Onsite Wastewater Treatment System Policy

Draft Substitute Environmental Document

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Acronyms and Abbreviations

AB	Assembly Bill
AB 885	Water Code Section 13291
AE	alcohol ethoxylate
AES	alcohol ether sulfate
AHTN	acetyl-hexamethyl-tetrahydro-naphthalene
ALA	authorized local agencies
Alquist-Priolo Act	Alquist-Priolo Earthquake Fault Zoning Act
ARB	Air Resources Board
ASBS	areas of special biological significance
ASP	Amnesic Shellfish Poisoning
Assembly Bill 939	California Integrated Waste Management Act of 1989
ATP	adenosine triphosphate
ATU	Aerobic treatment unit
Basin Plan	Water Quality Control Plan
BMP	best management practices
BOD	biochemical oxygen demand
CAA	Clean Air Act
CAAQS	California ambient air quality standards
Cal/EPA	The California Environmental Protection Agency
Cal/OSHA	The California Occupational Safety and Health Administration
Caltrans	California Department of Transportation
CCAA	California Clean Air Act
CCC	California Coastal Commission
CCDEH	Coalition of California Directors of Environmental Health
CCR	California Code of Regulations
CDC	California Department of Conservation
CEC	ation exchange capacity
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CESA	California Endangered Species Act
CETAP	Community Environmental Transportation Corridor Acceptability Process
CFR	Code of Federal Regulations
CIWMA	California Integrated Waste Management Act
Clean Water Act	Water Pollution Control Act of 1972
CNEL	community noise equivalent level

Acronyms and Abbreviations

CPC	California Plumbing Code
CSD	Community Services District
CSUC	California State University, Chico
CUP	conditional use permits
CVCOI	Cherry Valley Community of Interest
CVP	Central Valley Project Improvement Act
CWA	Clean Water Act
CWTRC	California Wastewater Research and Training Center
DDT	dichlorodiphenyltrichloroethane
DEIR	draft environmental impact report
Delta	Sacramento–San Joaquin River Delta
DFG	Department of Fish and Game
Director	Director of the Riverside County Department of Environmental Health
DNA	deoxyribonucleic acid
DOF	Department of Finance
DPH	Department of Public Health
DSP	Diarrhetic Shellfish Poisoning
DTSC	Department of Toxic Substances Control
EDC	endocrine-disrupting chemicals
EDU	Equivalent dwelling units
EIR	environmental impact report
EPA	Environmental Protection Agency
ESA	Endangered Species Act
ETI	evapotranspiration and infiltration
FEIR	final Environmental Impact Report
FEMA	Federal Emergency Management Agency
FPP	Farmland Protection Program
FPPA	Farmland Protection Policy Act
FSZ	Farmland Security Zones
FWPCA	Federal Water Pollution Control Act
GPAC	General Plan Advisory Committee
gpd	gallons per day
HAB	harmful algal blooms
HCH	hexachlorocyclohexane
HWCL	Hazardous Waste Control Law
IAPMO	International Association of Plumbing and Mechanical Officials
IPHCP	Interim Programmatic Habitat Conservation Plan
IS	initial study

Acronyms and Abbreviations

LADWP	Los Angeles Department of Water and Power
LAS	linear alkylbenzene sulfonate
LCP	Local Coastal Program
LESA	Land Evaluation and Site Assessment
LOS	level-of-service
LTAR	long-term acceptance rate
Map Act	Subdivision Map Act
MCL	maximum contaminant level
µg/l	micrograms per liter
mg/l	milligrams per liter
ml	milliliters
MOU	memorandum of understanding
mpi	minutes per inch
MPN	most probable number
MSHCP	Multiple Species Habitat Conservation Plan
NAAQS	National Ambient Air Quality Standards
NCCP	natural community conservation plan
NEHRP	National Earthquake Hazards Reduction Program
NEHRPA	National Earthquake Hazards Reduction Program Act
NEPA	National Environmental Policy Act
NESHAP	national emissions standards for hazardous air pollutants
NH_4^+	ammonium
NMFS	National Marine Fisheries Service
NO_2^-	nitrite
NO_3	Nitrate
NOAA Fisheries Service	National Oceanic and Atmospheric Administration Fisheries Service (formerly National Marine Fisheries Service)
NOP	Notice of Preparation
NPDES	National Pollutant Discharge Elimination System
O&M	operations and maintenance
OC	organochlorine
OES	Office of Emergency Services
OSHA	The Occupational Safety and Health Administration
OWTS	on-site wastewater treatment systems
PAH	polycyclic aromatic hydrocarbons
PCB	polychlorinated biphenyl
Porter-Cologne Act	Porter-Cologne Water Quality Control Act of 1969
PRC	Public Resources Code

Acronyms and Abbreviations

PRMD	Permit and Resource Management Department
PSP	Paralytic Shellfish Poisoning
RCE	Registered Civil Engineer
RCIP	Riverside County Integrated Project
RCRA	Resource Conservation and Recovery Act
Regional Water Board	Regional Water Quality Control Board
REHS	Registered Environmental Health Specialist
RNA	ribonucleic acid
ROWD	report of waste discharge
RWQCB	regional water quality control board
SB	Senate Bill
SIP	State Implementation Plan
SR	State Route
SRF	State Revolving Fund
State Water Board	State Water Resources Control Board
SWPPP	storm water pollution prevention plan
TAC	toxic air contaminants
TCE	Trichloroethylene
TCR	transportation concept reports
TDS	Total dissolved solids
THM	trihalomethane
TMDL	total maximum daily load
TN	total nitrogen
TOC	Toxic organic compounds
TSS	total suspended solids
UBC	Uniform Building Code
UPC	Uniform Plumbing Code
USACE	U.S. Army Corps of Engineers
USFWS	U. S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tanks
UV	ultraviolet
WDR	waste discharge requirements
WQO	water quality objective
YSAQMD	Yolo-Solano Air Quality Management District

1 Summary

1.1 Introduction

This draft substitute environmental document (draft SED) has been prepared by the State Water Resources Control Board (State Water Board) to evaluate the potential environmental effects of the adoption and implementation of a proposed statewide on-site wastewater treatment system policy (OWTS Policy) as required by Assembly Bill 885 (Chapter 781, Statutes of 2000), which was approved by the California State Legislature and signed into law in September 2000 and codified as sections 13290-13291.7, Chapter 4.5, Division 7 of the Water Code, and the adoption and implementation of the proposed statewide waiver.

Because a proposed waiver is included in the Policy, hereinafter, when this SED refers to the proposed project or the proposed OWTS Policy or the proposed Policy, it means both the proposed OWTS Policy and the proposed waiver. The proposed OWTS Policy would be incorporated into the water quality control plans (basin plans) of all nine Regional Water Quality Control Boards (regional water boards). The regional water boards would implement the OWTS Policy along with those local agencies that would be given authority by the regional water boards to implement and enforce the OWTS Policy. The State Water Board would also have oversight over the implementation of the proposed Policy, and would be responsible for updating and renewing the proposed Policy over time. The environmental impacts of subsequent actions by the State Water Board, the regional water boards, and the local agencies to implement the proposed Policy are analyzed in this SED, as further explained in Section 6.

This draft SED has been prepared in accordance with the requirements of Article 6, Exempt Regulatory Programs, of Title 23, Division 3, Chapter 27 of the California Code of Regulations (23 CCR § 3775 *et seq*.). The State Water Board's approval of policies for water quality control is a regulatory program that has been certified as exempt from the requirements of the California Environmental Quality Act (CEQA) by the Secretary for Natural Resources.

1.2 Project Objectives

Based on the requirements of Water Code Section 13290 *et seq*. and the intent of the state legislature in adopting the legislation, and in the context of other state laws relating to wastewater discharge and water quality, the State Water Board has identified the following objectives for the proposed project:

- As required by Water Code Section 13290 *et seq*., adopt a statewide policy for OWTS that is consistent with other provisions of the Porter-Cologne Water Quality Control Act and related state water quality control plans and policies adopted by the State Water Board.

- Help ensure that public health and beneficial uses of the state's waters are protected from OWTS effluent discharges by meeting water quality objectives.

- Establish an effective implementation process that considers economic costs, practical considerations for implementation, and technological capabilities existing at the time of implementation.

1.3 Project Characteristics

The State Water Board proposes to adopt an OWTS Policy and a statewide conditional waiver (waiver) that establish minimum requirements for the permitting and operation of OWTS. The waiver allows owners of OWTS to discharge wastewater without having to file a report of waste discharge (and obtain waste discharge requirements [WDRs]) with a regional water board as long as the existing or new OWTS and its owner comply with the applicable minimum requirements set forth in the proposed OWTS Policy.

In some cases, elements of the proposed OWTS Policy may already be in use but may vary around the state. See section 5 for more information on the existing regulatory setting at the regional and local levels, including examples of regulations from representative municipalities in the state, presented for comparative purposes.

The proposed OWTS Policy has been drafted to fulfill the state mandate and address the seven requirements identified in AB 885 (the "seven points"). Table 1-1 describes the seven points from AB 885 and where in the proposed OWTS Policy they are addressed. The text that follows describes the major elements of the proposed OWTS Policy as they relate to the potential for the project to have an impact on the physical environment. Section references are references to specific sections in the proposed Policy.

Table 1-1: The Proposed Policy and the Seven Points of Assembly Bill 885

Point 1: Minimum Operating Requirements	Section 7, Low Risk New or Replacement OWTS Section 8, Minimum OWTS Design and Construction Standards
Point 2: Requirements for Impaired Waters, Including Clean Water Act Section 303(d)-listed Waters	Section 10, Advanced Protection Management Program
Point 3: Requirements Authorizing Local Implementation	Section 9, Local Management Program for Minimum OWTS Standards
Point 4: Requirements for Corrective Actions	Section 11, Corrective Action for OWTS
Point 5: Minimum Monitoring Requirements	Section 3, Local Agency Requirements and Responsibilities Section 9, Local Management Program for Minimum OWTS Standards Section 10, Advanced Protection Management Program
Point 6: Exemption Criteria	Section 4, Regional Water Board Functions and Duties Section 10, Advanced Protection Management

	Program
Point 7: Requirements for Determining when a System is Subject to Major Repair	Section 11, Corrective Action for OWTS

1.4 Implementation of the Proposed Policy

Regional water boards would be required to incorporate the requirements established in the proposed OWTS Policy, or standards that are more protective of the environment and public health than the proposed OWTS Policy, into their basin plans within 12 months of the effective date of the Policy.

The proposed OWTS Policy would be largely self-implementing, requiring actions to be completed by the property owner/operator. The proposed OWTS Policy would be overseen by the State Water Board and the regional water boards. Local agencies (e.g., county and city departments and independent districts) would continue to oversee local siting approval and compliance with basin plans and local ordinances, as required under existing law.

The proposed statewide waiver that would be established as part of the proposed project would also be self-implementing. As long as a property owner ensures that his or her OWTS complies with the requirements of the proposed OWTS Policy, no additional permit or review would be required by the state. Failure to comply with the minimum statewide requirements for construction, operation, and maintenance of OWTS could result in enforcement pursuant to Chapters 4 or 5 of Division 7 of the California Water Code. As a result, the property owner could be required to cease the discharge, submit monitoring results, or submit a report of waste discharge to the regional water board, along with the applicable fee, and the OWTS could be subject to individual WDRs as determined by the regional water board.

1.5 Environmental Impacts and Mitigation Measures

Section 6 of this draft SED evaluates in detail the environmental impacts that would result from implementation of the proposed project and sets forth mitigation measures required to avoid or reduce environmental impacts, where feasible. Implementation of the proposed project could significantly affect a number of environmental resources and issue areas, but mitigation is included to reduce these impacts to a less-than significant level, where feasible.

1.6 Alternatives to the Proposed Project

Title 23, Division 3, Chapter 27, Article 6 of the California Code of Regulations (section 3777) requires that an SED contain an analysis of reasonable alternatives to the proposed project. The State Water Board identified five alternatives for analysis in this draft SED:

1.6.1 No-Project (Status Quo) Alternative

The existing regulatory setting as summarized in section 5 and Tables 5-1, 5-2 and 5-3 of this draft SED would continue into the future. No new statewide OWTS requirements would be implemented; existing OWTS-related requirements in the regional water boards' water quality control plans (basin plans) and local agency ordinances would continue to be inconsistent from one jurisdiction to another and would be the primary means by which OWTS are regulated. Therefore, OWTS siting, design, and construction standards would continue to vary around California, along with corrective actions, exemption criteria, minimum monitoring requirements, and requirements for determining when a system is subject to major repair.

Potential Environmental Impacts of No Project (Status Quo) Alternative
With the No-Project (Status Quo) Alternative, as new OWTS are built, the typical environmental impacts associated with new OWTS construction and discharges would continue to occur. These typical OWTS impacts, which are described in section 6, Environmental Impacts, include excavation of trenches and other earthwork that can cause the erosion of soil into nearby surface waters; operation of construction vehicles, resulting in traffic, emission of air pollutants, and generation of noise; and operation of septage pumper trucks, resulting in traffic, emission of air pollutants, generation of noise, and use of space in a landfill or capacity in a wastewater treatment plant. Discharges of effluent would continue at existing OWTS sites.

1.6.2 Prescriptive Alternative

This alternative represents the regulatory approach of providing prescriptive standards for OWTS siting, site monitoring, and performance standards and has been called by some the "one size fits all" approach. Although this characterization is an oversimplification, this approach puts a heavy emphasis on standardized, comprehensive, and detailed requirements for the siting and design of OWTS. These requirements would primarily be based on the existing California Plumbing Code, which has been used by many California counties as the basis for their regulation of OWTS; thus, many of the standards used in this alternative are already being enforced in many of California's counties.

Potential Environmental Impacts of Prescriptive Alternative
The environmental impacts of the Prescriptive Alternative would for the most part be the same as, or similar to, those resulting from the proposed project. Where existing regulations are less stringent than the prescriptive standards in this alternative, environmental benefit would occur.

1.6.3 Matrix Alternative:

The intent of the Matrix Alternative is twofold: (1) to minimize the potential for OWTS to contaminate groundwater because systems (particularly OWTS with supplemental treatment components) are sited in areas with inadequate depth to groundwater, and (2) to reduce the potential for OWTS to be sited at a density that could overwhelm the ability of the soil to provide adequate treatment of effluent before it reaches groundwater. The Matrix Alternative focuses on these issues primarily through two mechanisms: restrictions on the size of lots and density of development at which OWTS are permitted, and more strict regulations for the siting and performance of OWTS with supplemental treatment components. It is called the "Matrix" Alternative because the lot size and density restrictions would be presented in a matrix format to accommodate the number of variables that would need to be considered.

Potential Environmental Impacts of Matrix Alternative
Given the restrictions relating to land use, soil percolation rate, engineered fill, and supplemental treatment performance requirements that are included in the Matrix Alternative, this alternative would likely restrict the number of new OWTS constructed in some areas of the state. Because OWTS are often constructed in relatively remote areas where construction or expansion of centralized sewer collection and treatment systems are typically not feasible, the restrictions included in this alternative could result in some lots not being developed at all and, in some areas, a shift in the construction of OWTS onto larger lots and in less dense development patterns than would occur under the proposed project and other alternatives.

1.6.4 Supplemental Treatment Alternative

The Supplemental Treatment Alternative is identical to the proposed project except for one major difference: all new and replaced OWTS throughout the state would be required to use supplemental treatment after the proposed Policy is adopted, and all existing conventional OWTS in the state would be required to be upgraded to include supplemental treatment components within nine years from the date when the proposed regulations go into effect. The performance standards included in the proposed project for supplemental treatment components would be included in this alternative.

Potential Environmental Impacts of Supplemental Treatment Alternative
This alternative has the potential to restrict development in areas throughout the state where conventional OWTS would no longer be allowed and OWTS owners cannot afford the higher costs associated with supplemental treatment. The development-restricting potential of this alternative would likely be greatest in rural counties where personal incomes tend to be lower than in those areas that are within commuting range of higher-paying jobs in urban areas. This alternative would also impose a substantial cost burden on all existing conventional OWTS owners within nine years, in the range of approximately $30 billion to $60 billion dollars statewide.

1.6.5 2008 Draft Regulations Alternative

This alternative would establish minimum requirements for the permitting, monitoring, and operation of OWTS for preventing conditions of pollution and nuisance. This alternative would require existing OWTS to comply with more extensive requirements than the proposed Policy, regardless of whether the OWTS is contributing to water quality degradation. This alternative would also require OWTS within 600 feet of impaired water bodies to upgrade to supplemental treatment if a TMDL has been adopted for OWTS.

The 2008 Draft Regulations alternative could cause a financial burden on owners of existing OWTS who have to comply with extensive regulations when there is an unknown and possibly absent pollution problem. For this reason, the alternative does not meet the project objective of establishing an effective implementation process that considers economic costs and practical considerations for implementation. In addition, this alternative would affect fewer OWTS near impaired water bodies, where OWTS are likely contributing to water quality degradation. For this reason, the alternative does not meet the project objectives of helping to ensure that public health and beneficial uses of the state's waters are protected from OWTS effluent discharges.

Summary of Methods of Compliance and Cost Analysis

The State Water Board, regional water boards, and local agencies will all have duties to perform in order to comply with the proposed Policy. These duties and their associated costs are summarized here, and presented in greater detail in section 8.

State Water Board

- periodic review and renewal of the Policy;
- approve or reject regional water board basin plan amendments;
- adjudicate disputes between the regional water boards and the local agencies; and,
- approve or disapprove local agency management programs, and consider requests for modification.

Regional Water Boards

- incorporate the proposed Policy into the basin plan within 12 months of the effective date of the Policy;
- approve or disapprove local agency management programs, and consider requests for modifications;
- issue or deny waste discharge permits;
- implement Tier 3; and,
- adopt waste discharge requirements or waivers when needed.

Local Agencies

- determine which tier(s) their local jurisdiction will apply to perform under;
- submit a proposed local agency management program if Tier 2 authorization is desired, and, upon approval, administer Tier 2.
- report annually to the regional water board on issues regarding complaints, septic tank cleaning registration, number of repair permits, and the number and location of new permits issued; and,
- retain reporting records;

All OWTS owners will need to comply with the proposed Policy. The means by which they will comply depends upon which tier of the Policy their OWTS will be regulated. The expected methods of compliance for each tier are outlined below:

Tier 0

No action is required, except maintaining their system in good operating condition.

Tier 1

New and replaced OWTS must meet the siting and design criteria for a standard OWTS.

Tier 2

New and replaced OWTS must meet the siting and design criteria of the local agency management program. The management program may allow for alternative siting and design criteria than that of Tier 1, and may also allow for the use of alternative treatment systems (*e.g.*, disinfection, aerobic treatment, mound or drip systems, *etc*.), thereby allowing for a wide variety of OWTS under this tier.

Tier 3

Various actions may be required by an implementation plan developed to reduce or remove the loading from the OWTS to the affected water body. These may include actions ranging from inspection or regular monitoring to the installation of supplemental treatment if it is determined that the OWTS is contributing to the pollution of an impaired water body for nitrates or pathogens.

Tier 4

Tier 4 requires the replacement of failing OWTS or other corrective action. The means of compliance will depend upon which tier the replacement OWTS will be constructed under.

The cost of compliance for OWTS owners will depend upon which tier a new or replaced OTWS will be covered under, the type of system, and the capacity of the system. Tier 0 OWTS will have no new costs associated with the proposed policy. Repairs for Tier 4 OWTS will consist of potential costs of whatever is appropriate under Tiers 1, 2, or 3. Estimated costs for OWTS under Tiers 1, 2, and 3 have a significant range (Table 1-2). In addition, local agencies that choose to administer a Tier 2 local agency management program will likely incur additional costs to the extent that they need to revise their existing programs or practices. These local agency costs may be passed on to OWTS owners in the form of permit fees.

Table 1-2: Estimated Cost of Compliance.

	Tier 1	Tier 2	Tier 3
Home	$5,600-$10,000	$5,300-$26,000	$5,300- >$26,000
Restaurant	$12, 350-$62,000	$43,300-$186,000	$43,300- >$186,000
School	$63,300-$212,000	$63,300-$692,000	$63,300- >$692,000

2 Introduction

2.1 Purpose of This Document

The State Water Resources Control Board (State Water Board) proposes to adopt a Policy for siting, design, operation and management of on-site wastewater treatment systems (Policy). The proposed Policy focuses on measures to protect water quality, with a particular emphasis on certain water bodies that are impaired with nitrogen and pathogens. In general, implementation of the Policy will protect the environment by ensuring that regulation of on-site wastewater treatment systems (OWTS) is administered in a manner that protects water quality. This document provides information regarding the potentially significant environmental effects of implementing the proposed Policy to the extent that those effects are reasonably foreseeable.

2.2 Statutory Basis for the Policy

Water Code section 13290 *et seq*., which was added by Assembly Bill 885,[1] requires the State Water Board to develop statewide standards or regulations for permitting and operation of OWTS in consultation with the California Department of Public Health (DPH), California Conference of Directors of Environmental Health (CCDEH), California Coastal Commission (CCC), counties, cities, and other interested parties. The standards adopted must address the following categories of OWTS:

1) those that are constructed or replaced;
2) those that are subject to a major repair;
3) those that pool or discharge waste to the surface of the ground; and
4) those that have affected, or will affect, groundwater or surface water to a degree that makes it unfit for drinking water or other uses, or cause a health or other public nuisance condition.

Water Code section 13290 *et seq.,* further requires the Policy to include, at a minimum, the seven types of requirements listed below (often referred to as the "seven points"):

a) Minimum operating requirements that may include siting, construction, and performance requirements.
b) Requirements for OWTS near waters listed as impaired under Section 303(d) of the Clean Water Act.
c) Requirements authorizing local agency implementation.
d) Corrective action requirements.
e) Minimum monitoring requirements.
f) Exemption criteria.
g) Requirements for determining when an existing OWTS is subject to major repair.

Water Code section 13290 *et seq.* also requires the regional water boards to incorporate the new statewide Policy into their basin plans. Neither the legislation nor the proposed

[1] Stats. 2000, ch. 781, § 1.

OWTS Policy preempt the regional water boards or any local agency from adopting or retaining performance requirements for OWTS that are more protective of public health or the environment than the new statewide Policy; however, if local agencies or regional water boards retain or adopt requirements that are more protective, certain conditions would apply. These conditions are described in the Policy and are further described in section 3.

2.3 CEQA Application

2.3.1 Basic Purposes of CEQA

When proposing to undertake or approve a discretionary project, state agencies must comply with the procedural and substantive requirements of the California Environmental Quality Act (CEQA)[2]. The State CEQA Guidelines[3] establish procedures to be followed by state and local public agencies in analyzing and disclosing the environmental consequences of activities that an agency proposes to carry out or approve. CEQA applies to discretionary projects that may cause a direct or indirect physical change in the environment. As described in the CEQA Guidelines (§ 15002, subd. (a)), the basic purposes of CEQA are to:

1) Inform governmental decision makers and the public about the potential, significant environmental effects of proposed activities.
2) Identify ways that environmental damage can be avoided or significantly reduced.
3) Prevent significant, avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures when the governmental agency finds the changes to be feasible.
4) Disclose to the public the reasons why a governmental agency approved the project in the manner the agency chose if significant environmental effects are involved.

2.3.2 Requirements for Certified Programs

State regulatory programs that meet certain environmental standards and are certified by the Secretary of the Natural Resources Agency are exempt from CEQA requirements for the preparation of environmental impact reports (EIR), negative declarations, and initial studies (Pub. Resources Code, § 21080.5). The CEQA Guidelines (§ 15251) describe certified state regulatory programs. Certified regulatory programs include the Water Quality Control (Basin)/208 Planning Program[4] of the State Water Resources Control Board and the Regional Water Quality Control Boards (§ 15251, subd. (g)). The Secretary has concluded that the certified program extends to the State Water Board's program for water quality control planning, including policies and procedures for the

[2] California Public Resources Code, section 21000 *et seq*.
[3] California Code of Regulations, title 14, section 15000 *et seq*. (Unless otherwise noted, further references to the CEQA Guidelines refer to title 14 of the California Code of Regulations.)
[4] The 208 Planning Program is a comprehensive regional water quality management plan designed to remedy water pollution derived primarily from non-point sources. The 208 Planning Program is based on regulations set forth in Section 208 of the Clean Water Act.

development and adoption of plans.[5] Accordingly, the adoption of this OWTS Policy, which is a policy for water quality control, is exempt from the CEQA requirement to prepare an EIR.

Agencies qualifying for such exemptions must still comply with CEQA goals and requirements, including the requirement to avoid significant adverse effects on the environment where feasible (§ 15250). Agencies must also evaluate environmental effects, including cumulative effects, consult with other agencies, allow public review, respond to comments on the draft environmental document, adopt CEQA findings, and provide for mitigation monitoring and reporting, as appropriate.

The CEQA Guidelines provide for the use of a "substitute document" by state agencies with certified programs (§ 15252). The document is a substitute for an EIR (or negative declaration) and is required to include at least the following:

1) A description of the proposed activity, and
2) Either:
    a. Alternatives to the activity and mitigation measures to avoid or reduce any significant or potentially significant effects that the project might have on the environment, or
    b. A statement that the agency's review of the project showed that the project would not have any significant or potentially significant effects on the environment and therefore no alternatives or mitigation measures are proposed to avoid or reduce any significant effects on the environment. This statement shall be supported by a checklist or other documentation to show the possible effects that the agency examined in reaching this conclusion.

Furthermore, the California Code of Regulations, title 23, section 3777, subdivision (a), requires the preparation of a Substitute Environmental Document (SED) for the adoption or approval of any water quality control plan or state policy for water quality control. Accordingly, the State Water Board has prepared this SED *in lieu* of an EIR or other environmental document for the adoption of a state policy for water quality control. This SED was prepared in accordance with the State Water Board's regulations for its certified regulatory programs, commencing with California Code of Regulations, title 23, section 3775.

2.3.3 Scoping and Environmental Checklist

The State Water Board has solicited comments from interested persons and governmental agencies regarding the scope and content of the environmental information to be included in the substitute environmental document. On April 4, 2011, the State Water Board submitted a Notice of Availability of Scoping Document and Notice of Public Scoping Meetings for California Environmental Quality Act Substitute Environmental Documentation (Notice) to the State Clearinghouse, Governor's Office of Planning and Research. A scoping document, which included an Environmental Checklist based on

[5] Memorandum dated September 7, 1989, from Christine Sproul, Assistant Secretary, Legal Affairs, Resources Agency to Andrew H. Sawyer, Assistant Chief Counsel, State Water Resources Control Board.

appendix G of the CEQA Guidelines, was made available to interested parties on the State Water Board's website. The Notice was circulated to members of the public, government agencies, and other interested persons.
Two scoping meeting were held; one was in Sacramento on May 2, 2011, and the other was in Riverside on May 5, 2011. The purpose of the meetings was to explain the proposed project and provide related information to resource agency personnel and the interested public and to invite them to submit written comments concerning the range of actions, Policy alternatives, mitigation measures, and significant effects that should be analyzed in the substitute environmental document[6].

The scoping period ended on May 19, 2011. A total of 66 public responses were received. Some were received in both written form and verbal form, while some (12) were received only in verbal form at scoping meetings. Comments were received from 21 federal, state and local agencies and elected representatives, 23 nongovernmental organizations and special-interest groups, and 22 individuals.

2.4 Potential Effects Not Analyzed In Detail

The Scoping Document describes the general nature of the proposed project's impacts in each of the environmental issue areas. The proposed project does not change the ordinances or regulations now being implemented by local agencies for review and approval of land use, including siting of residences. Typical review processes for such decisions may include approval of an environmental document (categorical exemptions, negative declaration or EIR) that identifies, when relevant, required mitigation measures to address significant environmental impacts and the accompanying mitigation monitoring and reporting plan, approval of a development project that includes conditions of approval, and standard best management practices for construction and storm water treatment. At the site-specific level, local agencies typically enforce local ordinances relating to siting requirements and site inspections, setbacks, and construction practices. Because the proposed Policy is not expected to significantly affect the way in which local agencies address individual OWTS projects, implementing the proposed project either would have no impact or would have a less-than-significant impact on the following environmental issue areas: Agricultural and Forest Resources, Air Quality, Noise, Public Service, Recreation, and Traffic.

Although the Environmental Checklist included in the Scoping Document does not identify any significant or potentially significant impacts to aesthetics or cultural resources, based on comments received during the scoping process, these issues are addressed further in this document (see section 6 Environmental Impact Analysis).

2.4.1 Agricultural and Forest Resources

Following implementation of the proposed project, more OWTS with supplemental treatment components could be installed on a wide variety of soil types throughout the

[6] A PowerPoint presentation delivered at the scoping meetings is posted on the State Water Board's website for OWTS at http://www.waterboards.ca.gov/water_issues/programs/owts/index.shtml. Also available on this website are the Notice, the Scoping Document, Frequently Asked Questions, and a Fact Sheet on the proposed Policy.

state, including areas that could be categorized under the Farmland Mapping and Monitoring Program as Prime Farmland, Unique Farmland, or Farmland of Statewide Importance. However, the proposed project would not be expected to increase the number of OWTS that would be placed on farmland, nor would it meaningfully (if at all) alter the amount of farmland converted to OWTS-related uses. The same is true for forest land. Therefore, the potential impacts of the proposed project on such farmland and forest land are considered less than significant.

Implementation of the proposed project would not affect zoning designations established by local land use jurisdictions. The proposed Policy does not address the types of land uses for which OWTS are appropriate; rather, it establishes consistent standards for the functioning (i.e., construction, operation, and maintenance) of treatment systems in whatever locations the local agency or regional water board chooses to approve them. Under existing conditions, most jurisdictions allow OWTS in conjunction with residences in agricultural areas, including properties with Williamson Act contracts; this situation would not change under the proposed Policy. Therefore, the project would have no impact on agricultural zoning or Williamson Act contracts.

2.4.2 Air Quality

The operation of OWTS does not generate criteria pollutants specific to air quality. For these reasons, implementing the proposed project would not affect applicable air quality plans, violate any air quality standard or contribute substantially to an existing or projected air quality violation, result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in nonattainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors), or expose sensitive receptors to substantial pollutant concentrations. The proposed Policy also contains specific requirements for maintenance and repair of faulty systems. Odors could occur for brief periods in areas immediately surrounding OWTS when septic tank cleanout operations are in progress, but this condition is present under existing conditions. This impact is considered less than significant.

2.4.3 Noise

Operation and maintenance of OWTS are not typically noise-producing activities. OWTS with supplemental treatment components may include mechanical components that produce a low level of noise during operation. Because OWTS are generally installed near residences and small commercial enterprises, the sound levels produced by the system are designed to be minimal. Maintenance activities, such as pumping of septic tanks, could involve higher levels of noise disturbance, but these activities are temporary and occur only periodically (in the case of pumping, once every few years). Similarly, operation and maintenance of OWTS would generate only minimal groundborne vibration or noise levels. For these reasons, the proposed project is considered to have a less-than-significant noise impact.

In addition, installation, operation, and maintenance of OWTS under the proposed project would not involve any activities that could specifically expose people residing or working near an airport to excessive noise levels. No impact would result.

2.4.4 Public Service

OWTS are privately-owned facilities operated by individual homeowners or small businesses. These systems do not require fire or police protection, educational services, or recreational services to construct, operate, or maintain. Thus, no impacts would occur related to these types of services.

2.4.5 Recreation

Installation of OWTS generally occurs in rural areas as part of new home or small business construction. In general, OWTS are designed for the purpose of treating domestic wastewater but are occasionally constructed in connection with developed recreational facilities. The proposed Policy would not be expected to increase the pattern or frequency of this use of septic systems. For this reason, implementing the proposed project would have no impact on the use of recreational facilities.

2.4.6 Traffic

OWTS are generally installed in rural areas where traffic loads are relatively light; in nearly all circumstances, urban areas are served by municipal wastewater treatment plants, rather than by OWTS. Construction activities associated with installation of a system with supplemental treatment components would generally include use of a backhoe, a dump truck, and possibly one additional piece of construction equipment operating for less than 1 week. Operation and maintenance activities would include an increase in septic tank inspections and perhaps pumping, but related vehicle trips would occur infrequently and on roads where traffic loads are relatively light. For these reasons, the proposed project would have a less than significant impact on traffic conditions. In addition, installation of OWTS would have no impact on air traffic patterns.

All OWTS are subject to local codes, and most local codes do not allow OWTS to be installed directly adjacent to a roadway. Accordingly, implementing the proposed project would have no impact on traffic hazards beyond that taking place under existing conditions. Therefore, the proposed project would likely not affect traffic hazards through introduction of a hazardous design feature or incompatible uses.

Because the proposed project would not be expected to increase the number of OWTS installed over time, OWTS-related traffic patterns or emergency access to either the site of a treatment system or surrounding areas would likely not be affected.

As stated above, OWTS-related construction and maintenance activities could increase slightly with implementation of the proposed project, but these activities would involve a minimal number of workers in rural areas for brief periods. This potential impact would be less than significant.

For the reasons described above, and because alternative transportation systems are typically found in more urbanized areas than those where OWTS are typically found, implementation of the proposed project would likely have no impact on alternative transportation systems.

3 Project Description

This section describes the proposed on-site wastewater treatment system (OWTS) Policy. It also provides an overview of the objectives of the proposed Policy and the legal background that requires adoption of statewide standards for OWTS.

3.1 Legal Requirements for the Proposed Project

The current practice of regulating OWTS has led to inconsistencies among the various regional water boards and among the numerous local agencies in California's 58 counties. For example, although most counties have some type of minimum performance requirements as well as siting and design requirements specifically for OWTS, exemption criteria, corrective actions, and repair and replacement requirements vary greatly from one jurisdiction to another. In fact, California is one of only two states that does not have statewide OWTS standards.

The inconsistency in regional and local OWTS requirements and related lack of statewide standards, along with public health and environmental issues associated with OWTS, were the primary motivation for AB 885, introduced by Assemblymember Hannah Beth Jackson in February 1999 and passed by the California Legislature and signed into law by Governor Gray Davis in September 2000. The State Water Board proposes to adopt both a state policy for water quality control pursuant to Water Code section 13142 and a statewide conditional waiver of WDRs pursuant to Water Code section 13269 that implements the standards contained in the proposed Policy.

Section 13291 of the Water Code provides specific direction from the legislature to the State Water Board to provide statewide minimum requirements related to the permitting and operation of OWTS. Typically, regional water boards have adopted minimum requirements for OWTS in their water quality control plans (basin plans) and have worked with local agencies (counties, cities, and special districts) through a formal or informal agreement. When a regional water board and local agency enter into such an agreement, the local agency commits to implement basin plan requirements for OWTS at the local level.

Based on the requirements of Water Code Sections 13290 – 13291.7, and the intent of the state legislature in passing the legislation, and in the context of other state laws related to wastewater discharge and water quality, the State Water Board intends to adopt a statewide Policy for permitting and operation of on-site wastewater treatment systems (OWTS). The proposed Policy shall contain the following:

1) Requirements for the following types of on-site wastewater treatment systems in the state:
    - New systems,
    - Replaced systems,
    - Systems subject to major repair,
    - Systems that pool or discharge to the surface, and/or

- Systems that, in the judgment of regional boards or authorized local agencies, discharge waste that has the reasonable potential to cause a violation of water quality objectives, or to impair present or future beneficial uses of water, to cause pollution, nuisance, or contamination of the waters of the state.

2) Standards for permitting and operation of OWTS that are consistent with provisions of the Porter-Cologne Water Quality Control Act and related state water quality control plans and policies.

3) A statewide conditional waiver for OWTS to comply with Section 13269 of the California Water Code.

3.2 Project Objectives

Based on the requirements of Water Code Section 13291 and the intent of the state legislature in passing the legislation, and in the context of other state laws relating to wastewater discharge and water quality, the State Water Board has identified the following objectives for the proposed project:

- As required by AB 885, adopt statewide OWTS standards and a statewide conditional waiver that are consistent with other provisions of the Porter-Cologne Water Quality Control Act and related state water quality control plans and policies adopted by the State Water Board.

- Help to ensure that public health and beneficial uses of the state's waters are protected from OWTS effluent discharges.

- Establish an effective implementation process that considers economic costs, practical considerations for implementation, and technological capabilities existing at the time of implementation.

3.3 Project Details

The proposed Policy is organized into implementation Tiers. Each Tier is applicable to a specific situation as described below. Regardless of which Tier an OWTS is regulated under and how the local governmental entity prefers to operate a program under that Tier, in no case is an OWTS allowed to discharge wastewater or effluent to the ground surface and/or to cause or contribute to an exceedance of water quality objectives in surface water or a groundwater well, or otherwise cause a condition of nuisance or pollution.

3.3.1 Tier Zero (Exempt Existing OWTS)

Tier Zero is intended to address existing OWTS that are functioning as designed. Existing OWTS are automatically included in Tier Zero as long as a Regional Water Board or local agency has not determined that:

a) the OWTS is near a specifically identified surface water that is polluted due to pathogens or nitrogen compounds,

b) the OWTS has affected, or will affect, groundwater or surface water to a degree that makes it unfit for drinking or other uses, or is causing a human health or other public nuisance condition, or
c) the OWTS must undergo a major repair to address surfacing effluent or the failure of a septic tank's structural integrity.

Provided none of the above criteria exist, OWTS in Tier Zero are exempt from any siting or design requirements under the proposed Policy. However, a local agency or Regional Water Board may adopt requirements for existing OWTS that are outside the scope of the proposed Policy. If a local agency has previously imposed requirements as conditions of permitting an OWTS, those requirements are not superseded by this policy and must continue to be met.

3.3.2 Tier One (Low Risk New or Replacement OWTS)

Tier One is intended to apply to new and replaced OWTS in local agency jurisdictions where the local agency has determined that it does not want to administer a Tier Two local agency management program . New and replaced OWTS in such jurisdictions would be included in Tier One automatically as long as they meet the following criteria:

1) A Regional Water Board or local agency has not determined that:
   a) the OWTS is near a specifically identified surface water that is polluted due to pathogens or nitrogen compounds,
   b) the OWTS has affected, or will affect, groundwater or surface water to a degree that makes it unfit for drinking or other uses, or is causing a human health or other nuisance condition, or
   c) the OWTS must undergo a major repair to address surfacing effluent or the failure of a septic tank's structural integrity, and

2) A qualified professional determines that specific Tier One site and design standards are met, including:
   a) the percolation must be adequate and not too fast or too slow,
   b) specific horizontal setbacks contained in section 7.5 of the proposed Policy are met,
   c) the ground slope doesn't exceed 25%,
   d) the OWTS is properly designed for the specific location and wastewater characteristics,
   e) the native soil depth to groundwater is greater than 5 feet and are as specified in Table 1 of the proposed Policy,
   f) the dispersal system has at least 12 inches of soil cover to protect against surfacing effluent,
   g) the average density for any subdivision property occurring after the effective date of the Policy is less than 1 dwelling units (single-family residence) per 2.5 acres,
   h) application rates are as specified in Table 2 or Table 3 of the proposed Policy,
   i) the septic tank meets specified design and performance standards per the California Plumbing Code.

3.3.3 Tier Two (Local Agency OWTS Management Program)

Tier Two is intended for new and replaced OWTS in local agency jurisdictions where the local agency is administering an approved Tier Two Local Agency Management Program. It is expected that most local agencies will administer such programs. Tier Two offers an alternative to compliance with the Tier One requirements, and is especially useful in areas that are potentially problematic for siting a new or replaced OWTS. This Tier is implemented by local government and supported by enforceable local ordinances and covenants. New and replaced OWTS are included in Tier Two as long as they meet the following eligibility criteria:

1) a Regional Water Board or local agency has not determined that:
   a) the OWTS is near a specifically identified surface water that is polluted due to pathogens or nitrogen compounds,
   b) the OWTS has affected, or will affect, groundwater or surface water to a degree that makes it unfit for drinking or other uses, or is causing a human health or other nuisance condition, or
   c) the OWTS must undergo a major repair to address surfacing effluent or the failure of a septic tank's structural integrity, and

2) The OWTS meets the requirements of an approved Tier Two local agency management program.

3.3.4 Tier Three (Impaired Areas)

OWTS are included in Tier Three if they are located near specifically identified (in Attachment 2 of the Policy) surface water bodies that are impaired by nitrogen compounds or pathogens. All impaired surface water bodies require a total maximum daily load (TMDL) with restrictions on the sources of pollution to correct the impairment. The water bodies that are specifically identified in Attachment 2 of the Policy are those water bodies for which regional water board staff believe, using their professional judgment and based on currently available information, that (1) existing OWTS are sources of pathogens or nitrogen compounds and therefore will receive loading reductions in the TMDL, and (2) it is likely that new OWTS discharging within 600 feet of the water bodies would contribute to the impairment. The list of water bodies in Attachment 2 of the Policy is subject to updating over time based on additional information. Existing OWTS in Tier 3 are not subject to any additional requirements under the Policy, except to the extent that a TMDL or local agency management program imposes additional requirements for that watershed. (Any such watershed-specific requirements in the local agency management program are referred to in the Policy as "special provisions.") New or replaced OWTS in Tier 3 also have to comply with any applicable TMDL or local agency management program's special provisions. If there is no TMDL or special provisions, then new and replaced OWTS that discharge within 600 feet of the water body are required to install supplemental treatment.

3.3.5 Tier Four (OWTS Requiring Corrective Action)

OWTS that require corrective action or are failing or fail at any time during the life of the Policy would be included automatically in Tier Four. This would include any OWTS that has pooling effluent or that discharges effluent to ground surface. Such an OWTS are no longer meeting its primary purpose to protect public health and the environment and require major repair, such as replacement or modification, to return to proper function and comply with Tiers One, Two, or Three, as appropriate. In addition to the above stated conditions that will place an OWTS into this Tier, additional problems that would place an OWTS in this Tier include:

a) OWTS tank failure, such as a baffle failure or tank structural integrity failure such that either wastewater is exfiltrating or groundwater is infiltrating, or
b) any OWTS that has affected, or will affect, groundwater or surface water to a degree that makes it unfit for drinking or other uses, or is causing a human health or other public nuisance condition.

If not able to comply with corrective action requirements, the owner of the OWTS may be required to submit a report of waste discharge to the appropriate Regional Water Board. In addition, in some cases, a local agency may authorize corrective action that does not strictly comply with the requirements of the local agency management program. In all cases, owners of OWTS must comply with the time schedule of any corrective action notice received from a local agency or Regional Water Board.

4 Environmental Setting

California contains a wide variety of bioregions, from desert environments below sea level, to coastal areas, to alpine areas of 14,000 feet or more in elevation. The diversity of geography colliding with temperature and moisture leads to a significant diversity of biological resources. California has the highest total number of species and the highest number of endemic species within its borders than any other state. California also has the highest number of rare species (species typically listed under the federal Endangered Species Act [ESA] or the California ESA), and about one-third of those species are at risk, meaning these species have the potential for local or global extinction.

4.1 Bioregions of California

California is divided geographically into bioregions (CBC 2008), classified by relatively large areas of land or water, which contain characteristic, geographically distinct assemblages of natural communities and species. The biodiversity of flora, fauna, and ecosystems that characterize a bioregion tend to be distinct from that of other bioregions. California is divided into 10 bioregions: Modoc, Klamath/North Coast, Sacramento Valley, Bay Area/Delta, Sierra, San Joaquin Valley, Central Coast, Mojave Desert, South Coast, and Colorado Desert (Figure 1).

4.1.1 Modoc Bioregion (CERES 2011a)

The Modoc Bioregion, an area of stark contrast to the rest of the state, extends across California's northeast corner from Oregon to Nevada, and south to the southern border of Lassen County. From many vantage points, the view to the west is of forests and mountains, while the vista to the east is high desert characteristic of Nevada. Much of this sparsely populated bioregion of forests, mountains, high desert, valleys, piney woodlands, and volcanic remains in its natural state.

<u>Location, People, Cities</u>

Bounded by Oregon on the north and Nevada on the east, the Modoc bioregion extends westward across the Modoc Plateau, encompassing the Lassen and Modoc national forests. It includes all or part of seven counties: Modoc, and Lassen, and the eastern end of Shasta, Siskiyou and Tehama, northern edges of Butte and Plumas. Because bioregions have only fuzzy lines and can take in portions of several counties, it is difficult to estimate their populations precisely. But the rural nature of the Modoc Bioregion is reflected in the populations of the two counties totally contained within its boundaries: Modoc, 10,700, and Lassen, 29,800. According to 1990 census figures, Modoc has the smallest population of all 10 bioregions, with fewer than 81,000. The largest cities are Alturas, the Modoc County seat; Susanville, the Lassen County seat; Burney in eastern Shasta County, and Maglia in northern Butte County.

The Northern Paiute and the Paiute-Shoshone tribes are native to this bioregion. Indian reservations include Fort Bidwell, Alturas, Cedarville, Likely, and Lookout Rancherias; and Pit River, all in Modoc County.

Main highways are U.S. Highway 395 and state routes 299, 139, 89, 44, and 36.

Figure 1: California Bioregions

Industries
Ranching remains the major agricultural industry, and timber is a significantly large employer.

Climate and Geography
The climate features hot, dry summers and cold, moist winters with snow at higher elevations. Geography is varied in the Modoc Bioregion, with volcanic areas and wetlands to the west and high desert to the east. Lassen Volcanic National Park, which is studded with lakes and crowned by 10,457-foot Lassen Peak; Tule Lake, and Clear Lake National Wildlife Refuges, Ahjumawi Lava Springs State Park, and Lava Beds National Monument are on the western side. The eastern side, which resembles its neighbor, Nevada, has desert alkali lakes, Honey Lake Valley, and Modoc National Wildlife Refuge. The last volcanic activity at Mount Lassen was in 1915.

The bioregion includes Modoc and Lassen National Forests and part of the Klamath National Forest. The largest lakes are Lake Almanor in Plumas County, Eagle Lake in Lassen County, Lower Klamath Lake in Siskiyou County, and Goose Lake in Modoc County. The Pit River flows southwest from the rugged Warner Mountains in eastern Modoc and Lassen counties across the Modoc Plateau and into the Sacramento River.

Plants and Wildlife
Juniper and sagebrush cover much of the eastern side of the Modoc Bioregion, while yellow and Jeffrey pine, white fir, mixed conifer, cedar, and aspen are common in the more mountainous and forested areas to the west. Rare plants include yellow arrowleaf, balsam root, long-haired star tulip, spiny milkwort, Ash Creek ivesia, Raven's lomatium, and woolly stenotus.

Wildlife include bald eagles, antelope, greater sandhill cranes, ospreys, Canada geese, black-crowned night herons, mule deer, muskrats, pronghorn, cinnamon teal, northern pintails, Swainson's hawks, sage grouse, rainbow trout, marmots, hummingbirds, great horned owls, black bears, coyotes, porcupine, Modoc sucker, goshawk, bank swallow, Shasta crayfish, sage grouse, and Lost River sucker.

4.1.2 Klamath/North Coast Bioregion (CERES 2011b)

The Klamath/North Coast Bioregion in California's northwestern corner extends roughly one-quarter of the way down the 1,100-mile coast and east across the Coastal Range and into the Cascades. This bioregion is famous for its rocky coastline, salmon fishing, and lush mountain forests of spectacular ancient redwoods and Douglas fir. Redwood National Park and numerous state parks, rivers, wilderness areas, and four national forests are in this bioregion.

Location, Cities, People
Ten counties make up the Klamath/North Coast Bioregion: Del Norte, most of Siskiyou, Humboldt, Trinity, Mendocino, Lake, and the northwestern portions of Shasta, Tehama, Colusa, and Glenn. Its boundaries are the Oregon border on the north, and the southern borders of Lake and Mendocino counties on the south. Despite the huge area of this

bioregion, its population is only about 410,000 according to 1990 census figures. The bioregion extends from the Pacific Coast eastward more than halfway across California to the Modoc Plateau and the Sacramento Valley floor. The Hoopa Valley, Yurok, Karok, Paiute-Shoshone, and Pomo-Kato Indians are native to various parts of this bioregion.

The largest cities are Redding -- a Northern California crossroad on Interstate 5 -- and Eureka, a Humboldt County seaport. Smaller cities include Clearlake, Ukiah, Arcata, Fort Bragg, Yreka, Mendocino, and Crescent City. Main highways are I-5, U.S. 101, and state Highways 36, 299, 96, and 3, which cross mountains and can be steep and winding.

Industries

Along the coast, redwood trees hundreds or thousands of years old are a cherished natural resource and major tourist attraction. These forests are home to the endangered marbled murrelet, a seabird that nests in old-growth, and the threatened northern spotted owl, whose decline prompted severe reductions in federal timber harvest sales to preserve its habitat. Listing of the owl under the federal Endangered Species Act and other 1990s environmental actions caused economic impacts upon the once-booming timber industry, such as forcing closure of many sawmills and dislocation of workers. Communities once dependent on timber activities are being forced to diversify their economies, and are encouraging the growth of tourism, improving infrastructure, and seeking ways to attract and accommodate new businesses. Cattle ranching, dairy farming, and fishing are popular traditional industries of the bioregion.

Climate and Geography

Much of the Klamath/North Coast Bioregion is covered by forest -- the Klamath, Shasta-Trinity, Six Rivers, and Mendocino National Forests, Jackson State Forest, and private forests, including the famous Headwaters ancient redwood forest in Humboldt County. This mountainous bioregion includes the North Coast Range and the Klamath, Siskiyou, Marble, Salmon, Trinity, and Cascade mountains. The Klamath/North Coast is the state's wettest climate, with rainfall distribution varying widely from an average annual 38 inches at Fort Bragg to 80 or more inches in the King Range National Conservation Area. The coastal climate is cool, moist, and often foggy, with rainy winters at lower elevations and snow in the higher mountains. Inland the climate is drier with low rainfall in winter and hot, dry summers.

Major rivers include the Eel, Trinity, Klamath, Russian, Smith, Salmon, Scott, Mad, and Mattole, which flows into the Pacific Ocean near seismically active Cape Mendocino. Clear Lake, Whiskeytown Lake, Clair Engle, and the western part of Shasta are the largest lakes in the bioregion.

Plants and Wildlife

Vegetation includes mixed conifer habitat of white fir, Douglas fir, ponderosa pine, Sierra lodgepole pine, incense cedar, sugar pine, red pine, Jeffrey pine, mountain hemlock, knobcone pine, western red cedar, red alder, redwood, tanoak, Pacific madrone, and chaparral. Rare plants include Sebastopol meadowfoam, Burke's goldfields, Humboldt Bay owl's clover, Calistoga ceanothus, Baker's navarretia, coast lily, swamp harebell, Tracy's sanicle, Snow Mountain willowherb, marsh checkerbloom, pale yellow stonecrop, Scott Mountain phacelia, McDonald's rock cress, Klamath Mountain buckwheat, Oregon fireweed, Adobe lily, dimorphic snapdragon, Colusa layia, Indian Valley brodiaea, and Stebbins' lewisia.

Wetlands provide places for resting, nesting, feeding and breeding for native and migrating birds and waterfowl. Wildlife in the bioregion includes deer, fox, black bear, mountain lion, California clapper rail, Aleutian Canada geese, Roosevelt elk, osprey, fisher, bank swallow, Coho salmon, king salmon, otis blue butterfly, bald eagle, Point Arena mountain beaver, Swainson's hawk, willow flycatcher, western sandpiper, and Oregon silverspot butterfly. Rare species include northern spotted owl, marbled murrelet, American peregrine falcon, Lotis blue butterfly, Trinity bristle snail, red-legged frog, Siskiyou Mountains salamander, Pacific fisher, Del Norte salamander, Karok Indian snail, wolverine, goshawk, and Chinook salmon.

4.1.3 Sacramento Valley Bioregion (CERES 2011c)

The Sacramento Valley Bioregion, a watershed of the Sierra Nevada, is rich in agriculture, but is also significant as the seat of California's state government. Lying halfway between the Pacific Ocean and the Sierra Nevada, the Sacramento Valley affords convenient travel time to San Francisco and Lake Tahoe. The bioregion encompasses the northern end of the great Central Valley, stretching from Redding to the southeast corner of Sacramento County. Its southern boundary borders the northern edge of the Sacramento-San Joaquin River Delta. Sacramento, the home of California's state Capitol, sits at the confluence of the Sacramento and American Rivers.

<u>Location, Cities, People</u>
The broad, flat valley that comprises this bioregion touches nine counties, including all of Sutter, most of Sacramento, and Yolo, and portions of Butte, Colusa, Glenn, Placer, Shasta, Tehama, and Yuba counties. Sacramento, with a population of about 400,000, is the bioregion's largest city and ranks seventh in the state behind Fresno, Long Beach, San Francisco, San Jose, San Diego, and Los Angeles. Other large cities, all smaller than Sacramento, include Redding, Chico, Davis, West Sacramento, and Roseville. More than 1.5 million people inhabit this bioregion, making it the fourth most populous of the 10 bioregions, based on 1990 census figures. The cultural roots of the region date from Native American inhabitants, such as the Wintun Indians, to 19th century settlers who established and worked the farms and ranches.

Two of the state's major interstate highways, I-5, the state's main north-south artery, and transcontinental I-80, intersect in Sacramento. Other main highways include U.S. Highway 50, and State Highways 99, 44, 113, 70, and 20.

<u>Industries</u>
Agriculture and state government are important industries in the Sacramento Valley bioregion, but only three of the counties -- Sutter, Yolo, and Colusa -- rank among California's top 20 agricultural producers. Still, the valley is known for tomatoes, rice, and olives, among other prominent crops produced in the plentiful fields and orchards.

