #17): Will financial planning and the EIR studies occur at the same time?

Response: Mr. Miller explained that the SRF loan application requires preparation of an engineering study, a financial plan, and an EIR. The County will simultaneously work on these components. The engineering component and financial plan will probably take 10 to 12 months to prepare. The EIR may take the longest

to complete, up to 12 to 16 months. All components may require significant input and review by the public and by policy makers. County staffs' goal is to submit the components of the SRF loan application to the State Water Resources Control Board by late 2000 or early 2001.

Question #18): What about other health effects of nitrate contamination besides the "blue baby syndrome?

Response: Mr. Reid stated that at this point the main issue is the blue baby syndrome. Humans ingest nitrates from many foods, not only from water, and it is very difficult to prove that nitrates are the sources for other health issues.

Question #19): After a septic system is emptied and is filled with sand (i.e. abandoned) how long will the groundwater be contaminated?

Response: Mr. Reid explained that there will still be residual septic tank effluent in the leach line conveyance system. As soon as the leach lines dry they will not release additional bacterial contaminants and the rainwater should wash other contaminants from the soil. He further explained that it is not known how much time is necessary for the soils and groundwater to show evidence of improvement. The process could take up to 10 or 20 years. Many factors are involved. The geology of the soil and concentration of contamination will affect the time required for the system to be cleaned out.

Other comments/requests

The notes below resulted from follow-up telephone calls made by Eric Miller after the meeting.

Michelle Lambert, Chico, 891-8875: Requested information on the local waste water treatment plant. Ms. Lambert was referred to contact the wastewater treatment plant supervisor. The supervisor said he is willing to give Ms. Lambert a tour of the treatment plant. Ms. Lambert is interested in the technology used at the plant to treat waste water.

Jeff Fralliacciardi, Chico, 879-0181: Requested copies of technical research and references to studies for a class at Chico State. Copies of several technical articles, the Executive Summary, and other information was sent on 11/1/99.

Irene Lawler, Chico, 343-4385: Ms. Lawler had questions about program costs, financing, and any assistance renters could qualify for. She is a resident of the Casa de Flores mobile home park, age 81, and on a fixed income.

Kathleen Lambert, 2033 Palm Avenue, Chico, 95926, 891-8875: Ms. Lambert gave the following advice regarding future presentations:

- Discuss the potential impacts of "infilling" and new development associated with the sewer connections and expansion of infrastructure.
- When the County implements its public outreach program in specific neighborhoods, address a personal letter to citizens, rather than a using a form letter or flyer.

- Explain who, in the long run, benefits from the Nitrate Compliance Program.
- Improve the relationships with the local media. Too many citizens think that the project is a "done deal." They do not realize that there is a lot of process involved, or that more public input is needed. The media is not capturing the entire scope of the project. The media's coverage to date is misleading.
- Do not spend so much time discussing the history of the problem. Rather, discuss "where we go from here." Address how roads will be reconstructed. Explain whether the costs include for the construction of curb, gutter and side walks.

Ms. Lambert also said she would gladly sponsor/help facilitate a neighborhood meeting in her area.

Barbara Vlamis, Butte Environmental Council, 891-6424: Ms. Vlamis commented that alternatives to connecting to the sewer system should be addressed. An example is compost toilets. Though it is realized compost toilets may not be feasible on such a large scale, an alternative such as this should at least be mentioned in the proposed EIR.

Shirley Quackenbush, Clerical Assistant and Eric Miller, Program Manager, for the Butte County Administrative Office summarized these notes.

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