Food canneries, high-technology, and biotechnology play a significant role. The bioregion once had a substantial military presence with three Air Force bases, but downsizing changed the picture, closing Mather, then adding McClellan to the closure list, but sparing Beale. Shipping is important in the port of West Sacramento.

Climate and Geography

The changing of the seasons is more evident in the Sacramento Valley than in the coastal regions to the west. Summer hot spells that drive daytime temperatures into triple digits are relieved by cooling "Delta breezes" that carry moist air from San Francisco Bay eastward through the Delta and into the Sacramento area. The brief, mild autumn ends when tule fog blankets the valley for much of the winter season from December into February, keeping temperatures chilled. Except during droughts, rainfall is frequent in winter, but snowfall is unusual because temperatures, particularly in the daytime, normally remain well above freezing.

The Sacramento Valley is flat for the most part, but is situated within view of mountains, which are particularly visible on clear days. To the west, the coastal range foothills loom on the horizon, while the snow-capped peaks of the Sierra Nevada can be seen to the east.

The valley's two major rivers -- the Sacramento and American -- carry water that originates in the Sierra Nevada south and west into the Sacramento-San Joaquin River Delta. The Delta supplies water to about two-thirds of California's 32 million residents. Other rivers include the Cosumnes -- the largest free-flowing river in the Central Valley -- the lower Feather, Bear, and Yuba Rivers.

Plants and Wildlife

Oak woodlands, riparian forests, vernal pools, freshwater marshes, and grasslands provide the major natural vegetation of the Sacramento Valley Bioregion. The Sacramento Valley is the most prominent wintering site for waterfowl, attracting more than 1.5 million ducks and 750,000 geese to its seasonal marshes along the Pacific Flyway. Species include northern pintails, snow geese, tundra swans, sandhill cranes, mallards, grebes, peregrine falcons, heron, egrets, and hawks. Black-tailed deer, coyotes, river otters, muskrats, beavers, ospreys, bald eagles, salmon, steelhead, and swallowtail butterflies are just some of the wildlife that abounds in this bioregion. Species on the endangered species list include the winter-run Chinook salmon, delta smelt, giant garter snake, and the western yellow-billed cuckoo.

4.1.4 Bay Area/Delta Bioregion (CERES 2011d)

The Bay Area/Delta Bioregion is one of the most populous, encompassing the San Francisco Bay Area and the Sacramento-San Joaquin River Delta. Environmentally, the bioregion is the focus of debate over conflicting demands for the water that flows through the Delta, supplying two-thirds of California's drinking water, irrigating farmland, and sustaining fish and wildlife and their habitat. Under a historic accord in 1994, competing interests initiated a process for working together to "fix" the Delta.

Location, Cities, People

The bioregion fans out from San Francisco Bay in a jagged semi-circle that takes in all or part of 12 counties, including the state's top six in family income: Marin, Contra Costa, Santa Clara, Alameda, Solano, San Mateo, as well as the counties of San Francisco, Sonoma, Napa, San Joaquin, and parts of Sacramento, and Yolo. Major cities include San Francisco, Santa Rosa, Oakland, Berkeley, Vallejo, Concord, and San Jose. Though of moderate size, the Bay-Delta Bioregion is the second most populous bioregion, next to the South Coast, with 6.6 million people, based on the 1990 census.

The Bay Area/Delta Bioregion extends from the Pacific Ocean to the Sacramento Valley and San Joaquin Valley bioregions to the northeast and southeast, and a short stretch of the eastern boundary joins the Sierra Bioregion at Amador and Calaveras counties. The bioregion is bounded by the Klamath/North Coast on the north and the Central Coast Bioregion to the south.

Major highways are Interstate 80, which concludes its transcontinental journey in San Francisco, I-280, I-580 and I-680, U.S. 101. State highways include 1, 12, 24, 29, 84, 92, 113, 116, 121, and 128.

Industries

Prominent industries of this bioregion include banking, high-technology and biotechnology, wine-making, fishing, shipping, oil refining, dairy farming, beer brewing, and fruit ranching. The Pacific coastal area of this bioregion features Point Reyes National Seashore, John Muir Woods National Monument, Golden Gate National Recreation Area, and numerous state parks and state beaches.

Climate and Geography

The temperatures in this Mediterranean climate don't vary much year-around. The coast experiences relatively cool, often foggy summers, mild falls, and chilly, rainy winters. Further inland, hot dry summers and warm autumns are followed by mild, wet winters. Snowfall is rare. The bioregion is mostly hilly with low coastal mountains and several peaks rising above 3,000 feet, including Mt. Diablo at 3,849 feet, in a state park. Coastal prairie provides grazing for wild and domestic animals, including dairy cattle.

The bioregion is named for its two major watersheds, San Francisco Bay and the Delta. Major rivers include the Russian, Gualala, Napa, Petaluma, and Alameda, and Putah Creeks. A network of reservoirs and canals comprise the State Water Project delivery system. Lake Berryessa in Napa County is the largest lake.

Plants and Wildlife

The habitats and vegetation of the Bay Area/Delta Bioregion are as varied as the geography. Coastal prairie scrub, mixed hardwoods and valley oaks are found among the rolling hills and mountains that descend to the ocean. Redwoods abound in Santa Cruz County. Coastal salt marsh lies around San Francisco Bay, and freshwater marshes are found in the Delta. Eucalyptus, manzanita, northern coastal scrub, California buttercups, goldfields, and Tiberon mariposa lily also are popular in the bioregion. Rare plants include Marin western flax, Baker's manzanita, Point Reyes checkerbloom, and Sonoma sunshine. Salt and freshwater marshes provide pickleweed, great bulrush, saltbush, and cattail.

Wetlands in the Bay-Delta -- brackish and freshwater -- furnish resting, nesting, feeding and breeding places for birds and waterfowl along the Pacific Flyway. These marshes, rich in biodiversity, are popular and necessary wintering spots for migrating birds.

Birds include canvasback, western grebe, black-crowned night heron, great egret, snowy egret, California brown pelican, white pelican, gull, acorn woodpecker, golden eagle, western bluebird, Caspian tern, American avocet, and cedar waxwing. Marine life includes Chinook salmon, harbor seal, sea lion, leopard shark, and bat ray. Other wildlife includes grey fox, mule deer, bobcat, raccoon, Pacific tree frog, and the swallowtail and painted lady butterfly.

Endangered species include the California least tern, California black rail and clapper rail, Smith's blue butterfly, salt marsh harvest mouse, California freshwater shrimp, northwestern pond turtle, and tidewater goby.

4.1.5 Sierra Bioregion (CERES 2011e)

The Sierra Bioregion is a vast and rugged mountainous area extending some 380 miles along California's eastern side and largely contiguous with Nevada. Named for the Sierra Nevada mountain range it encompasses, the Sierra Bioregion includes magnificent forests, lakes, and rivers that generate much of the state's water supply. It shares Lake Tahoe with Nevada and features eight national forests, three national parks -- Yosemite, Kings Canyon and Sequoia -- numerous state parks, historical sites, wilderness, special recreation and national scenic areas, and mountain peaks, including 14,495-foot Mt. Whitney.

<u>Location, Cities, People</u>
Eighteen counties, or their eastern portions, comprise the Sierra Bioregion: Alpine, Amador, Butte, Calaveras, El Dorado, Fresno, Inyo, Kern, Madera, Mariposa, Mono, Nevada, Placer, Plumas, Sierra, Tulare, Tuolumne, and Yuba. The bioregion extends from the northern edge of the Plumas National Forest south to Tejon Pass in the Tehachapi Mountains about 30 miles southeast of Bakersfield. The northern half of the Sierra Bioregion is bordered by the Nevada state line to the east and the Sacramento Valley floor to the west. The southern half of the Sierra extends westward from the Nevada state line and the western edge of the Bureau of Land Management's California Desert Conservation Area to the San Joaquin Valley floor. California's historic Mother Lode region of 19th century Gold Rush fame is in the Sierra Bioregion.

Scattered throughout the mountains are small cities such as Truckee, Placerville, Quincy, Auburn, South Lake Tahoe, and Bishop. The Sierra Nevada Ecosystem Project (SNEP) fixed the Sierra population at 650,000, which is consistent with 1990 census figures.

Major routes for vehicular traffic are Interstate 80, U.S. Highways 50 and 395, and state highways 4, 49, 70, 88, 89, 108, 120, and 178. Some mountain roads at higher elevations are closed in winter because of snow, and highways frequently require chains or snow tires for travel.

Industries

High tech has emerged as a significant industry in the Sierra, introducing satellite, on-line, and computer software companies and stimulating entrepreneurial small businesses. This growing segment of the economy joins staples such as hydropower, tourism and recreation. Other industries include logging, cattle ranching, and -- in the northern Sierra foothills -- apple orchards and wineries.

Climate and Geography

The climate varies with the elevation, offering cold snowy winters and cool summers at higher elevations and rainy winters and mild summers in the foothills. Summers are dry. Snowy winters in the northern Sierra are crucial to California's water supply, which depends heavily upon spring snowmelt to feed the reservoirs of the State Water Project and a portion of the federal Central Valley Project. The projects supply about two-thirds of California's water for drinking, irrigation, and industrial use. Snowfall also is welcomed by the ski industry and a myriad of other businesses that serve and supply skiers. Mild dry mountain summers accommodate outdoor sports and activities, but when high pressure areas push temperatures upward and gusty winds blow, California is vulnerable to wildfires that consume thousands of acres of brush and timber every year.

National forests of the Sierra Bioregion are the Plumas, Tahoe, Sierra, Eldorado, Stanislaus, Sequoia, Inyo, and Toiyabe. Major rivers include the American, Feather, Yuba, Cosumnes, Tuolumne, Merced, San Joaquin, Kern, Owens, Kings, Carson, Truckee, Walker, and Stanislaus. Mono Lake east of Yosemite is famous for its peculiar tufa formations rising from the lake bed.

Plants and Wildlife

The Sierra Bioregion is rich in biodiversity, containing over half the plant species found in California and more than 400 of the state's terrestrial wildlife species, or about two-thirds of the birds and mammals and half the reptiles and amphibians. The variety of habitat types include annual grassland, blue oak savannah, chaparral, ponderosa pine, black oak woodland, mixed conifer, red fir, riparian, alpine meadow, Jeffrey pine, sagebrush, and bitter brush.

Animals that inhabit the Sierra Bioregion include lodgepole chipmunk, mountain beaver, California mountain king snake, black bear, wolverine, California big horn sheep, Pacific fisher, mule deer, and mountain lion. The California Golden Trout -- the state fish -- is native to the Southern Sierra. Birds include the northern goshawk, mountain chickadee, pine grosbeak, California spotted owl, mountain quail, willow flycatcher, bald eagle, and great grey owl.

4.1.6 San Joaquin Valley Bioregion (CERES 2011f)

The San Joaquin Valley Bioregion in the heart of California is the state's top agricultural producing region. The bioregion is bordered on the west by the coastal mountain ranges. Its eastern boundary joins the southern two-thirds of the Sierra bioregion, which features Yosemite, Kings Canyon, and Sequoia National Parks.

<u>Location, Cities, People</u>

Eight counties comprise the San Joaquin Valley bioregion, including all of Kings County, most of Fresno, Kern, Merced, and Stanislaus counties, and portions of Madera, San Luis Obispo, and Tulare counties. This growing bioregion, the third most populous out of ten, has an estimated 2 million people, according to 1990 census data. The largest cities are Fresno, Bakersfield, Modesto, and Stockton. Some of California's poorest cities are in Fresno, Kern, and Tulare counties. At its northern end, the San Joaquin Valley bioregion borders the southern end of the Sacramento Valley bioregion. To the west, south, and east, the bioregion extends to the edges of the valley floor. Native people of the bioregion include the Mono and Yokut Indians. Native lands include the Tule River Indian Reservation in Tulare County, Cold Springs Rancheria, and Table Mountain and Big Sandy Reservations in Fresno County, and Santa Rosa Rancheria in Kings County.

Interstate 5 and State Highway 99 are the major north-south roads that run the entire length of the bioregion. Other main routes include State Highways 33, 41, 43, 65, 132, 140, 178, 180, and 198.

<u>Industries</u>

The San Joaquin Valley is California's leading agricultural producing bioregion, and five of its counties -- Fresno, Kern, Tulare, Merced, and Stanislaus-- rank among the state's top 10 counties in farm production value. Oil and gas also are important industries in the San Joaquin bioregion. The deepest wells and about half of the largest oil fields are found in Kern County, as is the Elkhorn Hills Naval Petroleum Reserve. Lemoore Naval Air Station west of Visalia also is in this bioregion.

<u>Climate and Geography</u>

Well-suited for farming, the bioregion is hot and dry in summer with long, sunny days. Winters are moist and often blanketed with heavy fog. The broad, flat valley is ringed by the Diablo and Coast Ranges on the west and the Sierra Nevada foothills on the east. Habitat includes vernal pools, valley sink scrub and saltbush, freshwater marsh, grasslands, arid plains, orchards, and oak savannah. The growth of agriculture in the Central Valley has converted much of the historic native grassland, woodland, and wetland to farmland.

The major river is the San Joaquin, with tributaries of the lower Stanislaus, Tuolumne, Merced, and Fresno rivers. The California Aqueduct extends the entire length of the bioregion. The southern portion of the bioregion includes the Kings, Kaweah, and Kern rivers, which drain into closed interior basins. No significant rivers or creeks drain into the valley from the Coast Range.

Plants and Wildlife
Historically, millions of acres of wetlands flourished in the bioregion, but stream diversions for irrigation dried all but about 5 percent. Precious remnants of this vanishing habitat are protected in the San Joaquin Valley bioregion in publicly owned parks, reserves, and wildlife areas. Seasonal wetlands are found at the Kern National Wildlife Refuge west of Delano, owned by the U.S. Fish and Wildlife Service. It attracts a variety of ducks, shorebirds, and song birds, as well as peregrine falcons.

The Tule Elk State Reserve west of Bakersfield, owned by the state Department of Parks and Recreation, features the habitat of the tule elk -- natural grassland with ponds and marshes. The reserve sustains four endangered species -- the San Joaquin kit fox, blunt-nosed leopard lizard, San Joaquin antelope squirrel, and Tipton kangaroo rat -- the threatened plant Hoover's woolystar, and other rare species, such as western pond turtles, tricolored blackbird, and northern harrier. Endangered species of the bioregion also include the California tiger salamander, Swainson's hawk, and giant and Fresno kangaroo rat. Other rare species include the western yellow-billed cuckoo and valley elderberry longhorn beetle.

About one-fifth of the state's remaining cottonwood and willow riparian forests are found along the Kern River in the South Fork Wildlife Area. Great blue herons, beavers, coyotes, black bears, mountain lions, red-shouldered hawks, and mule deer can be seen in the wildlife area. Other wildlife viewing sites are Millerton Lake State Recreation Area west of Madera, Little Panoche Wildlife Area near Los Banos, and the Valley Grasslands of Merced County, which attract 500,000 to 1 million birds each winter to lands owned by the state Departments of Fish and Game and Parks and Recreation, Fish and Wildlife Service, and privately. The San Luis Dam and Reservoir area, jointly operated by the state Department of Water Resources and U.S. Bureau of Reclamation, draws wintering bald eagles, abundant ducks, gopher snakes, San Joaquin kit foxes, and black-tailed deer.

Rare plants in the bioregion include Mason's lilaeopsis, San Joaquin woollythreads, and California hibiscus.

4.1.7 Central Coast Bioregion (CERES 1996)

The Central Coast Bioregion features coastal scenery, with a mild, seasonally moist, and sometimes foggy climate that favors rich farmland and vineyards. This highly agricultural region is famous for artichokes, garlic, and an array of fruits and vegetables. Other industries include wine-making, dairy, and cattle ranching. The coast supports a brisk fishing industry, and oil production along the southern end of the bioregion.

Industries
The bioregion extends some 300 miles from just north of Santa Cruz to just south of Santa Barbara, and inland to the floor of the San Joaquin Valley. It encompasses the counties of Santa Cruz, Monterey, San Benito, Santa Barbara, and portions of Los Angeles, San Luis Obispo, Fresno, Merced, Stanislaus, and Ventura. The region includes military installations Fort Ord, Camp Roberts, and Vandenburg Air Force Base. The geography offers coastal mountain ranges including the Santa Lucia and Santa Ynez, and

coastal sand dunes. Vegetation includes chaparral, mixed hardwood and redwood forests in the bioregion's northern coastal area, and oak woodlands. The Los Padres National Forest covers much of the southern portion of the bioregion. The Salinas and Cuyama rivers feed the bioregion's two major watersheds.

4.1.8 Mojave Desert Bioregion (CERES 2011g)

The Mojave Bioregion is one of California's largest bioregions and a desert showcase. The eastern boundary is contiguous with the borders of Nevada and Arizona. To the north and west, the Mojave borders the Sierra bioregion, and to the south, it is bounded by the South Coast and Colorado Desert bioregions.

<u>Location, Cities, People</u>
Seven counties make up the Mojave bioregion: nearly all of San Bernardino, most of Inyo, the southeastern tips of Mono and Tulare, the eastern end of Kern, northeastern desert area of Los Angeles, and a piece of northern-central Riverside County. The largest cities are Palmdale -- one of California's fastest-growing communities -- Victorville, Hesperia, Ridgecrest, and Barstow. The Mojave Bioregion, historically a sparsely populated expanse of desert, had nearly 612,000 people as of the 1990 census, but is growing rapidly, as urban congestion and housing costs push people farther into the open areas.

Native Americans lands in the Mojave bioregion include the Chemehuevi Indian Reservation on the Colorado River, Twentynine Palms Indian Reservation, Fort Mojave Indian Reservation, and Fort Mojave Trust Lands, which both straddle the California-Nevada border.

<u>Industries</u>
The Mojave bioregion is the home of three national parks -- Death Valley, East Mojave, and Joshua Tree -- under the National Park Service. The state Department of Parks and Recreation manages the Providence Mountains State Recreational Area near Goffs in eastern San Bernardino County, and the U.S. Fish and Wildlife Service operates Havasu National Wildlife Refuge on the Colorado River near Lake Havasu.

Military installations include Edwards Air Force Base in Kern, Los Angeles, and San Bernardino counties; Twentynine Palms Marine Corps Air Ground Combat Center, Fort Irwin Military Reservation, Inyokern Naval Ordnance Test Station, and China Lake U.S. Naval Ordnance Test Station in San Bernardino, Inyo, and the eastern end of Kern counties. Much of the desert is under the U.S. Bureau of Land Management, which manages the Desert Tortoise Natural Area northeast of Palmdale, and Harper Lake near Barstow. The BLM has created a multi-agency, multi-species plan for the desert that designates certain areas for habitat, multiple uses, and development. It is designed to conserve habitat, foster economic development, and streamline the permitting process for development.

Major highways in the bioregion are Interstates 15, 40, U.S. Highway 395, and State Highways 18, 58, 62, and 127, and 247.

Mining -- including lucrative gold mining -- is a major industry in the Mojave bioregion. Off-road vehicle riding is a popular sport in the desert, which offers many trails across the plains and through the scrub. Ranching and livestock grazing are significant economic interests in this bioregion.

Climate and Geography
The Mojave bioregion is the western extension of a vast desert that covers Southern Nevada, the southwestern tip of Utah, and 25 million acres of Southern California -- one quarter of the state. The climate is hot and dry in summer. Winters are cool to cold, depending on the elevation, with occasional rainstorms that can quickly turn a gulch or dry lake into a flash flood zone.

The landscape is mostly moderately high plateau with elevations averaging 2,000 to 3,000 feet and isolated peaks that exceed 6,000 and 7,000 feet. Though appearing barren and remote, the desert teems with biodiversity, and more than 90 percent is within three miles of a paved road or off-road vehicle track.

Palm oases provide water for wildlife, as do many streams and springs. In prehistoric times, the bioregion contained great desert lakes, which have long since evaporated and seeped underground. This bioregion has the lowest elevation in North America, 282 feet below sea level in Death Valley National Park. The Mojave, Amargosa, and Colorado Rivers are the largest rivers in this mostly arid bioregion.

Plants and Wildlife
Common habitats of the Mojave bioregion are: desert wash, Mojave creosote bush, scattered desert saltbush, Joshua tree scrub, alkali scrub, palm oasis, juniper-pinyon woodland, and some hardwood and conifer forests at higher elevations. Cottonwood willow riparian forest is rare habitat in this bioregion, as is alkali marsh and open sandy dunes.

Rare animals include the Mohave ground squirrel, prairie falcon, Le Conte's thrasher, Nelson's bighorn sheep, gray vireo, desert tortoise, pale big-eared bat, Amargosa vole, and Mohave tui chub, an olive-brown and silver fish, and the cottontail marsh pupfish, found only in Death Valley National Park. Parks and recreation areas that provide water are the home of snowy plovers, least sandpipers, killdeer, white pelicans, teal, and thousands of migratory wading shore birds, as well as eagles, harriers, falcons, owls, coyotes, badgers, great blue herons, least Bell's vireos, red-tailed hawks, and Canada geese.

Rare plants include white bear poppy, Barstow woolly sunflower, alkali mariposa lily, Red Rock poppy, Mojave monkeyflower, and Stephen's beardtongue.

4.1.9 Colorado Desert Bioregion (CERES 2011h)

The Colorado Desert Bioregion in the southeastern corner of California extends from the Mexican border north to San Bernardino County and the southern edge of the Joshua

Tree National Park, east to the Colorado River and Arizona, and west into Riverside and San Diego counties. This agriculturally rich bioregion is semi arid, but heavily irrigated.

Location, Cities, People

With a population of about 375,000, according to 1990 census figures, the Colorado Desert is the second least populous of the ten bioregions. Only the Modoc Bioregion has fewer people. The bioregion encompasses all of Imperial County, the southeastern portion of Riverside County, the eastern end of San Bernardino County, and the eastern portion of San Diego County. Its most prominent cities are Palm Springs, Rancho Mirage, El Centro, and the smaller, but landmark communities of Blythe, Coachella, and Calexico. The bioregion is home to the Fort Yuma Indian Reservation in Imperial County and Arizona, the Colorado River Indian Reservation in Riverside County, and the Campo and Manzanita Indian Reservations in San Diego County. Imperial County has the state's lowest median family income.

Major highways are Interstate 10 in Riverside County, Interstate 8 in Imperial and San Diego counties, and State Highways 111 and 115 in Imperial County.

Industries

Picacho State Recreation Area on the Arizona border, operated by the state Department of Parks and Recreation, offers boat rides on the Colorado River from which can be seen migratory cormorants, mergansers, white pelicans, and wintering bald eagles. Trails into the rugged backcountry lead to the habitat of desert bighorn sheep, feral burros, golden eagles, and nesting prairie falcons.

The Salton Sea National Wildlife Refuge features open water, salt marshes, freshwater ponds, and desert scrub, which attract nearly 400 bird species, including great roadrunners, Gambel's quail, Albert's towhees, endangered Yuma clapper rails, egrets, plovers, northern pintails, Canada geese, snow geese, rough-legged hawks, peregrine falcon, terns, yellow-headed blackbirds, hooded orioles, and white-faced ibises. The refuge is operated by the state Departments of Fish and Game and Parks and Recreation, and the U.S. Fish and Wildlife Service.

Dos Palmas Preserve, near Indio, owned by the U.S. Bureau of Land Management, offers a lush desert oasis with a restored wetlands that accommodates endangered desert pupfish. The preserve attracts an array of wildlife, such as hooded orioles, warblers, snowy egrets, ospreys, American avocets, and horned lizards. The western fringe of the Imperial National Wildlife Refuge, located mostly in Arizona, is also in this bioregion.

Imperial County is one of California's top-ranking agricultural counties and a producer of cotton. Military installations include the Chocolate Mountains Naval Aerial Gunnery Range and the Naval Desert Test Range.

Climate and Geography

The Colorado Desert is the western extension of the Sonoran desert that covers southern Arizona and northwestern Mexico. It is a desert of much lower elevation than the

Mojave Desert to the north, and much of the land lies below 1,000 feet elevation. Mountain peaks rarely exceed 3,000 feet. Common habitat includes sandy desert, scrub, palm oasis, and desert wash. Summers are hot and dry, and winters are cool and moist.

The Colorado River flows along the entire eastern boundary of the Colorado Desert bioregion on its way to Yuma, Ariz., where the two states and Mexico come together. The only other river of significant size in this bioregion is the polluted New River, which flows from Mexico into the Salton Sea, the region's largest body of water, on the border of Imperial and Riverside counties. The Salton Sea was created in 1905 when the Colorado River broke through an irrigation project and flooded a saline lake bed, creating an inland sea, which now lies about 235 feet below sea level and is some 35 miles long and 15 miles wide.

Anza Borrego Desert State Park, located mostly in eastern San Diego County, but jutting into Imperial County, is the bioregion's largest recreation area, covering 600,000 acres. It offers more than 225 bird species and dozens of mammals, amphibians, and reptiles. Bighorn sheep can be seen there, as well as thrashers and owls.

Plants and Wildlife

Other species in the Colorado Desert are Yuma antelope ground squirrels, white-winged doves, muskrats, southern mule deer, coyotes, bobcats, and raccoons. Rare animals include desert pupfish, flat-tailed horned lizard, prairie falcon, Andrew's dune scarab beetle, Coachella Valley fringe-toed lizard, Le Conte's thrasher, black-tailed gnatcatcher, and California leaf-nosed bat.

Rare plants include Orcutt's woody aster, Orocopia sage, foxtail cactus, Coachella Valley milk vetch, and crown of thorns.

4.1.10 South Coast Bioregion (CERES 2011i)

The South Coast Bioregion is an area of starkly contrasting landscapes ranging from rugged coastal mountains, world-famous beaches, rustic canyons, rolling hills, and densely populated cities. The bioregion extends from the southern half of Ventura County to the Mexican Border and east to the edge of the Mojave Desert. Two of California's largest metropolitan areas -- Los Angeles and San Diego -- are in this bioregion.

Location, Cities, People

Bounded on the north by the southern end of the Los Padres National Forest, the bioregion extends some 200 miles south to Mexico, east to the Mojave Desert and west to the Pacific Ocean. The bioregion encompasses all or part of six counties: the coastal half of Ventura County, all of Orange County, most of Los Angeles County, the southwestern edge of San Bernardino County, the western end of Riverside County, and the western two-thirds of San Diego County. Major cities include Los Angeles, San Diego, Long Beach, Santa Ana, Anaheim, Riverside, and San Bernardino. The South Coast, home to two of the state's largest cities, is the most populous bioregion with more than 16.1 million people, according to 1990 census figures.

Metropolitan Los Angeles, a major transportation hub, is criss-crossed by a network of freeways that have names as well as numbers. For example, Interstate 5, California's main north-south highway, is known in different segments as the Golden State Freeway, the Santa Ana Freeway, and the San Diego Freeway. Other major routes are Interstates, 8, 10, 15, 110, 210, 405, 605, and 805, U.S. 101, and State Highways 1 (the Pacific Coast Highway), 57, 60, 74, 76, 78, 91, 118, and 126.

As in much of California, the people of the South Coast bioregion reflect the state's cultural history. The Native American population includes many bands of Mission Indians, and the Spanish and Mexican heritage is evident in architecture, geographic names, and a large Spanish-speaking population. Rapid growth, employment opportunity, and a mild, mostly dry climate has attracted immigrants from all over the world, particularly in metropolitan Los Angeles.

Industries

Major industries include oil, agriculture, fishing, shipping, movies and television, banking and finance, computers, and aerospace, which has declined with the ending of the Cold War. Military installations include Camp Pendleton Marine Corps Base, El Toro Marine Corps Air Station, March Air Force Base, Miramar Naval Air Station, North Island Naval Air Station, and Point Mugu Naval Pacific Missile Test Center.

Climate and Geography

The year-round mild climate and varied geographical features of the South Coast contribute to its great popularity. Hot dry summers with predictable wildfires are followed by wet winters with storms that can trigger mudslides on fire-denuded slopes. Smog remains a serious problem in the South Coast bioregion, particularly the Los Angeles basin, but air quality regulations have helped to control it.

The South Coast bioregion is a study in contrasts -- ocean and desert, flatlands and mountains, including 11,500-foot San Gorgonio Peak in Riverside County. Major rivers and their watersheds are: the Santa Clara, Los Angeles, Santa Ana, San Gabriel, San Luis Rey, San Jacinto, Santa Margarita, and San Diego. Publicly owned or managed lands include four national forests: the Angeles, Los Padres, Cleveland, and San Bernardino; numerous parks, state beaches, historic parks; and federal wilderness, recreation and wildlife areas, including Malibu Creek and Point Mugu State Parks, Bolsa Chica Ecological Reserve, Torrey Pines State Reserve, and Sweetwater and Tijuana National Wildlife Refuges. In San Diego, Orange and Riverside counties, the state's Natural Community Conservation Planning (NCCP) pilot program involving local, state, and federal partners is helping to protect the coastal sage scrub habitat of the threatened California gnatcatcher. In the Santa Monica Mountains, the National Park Service, Santa Monica Mountains Conservancy, and state Department of Parks and Recreation are helping to preserve spectacular habitat. In Ventura County, endangered California condors are protected at the Sespe Condor Sanctuary.

<u>Plants and Wildlife</u>
Tremendous urbanization in the South Coast bioregion has brought about the most intense effects on natural resources of any bioregion, resulting in alteration and destruction of habitat and proliferation of exotic or non-native species. In fact, the popular palm tree is not native to the Golden State. Habitat varies widely, from chaparral, juniper-pinyon woodland, and grasslands at lower elevations to mixed hardwood forest, southern oak, southern Jeffrey pine and southern yellow pine at higher levels. Along the coast, where real estate is especially prized, salt marshes and lagoons no longer are common habitat. But efforts are underway from Ventura County to the Mexican border to preserve and restore coastal wetlands.

The bioregion is home to mountain lions, coyotes, badgers, grey foxes, kit foxes, black bears, raccoons, mule deer, hawks, herons, golden eagles, ospreys, peregrine falcons, desert iguanas, dolphins, whales, endangered brown pelicans, and California sea lions. Rare animals include the Stephen's kangaroo rat, monarch butterfly, San Diego horned lizard, Peninsula desert bighorn sheep, orange-throated whiptail, California least tern, Belding's savannah sparrow, least Bell's vireo, Santa Ana sucker, arroyo southwestern toad and Tehachapi pocket mouse.

Rare plants include San Diego barrel cactus, Conejo buckwheat, Plummer's mariposa lily, mountain springs bush lupine, Otay tarplant, Laguna Mountains jewelflower, San Jacinto prickly phlox, and Mt. Gleason Indian paintbrush.

4.2 Hydrologic Regions of California

Hydrologists divide California into 10 hydrologic regions (CalWater 1999) (Figure 2). The regional water boards are defined (for the most part) by the boundaries of these hydrologic regions, as described in Water Code section 13200. Hydrologic regions are further divided into hydrologic units, hydrologic areas, and hydrologic subareas.

4.2.1 North Coast Hydrologic Region

The North Coast hydrologic region covers approximately 12.46 million acres (19,470 square miles) and encompasses the counties of Siskiyou, Del Norte, Trinity, Humboldt, Mendocino, Sonoma, and small areas of Marin. The region, extending from the Oregon border south to Tomales Bay, includes portions of four geomorphic provinces—the northern Coast Range, the Mad River drainage, the Klamath Mountains, and the coastal mountains. The majority of the population is located along the Pacific Coast and in the inland valleys north of the San Francisco Bay Area. The northern mountainous portion of the region is rural and sparsely populated, and most of the area is heavily forested. A majority of the surface water in the North Coast hydrologic region is committed to environmental uses because of the “wild and scenic” designation of most of the region’s rivers. Average annual precipitation in this hydrologic region ranges from 100 inches in the Smith River drainage to 29 inches in the Santa Rosa area.

Water bodies that provide municipal water include the Smith, Mad, and Russian Rivers. Areas providing agricultural water are more widespread than those for domestic, municipal and industrial use, as they occur in all of the hydrologic units within the region. Many of the smaller communities and rural areas are generally supplied by small local surface water and groundwater systems. Water recreation occurs in all hydrologic units on both fresh and salt water, attracting over 10 million people annually. Coastal areas receiving the greatest recreational use are the ocean beaches, the lower reaches of rivers draining to the ocean, and Humboldt and Bodega Bays. The Russian, Eel, Mad, Smith, Trinity, and Navarro Rivers and Redwood Creek provide the most freshwater recreational use.

Groundwater aquifers in the northeastern portion of the North Coast hydrologic region consist primarily of volcanic rock aquifers and some basin-fill aquifers. Coastal basin aquifers are predominantly found in the southern portion of this hydrologic region and along the northern coast. In general, though, a large percentage of this region is underlain by fractured hard rock zones that may contain localized sources of groundwater.

4.2.2 San Francisco Bay Hydrologic Region

The San Francisco Bay hydrologic region covers approximately 2.88 million acres (4,500 square miles) and encompasses the county and city of San Francisco and portions of Marin, Sonoma, Napa, Solano, San Mateo, Santa Clara, Contra Costa, and Alameda. Significant geographic features include the Santa Clara, Napa, Sonoma, Petaluma, Suisun-Fairfield, and Livermore valleys; the Marin and San Francisco peninsulas; San Francisco, Suisun, and San Pablo bays; and the Santa Cruz Mountains, Diablo Range, Bolinas Ridge, and Vaca Mountains of the Coast Range. Major rivers in this hydrologic region include the Napa and Petaluma, which drain to San Francisco Bay. Although this is the smallest hydrologic region in the state, it contains the second largest human population.

Coastal basin aquifers are the primary type of aquifer system in this region. They can be found along the perimeter of San Francisco Bay extending southeast into the Santa Clara Valley, as well as in the Livermore Valley. The northeastern portion of this region, which includes the eastern Sacramento–San Joaquin Delta, is underlain by a portion of the Central Valley aquifer system. The remaining areas in this region are underlain by fractured hard rock zones.

4.2.3 Central Coast Hydrologic Region

The Central Coast hydrologic region covers approximately 7.22 million acres (11,300 square miles) in central California, and includes all of Santa Cruz, Monterey, San Luis Obispo, and Santa Barbara Counties, most of San Benito County, and parts of San Mateo, Santa Clara, and Ventura Counties. Groundwater is the primary source of water in the region, accounting for approximately 75% of the annual supply. Most of the freshwater in this region is found in coastal basin aquifers, with localized sources of groundwater also occurring in fractured hard rock zones throughout the region.

4.2.4 South Coast Hydrologic Region

The South Coast hydrologic region includes all of Orange County; most of San Diego and Los Angeles Counties; parts of Riverside, San Bernardino, and Ventura Counties; and a small portion of Kern and Santa Barbara Counties. Because it is the most populous area of the state, it is divided into three water quality control regions. Region 4, Los Angeles, encompasses portions of Ventura and Los Angeles counties. Region 8, Riverside, encompasses portions of San Bernardino, Riverside, and Orange Counties. Region 9, San Diego, encompasses portions of Orange, Riverside, and San Bernardino Counties. Approximately half of California's population, or about 17 million people, live within the boundaries of the South Coast hydrologic region. This, combined with its comparatively small surface area of approximately 6.78 million acres (10,600 square miles) gives it the highest population density of any hydrologic region in California. Major population centers include the metropolitan areas surrounding Ventura, Los Angeles, San Diego, San Bernardino, Orange County, and Riverside. Water use efficiency measures and water recycling efforts play a significant role in addressing increasing water use from population growth.

Groundwater is what supplies approximately 23% of the region's water in normal years and about 29% in drought years. Like the Central Coast hydrologic region, the majority of aquifers in this region are coastal basin aquifers. In the eastern central portion of the region includes lies a small section of basin and range aquifer and the remainder of the region is comprises fractured hard rock zones.

4.2.5 Central Valley Hydrologic Region

The Central Valley hydrologic region is the largest in California, and encompasses the three subregions described below.

4.2.5.1 Sacramento River Hydrologic Subregion

The Sacramento River hydrologic subregion, which corresponds to roughly the northern third of the Central Valley Regional Board, covers 27,246 square miles and includes all or a portion of 20 predominately rural northern California counties. The subregion extends from the crest of the Sierra Nevada in the east to the summit of the Coast Range in the west, and from the Oregon border north downstream to the Sacramento–San Joaquin River Delta (Delta). It includes the entire drainage area of the Sacramento River, the largest river in California, and its tributaries.

Groundwater in the northern half of this hydrologic subregion is, for the most part, contained in volcanic rock aquifers and some basin-fill aquifers. The southwestern half of this subregion is underlain by part of the Central Valley aquifer system. The remaining areas that comprise the southeastern half of the subregion and portions of the northern half of the subregion are underlain by fractured hard rock zones. Surface water quality in this hydrologic subregion is generally good. Groundwater quality in the Sacramento River subregion is also generally good, although there are localized problems.

4.2.5.2 San Joaquin River Hydrologic Subregion

The San Joaquin River hydrologic subregion is bordered on the east by the Sierra Nevada and on the west by the coastal mountains of the Diablo Range, and extends from the southern boundaries of the Delta to the northern edge of the San Joaquin River in Madera. It consists of the drainage area of the San Joaquin River, which at approximately 300 miles long is one of California's longest rivers. The San Joaquin River hydrologic subregion, which corresponds to roughly the middle third of the Central Valley Regional Water Board, covers approximately 9.7 million acres (15,200 square miles). Roughly half of the Delta is within this hydrologic region, which extends south from just below the northeastern corner of Sacramento County and east to include the southern third of El Dorado County, almost all of Amador County, all of Calaveras, Mariposa, Madera, Merced, Stanislaus, and Tuolumne counties, the western slope of Alpine County, and the portions of the Delta in Contra Costa, Alameda, and San Joaquin Counties.

A portion of the Central Valley aquifer system underlies nearly all of the eastern half of this subregion, while the western half of this subregion consists of fractured hard rock zones. The groundwater quality throughout this hydrologic region is generally good and usable for most urban and agricultural uses, although localized problems occur.

4.2.5.3 Tulare Lake Hydrologic Subregion

The Tulare Lake hydrologic subregion is located in the southern end of the San Joaquin Valley, and includes all of Tulare and Kings Counties and most of Fresno and Kern Counties. Major cities include Fresno, Bakersfield, and Visalia. The region, which corresponds to approximately the southern third of the Central Valley Regional Water Board, covers approximately 10.9 million acres (17,000 square miles). A small area at the southern end of this region is underlain by basin and range aquifers, while a majority of the western half is underlain by a portion of the Central Valley aquifer system The eastern half, once again, consists of fractured hard rock zones.

4.2.6 Lahontan Hydrologic Region

The Lahontan hydrologic region encompasses two subregions: the North Lahontan, extending north from the Oregon border near Mono Lake on the east side of the Sierra, and the South Lahontan, extending south to the crest of the San Gabriel and San Bernardino mountains and the divide between watersheds draining south toward the Colorado River and those draining northward.

4.2.6.1 North Lahontan Hydrologic Subregion

The North Lahontan hydrologic subregion extends south from the Oregon border approximately 270 miles to the South Lahontan region. Extending east to the Nevada border, it consists of the western edge of the Great Basin, and water in the region drains eastward toward Nevada. Groundwater in the northern half of this subregion is primarily contained in basin-fill and volcanic rock aquifers, with some fractured hard rock zones. The southern half of this region is dominated by fractured hard rock zones, but small segments of basin and range aquifers also exist in this part of the subregion. The subregion, corresponding to approximately the northern half of the Lahontan Regional Water Board, covers approximately 3.91 million acres (6,110 square miles) and includes portions of Modoc, Lassen, Sierra, Nevada, Placer, El Dorado, Alpine, Mono, and Tuolumne Counties.

In general, the water quality in the North Lahontan hydrologic region is good. In basins in the northern portion of the region, groundwater quality is widely variable. The groundwater quality along these basin margins tends to be of higher quality, but the potential for future groundwater pollution exists in urban and suburban areas where single-family septic systems have been installed, especially in hard rock areas. Groundwater quality in the alpine basins ranges from good to excellent.

4.2.6.2 South Lahontan Hydrologic Subregion

The South Lahontan hydrologic subregion in eastern California, which includes approximately 21% of the state, covers approximately 21.2 million acres (33,100 square miles). This region contains both the highest (Mount Whitney) and lowest (Death Valley) surface elevations of the contiguous United States. It is bounded on the west by the crest of the Sierra Nevada and on the north by the watershed divide between Mono Lake and East Walker River drainages; on the east by Nevada and the south by the crest of the San Gabriel and San Bernardino mountains and the divide between watersheds draining south toward the Colorado River and those draining northward. The subregion includes all of Inyo County and parts of Mono, San Bernardino, Kern, and Los Angeles Counties.

This subregion contains numerous basin and range aquifers, separated by fractured hard rock zones. Although the quantity of surface water is limited in the South Lahontan hydrologic subregion, the quality is very good, being greatly influenced by snowmelt from the eastern Sierra Nevada. However at lower elevations, groundwater and surface water quality can be degraded, both naturally from geothermal activity, and as a result of human-induced activities. Drinking water standards are most often exceeded for TDS, fluoride, and boron content.

Groundwater near the edges of valleys generally contains lower TDS content than water beneath the central part of the valleys or near dry lakes.

4.2.7 Colorado River Hydrologic Region

The southeast portion of California consists of the Colorado River hydrologic region, which contains 12% of the state's land area. The Colorado River forms most of the region's eastern boundary except for a portion of Nevada at the northeast, and extends south to the Mexican border. The region includes all of Imperial County, approximately the eastern one-fourth of San Diego County, the eastern two-thirds of Riverside County, and the southeastern one-third of San Bernardino County. It includes a large portion of the Mojave Desert and has variable arid desert terrain that includes many bowl-shaped valleys, broad alluvial fans, sandy washes, and hills and mountains. Aquifers in this region are nearly all of the basin and range type.

4.3 Groundwater

Groundwater is water located beneath the ground surface in soil pore spaces and in the fractures of geologic formations. Groundwater is the largest single source of freshwater available for human use—domestic use, drinking water, agriculture, and industrial uses (USGS 1999). Since 1987, 82% of water supply wells in California that were newly constructed, reconditioned, or deepened, were drilled for individual domestic uses (DWR 1998).

The uppermost portion of the earth's crust can be divided into the unsaturated zone and the saturated zone. The unsaturated zone is where available spaces between soil pores are filled with air, other gases, and some water and where the water that is present adheres to the surfaces of the sediment grains and cannot be easily extracted (Bachman *et al.* 2005). Farther down is the saturated zone where all available spaces are filled with water (e.g., aquifers). This is where available groundwater lies.

4.3.1 Unconfined versus Confined Groundwater

Aquifers are typically saturated zones (soils fully inundated by water) that provide an economically feasible quantity of water to a well or spring. The two ends of the spectrum of aquifer types are confined and unconfined. Unconfined aquifers are sometimes also called water table aquifers because their upper boundary is the water table. Typically (but not always) the shallowest aquifer at a given location is unconfined, meaning it does not have an impermeable confining layer acting as a lid (an aquitard or an aquiclude, with extremely low permeability) between it and the surface. Unconfined aquifers usually recharge (i.e., receive water to replace the water that is removed or flows out) either directly from the ground surface as runoff held by lakes, creeks, and streams that infiltrates into the aquifer or through precipitation that infiltrates directly through the soil.

In an unconfined aquifer, water that infiltrates directly from the surface can transport contaminants with it. Concentrations of some contaminants may be reduced by the soil to some extent depending on how porous the soil is and the nature of the contaminant. Where the soil is sandy or porous, water flows more quickly below the surface and fewer contaminants are removed before reaching groundwater.

Confined aquifers are typically found below unconfined aquifers, separated by an aquitard or aquiclude (barrier). Under natural conditions in a confined aquifer, the layers of minimally permeable or impermeable clay or rock above and below the aquifer protect the water from contact with some surface contaminants and somewhat restrict the water's movement. The recharge area for a confined aquifer, where surface water (and associated contaminants) infiltrates the land and resupplies the aquifer, may be miles from a well that draws water from it. Wells, however, can cause cross contamination by short-circuiting the natural flow pathway and by introducing surface contaminants into deeper groundwater.

The term "perched" refers to groundwater accumulating above a low-permeability unit or strata, such as a clay layer. This term is generally used to refer to a small local area of groundwater that collects at an elevation higher than a regionally extensive aquifer. The difference between perched and unconfined aquifers is their size; a perched aquifer is smaller and more locally contained whereas an unconfined aquifer more broadly underlies a larger area.

4.3.2 Unconsolidated Alluvium versus Fractured Hard Rock

In non-mountainous areas (or near rivers in mountainous areas), the main aquifers are typically unconsolidated alluvium—loose gravel, sand, and silt with pore spaces between the grains. These aquifers are typically composed of mostly horizontal layers of materials deposited by water processes (rivers and streams), which in cross-section appear to be layers of alternating coarse and fine materials. Coarser soil materials, because of the high energy needed to move them, tend to be found nearer their source (mountain fronts or rivers), while fine-grained soil material can travel farther from the source (to the flatter parts of the basin or overbank areas). Because coarse soils are located closer to the source, aquifers in these areas are often unconfined or may break through to the land surface (usually in springs or riverbeds).

In mountainous and hilly areas, the main water-bearing features are typically fractured hard rock formations. A thin layer of sediments, soil, or weathered rock frequently covers the hard rock formations. Cracks or fractures typically form in hard rock and are the result of different types of stress on the rock (i.e., folding, fault movement, weathering, heating, cooling). Fractures may be large or small and may run vertically or horizontally. They may be a few millimeters to hundreds of meters long and range in width from less than a millimeter to several centimeters. In carbonate rocks (limestone and dolomite) the fractures may be enlarged into caverns when the rock is dissolved by water. Most fractures are found in the upper few hundred feet of rock, although deep fractures are common. The width of fractures tends to diminish with depth.

Groundwater can percolate through the thin layer of soil and enter cracks or fractures of hard rocks, such as granite, greenstone, and basalt. The water does not actually penetrate the rocks because no pore space is present between the grains of the rock. However, some of these rocks have fractures in them that can store and transmit water over large distances and yield water to wells. The amount of groundwater that may be yielded to wells that intersect the fractures depends on the size and location of the fractures, the interconnection of the fractures, and the amount of collected soil material that may fill the fractures. Water can also be stored in lava tubes in volcanic rock and in solution openings in carbonate rocks. Some sedimentary rocks, like sandstone, are hard but can still absorb some water into their pores. These rocks may also have fractures that contain water.

4.3.3 Groundwater Aquifers in California

California has five major aquifers or aquifer systems (Figure 2) and large areas that do not represent principal aquifers but that may contain locally important groundwater sources (Figure 2, areas in gray) (Planert and Williams 1995). Although four of the aquifers consist of basin-fill deposits (unconsolidated or semiconsolidated alluvium), the characteristics of these deposits vary, depending on differences in geology, physiography, and climate. Below is a general description of each of the major aquifers in California.

4.3.3.1 Basin and Range Aquifers

The basin and range aquifers in California contain two principal aquifer types: basin-fill aquifers and carbonate-rock aquifers. These aquifers underlie parts of eastern and southern California, including the White and Inyo Mountains, the Owens Valley, Mono Lake, Death Valley, and the Mojave and Colorado Desert regions. The most permeable basin-fill deposits are present in depressions created by block faulting and originate from alluvial-fan, lake-bed, or fluvial (river-formed) deposits. The carbonate-rock aquifers underlie alluvial basins and occur in carbonate rock that is highly fractured and locally brecciated (i.e., contains angular fragments of older rocks cemented together).

4.3.3.2 Central Valley Aquifer System

The Sacramento and San Joaquin Valleys compose the Central Valley, which is a basin comprising thousands of feet of sedimentary deposits. The Central Valley aquifer system, which underlies the Central Valley, is the largest basin-fill aquifer system in California. It is a single heterogeneous aquifer system formed primarily of sand and gravel with large amounts of fine-grained materials, such as silt and clay, occurring in beds and lenses scattered vertically and horizontally throughout the system. Water in the upper few hundred feet of this aquifer system is typically unconfined. With increasing depth, the numerous overlapping lens-shaped clay beds result in increasing confinement of groundwater.

4.3.3.3 Coastal Basin Aquifers

The California coastal region is characterized by mountain ranges and intermontane valleys that formed as a result of folding, faulting of marine sediments, and associated vulcanism. The terrestrial, marine, and volcanic rocks deposited in the intermontane valleys compose the Coastal Basin aquifers. These aquifers consist of continental deposits of sand and gravel that, in some cases, are interbedded with confining units of fine-grained material, such as silt and clay. Natural movement of water in these aquifers is generally parallel to the long axis of the basin because of impermeable rocks that commonly form a barrier between the basin and the sea. However, in a few coastal basins the coastal barrier is absent and the natural direction of flow is perpendicular to the long axis of the basin, from the inland mountains to the sea.

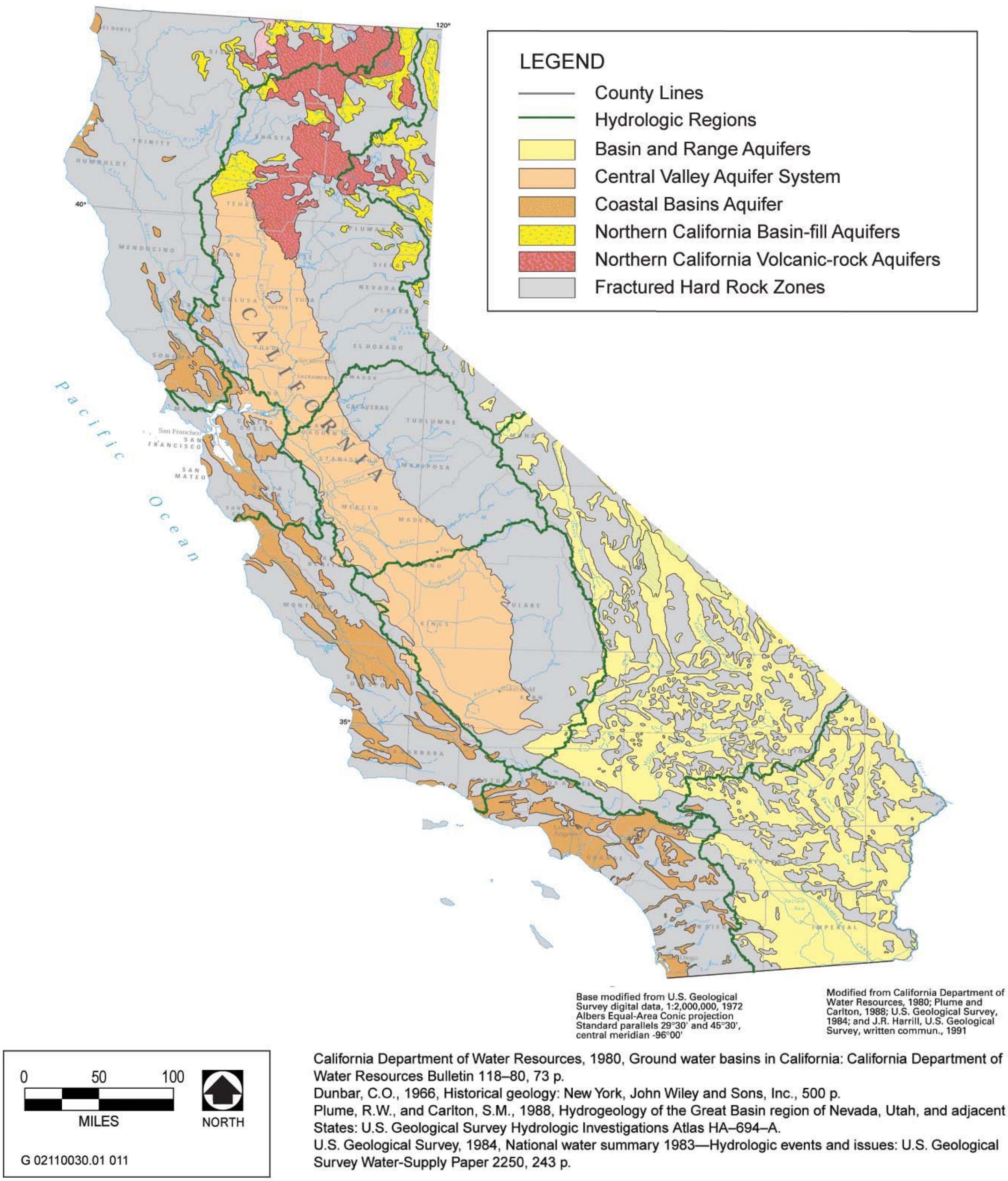

Figure 2: California Hydrologic Regions and Aquifers

4.3.3.4 Northern California Basin-Fill Aquifers

The northern California basin-fill aquifers comprise an assemblage of intermontane valley aquifers in unconsolidated alluvium that have similar hydrogeologic characteristics. These valleys are located mostly in the Cascade Mountains, the northern Sierra Nevada, and the Modoc Plateau. Groundwater in these valleys is contained mostly in alluvial-fan and lake deposits that fill the basins and may be under unconfined or confined conditions depending on the depth and the amount of fine-grained materials present.

4.3.3.5 Northern California Volcanic-Rock Aquifers

The northern California volcanic-rock aquifers are located in the Modoc Plateau and the Cascade Mountains in volcanic terranes. These aquifers are not distinct, identifiable aquifers because they contain water in fractures, volcanic pipes, tuff beds, rubble zones, and interbedded sand layers.

4.3.3.6 Fractured Hard Rock Zones

The remaining areas in California are areas that lack sufficient basin-fill sediments or permeable consolidated rock. Although these areas do not represent principal aquifers, they frequently have localized sources of groundwater that may provide water to individual wells. One-quarter of all public supply wells are in these areas.

4.4 Soils

The relative effectiveness of the OWTS dispersal system in the treatment and removal of contaminants, especially pathogens, is dependent on the complex physical, chemical, and biochemical characteristics of the soil and the characteristics of the OWTS wastewater contaminants. Various properties of soil play a role in the transformation, retention, and degradation of contaminants in OWTS effluent after the effluent enters the soil through the dispersal field. An understanding of these soil properties is necessary to understand the mechanisms involved in the environmental fate and transport of OWTS pollutants of concern.

As contaminants flow downward and laterally through the soil, they may be changed through a variety of processes (e.g., filtered, absorbed, volatilized, neutralized, adsorbed, hydrolyzed, attenuated, reduced/oxidized). They may be broken down by aerobic, facultative, and anaerobic organisms, which may include organisms such as bacteria, fungi, protozoa, algae, and earthworms, all of which reduce the organic content of effluent through their metabolic processes.

Soil is complex and variable, and its effectiveness at attenuating contaminants from OWTS effluent is determined by many factors, including depth to groundwater, soil type, soil chemistry, soil texture, soil structure and depth, moisture, and activity in the aerobic vegetative root zone where chemical and organic substances are taken up or broken down. Specific soil conditions, such as oxygen content, pH, salinity, temperature, and moisture affect the community of soil microorganisms that are essential for breaking down and decomposing OWTS effluent.

4.4.1 Soil Properties

4.4.1.1 Oxidation-Reduction Potential

Oxygen content of the soil will affect the soil's ability to remove additional contaminants before the treated effluent reaches groundwater. Oxidation-reduction potential, or "redox" potential is closely related to oxygen concentration. Low oxygen concentrations usually lower the redox potential, and higher concentrations raise it. Redox potential is the tendency of a chemical compound or substance to acquire electrons and thereby be reduced. In solution with water, the reduction potential of a chemical compound is the tendency of the substance to either gain or lose electrons when it is subject to the introduction of a new compound. A solution with a higher reduction potential will have a tendency to gain electrons from other compounds (i.e., oxidize them) and a solution with a lower reduction potential will have a tendency to lose electrons to other compounds (i.e., reduce them).

4.4.1.2 Redoximorphic Features

Redoximorphic features include iron nodules and mottles that form in seasonally saturated soils by the reduction, translocation, and oxidation of iron and manganese oxides (USEPA 2002). The presence of one or more of these features in the soil indicates that the surrounding soil is periodically or continuously saturated and has been anaerobic for a period of time. Saturated soils prevent reaeration of the vadose zone below dispersal fields and reduce the hydraulic gradients necessary for adequate drainage, which can lead to surfacing effluent. Therefore, OWTS siting where soil shows redoximorphic features may indicate a high water table and potential for wastewater to surface during high rainfall or OWTS failure.

On the other hand, the absence of redoximorphic features is not an indication that the soil has not been saturated. Redoximorphic features in soil largely result from oxidation-reduction reactions that are biochemically mediated and therefore do not occur in soils with low amounts of organic carbon, high pH (more than 7 standard pH units), low soil temperatures, or low amounts of iron, or where the groundwater is aerated.

4.4.1.3 Soil pH

The pH scale is a measure of the acidity or alkalinity of a solution in terms of its relative concentration of hydrogen ions. The pH scale ranges from 0 to 14, with pH 7 (the hydrogen ion concentration in pure water) being neutral. Most soils are in the range between pH 3 and pH 10. Acidic conditions involve a pH less than 7; alkaline conditions involve a pH greater than 7.

Complexation (the process of binding or stabilizing metallic ions by means of creating an inert compound) by organic matter in natural waters and wastewater systems occurs when an organic chemical binds to a receptor, and this process is affected by the pH of the solution (Manahan 1994). Acidic conditions can reduce the sorption of metals in soils, leading to increased risk of metals entering groundwater.

4.4.1.4 Cation Exchange Capacity

Because the amount of naturally occurring organic matter in the soil below the infiltrative surface is typically low (USEPA 2002), the cation exchange capacity (CEC) of the soil and the soil solution pH control the mobility of metals below the infiltrative surface. The CEC represents the number of cations that can be adsorbed to a unit mass of soil and is normally expressed as milliequivalents per 100 grams dry soil. In general, soils with higher clay content and more organic matter have higher CEC values and so more cations per unit mass will attach to the soil molecules, resulting in a higher degree of metals retention from effluent (Table 4-1).

Table 4-1: Cation Exchange Capacity for Different Soil Textures

Soil Texture	CEC (milliequivalents per 100 grams of soil)
Sands (light colored)	3-5
Sands (dark colored)	10-20
Loams	10-15
Silt loams	15-25
Clay and clay loams	20-50
Organic soils	50-100

Source: WSU 2004

4.4.1.5 Soil Texture and Structure

Soil texture describes the relative proportion of different mineral particle grain sizes in a soil. Coarse-textured soils contain a large proportion of sand, medium textures are dominated by silt, and fine textures are primarily clay. The soil texture consists primarily of sand, silt, and clay particles of less than 2 millimeters in diameter, and the proportion and size of each constituent affect the soil's filtration capacity and permeability (Figure 3). Soil structure is defined by the way individual particles of sand, silt, and clay are assembled. Single particles when assembled appear as larger particles. These are called aggregates. Aggregation of soil particles can occur in different patterns, resulting in different soil structures. Soil texture and structure play an important role in the formation of micro- and macropores respectively, and along with other chemical, biological and physical components of the soil, they affect the porosity of the soil, and thus, the flow and residence time of water in the soil.

The infiltration or percolation rate, measured as hydraulic conductivity (k), is the rate at which water flows through a soil horizon (Table 4-2). High porosity soils typically have larger pores and as a result give rise to fast-draining soils that can accommodate a higher application rate of OWTS effluent to the dispersal field than slow-draining soils. However, fast-draining soils often have less treatment capacity because the physical, chemical, and biochemical processes of contaminant attenuation within the vadose zone have less time to work on contaminants in the effluent, especially pathogens. A coarse soil of sand particles mixed with rock, for instance, is not well suited for filtering contaminants from effluent because wastewater moves quickly through the large pore spaces created by the large particle sizes without adequate retention time for remediation by all of the chemical, biological, and physical processes that may reduce some effluent contaminants. An extreme example of this circumstance would be a case where most of the soil mantle is fractured rock. Here, little if any treatment is likely as the water flows rapidly through the soil mantle until it contacts groundwater. Slower draining soils provide more time for the chemical, biological, and physical processes to attenuate contaminants, but require lower application rates per unit area. Therefore, a fine-grained soil with a moderate percentage of silts and clays is more suitable for filtering as it slows the flow of the wastewater, allowing chemical, biological, and physical processes more time to act on the effluent. An extreme example of this case would be expansive, fine-grained clay. Although it filters contaminants from effluent extremely well, it does not allow the effluent to move very rapidly through the soil, which in more extreme instances leads to ponding, eventual failure of the dispersal field, and surfacing effluent.

Table 4-2: Porosity and hydraulic Conductivity for Representative Substrate Types

Material	Porosity (%)	Hydraulic Conductivity (K), cm/sec
Unconsolidated Deposits		
Gravel	25–35	1–100
Sand	30–45	10^{-4}–10^{-1}
Silt	35–45	10^{-6}–10^{-4}
Clay	40–55	10^{-9}–10^{-6}
Rocks		
Karst limestone	15–40	10^{-4}–10^{-1}
Limestone, nonkarst	5–15	10^{-6}–10^{-4}
Sandstone	10–25	10^{-7}–10^{-4}
Shale	0–10	10^{-11}–10^{-7}
Crystalline rock (fractured)	1–10	10^{-6}–10^{-4}
Crystalline rock (unfractured)	0–2	10^{-11}–10^{-9}

Note: Porosity is the ratio of pore volume to total volume
Hydraulic conductivity is the rate of flow in centimeters per second (cm/sec) per unit time per unit cross-sectional area. 1 cm/sec equals 23.62 inches per minute.
Source: Adapted from Schnoor 1996.

4.4.1.6 Biomat Formation

In an ideal system, a biomat forms at the wastewater-soil interface, or infiltrative surface. This layer of biological growth and inorganic matter may extend as far as 1 inch into the soil matrix. It provides physical, chemical, and biological treatment of the OWTS effluent as effluent migrates toward groundwater. The density and composition of the biomat also controls the rate at which wastewater can move through the infiltrative zone of coarse to medium-textured soils into the vadose zone (see below for more information on the vadose zone). Biomats may not exercise the same degree of control in fine-textured soils, as these soils may be more restrictive to flow than the biomat.

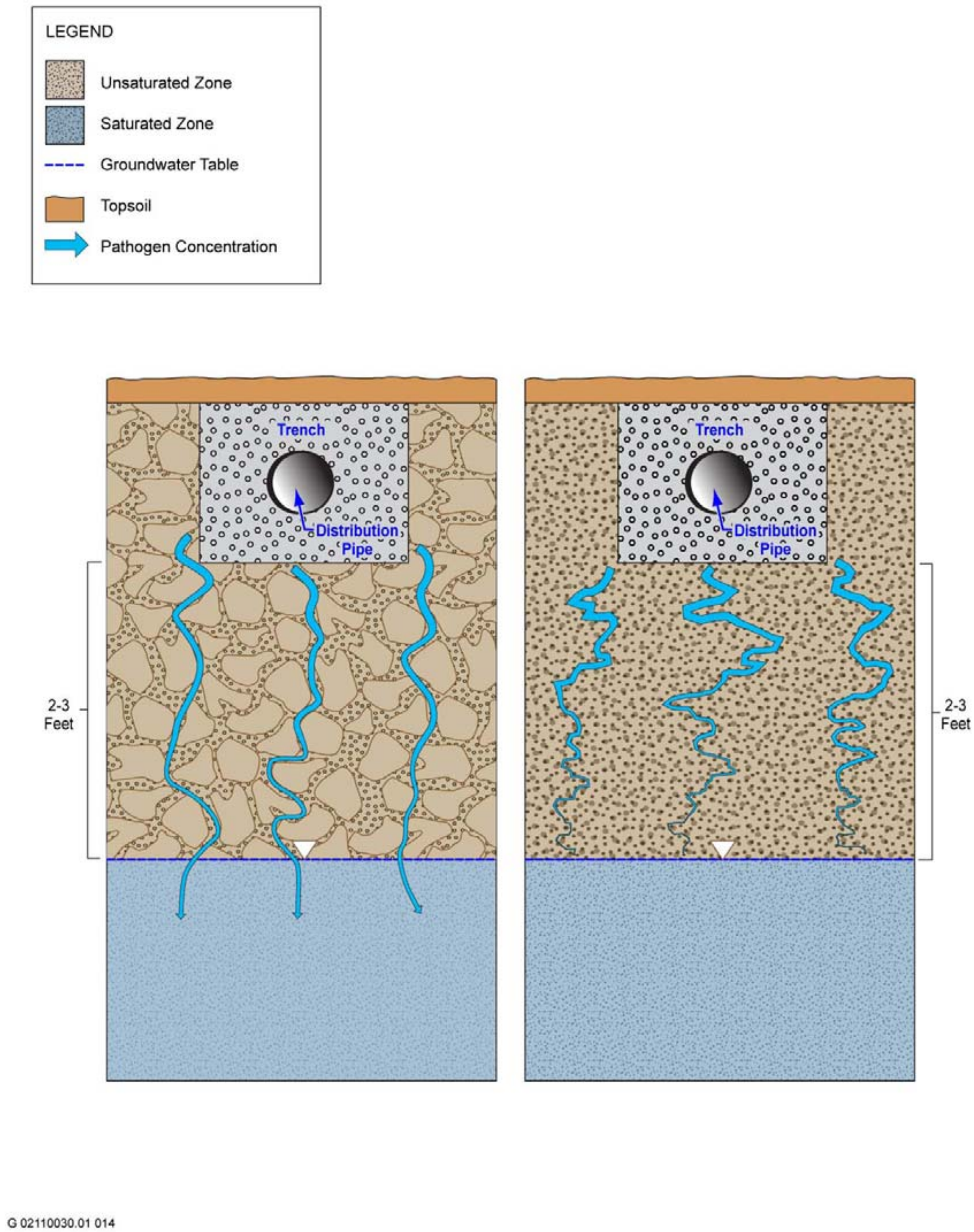

Figure 3: Soil Texture and OWTS Function

4.4.1.7 Depth of Unsaturated Soil below the Dispersal Field

One of the most important soil characteristics is the thickness of the unsaturated soil below the infiltrative surface. This zone of unsaturated soil between the ground surface and the groundwater table is known as the vadose zone. A conventional OWTS eventually discharges to groundwater and usually relies on the vadose zone to maximize the treatment potential of the wastewater before the effluent enters the groundwater, although some pollutants will usually remain. The vadose zone typically contains more microorganisms than the saturated zone and has a higher rate of contaminant adsorption. The unsaturated soil allows air to diffuse into the open soil pores to supply oxygen to the microbes that grow on the surface of the soil particles. The OWTS effluent is under a negative pressure potential (less than atmospheric pressure) in the vadose zone because of the capillary and adsorptive forces of the soil matrix. This negative soil moisture potential forces the effluent into the finer pores and over the surfaces of the soil particles, increasing adsorption, filtration, and biological treatment of the wastewater.

A larger thickness of unsaturated soil increases residence time in the soil, allowing the above-noted processes more time to maximize any reduction of contaminants that may be possible, pathogens in particular. Saturated soil, on the other hand, increases flow through the larger soil pores, reducing residence time and the filtering effect of the smaller pores. In addition, lack of oxygen or low oxygen concentration in saturated soils reduces aerobic activity and increases less effective anaerobic activity (USEPA 2002, Salvato 1992). For proper OWTS siting (particularly for conventional OWTS that do not have supplemental treatment units), adequate thickness of unsaturated soil below the dispersal field and above groundwater is a crucial element of the treatment process that, in a properly designed and functioning system, allows maximum removal of contaminants that may be possible before effluent reaches groundwater. Failure to provide adequate unsaturated soil thickness can result in inadequate removal of pathogens, leading to violation of water quality objectives for pathogens when those contaminants come into contact with groundwater. Other contaminants pass through to groundwater regardless of the thickness of the unsaturated soil.

4.4.2 Soils of California

California contains 2,031 soil series throughout the state (USDA 2011a). Within soil surveys, these soil series are divided into *soil phases* based on texture of the surface or underlying layers, slope, stoniness, salinity, wetness, depth to groundwater, bedrock, or hardpan, and other characteristics that affect their use (USDA 1988b).

Eighty-five soil surveys were examined for soils rated suitable for septic tank absorption fields (leach fields). Thirty-two surveys conducted prior to 1969 did not include an analysis for septic tank absorption field suitability and the most recent soil survey for the Surprise Valley-Home Camp area was used for this analysis (Figure 4).

Prior to 2006, the Natural Resources Conservation Service (NRCS) (formerly the Soil Conservation Service) used a rating system of slight, moderate, and severe to describe the degree of soil limitations that affect septic tank absorption fields. The limitations are considered *slight* if the soil properties and site features are generally favorable for septic tank absorption fields and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. The soil properties used to determine soil limitations were: texture, flooding, depth to bedrock, depth to cemented pan, depth to high water table, permeability, slope, and the fraction of the soil greater than 3 inches in diameter (Table 4-3) (USDA 1988b).

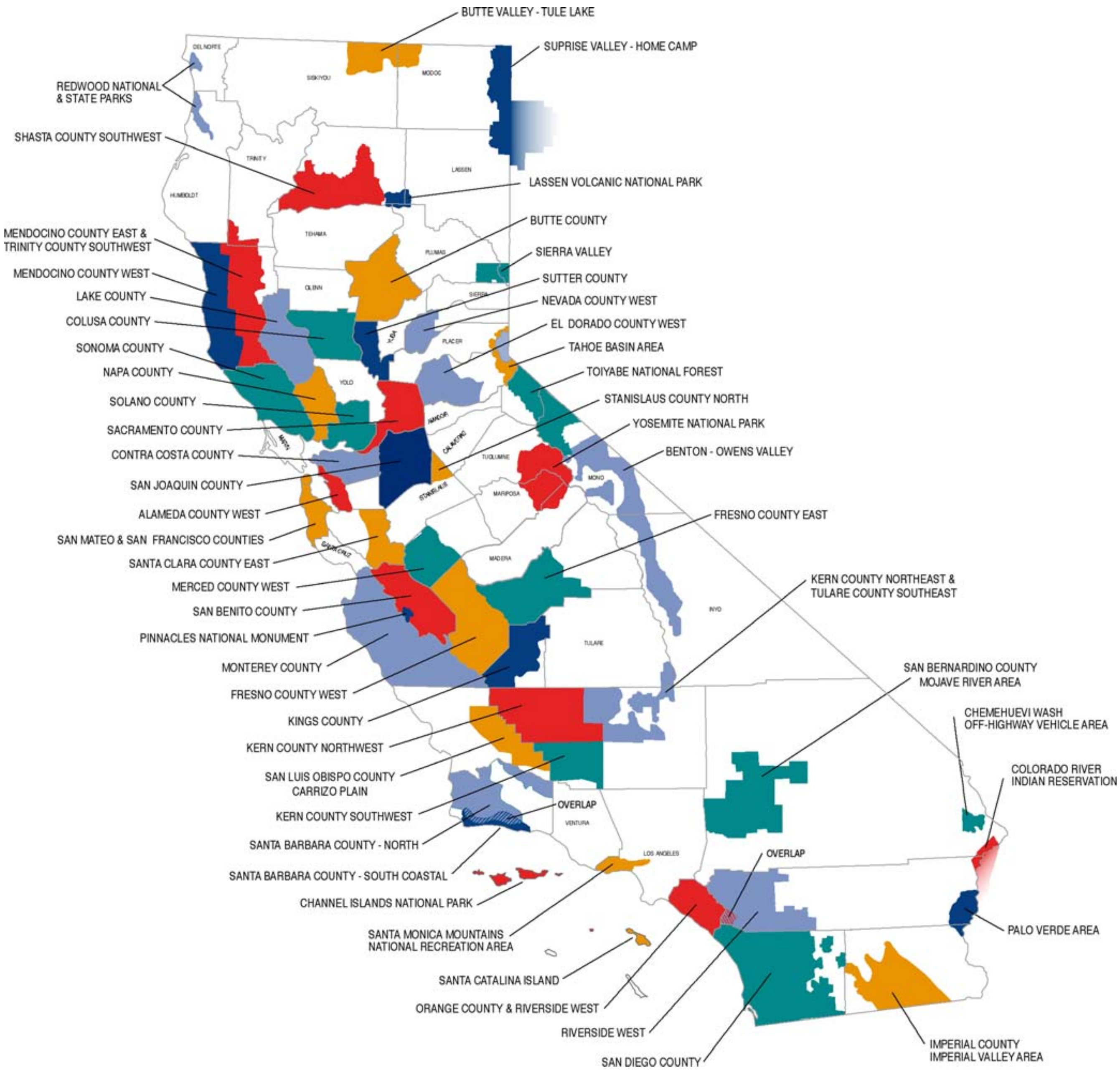

Figure 4: Location of Natural Resources Conservation Service Soil Surveys

More recent soil surveys use numerical ratings to indicate the severity of individual limitations. The ratings are expressed as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on septic tank absorption fields (1.00) and the point at which the soil feature is not a limitation (0.00). No limitation indicates that the soil has features that are very favorable for septic tank absorption fields. Good performance and very low maintenance can be expected. Limitations with a value of more than 0.00 but less than 1.00 can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. Limitations with a value of 1.00 indicate that the soil has one or more features that are unfavorable for septic tank absorption fields. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected (USDA 2006a).

Table 4-3: Criteria Used in Rating Soils for Septic Tank Absorption Fields

		Limits		Restrictive Feature
Property	Slight	Moderate	Severe	
USDA Texture	---	---	Ice	Permafrost
Flooding	None, Protected	Rare	Common	Floods
Depth to Bedrock (In)	>72	40-72	<40	Depth to Rock
Depth to Demented Pan (In)	>72	40-72	<40	Cemented Pan
Depth to High Water Table (Ft)	---	---	+	Ponding
	>6	4-6	0-4	Wetness
Permeability (In/Hr): 24-60”	2.0-6.0	0.6-2.0	<0.6	Percs Slowly
All Layers Below 24”	---	---	>6.0	Poor Filter
Slope (%)	0-8	8-15	>15	Slope
Fraction >3 In (Wt %)*	<25	25-50	>50	Large Stones

*Weighted average to 40 inches.
Source: USDA 1988b

The management considerations (limitations) for septic tank absorption fields are as follows (USDA 2006a):

- Depth to bedrock.—Depth to bedrock affects the construction, installation, and functioning of septic tank absorption fields and affects other site applications. Shallow soils have a limited absorption capacity and have biologically active zones through which waste materials can percolate. If these soils are used as filter fields, environmental and health risks should be considered.

- Depth to pan.—Depth to a cemented pan affects the construction, installation, and functioning of septic tank adsorption fields and other site applications. Shallow soils have a limited absorption capacity and have biologically active zones through which waste materials can percolate. If these soils are used as filter fields, environmental and health risks should be considered.

- Flooding, rare flooding, or very rare flooding.—Flooding can transport waste offsite and pollute surface waters. Flooding limits the use and management of the soil for sanitary facilities.

- Fragments (greater than 3").—Rock fragments larger than 3 inches in diameter impede the workability of the soil and restrict the use of heavy machinery during construction of absorption fields.

- Permeability (Ksat) greater than 6"/hr.—The soil horizon with the maximum Ksat governs the leaching and seepage potential of the soil. If this rate is high, the transmission of fluids through the soil is unimpeded and leaching and seepage may affect environmental, health, and performance.

- Permeability less than 0.6"/hr; permeability from 0.6 to 2"/hr.—The soil horizon with the minimum Ksat governs the rate of water movement through the whole soil. If this rate is low, the transmission of fluids into and through the soil is impeded and runoff, infiltration, and percolation of pollutants may affect environmental, health, and performance.

- Ponding.—Ponding is the condition where standing water is on the soil surface for any period of time. Ponding limits the installation and functioning of most land use applications.

- Saturation.—Soils that have a water table at a shallow depth may become waterlogged during periods of heavy precipitation and are slow to drain. The contamination of ground water is a concern in areas with these soils.

- Seepage in bottom layer.—The Ksat in the bottom layer of the soil governs the leaching and seepage potential of the soil. If this rate is high, the transmission of fluids through the soil and underlying materials is unimpeded. As a result, leaching and seepage may affect environmental, health, and performance.

- Slope.—Steep slopes affect the transmission of fluids through the soil. As a result, piping or seepage may affect environmental, health, and performance.

A total of 6.8% of the acreage surveyed is suitable for septic tank absorption fields (Table 4-4). Percentages of suitable soil for septic tank absorption fields for various areas ranged from 0.0% (San Mateo County [eastern part] & San Francisco County and Santa Monica Mountains National Recreation Area) (USDA 1991b; 2006d) to 63.9% (Palo Verde Area) (USDA 1974c). Soils included as suitable were rated as slight, moderate, slight to moderate, moderate to severe, and slight to severe under the older rating system, and as having no limitations rated as 1.0 under the newer system. All soils rated as severe or having a numeric value of 1.0 in any category were excluded.

Table 4-4: Percent Acreage of Soils Suitable for Septic Tank Absorption Fields from California Soil Surveys

Survey Area	Suitable Soils (Acres)	Total Acreage	Percent of Total	Citation
Alameda County, western part	6,175	144,120	4.3%	USDA 1981a
Benton-Owens Valley Area	121,372	1,070,115	11.3%	USDA 2002
Butte Area	20,249	930,752	2.2%	USDA 2006a
Butte Valley-Tule Lake Area	17,350	436,800	4.0%	USDA 1994
Channel Islands National Park	3,049	124,102	2.5%	USDA 2007a
Chemehuevi Wash Off-Highway Vehicle Area	34,183	94,460	36.2%	USDA 2005
Colorado River Indian Reservation	5,979	42,936	13.9%	USDA 1986a
Colusa County	19,863	737,920	2.7%	USDA 2006b
Contra Costa County	11,170	468,650	2.4%	USDA 1977a
Eastern Fresno Area	336,446	1,109,156	30.3%	USDA 1971a
Eastern Santa Clara Area	14,380	519,280	2.8%	USDA 1974a
El Dorado Area	3,545	539,065	0.7%	USDA 1974b
Fresno County, western part	122,414	1,386,400	8.8%	USDA 2006c

Table 4-4: Percent Acreage of Soils Suitable for Septic Tank Absorption Fields from California Soil Surveys

Survey Area	Suitable Soils (Acres)	Total Acreage	Percent of Total	Citation
Imperial County (Imperial Valley Area)	334,901	989,450	33.8%	USDA 1981b
Kern County (northeastern part) & Tulare County (southeastern part)	1,528	913,000	0.2%	USDA 2007b
Kern County (northwestern part)	495,400	1,371,900	36.1%	USDA 1988a
Kern County (southwest part)	110,175	672,400	16.4%	USDA 2009
Kings County	157,078	892,800	17.6%	USDA 1986b
Lake County	2,755	857,072	0.3%	USDA 1989
Lassen Volcanic National Park	3,168	126,720	2.5%	USDA 2010
Mendocino County (eastern part) & Trinity County (southwestern part)	21,368	1,103,912	1.9%	USDA 1991a
Mendocino County (western part)	17,860	1,042,400	1.7%	USDA 1999
Merced County (western part)	3,810	609,820	0.6%	USDA 1990a
Monterey County	138,470	2,127,360	6.5%	USDA 1978a
Napa County	23,430	485,120	4.8%	USDA 1978b
Nevada County Area	24,744	341,966	7.2%	USDA 1975a
Orange County & Riverside County (western part)	126,445	580,994	21.8%	USDA 1978c
Paolo Verde Area	98,655	154,500	63.9%	USDA 1974c
Pinnacles National Monument	69	27,095	0.3%	USDA 2008a
Redwood National & State Parks	2,740	161,993	1.7%	USDA 2008b
Sacramento County	20,210	629,088	3.2%	USDA 1993
San Benito County	103,372	893,440	11.6%	USDA 1969
San Bernardino County (Mojave River Area)	156,470	1,200,000	13.0%	USDA 1986c
San Diego County	220,669	2,204,880	10.0%	USDA 1973a & b
San Joaquin County	124,750	901,760	13.8%	USDA 1992
San Luis Obispo County (Carrizo Plain Area)	40,781	563,840	7.2%	USDA 2003
San Mateo County (eastern part) & San Francisco County	0	358,735	0.0%	USDA 1991b
Santa Barbara Area (northern)	120,069	830,870	14.5%	USDA 1972
Santa Barbara County (south coastal part)	13,194	218,586	6.0%	USDA 1981c
Santa Catalina Island	42	48,400	0.1%	USDA 2008c
Santa Monica Mountains National Recreation Area	0	182,400	0.0%	USDA 2006d
Shasta County Area	168,175	1,035,000	16.2%	USDA 1974d
Sierra Valley Area	12,417	204,948	6.1%	USDA 1975b
Solano County	30,285	526,720	5.7%	USDA 1977b
Sonoma County	61,451	1,010,560	6.1%	USDA 1990b
Stanislaus County (northern part)	8,024	1,098,024	0.7%	USDA 2007c
Surprise Valley-Home Camp Area	28,008	1,290,985	2.2%	USDA 2011b
Sutter County	6,220	388,480	1.6%	USDA 1988b
Tahoe Basin	6,022	247,704	2.4%	USDA 2007d
Toiyabe National Forest Area	1,203	663,783	0.2%	USDA 2006e
Western Riverside Area	207,130	1,105,940	18.7%	USDA 1971b
Yosemite National Park	874	761,236	0.1%	USDA 2007e
Total	1,557,275	23,000,539	6.8%	

There may be areas within a soil mapping unit identified in a soil survey as unsuitable for septic tank absorption fields that are actually suitable, and conversely there may be areas within a mapped area considered suitable that are not. A site specific evaluation is required to determine the suitability of any specific area for a septic tank absorption field. Overall, most of the soils surveyed in California are poorly suited for septic tank absorption fields.

4.5 Overview of OWTS Use and Siting

OWTS treat wastewater and disperse effluent for the approximately 1.2 million California households and numerous businesses that are not connected to sewer systems and related centralized municipal wastewater treatment plants (CWTRC 2003). (This estimate reflects the number of systems in 1999.) Approximately 10% of all California households, or about 3.5 million people, rely on some type of OWTS to treat and dispose of the wastewater they generate. The annual rate of growth in new OWTS installations is approximately 1%, or 12,000 systems (CWTRC 2003).

OWTS are defined by the U.S. Environmental Protection Agency (USEPA) as systems "relying on natural processes and/or mechanical components that are used to collect, treat, and disperse/discharge wastewater from single family dwellings or buildings" (USEPA 2002). Most OWTS are commonly referred to as "septic systems"; however, many different types of systems exist. Conventional septic systems consist of a septic tank and subsurface dispersal system. A wide range of supplemental treatment devices can also be included in the septic system design to address different site constraints and achieve higher levels of treatment than that provided by conventional septic systems. Descriptions of the design and operation of conventional OWTS and a variety of supplemental treatment devices are provided in the following sections.

Proper site conditions are an important factor in ensuring the optimal functioning of an OWTS. A key issue that has an impact on the effectiveness of a treatment system and that may determine the need for additional treatment is the amount and type of soil available for treatment of the effluent. In practice, this is measured as separation between the bottom of the dispersal field and the groundwater table, bedrock, or impervious soil layer. If the OWTS is properly sited, unsaturated soil (soil above groundwater level) with sufficient depth underlying the dispersal fields can, through absorption, filtration, and other natural processes that break down some effluent pollutants, substantially reduce the levels of human pathogenic organisms (viruses and bacteria) and some chemical compounds in effluent before it reaches the underlying groundwater table or surface water that is hydrologically connected to the groundwater.

The depth and type of unsaturated soil below the dispersal system are the most important factors in the treatment process. The number of pathogens and other pollutants removed through this process increases with the length of time the OWTS effluent is retained in the unsaturated soil layer (i.e., the retention time). Note that, regardless of the length of time that wastewater is retained in the unsaturated soil layer, soil does not provide effective treatment of some soluble compounds that are resistant to biodegradation, such as nitrate.

Domestic wastewater entering septic systems also contains high levels of phosphorus. For properly designed and functioning septic systems, phosphate is removed in the leachfield by binding to porous media (Wilhelm *et al.* 1994, cited in Angenent *et al.* 2006). However, fractured bedrock and thin, sandy soils have limited capacity to bind phosphate, and unfavorable soil and water chemistry or saturation of the soil can allow the phosphate to be mobile (Robertson *et al.* 1998, cited in Angenent *et al.* 2006).

Deep unsaturated soils provide for relatively long retention times and are ideal conditions for promoting die-off of pathogens (viruses and/or bacteria). Such conditions are not present in many areas of California, however. Areas of the state with relatively porous, sandy soils allow OWTS effluent to move into local groundwater and other receiving waters very quickly and, therefore, with little treatment. In areas with underlying fractured and granitic bedrock, it is almost impossible to accurately predict how fast OWTS effluent will travel and the likely pathway that OWTS effluent will take before it reaches groundwater. In areas with poorly draining clay soils, OWTS effluent can pool at the surface, creating potential public health threats through direct human contact and through runoff to receiving waters intended for beneficial uses (e.g., drinking water, fisheries).

The distance to nearby drinking water wells or surface waters is also a key issue. Frequently, properties served by OWTS are also served by private on-site (“domestic”) water wells. In other cases, properties with OWTS may be located within the groundwater capture zone of a public drinking water well. Once in the groundwater, OWTS effluent travels as a plume (Robertson 1991). Depending on the direction of groundwater flow, nearby wells may be in the path of the effluent plume.

4.5.1 Conventional OWTS

The vast majority of existing OWTS are conventional systems and are designed to provide “passive” (i.e., minimally mechanical) operation and treatment of domestic wastewater. A conventional OWTS typically consists of a septic tank, a wastewater dispersal system, and the native underlying soil (Figure 5).

4.5.2 Septic Tank

The septic tank serves a number of important functions, including the following:

- The septic tank removes oils and grease (floatable materials) and settleable solids. The septic tank is designed to provide quiescent conditions over a sufficient period to allow settleable solids to sink to the bottom of the tank and floatable materials to rise to the surface. The result of this primary treatment process is a middle layer of partially clarified effluent that exits the tank and is directed to the dispersal system.

- The septic tank stores settleable and floatable material. Tanks are generously sized according to projected wastewater flow and composition to accumulate sludge (settleable solids) and scum (floatable solids) at the bottom and top of the tank, respectively. Tanks require pumping at infrequent intervals, depending on the rate that sludge and scum accumulate. USEPA indicates that pumping may be needed every 1–7 years (USEPA 2002).

- The septic tank allows digestion or decomposition of organic matter. In the oxygen-deprived (anaerobic) environment found in a septic tank, several types of bacteria break down biodegradable organic molecules for further treatment in the soil or by other unit processes. This digestion can reduce sludge and scum volumes by as much as 40–50%.

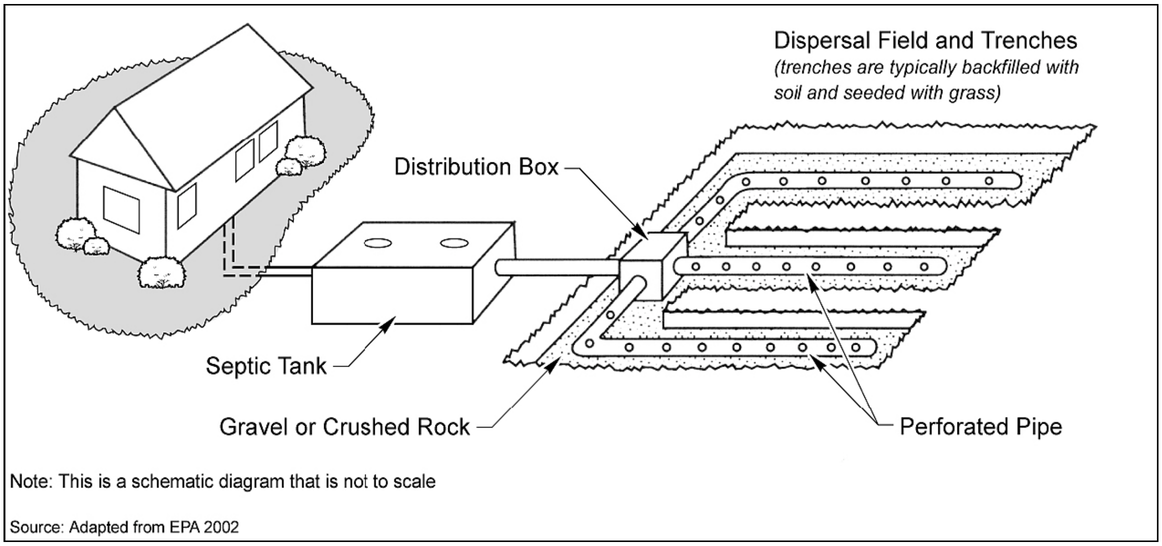

Figure 5: Elements of a Conventional System

4.5.3 Wastewater Dispersal System

The dispersal system is where the septic tank effluent infiltrates the underlying soil. The soil is the final and most important treatment component for pathogen removal in a conventional OWTS.

Infiltrative surfaces are the surfaces in the dispersal system that are designated to accept OWTS effluent. The infiltrative surfaces in dispersal systems are located in either permeable, unsaturated natural soil or imported fill material so wastewater can infiltrate and percolate through the underlying soil to the groundwater. Permeable, unsaturated soil is native soil material that is not inundated by groundwater. As the wastewater infiltrates and percolates through the soil or fill, a variety of physical, chemical, and biochemical processes and reactions can filter or biodegrade some of the organic materials that remain after treatment in the septic tank. Many different dispersal system designs and configurations are used, but all incorporate soil infiltrative surfaces that are located in buried excavations (usually trenches or pits).

Wastewater dispersal systems provide both dispersal and final treatment of the applied wastewater. Wastewater is transported from the dispersal system through the infiltrative surface and the unsaturated zone in the soil. The transition zone between the infiltrative surface and the unsaturated zone is only a few centimeters thick. It is the most biologically active zone and is often referred to as the "biomat." Material in the wastewater that is rich in carbon is quickly degraded in the biomat, and ammonia and organic nitrogen are converted to nitrate immediately below this zone if sufficient oxygen is present. Free oxygen or combined forms of oxygen (e.g., iron oxide) in the soil must satisfy the oxygen demand generated by the microorganisms degrading the materials. If sufficient oxygen is not present, the metabolic processes of the microorganisms will be reduced or halted and both treatment and infiltration of the wastewater will be adversely affected (Otis 1985). The unsaturated soil surrounding the dispersal system provides a significant pathway for oxygen to enter the biomat, thus sustaining the organisms in the biomat (Otis 1997, Siegrist *et al.* 1986). Also, it is the primary zone where soil particles attract and hold contaminants through chemical and physical absorption (uptake into a solution) and adsorption (attachment onto the surface of particles). Pathogens and most phosphorus are removed in this zone (Robertson and Harman 1999, Robertson *et al.* 1998, Rose *et al.* 1999, Yates and Yates 1988).

Several different designs are used for dispersal systems. They include trenches, beds, seepage pits, at-grade systems, and mounds. Applications of dispersal systems differ in their geometry and location in the soil. Trenches, the most commonly used design for wastewater dispersal systems, have a large length-to-width ratio, whereas beds have a wide rectangular or square geometry. Some jurisdictions require redundancy in the dispersal system (i.e., alternating fields, 100% replacement area) to provide for resting dispersal systems or in cases of failure, respectively.

The infiltration surfaces of dispersal systems may be created in natural soil or imported fill material. Most traditional systems are constructed below the ground surface in natural soil. In some instances, a restrictive horizon (or layer) above a more permeable horizon may be removed and the excavation filled with suitable porous material in which to construct the infiltrative surface (Hinson *et al.* 1994). Infiltrative surfaces may also be constructed at the ground surface (at-grade systems) or elevated in imported fill material above the natural soil surface (mound systems). An important difference between infiltration surfaces constructed in natural soil and those constructed in fill material is that a secondary infiltrative surface (which must be considered in design) is created at the fill/natural soil interface. This secondary infiltrative surface is sometimes the area where OWTS failure occurs because of the inability of that surface to accept wastewater. Despite the differences between the types of dispersal system designs, the mechanisms of treatment and dispersal are similar.

4.5.4 Wastewater Distribution Methods

The method and pattern of wastewater distribution in a dispersal system are important design elements.

4.5.4.1 Gravity Flow versus Pressure Distribution

Gravity flow and pressure distribution are the two most commonly used distribution methods. Gravity flow is the most commonly used method because it is simple and inexpensive. It can be used where there is a sufficient elevation difference between the outlet of the septic tank and the wastewater dispersal system to allow flow to and through the dispersal system by gravity. This method discharges effluent from the septic tank directly to the infiltrative surface as incoming wastewater displaces it from the tank(s). Typically, tank discharges are too low to flow throughout the entire distribution network and the soils near the beginning of the distribution network receive more flow. Thus, distribution can be unequal and localized overloading of the infiltrative surfaces can result, accompanied by poor treatment and soil clogging (Bouma 1975, McGauhey and Winneberger 1964, Otis 1985, Robeck *et al.* 1964). Pressure distribution, on the other hand, discharges wastewater effluent under pressure to the dispersal system. Pressurization causes the filling of the entire distribution network, which results in more uniform distribution of wastewater effluent over the entire dispersal system infiltrative surface.

Dosing, which can be incorporated into both gravity flow and pressure distribution systems, also increases the effectiveness of soil treatment. Dosing accumulates the wastewater effluent in a dose tank from which the water is periodically discharged in "doses" to the dispersal system by either a siphon (gravity-flow) or pump (pressure distribution). The treated wastewater is allowed to accumulate in the dose tank and is discharged when a predetermined water level, water volume, or elapsed time is reached. Dosing outperforms gravity displacement methods because the regulated volume and timing of doses provides opportunities for the subsoil to drain and re-aerate before the next dose arrives, resulting in more effective soil treatment of the discharged effluent (Bouma and Daniels 1974, Hargett *et al.* 1982, Otis *et al.* 1977). Pressure-dosing combines the benefits of pressure distribution and dosing. It achieves uniform distribution, which results in more complete use of the infiltrative surface, and also aids in maintaining unsaturated flow below the infiltrative surface, which results in wastewater retention times in the soil that are long enough to affect treatment and promote subsoil re-aeration.

4.5.4.2 Porous Media-Filled versus Aggregate-Free Trenches

Typically, a porous medium is placed below and around the distribution piping of the subsurface dispersal system. The porous medium keeps open the infiltrative area exposed to the wastewater and provides additional treatment surfaces. This approach is similar in most subsurface dispersal system designs, except when drip distribution or aggregate-free designs are used. In addition, the medium also supports the excavated sidewalls, provides storage of peak wastewater flows, minimizes erosion of the infiltrative surface by dissipating the energy of the influent flow, and provides some protection for the piping from freezing and root penetration.

Traditionally, washed gravel or crushed rock, typically ranging from three-quarters of an inch to 2½ inches in diameter, has been used as the porous medium. In addition to natural aggregates, gravel-less systems have been widely used as an alternative dispersal system medium. These systems take many forms, including open-bottomed chambers, fabric-wrapped pipe, and synthetic materials such as expanded polystyrene foam chips. Systems that provide an open chamber are sometimes referred to as "aggregate-free" systems, to distinguish them from others that substitute lightweight media for gravel or stone. Aggregate-free systems are essentially a half pipe placed in the trench with its inverted side down. These systems can provide a suitable substitute in locales where gravel is not available or affordable. Some systems (polyethylene chambers and lightweight aggregate systems) can also offer substantial advantages over the traditional gravel in terms of reduced site disruption because their light weight makes them easy to handle without the use of heavy equipment. This can reduce labor costs, limit damage to the property by machinery, and allow construction on difficult sites where conventional media could not reasonably be used. Reduced sizing of the infiltrative surface is often promoted as another advantage of the open chamber system. This is based primarily on the premise that these systems do not "mask" the infiltration surface as gravel- or other media-filled systems do where the media is in direct contact with the soil (Siegrist *et al.* 2004).

4.5.4.3 Shallow Dispersal

The most biologically active area in a soil column is the aerobic environment at or near the ground surface. An aerobic environment (oxygen rich) is desired for most wastewater treatment and dispersal systems. Aerobic decomposition of wastewater solids is significantly faster and more complete. Maximum delivery of oxygen to the infiltration zone is most likely to occur when dispersal systems are shallow (USEPA 2002).

Shallow dispersal methods, primarily drip distribution, which was derived from drip irrigation technology, is a method of pressure-dosed distribution capable of delivering small, precise volumes of wastewater effluent to the infiltrative surface. It is the most efficient of the distribution methods, and although it requires supplemental treatment, it is well suited for all types of dispersal system applications.

A drip line pressure network consists of several components:

- dose tank,
- pump,
- prefilter,
- supply manifold,
- pressure regulator (when turbulent, flow emitters are used),
- drip line,
- emitters,
- vacuum release valve,
- return manifold,
- flush valve, and
- controller.

The drip line is normally a flexible polyethylene tube that is a half-inch in diameter with emitters attached to the inside wall spaced 1–2 feet apart along its length. Because the emitter passageways are small, friction losses are large and the rate of discharge is low (typically from 0.5 to nearly 2 gallons per hour). Usually, the drip line is installed in shallow (less than 1 foot deep), narrow trenches 1–2 feet apart and only as wide as necessary to insert the drip line using a trenching machine or vibratory plow. The trench is backfilled without any porous medium so that the emitter orifices are in direct contact with the soil. The distal ends of each drip line are connected to a return manifold. The return manifold is used to regularly flush the drip line.

Because of the unique construction of drip distribution systems, they cause less site disruption during installation, are adaptable to irregularly shaped lots or other difficult site constraints, and use more of the soil mantle and take advantage of plant uptake (absorption into the roots of plants) for treatment because of their shallow placement in the ground.

4.5.4.4 Mound

A mound system is a wastewater dispersal system placed above the natural surface of the ground (Figure 6). These systems are often used when a site has high groundwater, the soils are too shallow, or drainage is poor and thus conditions are unsuitable for the more common dispersal system described above. A mound is a layered structure consisting of a topsoil cap, a layer of sand or sandy loam, a geotextile layer, rock aggregate beds or trenches, a low-pressure distribution system, and an absorption area. In pressure-dosed mounds, primary treated effluent is dispersed into carefully chosen fill of permeable, well-drained sands, which contain a high volume of free air within the pore space.

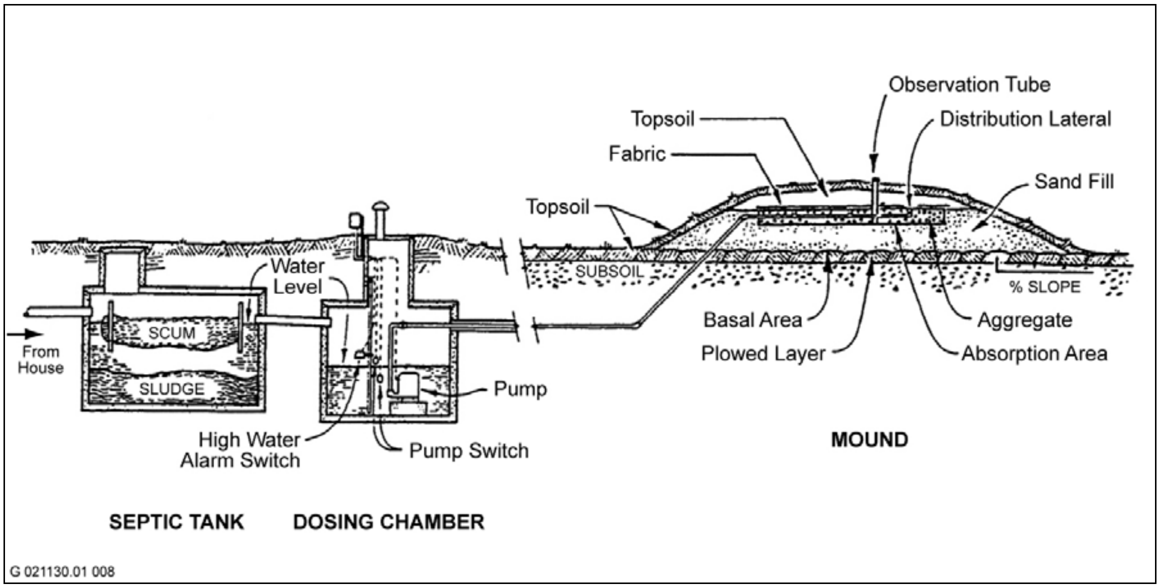

Figure 6: Elements of a Typical Mound System
Source: ASAE, Converse, and Tyler 1998, cited in USEPA 2002

Because the effluent is distributed over a large area of sand, it moves slowly through the fill material and is in contact with air as it percolates downward. An elevated mound system is built above the native soil to achieve the required separation distance between the infiltrative surface and the limiting soil condition of the site. A mound has 1–2 feet of treatment media. The main goal is to preserve and use the natural soil conditions at the site. The wastewater must move into unsaturated soil for the microbes in the soil and in the biomat to feed on the waste and nutrients in the wastewater.

4.5.4.5 At-Grade System

The at-grade system is another example of a shallow dispersal system. They are typically used when sites have soils that are too deep to justify a mound and too shallow to permit a more conventional subsurface dispersal system. Unlike the mound, where a layer of sand material exists between the bottom of the absorption area and the ground surface, the ground surface is the bottom of the trench or infiltrative surface in an at-grade system.

4.5.4.6 Evapotranspiration/Infiltration

The evapotranspiration/infiltration (ETI) process is a subsurface system designed to disperse effluent by both evapotranspiration and infiltration into the soil. Evapotranspiration is defined as the combined effect of water removal from a medium by direct evaporation and by plant transpiration. This system is typically preceded by a pretreatment tank to remove settleable and floatable solids. Supplemental treatment may be used to minimize clogging of the ETI system piping and media.

The influent to the ETI unit enters through a series of distribution pipes to a porous bed. The surface of the sand bed is planted with water-tolerant plants. Effluent is drawn up through fine media by capillary wicking and evaporated or transpired into the atmosphere, and allowed to percolate into the underlying soil.

ETI systems are best suited for arid (evaporation exceeds precipitation) climates. These systems are often selected when site characteristics dictate that conventional methods of effluent dispersal are not appropriate (e.g., unprotected aquifer, high water table, shallow bedrock, tight soils). ETI systems can be employed to reduce the infiltrative burden on the site during the growing season. Such applications can also result in reduction of some nutrients, which are transferred to the overlying vegetation (USEPA 1999).

4.5.4.7 Seepage Pit

Another type of subsurface dispersal system widely used in some areas of California is the seepage pit. However, seepage pits are not permitted in some jurisdictions because their depth and relatively small horizontal profile create a greater pollutant loading potential to groundwater relative to other subsurface infiltration methods (USEPA 2002).

A seepage pit consists of a deep vertical circular hole with a porous-walled inner chamber, usually of pre-manufactured concrete rings with precut holes or notches, and a filling of gravel between the chamber and the surrounding soil. Seepage pits are generally installed in sandy or gravel-type soils. They are typically 4–12 feet in diameter and 10–40 feet deep. These dispersal systems operate as septic tank effluent enters the inner chamber and is temporarily stored there until it gradually seeps into the surrounding sidewall soil. Because seepage pits are often buried deep, they typically experience progressive biomat growth. As the biomat grows denser in the lower level, the effluent rises to a higher level, where it filters through the as-yet-unclogged sections of the sidewall.

4.5.5 Treatment Effectiveness of Conventional OWTS

If properly sited (i.e., with suitable soil and groundwater separation conditions), designed, and installed, conventional systems are capable of nearly complete removal of suspended solids, biodegradable organic compounds, and fecal coliform bacteria. However, other pollutants may not be removed as effectively. For example, conventional systems are expected to remove no more than 10–40% of the total nitrogen in domestic wastewater. Other pollutants that may not be completely removed include pharmaceuticals, other synthetic organic chemicals and viruses.

4.5.5.1 Septic Tank Outlet (Effluent) Filters and Pump Vaults

An effluent filter in a septic tank is a screen device installed at the septic tank outlet to catch solid particles before they enter the dispersal field. About half of all State and local agencies currently require the use of an effluent filter with a septic tank; most older septic tanks were not constructed with filters. The use of an effluent filter can significantly improve effluent quality and protect dispersal field functioning by preventing carryover of solids to the dispersal field. Most manufacturers offer models of filters that are located inside the septic tank (attached to the outlet) or systems that are located outside of the septic tank in a separate tank (i.e., pump vault). Most systems are also available with an integrated pump, for use with septic tanks designed with effluent pump systems or other pressure distribution systems. The effluent filters must be cleaned at regular intervals, as recommended by the manufacturer and depending on usage, to remove accumulated solids from the screen to prevent system backups into the building served by the OWTS.

4.5.5.2 Septic Tank Additives

Approximately 1,200 septic tank additives are promoted as being able to improve the operation of septic tanks, reduce odors associated with septic systems, or unclog soil adsorption systems. These products fall into three general categories: inorganic compounds (usually strong acids or alkalis), organic solvents (often chlorinated hydrocarbons), and biological additives (bacteria or enzymes). Most studies have concluded that these products are not effective and in some cases are detrimental to OWTS (USEPA 2002).

Inorganic compounds, such as hydrogen peroxide or other strong alkalis or acids, can adversely affect biological decomposition processes, degrade soil structure, and cause structural damage to treatment systems. Organic solvents are commonly used as degreasers but pose significant risks to groundwater and wastewater treatment processes by destroying populations of helpful microorganisms in the treatment system. Biological additives, such as bacteria and extracellular enzymes mixed with surfactants or nutrient solutions, do not significantly enhance normal biological decomposition processes in the septic tank and may increase loadings of biochemical oxygen demand (BOD), total suspended solids (TSS), and other contaminants (USEPA 2002). Use of other products advertised to control septic odors by killing bacteria run counter to the purpose and function of septic tanks, which are designed to promote anaerobic bacterial growth.

Another variety of consumer product is marketed for its ability to remove phosphorus, a nutrient that, when available in sufficient quantities in surface waters, can result in nuisance algal blooms that may cause low oxygen conditions and fish mortality. This product can destroy the microbial population in the septic tank by eliminating the system’s capacity to buffer (or adjust to) changes in pH, which can result in a drop in pH and can severely compromise the function of additional wastewater treatments (i.e., supplemental treatment units) in the treatment train.

4.5.6 Supplemental Treatment Units

Supplemental treatment units are “active” operation devices incorporated into the treatment train of an OWTS following the septic tank, or in place of the septic tank, to provide additional wastewater treatment before the wastewater enters the dispersal system. OWTS with supplemental treatment units achieve a higher level of treatment than conventional OWTS. Currently, some but not all local agencies allow and regulate the use of OWTS with supplemental treatment units, usually to address site or soil limitations that would otherwise substantially reduce the ability of a conventional OWTS to effectively treat wastewater constituents (especially pathogens [bacteria and viruses] and nitrogen) to meet local and regional water board requirements. This section provides descriptions of several varieties of active wastewater treatment systems: aerobic treatment units, anoxic systems, and disinfection systems. These are the major types of supplemental treatment units employed in California (SWRCB 2002).

4.5.6.1 Aerobic Treatment Units

Aerobic treatment units (ATUs) are a broad category of pre-engineered wastewater treatment devices for residential and commercial use. They provide a secondary level of wastewater treatment, which means they are designed to oxidize both organic material and ammonium-nitrogen (to nitrate-nitrogen), decrease suspended solids concentrations, and reduce concentrations of pathogens. ATUs may provide treatment using suspended-growth elements (activated sludge process), attached-growth elements (i.e., trickling biofilters), or in the case of hybrid aerobic systems, suspended-growth processes combined with attached-growth.

Although they reduce concentrations of pathogens beyond the level allowed by a septic tank alone, most ATUs do not sufficiently reduce pathogens on their own to meet regulatory requirements. Additional disinfection can be achieved through chlorination, ultraviolet (UV) radiation, ozonation, and/or soil filtration. Increased nitrogen removal (denitrification) can be achieved by modifying the treatment process to incorporate an anaerobic/anoxic step or by adding the following treatments to the treatment train.

- **Suspended-Growth Aerobic Treatment Units:** In a suspended-growth aerobic treatment unit, microorganisms maintained in suspension using aeration provide aerobic treatment of the wastewater. Such designs typically consist of aeration, clarification, sludge return processes, and sludge wasting processes. The principal types of processes are classified as continuous flow reactor, sequencing batch reactor, and membrane bioreactor.

- **Attached-Growth Aerobic Treatment Units (Trickling Biofilters):** Treating wastewater by trickling it over a biofilter is among the oldest and most well-characterized technologies for aerobic treatment. The trickling biofilter system basically consists of a medium (sand, gravel, or synthetic) on which a microbial community develops (biofilm), a container or lined excavated pit to house the medium, a system for applying the wastewater to be treated to the medium, and a system for collecting and distributing the treated wastewater.

- **Hybrid Aerobic Treatment Units:** Hybrid ATUs combine suspended- and attached-growth elements.

4.5.6.2 Anoxic Systems

Anoxic treatment processes are characterized by the absence of free oxygen from the treatment process. Many aerobic treatment systems use anoxic or anaerobic stages to accomplish specific treatment objectives. Anoxic processes are typically used for the removal of nitrogen from wastewater through a process known as denitrification. Denitrification requires that nitrogen first be converted to nitrate, which typically occurs in an aerobic treatment process, such as a trickling filter or suspended-growth process. The nitrified water is then exposed to an environment without free oxygen. Organisms in this anoxic system use the nitrate and release nitrogen gas. Efficient denitrification processes need a carbon source that is readily biodegradable.

4.5.6.3 Disinfection Systems

Waterborne pathogens found in the United States include some bacteria, protozoans, and viruses. The process of disinfection destroys pathogenic and other microorganisms in wastewater and can be used to reduce the possibility of pathogenic organisms entering the environment.

Currently, the effectiveness of disinfection is measured by the use of indicator bacteria. Indicator bacteria are selected groups of microorganisms that indicate the possible presence of disease-causing pathogens. It is difficult to detect all types of pathogenic organisms in water because of the wide array of microbes that occur in the natural environment. As a solution, indicator organisms that are easy to detect are typically used.

A number of methods are available to disinfect wastewater. The most common types of on-site disinfection units use chlorine tablets, ultraviolet radiation, and ozonation. These approaches and their effectiveness are summarized below.

Chlorination

Chlorine is a powerful oxidizing agent and has been used as an effective disinfectant in water and wastewater treatment for a century. For small on-site wastewater treatment systems, the most common type of disinfection equipment is the tablet chlorinator because it does not require electricity, is easy to operate and maintain, and is relatively inexpensive.

Chlorinated water may inhibit the performance of subsequent soil treatment in the dispersal system because of its toxicity to soil microorganisms. In some cases, chlorination has been used to inhibit biological growth in trickling filter systems. In areas where water is distributed for irrigation, chlorine is used to prevent the spread of disease through wastewater.

There have been few field studies of tablet chlorinators, but those conducted for post-sand filter applications show significant fecal coliform reductions (2–3 logs per 100 milliliters) (USEPA 2002).

Ultraviolet Radiation
UV light is an effective disinfectant for water and wastewater. The germicidal properties of UV irradiation have been recognized for many years, and the technology is widely available and well characterized. UV is germicidal in the wavelength range of 250–270 nanometers. The effectiveness of UV irradiation highly depends on the quality of the wastewater to be treated. Wastewater particles have the ability to absorb UV radiation, yet only UV radiation that which reaches the surface of the microorganisms is effective in destroying microorganisms. Lower levels of turbidity and suspended solids in the wastewater therefore lead to greater microorganism inactivation and result in improved disinfection.

Ozonation
Ozone is a strong oxidant that has been used for the disinfection of water and wastewater. Because ozone is not chemically stable, it must be generated on-site near the point of use, making the system more complex than tablet chlorinators. It has been used in combination with other compounds for advanced oxidation treatment of wastewater. Ozone is used primarily for medium and large treatment facilities; however, ozone disinfection may become feasible for small systems in the future.

4.5.7 Community Systems

Community systems, also known as shared systems, cluster systems, and community septic systems, are OWTS for serving more than one property owner. Either a conventional OWTS or an OWTS with supplemental treatment can be used in a community system, depending on the type of soil underlying the dispersal field, the depth to groundwater, the proximity to wells or sensitive surface water resources, and other factors. Because the proposed Policy does not address the scale of the treatment systems and focuses instead on the wastewater treatment capabilities of conventional OWTS and supplemental treatment units, community systems are not discussed further in this document because the per capita impact on community systems is not believed to be different from smaller OWTS.

4.6 Estimated Number of OWTS in California

4.6.1 Households Using OWTS in California

From 1970 through 1990, the U.S. Census Bureau, as part of its decennial housing and population census, collected information on the number of housing units using septic systems for sewage disposal. (This information was not collected as part of the 2000 Census.) The percentage of occupied year-round housing units using septic systems in California declined between 1970 and 1980, but stabilized between 1980 and 1990 (Table 4-5). The percentage of housing units on septic systems fell from 12.2% to 10.0% between 1970 and 1980, but declined only slightly, to 9.8%, by 1990. Excluding seasonal and vacant housing units, approximately one million housing units were hooked up to septic systems in 1990.

Table 4-5: Number of Housing Units with On-Site Wastewater Treatment Systems in California, 1970–1990

Year	Number of Housing Units with Septic Tanks or Cesspools	Percent of Total Housing Units	Percent of Total Households
1970	853,013	12.2	12.9
1980	920,690	10.0	10.7
1990	1,092,174	9.8	10.5

Note: Housing unit totals do not include seasonal and vacant housing units.
Sources: Hobbs and Stoop 2002, U.S. Census Bureau 2004

4.6.2 Housing Units Using OWTS in 1999 and 2000

An estimated 1,202,300 housing units were using septic systems in 1999 (CWTRC 2003). This estimate was prepared by adding the number of OWTS installed since 1990 to the number of systems reported by the 1990 Census. The source for the number of systems installed since 1990 came from a survey of officials of public agencies that have jurisdiction for approving and inspecting OWTS in California. The CWTRC study estimated that 9.9% of all housing units in California were using septic systems, virtually the same as the percentage reported by the 1990 U.S. Census (9.8%).

For purposes of comparison, the number of housing units in California using OWTS in 2000 was estimated using data from the 1990 and 2000 U.S. Census. Starting with the number of existing housing units statewide in 2000, as reported by the 2000 U.S. Census, it was then assumed that statewide OWTS usage in 2000, on a percentage basis, was the same as the percentage in 1990 (9.8%). This percentage was applied to the total number of housing units statewide in 2000 to arrive at an estimate of the total number of housing units using OWTS within the state. These units were then distributed among the counties based on each county’s percentage share of statewide OWTS in 1990. This methodology resulted in an estimated total of 1,192,900 housing units using OWTS in California in 2000, a result that is only about 0.8% lower than the CWTRC estimate of 1,202,300 housing units with OWTS in 1999. Because the statewide estimates produced by the two methodologies are similar, 1.2 million OWTS was used as the total number of OWTS in use statewide in 2000.

Because of concerns about the accuracy of the survey results on which the CWTRC study based its estimates, both the Census-based and CWTRC estimates were used as a basis for projecting OWTS usage at the county level for both existing (2008) conditions and future baseline (2013) conditions.

4.6.3 Existing Baseline (2008) Conditions

Based on the Census and CWTRC estimates of OWTS usage in 1990 and 1999, two sets of projections of OWTS usage in 2008 were prepared. Both sets of projections, hereafter referred to as the Census-based and CWTRC-based projections, used estimates of the statewide percentage of housing units using OWTS as the basis for estimating OWTS usage in 2008.

The Census-based methodology resulted in a projection of 1,323,500 housing units using OWTS in 2008, and the CWTRC-based method resulted in a 2008 projection of 1,344,300 housing units using OWTS in California, a difference of about 1.6%.

Table 4-6: Projected Housing Units with OWTS in 2008 and 2013

	2008 Projections			2013 Projections		
		Units with OWTS			Units with OWTS	
County	Total Housing Units[1]	Census-Based Estimate[2]	CWTRC-Based Estimate[3]	Total Housing Units[4]	Census-Based Projection[5]	CWTRC-Based Projection[6]
Alameda	577,988	5,167	5,019	651,149	5,614	5,453
Alpine	1,761	547	616	1,942	594	669
Amador	17,296	9,261	10,734	20,216	10,062	11,662
Butte	95,514	49,857	49,550	105,328	54,168	53,834
Calaveras	27,822	15,727	17,195	31,032	17,087	18,682
Colusa	7,890	2,682	2,803	8,557	2,914	3,046
Contra Costa	397,729	11,418	12,548	445,696	12,405	13,633
Del Norte	11,071	5,553	5,848	12,849	6,033	6,354
El Dorado	84,551	31,337	36,462	92,253	34,047	39,615
Fresno	308,259	46,487	47,925	337,429	50,507	52,069
Glenn	10,729	5,223	5,240	11,219	5,675	5,693
Humboldt	59,492	18,620	18,187	62,098	20,230	19,759
Imperial	54,283	7,793	7,437	63,245	8,467	8,080
Inyo	9,233	2,364	2,450	9,302	2,569	2,662
Kern	274,335	56,882	52,485	300,999	61,801	57,023
Kings	42,254	6,149	6,187	53,451	6,681	6,722
Lake	35,215	15,090	15,041	39,138	16,395	16,342
Lassen	13,047	5,990	6,546	18,330	6,508	7,112
Los Angeles	3,428,202	94,328	89,603	3,538,981	102,484	97,351
Madera	48,582	18,592	19,597	55,217	20,200	21,291
Marin	108,084	9,060	10,372	112,107	9,843	11,269
Mariposa	10,124	6,807	7,097	11,406	7,395	7,711
Mendocino	39,660	20,539	22,944	42,541	22,315	24,928
Merced	85,216	16,935	16,772	99,975	18,400	18,223
Modoc	5,113	3,360	3,662	5,127	3,651	3,979
Mono	13,921	2,281	2,684	15,345	2,478	2,916
Monterey	142,028	23,304	23,653	161,543	25,319	25,699
Napa	54,397	10,381	10,567	61,176	11,278	11,480
Nevada	50,536	23,737	25,704	55,830	25,790	27,927
Orange	1,047,364	8,129	7,501	1,123,108	8,832	8,149
Placer	151,540	25,927	26,070	170,762	28,169	28,324
Plumas	15,023	8,987	10,383	14,838	9,764	11,281
Riverside	779,191	117,230	126,617	873,495	127,367	137,566
Sacramento	564,125	20,161	21,119	659,086	21,905	22,945
San Benito	18,276	5,081	5,583	20,399	5,521	6,066
San Bernardino	693,509	151,096	147,596	760,348	164,162	160,359
San Diego	1,152,920	74,653	80,429	1,275,615	81,108	87,383
San Francisco	360,189	756	0	374,953	822	0
San Joaquin	233,597	31,383	31,345	276,639	34,097	34,056
San Luis Obispo	115,232	29,904	29,855	130,078	32,490	32,436
San Mateo	269,592	7,368	7,111	283,804	8,005	7,726
Santa Barbara	155,467	11,893	12,785	168,614	12,921	13,890

County		2008 Projections			2013 Projections	
		Units with OWTS			Units with OWTS	
	Total Housing Units[1]	Census-Based Estimate[2]	CWTRC-Based Estimate[3]	Total Housing Units[4]	Census-Based Projection[5]	CWTRC-Based Projection[6]
Santa Clara	623,202	21,973	21,245	664,852	23,873	23,082
Santa Cruz	104,444	30,978	29,847	112,648	33,657	32,428
Shasta	78,137	32,230	31,885	87,002	35,017	34,642
Sierra	2,259	1,692	1,701	2,339	1,838	1,848
Siskiyou	23,446	10,557	10,913	23,463	11,470	11,857
Sonoma	198,450	49,661	48,483	224,752	53,955	52,675
Stanislaus	180,063	31,161	29,474	199,146	33,856	32,023
Sutter	33,804	12,931	13,050	36,282	14,050	14,178
Tehama	26,472	14,315	15,284	27,462	15,553	16,606
Trinity	8,392	6,500	6,474	8,119	7,062	7,034
Tulare	138,061	37,976	38,283	152,137	41,260	41,594
Tuolumne	30,611	17,825	17,905	34,679	19,366	19,453
Ventura	277,984	17,946	18,674	296,109	19,498	20,289
Yolo	74,893	5,531	5,774	91,935	6,009	6,273
Yuba	27,594	7,408	7,363	29,306	8,049	8,000
Total	13,551,786	1,323,533	1,344,314	14,723,621	1,437,980	1,460,559

Notes and sources:

[1] Estimated for 2008 by adjusting 2006 county-level housing estimates made by the California Department of Finance (2006) by the average annual population growth rate for each county projected by the California Department of Finance (2007) for the 2000–2010 period.

[2] Estimated for 2008 by assuming that future statewide on-site wastewater treatment system (OWTS) usage, on a percentage basis, will be the same as the 1990 Census rate (9.8%). This rate was applied to the projected total number of housing units statewide in 2008 to arrive at an estimate of the total number of housing units using OWTS within the state. These units were then distributed among the counties based on each county's percentage share of statewide OWTS in 1990.

[3] Estimated for 2008 by assuming that future statewide OWTS usage, on a percentage basis, will be the same as the 1999 CWTRC rate (9.9%). This rate was applied to the projected total number of housing units statewide in 2008 to arrive at an estimate of the total number of housing units using OWTS within the state. These units were then distributed among the counties based on each county's percentage share of statewide OWTS in 1999.

[4] Housing unit projections for 2013 were developed by interpolating between 2010 and 2020 population levels for each county, as projected by the California Department of Finance (2007), and then dividing the resulting 2013 population level by the average number of persons per housing unit in each county, as estimated by the California Department of Finance (2006).

[5] Projected to 2013 by assuming that future statewide OWTS usage, on a percentage basis, will be the same as the 1990 U.S. Census rate (9.8%). This rate was applied to the projected total number of housing units statewide in 2013 to arrive at an estimate of the total number of housing units using OWTS within the state. These units were then distributed among the counties based on each county's percentage share of statewide OWTS in 1990.

[6] Projected to 2013 by assuming that future statewide OWTS usage, on a percentage basis, will be the same as the 1999 CWTRC rate (9.9%). This rate was applied to the projected total number of housing units statewide in 2013 to arrive at an estimate of the total number of housing units using OWTS within the state. These units were then distributed among the counties based on each county's percentage share of statewide OWTS in 1999.

4.6.4 Future Baseline (2013) Conditions

Two sets of OWTS usage projections for 2013 were developed, generally using the same two methods employed to develop 2008 projections. In summary, estimates were developed in the following manner:

1. Housing unit projections were developed for 2013.
2. Statewide percentages of OWTS usage from the 1990 Census and the 1999 CWTRC (2003) study were applied to the housing projections.
3. The projections of housing units statewide using OWTS were distributed among the counties based on county shares of statewide OWTS usage in 1990 and 1999.

The methodology used for the 2013 projections differed only in how the projections of total housing units at the county level were developed. For 2013, housing unit projections were developed by interpolating between 2010 and 2020 population levels for each county, as projected by the California Department of Finance (2007), and then dividing the resulting 2013 population levels by the average number of persons per housing unit in each county, as estimated by the California Department of Finance (2006).

This methodology resulted in a Census-based projection of 1,437,980 housing units using OWTS and a CWTRC-based projection of 1,460,559 housing units using OWTS in California in 2013 (Table 4-6), a difference of about 1.6%. These 2013 projections of OWTS usage represent an 8.6% increase in statewide OWTS usage compared to their respective 2008 projections of OWTS usage.

4.6.5 Businesses Using OWTS in California

In addition to household usage, OWTS are used by a small percentage of businesses in the state. No information, however, is available from the U.S. Census Bureau concerning historical or current numbers of businesses using OWTS in California. Sonoma County (2007) conducted a survey of USEPA Class V wells[7] within the county. Sonoma County identified 904 parcels as commercial or industrial in nature and utilizing OWTS (Table 4-7). Of these, 102 OWTS met the USEPA's Class V large-capacity criterion, and 271 OWTS met the USEPA's Class V industrial/commercial criterion. The remaining 531 OWTS were discharging "sanitary" waste from offices, warehouses, retail stores, self-storage facilities, etc. Businesses account for approximately 2% of all OWTS users in Sonoma County (see Table 4-6 for the number of household OWTS in Sonoma County),

The number and percentage of businesses using OWTS vary from county to county depending on many factors, including the size of a county, the number of businesses

[7] Class V wells are typically shallow "wells," such as shallow disposal systems and dry wells, used to place a variety of fluids directly below the land surface (40 CFR 144.80 (e)). A septic system is considered a Class V well if either one of the following conditions are met:

- The septic system, regardless of size, receives any amount of industrial or commercial wastewater; or
- The septic system receives solely sanitary waste from multiple family residences or a non-residential establishment and has the capacity to serve 20 or more persons per day (also known as large-capacity septic systems).

within a county, and whether businesses in a county are concentrated in sewered areas or spread out in non-sewered areas. Discussions with USEPA staff, however, suggest that the 2% value from Sonoma County is considered to be fairly representative of the percentage of OWTS used by businesses statewide (Elizabeth Janes, USEPA, Region 9, pers. comm., 2007).

Table 4-7: Businesses within Sonoma County Utilizing OWTS

Business Type	Number of Businesses
Auto Sales/Storage (does not involve car fluids)	23
Auto Service	47
Beauty/Barber	2
Camp	15
Care Homes (includes residential treatment centers, group homes)	36
Church/Meeting Hall	49
Food Prep/Bar	104
Hotel/Motel	16
Light Manufacturing/Industrial	84
Misc. (did not fit any category)	37
Mixed Use	15
Multi-Residential	2
Nurseries	41
Poultry Farms	8
Schools	22
Store/Office/Self-Storage	167
Vet/Kennel/Medical	13
Warehouse	14
Winery	175
Unknown	34
Total	**904**

Source: Sonoma County (2007)

4.7 Contaminants of Concern

Groundwater exposed to a contaminant plume emanating from conventional OWTS effluent will likely exceed water quality objectives for nitrate and can contain other dissolved contaminants or pathogens (viruses and/or bacteria) not removed by the OWTS (Robertson 1995). Table 4-8 summarizes the major types of contaminants, or pollutants, found in OWTS discharges and briefly describes the primary reasons why pollutants such as pathogens and nitrogen are a concern.

Table 4-8: Typical Wastewater Pollutants of Concern

Pollutant	Reason for Concern
Total suspended solids and turbidity	In surface waters affected by surfacing on-site wastewater treatment system (OWTS) effluent, suspended solids can cause sludge deposits to develop that smother benthic macroinvertebrates and fish eggs and can contribute to benthic enrichment, toxicity, and sediment oxygen demand. Solids also harbor bacteria. Excessive turbidity resulting from solids that remain suspended can block sunlight, harm aquatic life (e.g., by blocking sunlight needed by plants), and lower the ability of aquatic plants to increase dissolved oxygen in the water column. In drinking water, turbidity is aesthetically displeasing and interferes with disinfection.
Biochemical oxygen demand	Biological stabilization of organics in the water column can deplete dissolved oxygen in surface waters, creating anoxic conditions harmful to aquatic life. Oxygen-reducing conditions in groundwater and surface waters can also cause taste and odor problems in drinking water.
Pathogens	Parasites, bacteria, and viruses can cause diseases through direct and indirect body contact or ingestion of contaminated water or shellfish. A particular threat occurs when OWTS effluent pools on the ground surface or migrates to recreational waters. Some pathogens (e.g., viruses and bacteria) in groundwater or surface waters can travel a significant distance.
Nitrogen	Nitrogen is an aquatic plant nutrient that can contribute to increased growth of aquatic plants and thus the loss of dissolved oxygen in surface waters, especially in lakes, estuaries, and coastal embayments. Algae and aquatic weeds can contribute trihalomethane (THM) precursors to the water column that may generate carcinogenic THMs in chlorinated drinking water. Excessive nitrate-nitrogen in drinking water can cause pregnancy complications for women and methemoglobinemia (blue baby syndrome) in infants. Livestock can suffer health

Table 4-8: Typical Wastewater Pollutants of Concern

Pollutant	Reason for Concern
	problems from drinking water high in nitrogen.
Phosphorus	Phosphorus is an aquatic plant nutrient that can contribute to increased growth of aquatic plants, including algae, which results in a reduction of dissolved oxygen in inland and coastal surface waters. Algae and aquatic weeds can contribute trihalomethane (THM) precursors to the water column that may generate carcinogenic THMs in chlorinated drinking water.
Toxic organic compounds	A variety of regulated organic compounds exist that cause direct toxicity to humans and aquatic life via skin contact and ingestion. Organic compounds present in household chemicals and cleaning agents can interfere with certain biological processes in alternative OWTS. They can be persistent pollutants in groundwater and contaminate down-gradient sources of drinking water. Some organic compounds accumulate and concentrate in ecosystem food chains.
Heavy metals	Heavy metals like lead and mercury in drinking water cause human health problems. In the aquatic ecosystem, they can be also toxic to aquatic life and accumulate in fish and shellfish that might be consumed by humans.
Dissolved inorganic compounds	Chloride and sulfide cause taste and odor problems in drinking water. Boron, sodium, chlorides, sulfate, and other solutes may limit treated wastewater reuse options (e.g., irrigation). Sodium and, to a lesser extent, potassium can be deleterious to soil structure and OWTS dispersal system performance. Total dissolved solids can pollute water to levels that render it unusable for domestic and agricultural purposes.
Endocrine disrupting compounds	The presence of common hormones, drugs, and chemicals contained in personal care products (e.g., shampoo, cleaning products, and pharmaceuticals) in wastewater and receiving water bodies is an emerging water quality and public health issue. Endocrine-disrupting compounds (EDCs) are substances that alter endocrine system function and consequently cause adverse health effects on organisms or their offspring. Only recently has it been recognized that EDCs are present in water bodies of the United States at a high frequency; however, measured concentrations have been low and usually below drinking water standards for compounds having such standards. Specific studies have found EDCs in sufficient quantity that they could potentially cause endocrine disruption in some fish. The extent of human health risks and dose responses to EDCs in concentrations at the low levels found in the environment are still unknown.

Source: Adapted from USEPA 2002 and Tchobanoglous and Burton 1991

4.7.1 Supplemental Treatment Performance

To varying degrees, different treatment components and supplemental treatment units described in section 4.5 reduce the concentrations of contaminants in effluent from OWTS before it is discharged to the dispersal system. Table 4-9 provides estimates of the ranges of typical contaminant concentrations in septic tank effluent with and without effluent filters and the effluent discharged from each major type of supplemental treatment unit.

Table 4-9: Wastewater Constituent Concentrations by Treatment System Type

Treatment System Type	Typical Effluent Constituent Concentrations				
	Biological Oxygen Demand (mg/l)	Total Suspended Solids (mg/l)	Total Nitrogen (mg/l)	Total Phosphor us (mg/l)	Fecal Coliform Bacteria (MPN/100 ml)
Septic Tank					
Without effluent filters	150–250	40–140	50–90	12–20	10^6 to 10^8
With effluent filters	100–140	20–55	50–90	12–20	10^6 to 10^8
Aerobic Treatment Systems					
Suspended growth	<5 to <50	<5 to 60	<5 to 60	<1 to >10	<2 to $<4x10^5$
Attached growth	<5 to <30	<5 to <30	<10 to >60	<1 to 15	<2 to $<10^5$
Anoxic systems	<10 to <50	<10 to <60	<10 to <20	<5	$<5x10^3$

Notes: mg/L = milligram per liter; MPN/100 ml = Most Probable Number per 100 milliliters
Source: Data compiled from Crites and Tchobanoglous 1998, USEPA 2002, and Leverenz, Tchobanoglous, and Darby 2002

Table 4-9 provides a summary of typical effluent concentrations expected after pretreatment using different treatment technologies. This table was prepared based on a review of data presented in Crites and Tchobanoglous (1998), Siegrist *et al.* (2001), and Leverenz, Tchobanoglous, and Darby (2002). The ranges identified in these sources were not always identical. Therefore, the ranges provided represent the low and high end of all the data sources reviewed. Disinfection systems are not included in Table 4-9. Data on disinfection system performance are not readily available in the literature.

Effluent concentration data for some constituents of concern listed in **Table 4-8** are not readily available in the literature. Sources of these constituents, their potential effects, possible source control measures, and factors affecting removal of these constituents by OWTS is discussed in the following narrative.

4.7.2 Occurrence of Other Constituents of Concern

4.7.2.1 Organic Wastewater Compounds

Household, industrial, and agricultural pesticides; pharmaceuticals; and endocrine-disrupting compounds are newly recognized classes of organic compounds that are often associated with wastewater. These organic wastewater compounds are characterized by high usage rates, potential health effects, and continuous release into the environment through human activities (Halling-Sørensen *et al.* 1998, Daughton and Ternes 1999). Organic wastewater compounds can enter the environment through a variety of sources and may not be completely removed in wastewater treatment systems (Richardson and Bowron 1985, Ternes 1998, Ternes *et al.* 1999) resulting in potentially continuous sources of organic wastewater compounds to surface water and groundwater.

The continual introduction of organic wastewater compounds into the environment may have undesirable effects on humans and animals (Daughton and Ternes 1999). Much of the concern has focused on the potential for endocrine disruption (change in normal processes in the endocrine system) in fish. Field investigations in Europe and the United States suggest that selected organic wastewater compounds (nonionic-detergent metabolites, plasticizers, pesticides, and natural or synthetic sterols and hormones) have caused changes in the endocrine systems of fish (Purdom *et al*. 1994, Jobling and Sumpter 1993, Folmar *et al*. 1996, Goodbred *et al.* 1997, Folmar *et al.* 2001).

An additional concern is the introduction of antibiotics and other pharmaceuticals into the environment. Antibiotics and other pharmaceuticals administered to humans and animals are not always completely metabolized and are excreted in urine or feces as the original product or as metabolites (Daughton and Ternes 1999). The introduction of antibiotics into the environment may result in strains of bacteria that become resistant to antibiotic treatment (Daughton and Ternes 1999).

Toxic organic compounds (TOCs), which are usually found in household products like solvents and cleaners, are also of concern. The TOCs that have been found to be the most prevalent in wastewater are 1, 4-dichlorobenzene, methylbenzene (toluene), dimethylbenzenes (xylenes), 1,1-dichloroethane, 1,1,1-trychloroethane, and dimethylketone (acetone). No studies are known to have been conducted to determine toxic organic treatment efficiency in single-family home septic tanks. A study of toxic organics in domestic wastewater and effluent from a community septic tank found that removal of low molecular-weight alkalized benzenes (*e.g.*, toluene, xylene) was noticeable, whereas virtually no removal was noted for higher molecular-weight compounds (DeWalle *et al.* 1985). Removal efficiency was observed to be directly related to tank detention time, which is directly related to settling efficiency. It should be noted that significantly high levels of toxic organic compounds can cause tank (and biomat) microorganisms to die off, which could reduce treatment performance. On-site systems that discharge high amounts of toxic organic compounds might be subject to USEPA's Class V Underground Injection Control Program and to other applicable California environmental regulations and statutes other than AB 885.

4.7.2.2 Dissolved Inorganic Compounds

Total Dissolved Solids

Total dissolved solids (TDS) is a measure of the combined content of inorganic and organic substances that can pass through a filter in water or wastewater. The most common constituents of TDS are calcium, phosphate, nitrates, sodium, magnesium, potassium and chloride. The principal application of TDS is in the study of water quality for streams, rivers and lakes, although TDS is generally considered not as a primary pollutant (*e.g.*, it is not deemed to be associated with health effects), but it is rather used as an indication of the aesthetic characteristics of drinking water.

Nitrates

Nitrate is a salt of nitric acid with an ion composed of one nitrogen and three oxygen atoms (NO_3). It is the naturally occurring chemical that remains after animal or human waste breaks down or decomposes. Excessive nitrate in drinking water can cause pregnancy complications for women and methemoglobenemia in infants.

Chlorides

Chloride concentration in wastewater is an important parameter regarding wastewater reuse applications. In wastewater, chlorides are added through usage. For example, human excreta, contains approximately 6 grams of chlorides per person per day. In areas where the hardness of water is high, use of regeneration-type water softeners will also add large quantities of chlorides. Conventional methods of wastewater treatment do not remove chloride to any substantial extent. In one study, chloride concentrations in septic tank effluent were found to range from <40 to >100 milligrams per liter (mg/l) (Anderson *et al.* 1994).

Sulfides

Sulfate ion occurs naturally in most water supplies and is also present in wastewater. Sulfate is reduced biologically, under anaerobic conditions, to sulfide, which, in turn, can combine with hydrogen to form hydrogen sulfide. Hydrogen sulfide can then be oxidized biologically to sulfuric acid, which can be corrosive to concrete.

Heavy Metals

Studies have found the presence of some metals in septic tank effluent (Otis *et al.* 1978, DeWalle *et al.* 1985). Metals can be present in the domestic waste stream because many commonly used household products contain metals. Aging interior plumbing systems may contribute lead, cadmium, and copper (Canter and Knox 1986). Other sources include vegetable matter and human excreta. Removal of sources of metals from the wastewater stream by altering user habits and implementing alternative disposal practices is recommended. In addition, the literature suggests that improving treatment processes by increasing septic tank detention times, ensuring greater unsaturated soil depths, and improving dose and rest cycles may decrease risks associated with metal loadings from on-site systems (Chang and Page 1985, Evanko and Dzombak 1997**,** Lim *et al.* 2001).

4.8 Impaired Surface Waters

The two major contaminants of surface waters related to OWTS are pathogens and nutrients. There are 641 water bodies included in the 2010 303(d) listing of impaired water bodies of California for pathogens and/or nutrients (Table 4-10)[8]. OWTS near the water bodies listed in **Table 4-11** are required to comply with Tier 3 requirements.

4.9 OWTS Discharge Prohibition Areas

The State Water Board and Regional Water Boards have broad jurisdiction to protect water quality in the state under the Porter-Cologne Act and delegated provisions of the federal Clean Water Act. Section 303(d) impaired surface water listing, waste discharge requirements (WDRs), and total maximum daily loads (TMDLs) are important tools used to protect water quality and reduce contamination of waters of the state (both groundwater and surface waters).

Where OWTS are specifically identified as being a primary source of contamination, another means of enforcing water quality standards is the adoption by Regional Water Boards of OWTS discharge prohibition areas (Table 4-12). Section 13243 of the California Water Code stipulates that a "Regional Water Board, in a water quality control plan or in waste discharge requirements, may specify certain conditions or areas where the discharge of waste, or certain types of waste, will not be permitted." Furthermore, Sections 13280, 13281, and 13283 of the California Water Code specifically address steps necessary for the regional water boards to enact a prohibition of OWTS. With this

[8] The State Water Board approved the 2010 Integrated Report on August 4, 2010. The 2010 Integrated Report includes changes to the 2006 Clean Water Act Section 303(d) list of impaired water bodies and Clean Water Act Section 305(b) report on the quality of waters in California. The 2010 Integrated Report and supporting documents were submitted to the USEPA for final approval on October 13, 2010.

On November 12, 2010, USEPA approved the inclusion of all waters to California's 2008-2010 Section 303(d) list of impaired waters requiring TMDLs and disapproved the omission of several water bodies and associated pollutants that meet federal listing requirements. USEPA is providing the public an opportunity to review its decision to add waters and pollutants to California's 2008-2010 Section 303(d) list. USEPA will consider public comments received and may revise these decisions. The State Water Board will post the final Integrated Report after USEPA approves California's 2008-2010 Section 303(d) list.

The disapproved omissions have been included in Table 4-10.

authority, the State Water Board may approve, revise, or deny adoption of a discharge prohibition area for OWTS for other discharges. An example of this is the Los Osos/Baywood Park Individual and Community Sewage Disposal System Prohibition Area (Resolution 83-13, Central Coast Regional Water Board), which was adopted after the Regional Water Board determined that septic systems were responsible for elevated coliform and nitrate levels in the watershed. There are 61 OWTS discharge prohibition areas in California (**Table 4-12**).

Table 4-10: 2010 303(d) Water Bodies Listed for Pathogens and/or Nutrients

Water Body Name	Water Body Type	Pollutant Category	TMDL Status
Region 1			
Bodega HU, Estero Americano HA, Americano Creek	River & Stream	Nutrients	TMDL required
Bodega HU, Estero Americano HA, estuary	Estuary	Nutrients	TMDL required
Bodega HU, Estero de San Antonio HA, Stemple Creek/Estero de San Antonio	River & Stream	Nutrients	being addressed by USEPA approved TMDL
Campbell Cove	Coastal & Bay Shoreline	Pathogens	TMDL required
Clam Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Eel River HU, Lower Eel River HA (includes the Eel River Delta)	River & Stream	Nutrients	TMDL required
Hare Creek Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Klamath River HU, Butte Valley HA	River & Stream	Nutrients	TMDL required
Klamath River HU, Lost River HA, Tule Lake and Mt Dome HSAs	River & Stream	Nutrients	being addressed by USEPA approved TMDL
Klamath River HU, Lower HA, Klamath Glen HSA	River & Stream	Nutrients	TMDL required
Klamath River HU, Middle HA and Lower HA, Scott River to Trinity River	River & Stream	Nutrients	TMDL required
Klamath River HU, Middle HA, Iron Gate Dam to Scott River	River & Stream	Nutrients	TMDL required
Klamath River HU, Middle HA, Oregon to Iron Gate	River & Stream	Nutrients	TMDL required
Klamath River HU, Shasta River HA	River & Stream	Nutrients	being addressed by USEPA approved TMDL
Luffenholtz Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Moonstone County Park	Coastal & Bay Shoreline	Pathogens	TMDL required
Pudding Creek Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Russian River HU, Lower Russian River HA, Guerneville HSA	River & Stream	Pathogens	TMDL required
Russian River HU, Lower Russian River HA, Guerneville HSA, Green Valley Creek watershed	River & Stream	Nutrients & Pathogens	TMDL required
Russian River HU, Middle Russian River HA, Geyserville HSA	River & Stream	Pathogens	TMDL required

Table 4-10: 2010 303(d) Water Bodies Listed for Pathogens and/or Nutrients			
Water Body Name	**Water Body Type**	**Pollutant Category**	**TMDL Status**
Russian River HU, Middle Russian River HA, Laguna de Santa Rosa	River & Stream	Nutrients & Pathogens	TMDL required
Russian River HU, Middle Russian River HA, Santa Rosa Creek	River & Stream	Pathogens	TMDL required
Trinidad State Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Region 2			
Aquatic Park Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Arroyo Las Positas	River & Stream	Nutrients	TMDL required
Candlestick Point	Coastal & Bay Shoreline	Pathogens	TMDL required
Chicken Ranch Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
China Camp Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Crissy Field Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Golden Hinde Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Hearts Desire Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Islais Creek	Estuary	Nutrients	TMDL required
Lagunitas Creek	River & Stream	Nutrients & Pathogens	TMDL required for Nutrients Pathogens being addressed by USEPA approved TMDL
Lake Merced	Lake & Reservoir	Nutrients	TMDL required
Lake Merritt	Lake & Reservoir	Nutrients	TMDL required
Lawsons Landing	Coastal & Bay Shoreline	Pathogens	TMDL required
Marina Lagoon (San Mateo County)	Estuary	Pathogens	TMDL required
McNears Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Millerton Point	Coastal & Bay Shoreline	Pathogens	TMDL required
Mission Creek	Estuary	Nutrients	TMDL required
Napa River	River & Stream	Nutrients & Pathogens	TMDL required for Nutrients Pathogens being addressed by USEPA approved TMDL
Olema Creek	River & Stream	Pathogens	being addressed by USEPA approved TMDL
Pacific Ocean at Baker Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean at Bolinas Beach	Coastal & Bay Shoreline	Pathogens	TMDL required

Table 4-10: 2010 303(d) Water Bodies Listed for Pathogens and/or Nutrients			
Water Body Name	**Water Body Type**	**Pollutant Category**	**TMDL Status**
Pacific Ocean at Fitzgerald Marine Reserve	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean at Muir Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean at Pacifica State/Linda Mar Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean at Pillar Point Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean at Rockaway Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean at Venice Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Petaluma River	River & Stream	Nutrients & Pathogens	TMDL required
Petaluma River (tidal portion)	River & Stream	Nutrients & Pathogens	TMDL required
Pomponio Creek	River & Stream	Pathogens	TMDL required
Richardson Bay	Bay & Harbor	Pathogens	TMDL required
San Gregorio Creek	River & Stream	Pathogens	TMDL required
San Pedro Creek	River & Stream	Pathogens	TMDL required
San Vicente Creek	River & Stream	Pathogens	TMDL required
Sonoma Creek	River & Stream	Nutrients & Pathogens	TMDL required for nutrients Pathogens being addressed by USEPA approved TMDL
Suisun Creek	River & Stream	Nutrients	TMDL required
Suisun Marsh Wetlands	Wetland, Tidal	Nutrients	TMDL required
Tomales Bay	Bay & Harbor	Nutrients & Pathogens	TMDL required for nutrients Pathogens being addressed by USEPA approved TMDL
Walker Creek	River & Stream	Nutrients & Pathogens	TMDL required for nutrients Pathogens being addressed by USEPA approved TMDL
Region 3			
Alamo Creek	River & Stream	Pathogens	TMDL required
Alisal Creek (Monterey County)	River & Stream	Nutrients & Pathogens	TMDL required
Alisal Slough (Monterey County)	River & Stream	Nutrients	TMDL required
Aptos Creek	River & Stream	Pathogens	TMDL required
Arana Gulch	River & Stream	Pathogens	TMDL required
Arroyo Burro Creek	River & Stream	Pathogens	TMDL required
Arroyo De La Cruz	River & Stream	Nutrients & Pathogens	TMDL required
Arroyo Grande Creek (below Lopez Lake)	River & Stream	Pathogens	TMDL required
Arroyo Paredon	River & Stream	Nutrients & Pathogens	TMDL required

Table 4-10: 2010 303(d) Water Bodies Listed for Pathogens and/or Nutrients

Water Body Name	Water Body Type	Pollutant Category	TMDL Status
Arroyo Seco River	River & Stream	Pathogens	TMDL required
Atascadero Creek (San Luis Obispo County)	River & Stream	Nutrients & Pathogens	TMDL required
Atascadero Creek (Santa Barbara county)	River & Stream	Nutrients & Pathogens	TMDL required
Beach Road Ditch	River & Stream	Nutrients	TMDL required
Bell Creek (Santa Barbara Co)	River & Stream	Nutrients & Pathogens	TMDL required
Bennett Slough	River & Stream	Nutrients	TMDL required
Blanco Drain	River & Stream	Nutrients	TMDL required
Blosser Channel	River & Stream	Nutrients & Pathogens	TMDL required
Bradley Canyon Creek	River & Stream	Nutrients	TMDL required
Bradley Canyon Creek	River & Stream	Nutrients & Pathogens	TMDL required
Bradley Channel	River & Stream	Nutrients & Pathogens	TMDL required
Branciforte Creek	River & Stream	Pathogens	TMDL required
Canada De La Gaviota	River & Stream	Pathogens	TMDL required
Canada Del Refugio	River & Stream	Pathogens	TMDL required
Carbonera Creek	River & Stream	Nutrients & Pathogens	Nutrients being addressed by USEPA approved TMDL TMDL needed for pathogens
Carnadero Creek	River & Stream	Nutrients & Pathogens	TMDL required
Carneros Creek (Monterey County)	River & Stream	Nutrients & Pathogens	TMDL required
Carpinteria Creek	River & Stream	Nutrients & Pathogens	TMDL required
Carpinteria Marsh (El Estero Marsh)	Estuary	Nutrients	TMDL required
Cholame Creek	River & Stream	Nutrients & Pathogens	TMDL required
Chorro Creek	River & Stream	Nutrients & Pathogens	Both being addressed by USEPA approved TMDL
Chualar Creek	River & Stream	Nutrients & Pathogens	TMDL required
Chumash Creek	River & Stream	Pathogens	TMDL required
Cieneguitas Creek	River & Stream	Nutrients & Pathogens	TMDL required
Corcoran Lagoon	Wetland, Freshwater	Pathogens	TMDL required
Corralitos Creek	River & Stream	Pathogens	TMDL required
Cuyama River (above Twitchell Reservoir)	River & Stream	Pathogens	TMDL required
Dairy Creek	River & Stream	Nutrients & Pathogens	Both being addressed with USEPA approved TMDL
Devereux Creek	River & Stream	Nutrients & Pathogens	TMDL required

Table 4-10: 2010 303(d) Water Bodies Listed for Pathogens and/or Nutrients

Water Body Name	Water Body Type	Pollutant Category	TMDL Status
Elkhorn Slough	Estuary	Nutrients & Pathogens	TMDL required
Esperanza Creek	River & Stream	Nutrients	TMDL required
Espinosa Slough	River & Stream	Nutrients	TMDL required
Estrella River	River & Stream	Pathogens	TMDL required
Franklin Creek (Santa Barbara County)	River & Stream	Nutrients & Pathogens	TMDL required
Furlong Creek	River & Stream	Nutrients & Pathogens	TMDL required
Gabilan Creek	River & Stream	Nutrients & Pathogens	TMDL required
Gallighan Slough	River & Stream	Pathogens	Being addressed by USEPA approved TMDL
Glen Annie Canyon	River & Stream	Nutrients & Pathogens	TMDL required
Goleta Slough/Estuary	Estuary	Pathogens	TMDL required
Greene Valley Creek (Santa Barbara County)	River & Stream	Nutrients	TMDL required
Hanson Slough	River & Stream	Pathogens	Being addressed by USEPA approved TMDL
Harkins Slough	River & Stream	Nutrients & Pathogens	TMDL required for nutrients Pathogens being addressed by USEPA approved TMDL
Little Oso Flaco Creek	River & Stream	Nutrients & Pathogens	TMDL required
Llagas Creek (below Chesbro Reservoir)	River & Stream	Nutrients & Pathogens	Nutrients being addressed by USEPA approved TMDL TMDL required for pathogens
Lockhart Gulch	River & Stream	Nutrients	TMDL required
Lompico Creek	River & Stream	Nutrients & Pathogens	Nutrients being addressed by USEPA approved TMDL TMDL required for pathogens
Los Berros Creek	River & Stream	Nutrients	TMDL required
Los Carneros Creek	River & Stream	Nutrients & Pathogens	TMDL required
Los Osos Creek	River & Stream	Nutrients & Pathogens	Both being addressed by USEPA approved TMDL
Main Street Canal	River & Stream	Nutrients & Pathogens	TMDL required
Majors Creek (Monterey County)	River & Stream	Pathogens	TMDL required
Maria Ygnacio Creek	River & Stream	Pathogens	TMDL required
McGowan Ditch	River & Stream	Nutrients	TMDL required
Merrit Ditch	River & Stream	Nutrients	TMDL required
Millers Canal	River & Stream	Nutrients & Pathogens	TMDL required
Mission Creek (Santa Barbara County)	River & Stream	Nutrients & Pathogens	TMDL required

Table 4-10: 2010 303(d) Water Bodies Listed for Pathogens and/or Nutrients			
Water Body Name	**Water Body Type**	**Pollutant Category**	**TMDL Status**
Moore Creek	River & Stream	Nutrients & Pathogens	TMDL required
Moro Cojo Slough	Estuary	Nutrients & Pathogens	TMDL required
Morro Bay	Bay & Harbor	Nutrients & Pathogens	TMDL required for nutrients Pathogens being addressed by USEPA approved TMDL
Moss Landing Harbor	Bay & Harbor	Nutrients & Pathogens	TMDL required
Natividad Creek	River & Stream	Nutrients & Pathogens	TMDL required
Nipomo Creek	River & Stream	Nutrients & Pathogens	TMDL required
Nobel Gulch Creek	River & Stream	Pathogens	TMDL required
North Main Street Channel	River & Stream	Nutrients	TMDL required
Old Salinas River	River & Stream	Nutrients & Pathogens	TMDL required
Old Salinas River Estuary	Estuary	Nutrients	TMDL required
Orcutt Creek	River & Stream	Nutrients & Pathogens	TMDL required
Oso Flaco Creek	River & Stream	Nutrients & Pathogens	TMDL required
Oso Flaco Lake	Lake & Reservoir	Nutrients	TMDL required
Pacheco Creek	River & Stream	Nutrients & Pathogens	TMDL required
Pacific Ocean at Arroyo Burro Beach (Santa Barbara County)	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean at Avila Beach (Avila Pier)	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean at Avila Beach (SLO creek mouth)	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean at Capitola Beach (Santa Cruz County)	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean at Carpinteria State Beach (Carpinteria Creek mouth, Santa Barbara County)	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean at Cayucos (Cayucos Creek Mouth)	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean at East Beach (mouth of Mission Creek, Santa Barbara County)	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean at East Beach (mouth of Sycamore Creek, Santa Barbara County)	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean at Goleta Beach (Santa Barbara County)	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean at Hammonds Beach (Santa Barbara County)	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean at Haskells Beach (Santa Barbara County)	Coastal & Bay Shoreline	Pathogens	TMDL required

Table 4-10: 2010 303(d) Water Bodies Listed for Pathogens and/or Nutrients			
Water Body Name	**Water Body Type**	**Pollutant Category**	**TMDL Status**
Pacific Ocean at Hope Ranch Beach (Santa Barbara County)	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean at Jalama Beach (Santa Barbara County)	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean at Leadbetter Beach (Santa Barbara County)	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean at Ocean Beach (Santa Barbara County)	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean at Olde Port Beach (at restrooms)	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean at Pismo State Beach (San Luis Obispo County), south of Pismo Pier	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean at Point Rincon (mouth of Rincon Cr, Santa Barbara County)	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean at Refugio Beach (Santa Barbara County)	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean at Stillwater Cove Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Pajaro River	River & Stream	Nutrients & Pathogens	Nutrients being addressed by USEPA approved TMDL TMDL required for pathogens
Pennington Creek	River & Stream	Pathogens	TMDL required
Pico Creek	River & Stream	Nutrients	TMDL required
Pinto Lake	Lake & Reservoir	Nutrients	TMDL required
Pismo Creek	River & Stream	Nutrients & Pathogens	TMDL required
Porter Gulch Creek	River & Stream	Pathogens	TMDL required
Prefumo Creek	River & Stream	Nutrients & Pathogens	TMDL required
Quail Creek	River & Stream	Nutrients & Pathogens	TMDL required
Rincon Creek	River & Stream	Pathogens	TMDL required
Salinas Reclamation Canal	River & Stream	Nutrients & Pathogens	TMDL required
Salinas River (lower, estuary to near Gonzales Rd crossing, watersheds 30910 and 30920)	River & Stream	Nutrients & Pathogens	TMDL required
Salinas River (middle, near Gonzales Rd crossing to confluence with Nacimiento River)	River & Stream	Pathogens	TMDL required
Salinas River Lagoon (North)	Estuary	Nutrients	TMDL required
Salsipuedes Creek (Santa Cruz County)	River & Stream	Nutrients & Pathogens	TMDL required
San Antonio Creek (San Antonio Watershed, Rancho del las Flores Bridge at Hwy 135 to downstream at Railroad Bridge)	River & Stream	Nutrients & Pathogens	TMDL required

Table 4-10: 2010 303(d) Water Bodies Listed for Pathogens and/or Nutrients			
Water Body Name	**Water Body Type**	**Pollutant Category**	**TMDL Status**
San Antonio River (below San Antonio Reservoir)	River & Stream	Pathogens	TMDL required
San Benito River	River & Stream	Pathogens	TMDL required
San Bernardo Creek	River & Stream	Pathogens	TMDL required
San Jose Creek (Santa Barbara County)	River & Stream	Pathogens	TMDL required
San Juan Creek (San Benito County)	River & Stream	Nutrients & Pathogens	TMDL required
San Lorenzo Creek (Monterey County)	River & Stream	Pathogens	TMDL required
San Lorenzo River	River & Stream	Nutrients & Pathogens	Nutrients being addressed by USEPA approved TMDL TMDL required for pathogens
San Lorenzo River Lagoon	Estuary	Pathogens	TMDL required
San Luis Obispo Creek (above Osos Street)	River & Stream	Pathogens	TMDL required
San Luis Obispo Creek (below Osos Street)	River & Stream	Nutrients & Pathogens	Both being addressed by USEPA approved TMDL
San Luisito Creek	River & Stream	Pathogens	TMDL required
San Pedro Creek (Santa Barbara County)	River & Stream	Pathogens	TMDL required
San Simeon Creek	River & Stream	Nutrients	TMDL required
Santa Maria River	River & Stream	Nutrients & Pathogens	TMDL required
Santa Maria River Estuary	Estuary	Pathogens	TMDL required
Santa Monica Creek	River & Stream	Pathogens	TMDL required
Santa Rita Creek (Monterey County)	River & Stream	Nutrients & Pathogens	TMDL required
Santa Ynez River (below city of Lompoc to Ocean)	River & Stream	Nutrients & Pathogens	TMDL required
Schwan Lake	Lake & Reservoir	Nutrients & Pathogens	TMDL required
Shingle Mill Creek	River & Stream	Nutrients	Being addressed by USEPA approved TMDL
Soda Lake	Saline Lake	Nutrients	TMDL required
Soquel Creek	River & Stream	Pathogens	TMDL required
Soquel Lagoon	Estuary	Pathogens	TMDL required
Stenner Creek	River & Stream	Pathogens	TMDL required
Struve Slough	River & Stream	Nutrients & Pathogens	TMDL required for nutrients Pathogens being addressed by USEPA approved TMDL
Sycamore Creek	River & Stream	Pathogens	TMDL required
Tembladero Slough	River & Stream	Nutrients & Pathogens	TMDL required
Tequisquita Slough	River & Stream	Nutrients & Pathogens	TMDL required
Toro Canyon Creek	River & Stream	Pathogens	TMDL required
Toro Creek	River & Stream	Nutrients & Pathogens	TMDL required
Tres Pinos Creek	River & Stream	Pathogens	TMDL required
Tularcitos Creek	River & Stream	Pathogens	TMDL required

Table 4-10: 2010 303(d) Water Bodies Listed for Pathogens and/or Nutrients

Water Body Name	Water Body Type	Pollutant Category	TMDL Status
Uvas Creek (below Uvas Reservoir)	River & Stream	Nutrients	TMDL required
Valencia Creek	River & Stream	Pathogens	TMDL required
Walters Creek	River & Stream	Pathogens	TMDL required
Warden Creek	River & Stream	Nutrients & Pathogens	Both being addressed by USEPA approved TMDL
Watsonville Creek	River & Stream	Nutrients & Pathogens	TMDL required
Watsonville Slough	River & Stream	Nutrients & Pathogens	TMDL required for nutrients Pathogens being addressed by USEPA approved TMDL
Zayante Creek	River & Stream	Pathogens	TMDL required
Region 4			
Abalone Cove Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Alamitos Bay	Bay & Harbor	Pathogens	TMDL required
Aliso Canyon Wash	River & Stream	Pathogens	TMDL required
Arroyo Seco Reach 1 (LA River to West Holly Ave.)	River & Stream	Pathogens	TMDL required
Arroyo Seco Reach 2 (West Holly Ave to Devils Gate Dam)	River & Stream	Pathogens	TMDL required
Artesia-Norwalk Drain	River & Stream	Pathogens	TMDL required
Avalon Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Ballona Creek	River & Stream	Pathogens	Being addressed by USEPA approved TMDL
Ballona Creek Estuary	River & Stream	Pathogens	Being addressed by USEPA approved TMDL
Bell Creek	River & Stream	Pathogens	TMDL required
Big Rock Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Bluff Cove Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Brown Barranca/Long Canyon	River & Stream	Nutrients	Being addressed by USEPA approved TMDL
Bull Creek	River & Stream	Pathogens	TMDL required
Burbank Western Channel	River & Stream	Pathogens	TMDL required
Cabrillo Beach (Outer)	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Calleguas Creek Reach 1 (was Mugu Lagoon on 1998 303(d) list)	Estuary	Nutrients	Being addressed by USEPA approved TMDL
Calleguas Creek Reach 2 (estuary to Potrero Rd- was Calleguas Creek Reaches 1 and 2 on 1998 303d list)	River & Stream	Nutrients & Pathogens	Nutrients being addressed by USEPA approved TMDL TMDL required for pathogens
Calleguas Creek Reach 3 (Potrero Road upstream to confluence with Conejo Creek on 1998 303d list)	River & Stream	Nutrients	Being addressed by USEPA approved TMDL
Calleguas Creek Reach 4 (was Revolon Slough Main Branch: Mugu Lagoon to Central Avenue on 1998 303d list)	River & Stream	Nutrients & Pathogens	Nutrients being addressed by USEPA approved TMDL TMDL required for pathogens

Table 4-10: 2010 303(d) Water Bodies Listed for Pathogens and/or Nutrients

Water Body Name	Water Body Type	Pollutant Category	TMDL Status
Calleguas Creek Reach 5 (was Beardsley Channel on 1998 303d list)	River & Stream	Nutrients	Being addressed by USEPA approved TMDL
Calleguas Creek Reach 6 (was Arroyo Las Posas Reaches 1 and 2 on 1998 303d list)	River & Stream	Nutrients & Pathogens	Nutrients being addressed by USEPA approved TMDL TMDL required for pathogens
Calleguas Creek Reach 7 (was Arroyo Simi Reaches 1 and 2 on 1998 303d list)	River & Stream	Nutrients & Pathogens	Nutrients being addressed by USEPA approved TMDL TMDL required for pathogens
Calleguas Creek Reach 9A (was lower part of Conejo Creek Reach 1 on 1998 303d list)	River & Stream	Nutrients & Pathogens	Nutrients being addressed by USEPA approved TMDL TMDL required for pathogens
Calleguas Creek Reach 9B (was part of Conejo Creek Reaches 1 and 2 on 1998 303d list)	River & Stream	Nutrients & Pathogens	Nutrients being addressed by USEPA approved TMDL TMDL required for pathogens
Calleguas Creek Reach 10 (Conejo Creek (Hill Canyon)-was part of Conejo Crk Reaches 2 & 3, and lower Conejo Crk/Arroyo Conejo N Fk on 1998 303d list)	River & Stream	Nutrients & Pathogens	Nutrients being addressed by USEPA approved TMDL TMDL required for pathogens
Calleguas Creek Reach 11 (Arroyo Santa Rosa, was part of Conejo Creek Reach 3 on 1998 303d list)	River & Stream	Nutrients & Pathogens	Nutrients being addressed by USEPA approved TMDL TMDL required for pathogens
Calleguas Creek Reach 12 (was Conejo Creek/Arroyo Conejo North Fork on 1998 303d list)	River & Stream	Nutrients	Being addressed by USEPA approved TMDL
Calleguas Creek Reach 13 (Conejo Creek South Fork, was Conejo Cr Reach 4 and part of Reach 3 on 1998 303d list)	River & Stream	Nutrients	Being addressed by USEPA approved TMDL
Canada Larga (Ventura River Watershed)	River & Stream	Nutrients & Pathogens	TMDL required
Carbon Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Castlerock Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Channel Islands Harbor Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Colorado Lagoon	Wetland, Tidal	Pathogens	TMDL required
Compton Creek	River & Stream	Pathogens	TMDL required
Coyote Creek	River & Stream	Nutrients & Pathogens	Nutrients being addressed with action other than TMDL TMDL required for pathogens
Coyote Creek, North Fork	River & Stream	Pathogens	TMDL required
Crystal Lake	Lake & Reservoir	Nutrients	TMDL required
Dan Blocker Memorial (Coral) Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Dockweiler Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Dominguez Channel (lined portion above Vermont Ave)	River & Stream	Nutrients & Pathogens	TMDL required

Table 4-10: 2010 303(d) Water Bodies Listed for Pathogens and/or Nutrients			
Water Body Name	**Water Body Type**	**Pollutant Category**	**TMDL Status**
Dominguez Channel Estuary (unlined portion below Vermont Ave)	Estuary	Nutrients & Pathogens	TMDL required
Dry Canyon Creek	River & Stream	Pathogens	TMDL required
Duck Pond Agricultural Drains/Mugu Drain/Oxnard Drain No 2	River & Stream	Nutrients	Being addressed by USEPA approved TMDL
Echo Park Lake	Lake & Reservoir	Nutrients	TMDL required
El Dorado Lakes	Lake & Reservoir	Nutrients	TMDL required
Elizabeth Lake	Lake & Reservoir	Nutrients	TMDL required
Escondido Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Flat Rock Point Beach Area	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Fox Barranca (tributary to Calleguas Creek Reach 6)	River & Stream	Nutrients	Being addressed by USEPA approved TMDL
Hermosa Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Hobie Beach (Channel Islands Harbor)	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Inspiration Point Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
La Costa Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Lake Calabasas	Lake & Reservoir	Nutrients	TMDL required
Lake Hughes	Lake & Reservoir	Nutrients	TMDL required
Lake Lindero	Lake & Reservoir	Nutrients	Being addressed by USEPA approved TMDL
Lake Sherwood	Lake & Reservoir	Nutrients	Being addressed by USEPA approved TMDL
Las Flores Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Las Tunas Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Las Virgenes Creek	River & Stream	Nutrients & Pathogens	Both being addressed by USEPA approved TMDL
Legg Lake	Lake & Reservoir	Nutrients	TMDL required
Leo Carillo Beach (South of County Line)	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Lincoln Park Lake	Lake & Reservoir	Nutrients	TMDL required
Lindero Creek Reach 1	River & Stream	Nutrients & Pathogens	Both being addressed by USEPA approved TMDL
Lindero Creek Reach 2 (Above Lake)	River & Stream	Nutrients & Pathogens	Both being addressed by USEPA approved TMDL

Table 4-10: 2010 303(d) Water Bodies Listed for Pathogens and/or Nutrients

Water Body Name	Water Body Type	Pollutant Category	TMDL Status
Long Beach City Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Long Point Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Los Angeles Harbor - Inner Cabrillo Beach Area	Bay & Harbor	Pathogens	Being addressed by USEPA approved TMDL
Los Angeles River Reach 1 (Estuary to Carson Street)	River & Stream	Nutrients & Pathogens	Nutrients being addressed by USEPA approved TMDL TMDL required for pathogens
Los Angeles River Reach 2 (Carson to Figueroa Street)	River & Stream	Nutrients & Pathogens	Nutrients being addressed by USEPA approved TMDL TMDL required for pathogens
Los Angeles River Reach 3 (Figueroa St. to Riverside Dr.)	River & Stream	Nutrients	Being addressed by USEPA approved TMDL
Los Angeles River Reach 4 (Sepulveda Dr. to Sepulveda Dam)	River & Stream	Nutrients & Pathogens	Nutrients being addressed by USEPA approved TMDL TMDL required for pathogens
Los Angeles River Reach 5 (within Sepulveda Basin)	River & Stream	Nutrients	Being addressed by USEPA approved TMDL
Los Angeles River Reach 6 (Above Sepulveda Flood Control Basin)	River & Stream	Pathogens	TMDL required
Los Angeles/Long Beach Inner Harbor	Bay & Harbor	Pathogens	TMDL required
Los Cerritos Channel	Wetland, Tidal	Nutrients & Pathogens	TMDL required
Lunada Bay Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Machado Lake (Harbor Park Lake)	Lake & Reservoir	Nutrients	Being addressed by USEPA approved TMDL
Malaga Cove Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Malibou Lake	Lake & Reservoir	Nutrients	Being addressed by USEPA approved TMDL
Malibu Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Malibu Creek	River & Stream	Nutrients & Pathogens	Both being addressed by USEPA approved TMDL
Malibu Lagoon	Estuary	Nutrients & Pathogens	Both being addressed by USEPA approved TMDL
Malibu Lagoon Beach (Surfrider)	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Manhattan Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Marina del Rey Harbor - Back Basins	Bay & Harbor	Pathogens	Being addressed by USEPA approved TMDL
Marina del Rey Harbor Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
McCoy Canyon Creek	River & Stream	Nutrients & Pathogens	TMDL required
McGrath Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL

Table 4-10: 2010 303(d) Water Bodies Listed for Pathogens and/or Nutrients			
Water Body Name	**Water Body Type**	**Pollutant Category**	**TMDL Status**
McGrath Lake	Lake & Reservoir	Pathogens	TMDL required
Medea Creek Reach 1 (Lake to Confl. with Lindero)	River & Stream	Nutrients & Pathogens	Both being addressed by USEPA approved TMDL
Medea Creek Reach 2 (Abv Confl. with Lindero)	River & Stream	Nutrients & Pathogens	Both being addressed by USEPA approved TMDL
Mint Canyon Creek Reach 1 (Confl to Rowler Cyn)	River & Stream	Nutrients	Being addressed by USEPA approved TMDL
Munz Lake	Lake & Reservoir	Nutrients	TMDL required
Nicholas Canyon Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Ormond Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Palo Comado Creek	River & Stream	Pathogens	Being addressed by USEPA approved TMDL
Palo Verde Shoreline Park Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Paradise Cove Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Peck Road Park Lake	Lake & Reservoir	Nutrients	TMDL required
Peninsula Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Point Dume Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Point Fermin Park Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Point Vicente Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Portuguese Bend Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Promenade Park Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Puddingstone Reservoir	Lake & Reservoir	Nutrients	TMDL required
Puente Creek	River & Stream	Pathogens	TMDL required
Puerco Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Redondo Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Resort Point Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Rincon Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Rio De Santa Clara/Oxnard Drain No. 3	River & Stream	Nutrients	Being addressed by USEPA approved TMDL
Rio Hondo Reach 1 (Confl. LA River to Snt Ana Fwy)	River & Stream	Pathogens	TMDL required

Table 4-10: 2010 303(d) Water Bodies Listed for Pathogens and/or Nutrients			
Water Body Name	**Water Body Type**	**Pollutant Category**	**TMDL Status**
Rio Hondo Reach 2 (At Spreading Grounds)	River & Stream	Pathogens	TMDL required
Robert H. Meyer Memorial Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Royal Palms Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
San Antonio Creek (Tributary to Ventura River Reach 4)	River & Stream	Nutrients & Pathogens	TMDL required
San Buenaventura Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
San Gabriel River Estuary	River & Stream	Nutrients	TMDL required
San Gabriel River Reach 1 (Estuary to Firestone)	River & Stream	Pathogens	TMDL required
San Gabriel River Reach 2 (Firestone to Whittier Narrows Dam	River & Stream	Pathogens	TMDL required
San Gabriel River Reach 3 (Whittier Narrows to Ramona)	River & Stream	Pathogens	TMDL required
San Jose Creek Reach 1 (SG Confluence to Temple St.)	River & Stream	Nutrients & Pathogens	Being addressed by action other than TMDL
San Jose Creek Reach 2 (Temple to I-10 at White Ave.)	River & Stream	Pathogens	TMDL required
Santa Clara River Estuary	Estuary	Nutrients & Pathogens	TMDL required
Santa Clara River Reach 3 (Freeman Diversion to A Street)	River & Stream	Nutrients	Being addressed by USEPA approved TMDL
Santa Clara River Reach 5 (Blue Cut gaging station to West Pier Hwy 99 Bridge) (was named Santa Clara River Reach 7 on 2002 303(d) list)	River & Stream	Pathogens	TMDL required
Santa Clara River Reach 6 (W Pier Hwy 99 to Bouquet Cyn Rd) (was named Santa Clara River Reach 8 on 2002 303(d) list)	River & Stream	Pathogens	TMDL required
Santa Clara River Reach 7 (Bouquet Canyon Rd to above Lang Gaging Station) (was named Santa Clara River Reach 9 on 2002 303(d) list)	River & Stream	Pathogens	TMDL required
Santa Monica Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Santa Monica Canyon	River & Stream	Pathogens	Being addressed by USEPA approved TMDL
Sawpit Creek	River & Stream	Pathogens	TMDL required
Sea Level Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Sepulveda Canyon	River & Stream	Nutrients & Pathogens	TMDL required for nutrients Pathogens being addressed by USEPA approved TMDL
Stokes Creek	River & Stream	Pathogens	Being addressed by USEPA approved TMDL
Surfers Point at Seaside	Coastal & Bay Shoreline	Pathogens	TMDL required

Table 4-10: 2010 303(d) Water Bodies Listed for Pathogens and/or Nutrients			
Water Body Name	**Water Body Type**	**Pollutant Category**	**TMDL Status**
Topanga Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Torrance Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Torrance Carson Channel	River & Stream	Pathogens	TMDL required
Torrey Canyon Creek	River & Stream	Nutrients	Being addressed by USEPA approved TMDL
Trancas Beach (Broad Beach)	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Tujunga Wash (LA River to Hansen Dam)	River & Stream	Nutrients & Pathogens	Nutrients being addressed by USEPA approved TMDL TMDL required for pathogens
Venice Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Ventura Harbor: Ventura Keys	Bay & Harbor	Pathogens	TMDL required
Ventura River Estuary	River & Stream	Nutrients & Pathogens	TMDL required
Ventura River Reach 1 and 2 (Estuary to Weldon Canyon)	River & Stream	Nutrients	TMDL required
Ventura River Reach 3 (Weldon Canyon to Confl. w/ Coyote Cr)	River & Stream	Pathogens	TMDL required
Verdugo Wash Reach 1 (LA River to Verdugo Rd.)	River & Stream	Pathogens	TMDL required
Verdugo Wash Reach 2 (Above Verdugo Road)	River & Stream	Pathogens	TMDL required
Walnut Creek Wash (Drains from Puddingstone Res)	River & Stream	Pathogens	TMDL required
Westlake Lake	Lake & Reservoir	Nutrients	Being addressed by USEPA approved TMDL
Wheeler Canyon/Todd Barranca	River & Stream	Nutrients	Being addressed by USEPA approved TMDL
Whites Point Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Will Rogers Beach	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Wilmington Drain	River & Stream	Pathogens	TMDL required
Zuma Beach (Westward Beach)	Coastal & Bay Shoreline	Pathogens	Being addressed by USEPA approved TMDL
Region 5			
Anderson Creek (Shasta County)	River & Stream	Pathogens	TMDL required
Ash Creek, Upper	River & Stream	Pathogens	TMDL required
Avena Drain	River & Stream	Nutrients & Pathogens	TMDL required
Bear Creek (from Bear Valley to San Joaquin River, Mariposa and Merced Counties)	River & Stream	Pathogens	TMDL required
Bear Creek (San Joaquin and Calaveras Counties; partly in Delta Waterways, eastern portion)	River & Stream	Nutrients & Pathogens	TMDL required
Beaver Creek	River & Stream	Pathogens	TMDL required

Table 4-10: 2010 303(d) Water Bodies Listed for Pathogens and/or Nutrients

Water Body Name	Water Body Type	Pollutant Category	TMDL Status
Butte Slough	River & Stream	Nutrients	TMDL required
Calaveras River, Lower (from Stockton Diverting Canal to the San Joaquin River; partly in Delta Waterways, eastern portion)	River & Stream	Nutrients & Pathogens	TMDL required for nutrients Pathogens being addressed by USEPA approved TMDL
Canyon Creek (Modoc County)	River & Stream	Pathogens	TMDL required
Clear Lake	Lake & Reservoir	Nutrients	Being addressed by USEPA approved TMDL
Clover Creek	River & Stream	Pathogens	TMDL required
Colusa Basin Drain	River & Stream	Nutrients & Pathogens	TMDL required
Coon Creek, Lower (from Pacific Avenue to Main Canal, Sutter County)	River & Stream	Pathogens	TMDL required
Cosumnes River, Lower (below Michigan Bar; partly in Delta Waterways, eastern portion)	River & Stream	Pathogens	TMDL required
Cottonwood Creek (S Madera County)	River & Stream	Pathogens	TMDL required
Curtis Creek (Tuolumne County)	River & Stream	Pathogens	TMDL required
Deadman Creek (Merced County)	River & Stream	Pathogens	TMDL required
Del Puerto Creek	River & Stream	Pathogens	TMDL required
Delta Waterways (Stockton Ship Channel)	Estuary	Nutrients & Pathogens	Both being addressed by USEPA approved TMDL
Dry Creek (tributary to Tuolumne River at Modesto, E Stanislaus County)	River & Stream	Pathogens	TMDL required
Duck Creek (San Joaquin County)	River & Stream	Pathogens	TMDL required
Duck Slough (Merced County)	River & Stream	Pathogens	TMDL required
Five Mile Slough (Alexandria Place to Fourteen Mile Slough; in Delta Waterways, eastern portion)	River & Stream	Nutrients & Pathogens	TMDL required for nutrients Pathogens being addressed by USEPA approved TMDL
French Camp Slough (confluence of Littlejohns and Lone Tree Creeks to San Joaquin River, San Joaquin Co.; partly in Delta Waterways, eastern portion)	River & Stream	Nutrients & Pathogens	TMDL required
French Ravine	River & Stream	Pathogens	TMDL required
Fresno River (Above Hensley Reservoir to confl w Nelder Creek and Lewis Fork)	River & Stream	Nutrients	TMDL required
Gordon Slough (from headwaters and Goodnow Slough to Adams Canal, Yolo County)	River & Stream	Nutrients	TMDL required
Grayson Drain (at outfall)	River & Stream	Pathogens	TMDL required
Harding Drain	River & Stream	Pathogens	TMDL required
Hensley Lake	Lake & Reservoir	Nutrients	TMDL required
Honcut Creek (Butte and Yuba Counties)	River & Stream	Nutrients	TMDL required
Hospital Creek (San Joaquin and Stanislaus Counties)	River & Stream	Pathogens	TMDL required
Hume Lake	Lake & Reservoir	Nutrients	TMDL required

Table 4-10: 2010 303(d) Water Bodies Listed for Pathogens and/or Nutrients			
Water Body Name	**Water Body Type**	**Pollutant Category**	**TMDL Status**
Ingram Creek (from confluence with San Joaquin River to confluence with Hospital Creek)	River & Stream	Pathogens	TMDL required
Isabella Lake	Lake & Reservoir	Nutrients	TMDL required
Kellogg Creek (Los Vaqueros Reservoir to Discovery Bay; partly in Delta Waterways, western portion)	River & Stream	Nutrients & Pathogens	TMDL required
Knights Landing Ridge Cut (Yolo County)	River & Stream	Nutrients	TMDL required
Littlejohns Creek	River & Stream	Pathogens	TMDL required
Live Oak Slough	River & Stream	Nutrients	TMDL required
Lone Tree Creek	River & Stream	Nutrients & Pathogens	TMDL required
Los Banos Creek (below Los Banos Reservoir, Merced County)	River & Stream	Nutrients & Pathogens	TMDL required
Main Drainage Canal	River & Stream	Nutrients	TMDL required
Marsh Creek (Marsh Creek Reservoir to San Joaquin River; partly in Delta Waterways, western portion)	River & Stream	Pathogens	TMDL required
Merced River, Lower (McSwain Reservoir to San Joaquin River)	River & Stream	Pathogens	TMDL required
Middle River (in Delta Waterways, southern portion)	River & Stream	Nutrients	TMDL required
Miners Ravine (Placer County)	River & Stream	Nutrients	TMDL required
Mokelumne River, Lower (in Delta Waterways, eastern portion)	River & Stream	Nutrients	TMDL required
Mormon Slough (Commerce Street to Stockton Deep Water Channel; partly in Delta Waterways, eastern portion)	River & Stream	Nutrients & Pathogens	TMDL required
Mormon Slough (Stockton Diverting Canal to Commerce Street)	River & Stream	Pathogens	TMDL required
Mosher Slough (downstream of I-5; in Delta Waterways, eastern portion)	River & Stream	Nutrients & Pathogens	TMDL required
Mosher Slough (upstream of I-5; partly in Delta Waterways, eastern portion)	River & Stream	Pathogens	TMDL required
Mud Slough, North (upstream of San Luis Drain)	River & Stream	Pathogens	TMDL required
Newman Wasteway	River & Stream	Nutrients & Pathogens	TMDL required
Oak Run Creek	River & Stream	Pathogens	TMDL required
Old River (San Joaquin River to Delta-Mendota Canal; in Delta Waterways, southern portion)	River & Stream	Nutrients	TMDL required
Orestimba Creek (above Kilburn Road)	River & Stream	Pathogens	TMDL required
Orestimba Creek (below Kilburn Road)	River & Stream	Pathogens	TMDL required
Pit River (from confluence of N and S forks to Shasta Lake)	River & Stream	Nutrients	TMDL required

Table 4-10: 2010 303(d) Water Bodies Listed for Pathogens and/or Nutrients			
Water Body Name	**Water Body Type**	**Pollutant Category**	**TMDL Status**
Pixley Slough (San Joaquin County; partly in Delta Waterways, eastern portion)	River & Stream	Nutrients & Pathogens	TMDL required
Pleasant Grove Creek	River & Stream	Nutrients	TMDL required
Pleasant Grove Creek, South Branch	River & Stream	Nutrients	TMDL required
Ramona Lake (Fresno County)	Lake & Reservoir	Pathogens	TMDL required
Rattlesnake Creek (at confluence w Mokelumne River, N Fork)	River & Stream	Pathogens	TMDL required
Sacramento Slough	River & Stream	Nutrients	TMDL required
Salado Creek (Stanislaus County)	River & Stream	Pathogens	TMDL required
Salt Slough (upstream from confluence with San Joaquin River)	River & Stream	Pathogens	TMDL required
San Joaquin River (Bear Creek to Mud Slough)	River & Stream	Pathogens	TMDL required
San Joaquin River (Mud Slough to Merced River)	River & Stream	Pathogens	TMDL required
San Joaquin River (Stanislaus River to Delta Boundary)	River & Stream	Pathogens	TMDL required
Sand Creek (Colusa County)	River & Stream	Nutrients	TMDL required
Sand Creek (tributary to Marsh Creek, Contra Costa County; partly in Delta Waterways, western portion)	River & Stream	Pathogens	TMDL required
Smith Canal (in Delta Waterways, eastern portion)	River & Stream	Nutrients & Pathogens	TMDL required
South Cow Creek	River & Stream	Pathogens	TMDL required
Spring Creek (Colusa County)	River & Stream	Nutrients	TMDL required
Stone Corral Creek	River & Stream	Nutrients	TMDL required
Sullivan Creek (from Phoenix Reservoir to Don Pedro Lake, Tuolumne County)	River & Stream	Pathogens	TMDL required
Sycamore Slough (Yolo County)	River & Stream	Nutrients	TMDL required
Temple Creek	River & Stream	Nutrients	TMDL required
Tom Paine Slough (in Delta Waterways, southern portion)	River & Stream	Nutrients	TMDL required
Tule Canal (Yolo County)	River & Stream	Pathogens	TMDL required
Turner Slough (Merced County)	River & Stream	Pathogens	TMDL required
Walker Slough (partly in Delta Waterways, eastern portion)	River & Stream	Pathogens	Being addressed by USEPA approved TMDL
Westley Wasteway (Stanislaus County)	Lake & Reservoir	Pathogens	TMDL required
Willow Creek (Lassen County, Central Valley)	River & Stream	Pathogens	TMDL required
Willow Slough Bypass (Yolo County)	River & Stream	Pathogens	TMDL required
Wolf Creek (Nevada County)	River & Stream	Pathogens	TMDL required
Woods Creek (Tuolumne County)	River & Stream	Pathogens	TMDL required
Region 6			
Blackwood Creek	River & Stream	Nutrients	TMDL required
Bridgeport Reservoir	Lake & Reservoir	Nutrients	TMDL required

Table 4-10: 2010 303(d) Water Bodies Listed for Pathogens and/or Nutrients			
Water Body Name	**Water Body Type**	**Pollutant Category**	**TMDL Status**
Buckeye Creek	River & Stream	Pathogens	Being addressed by action other than TMDL
Carson River, West Fork (Headwaters to Woodfords)	River & Stream	Nutrients	TMDL required
Carson River, West Fork (Paynesville to State Line)	River & Stream	Pathogens	TMDL required
Carson River, West Fork (Woodfords to Paynesville)	River & Stream	Nutrients & Pathogens	TMDL required
Cold Creek	River & Stream	Nutrients	Being addressed by action other than TMDL
Crowley Lake	Lake & Reservoir	Nutrients	TMDL required
Eagle Lake (Lassen County)	Lake & Reservoir	Nutrients	TMDL required
East Walker River, above Bridgeport Reservoir	River & Stream	Pathogens	Being addressed by action other than TMDL
General Creek	River & Stream	Nutrients	TMDL required
Heavenly Valley Creek (source to USFS boundary)	River & Stream	Nutrients	TMDL required
Hilton Creek	River & Stream	Nutrients	TMDL required
Indian Creek (Alpine County)	River & Stream	Pathogens	TMDL required
Indian Creek Reservoir	Lake & Reservoir	Nutrients	Being addressed by USEPA approved TMDL
Pleasant Valley Reservoir	Lake & Reservoir	Nutrients	TMDL required
Robinson Creek (Hwy 395 to Bridgeport Res)	River & Stream	Pathogens	Being addressed by action other than TMDL
Robinson Creek (Twin Lakes to Hwy 395)	River & Stream	Pathogens	Being addressed by action other than TMDL
Sheep Creek	River & Stream	Nutrients	TMDL required
Susan River (Headwaters to Susanville)	River & Stream	Nutrients	TMDL required
Swauger Creek	River & Stream	Nutrients & Pathogens	TMDL required
Tahoe, Lake	Lake & Reservoir	Nutrients	TMDL required
Tallac Creek (below Hwy 89)	River & Stream	Pathogens	TMDL required
Trout Creek (above Hwy 50)	River & Stream	Nutrients & Pathogens	TMDL required
Trout Creek (below Hwy 50)	River & Stream	Nutrients & Pathogens	TMDL required
Truckee River, Upper (above Christmas Valley)	River & Stream	Nutrients	TMDL required
Truckee River, Upper (below Christmas Valley)	River & Stream	Nutrients	TMDL required
Ward Creek	River & Stream	Nutrients	TMDL required
Region 7			
Alamo River	River & Stream	Pathogens	TMDL required
Coachella Valley Storm Water Channel	River & Stream	Pathogens	TMDL required

Table 4-10: 2010 303(d) Water Bodies Listed for Pathogens and/or Nutrients

Water Body Name	Water Body Type	Pollutant Category	TMDL Status
New River (Imperial County)	River & Stream	Nutrients & Pathogens	TMDL required for nutrients Pathogens being addressed by USEPA approved TMDL
Palo Verde Outfall Drain and Lagoon	River & Stream	Pathogens	TMDL required
Salton Sea	Saline Lake	Nutrients & Pathogens	TMDL required
Region 8			
Big Bear Lake	Lake & Reservoir	Nutrients	Being addressed by USEPA approved TMDL
Bolsa Chica Channel	River & Stream	Nutrients & Pathogens	TMDL required (Pathogens added by USEPA)
Borrego Creek (from Irvine Blvd to San Diego Creek Reach 2)	River & Stream	Nutrients & Pathogens	TMDL required (Pathogens added by USEPA)
Buck Gully Creek	River & Stream	Pathogens	TMDL required
Canyon Lake (Railroad Canyon Reservoir)	Lake & Reservoir	Nutrients & Pathogens	Nutrients being addressed by USEPA approved TMDL TMDL required for pathogens
Chino Creek Reach 1A (Santa Ana River R5 confl to just downstream of confl with Mill Creek)	River & Stream	Nutrients & Pathogens	TMDL required for nutrients Pathogens being addressed by USEPA approved TMDL
Chino Creek Reach 1B (Mill Creek confl to start of concrete lined channel)	River & Stream	Nutrients & Pathogens	TMDL required for nutrients Pathogens being addressed by USEPA approved TMDL
Chino Creek Reach 2 (Beginning of concrete channel to confl w San Antonio Creek)	River & Stream	Pathogens	Being addressed by USEPA approved TMDL
Cucamonga Creek Reach 1 (Valley Reach)	River & Stream	Pathogens	Being addressed by USEPA approved TMDL
East Garden Grove Wintersburg Channel	River & Stream	Nutrients	TMDL required
Elsinore, Lake	Lake & Reservoir	Nutrients	Being addressed by USEPA approved TMDL
Fulmor, Lake	Lake & Reservoir	Pathogens	TMDL required
Goldenstar Creek	River & Stream	Pathogens	TMDL required (added by USEPA)
Grout Creek	River & Stream	Nutrients	TMDL required
Huntington Harbour	Bay & Harbor	Pathogens	TMDL required
Knickerbocker Creek	River & Stream	Pathogens	TMDL required
Los Trancos Creek (Crystal Cove Creek)	River & Stream	Pathogens	TMDL required
Lytle Creek	River & Stream	Pathogens	TMDL required
Mill Creek (Prado Area)	River & Stream	Nutrients & Pathogens	TMDL required for nutrients Pathogens being addressed by USEPA approved TMDL
Mill Creek Reach 1	River & Stream	Pathogens	TMDL required
Mill Creek Reach 2	River & Stream	Pathogens	TMDL required
Morning Canyon Creek	River & Stream	Pathogens	TMDL required (added by USEPA)
Mountain Home Creek	River & Stream	Pathogens	TMDL required
Mountain Home Creek, East Fork	River & Stream	Pathogens	TMDL required

Table 4-10: 2010 303(d) Water Bodies Listed for Pathogens and/or Nutrients			
Water Body Name	**Water Body Type**	**Pollutant Category**	**TMDL Status**
Newport Bay, Lower (entire lower bay, including Rhine Channel, Turning Basin and South Lido Channel to east end of H-J Moorings)	Bay & Harbor	Nutrients & Pathogens	Both being addressed by USEPA approved TMDL
Newport Bay, Upper (Ecological Reserve)	Estuary	Nutrients & Pathogens	Both being addressed by USEPA approved TMDL
Newport Slough	River & Stream	Pathogens	TMDL required
Peters Canyon Channel	River & Stream	Pathogens	TMDL required (added by USEPA)
Prado Park Lake	Lake & Reservoir	Nutrients & Pathogens	TMDL required for nutrients Pathogens being addressed by USEPA approved TMDL
Rathbone (Rathbun) Creek	River & Stream	Nutrients	TMDL required
San Diego Creek Reach 1	River & Stream	Nutrients & Pathogens	Nutrients being addressed by USEPA approved TMDL TMDL required for pathogens
San Diego Creek Reach 2	River & Stream	Nutrients & Pathogens	Nutrients being addressed by USEPA approved TMDL TMDL required for pathogens (Pathogens added by USEPA)
Santa Ana Delhi Channel	River & Stream	Pathogens	TMDL required (added by USEPA)
Santa Ana River, Reach 2	River & Stream	Pathogens	TMDL required (added by USEPA)
Santa Ana River, Reach 3	River & Stream	Pathogens	Being addressed by USEPA approved TMDL
Santa Ana River, Reach 4	River & Stream	Pathogens	TMDL required
Seal Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Serrano Creek	River & Stream	Nutrients & Pathogens	TMDL required (Pathogens added by USEPA)
Silverado Creek	River & Stream	Pathogens	TMDL required
Summit Creek	River & Stream	Nutrients	TMDL required
Temescal Creek, Reach 6 (Elsinore Groundwater sub-basin boundary to Lake Elsinore Outlet)	River & Stream	Pathogens	TMDL required (added by USEPA)
Region 9			
Agua Hedionda Creek	River & Stream	Nutrients & Pathogens	TMDL required
Aliso Creek	River & Stream	Nutrients & Pathogens	TMDL required
Aliso Creek (mouth)	Estuary	Pathogens	TMDL required
Arroyo Trabuco Creek	River & Stream	Nutrients	TMDL required
Barrett Lake	Lake & Reservoir	Nutrients	TMDL required
Buena Creek	River & Stream	Nutrients	TMDL required
Buena Vista Lagoon	Estuary	Nutrients & Pathogens	TMDL required
Chollas Creek	River & Stream	Nutrients & Pathogens	TMDL required
Cloverdale Creek	River & Stream	Nutrients	TMDL required
De Luz Creek	River & Stream	Nutrients	TMDL required

Table 4-10: 2010 303(d) Water Bodies Listed for Pathogens and/or Nutrients			
Water Body Name	**Water Body Type**	**Pollutant Category**	**TMDL Status**
El Capitan Lake	Lake & Reservoir	Nutrients	TMDL required
Escondido Creek	River & Stream	Nutrients & Pathogens	TMDL required
Famosa Slough and Channel	Estuary	Nutrients	TMDL required
Forester Creek	River & Stream	Pathogens	TMDL required
Guajome Lake	Lake & Reservoir	Nutrients	TMDL required
Hodges, Lake	Lake & Reservoir	Nutrients	TMDL required
Loma Alta Slough	Estuary	Nutrients & Pathogens	TMDL required
Long Canyon Creek (tributary to Murrieta Creek)	River & Stream	Pathogens	TMDL required
Los Penasquitos Creek	River & Stream	Nutrients & Pathogens	TMDL required
Loveland Reservoir	Lake & Reservoir	Nutrients	TMDL required
Miramar Reservoir	Lake & Reservoir	Nutrients	TMDL required
Mission Bay (area at mouth of Rose Creek only)	Bay & Harbor	Nutrients	TMDL required
Mission Bay (area at mouth of Tecolote Creek only)	Bay & Harbor	Nutrients	TMDL required
Mission Bay Shoreline, at Bahia Point	Coastal & Bay Shoreline	Pathogens	TMDL required
Mission Bay Shoreline, at Bonita Cove	Coastal & Bay Shoreline	Pathogens	TMDL required
Mission Bay Shoreline, at Campland	Coastal & Bay Shoreline	Pathogens	TMDL required
Mission Bay Shoreline, at De Anza Cove	Coastal & Bay Shoreline	Pathogens	TMDL required
Mission Bay Shoreline, at Fanual Park	Coastal & Bay Shoreline	Pathogens	TMDL required
Mission Bay Shoreline, at Leisure Lagoon	Coastal & Bay Shoreline	Pathogens	TMDL required
Mission Bay Shoreline, at North Crown Point	Coastal & Bay Shoreline	Pathogens	TMDL required
Mission Bay Shoreline, at Tecolote Shores	Coastal & Bay Shoreline	Pathogens	TMDL required
Mission Bay Shoreline, at Visitors Center	Coastal & Bay Shoreline	Pathogens	TMDL required
Morena Reservoir	Lake & Reservoir	Nutrients	TMDL required
Murray Reservoir	Lake & Reservoir	Nutrients	TMDL required
Murrieta Creek	River & Stream	Nutrients	TMDL required
Otay Reservoir, Lower	Lake & Reservoir	Nutrients	TMDL required

Table 4-10: 2010 303(d) Water Bodies Listed for Pathogens and/or Nutrients

Water Body Name	Water Body Type	Pollutant Category	TMDL Status
Pacific Ocean Shoreline, Aliso HSA, at Aliso Beach - middle	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Aliso HSA, at Aliso Creek mouth	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Batiquitos HSA, at Moonlight State Beach (Cottonwood Creek outlet)	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Coronado HA, at Silver Strand (north end, Oceanside)	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Dana Point HSA, at Aliso Beach at West Street	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Dana Point HSA, at Dana Point Harbor at Baby Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Dana Point HSA, at Salt Creek outlet at Monarch Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Imperial Beach Pier	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Laguna Beach HSA, at Main Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Loma Alta HSA, at Loma Alta Creek mouth	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Lower San Juan HSA, at North Beach Creek	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Lower San Juan HSA, at North Doheny State Park Campground	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Lower San Juan HSA, at San Juan Creek	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Lower San Juan HSA, at South Doheny State Park Campground	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Miramar Reservoir HA, at Los Penasquitos River mouth	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Otay Valley HA, at Carnation Ave and Camp Surf Jetty	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Point Loma HA, at Bermuda Ave	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, San Clemente HA, at Poche Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, San Clemente HA, at San Clemente City Beach at Pier	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, San Clemente HA, at San Clemente City Beach, North Beach	Coastal & Bay Shoreline	Pathogens	TMDL required

Table 4-10: 2010 303(d) Water Bodies Listed for Pathogens and/or Nutrients

Water Body Name	Water Body Type	Pollutant Category	TMDL Status
Pacific Ocean Shoreline, San Clemente HA, at South Capistrano Beach at Beach Road	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, San Clemente HA, at South Capistrano County Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, San Diego HU, at the San Diego River outlet, at Dog Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, San Dieguito HU, at San Dieguito Lagoon Mouth at San Dieguito River Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, San Elijo HSA, at Cardiff State Beach at San Elijo Lagoon	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, San Luis Rey HU, at San Luis Rey River mouth	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, San Mateo Canyon HA, at San Mateo Creek outlet	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Scripps HA, at Avenida de la Playa at La Jolla Shores Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Scripps HA, at Childrens Pool	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Scripps HA, at La Jolla Cove	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Scripps HA, at Pacific Beach Point , Pacific Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Scripps HA, at Ravina	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Scripps HA, at Vallecitos Court at La Jolla Shores Beach	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Tijuana HU, at 3/4 mile North of Tijuana River	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Tijuana HU, at end of Seacoast Drive	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Tijuana HU, at Monument Road	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Tijuana HU, at the US Border	Coastal & Bay Shoreline	Pathogens	TMDL required
Pacific Ocean Shoreline, Tijuana HU, at Tijuana River mouth	Coastal & Bay Shoreline	Pathogens	TMDL required
Prima Deshecha Creek	River & Stream	Nutrients	TMDL required
Rainbow Creek	River & Stream	Nutrients	Being addressed with USEPA approved TMDL
Redhawk Channel	River & Stream	Nutrients & Pathogens	TMDL required
San Diego Bay Shoreline, at Bayside Park (J Street)	Bay & Harbor	Pathogens	TMDL required
San Diego Bay Shoreline, at Spanish Landing	Bay & Harbor	Pathogens	TMDL required

Table 4-10: 2010 303(d) Water Bodies Listed for Pathogens and/or Nutrients

Water Body Name	Water Body Type	Pollutant Category	TMDL Status
San Diego Bay Shoreline, G Street Pier	Coastal & Bay Shoreline	Pathogens	TMDL required
San Diego Bay Shoreline, Shelter Island Shoreline Park	Coastal & Bay Shoreline	Pathogens	TMDL required
San Diego Bay Shoreline, Tidelands Park	Coastal & Bay Shoreline	Pathogens	TMDL required
San Diego Bay Shoreline, Vicinity of B St and Broadway Piers	Bay & Harbor	Pathogens	TMDL required
San Diego River (Lower)	River & Stream	Nutrients & Pathogens	TMDL required
San Dieguito River	River & Stream	Nutrients & Pathogens	TMDL required
San Elijo Lagoon	Estuary	Nutrients & Pathogens	TMDL required
San Juan Creek	River & Stream	Nutrients & Pathogens	TMDL required
San Juan Creek (mouth)	Estuary	Pathogens	TMDL required
San Luis Rey River, Lower (west of Interstate 15)	River & Stream	Nutrients & Pathogens	TMDL required
San Luis Rey River, Upper (east of Interstate 15)	River & Stream	Nutrients	TMDL required
San Marcos Creek	River & Stream	Nutrients	TMDL required
San Marcos Lake	Lake & Reservoir	Nutrients	TMDL required
San Vicente Creek (San Diego County)	River & Stream	Nutrients	TMDL required
San Vicente Reservoir	Lake & Reservoir	Nutrients	TMDL required
Santa Gertrudis Creek	River & Stream	Nutrients & Pathogens	TMDL required
Santa Margarita Lagoon	Estuary	Nutrients	TMDL required
Santa Margarita River (Lower)	River & Stream	Nutrients & Pathogens	TMDL required
Santa Margarita River (Upper)	River & Stream	Nutrients	TMDL required
Segunda Deshecha Creek	River & Stream	Nutrients	TMDL required
Sutherland Reservoir	Lake & Reservoir	Nutrients	TMDL required
Sweetwater Reservoir	Lake & Reservoir	Nutrients	TMDL required
Sweetwater River, Lower (below Sweetwater Reservoir)	River & Stream	Nutrients & Pathogens	TMDL required
Tecolote Creek	River & Stream	Nutrients & Pathogens	TMDL required
Temecula Creek	River & Stream	Nutrients	TMDL required
Tijuana River	River & Stream	Nutrients & Pathogens	TMDL required
Tijuana River Estuary	Estuary	Nutrients & Pathogens	TMDL required
Warm Springs Creek (Riverside County)	River & Stream	Nutrients & Pathogens	TMDL required

Table 4-11: Water Bodies from 2010 303(d) List Subject to Tier 3 Requirements

REGION NO.	REGION NAME	WATER BODY NAME	COUNTIES	TMDL or Assessment Completion Date
		PATHOGENS		
1	North Coast	Clam Beach	Humboldt	2020
1	North Coast	Luffenholtz Beach	Humboldt	2020
1	North Coast	Moonstone County Park	Humboldt	2020
1	North Coast	Russian River HU, Lower Russian River HA, Guerneville HSA, mainstem Russian River from Fife Creek to Dutch Bill Creek	Sonoma	2016
1	North Coast	Russian River HU, Lower Russian River HA, Guerneville HSA, Green Valley Creek watershed	Sonoma	2016
1	North Coast	Russian River HU, Middle Russian River HA, Geyserville HSA, mainstem Russian River at Healdsburg Memorial Beach and unnamed tributary at Fitch Mountain	Sonoma	2016
1	North Coast	Russian River HU, Middle Russian River HA, mainstem Laguna de Santa Rosa	Sonoma	2016
1	North Coast	Russian River HU, Middle Russian River HA, mainstem Santa Rosa Creek	Sonoma	2016
1	North Coast	Trinidad State Beach	Humboldt	2020
2	San Francisco Bay	China Camp Beach	Marin	2014
2	San Francisco Bay	Lawsons Landing	Marin	2015
2	San Francisco Bay	Pacific Ocean at Bolinas Beach	Marin	2014
2	San Francisco Bay	Pacific Ocean at Fitzgerald Marine Reserve	San Mateo	2016
2	San Francisco Bay	Pacific Ocean at Muir Beach	Marin	2015
2	San Francisco Bay	Pacific Ocean at Pillar Point Beach	San Mateo	2016
2	San Francisco Bay	Petaluma River	Marin, Sonoma	2017
2	San	Petaluma River (tidal portion)	Marin, Sonoma	2017

Table 4-11: Water Bodies from 2010 303(d) List Subject to Tier 3 Requirements				
REGION NO.	**REGION NAME**	**WATER BODY NAME**	**COUNTIES**	**TMDL or Assessment Completion Date**
	Francisco Bay			
2	San Francisco Bay	San Gregorio Creek	San Mateo	2019
3	Central Coast	Pacific Ocean at Point Rincon (mouth of Rincon Cr, Santa Barbara County)	Santa Barbara	2015
3	Central Coast	Rincon Creek	Santa Barbara, Ventura	2015
4	Los Angeles	Canada Larga (Ventura River Watershed)	Ventura	2017
4	Los Angeles	Coyote Creek	Los Angeles, Orange	2015
4	Los Angeles	Rincon Beach	Ventura	2017
4	Los Angeles	San Antonio Creek (Tributary to Ventura River Reach 4)	Ventura	2017
4	Los Angeles	San Gabriel River Reach 1 (Estuary to Firestone)	Los Angeles	2015
4	Los Angeles	San Gabriel River Reach 2 (Firestone to Whittier Narrows Dam	Los Angeles	2015
4	Los Angeles	San Gabriel River Reach 3 (Whittier Narrows to Ramona)	Los Angeles	2015
4	Los Angeles	San Jose Creek Reach 1 (SG Confluence to Temple St.)	Los Angeles	2015
4	Los Angeles	San Jose Creek Reach 2 (Temple to I-10 at White Ave.)	Los Angeles	2015
4	Los Angeles	Sawpit Creek	Los Angeles	2015
4	Los Angeles	Ventura River Reach 3 (Weldon Canyon to Confl. w/ Coyote Cr)	Ventura	2017
4	Los Angeles	Walnut Creek Wash (Drains from Puddingstone Res)	Los Angeles	2015
5	Central Valley	Wolf Creek (Nevada County)	Nevada, Placer	2020
5	Central Valley	Woods Creek (Tuolumne County)	Tuolumne	2020
7	Colorado River	Alamo River	Imperial	2017
7	Colorado River	Palo Verde Outfall Drain and Lagoon	Imperial, Riverside	2017
8	Santa Ana	Canyon Lake (Railroad Canyon Reservoir)	Riverside	2019
8	Santa Ana	Fulmor, Lake	Riverside	2019
8	Santa Ana	Goldenstar Creek	Riverside	2019
8	Santa Ana	Los Trancos Creek (Crystal Cove Creek)	Orange	2017
8	Santa Ana	Lytle Creek	San Bernardino	2019
8	Santa Ana	Mill Creek Reach 1	San Bernardino	2015

Table 4-11: Water Bodies from 2010 303(d) List Subject to Tier 3 Requirements

REGION NO.	REGION NAME	WATER BODY NAME	COUNTIES	TMDL or Assessment Completion Date
8	Santa Ana	Mill Creek Reach 2	San Bernardino	2015
8	Santa Ana	Morning Canyon Creek	Orange	2017
8	Santa Ana	Mountain Home Creek	San Bernardino	2019
8	Santa Ana	Mountain Home Creek, East Fork	San Bernardino	2019
8	Santa Ana	Silverado Creek	Orange	2017
8	Santa Ana	Peters Canyon Channel	Orange	2017
8	Santa Ana	Santa Ana River, Reach 2	Orange, Riverside	2019
8	Santa Ana	Temescal Creek, Reach 6 (Elsinore Groundwater sub basin boundary to Lake Elsinore Outlet)	Riverside	2019
8	Santa Ana	Seal Beach	Orange	2017
8	Santa Ana	Serrano Creek	Orange	2017
8	Santa Ana	Huntington Harbour	Orange	2017
		NUTRIENTS		
1	North Coast	Russian River HU, Middle Russian River HA, mainstem Laguna de Santa Rosa	Sonoma	2015
2	San Francisco Bay	Lagunitas Creek	Marin	2016
2	San Francisco Bay	Napa River	Napa, Solano	2014
2	San Francisco Bay	Petaluma River	Marin, Sonoma	2017
2	San Francisco Bay	Petaluma River (tidal portion)	Marin, Sonoma	2017
2	San Francisco Bay	Sonoma Creek	Sonoma	2014
2	San Francisco Bay	Tomales Bay	Marin	2019
2	San Francisco Bay	Walker Creek	Marin	2016
4	Los Angeles	Lake Calabasas	Los Angeles	2012
4	Los Angeles	Legg Lake	Los Angeles	2012
4	Los Angeles	San Antonio Creek (Tributary to Ventura River Reach 4)	Ventura	2013
8	Santa Ana	East Garden Grove Wintersburg	Orange	2017

Table 4-11: Water Bodies from 2010 303(d) List Subject to Tier 3 Requirements				
REGION NO.	**REGION NAME**	**WATER BODY NAME**	**COUNTIES**	**TMDL or Assessment Completion Date**
		Channel		
8	Santa Ana	Grout Creek	San Bernardino	2015
8	Santa Ana	Rathbone (Rathbun) Creek	San Bernardino	2015
8	Santa Ana	Summit Creek	San Bernardino	2015
8	Santa Ana	Serrano Creek	Orange	2017

Table 4-12: OWTS Discharge Prohibition Areas	
	County
Region 1	
The Larkfield Area	Sonoma
Willside Estates Area	Sonoma
Region 2	
Stinson Beach Area	Marin
Glen Ellen Area	Sonoma
Emerald Lake Hills	San Mateo
Oak Knoll Manor	San Mateo
Region 3	
Portions of the City of Nipomo	San Luis Obispo
Portions of the San Lorenzo River Valley	Santa Cruz
Los Osos/Baywood Park Area	San Luis Obispo
Region 4	
Oxnard Forebay	Ventura
Region 5	
Amador City	Amador
Martell Area	Amador
Shasta Dam Area Public Utilities District	Shasta
Vallecito Area	Calaveras
West Point Area	Calaveras
Celeste Subdivision Area	Merced
North San Juan	Nevada
Arnold Area	Calaveras
Contra Costa County Sanitation District No. 15	Contra Costa
Madera County Service Area No. 3, Bass Lake	Madera
Madera County Service Area No. 1, Parksdale	Madera
Coulterville County Service Area No. 1	Mariposa
Midway Community Services District	Merced
Adin Community Services District	Modoc
Fall River Mills, Community Services District	Shasta
Bell Road Community, including Panorama and Pearl	Placer
Nice and Lucerne	Lake
Courtland Sanitation District	Sacramento

Table 4-12: OWTS Discharge Prohibition Areas	
	County
Six-Mile Village	Calaveras
Communities of South Lakeshore Assessment District	Lake
Anderson-Cottonwood Irrigation District, Community of Cottonwood	Shasta
Daphnedale Area	Modoc
Chico Urban Area	Butte
Corcoran Fringe Area	Kings
East Porterville Area	Tulare
Home Garden Community Services District	Kings
Kettleman City County Service Area No. 1	Kings
Region 6	
Cady Springs Area	Lassen
Spaulding Tract and Stone-Bengard Subdivisions	Lassen
Truckee River Hydrologic Unit above Boca River confluence	Placer
Glenshire and Devonshire Subdivisions	Placer
Rush Creek above Grant Lake	Mono
Mammoth Creek watershed	Mono
Assessment District No. 1	Inyo
Assessment District No. 2	Inyo
Rocking K Subdivision	Inyo
City of Bishop	Inyo
Hilton Creek/Crowley Lake Communities	Mono
Silverwood Lake	San Bernardino
Deep Creek and Grass Valley Creek watersheds above 3,200 feet	San Bernardino
Desert Knolls Community	San Bernardino
Region 7	
Cathedral City	
Mission Creek or Desert Hot Springs Aquifers	
Region 8	
Grand Terrace (CSD 70, Improvement Zone H)	
Yucaipa – Calimesa (Yucaipa Valley County Water District)	
Lytle Creek (above 2,00 foot elevation)	
Mill Creek (above 2,600 foot elevation)	
Bear Valley (includes the Baldwin Lake drainage area)	
Homeland-Green Acres	Riverside
Romoland	Riverside
Quail Valley	Riverside

5 Existing Regulatory Framework

A wide range of overlapping laws, regulations, policies, plans, and programs are administered by federal, state, and local agencies to regulate the operation, maintenance, and monitoring of OWTS in California. This section presents a summary of those regulations.

5.1 General Federal Plans, Policies, Regulations, and Laws

The U.S. Environmental Protection Agency (USEPA) is the lead federal agency responsible for managing water quality. The Federal Water Pollution Control Act of 1972 (also known as the Clean Water Act [CWA]) and its amendments and the Safe Drinking Water Act are the primary federal law that govern and authorize EPA's actions to control water quality. Elements of the CWA that address water quality and are relevant to the regulation of OWTS are discussed below.

5.1.1 Federal Clean Water Act - Water Quality Control Plans and Standards

Section 303 of the CWA requires states to adopt water quality standards for all surface waters of the United States. These water quality standards are contained in the water quality control plans (basin plans) of each of California's Regional Water Quality Control Boards.

Water quality standards consist of beneficial uses, water quality objectives to protect those uses, and an antidegradation policy that requires that, in water bodies with water quality better than water quality objectives, quality must be maintained at the higher water quality level. Where multiple uses for the water exist, water quality standards must protect the most sensitive use. In California, the State Water Board and nine regional water boards are responsible for identifying beneficial uses and adopting applicable water quality objectives, although USEPA has oversight and promulgation authority as well.

5.1.2 Federal Clean Water Act Antidegradation Policy

The federal government established an antidegradation policy in 1968 (40 CFR 131.12). The policy is designed to protect existing beneficial uses of water and water quality. The federal policy directs states to adopt statewide policies that include the following primary provisions:

- existing instream uses and the water quality necessary to protect those uses shall be maintained and protected;
- where existing water quality is better than necessary to support fishing and swimming conditions, that quality shall be maintained and protected unless the state finds that allowing lower water quality is necessary for important local economic or social development; and
- where high-quality waters constitute an outstanding national resource, such as waters of national and state parks, wildlife refuges, and waters of exceptional recreational or ecological significance, that water quality shall be maintained and protected.

5.1.3 Federal Clean Water Act - Section 303(d) Impaired Waters List

As part of the State Water Board's mandate for creating statewide standards for OWTS, the State Water Board must establish requirements for OWTS near water bodies listed pursuant to CWA Section 303(d). Under Section 303(d) of the CWA, each state is required to develop a list of water bodies, or segments of water bodies that do not attain water quality objectives for specific pollutants even after point-source dischargers (municipalities and industries) have installed the minimum required levels of pollution control technology. Section 303(d) requires that, for each water body listed, the states develop a total maximum daily load (TMDL) for each of the listed pollutants.

A TMDL is a calculation of the maximum amount of a pollutant that the water body can receive and still be in compliance with water quality standards. The regional water boards allocate portions of each pollutant's TMDL to its determined source or sources (a waste load allocation). The TMDL, therefore, consists of the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. The calculation must include a margin of safety to ensure that the water body can be used for the purposes the state has designated, such as swimming, drinking, and protecting wildlife habitat. It also must account for seasonal variation in water quality.

The process of developing TMDLs involves several steps, including: describing the water quality problem addressed by the TMDL; detailing the sources of pollution; outlining pollution prevention, control, or restoration actions and identifying who is responsible for implementing these actions; and ultimately amending the relevant water quality control plan (basin plan). USEPA must either approve a TMDL prepared by the regional water board or, if it disapproves the proposed TMDL, issue its own. NPDES permit limits for listed pollutants in a 303(d)-listed area must be consistent with the waste load allocation prescribed in the applicable TMDL.

After implementation of a TMDL, it is anticipated that the problems that led to placement of a water body on the Section 303(d) list would be remediated. The Section 303(d) list of impaired water bodies in California was last updated in 2010. Table 4-10 identifies section 303(d)-listed water bodies in California that are identified as being impaired by nutrients and/or pathogens; Table 4-11 identifies water bodies where OWTS have been identified as contributing to the impairment.

5.1.4 Safe Drinking Water Act

Under the Safe Drinking Water Act (Public Law 93-523), passed in 1974, USEPA regulates contaminants of concern in the domestic water supply. Contaminants of concern relevant to the domestic water supply are defined as those that pose a public health threat or alter the aesthetic acceptability of the water (e.g., odor, taste, color). USEPA establishes primary and secondary maximum contaminant levels that regulate these types of contaminants. The law, amended most recently in 1996, requires many actions to protect drinking water and its sources, including both surface waters (e.g., rivers, lakes) and groundwater (e.g., drinking water wells).

Additionally, a federal Underground Injection Control (UIC) program was established under the provisions of the Safe Drinking Water Act. Under this program, wells that inject waste into the ground are regulated. Some of these wells (Class V wells) include OWTS. States are not delegated oversight of this portion of the program. As such, the USEPA is the regulatory agency for that federal program.

5.1.5 Federal Farmland Protection Policy Act

The federal Farmland Protection Policy Act (FPPA) was enacted to minimize federal contributions to the conversion of farmland to nonagricultural uses by ensuring that federal programs are administered in a manner compatible with state government, local government, and private programs designed to protect farmland. The FPPA established the Farmland Protection Program (FPP) and the Land Evaluation and Site Assessment (LESA) system.

The FPP is a voluntary program that provides funds to help purchase development rights to keep productive farmland in agricultural uses. The LESA system helps state and local officials make sound decisions about land use and accurately ranks land for suitability and inclusion in the FPP. LESA evaluates several factors, including soil potential for agriculture, location, market access, and adjacent land use. These factors are used to rank land parcels for inclusion in the FPP based on local resource evaluation and site considerations. The LESA system classifies land based on ten soil and climatic characteristics. The California Department of Conservation (CDC) augmented that program in 1980 by initiating a system of inventorying, mapping, and monitoring the acreage of farmland in California. The CDC inventory system was designed to document how much agricultural land in California was being converted to nonagricultural land or transferred into Williamson Act contracts.

5.1.6 Clean Air Act

Air quality in California is highly regulated. At the federal level, the Clean Air Act (CAA) required USEPA to establish primary and secondary National Ambient Air Quality Standards (NAAQS) to protect public health and welfare. The CAA also required each state to prepare an air quality control plan referred to as a State Implementation Plan (SIP). The CAA also required USEPA to promulgate national emissions standards for hazardous air pollutants (NESHAP). The CAA required USEPA to promulgate vehicle or fuel standards containing reasonable requirements that control toxic emissions, addressing at a minimum benzene and formaldehyde.

5.1.7 Hazards

At the federal level, the principal agency regulating the generation, transport, treatment, storage, and disposal of hazardous substances is the USEPA, under the authority of the Resource Conservation and Recovery Act (RCRA). Individual states may implement their own hazardous substance management programs as long as they are consistent with, and at least as strict as, RCRA. USEPA must approve state programs implementing the RCRA requirements.

USEPA regulates hazardous substance sites under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). Applicable federal regulations are outlined primarily in Titles 29, 40, and 49 of the Code of Federal Regulations (CFR).

The Occupational Safety and Health Administration (OSHA) is the agency responsible for ensuring worker safety. OSHA sets federal standards for training in the work place, exposure limits, and safety procedures in the handling of hazardous substances. OSHA also establishes criteria by which each state can implement its own health and safety program.

5.2 General State Plans, Policies, Regulations, and Laws

5.2.1 Porter-Cologne Water Quality Control Act of 1969

California's Porter-Cologne Water Quality Control Act (Porter-Cologne Act), part of the California Water Code, is California's statutory authority for the protection of water quality. Under the Porter-Cologne Act, California must adopt water quality policies, plans, and objectives that protect the state's waters for the use and enjoyment of the people. The act sets forth the obligations of the State Water Board and the nine regional water boards pertaining to the adoption of basin plans and establishment of water quality objectives.

5.2.2 State Water Resources Control Board

The State Water Resources Control Board establishes policy for the nine Regional Water Quality Control Boards. The State Water Board has primary responsibility for overseeing all the state's water quality regulations and standards, including water quality control plans and relevant water quality objectives and standards.

5.2.2.1 State Antidegradation Policy (Resolution 68-16)

State Water Board Resolution No. 68-16 contains the state Antidegradation Policy, which is titled "Statement of Policy with Respect to Maintaining High Quality Waters in California." The State Water Board has interpreted Resolution No. 68-16 to incorporate the federal Antidegradation Policy where the federal policy applies (Water Quality Objective 86-17). The state Antidegradation Policy applies more comprehensively to water quality changes than the federal policy. In particular, the state policy applies to all waters of the state, including both groundwater and surface water, whose quality meets or exceeds water quality objectives. The policy states that the disposal of wastes into state waters shall be regulated to achieve the highest water quality consistent with maximum benefit to the people of the state and to promote the peace, health, safety, and welfare of the people of the state. The policy provides as follows:

a. Where the existing quality of water is better than required under existing water quality control plans, such existing high quality will be maintained until it has been demonstrated that any change will be consistent with maximum benefit to the people of the state and will not unreasonably affect present and anticipated beneficial uses of such water.

b. Any activity that produces waste or increases the volume or concentration of waste and that discharges to existing high-quality waters will be required to meet waste discharge requirements that will ensure (1) pollution or nuisance will not occur and (2) the highest water quality consistent with the maximum benefit to the people of the state will be maintained.

5.2.2.2 State Policy on Sources of Drinking Water (Resolution 88-63)

In 1988, the State Water Board adopted Resolution 88-63, "Sources of Drinking Water." This policy specifies that, except under specifically defined circumstances, all surface water and groundwater of the state are to be protected as existing or potential sources of municipal and domestic supply. The policy lists specific and limited circumstances under which waters may be excluded from this policy.

5.2.3 Regional Water Quality Control Boards

Each Regional Water Board has primary responsibility for designating the beneficial uses of water bodies within its region, establishing water quality objectives for protection of those uses, issuing permits, and conducting enforcement activities. Numerical and narrative water quality objectives have been established to protect beneficial uses of water bodies. Water quality objectives are established in a basin plan for each of the nine regions. Permitting and enforcement are implementation tools for the regional water boards for protection of the state's waters.

Regional water boards issue waste discharge requirements (WDRs), which are intended to regulate and monitor waste discharges to land and water and may include NPDES permits, as required by the CWA. WDRs impose discharge restrictions and pollutant limitations that protect water quality objectives. The permit processes also consider the state's antidegradation policy. Unlike the CWA, which regulates only surface water, the Porter-Cologne Act regulates both surface water and groundwater.

Each of the nine Regional Water Boards has adopted a basin plan. Basin plans establish water quality objectives, which are mandated by both the CWA and the Porter-Cologne Act, and provide the basis for protecting water quality in California. Sections 13240–13247 of the California Water Code specify that the basin plans shall include the following:

- water quality objectives that, in the judgment of the Regional Water Board, will ensure the reasonable protection of beneficial uses and the prevention of nuisance and
- a program of implementation for achieving water quality objectives, including a description of the nature of actions that are necessary to achieve the objectives, time schedules for the actions to be taken, and a description of surveillance to be undertaken to determine compliance with objectives.

5.2.4 California Environmental Quality Act

CEQA requires government agencies to consider the environmental consequences of their actions before approving plans and policies or committing to a course of action on a project. The CEQA process is intended to: (1) inform government decision makers and the public about the potential environmental effects of proposed activities; (2) identify the ways that environmental damage can be avoided or significantly reduced; (3) prevent significant, avoidable environmental damage by requiring changes in projects, either by the adoption of alternatives or imposition of mitigation measures; and (4) disclose to the public why a project was approved if that project would have significant environmental effects (Public Resources Code Sections 21000 and 21001).

Consistent with these purposes, CEQA applies to most state, regional, and local agency decisions to carry out, authorize, or approve projects that could have adverse effects on the environment. CEQA requires that public agencies inform themselves about the environmental effects of proposed actions, consider all relevant information before they act, give the public an opportunity to comment on the environmental issues, and avoid or reduce potential harm to the environment when feasible.

To ensure their validity, an agency's actions should comply with CEQA's statutory provisions as well as the state environmental guidelines that have been adopted by the Secretary of Resources and incorporated into the State CEQA Guidelines (Title 14 of the California Code of Regulations, Section 15000 et seq.).

The CEQA process begins with a preliminary review of the proposal to determine whether CEQA applies to the agency action, or whether the action is exempt (State CEQA Guidelines Sections 15060–15061). If the agency determines that the activity is not subject to CEQA, it may file a notice of exemption and no further action to comply with CEQA is required (State CEQA Guidelines Sections 15061 and 15062). If the agency determines that the activity is a project subject to CEQA, the agency then must prepare either an EIR or a negative declaration. For programs that have been certified as an exempt regulatory program by the Secretary for Natural Resources pursuant to subdivision (c) of Public Resources Code section 21080.5, an agency may comply with CEQA by preparing a substitute environmental document in place of an EIR. The State Water Board's procedural requirements for certified regulatory programs are set forth at Title 23, California Code of Regulations, section 3775 et. seq.

5.2.5 California Land Conservation Act (The Williamson Act)

The California Land Conservation Act, also known as the Williamson Act, was enacted to provide landowners and local governments with a strategy to protect open space and agricultural lands while integrating long-term planning and growth patterns. Under a Williamson Act contract, the property owner is guaranteed that the property would be taxed according to its potential agricultural income, as opposed to the maximum valued use of the property, such as for residential development.

5.2.6 State Farmland Security Zones

State Farmland Security Zones (FSZs) were established by the California Department of Conservation with the same intent as Williamson Act contracts. An FSZ must be located in an Agricultural Preserve (area designated as eligible for a Williamson Act contract) and designated as Prime Farmland, Farmland of Statewide Importance, Unique Farmland, or Farmland of Local importance. Agricultural and open space lands are protected for a minimum of a 20 year term under an FSZ designation and receive an even greater property tax reduction than a Williamson Act valuation. Land protected in an FSZ cannot be annexed by a city or county government or school district (CDC 2001).

An FSZ can be terminated through a nonrenewal or cancellation. The nonrenewal allows for a rollout process to occur over the remainder of the term of the contract, where the tax rates would gradually rise to the full rate by the end of the 20-year term. A cancellation must be applied for and approved by the director of the CDC, and specific criteria must be met. The cancellation must be in the public interest and consistent with the Williamson Act criteria (CDC 2001).

5.2.7 Transportation

The California Department of Transportation (Caltrans) establishes performance standards that apply to specific routes and publishes those standards in transportation concept reports (TCRs). Performance standards in TCRs are often expressed as level-of-service (LOS) standards. Caltrans establishes reasonable LOS standards for state highway facilities, based on current operating conditions, surrounding land uses, local policies, and current plans for improvement on the facility. Local agencies typically identify LOS standards for roadways in the agencies' jurisdiction.

5.2.8 Noise

Title 24 of the California Code of Regulations establishes standards governing interior noise levels that apply to all new residential units in California. In addition, the State of California has developed land use compatibility guidelines for community noise environments. The State of California General Plan Guidelines provides guidance for the acceptability of projects within specific community noise equivalent level (CNEL)/Ldn contours. The guidelines also present adjustment factors that may be used to arrive at noise acceptability standards that reflect the noise control goals of the community, the particular community's sensitivity to noise, and the community's assessment of the relative importance of noise pollution. Local policies regulating noise often provide more detailed, and sometimes more restrictive, regulations on noise levels and acceptable means of reducing them to an acceptable level. Noise ordinances identify performance standards intended to prevent any use that may create dangerous, injurious, noxious, or otherwise objectionable conditions.

5.3 Land Use Planning and Environmental Protection Regulations

5.3.1 Land Use Planning

The discussion below summarizes the land use planning process in California and is based primarily on information contained in *Curtin's California Land Use and Planning Law* (Curtin and Talbert 2006). The land use planning process in California would be unaffected from implementation of the proposed Policy.

Local jurisdictions receive the authority to exercise their respective land use planning functions through State of California planning laws. State laws that outline the legal framework within which a city or county must exercise its land use functions include the following, which does not represent an exhaustive list of all applicable laws:

- local planning agencies, commissions, and departments (Government Code Section 65100 et seq.);
- the general plan and specific plan (Government Code Section 65300 et seq.);
- zoning regulations (Government Code Section 65800 et seq.);
- the Subdivision Map Act (Government Code Section 66410 et seq.); and
- the California Environmental Quality Act (CEQA) (Public Resources Code Section 21000 et seq.) and the State CEQA Guidelines (Title 14, California Code of Regulations Sections 15000-15387).

5.3.1.1 Planning Commission

The planning commission is a permanent committee of five or more citizens who have been appointed by the city council to review and act on matters related to planning and development. (For unincorporated communities, the planning commission would serve the local county jurisdiction.) The commission holds regularly scheduled public hearings to consider land use matters, such as the general plan, specific plan, rezonings, use permits, and subdivisions. Depending on local ordinances, local commissioners may serve at the pleasure of the city council, so that commission membership changes in response to changes in the council, or they may serve for a fixed term. A city need not create a planning commission. In some jurisdictions, especially smaller ones, the city council acts as the planning commission. Typically, the planning commission advises the city council on land use matters. The city council may follow the recommendation of the commission, may reverse or modify the commission action, or may send the project back to the commission for further review. All commission decisions are subject to appeal to the council, and the council has the final say in all city matters. The city’s community development or planning department is the planning commission’s staff.

For the most part, state law requires public hearings before planning actions are taken. The planning commission considers planning proposals in light of federal, state, and local regulations and potential environmental effects, and receives testimony from citizens and other interested parties at the meetings. Pursuant to the Ralph M. Brown Act (also known as the Open Meeting Act or the Brown Act, Government Code Section 54950), all planning commission meetings must be open and public, including study sessions and workshops. This means that a quorum of commissioners can discuss commission business in a public meeting only.

5.3.1.2 General Plan

California Government Code Section 65300 et seq. establishes the obligation of cities and counties to adopt and implement general plans. The general plan is a comprehensive, long-term, and general document that describes plans for the physical development of the city or county and of any land outside its boundaries that, in the city's or county's judgment, bears relation to its planning. The general plan shall consist of seven mandatory elements—land use, circulation, housing, conservation, open space, noise, and safety—and any optional element(s) that the city or county chooses to adopt. In addressing these topics, the general plan shall consist of a "statement of development policies" and must include diagrams and text setting forth "objectives, principles, standards, and plan proposals" (Government Code Section 65302). The general plan is a long-range document that typically addresses the physical character of an area over a 20-year period. Finally, although the general plan serves as a blueprint for future development and identifies the overall vision for the planning area, it remains general enough to allow for flexibility in the approach taken to achieve the plan's goals. The preparation, adoption, and implementation of a general plan serve to:

- identify the community's land use, circulation, housing, environmental, economic, and social goals and policies as they relate to land use and development;
- provide a basis for local government decision making, including decisions on development approvals and exactions;
- provide citizens with opportunities to participate in the planning and decision-making processes of their community; and
- inform citizens, developers, decision makers, and other cities and counties of the ground rules that guide development within the community.

The general plan provides a two-way connection between community values, visions, and objectives and the planned physical development within a community (e.g., construction of subdivisions and public works projects). The adoption of a general plan or any amendments thereto generally must follow the procedure set forth in Government Code Section 65350 et seq. If a city has a planning commission, at least one public hearing must be conducted by the planning commission and then one public hearing by the city council after proper notice has been given.

5.3.1.3 Specific Plan

The specific plan is a step below the general plan in the land use approval hierarchy and is used for the systematic implementation of the general plan for particular geographic areas (Government Code Section 65450). Zoning ordinances, subdivisions, public works projects, and development agreements all must be consistent with the adopted specific plan (Government Code Sections 65455 and 65867.5). A specific plan must include all of the following in detail in both text and diagram(s):

- distribution, location, and extent of the uses of land, including open space, within the area covered by the plan;
- proposed distribution, location, extent, and intensity of major components of public and private infrastructure and other essential facilities proposed to be located within the area covered by the plan and needed to support the land uses described in the plan;

- standards and criteria by which development will proceed, and applicable standards for conservation, development, and use of natural resources; and
- a program of implementation measures including regulations, programs, public works projects, and financing measures necessary to carry out the matters listed above.

The specific plan also must include a statement of the relationship of the specific plan to the general plan. The procedure for adoption of a specific plan is basically the same as for a general plan. Government Code Section 65457, with certain exceptions, exempts residential development projects from further CEQA review if they are undertaken to implement and are consistent with a specific plan for which an EIR has been certified.

5.3.1.4 Zoning Regulations

The state zoning law (Government Code Section 65800 et seq.) provides for the "adoption and administration of zoning laws, ordinances, rules, and regulations by counties and cities, as well as to implement such general plan as may be in effect in any such county or city." Zoning is basically the division of a city or county into districts and the application of different regulations in each district. Zoning regulations are generally divided into two classes: (1) those that regulate the height or bulk of buildings within certain designated districts—in other words, those regulations that have to do with structural and architectural design of the buildings; and (2) those that prescribe the uses of buildings within certain designated districts. The California State Legislature has given cities maximum control over zoning matters while ensuring uniformity of, and public access to, zoning and planning hearings.

Zoning ordinances must be consistent with the general plan and any applicable specific plan (Government Code Section 65860[a]). When amendments to the general plan are made, corresponding changes in the zoning ordinance may be required within a reasonable time to ensure the land uses designated in the general plan would also be allowable by the zoning ordinance (Government Code Section 65860[c]). If the city council approves, or approves as modified, a proposed zoning amendment, the council must introduce it at a regular or adjourned regular meeting and then adopt the amendment by ordinance at a subsequent meeting (Government Code Sections 36934 and 65850). County boards of supervisors are authorized to adopt a rezoning ordinance with only one reading after a noticed public hearing (Government Code Section 25131).

5.3.1.5 Variances and Conditional Use Permits

Variances and conditional use permits (CUPs) are methods by which a property owner may seek relief from the strict terms of a comprehensive zoning ordinance. Just as the amendment of a zoning regulation is a legislative function, the granting of variances and use permits are quasi-judicial, administrative functions. Variances and use permits run with the land.

A variance is a permit issued to a landowner by an administrative agency (zoning administrator, board of zoning adjustment, planning commission, or the city council acting as an administrative agency) to construct a structure not otherwise permitted under the zoning regulations. An application for a variance must address circumstances surrounding the applicant's situation that are unique in that they create disparities between the applicant's property and other properties in the area. The unique circumstances must cause hardship to the property owner to justify the authorization for a variance. Unique circumstances may be related to the parcel size, shape, topography, location, or surroundings (Government Code Section 65906). A variance must be consistent with the objectives of the general plan and the zoning ordinance.

A CUP is the second administrative method of providing relief from the strict terms of a comprehensive zoning ordinance. State zoning law is silent on establishing any criteria for issuing or denying a CUP, which is evaluated based on local ordinances (Government Code Section 65901). Typically, following a list of permitted uses in each zone, a local zoning ordinance will provide for other uses that are not permitted as a matter or right, but that could be allowable with issuance of a CUP.

5.3.1.6 Subdivision Map Act

The Subdivision Map Act (Map Act) vests in the legislative bodies of local agencies the power to regulate and control the design and improvement of subdivisions (Government Code Section 66411). Each city or county must adopt an ordinance regulating and controlling subdivisions for which the Map Act requires a tentative and final or parcel map. The Map Act's primary goals are:

- to encourage orderly community development by providing for the regulation and control of the design and improvement of the subdivision, with a proper consideration of its relation to adjoining areas;
- to ensure that the areas within the subdivision that are dedicated for public purposes will be properly improved by the subdivider so that they will not become an undue burden on the community; and
- to protect the public and individual transferees from fraud and exploitation (61 Opinions of California Attorney General 299, 301 [1978]; 77 Opinions of California Attorney General 185 [1994]).

The Map Act is applied in conjunction with other state land use laws such as the general plan and the specific plan, zoning, CEQA, and the Permit Streamlining Act (Government Code Section 65920 et seq.).

A subdivision is defined in the statute as "the division, by any subdivider, of any unit or units of improved or unimproved land, or any portion thereof, shown on the latest equalized county assessment roll as a unit or as continuous units, for the purpose of sale, lease, or financing, whether immediate or future" (Government Code Section 66424). The Map Act distinguishes between a subdivision consisting of five or more parcels and one consisting of four or fewer parcels.

In general, a subdivision of five or more parcels requires a tentative and a final map; a subdivision of four or fewer requires only a parcel map. The Map Act contains detailed provisions governing the content and form of the final map. Government Code Section 66433 et seq. establishes the persons who are qualified to prepare the final map, the standard for preparation, and the various certificates and acknowledgments required for the final map. Parcel map procedures and approvals are left up to the local ordinance, except as specifically provided in the Map Act (Government Code Section 66463[a]). Approval of a final map or parcel map does not in itself confer a vested right to develop. No vested right to develop exists until actual building or other permits for identifiable buildings have been issued and substantial work has been done thereafter in reliance on those permits.

In 1984, the California State Legislature added Chapter 4.5, "Development Rights," to the Map Act; this statute established a new form of tentative map for subdivisions in the state: the vesting tentative map (Government Code Section 66498.1 et seq.). The approval of a vesting tentative map expressly confers a vested right to proceed with a development in substantial compliance with the ordinances, policies, and standards in effect at the time the application for approval of the vesting tentative map is deemed complete (Government Code Section 66498.1[b]).

Before a tentative map or a parcel map is approved, the city or county must find that the proposed subdivision, together with the provisions for its design and improvement, is consistent with the general plan and any applicable specific plan. If the local jurisdiction makes any of the following findings with respect to a tentative map or a parcel map, it must deny approval of the map (Government Code Section 66474):

- The proposed map or the design or improvements of the proposed subdivision are inconsistent with the applicable general and specific plans, or with a draft general plan being prepared under an extension by the Governor's Office of Planning and Research.
- The site is not physically suited for the proposed type or density of development. Where such a finding has been made, the legislative body may approve the map on conditions that will reduce the density.
- The design or proposed improvements are likely to cause substantial environmental damage, or substantially and avoidably injure fish, wildlife, or their habitats, or cause serious public health problems, based on an analysis of the project as part of the environmental compliance process (e.g., the conclusions presented in an EIR prepared for the project).

With regard to the environmental review process for a project involving construction of a subdivision, if the EIR identifies negative impacts, the city or county may impose conditions to mitigate those impacts based on Government Code Section 66474(e). The imposition of mitigating conditions is grounded in the theory that the power to reject for a given impact implies the power to accept with conditions that would prevent that impact.

5.3.1.7 Population, Employment, and Housing

As with land use, regulatory guidance regarding population, employment, and housing is provided primarily by local planning documents. The policies, regulations, and ordinances presented in those documents address such issues as the provision of housing sufficient to support the current and projected local population at a range of income levels; the establishment, maintenance, and expansion of particular types of development in specific areas; the density of development; and the balance between employment-generating development and housing development.

5.3.2 Environmental Protection Regulations

The proposed Policy provides minimum standards for siting, construction, operation, and maintenance of specified OWTS in California. The process by which local agencies approve a project that includes construction and operation of an OWTS is a local land use and development process that would remain unchanged by the proposed Policy. Other regulations designed to protect the environment would also be unaffected by implementation of the proposed Policy. This subsection provides an overview of the more important federal, state, and local laws and regulations that protect the environment of California. These laws and regulations would continue to guide the construction and operation of projects in California, including OWTS.

5.3.2.1 Air Quality

The California Air Resources Board (ARB) is the agency responsible for coordination and oversight of state and local air pollution control programs in California and for implementing the California Clean Air Act (CCAA). The CCAA required ARB to establish California ambient air quality standards (CAAQS). In most cases, the CAAQS are more stringent than the national ambient air quality standards (NAAQS). The act specifies that local air districts should focus particular attention on reducing the emissions from transportation and area wide emission sources, and provides districts with the authority to regulate indirect sources.

In California, toxic air contaminants (TACs) are regulated primarily through the Tanner Air Toxics Act and the Air Toxics Hot Spots Information and Assessment Act of 1987. The Tanner Act sets forth a formal procedure for ARB to designate substances as TACs. This includes research, public participation, and scientific peer review before ARB can designate a substance as a TAC.

On a regional level, air quality control districts or air quality management districts attain and maintain air quality conditions in the region through comprehensive programs of planning, regulation, enforcement, technical innovation, and promotion of the understanding of air quality issues. Clean-air strategies typically include the preparation of plans for the attainment of ambient air quality standards, adoption and enforcement of rules and regulations concerning sources of air pollution, and issuance of permits for stationary sources of air pollution. Air pollution control or management districts also may adopt and enforce ARB's control measures regarding TACs. For example, under the Yolo-Solano Air Quality Management District's (YSAQMD's) Rule 3-1 ("Permit Requirements"), Rule 3-4 ("New Source Review"), and Rule 3-8 ("Federal Operating Permit"), all sources that possess the potential to emit TACs are required to obtain permits from the district. Permits may be granted to these operations if they are constructed and operated in accordance with applicable regulations.

Policies in general plans and other local planning documents typically support such actions as development of a local circulation system that encourages and accommodates the use of transportation modes other than the automobile; the construction of new development that incorporates the infrastructure, facilities, and design standards necessary to encourage and accommodate transit, ridesharing and non-automobile travel modes; development and implementation of a local transportation system management ordinance applicable to major projects and employers; and separation of sensitive land uses from significant sources of air pollutants or odor emissions.

5.3.2.2 Public Services

Typically, regulations regarding public services are presented in local planning documents and relate to a broad range of issues, including the provision of adequate fire-flow rates in new development; the assurance that fire equipment access is integrated into the design of new facilities; the assurance that emergency access is an integral part of the design of all public facilities for the safety of users and workers; the assurance that public facilities and services (such as water, sewer, and emergency services) are available before occupancy of residential projects; the assurance that new development is provided with all necessary water service, fire hydrants, and roads consistent with Fire Department Standards; the assurance that all new development is constructed according to fire safety and structural stability standards contained in the latest adopted California Fire and Building Codes and related high rise regulations; the provision and maintenance of an adequate level of police and fire department equipment and personnel consistent with city growth and development; and the adequate provision of parkland.

5.3.2.3 Public Utilities

Section 21151.9 of the Public Resources Code and Section 10910 et seq. of the Water Code require the preparation of water supply assessments for large developments (i.e., more than 500 dwelling units or nonresidential equivalent) to determine whether existing and projected water supplies are adequate to serve the projects while also meeting existing urban and agricultural demands and the needs of other anticipated development in the service area in which the project is located. Where a water supply assessment concludes that insufficient supplies are available, the assessment must lay out the steps that would be required to obtain the necessary supply.

Section 15155 of the State CEQA Guidelines requires that local agencies must have sufficient information about the availability of water supplies when they decide whether to approve projects. Section 15155 requires the city or county to consult with water agencies to approve the tentative map to obtain written verification of sufficient water supply for proposed residential development of more than 500 units if the public water system would have at least 5,000 service connections and for proposed residential development that would increase by 10% or more the number of the public water system's existing service connections if the system has fewer than 5,000 connections.

The determination of sufficiency is required to consider the availability of water supplies over a historical record of at least 20 years; the applicability of an urban water shortage contingency analysis prepared pursuant to Section 10632 of the Water Code that includes actions to be undertaken by the public water system in response to water supply shortages; the reduction in water supply allocated to a specific water use sector pursuant to a resolution or ordinance adopted, or a contract entered into, by the public water system; and the amount of water that the water supplier can reasonably rely on receiving from other water supply projects, such as conjunctive use, reclaimed water, water conservation, and water transfer. The written verification must provide evidentiary proof of the water supply.

5.3.2.4 California Integrated Waste Management Act

To minimize the amount of solid waste that must be disposed of by transformation (e.g., incineration, distillation, gasification, or biological conversion other than composting) and land disposal, the State Legislature passed the California Integrated Waste Management Act (CIWMA) of 1989 (Assembly Bill 939), effective January 1990. According to the CIWMA, all cities and counties were required to divert 25% of all solid waste from landfill facilities by January 1, 1995, and 50% by January 1, 2000. Each city is required to develop solid waste plans demonstrating integration with the CIWMA plan and the applicable county plan. The plans must promote (in order of priority) source reduction, recycling and composting, and environmentally safe transformation and land disposal. Disposal of pumped septage is subject to the state's landfill regulations or the federal government's regulations contained in Part 503 of Title 40 in the Code of Federal Regulations where it is applied to land.

5.3.2.5 California Uniform Building Code

The State of California provides minimum standards for building design through the California Building Standards Code (California Code of Regulations, Title 24). Title 24 is published by the California Building Standards Commission and it applies to all building occupancies (see Health and Safety Code Section 18908 and 18938) throughout the State of California.

Title 24 is reserved for state regulations that govern the design and construction of buildings, associated facilities and equipment and contains requirements to the structural, mechanical, electrical, and plumbing systems, and requires measures for energy conservation, green design, construction and maintenance, fire and life safety. Thus, Title 24 is organized into separate parts. Each part is given a separate name reflecting its subject. Some parts are based on model codes as discussed later. Part 5 is named the California Plumbing Code and is based on the 2009 Uniform Plumbing Code. Appendix K in the California Plumbing Code contains standards for the design of OWTS.

Cities and counties are required by state law to enforce CCR Title 24 (Health and Safety Code Sections 17958, 17960, 18938(b), & 18948). Cities and counties may adopt ordinances making more restrictive requirements than provided by CCR Title 24, because of local climatic, geological, or topographical conditions. Such adoptions and a finding of need statement must be filed with the California Building Standards Commission (Reference Health and Safety Code Sections 17958.7 and 18941.5).

5.3.2.6 Hazards

Several state agencies regulate the transportation and use of hazardous materials to minimize potential risks to public health and safety. The California Environmental Protection Agency (Cal/EPA) and the Office of Emergency Services (OES) establish rules governing the use of hazardous substances in California. Within Cal/EPA, the Department of Toxic Substances Control (DTSC) has primary responsibility, with delegation of enforcement to local jurisdictions, for regulating the generation, transport, and disposal of hazardous substances under the authority of the Hazardous Waste Control Law (HWCL). Regulations implementing the HWCL list hazardous chemicals and common substances that may be hazardous; establish criteria for identifying, packaging, and labeling hazardous substances; prescribe management of hazardous substances; establish permit requirements for hazardous substances treatment, storage, disposal, and transportation; and identify hazardous substances prohibited from landfills.

The California Highway Patrol and California Department of Transportation (Caltrans) enforce regulations specifically related to hazardous materials transport. Individual Regional water boards are the lead agencies responsible for identifying, monitoring, and cleaning up leaking underground storage tanks (USTs). The results of environmental site assessments are provided to DTSC for concurrence and to obtain recommendations for further investigation. State regulations applicable to hazardous substances and hazardous waste regulations are outlined in Titles 22 and 26 of the California Code of Regulations (CCR).

The California Occupational Safety and Health Administration (Cal/OSHA) assumes primary responsibility for developing and enforcing workplace safety regulations in the state. Cal/OSHA regulations concerning the use of hazardous substances include requirements for safety training, availability of safety equipment, hazardous substances exposure warnings, and emergency action and fire prevention plan preparation. Cal/OSHA enforces the hazard communication program regulations, which include provisions for identifying and labeling hazardous substances, describing the hazards of chemicals, and documenting employee training programs.

5.4 Chapter 4.5, Division 7 of the California Water Code

Water Code section 13290 et seq. requires the State Water Board to develop statewide standards for OWTS in consultation with the California Department of Public Health (DPH), California Conference of Directors of Environmental Health (CCDEH), California Coastal Commission (CCC), counties, cities, and other interested parties. Water Code section 13290 et seq. further requires standards to include, at a minimum, the seven types of requirements listed below (often referred to as the “seven points”):

1. Minimum operating requirements that may include siting, construction, and performance requirements
2. Requirements for OWTS near waters listed as impaired under Section 303(d) of the Clean Water Act.
3. Requirements authorizing local agency implementation

4. Corrective action requirements
5. Minimum monitoring requirements
6. Exemption criteria
7. Requirements for determining when an existing OWTS is subject to major repair

Water Code section 13290 et seq. also requires the regional water boards to incorporate the new statewide standards into their basin plans. Neither the legislation nor the proposed OWTS policy preempt the regional water boards or any local agency from adopting or retaining performance requirements for OWTS that are more protective of public health or the environment than the new statewide policy.

5.5 Representative Regulations of Selected Local Governments and Regional Water Quality Control Boards

California currently has no statewide system of regulation that directly addresses the construction, operation, maintenance, and monitoring of OWTS. However, numerous California cities and counties regulate OWTS through a variety of means, including zoning ordinances and permitting requirements. Circumstances vary among agencies, but enforcement of these regulations generally is the responsibility of the local environmental or public health department. Examples of local regulations related to OWTS are provided below.

The current state of OWTS regulations in California is characterized by separate and overlapping regional and local regulations established by the nine regional water boards, 58 counties, and a variety of cities and special districts that administer OWTS regulations. To provide context for the evaluation of environmental impacts in this SED, a comparison of representative regulations will be useful. Given the large number of jurisdictions, each with its unique set of regulations, a comprehensive review of these regulations would be prohibitive.

For the purposes of this SED, 15 local agencies (counties and cities) and the nine regional water boards were selected as a representative sample of the regulating agencies (see Table 5-1 and Table 5-2. The agencies are geographically diverse, representing the north, south, east, west, coastal, and central regions of California. Recognizing that all jurisdictions have unique circumstances specific to the administration of OWTS in their areas, the sample includes jurisdictions with a range of unique physical, administrative, and regulatory conditions. For example, El Dorado County represents a jurisdiction with large areas of steep, difficult terrain; Merced County has a large number of inhabitants depending on groundwater for domestic water supply; and Stinson Beach County Water District administers OWTS installed in fast-draining beach sands.

Several jurisdictions within California have established unique administrative arrangements to manage OWTS. Incorporated and unincorporated areas may set up county service areas or special districts, such as those established by the City of Paradise in Butte County and the community of Stinson Beach in Marin County. Several jurisdictions within California experience administrative challenges stemming from their remote location or remote areas within jurisdictional limits. Remoteness and small local government play into the approach used by Modoc and Inyo Counties, where contracted professional services fill the administrative role.

Several local agencies have no sewers within their jurisdictions as a consequence of historical development (e.g., the City of Paradise) or the intentional will of the citizens. Many California jurisdictions are predominantly rural, such as El Dorado and Sutter Counties. The City of Los Angeles and City of Calabasas, in contrast, are intensively urbanized jurisdictions. Santa Cruz and Riverside counties represent jurisdictions that have areas representing both conditions within this spectrum. Several jurisdictions experience a strong pressure for urban development, regardless of existing population densities within their jurisdictions; Sutter and Riverside Counties are examples.

Typically, local agencies derive their regulations from the Uniform Plumbing Code (UPC). The UPC provides instruction on percolation testing, flow projections from households and other establishments, basic features of leach lines and seepage pits, setbacks from water bodies and buildings, the depth of unsaturated soil below the disposal field, and other prescriptive requirements. However, the range and content of those prescriptive measures vary widely. For example, the UPC prohibits construction of OWTS in areas with steep slopes, defined as slopes greater than 20%. The depth to a limiting layer (e.g., impermeable layer, ground water, fractured bedrock) ranges from more than 5 feet for conventional systems to less than 2 feet for supplemental treatment systems. Allowable percolation rates typically may not be any slower than 60 or 120 minutes per inch, also a sizeable range.

Within the state, some regulations have changed little for several decades, notably the City of Los Angeles. Regulations such as those of Merced County incorporate modest change. Regulations from the Cities of Calabasas and Paradise and Solano and Sutter Counties reflect recently and substantially revised policies that address specific site or administrative issues and accommodate technological advances to resolve site constraints. Despite these differences, virtually all regulations of the local agencies listed in Table 5-1 and Table 5-2 focus on the siting, design, and construction of new OWTS. The repair of OWTS is addressed sporadically and with little consistency.

Operations and monitoring of conventional and supplemental systems are minimally addressed or completely absent. A notable exception is Sonoma County, which addresses operating permits and monitoring wells in detail, especially for OWTS with supplemental treatment systems. Many local agencies may address operations and monitoring in other ways to a greater extent than exhibited in their OWTS policies. In these cases, individual OWTS permitting requirements address operations and monitoring.

Lot size limitations and OWTS prohibitions affect the distribution of OWTS. All of the regional water boards, except the San Diego Regional Water Board, identify specific OWTS prohibition areas (Table 4-12). Merced and Santa Cruz Counties limit minimum lot sizes, as do the Central Coast, Central Valley, Lahontan, Colorado, and Santa Ana Regional Water Boards. The regional water boards typically establish OWTS prohibition areas based on water quality objectives for groundwater and surface waters within discrete hydrologic and hydrogeologic units, as described in each regional water board's basin plan. However, the regional water boards' policies governing OWTS as described in the basin plans are brief and often not specific. Specific pollutants, such as nitrate or coliform bacteria, may drive the designation of prohibitions, Areas of Special Concern (e.g., in Sutter County by the San Francisco Regional Water Board), or Contributory Areas (e.g., the Malibu Lagoon and Beaches Bacterial Contributory Areas by the Los Angeles Regional Water Board).

The regional water boards typically permit OWTS that serve facilities with larger flows as opposed to local agencies, although the cut-off point between regulation by regional water boards and local agency differs from regional water board region to region. The regional water boards' use of water quality objectives to regulate OWTS contrasts sharply with local agencies' generally prescriptive requirements. The water quality objectives typically translate into performance measures for discharge and receiving water quality with specific monitoring and reporting requirements to ensure that individual OWTS owners adhere to their permits.

Table 5-1 and Table 5-2 provide a comparison of representative county and city OWTS regulations with the proposed Policy. Table 5-3 presents a comparison of relevant regulations of the nine regional water boards with the proposed Policy.

Table 5-1: Points of Comparison for Select Counties and the Proposed Policy

Regulatory Elements	Proposed Project	El Dorado County	Inyo County	Los Angeles County	Mendocino County	Merced County	Riverside County	Santa Cruz County	Solano County
Point 1: Minimum Operating Requirements									
General requirements: Siting and design, construction, performance requirements and maintenance	▸ TIER I • Applies to all new and replaced OWTS with the capacity to treat up to 3,500 gpd • Qualified professionals requirements: o Soils and site evaluation and design • Designed for percolation rates from 1-90 MPI. • Setbacks from wells, surface waters, unstable land masses, and drinking water intakes. • Ground slope limitation of 25 percent. • Average density not greater than 2.5 acres per OWTS. • Tank performance standards: o Secure access opening and	• Tank performance standards: o Effluent filter required o Two 20-inch risers o 2 compartments • General standards provided for siting, design, and construction including conditions requiring special design, such as STS • Standards for pump systems • Qualified professionals requirements: for design (registered civil engineer, geologist or environmental health specialist or certified soil scientist) and	• Must first notify county of intended discharges • County must approve construction of facilities for wastewater discharge • Prescriptive measures follow the 1985 Uniform Plumbing Code • • STS may be used on a case-by-case basis and with regional water board or County Environmental Health Services approval using siting and emergency contingency plans • Residential land use density dictates applicability of	• Tank performance standards o Two 20-inch risers o 2 compartments • Prescriptive measures follow a modified Uniform Plumbing Code • Qualified professionals required for site evaluation and design of new construction and some repairs • Use percolation testing for system suitability. • Allow STS where prescriptive condition cannot be met, including performance requirements: TKN: 50% reduction, BOD: 30 mg/L; TSS 30	• Qualified professionals requirements for design and site evaluation • General standards provided for siting, design, and construction • STS required for repairs with less than 12 inches to groundwater or bedrock • Allows composting systems • STS require a permit for STS • Contains lot size requirements: o 12,000 SQFT for sites with municipal water o 40,000 SQFT where no municipal system exists. • Adopted Appendix I of	• Tank sizing and performance standards o Two 20-inch risers o Two compartments • 5 feet of continuous unsaturated soil for leach lines and 10 feet for pits • General standards provided for siting, design, and construction • Qualified professionals required o for site evaluation, design, and installation of conventional systems as approved by environmental health or licensed by the state	• Tank performance standards: o Secure access opening and watertight risers o 1/8-inch mesh effluent filter • Ordinance with setbacks • Qualified professionals requirements: Registered environmental health specialist or registered civil engineer for testing and design • Percolation test requirements • Qualified service provider required for operation and maintenance • Operating permit required for STS with pumping schedule, proof of ongoing	• Septic tank must have risers • Site suitability determined by percolation testing and groundwater level. • Setbacks in ordinance • Site evaluation and design done by registered environmental health specialist, geologist, or civil engineer • Slopes limited to less than 30% • Prescribes design flows • Lot size limitations apply, typically 1 acre for existing lots and 2.5 acres areas within a reservoir containing watershed. • O&M manual required for STS	• Septic tank o Must be able to accommodate an effluent filter o Two 20-inch risers • Qualified professionals requirement: o Siting and design must be prepared by a civil engineer, geologist, environmental health specialist, or certified professional soil scientist o For STS, must use a registered civil engineer of environmental health specialist. Treatment must be better or equal to intermittent sand filter. • STS Performance o 240,000/100 mL total coliform or

Table 5-1: Points of Comparison for Select Counties and the Proposed Policy

Regulatory Elements	Proposed Project	El Dorado County	Inyo County	Los Angeles County	Mendocino County	Merced County	Riverside County	Santa Cruz County	Solano County
	watertight risers o 3/16-inch mesh effluent filter o IAPMO-approved tanks, or stamped and certified by CA registered civil engineer ▸ **POSSIBLE IN TIER 2** • Various supplemental treatment systems • Various dispersal systems ▸ **TIER 3** • Supplemental treatment system performance standards: o 50% reduction in TN; 30 mg/l TSS and 200 MPN fecal coliform per 100 mL o Periodic performance evaluation	construction (Class A, B-1, or C-42 licensed contractor) • STS required if percolation >60 mpi or less than 5 mpi	OWTS • OWTS prohibited on lots smaller than ½ acre	mg/L; pH 6 -9 • Includes setback requirements	the 1991 Uniform Plumbing Code with modifications •	o for STS design – registered geologist, engineer, or environmental health specialist • STS required for new, larger subdivisions with OWTS • STS required where poor percolation rates, slopes greater than 20%, and for treatment from more than one residence	maintenance at least every 3 months and maintenance agreement	• STS required when o A repair cannot otherwise meet requirements using a standard systems o For OWTS in soils with 1–5 mpi percolation rate o Nitrate must be reduced in the effluent	2.2 MPN/mL fecal coliform from monitoring well o STS required where nitrate elevated in soil or groundwater • Establishes design flow. • Minimum lot size in accordance to Chapter 26, 26-82. • 25% slope limitation • Setbacks • Septic tank sizing specifications
Dispersal System	▸ **TIER I**	• Standards for	• All discharges	• Prescriptive	• 2–3 feet of	• 5 feet of	• 5 feet of	• 5–50 feet of	• 3–20 feet to

Table 5-1: Points of Comparison for Select Counties and the Proposed Policy

Regulatory Elements	Proposed Project	El Dorado County	Inyo County	Los Angeles County	Mendocino County	Merced County	Riverside County	Santa Cruz County	Solano County
Standards and Requirements	• 12 inches soil cover • Soil texture or percolation test allowed as the basis for sizing the dispersal field • 5-foot minimum depth to groundwater or impermeable layer for conventional OWTS • Limits for rocky soils exceeding 50% rock, • Leachfield designed using no more than 4 square feet of infiltrative area per linear foot of trench, and with trench no wider than 3 feet. ► **POSSIBLE IN TIER 2** • Differing system design requirements • Differing siting controls • Requirements for owners to enter monitoring and	materials, spacing, depth, and size of conventional leach lines • Soil texture or percolation test allowed as the basis for sizing the dispersal field • Setbacks to water bodies and buildings • 4 feet of continuous unsaturated soil below disposal field • Allowance for using a soil cap of fill with specified texture and depth fill • Standards for pressurized distribution • Standards for steep slopes • Leach lines must use serial distribution with distribution boxes • Gravelless systems may count sidewall • No provision for	must be confined to subsurface percolation without nuisance, pollution, or contamination • Only use of percolation test allowed • Typically install on slopes < 30% • Low-permeability soils may prohibit use of OWTS • 5-foot minimum depth to groundwater or impermeable layer for conventional OWTS • Setbacks per the Lahontan Regional Water Board • Seepage pits allowed	measures follow a modified Uniform Plumbing Code • Only use of percolation test allowed • Setbacks to water bodies, water lines, and buildings • Seepage pits allowed • 0.7 reduction factor allowed for gravelless chambers • Leach beds allowed • Pump systems require 24-hour storage capacity • Allow fills where insufficient soil is present on the site to meet prescriptive requirements.	continuous unsaturated soil • Standards for materials, spacing, depth, and size of conventional leach lines • Soil texture or percolation test allowed as the basis for sizing the dispersal field • Leach fields, subsurface drip dispersal, and at-grade mounds allowed	continuous unsaturated soil • Setbacks to water bodies, buildings, and property lines • Both soil characterization and percolation test are required for siting and sizing the dispersal field	continuous unsaturated soil to groundwater and 8 feet to an impermeable layer for leach lines • 10 feet of continuous unsaturated soil to groundwater and 8 feet to an impermeable layer for seepage pits • Only percolation tests dictate for sizing dispersal system • Setbacks to water bodies, water lines, and buildings • Seepage pits allowed • Specific mound system requirements • Adjustments for rocky soils • Leachfield designed using bottom area and sidewall.	continuous unsaturated soil depending on the percolation rate • Percolation test must be used to size the dispersal system • Setbacks and slope restrictions apply • Seepage pits allowed	groundwater and 3–5 feet to other limiting factor depending on the percolation rate • Soil texture or percolation test allowed as the basis for sizing the dispersal field • Limit on percentage of rock in soil set at 50% • Seepage pits not allowed • 0.7 reduction factor allowed for gravelless chambers • Evapotranspiration system not allowed • Graduated Application rates • Allows the use of sidewall and bottom are for sizing leachfield

Table 5-1: Points of Comparison for Select Counties and the Proposed Policy

Regulatory Elements	Proposed Project	El Dorado County	Inyo County	Los Angeles County	Mendocino County	Merced County	Riverside County	Santa Cruz County	Solano County
	maintenance agreements	seepage pits • No provision for subsurface drip dispersal separate from an STS							
Point 2: Requirements for Impaired Waters									
These requirements apply to OWTS within the watersheds of impaired water bodies as listed under Section 303(d) of the Clean Water Act unless otherwise stated. Other regulatory requirements associated with the other six points of this table also apply.	• Mandatory supplemental treatment for new and replaced OWTS within 600' of impaired water bodies listed on attachment 2 of the Policy, if a TMDL or Local Agency Management Program is not already addressing the problem.	None stated	None stated	None stated	None stated	• Established Zone of Benefit in vicinity of Lake Yosemite and new Zones of Benefit for large subdivisions; Zones of Benefit require nitrate effluent limit of 10 mg/L as N.	None stated	• Limitations on septic systems exist in areas of groundwater recharge • The San Lorenzo Wastewater Management Plan allows development with OWTS with standards from the regional water board; repairs must follow these standards	None stated
Point 3: Requirements Authorizing Local Implementation									
The requirements provide direction on how OWTS regulations can be entirely or partially implemented by counties, cities, and special districts.	• Local Implementation is allowed and detailed in Tier 2 • Local agency or regional water board retains option for setting	• County is granted authority to permit and enforce OWTS systems for individual and multiple dwellings and	• MOU with Lahontan Regional Water Board	• County authority applies to single-family residences only	• MOU between local agency and regional water board	No reference to local versus state implementation	• OWTS regulation is shared between the county and the regional water boards, with County as lead agency for	• MOU between local agency and regional water board allows county to permit and oversee OWTS to 20,000 gpd	• Ordinance adopted to comply with basin plan and Porter Cologne Water Quality Control Act

Table 5-1: Points of Comparison for Select Counties and the Proposed Policy

Regulatory Elements	Proposed Project	El Dorado County	Inyo County	Los Angeles County	Mendocino County	Merced County	Riverside County	Santa Cruz County	Solano County
	more protective requirements for water quality	small commercial facilities • Department of Environmental Management is recognized by the Board of Supervisors as a public entity (i.e., a local agency empowered to plan, design, finance, construct, operate, maintain, and abandon any sewage system or treatment facility serving a land development)					single-family residences, including new subdivisions and small commercial; regional water boards may review and approve or deny subdivisions and maintain jurisdiction over multifamily and large flow discharges.		
Point 4: Requirements for Corrective Actions									

Table 5-1: Points of Comparison for Select Counties and the Proposed Policy

Regulatory Elements	Proposed Project	El Dorado County	Inyo County	Los Angeles County	Mendocino County	Merced County	Riverside County	Santa Cruz County	Solano County
	▸ **TIER 4** • All failing OWTS must be repaired or replaced per the time schedule set by the regional board or local agency.	• Enforcement will be taken for infractions against the county ordinance • Correction notice issued if system operation or construction in violation of county ordinance • Permit suspension	None stated	• Overflows, discharges to the ground surface of any premises are prohibited and may cause the health director to order occupants to vacate premises within 24 hours	• Failure identified and a permit application to correct the condition	None stated	• The director shall order abatement when a failure condition is present that threatens public health or water quality. Enforcement may include requirement for immediate abatement based on severity of the environmental or health risk. May include immediate pumping of septic tank, use of portable toilets, and other interim measures while permanent abetment measures under permit.	• If a system fails, it must be corrected	• Required for a failing OWTS or when a violation of the county code occurs
Point 5: Minimum Monitoring Requirements									
Inspection requirements	All local agencies permitting OWTS will monitor and report annually to regional water boards. The annual report shall	• Inspections during siting and construction phases	• Optional real estate certification inspection for integrity and functionality of tank and leach	• Inspections to verify that number of bedrooms and capacity of the installed OWTS match the permit	• Installation inspections • Monitoring inspection of nonstandard OWTS, including STS systems	None stated	• All new and repaired STS must have yearly inspection of tanks and proof of septic tank pumping at least	• All STS subject to regular inspections • Inspections by health officer during construction of	• Inspections during site evaluation and construction phases

Table 5-1: Points of Comparison for Select Counties and the Proposed Policy

Regulatory Elements	Proposed Project	El Dorado County	Inyo County	Los Angeles County	Mendocino County	Merced County	Riverside County	Santa Cruz County	Solano County
	include: 1. number and location of complaints pertaining to OWTS operation and maintenance; 2. applications and registrations issued as part of the local septic tank cleaning registration program pursuant to Section 117400 et. Seq. of the California Health and Safety Code; 3. number and location of OWTS repair permit number and location of permits issued for new OWTS, and which Tier the permit is issued under		field				every 5 years • For STS, must have proof of service contract and repairs records	OWTS	
System operation inspections and monitoring	• TIER 2 has options that will allow groundwater monitoring. • TIER 3	None stated	None stated	None stated	• Operating permit for large flows, nonstandard systems • Monitoring and inspection	• Must inspect solids levels in septic tanks at new larger subdivisions • Biyearly	• STS subject to yearly inspection and proof of cleaning every 5 years, ongoing maintenance,	• Operating permit required for STS and possibly for other OWTS • For STS, generic specification of	• STS must have an operating permit with annual reporting and revocable permit

Table 5-1: Points of Comparison for Select Counties and the Proposed Policy

Regulatory Elements	Proposed Project	El Dorado County	Inyo County	Los Angeles County	Mendocino County	Merced County	Riverside County	Santa Cruz County	Solano County
	telemetric alarm requirements or monthly inspection by the homeowner.				requirements, but varying discharge limits may vary the requirements	evaluation of proper functioning of experimental systems	maintenance agreement	monitoring frequency, location, and parameters provided in the code	
Groundwater quality monitoring	• Optional under TIER 2	None stated	• 3-foot minimum depth to groundwater or impermeable layer for conventional OWTS	None stated	• May be required for STS	None stated	• For repairs only if using STS; monitor adjacent to mound system • For a repair using a mound system, must monitor winter and spring for 3 years adjacent to mound	• May be required as part of operating permit	• For siting by using soil mottling or monitoring wells within the proposed disposal field
Effluent quality monitoring	TIER 3: • Monitoring supplemental treatment system with disinfection quarterly with samples tested by a CDPH-certified laboratory	None stated	None stated	None stated	• Effluent flows and quality monitored under operating permits for high-flow and high-strength OWTS	• In Zones of Benefit, must meet 10 mg/L nitrate as N effluent limit.	None stated	None stated	Form Purge within 25 feet of OWTS
Point 6: Exemption Criteria									
Conditions by which regional water boards may set criteria for exemptions to	• OWTS regulated by WDRs may be exempted from requirements by regional water	Not applicable for county agency	Not applicable for county agency	Not applicable for county agency	Not applicable for county agency	Not applicable for county agency	Not applicable for county agency	Not applicable for county agency; however, the ordinance does have a process for	Not applicable for county agency

Table 5-1: Points of Comparison for Select Counties and the Proposed Policy

Regulatory Elements	Proposed Project	El Dorado County	Inyo County	Los Angeles County	Mendocino County	Merced County	Riverside County	Santa Cruz County	Solano County
OWTS	boards							waivers and exemptions.	
Point 7: Major Repair									
Requirements for determining when a system is subject to a major repair.	▸ Major repair means: (1) for a dispersal system, repairs required for an OWTS due to surfacing wastewater effluent and/or wastewater backed up into plumbing fixtures because the dispersal system is not able to percolate the design flow of wastewater associated with the structure served, or (2) for a septic tank, repairs required to the tank for a compartment baffle failure or tank structural integrity failure such that either wastewater is exfiltrating or	• A failing septic system is any system that discharges untreated or inadequately treated sewage or septic tank effluent directly or indirectly onto the ground surface, into public waters, or into a dwelling	None stated	• Required when overflows or discharges to the ground surface of any premises occur • "Failed seepage pits are those pits that overflow, are required to be pumped out, and have effluent sewage leaking on the lot or beyond."	• Follow "Guidelines for Issuing Repair Permits" policy.	• Leach field failure if constant wet spots or lush growth over field, plumb drainage is sluggish, or odors over the leach field	• When a system is determined to be in failure (i.e., is surfacing or leaking to groundwater, polluting of surface or groundwater, when sewage backs up into buildings, or a system is out of compliance with permit requirements) • OWTS improvements or corrective work where such improvements result in replacement, enlargement or modification are major repairs.	• Minor repairs consist of replacing the septic tank or installing a greywater sump; all other repairs are considered major and must comply with current standards.	• When wastewater from an OWTS is: o Septic tank baffle missing; o backing into buildings o surfacing on the ground o discharged to surface water or groundwater o lacking unsaturated vertical soil separation to groundwater o elevated above the disposal pipe • For STS, when: o fecal coliform over 2.2 MPN or total coliform over 240,000 MPN o Nitrate limit not met

Table 5-1: Points of Comparison for Select Counties and the Proposed Policy

Regulatory Elements	Proposed Project	El Dorado County	Inyo County	Los Angeles County	Mendocino County	Merced County	Riverside County	Santa Cruz County	Solano County
	groundwater is infiltrating ► **TIER 4** All failing OWTS must be repaired or replaced in accordance the time schedule from the regional board or local agency								
Conditions that require a repair	• A major repair is required when surfacing effluent occurs from an OWTS or when effluent concentrations exceed the requirements for supplemental treatment systems.	None stated	None stated	• Overflows, discharges to the ground surface of any premises	• Repairs requiring permits include replacement of septic tanks, pump tanks or basins, pump controls, grease tanks, or the absorption system (dispersal system)	None stated	• Conditions requiring the replacement, enlargement, or modification of a septic tank, treatment unit, or dispersal system regardless of whether a failure condition exists	• Conditions that create a public health hazard or degrade surface water or groundwater quality • Conditions that violate county OWTS code	• Failure to accept discharge; • Discharge on the ground surface • Discharge to Groundwater • Saturated flow

Notes: BOD = biochemical oxygen demand.
CDPH = California Department of Public Health.
gpd = gallons per day.
IAPMO = International Association of Plumbing and Mechanical Officials.
mg/l = milligrams per liter.
MOU = memorandum of understanding.
mpi = minutes per inch.
MPN = Most Probable Number.
O&M = operation and maintenance.
regional water board = regional water quality control board.

Table 5-1: Points of Comparison for Select Counties and the Proposed Policy

Regulatory Elements	Proposed Project	El Dorado County	Inyo County	Los Angeles County	Mendocino County	Merced County	Riverside County	Santa Cruz County	Solano County
STS = supplemental treatment system SWRCB = State Water Resources Control Board. TMDL = total maximum daily load. TN-N = total nitrogen as nitrogen. TSS = total suspended solids. WDR = waste discharge requirement.									
Sources: **El Dorado County:** El Dorado County Ordinance Chapter 15.32, El Dorado County Resolution No. 259-99. County of El Dorado. November 24, 1999. **Inyo County:** Inyo County Code 7.12, Discharge of Sewage, 7.52.020, and 7.52.060. Inyo County, Inyo County Code 14.08.030 (1985 Plumbing Code). **Los Angeles County:** County of Los Angeles 2002 Plumbing Code; Private Sewage Disposal Systems Guidelines for Department Personnel. January 25, 2002. Procedures for Application for Approval of Private Sewage Disposal System Construction. January 1, 2000. Los Angeles County Code Parts 3.38.450 and .460; 11.38.470 -- .670. **Merced County:** 1. Merced County Minimum Design standards – Operation and Maintenance, and Site Evaluation for On-Site Sewage Disposal Systems. Merced County Division of Environmental Health. 1995 2. New On-site Sewage Requirements (Effective 11/18/05). Merced County Division of Environmental Health. 2005. **Mendocino County**: 1. Land Use Programs: On-Site Sewage (Septic) Systems and Water Wells. County of Mendocino Environmental Health. 2006. 2. Land Use Policies. County of Mendocino Environmental Health. 2006. 3. Land Development Requirements: Minimum Standards for On-Site Sewage Systems. Form #42.28. revised June 1998. 4. Non-Standard On-Site Sewage Disposal Systems Program. County of Mendocino Environmental Health. 1996. 5. Division of Environmental Health Policies and Procedures. Subject: Wet Weather Testing of Soils. December 1, 1982. **Riverside County:** 1. Ordinance No. 650.4; April 2, 1988. Ordinance 650.5 June 14, 2006.. 2. On-site Wastewater Treatment Systems Technical Guidance Manual, Version A. 3. Ordinance No. 856: An Ordinance of the Count of Riverside Establishing a Septic Tank Prohibition for Specified Areas of Quail Valley and Requiring the Connection of Existing Septic Systems to Sewer. August 28, 2006. **Santa Cruz County:** Septic Ordinance; Santa Cruz County Code Chapter 7.38 Sewage Disposal 2007. **Solano County:** Solano County Ordinance Chapter 6.4; Sewage Standards.									

Table 5-2: Points of Comparison for Select Counties and Cities and the Proposed Policy								
Regulatory Elements	**Proposed Project**	**Sutter County**	**Stinson Beach County Water District**	**Tehama County**	**City of Los Angeles**	**Sonoma County**	**Town of Paradise**	**City of Malibu**
Point 1: Minimum Operating Requirements								
General requirements: Siting and design, construction, performance requirements and maintenance	▸ TIER I • Applies to all new and replaced OWTS with the capacity to treat up to 3,500 gpd • Qualified professionals requirements: o Soils and site evaluation and design • Designed for percolation rates from 1-90 MPI. • Setbacks from wells, surface waters, unstable land masses, and drinking water intakes. • Ground slope limitation of 25 percent. • Average density not greater than 2.5 acres per OWTS. • Tank performance standards: o Secure access opening and watertight risers o 3/16-inch mesh	• Tank performance standards: o Must be on approved list of water-tight tanks o Effluent filter required and department approved o Access risers to be water tight, at or above grade with secure, lockable lid o Designed for protection against flotation and groundwater intrusion o Must be tested in place to be water tight by commercial installer and/or authorized professional o Tank sizing dependent on bedroom count o Multicompartment tank design requirements	• Tank performance standards: o Conform to UPC, not less than 1,500 gallons, access risers, gas and water tight; if used as sump tank, shall have 1/8-inch screen and deliver design volume, installed level and not less than 12-inch cover, shall have effluent filter of approved type • Percolation testing to be used for design with soil profile requiring backhoe excavations, hand auguring and/or coring and minimum holes set in primary and reserve areas • Designed by person licensed or registered or otherwise authorized by	• Tank performance standards: o Septic tank construction shall be approved by the Tehama Building Department. Sizing according to bedroom count and minimum 1,200-gallon tank and system materials shall conform to UPC as adopted by the county or as superseded by this code o On-site sewage disposal systems shall comply with UPC, as adopted by the county and the Manual of Septic Tank Practice, 1967; where conflicts occur, UPC supersedes, and where differences occur between this code and	• On-site sewage disposal systems similar to Appendix K of 2007 California Plumbing Code, as adopted by the county • Specific septic tank requirements for earth loads, volume, and buoyancy. • Setbacks to water bodies and buildings specified • Alternative systems shall be approved by the DEHS, Building official and the regional water board; permit required before installation of this system • Soil testing for disposal systems to be conducted only by registered or certified professional personnel • Certification	• Tank performance standards: o IAPMO-approved tanks o Water tight o Restrictions on aboveground uses over tank • Registered Environmental Health Specialist or Registered Civil Engineer for design of most systems; licensed Class A or C-42 may design pump and dosing systems • Compliance with Appendix K, UPC • Conventional systems limited to using leach lines • Very detailed percolation testing and site evaluation procedures defined	• Septic tank performance standards: o Watertight o At least two compartments o Capacity to resist weight loading • Many other tank, valve, and component requirements • Site evaluation by Registered Environmental Health Specialist, Registered Civil Engineer, certified professional soil scientist, or certified engineering geologist/ registered geologist • Site evaluation and design standards • Operating permit for standard and alternative systems • Soil group used to determine OWTS type	• Use of modified California Plumbing Code setting requirements for septic tank sizing and setbacks • Tank construction and access requirements • Licensed contractors for installation • Inspector registration program • Registered civil engineer or geologist for supplemental treatment system design • Supplemental treatment systems allowed throughout the city • STS required for commercial land uses, beach front properties, and other special cases • Revocable operating permit required and may include groundwater monitoring and reporting

Table 5-2: Points of Comparison for Select Counties and Cities and the Proposed Policy

Regulatory Elements	Proposed Project	Sutter County	Stinson Beach County Water District	Tehama County	City of Los Angeles	Sonoma County	Town of Paradise	City of Malibu
	effluent filter o IAPMO-approved tanks, or stamped and certified by CA registered civil engineer ▸ **POSSIBLE IN TIER 2** • Various supplemental treatment systems • Various dispersal systems ▸ **TIER 3** • Supplemental treatment system performance standards: o 50% reduction in TN; 30 mg/l TSS and 200 MPN fecal coliform per 100 mL o Periodic performance evaluation	o Pump tank requirements are similar o Location of ST and PT [in vehicular traffic to be designed by registered engineer • Setbacks to water bodies and buildings specified • Standards for sand filters • Requirements for OWTS designers (state registered and approval by the department) and continuing education requirements • Construction by commercial installers (Class A, B-1, C-36 or C-42 licensed contractor) • STS required if percolation >60 mpi or less than 5 mpi	California to design on-site wastewater systems • Depth to groundwater based on percolation and minimum depth to suitable soil set at 3 feet; minimum percolation set at 120 mpi; ground slope maximum set at 20% and greater requires geological report • Waiver approval required by regional water board for alternative systems • Design standards established for pressure and alternative systems • Sand filter systems criteria established for conditions of greater than 5 mpi and inadequate depth-to-groundwater separation • Design standards established for drip dispersal systems	referenced standards, this code applies • Design standards and site evaluation shall be published by the DEH and approved by the County Board of Supervisors for standards and special or alternative systems • Special systems shall be designed by a consultant and certified to the DEH that system installed as specified or changed as approved by DEH • Cesspools and holding tanks not allowed • Privies installation and use conditions specified • Requirements for grease interceptors specified and conformance to UPC	compliance of wastewater disposal system by person registered with DEHS and state registered in civil engineer, sanitarian, geologists, or C-42 contractor • Modifications and/or alternatives systems shall be considered on case-by-case basis upon petition to the DEHS • Special designated areas identified as "Maintenance Areas" require specific conditions		• Design requirements for conventional and supplemental systems	• O&M manual required for all systems • In general, regional water board Order 01-031 sets receiving water limits for commercial and multifamily development that the City enforces through permitting • Inspector program specified for OWTS inspection, including city-approved required training and passing of exam

Table 5-2: Points of Comparison for Select Counties and Cities and the Proposed Policy

Regulatory Elements	Proposed Project	Sutter County	Stinson Beach County Water District	Tehama County	City of Los Angeles	Sonoma County	Town of Paradise	City of Malibu
Dispersal System Standards and Requirements	► **TIER I** • 12 inches soil cover • Soil texture or percolation test allowed as the basis for sizing the dispersal field • 5-foot minimum depth to groundwater or impermeable layer for conventional OWTS • Limits for rocky soils exceeding 50% rock, • Leachfield designed using no more than 4 square feet of infiltrative area per linear foot of trench, and with trench no wider than 3 feet. ► **POSSIBLE IN TIER 2** • Differing system design requirements • Differing siting controls • Requirements for owners to enter monitoring and maintenance agreements	• Standards for materials, spacing, depth, and size of conventional leach lines • Standards provided for minimum sewer pipe versus slope, sanitary tees, cleanouts for building sewer and effluent pipe, D-Boxes, trench design • Soil texture allowed as the basis for sizing the dispersal field • Percolation testing as required in situations of types 5 and 6 soils, referred to as “extended site evaluation” • Water table evaluations based on seasonal requirements • Standards for subdivisions • Standards for pressure distribution and gravvelless trenches	• Criteria established for holding tanks, permits for septic pumping and use of chemical toilets for temporary use • Percolation soil testing and soil profile used for design of standard systems • Groundwater evaluation based on percolation • Standards set for subdivisions. • Percolation testing required • Variances to standards established and require submittal to the RWQCB • No provisions for gravelless drainfield systems • Installation shall be by licensed contractor	• Setbacks to water bodies, water lines, and buildings specified • Seepage pits allowed • Slope limited to 30% • Reserve area (replacement area) specified for residential, commercial, industrial, and agricultural • Prohibited areas specified for location of disposal areas • Additional evaluation may be required for other than residential single-family systems • Soil absorption conditions specified and minimum separation of 3-1/2 feet to restrictive layer in the upper horizons of the soil	• Percolation tests shall be used as the basis for sizing the dispersal field • Minimum setbacks specified • Allows gravelless trenches • Requires a distribution box for OWTS with more than one leachlines or seepage pits. • Allows seepage pits • Specifies the size of gravel needed for dispersal system. • Specifies UPC design application rates for sizing drainfield.	For conventional: • >2 feet of continuous unsaturated soil • Many detailed requirements that address specific conditions • 25 feet from cut banks, sharp grade changes • <30% slope For STS: • <2 feet of continuous unsaturated soil • Strict setback distances • Slope restrictions based on type of supplemental system • Must notify the county of malfunctioning system • Many prescriptive physical requirements for design of specific supplemental systems • Special	• Setbacks to water bodies, water lines, buildings, and other specified • Minimum separation to restrictive layer • Trench and bed specifications • Steep slope requirements • Capping fill requirements • Design requirements for several soil-based systems	• Use of modified California Plumbing Code setting requirements for disposal field sizing, setbacks, and percolation testing • Sieve analyses may be used in lieu of percolation test • Infiltration test allowed for subsurface drip dispersal • Special conditions apply to beachfront property • Leach fields, absorption beds, seepage pits, and subsurface drip dispersal allowed • No reduction factor for infiltration chambers • Registered civil engineer, geologist, soils engineer, or environmental health specialist for site characterization • Groundwater mounding analysis may be required

Table 5-2: Points of Comparison for Select Counties and Cities and the Proposed Policy

Regulatory Elements	Proposed Project	Sutter County	Stinson Beach County Water District	Tehama County	City of Los Angeles	Sonoma County	Town of Paradise	City of Malibu
		• Leach lines must use distribution boxes • Criteria for failing systems, repairs and abandonment • Minimum lot size specified per soil type • No provision for seepage pits • No provision for subsurface drip dispersal				requirements for commercial, agricultural, and industrial discharges		
Point 2: Requirements for Impaired Waters								
These requirements apply to OWTS within the watersheds of impaired water bodies as listed under section 303(d) of the Clean Water Act unless otherwise stated, Other regulatory requirements associated with the other six points of this table also apply.	• Mandatory supplemental treatment for new and replaced OWTS within 600' of impaired water bodies listed on attachment 2 of the Policy, if a TMDL or Local Agency Management Program is not already addressing the problem.	None stated	None stated	None stated	None stated	• Nitrate-sensitive areas • Seven areas have special restrictions, prohibitions, or construction requirements for protection or to remediate contamination	None stated	• Properties in the vicinity of 303(d) impaired water bodies with TMDLs for nitrate and/or total coliform linked to OWTS discharges require higher levels of STS treatment, including more stringent permit application details and effluent and groundwater monitoring requirements
Point 3: Local Implementation								

Table 5-2: Points of Comparison for Select Counties and Cities and the Proposed Policy

Regulatory Elements	Proposed Project	Sutter County	Stinson Beach County Water District	Tehama County	City of Los Angeles	Sonoma County	Town of Paradise	City of Malibu
The requirements provide direction on how OWTS regulations can be entirely or partially implemented by counties, cities, and special districts.	• Local Implementation is allowed and detailed in Tier 2 • Local agency or regional water board retains option for setting more protective requirements for water quality	• No reference made to local or state implementation	• General manager of the Stinson Beach County Water District is authorized to enforce this code and may appoint a district engineer to implement	• Health officer shall be empowered to enforce the provisions of this chapter and amendments • County authority applies to single-family residences and nonresidential in line with DEH published design standards and as approved by the County Board of Supervisors	• County Board of Supervisors designates the County DEHS as the enforcement authority	• MOUs and Joint Innovative Waste Treatment and Disposal System Evaluation Agreements in effect with the North Coast and San Francisco Regional Water Boards	• No reference made to local or state implementation	• MOU with Los Angeles Regional Water Board defining division of enforcement based on OWTS size and waste strength • Close collaboration with Los Angeles Regional Water Board on large projects and projects with high-strength waste
Point 4: Requirements for Corrective Actions								
	▸ **TIER 4** • All failing OWTS must be repaired or replaced per the time schedule set by the regional board or local agency.	• Enforcement taken for infractions against the county ordinance and treated as a misdemeanor	• Every wastewater disposal system will be inspected every 3 years. If found not to comply with design or is discharging to surface water, groundwater of the contiguous seashores of the district, the discharge permit may be revoked. Upon completion of repairs and the district	• Enforcement action for permit violation, such as commencing without a permit, shall be a violation of county code; shall be guilty of a misdemeanor punishable by fine not to exceed $500 or imprisonment not to exceed 6 months or both	• Reasonable suspicion of threat to public health and safety is grounds for temporary suspension of operational permit; revoked permit reinstated upon adequate repair, alteration, or maintenance	• Reasonable suspicion of threat to public health and safety is grounds for temporary suspension of operational permit; revoked permit reinstated upon adequate repair, alteration, or maintenance • If disposal field area is physically altered by site activities such as grading, the vesting	• Enforcement will be taken for failure to have or comply with the requirements of the construction or operating permit conditions, except under conditions that allow for an emergency repair without a construction permit	• Enforcement action for violations of city OWTS code. A conviction assesses guilt of a misdemeanor punishable by a fine not to exceed $1,000 or imprisonment up to 6 months or both. Each day of violation constitutes a separate offense.

Table 5-2: Points of Comparison for Select Counties and Cities and the Proposed Policy

Regulatory Elements	Proposed Project	Sutter County	Stinson Beach County Water District	Tehama County	City of Los Angeles	Sonoma County	Town of Paradise	City of Malibu
			determination is that the violation no longer exists, then the permit will be reissued.			certificate may be revoked • Operating a septic system without an Operational Permit is grounds for corrective action		
Point 5: Minimum Monitoring Requirements								
Inspection requirements	All local agencies permitting OWTS will monitor and report annually to regional water boards. The annual report shall include: 1. number and location of complaints pertaining to OWTS operation and maintenance; 2. applications and registrations issued as part of the local septic tank cleaning registration program pursuant to Section 117400 et. Seq. of the California Health and Safety Code; 3. number and location of OWTS repair permit number	• Inspections during siting and construction phases	• Designer shall provide an inspection schedule and will provide an as-built once system is completed and note any changes for district approval as necessary	• Inspections shall be conducted by the administrative authority to ensure work complies with this chapter	• Installation inspections and subsequent inspection specified as well as periods between tank pumping •	• Easement agreements required for county access for observing, testing, and sampling	• Inspections of conventional and STS upon construction and as required for compliance and enforcement of operating permits	• OWTS inspection required by city-approved contractor, civil or geotechnical engineer, engineering geologist, or environmental health specialist licensed or registered with the state • Inspections include major components of conventional and STS

Table 5-2: Points of Comparison for Select Counties and Cities and the Proposed Policy

Regulatory Elements	Proposed Project	Sutter County	Stinson Beach County Water District	Tehama County	City of Los Angeles	Sonoma County	Town of Paradise	City of Malibu
	and location of permits issued for new OWTS, and which Tier the permit is issued under.							
System Operation Inspections and Monitoring	• TIER 2 has options that will allow groundwater monitoring. • TIER 3 telemetric alarm requirements or monthly inspection by the homeowner.	• Alternative systems as directed by health officer	• Inspections will be conducted every 3 years	• None stated	• Special monitoring required within designated maintenance areas •	• For STS, operational permit required; 1-year renewable operational permit • STS should pump septic tank once every 5 years	• For STS, requires monthly inspections by experienced personnel, including Town of Paradise Licensed Evaluators and state-certified wastewater treatment plant operators; maintenance logs required	• Operating permit must be renewed every 2–5 years and upon point of property sale • Revoked if noncompliance with city code • Monitoring requirements included for commercial and multifamily sites • STS must have telemetric alarms
Groundwater quality monitoring	• Optional under TIER 2	None stated	None stated	None stated	None stated	• For STS: • Semi-annual monitoring in monitoring wells in accordance with operating permit • 2.2 MPN fecal coliform, 3,000 MPN total coliform in wells	• Surface water and groundwater monitoring program protocol for Town of Paradise On-site Wastewater Management Zone	• Quarterly monitoring for commercial and multifamily residential sites in conjunction with the regional water board Order 01-031 and in special cases such as near 303(d) impaired water bodies
Effluent quality monitoring	TIER 3: • Monitoring supplemental treatment system with disinfection	None stated	None stated	None stated	None stated	None stated	► BOD, TSS, nitrogen, and flow monitoring at least quarterly	► Yes, when ongoing monitoring occurs as part of an operating permit, frequently in conjunction with

Table 5-2: Points of Comparison for Select Counties and Cities and the Proposed Policy

Regulatory Elements	Proposed Project	Sutter County	Stinson Beach County Water District	Tehama County	City of Los Angeles	Sonoma County	Town of Paradise	City of Malibu
	quarterly with samples tested by a CDPH-certified laboratory							requirements of regional water board Order 01-031
Point 6: Exemption Criteria								
Conditions by which regional water boards may set criteria for exemptions to OWTS	• OWTS regulated by WDRs may be exempted from requirements by regional water boards	Not applicable for county agency	Not applicable for county agency	Not applicable for county agency	Not applicable for county agency	Not applicable for county agency	Not applicable for city agency	Not applicable for city agency
Point 7: Major Repair								
Requirements for determining when a system is subject to a major repair.	► Major repair means: (1) for a dispersal system, repairs required for an OWTS due to surfacing wastewater effluent and/or wastewater backed up into plumbing fixtures because the dispersal system is not able to percolate the design flow of wastewater associated with the structure served, or (2) for a septic tank,	► A failing septic system is any system that discharges untreated or inadequately treated sewage or septic tank effluent directly or indirectly onto the ground surface, that is backing up, or that allows untreated or inadequately treated sewage or septic tank effluent to reach groundwater ► Also considered failing are privies,	► During the periodic inspection (every 3 years), if the system is not performing according to design or contamination occurs to groundwater, surface water, or the contiguous seashores of the district, the permit may be revoked and repair may be required	► Emergency repairs specified to allow work to proceed without a permit, but subsequent permit required and to be approved in accordance with county code	► A failing system has surfacing effluent or septage, or backup of septage toward fixtures	► Determination of a serious or imminent threat to public health and safety associated with the use of a nonstandard or monitored system	► Upon written notification, the owner of an OWTS shall repair, modify, replace, or abandon a failing system discharging incompletely treated wastewater directly into public water or onto the ground or a malfunctioning systems causing (1) contamination of nearby water wells or surface water, (2) surface ponding or backups of sewage into the	► Emergency permitting procedures instituted to allow for upgrade of commercial or multifamily residential OWTS within coastal zone based on either report of overflows, backups, wastewater surfacing, or increase frequency of tank pumping to avoid these occurrences

Table 5-2: Points of Comparison for Select Counties and Cities and the Proposed Policy

Regulatory Elements	Proposed Project	Sutter County	Stinson Beach County Water District	Tehama County	City of Los Angeles	Sonoma County	Town of Paradise	City of Malibu
	repairs required to the tank for a compartment baffle failure or tank structural integrity failure such that either wastewater is exfiltrating or groundwater is infiltrating ► **TIER 4** All failing OWTS must be repaired or replaced in accordance the time schedule from the regional board or local agency	seepage pits, or cesspools; deep trenches that discharge directly to groundwater in special areas; metal/wood tanks; septic tanks considered a safety hazard and unrecorded drainfields					building, (3) seepage of wastewater below a building, or (4) foul odors from the disposal system are subject to repair.	
Conditions that require a repair	• See above.	See above.	See permit violation above.	See above requirements.	See above requirements.	Among other reasons, system was installed at time when county codes were rudimentary or before codes	See above requirements.	See above.

Notes: BOD = biochemical oxygen demand.
CDPH = California Department of Public Health.
DEH = Division of Environmental Health.
DEHS = County Department of Environmental Services.
gpd = gallons per day.
IAPMO = International Association of Plumbing and Mechanical Officials.
mg/l = milligrams per liter.
MOU = memorandum of understanding.

Table 5-2: Points of Comparison for Select Counties and Cities and the Proposed Policy

Regulatory Elements	Proposed Project	Sutter County	Stinson Beach County Water District	Tehama County	City of Los Angeles	Sonoma County	Town of Paradise	City of Malibu

mpi = minutes per inch.
MPN = Most Probable Number.
O&M = operation and maintenance.
PT = Pump Tank
regional water board = regional water quality control board.
ST = Septic Tank
STS = supplemental treatment system
SWRCB = State Water Resources Control Board.
TMDL = total maximum daily load.
TN-N = total nitrogen as nitrogen.
TSS = total suspended solids.
UPC = Uniform Plumbing Code.
WDR = waste discharge requirement.

Sources: **El Dorado County:** (1) El Dorado County Ordinance Chapter 15.32.
(2) El Dorado County Resolution No. 259-99.
(3) County of El Dorado. November 24, 1999.

Inyo County: Inyo County Code 7.12 Discharge of Sewage, 7.52.020, 7.52.060. Inyo County.

Los Angeles County: (1) County of Los Angeles 2002 Plumbing Code; On-site Wastewater Treatment System (OWTS) guidelines. September 1, 2009.
(2) Procedures for Application for Approval of Private Sewage Disposal System Construction. January 1, 2000.
(3) Los Angeles County Code Parts 3.38.450 and .460; 11.38.470 -- .670.

Calabasas, City of: (1) On-site Wastewater Treatment Systems: Title 28 of the Los Angeles County Code, Incorporating the California Plumbing Code, 2001 Edition, and the City of Malibu Ordinance No. 242 Amendments. March 2003.
(2) Malibu Private Sewage Disposal System Design Requirements. November 24, 2004
(3) City of Malibu LCP Local Implementation Plan: Adopted by the California Coastal Commission on September 13, 2002. Pages 291 and 292. September 2002.

Merced County: (1) Merced County Minimum Design Standards – Operation and Maintenance, and Site Evaluation for On-Site Sewage Disposal Systems. Merced County Division of Environmental Health. 1995
(2) New On-site Sewage Requirements (Effective 11/18/05). Merced County Division of Environmental Health. 2005.

Mendocino County: (1) Land Use Programs: On-Site Sewage (Septic) Systems and Water Wells. County of Mendocino Environmental Health. 2006.
(2) Land Use Policies. County of Mendocino Environmental Health. 2006.
(3) Land Development Requirements: Minimum Standards for On-Site Sewage Systems. Form #42.28. revised June 1998.
(4) Non-Standard On-Site Sewage Disposal Systems Program. County of Mendocino Environmental Health. 1996.

Table 5-2: Points of Comparison for Select Counties and Cities and the Proposed Policy

Regulatory Elements	Proposed Project	Sutter County	Stinson Beach County Water District	Tehama County	City of Los Angeles	Sonoma County	Town of Paradise	City of Malibu

(5) Division of Environmental Health Policies and Procedures. Subject: Wet Weather Testing of Soils. December 1, 1982.

Paradise, Town of: Town of Paradise On-site Wastewater Management Zone: Manual for the On-site Treatment of Wastewater. Revised November 8, 2005.

Riverside County: (1) Ordinance No. 650.4. April 2, 1988.
(2) Ordinance 650.5 June 14, 2006.
(3) Waste Disposal for Individual Homes, Commercial, and Industrial. County of Riverside. August 1981.

Santa Cruz County: (1) Septic Systems and Design Standards in Santa Cruz County. March 1999
(2) Santa Cruz County Code Chapter 7.38 Sewage Disposal.
(3) Memorandum or Understanding: Regional Water Quality Control Board Central Coast Region and County of Santa Cruz. August 21, 2001
(4) Information on service Charges for County Service area No. 12: Septic System Maintenance and Management
(5) Draft Standards and Procedures for the Repair and Upgrade of Septic Systems. August 28, 2002.

Solano County: Solano County Ordinance Chapter 6.4; Sewage Standards. November 7, 2005.

Sonoma County: Policy and Procedure Numbers 1-4-3, 9-2-2, 9-2-3, 9-2-6, 9-2-8, 9-2-9, 9-2-10, 9-2-13, 9-2-17, . Permit and Resource Management Department. Sonoma County. October 27, 2002. County Code Chapter 24 Sewers and Sewage Disposal. Guidelines for Subsurface Drip Irrigation (SDI) Systems. April 24, 2003.

Sutter County: (1) Ordinance 1335. An ordinance of the County of Sutter …relating to on-site sewage treatment and disposal. July 2, 2002.
(2) Gravvelless Drainfields (2002): Standards and guidance for performance, application, design, and operation and maintenance.
(3) Pressure Distribution (August 2002): Standards and guidance for performance, application, design, and operation and maintenance.
(4) Intermittent Sand Filtration (200): Standards and guidance for performance, application, design, and operation and maintenance.

Stinson Beach County Water District: Title IV On-site Wastewater Management Code. July 6, 2005

Tehama County: (1) Tehama county Septic Systems Code. No date.
(2) Application and Site Evaluation Procedures for Conventional on-Site Sewage Disposal and Treatment Systems. January 1, 1997.

Table 5-3: Points of Comparison for Regional Water Quality Control Boards and Proposed Policy

Regulatory Elements	Proposed Project	Regional Water Quality Control Board								
		North Coast (Region 1)	San Francisco Bay (Region 2)	Central Coast (Region 3)	Los Angeles (Region 4)	Central Valley (Region 5)	Lahontan (Region 6)	Colorado River Basin (Region 7)	Santa Ana (Region 8)	San Diego (Region 9)

Table 5-3: Points of Comparison for Regional Water Quality Control Boards and Proposed Policy

Regulatory Elements	Proposed Project	Regional Water Quality Control Board								
		North Coast (Region 1)	San Francisco Bay (Region 2)	Central Coast (Region 3)	Los Angeles (Region 4)	Central Valley (Region 5)	Lahontan (Region 6)	Colorado River Basin (Region 7)	Santa Ana (Region 8)	San Diego (Region 9)
Point 1: Minimum Operating Requirements										
General requirements: Siting and design, construction, performance requirements and maintenance	▸ TIER I •Applies to all new and replaced OWTS with the capacity to treat up to 3,500 gpd •Qualified professionals requirements: o Soils and site evaluation and design •Designed for percolation rates from 1-90 MPI. •Setbacks from wells, surface waters, unstable land masses, and drinking water intakes. •Ground slope limitation of 25 percent. •Average density not greater than	Tank standards based on IAPMO, UPC, or approved local agency standard: NSF- or IAPMO-certified STS treatment units Qualified professional defined as geologist, soil scientist, registered civil engineer, or registered environmental health specialist STS performance: • Maximum slope limits • Separation to groundwater 2–3 feet • Monitoring program • Reporting by	IAPMO and NSF tank standards Requirements for design professionals STS performance: Region 2 uses the *Regional Board Waiver Program for Approving Local Agency Regulatory Programs. Oct 1995* to define STS and other requirements; the document is not specifically mentioned in the Basin Plan. • 3 feet of continuous unsaturated soil • Monitoring program	Yes, sanitary engineers must design mound and evapotranspiration systems. STS performance: • Evapotranspiration system requirements • Designed by registered professional engineer experienced in sanitary engineering • 40 g/day total nitrogen per acre for community systems in groundwater recharge areas • Risers required on	Requirements for qualified professionals not stated in the Basin Plan STS performance: None stated, but the Basin Plan encourages the use of alternative waste treatment systems.	Requirements for qualified professionals: registered engineer, geologist, sanitarian may submit specially designed systems. STS performance: Ground slope maximum 30%	STS performance: a. Horizontal setbacks b. O&M manual c. Designed by a California-registered civil engineer, engineering geologist, or sanitarian d. System inspected by designer during installation e. STS may be required when higher density Public or private entity assumes O&M and monitoring responsibility	Requirements for qualified professionals: Soils Report must be prepared by a registered engineer or certified engineering geologist. STS performance: Basin Plan requires adherence to *Guidelines for Sewage Disposal from Land Developments* (1979). Innovative waste treatment systems as alternates to septic tank-subsurface disposal systems will be evaluated on a case-by-case basis, but must conform with these guidelines and provide protection	Requirements for qualified professionals not stated in the Basin Plan STS performance: None stated in Basin Plan	Requirements for qualified professionals not stated in the Basin Plan STS performance: Basin Plan requires adherence to *Guidelines for Evapotranspiration Systems* (1980) and *Guidelines for Mound Systems* (1980). Supplemental system requirements are otherwise deferred to the counties. Permit applications for WDR have same requirements as conventional systems.

Table 5-3: Points of Comparison for Regional Water Quality Control Boards and Proposed Policy

Regulatory Elements	Proposed Project	Regional Water Quality Control Board								
		North Coast (Region 1)	San Francisco Bay (Region 2)	Central Coast (Region 3)	Los Angeles (Region 4)	Central Valley (Region 5)	Lahontan (Region 6)	Colorado River Basin (Region 7)	Santa Ana (Region 8)	San Diego (Region 9)
	2.5 acres per OWTS. • Tank performance standards: o Secure access opening and watertight risers o 3/16-inch mesh effluent filter o IAPMO-approved tanks, or stamped and certified by CA registered civil engineer ▸ **POSSIBLE IN TIER 2** • Various supplemental treatment systems • Various dispersal systems ▸ **TIER 3** • Supplemental treatment system performance	the agencies	• Operational permit • Legal easement for agency access to system • Registered engineer or environmental health specialist for design • Annual report	STS • Engineer responsible for inspecting system during construction, establishing maintenance schedule, and education of owner				to water quality and public health at least equivalent to conventional septic tank-subsurface systems.		

Table 5-3: Points of Comparison for Regional Water Quality Control Boards and Proposed Policy										
Regulatory Elements	Proposed Project	Regional Water Quality Control Board								
		North Coast (Region 1)	San Francisco Bay (Region 2)	Central Coast (Region 3)	Los Angeles (Region 4)	Central Valley (Region 5)	Lahontan (Region 6)	Colorado River Basin (Region 7)	Santa Ana (Region 8)	San Diego (Region 9)
	standards: o 50% reduction in TN; 30 mg/l TSS and 200 MPN fecal coliform per 100 mL o Periodic performance evaluation									
Dispersal System Standards and Requirements	► **TIER I** • 12 inches soil cover • Soil texture or percolation test allowed as the basis for sizing the dispersal field • 5-foot minimum depth to groundwater or impermeable layer for conventional OWTS • Limits for rocky soils exceeding 50% rock, • Leachfield designed using no more than 4	• Shall be located, designed, constructed, and operated to ensure that effluent does not surface at any time and that percolation of effluent will not adversely affect beneficial uses of waters of the state • 30% maximum	• 3–5 feet of continuous unsaturated soil; 2 feet for mounds • Maximum 20% slope • Maximum 120 mpi • Setbacks to wells, drainages, water bodies, and embankments • Reserve areas required for future replacement of dispersal field	• Setbacks • Groundwater separation ranges from 5 to 50 feet • Separation to impermeable layer is 10 feet • Ground slope is not over 30% • Seepage pits have extra considerations, my require 10-50 feet to groundwater • Nitrate disposal restrictions over recharge areas	None stated in Basin Plan. Refer to Region 4 General Orders 91-94, 01-031, and 2004-0146 for guidance on OWTS.	Provided in "Guidelines for Waste Disposal from Land Developments," Appendix 36. Include 5-foot separation to groundwater or impermeable layer from leach lines and 10 feet from seepage pits.	f. Horizontal setbacks g. 5 feet to limiting layer or groundwater h. Maximum density of 2 EDUs per acre i. Slope and expansion area requirements j. Soil percolation limit	Per Guidelines: In areas overlying groundwaters which are useable or potentially usable for domestic purposes: k. Separation to impermeable layer or groundwater is 5' for leach lines and 10' for seepage pits. l. Maximum 30% slope m. Soil percolation limits	None stated in Basin Plan. Future discharge requirements for larger discharges not covered by an MOU must have 250 mg/L TDS discharge limit.	Basin Plan requires conformance with design criteria used by the local jurisdiction (county) for setbacks, slope, leach line spacing, and percolation testing. Minimum depth of unsaturated soil thickness varies from 9 to 14 feet, depending on soil type and depth to groundwater. Permit applications to the regional water board must

Table 5-3: Points of Comparison for Regional Water Quality Control Boards and Proposed Policy

Regulatory Elements	Proposed Project	Regional Water Quality Control Board								
		North Coast (Region 1)	San Francisco Bay (Region 2)	Central Coast (Region 3)	Los Angeles (Region 4)	Central Valley (Region 5)	Lahontan (Region 6)	Colorado River Basin (Region 7)	Santa Ana (Region 8)	San Diego (Region 9)
	square feet of infiltrative area per linear foot of trench, and with trench no wider than 3 feet. ► **POSSIBLE IN TIER 2** • Differing system design requirements • Differing siting controls • Requirements for owners to enter monitoring and maintenance agreements	ground slope • 3-foot minimum depth to groundwater or impermeable layer for conventional OWTS; 2 feet for STS • 5- to 40-foot setback to groundwater based on soil type • Setbacks to water bodies • Reserve areas required for future replacement of dispersal field • Defined procedures for evaluating soil, including percolation testing and/or soil analysis	• Defined procedures for evaluating soil, including percolation testing and/or soil analysis as basis for application rates • Allowance for engineered fill							include (1) groundwater mounding study, (2) nitrate study, (3) public entity for O&M, (4) environmental study, and (5) O&M plan. Conditional Waiver No.1 (2008) requires 5' to groundwater and 100' setback to surface waters.

Table 5-3: Points of Comparison for Regional Water Quality Control Boards and Proposed Policy

Regulatory Elements	Proposed Project	Regional Water Quality Control Board								
		North Coast (Region 1)	**San Francisco Bay (Region 2)**	**Central Coast (Region 3)**	**Los Angeles (Region 4)**	**Central Valley (Region 5)**	**Lahontan (Region 6)**	**Colorado River Basin (Region 7)**	**Santa Ana (Region 8)**	**San Diego (Region 9)**
		as basis for application rates • Allowance for engineered fill								
Point 2: Requirements for Impaired Waters										
4. These requirements apply to OWTS within the watersheds of impaired water bodies as listed under section 303(d) of the Clean Water Act unless otherwise stated. Other regulatory requirements associated with the other six points of this table also apply.	• Mandatory supplemental treatment for new and replaced OWTS within 600' of impaired water bodies listed on attachment 2 of the Policy if a TMDL or Local Agency Management Program is not already addressing the problem.	Prohibition of septic systems in Jacoby Creek and Old Arcata Road areas	Moratoriums on use of OWTS for new construction in Bolinas, Stinson Beach, Glen Ellen, and Emerald Lake Hills to protect nearby surface waters	San Lorenzo River watershed discharges must follow Santa Cruz County wastewater management and nitrate management plans. Wastewater management plans should be implemented for urbanizing and high density areas. Prohibitions in Nipomo, San Luis Obispo, and Los Osos.	Basin Plan references the Aqua Dulce area, where groundwater is primary source of drinking water, and references "General waste discharge requirements for residential subsurface sewage disposal systems in areas where ground water is used for domestic purposes" (Order No. 91-94, adopted July 22, 1991); prohibited installation of	Preferences for sewered wastewater systems in areas of impaired groundwater	Yes, for subdivisions in the Eagle Drainage Hydrological Area	Prohibition of all OWTS discharges to Cathedral City Cove in 2012. Prohibition of OWTS discharges from parcels less than ½ acre over Mission Creek and Desert Hot Springs aquifers if sewer is available and also from larger parcels if sewer is available, unless density is 2 EDUs per acre or less.	On-site septic tank-subsurface disposal systems in the Quail Valley area of Riverside County are prohibited if a sewer system is available to serve the lot. Prohibition areas have 1-acre minimum lot size.	None stated in Basin Plan

Table 5-3: Points of Comparison for Regional Water Quality Control Boards and Proposed Policy

Regulatory Elements	Proposed Project	Regional Water Quality Control Board								
		North Coast (Region 1)	San Francisco Bay (Region 2)	Central Coast (Region 3)	Los Angeles (Region 4)	Central Valley (Region 5)	Lahontan (Region 6)	Colorado River Basin (Region 7)	Santa Ana (Region 8)	San Diego (Region 9)
					new OWTS within 100 feet of water courses and bodies Discharges into environmentally sensitive areas require special WDR conditions. Order No. 2004—0146 requires 600' separation to 303(d) listed waters. OWTS prohibited in Malibu Civic Center Area.					
Point 3: Local Implementation										
5. The requirements provide direction on how OWTS regulations can be entirely or partially implemented by counties, cities, and special districts.	• Local Implementation is allowed and detailed in Tier 2 • Local agency or regional water board retains option for setting more protective requirements for water quality	Agreement between local agency and regional water board allows local agency to permit for single-family residences, commercial, and industrial	MOU between local agency and regional water board typically used for implementation and enforcement, including STS	Local agency jurisdiction assumed in the Basin Plan but not defined	MOU with local agencies that delegate authority to the local agency for OWTS that: 3) Generate 20,000 gpd or less 4) Generate domestic or	Preferred local agency implementation but recoverable to the regional water board if county ordinance is not compatible with the board	Collaborate sharing of responsibility between the regional water board and county occurs without an official MOU.	MOU for domestic OWTS per the 1979 Guidelines for Sewage Disposal from Land Development	Unclear.	MOU for domestic OWTS for individual households and other facilities with flows less than 1,200 gpd and less than five family units.

Table 5-3: Points of Comparison for Regional Water Quality Control Boards and Proposed Policy

Regulatory Elements	Proposed Project	Regional Water Quality Control Board								
		North Coast (Region 1)	San Francisco Bay (Region 2)	Central Coast (Region 3)	Los Angeles (Region 4)	Central Valley (Region 5)	Lahontan (Region 6)	Colorado River Basin (Region 7)	Santa Ana (Region 8)	San Diego (Region 9)
		establishments with less than 1,500 gpd, and subdivisions of fewer than five lots. Waivers, management districts, prohibitions require regional water board involvement. Local agency shall report on STS performance and findings.			similar waste that is dsiposed of below the ground surface 5) Discharge waste from single family residential structures (developments of more than two homes are covered by the Reional Board) 6) Discharge waste from non-food related commercial facilities that generate 2,000 gpd or less					
6. Point 4: Requirements for Corrective Actions	▸ **TIER 4** • All failing OWTS must be repaired or replaced per the	Abatement of failing systems includes short-term mitigation and permanent	Provides guidance on how to use a sewer system, on frequent tank	Provides guidance on how to use a sewer system, on frequent tank	None stated in Basin Plan.	Prohibition on discharges that do not meet minimum protective criteria	Prohibition on discharges that do not meet minimum protective criteria	Prohibition on discharges that do not meet minimum protective criteria	Prohibition on discharges that do not meet minimum protective criteria	Prohibition on discharges that do not meet minimum protective criteria

Table 5-3: Points of Comparison for Regional Water Quality Control Boards and Proposed Policy										
Regulatory Elements	Proposed Project	Regional Water Quality Control Board								
		North Coast (Region 1)	San Francisco Bay (Region 2)	Central Coast (Region 3)	Los Angeles (Region 4)	Central Valley (Region 5)	Lahontan (Region 6)	Colorado River Basin (Region 7)	Santa Ana (Region 8)	San Diego (Region 9)
	time schedule set by the regional board or local agency.	corrective measures. Abate discharges in accordance with local agency requirements, reduce effluent flows, and post areas subject to surfacing sewage. Use a sewer system where available.	pumping, on making corrections to plumbing and leach fields, on water conservation, and on using a separate disposal field for wash water. Alternative systems may be used. Provides guidance for identifying system failure.	pumping, on making corrections to plumbing and leach fields, on water conservation, and on using a separate disposal field for wash water. Local agencies to bring failing systems into compliance with the Basin Plan.						
Point 5: Minimum Monitoring Requirements										
Inspection requirements	All local agencies permitting OWTS will monitor and report annually to regional water boards. The annual report shall include: 1. number and location of complaints	None stated in Basin Plan; typically stated in WDR	None stated in Basin Plan, typically stated in WDR	Guidelines for tank and drain field inspection	None stated in Basin Plan; typically stated in WDR.	None stated in Basin Plan; typically stated in WDR	None stated in Basin Plan; typically stated in WDR	None stated in Basin Plan; typically stated in WDR	None stated in Basin Plan; typically stated in WDR	None stated in Basin Plan; typically stated in WDR

Table 5-3: Points of Comparison for Regional Water Quality Control Boards and Proposed Policy

Regulatory Elements	Proposed Project	Regional Water Quality Control Board								
		North Coast (Region 1)	San Francisco Bay (Region 2)	Central Coast (Region 3)	Los Angeles (Region 4)	Central Valley (Region 5)	Lahontan (Region 6)	Colorado River Basin (Region 7)	Santa Ana (Region 8)	San Diego (Region 9)
	pertaining to OWTS operation and maintenance; 2. applications and registrations issued as part of the local septic tank cleaning registration program pursuant to Section 117400 et. Seq. of the California Health and Safety Code; 3. number and location of OWTS repair permit number and location of permits issued for new OWTS, and which Tier the permit is issued under									
System Operation Inspections and Monitoring	• TIER 2 has options that will allow groundwater monitoring. • TIER 3 telemetric alarm requirements or	None stated in Basin Plan; typically stated in WDR	None stated in Basin Plan; typically stated in WDR	None stated in Basin Plan; typically stated in WDR	None stated in Basin Plan; typically stated in WDR	None stated in Basin Plan; typically stated in WDR	None stated in Basin Plan; typically stated in WDR	None stated in Basin Plan; typically stated in WDR	None stated in Basin Plan; typically stated in WDR	None stated in Basin Plan; typically stated in WDR

Table 5-3: Points of Comparison for Regional Water Quality Control Boards and Proposed Policy

Regulatory Elements	Proposed Project	Regional Water Quality Control Board								
		North Coast (Region 1)	**San Francisco Bay (Region 2)**	**Central Coast (Region 3)**	**Los Angeles (Region 4)**	**Central Valley (Region 5)**	**Lahontan (Region 6)**	**Colorado River Basin (Region 7)**	**Santa Ana (Region 8)**	**San Diego (Region 9)**
	monthly inspection by the homeowner.									
Groundwater quality monitoring	• Developed by the local agencies under TIER 2	Supplemental systems subject to monitoring	Supplemental systems require monitoring wells within and around the soil absorption system	Monitoring wells and monitoring may be required as part of WDRs for individual OWTS in the San Lorenzo watershed.	None stated in Basin Plan; typically stated in WDR	None stated in Basin Plan; typically stated in WDR	None stated in Basin Plan; typically stated in WDR	None stated in Basin Plan; however, WDRs set discharge limits and groundwater quality limits for discharges not falling under an MOU.	None stated in Basin Plan	None stated in Basin Plan; however, WDRs set discharge limits and groundwater quality limits for discharges not falling under an MOU (e.g., community sewerage systems or individual systems with flows larger than 1,200 gpd).
Effluent quality monitoring	TIER 3: • Monitoring supplemental treatment system with disinfection quarterly with samples tested by a CDPH-certified laboratory	Supplemental systems subject to monitoring	WDRs may require effluent monitoring for individual OWTS.	Provided through individual WDRs in the San Lorenzo watershed.	Not in Basin Plan. WDRs may require efflunet monitoring for OWTS.	None stated in Basin Plan; however, WDRs set discharge limits and groundwater quality limits for discharges not falling under MOUs.	None stated in Basin Plan	If an MOU is in place, the local agencsy is responsible for providing any monitoring requirements.	None stated in Basin Plan	None stated in Basin Plan; however, WDRs set discharge limits and groundwater quality limits for discharges not falling under an MOU (e.g., community sewerage systems or individual systems with flows

Table 5-3: Points of Comparison for Regional Water Quality Control Boards and Proposed Policy										
Regulatory Elements	**Proposed Project**	**Regional Water Quality Control Board**								
		North Coast (Region 1)	**San Francisco Bay (Region 2)**	**Central Coast (Region 3)**	**Los Angeles (Region 4)**	**Central Valley (Region 5)**	**Lahontan (Region 6)**	**Colorado River Basin (Region 7)**	**Santa Ana (Region 8)**	**San Diego (Region 9)**
										larger than 1,200 gpd).
Point 6: Criteria for Exemption										
Conditions by which Regional Water Boards may set criteria for exemptions to OWTS	• OWTS regulated by WDRs may be exempted from requirements by regional water boards	Provisions for waivers may be set to justify less stringent requirements than those in the Basin Plan either for individual lots or for defined geographic areas.	Current regulations allow waiver from filing of reports of waste discharge for OWTS under set flow volumes. Waiver also possible for site suitability criteria on a case-by-case basis.	Exemptions possible in a prohibition area if using STS	None stated in Basin Plan.	None stated in Basin Plan. Current Basin Plan provides waiver to WDRs to OWTS where project has county permit and county uses the regional water board's guidelines.	Exemptions (waiver) to current Basin Plan limits and land use limitations if groundwater has no beneficial use, no pollution or degradation of surface water or groundwater would occur, and/or a community wastewater system is imminent. Case-by-case exemptions may be granted for density restrictions.	Exemption to minimum lot size criteria must provide sewered hookup offsets and follow the Board's "Guidelines for Sewage Disposal from Land Developments."	Exemption to minimum lot size criteria must provide sewered hookup offsets and follow the Board's "Guidelines for Sewage Disposal from Land Developments."	None stated in Basin Plan
Point 7: Major Repair										
Requirements for	► Major repair means:	Failure of	Failure of	Informal	None provided in	None stated in	None stated in	None stated in	None stated in	None stated in

Table 5-3: Points of Comparison for Regional Water Quality Control Boards and Proposed Policy

Regulatory Elements	Proposed Project	Regional Water Quality Control Board								
		North Coast (Region 1)	San Francisco Bay (Region 2)	Central Coast (Region 3)	Los Angeles (Region 4)	Central Valley (Region 5)	Lahontan (Region 6)	Colorado River Basin (Region 7)	Santa Ana (Region 8)	San Diego (Region 9)
determining when a system is subject to a major repair.	(1) for a dispersal system, repairs required for an OWTS due to surfacing wastewater effluent and/or wastewater backed up into plumbing fixtures because the dispersal system is not able to percolate the design flow of wastewater associated with the structure served, or (2) for a septic tank, repairs required to the tank for a compartment baffle failure or tank structural integrity failure such that either wastewater is exfiltrating or	existing system (i.e., the ineffective treatment and disposal of waste resulting in the surfacing of raw or inadequately treated sewage effluent and/or the degradation of surface water or groundwater quality).	existing system (i.e., the ineffective treatment and disposal of waste resulting in the surfacing of raw or inadequately treated sewage effluent and/or the degradation of surface water or groundwater quality).	definition: OWTS is inadequately or improperly sited, designed, or constructed; long-term use is not considered; inadequate operation and maintenance; destruction of beneficial uses of surface water or groundwater; transmission of diseases	the Basin Plan	Basin Plan	Basin Plan	Basin Plan	Basin Plan	Basin Plan

Table 5-3: Points of Comparison for Regional Water Quality Control Boards and Proposed Policy

Regulatory Elements	Proposed Project	Regional Water Quality Control Board								
		North Coast (Region 1)	San Francisco Bay (Region 2)	Central Coast (Region 3)	Los Angeles (Region 4)	Central Valley (Region 5)	Lahontan (Region 6)	Colorado River Basin (Region 7)	Santa Ana (Region 8)	San Diego (Region 9)
	groundwater is infiltrating ▸ **TIER 4** All failing OWTS must be repaired or replaced in accordance the time schedule from the regional board or local agency									
Conditions that require a repair	• See above.	None stated in Basin Plan	Lack of conformance with current regulations	None provided in Basin Plan	None stated in Basin Plan	None stated in Basin Plan	None stated in Basin Plan	None stated in Basin Plan	None stated in Basin Plan	Implied conditions: (1) sewage will not surface, (2) discharge will not cause groundwater to rise within 5 feet of the disposal system database, and (3) cumulative impacts will not cause nitrate concentrations in groundwater to exceed water quality standards.

Notes: BOD = biochemical oxygen demand.
CCR = California Code of Regulations.
CDPH = California Department of Public Health.
EDU = equivalent dwelling unit.

Table 5-3: Points of Comparison for Regional Water Quality Control Boards and Proposed Policy

Regulatory Elements	Proposed Project	Regional Water Quality Control Board								
		North Coast (Region 1)	San Francisco Bay (Region 2)	Central Coast (Region 3)	Los Angeles (Region 4)	Central Valley (Region 5)	Lahontan (Region 6)	Colorado River Basin (Region 7)	Santa Ana (Region 8)	San Diego (Region 9)

gpd = gallons per day.
IAPMO = International Association of Plumbing and Mechanical Officials.
mg/l = milligrams per liter.
MOU = memorandum of understanding.
mpi = minutes per inch.
MPN = Most Probable Number.
NSF = National Sanitation Foundation.
O&M = operation and maintenance.
regional water board = regional water quality control board.
STS = supplemental treatment system
SWRCB = State Water Resources Control Board.
TDS = total dissolved solids.
TMDL = total maximum daily load.
TN-N = total nitrogen as nitrogen.
TSS = total suspended solids.
UPC = Uniform Plumbing Code.
WDR = waste discharge requirement.

Notes for North Coast, Region 1:
1. Policy on the Control of Water Quality with Respect to On-Site Waste Treatment and Disposal Objectives, 1996. North Coast Regional Water Quality Control Board.
2. Water Quality Control Plan for the North Coast Basin. North Coast Regional Water Quality Control Board. 1996.

Notes for San Francisco Bay, Region 2:
1. Water Quality Control Plan for the California Regional Water Quality Control Board San Francisco Bay Region. 1995.
2. On-Site Wastewater Treatment and Disposal: Regional Board Waiver Program for Approving Local Agency Regulatory Programs. June 1996.
3. Minimum guidelines for the Control of Individual Wastewater Treatment and Disposal Systems. California Regional Water Quality Control Board San Francisco Bay Region. 1979.

Notes for Central Coast, Region 3:
1. Water Quality Control Plan for the Central Coast Basin. Central Coast Regional Water Quality Control Board. 1988.

Notes for Los Angeles, Region 4:
1. Water Quality Control Plan: Los Angeles Region (4) 1995.
2. General Waste Discharge Requirements for Small Commercial and Multifamily Residential Subsurface Sewage Disposal Systems. Order No. 01-031 adopted February 22, 2001.

Notes for Central Valley, Region 5:

<table>
<tr><th colspan="11">Table 5-3: Points of Comparison for Regional Water Quality Control Boards and Proposed Policy</th></tr>
<tr><th rowspan="2">Regulatory Elements</th><th rowspan="2">Proposed Project</th><th colspan="9">Regional Water Quality Control Board</th></tr>
<tr><th>North Coast (Region 1)</th><th>San Francisco Bay (Region 2)</th><th>Central Coast (Region 3)</th><th>Los Angeles (Region 4)</th><th>Central Valley (Region 5)</th><th>Lahontan (Region 6)</th><th>Colorado River Basin (Region 7)</th><th>Santa Ana (Region 8)</th><th>San Diego (Region 9)</th></tr>
<tr><td colspan="11">1. Water Quality Control Plan: Central Valley Basin (5) including Appendix 36, “Guidelines for Waste Disposal from Land Developments,” 2004.
Notes for Lahontan, Region 6:
1. “Executive Officer’s Report January 2001.” Region 6. 2001.
Notes for Colorado River, Region 7:
1. References: “Water Quality Control Plan: Santa Ana River Basin 7: Includes Amendments Adopted by the Regional Board through October 2005.”
2. Basin Plan references “Guidelines for Sewage Disposal From Land Development.” 1979 wherein discharges falling under MOUs or WDRs are defined and minimum design criteria for septic systems to protect groundwater quality. This seems the appropriate document to reference for more basic regulations for OWTS.
3. EDU added to notes in table above.
Notes for Santa Ana, Region 8:
1. It appears that the Basin Plan is not an adequate source basic of OWTS regulations for Region 8. In general, the Basin Plans do not address setting Waste Discharge Requirements and WDRs are where numerical discharge limits are found.
2. Basin Plan references “Guidelines for Sewage Disposal From Land Development.”
3. References: Water Quality Control Plan: Santa Ana River Basin (8). 1995.
Resolution No. R8-2004-0001. California Regional Water Quality Control Board Santa Ana Region. 2004.
4. Note addition of TDS to the table notes above.
Notes for San Diego, Region 9:
1. References: Water Quality Control Plan: San Diego Basin (9), 1995.
2. Basin Plan references “Guidelines for New Communities and Individual Sewage Facilities” Resolution No. 79-44, June 25, 1979. This seems the appropriate document to reference for more basic regulations for OWTS.</td></tr>
</table>

6 Environmental Impacts Analysis

6.1 Approach and Methods to this Assessment

The State Water Board has prepared this substitute environmental document to assess the potential environmental effects of adopting and implementing the proposed Policy for regulating wastewater discharges from on-site wastewater treatment systems. In general, the Policy will operate to protect the environment by ensuring that discharges from on-site wastewater treatment systems occur in a manner that does not pollute groundwater or surface water. However, there are potential environmental impacts associated with aspects of the proposed Policy.

The potential environmental impacts were identified and then reviewed for applicability and significance. Applicability was determined by assessing whether the impact would likely occur in each tier based on activities taken to comply with the proposed Policy. A description of each tier in the proposed Policy is provided in section 3.3.

Environmental impacts are the same for multiple tiers in several cases, while others are unique to a tier. If it was determined that activity within a tier would cause an impact, the significance of the impact was then assessed. Environmental impacts as a result of complying with the proposed Policy are similar to impacts that are reasonably foreseeable as a result of an individual project. The proposed Policy allows OWTS to be operated and, in some cases (e.g., failing OWTS), will require that OWTS be repaired, constructed and replaced in a particular manner. The resulting discharges allowed by the proposed Policy, the resulting construction activities, and other environmental impacts are associated with complying with the proposed Policy.

In order to more accurately describe what the methods of compliance are as a result of the proposed Policy, a short description is included here as well as a more detailed description with expected costs in section 8 of the SED.

<u>Implementation by local and state agencies</u>: Local agencies and the state water boards and regional water boards are required to perform specific tasks for implementing this proposed Policy. The State Water Board is the agency that adopts updates to the proposed Policy (including updates to Attachment 2 of the Policy), renews, and oversees implementation of the proposed Policy, approves basin plans incorporating the proposed Policy, and resolves disputes between the regional boards, the local agencies, and the public. The regional boards are required by the proposed Policy to incorporate the proposed Policy and any additional, more protective standards, into their basin plans, negotiate an agreement for implementation with the local agencies desiring to implement Tier 2, and oversee implementation of large OWTS, OWTS that are subject to specific requirements in areas with impaired waters, and any other OWTS that are outside of a local agency management program.

Most local agencies will apply for authorization of a Tier 2 program. The Tier 2 local agency management programs will provide for the installation of new and replaced OWTS under local agency regulation, and may also include special provisions for OWTS near water bodies that are impaired for nitrogen compounds or pathogens. As part of all local agency management programs, local agencies will have to report to the regional water quality control boards. While it takes staff time to perform these functions, the staff time associated with the duties required by the proposed Policy on the state and local agencies is expected to be relatively minor in the overall implementation scheme and is not considered to result in an impact that would require any environmental impact analysis. The regional water boards and local agencies will also implement Tier 4 by issuing corrective action or cleanup and abatement orders to owners of individual OWTS that need corrective action.

All of the subsequent implementation of the proposed Policy described above by the State Water Board, regional water boards, and local agencies is expected to have the same, or similar types of, potential environmental impacts as those analyzed in this SED. Therefore, unless a subsequent implementation action by the State Water Board, a regional water board, or a local agency may result in environmental impacts not analyzed in this SED, it is expected that no further environmental documentation would be required for those implementation actions.

The means of compliance with the proposed Policy may result in impact to the environment, as discussed below. The public will be installing and operating OWTS in compliance with the requirements of the proposed Policy. Depending on which tier, the environmental impacts are assessed accordingly. While many people may have a conceptual idea of what a standard septic tank and leachfield look like, the proposed Policy allows other designs for use in California. Depending upon which tier, the proposed Policy allows the following:

<u>Tier 0:</u> The proposed Policy allows all existing OWTS that are not failing or are not polluting waters of the state to continue operating. Existing OWTS can be anything from a standard OWTS to a supplemental treatment system.

<u>Tier 1</u>: Tier 1 consists of a conventional OWTS. Such OWTS are discussed in section 4.5.1 of this SED and shown in Figure 5.

<u>Tier 2:</u> Tier 2 allows a much wider range of OWTS. In terms of dispersal systems, Tier 2 can allow anything from a conventional leachfield system to any design described in section 4.5.4. In terms of OWTS treatment components, Tier 2 can allow anything from a standard septic tank to any supplemental treatment system fitting into the distinct types of treatment system categories listed in section 4.5.6.

<u>Tier 3</u>: Tier 3 requires new and replaced OWTS within 600 feet of impaired water bodies listed on Attachment 2 of the Policy to provide nitrogen or pathogen treatment and disinfection if there is no approved TMDL or local agency management program special provisions for that water body. The systems are described in section 4.5.6.

<u>Tier 4</u>: Tier 4 requires OWTS to be repaired to the standards of Tiers 1, 2, or 3, depending on which Tier is appropriate.

As part of the overall analysis, the assessment below includes cumulative impacts. According to section 15355 of the State CEQA Guidelines, "cumulative impacts" refers to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts including situations where:

(a) The individual effects may be changes resulting from a single project or a number of separate projects.

(b) The cumulative impact from several projects results in a change in the environment from the incremental impacts of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time.

The cumulative impacts analysis evaluates statewide conditions and related projects that could contribute to impacts along with the implementation of the proposed project. Extra attention is given to those situations where existing OWTS are contributing to, and proposed new and replaced OWTS would contribute to, the most significant cumulative water quality impacts (i.e., in the watersheds of water bodies designated as impaired under Section 303[d] of the Clean Water Act) where OWTS are likely to be contributing to the impairment and likely to receive a loading reduction in a TMDL, and likely that new and replaced OWTS installations discharging within 600 feet of the water body would further contribute to the impairment (also referred to as "water bodies listed in Attachment 2 of the Policy"). Existing OWTS that may be affecting water bodies listed in Attachment 2 of the Policy (and any other impaired water bodies) may be addressed in the future by an implementation plan contained in a TMDL or a local agency management program. While the proposed Policy does not contain any specific requirements for such an implementation plan, it is expected that such an implementation plan would likely include some of the requirements discussed in this SED. Since the environmental baseline includes ongoing contributions to impaired water bodies from existing OWTS, **no new impacts** will result from the proposed Policy due to any ongoing contributions to impairments from existing OWTS prior to the development of implementation plans.

6.2 Water Quality Impacts

The siting, construction, and operation of OWTS can affect water quality and public health. Each of these mechanisms provides distinct avenues by which OWTS could affect water quality and public health. Improper siting of OWTS can result in ineffective treatment and failure of OWTS. Construction-related water quality impacts come from installing, upgrading, or repairing OWTS. Operation of OWTS causes direct impacts on water quality or public health through discharge of effluent.

Conventional OWTS that comply with Tier 1 are expected to work well for the removal of pathogens, and to a lesser extent some but not all other contaminants, when they are installed in areas with appropriate geology, soils, and hydrologic conditions. The amount of slope, soil permeability and texture, soil depths to bedrock, hardpan, or groundwater, amount and frequency of rainfall, and distances from drinking water sources and surface water bodies are major factors when considering septic system placement and design and the system's associated environmental effects. Specific soil conditions, such as soil texture, soil structure, pH, salinity, temperature, oxygen, and moisture, affect the soil microorganisms that are essential for breaking down and decomposing wastewater effluent.

Conventional OWTS and OWTS using supplemental treatment allowed under Tier 2 and within the regional water board basin plans are expected to also work well for the removal of pathogens and some but not all other contaminants when they are installed in areas with appropriate geology, soils, and hydrologic conditions. Similar to Tier 1, the amount of slope, soil permeability and texture, soil depths to bedrock, hardpan, or groundwater, amount and frequency of rainfall, and distances from drinking water sources and surface water bodies are major factors when considering the placement and design of OWTS and for determining a Tier 2 system's environmental effects. Specific soil conditions, such as soil texture, soil structure, pH, salinity, temperature, oxygen, and moisture, affect the soil microorganisms that are essential for breaking down and decomposing wastewater effluent.

Construction of OWTS is regulated by local agencies through the land use and development approval process (described in section 5, and in section 5.3, Land Use and Planning). The proposed Policy does not alter the authority of local agencies to approve construction of OWTS or the processes by which local agencies determine whether to allow development of specific properties and construction of OWTS on those properties, as long as the local agency has an approved local agency management program under Tier 2.

OWTS construction procedures in accordance with the proposed Policy will typically involve excavations for placement of septic tanks, supplemental treatment systems, dispersal systems, and electric lines (power and phone), seepage pits, shallow dispersal trenches, and groundwater monitoring wells. They also may involve soil disturbance for sites prepared for sand and gravel –filled beds. Such earthwork can cause the erosion of soil into nearby streams and receiving waters, especially if standard best management practices (BMPs) for erosion control are not implemented successfully. This impact is evaluated below. In addition, the proposed Policy could affect the number of new OWTS installed in areas that have been designated as impaired under Section 303(d) of the Clean Water Act and listed in Attachment 2 of the Policy.

Once operational, different types of OWTS treat the pollutants found in wastewater to varying levels, and then discharge the treated effluent and its remaining contaminants into the soil and then groundwater below the dispersal fields. The most commonly used types of dispersal systems include dispersal trenches, seepage pits, mound systems, gravel-less chambers, and evapotranspiration and infiltration systems. Some pollutants, if not adequately removed, can eventually reach nearby surface waters and may create a public health risk or could adversely affect other beneficial uses.

The primary method used in the water quality and public health impact analysis consists of comparing water quality objectives to projected concentrations expected to result from discharges in compliance with the proposed Policy under the tiers, including Tier 2 where local agencies have an approved local agency management program, and when regional water boards adopt or retain more protective requirements in their basin plans within the requirements of the proposed Policy. Water quality objectives are numerical or narrative limits for constituents in water. Water quality objectives are listed in regional water board basin plans. Water quality objectives help to protect beneficial uses of surface water and groundwater by governing the needed restrictions and limits on waste discharges (from sources such as OWTS) and on waters to which sources discharge. An exceedance of water quality objectives resulting from waste discharges would not protect the beneficial uses of the state's water resources. Narrative objectives describe water quality conditions that must be met and often provide the basis for further development of numerical objectives, which usually describe pollutant concentrations, physical and chemical conditions, and toxicity to organisms.

The primary contaminants of concern were determined through the likelihood of their presence in OWTS effluent, their typical concentrations, and their physical and chemical characteristics in soil and groundwater. This analysis evaluates the projected concentrations of these constituents at the point where OWTS effluent mixes with groundwater (the point of compliance for water quality objectives under the Porter-Cologne Water Quality Control Act). Drinking water standards are used because groundwater is defined as having municipal and domestic beneficial uses (such as drinking water) unless specifically noted otherwise, and the drinking water standards are the most restrictive.

6.2.1 Thresholds of Significance

For the purpose of this analysis, a water quality impact is considered significant if implementation of the proposed project would result in exceeding any water quality objectives. These thresholds of significance are based on the California Environmental Quality Act (CEQA) Guidelines (State CEQA Guidelines) and relevant adopted water quality objectives. Consistent with State CEQA Guidelines, a public health impact is considered significant in this analysis if implementation of the proposed project would result in potential for exceeding any of these adopted water quality objectives related to public health.

Implementation of the proposed project would also result in significant public health impacts if it would:

- violate federal, state, or local criteria concerning exposure to pollutants or pathogenic microorganisms (including the Safe Drinking Water Act, federal Occupational Safety and Health Administration workplace standards, food safety laws, and other public health criteria); or
- violate any ambient water quality objective, contribute substantially to an existing or projected water quality violation, or expose sensitive receptors to substantial waterborne pollutant concentrations; or
- create a substantial public health hazard or involve the use, production, or disposal of materials that pose a hazard to people in the area affected.

6.2.2 Direct Impacts from Construction of OWTS (Tiers 1, 2, and 4)

OWTS covered by Tiers 1, 2, 4, and the basin plans that may include more protective requirements would require new and replacement systems to comply with requirements in specific cases, resulting in additional construction activities beyond those that may occur in the absence of the proposed Policy. While the potential exists for OWTS-related construction to result in water quality impacts related to sedimentation and erosion, the likelihood of uncontrolled releases of sediment from erosion or other releases of pollutants from such activities is small. These activities would be minimal and widely distributed throughout the state. In addition, since demand for new and repaired OWTS is not likely to be significantly affected by the proposed Policy, the proposed Policy would not substantially increase or decrease the rate at which OWTS are installed. Since the existing rate of installation would stay the same (linked to a demand for new housing) there would not be a significant change from baseline conditions. The proposed Policy also does not dictate where OWTS construction would occur.

In general, most OWTS installation, replacement, repair, or upgrade projects would disturb less than 1 acre, and are regulated by the local land use agency with a building permit that includes implementation of appropriate grading plans, siting, and erosion control measures. The proposed Policy would not remove or otherwise affect this authority. For instance, as identified in Tables 5-1 and 5-2, the example counties and cities have requirements in place for siting of OWTS that include sediment and erosion control measures. While regional water boards do not have these requirements in their basin plans, under the auspice of the building permit process, those OWTS regulated by the regional water boards would still need to comply with the grading plans and erosion control measures.

While existing requirements to implement best management practices (BMPs) at the local level may be adequate to avoid significant water quality impacts in many or most situations, local agencies vary widely in the management measures required, and there may be some situations where those BMPs are not sufficient to avoid such impacts. Therefore, in instances where OWTS being installed, replaced, repaired, or upgraded would disturb less than 1 acre, the potential exists for construction to affect water quality related to sedimentation and erosion. However, the likelihood of uncontrolled releases of sediment from erosion or other releases of pollutants from such activities is small. Furthermore, these impacts, as with the initial construction impacts described in "Approach and Methods" above, would be minimal and widely distributed throughout the state, and associated with other development on generally the same sites; for instance, a home and septic system would be constructed on the same site, and future repairs would occur on that site.

The proposed Policy would not affect where development occurs. For these reasons, water quality impacts relating to typical ground disturbance from OWTS installation, repair, replacement, and upgrade are considered **less than significant**.

In the few instances where the area of ground disturbance affected by construction of new OWTS facility infrastructure and construction of staging areas would exceed 1 acre, OWTS installation, replacement, repair and upgrade would be subject to the requirements of the statewide NPDES storm water general permit for construction activity. In these situations, before OWTS construction activities can be approved, the project applicant is required under existing state regulatory requirements to apply for permit coverage. This would result in the project applicant preparing a storm water pollution prevention plan (SWPPP) and any other necessary engineering plans and specifications for pollution prevention and control. The SWPPP would identify and specify BMPs that must be in place throughout all site work and construction. Typical BMPs include the following:

- Use erosion and sediment control measures, including construction techniques that would reduce the potential for runoff and minimize discharge of sediment into nearby drainage conveyances; these BMPs may include silt fences, staked straw bales or wattles, sediment/silt basins and traps, geofabric, sandbag dikes, and temporary vegetation.
- Establish permanent vegetative cover to reduce erosion in areas disturbed by construction by slowing runoff velocities, trapping sediment, and enhancing filtration and transpiration.
- Use drainage swales, ditches, and earth dikes to control erosion and runoff by conveying surface runoff down sloping land, intercepting and diverting runoff to a watercourse or channel, preventing sheet flow over sloped surfaces, preventing runoff accumulation at the base of a grade, and avoiding flood damage along roadways and facility infrastructure.
- Identify the means of disposal of waste materials (i.e., brush, vegetation) removed from the site.
- Identify pollutants that are likely to be involved in construction activities that could be present in stormwater drainage and non-stormwater discharges and in other types of materials used for equipment operation.
- Establish spill prevention and contingency measures, including measures to prevent or clean up spills of hazardous waste and of hazardous materials used for equipment operation, and emergency procedures for responding to spills.

Several technical studies (California Stormwater Quality Association 2003, Huffman and Carpenter 2003, and USEPA 1999) have established that water quality control features such as revegetation, erosion control measures, and detention and infiltration basins are successful techniques for avoiding or minimizing construction-related water quality impacts (e.g., metals and organic compounds from stormwater are typically filtered out within the first few feet of soil beneath retention basins for groundwater). Technical studies by Huffman and Carpenter (2003) demonstrated that the use of various BMPs, such as source control, detention basins, revegetation, and erosion control, have maintained surface water quality conditions in adjacent receiving waters.

Given the adequacy of the existing NPDES and SWPPP program where applicable (for areas of disturbance of 1 acre or more) and the effectiveness of BMPs when used appropriately in such situations, the project's potential construction-related impacts on water quality are also considered **less than significant** for OWTS construction disturbing 1 acre or more.

No mitigation is required.

6.2.3 Direct Impacts from Construction of OWTS (Tier 3)

The proposed Policy could affect owners of conventional OWTS in Tier 3 because their OWTS may be assessed for contribution to pollution of nearby surface waters. OWTS that are contributing pollution may have to be retrofittted to provide supplemental treatment under an implementation plan developed pursuant to a TMDL or special provisions in a local agency management program. In the absence of an implementation plan, new and replaced OWTS would be required to provide supplemental treatment if they are within 600 feet of a water body listed in Attachment 2.

In cases where supplemental treatment is required, construction-related impacts would possibly occur under Tier 3. Normal construction permit processes would not be affected. Conversion of conventional OWTS to OWTS with supplemental treatment would require some digging, trenching, grading, and other earthwork and the use of heavy construction vehicles on previously developed parcels. In cases of widespread conversion of systems and the resulting construction in these areas, this could lead to erosion, sedimentation, and deposition of hazardous materials on and off-site that could result in violation of state water quality regulations and adverse water quality impacts on surface water bodies.

Potentially, the proposed Policy could require all owners of conventional OWTS within surface water impairment boundaries to convert their existing conventional systems to OWTS with supplemental treatment units within a short time frame. This activity would require digging, trenching, grading, and other earthwork using equipment within 600 feet of impaired surface waters.

As explained above for Tiers 1, 2, and 4, local BMP requirements related to sedimentation and erosion control for construction activities disturbing less than 1 acre and SWPPPs required for construction activities disturbing more than 1 acre, the potential for uncontrolled releases of sediment from erosion or other releases of pollutants from such activities is small. Most construction would occur at existing sites; for instance, a home with a septic system would construct a supplemental treatment system on the same site, and future repairs would occur on the same site. For these reasons, water quality impacts relating to typical ground disturbance from OWTS installation, repair, replacement, and upgrade are considered **less than significant**.

No mitigation is required

6.2.4 Direct Impacts from Pathogen Contamination Caused by Operation of OWTS Statewide

OWTS wastewater effluent contains pathogens that cause communicable diseases in humans. Some or all of the OWTS effluent discharged to a subsurface dispersal system may eventually reach groundwater. However, the amount of pathogenic contamination that reaches groundwater is dependent on many factors. Attenuation and removal of pathogenic bacteria, viruses, and protozoa in the soil is accomplished through such mechanisms as microbial predation, filtration/adsorption, and inactivation (die-off). These mechanisms are affected by the depth, texture, and structure of the soil, hydraulic loading or application rates, effluent quality, and various other physical and chemical soil conditions, such as temperature, pH, and oxygen. These factors may be unfavorable for pathogen survival. In addition, other soil conditions may affect residence time and the metabolic processes of resident microbial organisms that may prey on pathogens in the effluent.

Once pathogenic material reaches groundwater, dispersion or dilution is not typical because the discharge does not mix with the groundwater, instead staying intact as a distinct plume (USEPA 2002). Therefore, if pathogenic material reaches groundwater, the potential for human health risk exists because groundwater is sometimes accessed by drinking water wells and/or reaches surface water bodies. Pathogens (including protozoa, bacteria, and viruses) that are found in wastewater effluent can cause communicable diseases in humans through direct and indirect body contact or ingestion of contaminated water or shellfish.

Studies have shown that a mature biomat can be extremely important in pathogen removal (Van Cuyk *et al.* 2001b). These processes can effectively reduce or eliminate bacteria and parasites. Most bacteria are removed within the first 1 foot of distance vertically or horizontally from the trench-soil interface at the infiltrative surface of coarse soils with a mature biomat (University of Wisconsin 1978). However, most conventional OWTS require 2 to 4 feet of unsaturated soil conditions to ensure pathogen destruction (USEPA 2002).

The level of potential pathogen impact is different, depending on each tier:

<u>Tier 0:</u> Tier 0 encompasses existing OWTS that are functioning as designed with no surfacing effluent, do not require major repairs, are not utilizing a dispersal system that is in soil that is saturated with groundwater, are not failing as covered by Tier 4, and are not within the boundaries of impaired surface water bodies listed in Attachment 2 as defined in Tier 3. The percentage of OWTS that are contributing pathogen contamination to groundwater has not been estimated. Regardless, it is assumed that some number of OWTS are contributing pathogen contamination to groundwater, and as a result of the proposed Policy, these OWTS would continue to contribute pathogen contamination to groundwater. OWTS that comply with Tier 0 standards would continue to operate with no additional requirements (i.e., no change from environmental baseline). Since the environmental baseline includes potential pathogen contamination from existing OWTS, the potential pathogen contamination would continue as the result of the proposed Policy. **No new impacts** will result from OWTS covered under Tier 0 of the proposed Policy.

<u>Tier 1</u>: Standards of the proposed Policy would not require sterilization of pathogens. Therefore, pathogen contamination could potentially occur under Tier 1. However, Tier 1 requires that a minimum of 5 feet of soil separate the bottom of the dispersal system from groundwater. Since this separation exceeds the 2 to 4 foot separation cited in the literature for the removal of pathogens (USEPA 2002), it is expected that complete pathogen removal will occur for new and replaced OWTS covered under Tier 1 and potential impacts are **Less Than Significant**.

<u>Tier 2 and Basin Plans</u>: In some cases, basin plans and Tier 2 programs may be similar to Tier 1 standards, since Tier 1 standards contain the type of baseline OWTS requirements

common to most rules found throughout the state and nationwide. Any Basin Plan requirements must be more protective than the proposed Policy. However, pathogen contamination could potentially occur under Tier 2 programs and basin plans because they may allow for implementation strategies and requirements different than those contained in Tier 1. For example, Tier 2 programs and basin plans may allow seepage pits. However, the industry standard for vertical separation from groundwater, thought to be protective against pathogen pollution from seepage pits, is ten feet, not five, as allowed under Tier 1. In most cases, different requirements that may translate into increased risk will be counterbalanced by increased risk management and increased protection. An example of this is the allowance of a reduced separation to groundwater allowed by Sonoma County (see Table 5.1). This is allowed if additional soil is placed at the site to create a mound system. Mound systems in Sonoma County are also monitored for performance making the system equally or more protective than the Tier 1 standards. Basin plans and Tier 2 programs with different protective requirements are expected to balance those different requirements with methods of risk management to make the probability of impacts associated with those programs comparable to Tier 1. By doing so, the environmental impacts from new and replaced OWTS approved under Tier 2 programs and the regional board basin plans are generally expected to be equivalent to Tier 1 standards at the worst case and more protective than Tier 1 at the best case for pathogen risks.

Tier 2 programs cannot allow a separation between groundwater and the bottom of the dispersal system to be less than two feet. For that reason and because it has been found that OWTS require 2 to 4 feet of unsaturated soil conditions to ensure pathogen destruction (USEPA 2002), we expect good protection where soils are appropriate for the siting. However, if the soils are inappropriate for less than five feet of separation (e.g. gravelly sand) and the corresponding risk management provisions in a Tier 2 program or basin plan are not adequate, degradation of the groundwater would be expected leading to pathogen impacts exceeding water quality objectives. A two foot separation may not provide a protective standard unless supplemental treatment is provided or the soil application rate is low. Tier 2 programs and basin plans could have **Potentially Significant Impacts** due to potential violations of pathogen water quality objectives.

Furthermore, since Tier 2 programs could allow for the use of seepage pits with a five foot separation from the bottom of the seepage pit to groundwater, this could also lead to **Potentially Significant Impacts**.

<u>Tier 3:</u> To address pathogen-impaired water bodies listed in Attachment 3, Tier 3 of the Policy relies on the development of site specific implementation plans create as part of a TMDL, or special provision added to a Local Agency Management Program by a local agency and approved by a Regional Water Board for existing OWTS. The contribution to the impairment from existing OWTS is part of the environmental baseline. Tier 3 requires that new and replaced OWTS discharging within 600 feet of the impaired water body include supplemental treatment for pathogens, or comply with the implementation plan for that water body, if there is one. Therefore, impacts to water and public health for Tier 3 are **Less Than Significant**.

Tier 4: **Potentially Significant Impacts** due to pathogen contamination could also occur under Tier 4, because Tier 4 could require failing OWTS to be upgraded to standards in a Tier 2 program.

Potential Mitigation Measures 6.2.4:
The State Water Board could modify the proposed Policy to include the following additional requirements:

1) In addition to the prohibitions in section of 9.4 of the proposed Policy, the State Water Board could add a provision that prohibits the use of seepage pits when the seepage pit accepts septic effluent and where the seepage pit is closer than 10 feet from groundwater and does not incorporate supplemental treatment.

2) In addition to the prohibitions in section of 9.4 of the proposed Policy, the State Water Board could add a prohibition for allowing an application rate greater than 0.4 where the groundwater is less than 3 feet from the bottom of the dispersal trench where the OWTS is using standard treatment.

Implementation: The State Water Board does not intend to implement these Mitigation Measures, because it believes that it is infeasible to do so on a statewide basis. Several local agencies have commented that requirements such as these would remove too much local agency flexibility, render too many sites unsuitable for new and replaced OWTS, and impose significant costs without a corresponding environmental benefit.

Significance after Mitigation: **Significant and Unavoidable**.

6.2.5 Direct Impacts from Nitrogen Contamination from Operation of OWTS Statewide

Most of the nitrogen compounds in OWTS effluent will be nitrified as the effluent passes through the soil column and become nitrate below the infiltrative surface. Once nitrates from OWTS reach groundwater, they can travel hundreds of feet as long, narrow, and definable plumes in concentrations that may eventually exceed drinking water standards (USEPA 2002). The direction of groundwater flow, and thus the direction of the OWTS discharge plume, is generally not known, requires a costly study to determine, and can change substantially with seasonal variations or groundwater pumping. In a fractured rock environment, it is rarely possible to predict or determine the direction of OWTS discharge flow, and nitrates can travel considerable distances with little or no dilution in these environments (Winneberger 1984).

Until the early 1990s, it was assumed that all nitrogen applied to the infiltration system, following transformation to nitrate, would ultimately leach to groundwater (Brown, Slowey, and Wolf 1978; Walker *et al.* 1973a, 1973b). However, Jenssen and Siegrist (1990) found, during a review of several studies, that denitrification, the anaerobic process that converts nitrate to nitrogen gas, can contribute to nitrogen reduction by up to 20% in wastewater percolating through the soil (USEPA 2002). Factors found to favor denitrification are fine-grained soils (silts and clays) and layered soils (alternating fine-grained and coarser-grained soils with distinct boundaries between the texturally different layers), particularly if the fine-grained soil layers contain organic material, because the process of denitrification also requires an adequate source of carbon.

Even though some level of denitrification may occur in the soil under the right conditions, total nitrogen concentrations in OWTS effluent are not likely to be sufficiently reduced to protect water quality or public health. Thus, OWTS discharges would have the potential to degrade groundwater quality and adversely affect the beneficial uses of groundwater and surface waters that are hydrologically connected to the groundwater. Excluding Tier 0 from this impact, since it represents the environmental baseline, OWTS in Tiers 1, 2, 3 and 4 are found to cause nitrate pollution.

OWTS that comply with Tier 0 standards would continue to operate as they currently do (i.e., no change from environmental baseline). Since environmental baseline includes known nitrogen pollution problems from OWTS, existing pollution problems resulting in impacts from nitrogen discharges would continue. **No new impacts** will result from OWTS covered under Tier 0 of the proposed Policy.

Tier 1 requirements would ensure that OWTS meet minimum standards for protection of environmental and public health from OWTS effluent. However, Tier 1 requirements would not require supplemental treatment for the removal of nitrogen compounds. Therefore, impacts are possible. This possibility is already mitigated in the proposed Policy by the requirement 7.8 which states that all new OWTS in new subdivisions not be constructed if the average density is less than 2.5 acres per OWTS serving a household (single family dwelling unit). This density requirement will slow or stop severe nitrate pollution in the groundwater in areas where the groundwater basin is not discrete and bounded by barriers that limit groundwater movement, other than what is removed by pumping. In the case of discrete groundwater basins, impacts from nitrate accumulation in groundwater is expected to be **Potentially Significant**.

Overall, Tier 2 and basin plans with more protective requirements would be comparable to Tier 1 requirements, if the density requirement is the same. However, Tier 2 and some basin plans do not require density to be maintained below one household per every 2.5 acres for new OWTS in new subdivisions. Even existing programs that contain density requirements do not have similar density requirements to Tier 1 (e.g. the Santa Ana River Regional Water Board requires densities to not exceed over one household per acre). While different and more dense, the impact from density will vary from one location to another due to groundwater aquifer characteristics. In fact, the only concrete statement regarding this issue is that OWTS will contribute nitrogen to the soils and groundwater at levels above background and likely above the water quality objectives. However, Tier 2 OWTS and OWTS conforming to basin plans could include nitrogen removal where required. Several local agencies include requirements for removing nitrogen (e.g. Santa Cruz and Sonoma Counties). Since all basin plans and all local ordinances do not require the removal of nitrogen prior to OWTS discharge, the impact potential for violating water quality objectives with nitrogen-based compounds from OWTS statewide is **Potentially Significant**.

Tier 3: To address nitrogen-impaired water bodies listed in Attachment 3, Tier 3 of the Policy relies on the development of site specific implementation plans create as part of a TMDL, or special provision added to a Local Agency Management Program by a local agency and approved by a Regional Water Board for existing OWTS. The contribution to the impairment from existing OWTS is part of the environmental baseline. Tier 3 requires that new and replaced OWTS discharging within 600 feet of the impaired water body include supplemental treatment for nitrogen compounds, or comply with the implementation plan for that water body, if there is one. Therefore, impacts due to the release of nitrogen to groundwater for Tier 3 are **Less Than Significant**.

OWTS that fall under Tier 4 conditions would be required to come into compliance to Tier 1, 2 or 3 standards. Since Tiers 1 and 2 could potentially cause environmental impact, then Tier 4 impacts would also be **Potentially Significant**.

Therefore, the proposed Policy may result in impacts that are **Potentially Significant** due to the release of nitrogen to groundwater.

Potential Mitigation Measures 6.2.5:
The State Water Board could modify the proposed Policy to include the following additional requirement:

- All OWTS in Tier 1, Tier 2, Tier 3, and Tier 4 shall be designed to meet the nitrogen removal performance requirements for supplemental treatment contained in Section 10 of the proposed Policy.

Implementation: If this mitigation measures were to be implemented by the State Water Board, discharges from OWTS in Tiers 1, 2, 3, and 4 would meet the water quality objectives for nitrate-nitrogen (10mg/L) at the point of compliance. As stated above, this is only a potential impact, and may not occur in all soil and groundwater conditions. If implemented, the mitigation measures would result in the need for installation of large numbers of OWTS with nitrogen removal systems designed to reliably meet the 10 mg/L total nitrogen requirement. Supplemental treatment systems are very costly; current costs range from $26,000 to $50,000 and the cost for such systems would be borne by the owners. Recognizing that complying with the proposed Policy may, in some cases, impose a significant monetary hardship to homeowners, the State has set aside funds from its State Revolving Fund Program that can be made available to local qualified agencies who can then provide low-interest loans to homeowners to install, repair, replace, or upgrade their OWTS. The homeowners would still bear the primary financial responsibility for these improvements, but could potentially qualify for lower interest (than market rate) loans. If this mitigation measure were to be adopted, the water quality and public health impacts associated with nitrogen contamination from operation of OWTS would be reduced to a **Less Than Significant** level. The State Water Board does not intend to implement this Mitigation Measure, however, because it believes that it is infeasible to do so on a statewide basis. Several local agencies and members of the public have commented that a requirement such as this would remove too much local agency flexibility and impose significant costs without a corresponding environmental benefit. Therefore, the impact associated with nitrogen contamination from operation of OWTS would be potentially significant.

Significance after Mitigation: **Significant and Unavoidable.**

6.2.6 Direct Impacts from Contamination of Other Constituents of Concern from Operation of OWTS Statewide

There are many constituents of concern in domestic wastewater, including OWTS effluent that could contribute to degradation of water quality if discharged into the OWTS in lieu of disposing using other means. Researchers have evaluated a wide range of contaminants associated with domestic wastewater over the years. Constituents of particular concern are those that might contaminate surface water or groundwater.

Any such contamination could directly or indirectly affect beneficial uses of the waters. Contaminants included in this group are trace minerals and phosphorus, metals, salts, organic compounds and a group of compounds known as endocrine disrupting compounds. A brief summary of health concerns related to these contaminants follows.

Phosphorus. Phosphorus is an aquatic plant nutrient that can also contribute to eutrophication (algal blooms) of inland and coastal surface waters and reduction of dissolved oxygen. In contrast to some forms of nitrogen, phosphorus is not directly toxic to humans, but has been shown to be involved in several water quality problems related to eutrophication that can affect human or animal health. Examples include the formation of carcinogenic trihalomethanes during the chlorination of waters that have recently experienced algal blooms (Kotak *et al.* 1994); consumption by livestock or humans of waters containing cyanobacteria blooms or the neuro- and hepatotoxins released when these blooms die (Martin and Cooke 1994); and, most recently, the effect on human health of neurotoxins and other toxic constituents released by dinoflagellates, such as *Pfiesteria piscicida*, that bloom in phosphorus-limited eutrophic coastal waters (Burkholder and Glasgow 1997).

Metals. Some metals in drinking water may cause human health problems. Metals including lead, mercury, cadmium, copper, and chromium can cause physical and mental developmental delays, kidney disease, gastrointestinal illnesses, and neurological problems (DeWalle *et al.* 1985). In the aquatic ecosystem, they are also toxic to aquatic life and accumulate in fish and shellfish that might be consumed by humans. Metals can be present in raw household wastewater from commonly used household products; aging interior plumbing systems that can contribute lead, cadmium, and copper; foodstuffs; and human waste (USEPA 2002).

Several USEPA priority pollutant metals have been found in domestic septic tank effluent (including nickel, lead, copper, zinc, barium, and chromium), although at low concentrations. Copper and zinc were the only trace metals found in any significant amounts, and those concentrations were less than in tap water (Whelan and Titmanis 1982). Reviews and studies to date, although not extensive, have suggested there is very little need for concern over heavy metals in domestic septic tank effluent (Siegrist *et al.* 2000). The fate of metals in soil is varied and depends on complex physical, chemical, and biochemical interactions. Although studies appear to indicate possible removal in both the septic tank and soils, some risk remains, and groundwater contamination in specific cases, although unlikely, is possible (USEPA 2002).

The primary processes controlling the fixation or mobility of metals in subsurface infiltration systems are adsorption onto negatively charged soil particles and interaction with organic molecules. The solubility of metals is pH dependent and tends to be lowest between pH 6 and 8. Acidic conditions can reduce the sorption of metals in soils, leading to increased solubility and therefore increased risk of groundwater contamination (Evanko and D Zombak 1997, USEPA 2002).

Salts. Increases in dietary salt in humans via water or foods are associated with an increase in heart disease, but the levels of concern and effects are still under debate.

Chloride and sulfide cause taste and odor problems in drinking water. Sodium and to a lesser extent potassium can be deleterious to soil structure and OWTS dispersal system performance, although normal or conservative residential uses of salts and household bleaches are not detrimental to the microbial population (Bounds 1997). Sodium is commonly present in background levels in groundwater. However, the sodium concentration is considerably higher in discharges from an OWTS when the OWTS receives discharge from water softeners. Concentrations of boron and calcium in septic tank effluent typically reflect those found in the water supply source. Major natural sources of sulfate in drinking water are from oxidation of metallic sulfide compounds (such as FeS) found in bedrock. Domestic wastewater contains additional sulfate concentrations from the oxidation of reduced sulfur compounds present in fecal matter. Higher concentrations of sulfate in OWTS effluent typically are from the source water in the domestic supply (domestic well water or municipal water) as part of the natural water quality of the region. In general, dissolved inorganic compounds may affect the soil structure and function, which may subsequently reduce the effectiveness of the soil to treat OWTS effluent before it reaches groundwater.

Organic Compounds. Organic compounds are present in many routine household chemicals, cleaning products and solvents, and components of pharmaceuticals and personal care products that include prescription and nonprescription drugs and caffeine. Potential negative health effects from ingesting water containing these compounds include neurological and developmental problems, and cancer. In addition, concentrations of these chemicals in wastewater may affect some functions of both conventional and supplemental treatment systems, causing indirect effects such as a reduction in treatment of specific pollutants. The primary pathways of exposure to humans would be through ingestion of drinking water contaminated by organic chemicals, direct contact with water, such as bathing or swimming, and respiration of droplets from bathing or other aerosols.

Organic compounds can be present in groundwater and surface water from anthropogenic pollution sources. This type of pollution, once present, can be very difficult to remove. Some of these pollutants accumulate and concentrate in ecosystem food chains. Commonly used surfactants (or foaming agents) are linear alkylbenzene sulfonate (LAS), alcohol ethoxylate (AE), and alcohol ether sulfate (AES). They are readily removed via biodegradation in septic systems or sorption onto soils, even under worst-case conditions (Nielsen *et al*. 2002). As an example of persistence in the environment, Gamma-BHC, commonly called Lindane, is an isomer (one of several chemical forms) of the chemical hexachlorocyclohexane (HCH) and is used as an insecticide on fruit, vegetables, and forest crops. It is also used as a lotion, cream, or shampoo to treat head and body lice and scabies. It is banned in many, but not all countries and remains legal for use in the United States. Lindane has not been produced in the United States since 1976 but continues to be imported for insecticide use (ATSDR 2004).

Surfactants, or foaming agents, are commonly used in laundry detergents and other soaps to decrease the surface tension of water and increase wetting and emulsification. Surfactants are the largest class of human-produced organic compounds present in raw domestic wastewater. They can be found in most domestic septic system effluents (Wisconsin Department of Commerce 1998, USEPA 2002). Surfactant molecules contain both strongly hydrophobic (not easily mixing with water) and strongly hydrophilic (easily mixing with water) properties and thus tend to concentrate at interfaces where water meets air, oily material, and particles.

Hinkle *et al*. (2005) found nine organic wastewater compounds in more than 90% of groundwater samples from a monitoring network down gradient of OWTS dispersal system effluent:

- acetyl-hexamethyl-tetrahydro-naphthalene (AHTN)
- caffeine
- cholesterol
- hexahydrohexamethyl-cyclopentabenzopyran
- N,N-diethyl-meta-toluamide (DEET)
- tetrachloroethene
- tris (2-chloroethyl) phosphate
- tris (dichloroisopropyl) phosphate
- tributyl phosphate

Detection of these compounds provides evidence that some of them may be useful indicators of human waste effluent dispersal in some hydrologic environments. Studies have shown mixed results regarding removal of organic compounds using conventional OWTS. Reductions depend on the chemical type and a multitude of environmental factors. Although several studies found complete or nearly complete removal of organic compounds below OWTS (USEPA 2002; Ayres Associates 1993a, 1993b; Robertson 1991; Sauer and Tyler 1991), other studies found variable results in the potential for such chemicals to reach and flow with groundwater (USEPA 2002). Studies have indicated that the common LAS, AE, and AES surfactants are readily removed from groundwater in soils below the soil dispersal fields, even in situations with minimal unsaturated soil zones. The most successful processes for removing these surfactants are likely biodegradation and sorption (USEPA 2002, Nielsen *et al*. 2002). Surfactants do not usually create public health concerns, although methylene blue active substances, common in household laundry detergent, can affect the aesthetic quality of water if present in significant quantities by inducing foaming. No investigations have been found that identify cationic or nonionic surfactants in groundwater that originated from soil dispersal fields (WI DOC 1998, USEPA 2002). However, with the unpredictability of removal, groundwater contamination must be assumed to be taking place in some specific cases.

Endocrine-Disrupting Compounds. The presence of common hormones, drugs, and chemicals from personal care products (e.g., shampoo, cleaning products, and pharmaceutical products) in wastewater and receiving water bodies is an emerging water quality and public health concern. Endocrine-disrupting compounds (EDCs) are substances that alter the function of the endocrine system (secretions, such as hormones, distributed through the body by way of the bloodstream) and consequently cause adverse health effects on exposed organisms or their offspring. EDCs may be present in such common items as medicines, over-the-counter therapeutics, pesticides, soaps, shampoos, hair colors, plastics and plasticizers, polychlorinated biphenyls (PCBs), spermicides, preservatives, and specific metals. Only recently has the presence of EDCs been detected in water bodies of the United States at a high frequency; however, measured concentrations have been low and usually below drinking water standards (in the cases of those compounds for which standards have been established). Specific studies have found EDCs in water bodies in sufficient quantity that they could potentially cause endocrine disruption in some fish. The extent of human health risks and dose responses to EDCs in concentrations at the low levels found in the environment are still unknown. The specific category of EDCs includes both natural compounds, such as phytoestrogens, and synthetic chemicals, which are of increased concern. Congress has directed EPA to study the transmission of EDCs through drinking water. Some EDCs have been implicated in accelerating the growth of breast cancer cell cultures, thereby raising questions about other human health effects (Felsot 1994, MacMahon 1994, Safe 1995).

These effects were seen at concentrations measured in parts per trillion, levels at which most chemicals have never been tested. Other than the product-intended oral or dermal uses, exposure routes, after transmission to an OWTS, include ingestion of contaminated drinking water or foodstuffs, bathing or swimming in contaminated water, and possible respiratory contact.

Although some of the contaminants identified in Section 303(d) as contributing to impairment of water bodies in California are categorized as EDCs, EDCs as a category are not currently regulated as water quality contaminants in federal or state water quality objectives. EPA is currently studying the transmission pathways and effects of EDCs and although some scientific studies have investigated their effects on human health, these compounds are not currently regulated or classified as contaminants or pollutants by any federal, state, or local public health agency. If additional information becomes available indicating that EDCs pose a risk to human health and/or the environment, this issue may merit further consideration by public health agencies and the State Water Board.

All of the substances presently identified as hormone disruptors are now widely distributed throughout the environment. Some are common constituents of consumer products, and many are now found in human tissues and have been shown to affect the health, reproduction, and behavior of animals.

Although hormone-related diseases have not been clearly linked to environmental chemicals, it is probable that endocrine disruptors are contributing to human diseases and dysfunction (Ankley *et al*. 1997). The EPA, through the 1996 reauthorization of the Safe Drinking Water Act, was directed to address the issue of possible endocrine disruptors in drinking water. The White House convened an interagency task force of national experts to improve the national response to the issue and evaluate consumer exposures, workplace exposures, and facility releases of chemicals (Ankley *et al*. 1997).

These "endocrine disruptors" include both natural compounds and synthetic chemicals. Some, called phytoestrogens, occur naturally in a variety of plants. Living things have evolved with these natural substances and have mechanisms to metabolize or degrade them so they do not bioaccumulate. Of current concern are the synthetic estrogens produced either through industrial manufacture or as byproducts of such processes or burning. Some of these have been found to speed the growth of cultures of breast cancer cells, raising questions about human health effects (Felsot 1994, MacMahon 1994, and Safe 1995). The effects have been detected at chemical concentrations of parts per trillion, levels at which most chemicals have never been tested.

Diseases that are associated with general environmental exposure to toxic pollutants or other environmental contaminants are not well reported and the causes are difficult to pinpoint, even at some of the more infamous sites of exposure, such as the Love Canal in New York or other hazardous waste sites where high levels of contaminants can be found. At very low levels, such as those found in OWTS effluent or in foods, the risks are measured in terms of a lifetime of chronic exposure. No data are available that can be used to relate any type of OWTS-effluent related exposure to any occupational or consumer-related exposure to chemicals that could be meaningfully interpreted. Further investigation would require expenditure and work effort that is beyond the requirements of CEQA. **No conclusion can be made at this time.**

No Mitigation is Required.

6.2.7 Indirect Impacts related to the Relaxation of Existing Local Regulations

The policy requires that the regional water boards incorporate the requirements established in the Policy by amending their basin plans within 12 months of the effective date of this Policy, pursuant to Water Code Section 13291(e). In so doing, the regional water boards are required to consider whether it is necessary and appropriate to retain or adopt any more protective standards. To the extent that a regional water board determines that it is necessary and appropriate to retain or adopt any more protective standards, they need to reconcile those region-specific standards with the Policy to the extent feasible, and shall provide a detailed basis for its determination that each of the more protective standards are necessary and appropriate. The State Water Board ultimately determines adequacy of the standards included in the basin plans, including the basis for any more protective standards. Therefore, the standards could potentially be relaxed due to non-inclusion or non-adoption at the regional water board level or because of non-adoption of those more restrictive standards at the State Water Board. However, the tiers, as analyzed in this SED, already identify the impacts that are reasonably anticipated.

No Mitigation is Required

6.2.8 Cumulative Water Quality and Public Health Impacts

This section addresses potential cumulative impacts of the proposed project in combination with related projects (e.g. TMDL implementation and ongoing development). Cumulative impacts are of particular concern in these situations:

►impaired water bodies where OWTS have been determined to be contributing to impairment (water bodies listed in Attachment 2 of the proposed Policy), and

► developing areas that rely on OWTS where there is shallow or sandy soil and an underlying hydrogeology that could expose consumers to potential public health hazards.

The major cumulative impacts of concern on water quality involve nutrients (e.g., nitrate) and pathogen contamination, particularly in areas where beneficial uses are impaired by these contaminants. Surface water impairment, either directly (through mechanisms such as storm water runoff or surfacing OWTS effluent) or indirectly (through hydrologic connection with contaminated groundwater) is also of concern (USEPA 2004). Potential impairment of beneficial uses that would negatively affect public health and biological resources is also of concern.

Impaired Areas Where OWTS Are Near Surface Waters

Regional water boards are in the process of developing and implementing TMDLs, or have implemented such standards, for all of the state's impaired surface water bodies. By design, and when fully implemented, the TMDL addresses cumulative water quality impacts in a watershed because it not only implements TMDLs that are intended to protect the different types of beneficial uses that would be impaired without the TMDLs, it also uses load allocations and other methods to reduce the contributions of the different related projects that are contributing to the impairment. Cumulative water quality impacts in impaired water bodies where TMDLs have not yet been fully implemented may be significant because related WQOs and related beneficial uses may not be protected until the TMDLs are fully implemented. Over time and once the TMDLs are fully implemented, cumulative water quality impacts in areas with fully implemented TMDLs should be reduced to **Less Than Significant** levels.

The proposed project's contribution to cumulative water quality impacts in water bodies listed in Attachment 2 of the Policy would be less than significant because the proposed regulation would require the owners of new and replaced OWTS to convert to supplemental treatment in areas 600 feet from impaired water bodies. The proposed project would also generally improve the operation and management of OWTS via mandatory inspections, improved design standards, and other operational features described in that section. Therefore, the proposed project's contributions to cumulative impacts in water bodies listed in Attachment 2 of the Policy would not be cumulatively considerable.

In impaired areas where OWTS are not contributing to the impairment, owners would not be required to convert to supplemental treatment systems. Additional OWTS-related mitigation in these situations is not warranted because regional water boards have determined that OWTS are not contributing to impairment in these areas to an extent that it is likely that the TMDL will include load reductions from OWTS. In other words, the impairment of local beneficial uses is being caused by other sources of pollutants and OWTS contributions to impairment in these areas are either minor or are not occurring. The ongoing development and implementation of TMDLs in these watersheds is also expected to reduce pollutant loads to the point where beneficial uses are no longer impaired.

Various OWTS constituents of secondary concern are known to occur in wastewater effluent and have been identified in addition to those noted above. These could enter the water body directly as runoff from surfacing OWTS effluent or indirectly through hydrologic connection between surface water and groundwater. However, surfacing OWTS effluent requires repairs under the proposed project. Pollutants entering surface water through groundwater would depend on the constituent. In the case of surfacing effluent, the proposed project is written to specifically address the pollution.

For pollutants of secondary concern that may result from hydrologic connection, not enough is known about their concentration in wastewater effluent, and at what concentration they would adversely affect public health or biological resources. Much uncertainty also surrounds the characteristics that determine the transport and fate of the contaminants and how effective properly-sited and functioning OWTS systems are in attenuating these contaminants. Because of the lack of information or inconclusive nature of information currently available about these constituents in OWTS effluent, any additional analysis regarding potential cumulative impacts on water quality, public health, or biological resources related to these constituents would be speculative.

OWTS in Areas That Have Shallow or Sandy Soil and an Underlying Hydrogeology That Could Expose Consumers to Potential Public Health Hazards

Wastewater discharged from OWTS can cause diseases such as infectious hepatitis, typhoid fever, dysentery, and various gastrointestinal illnesses (USEPA 1977). It is also known that dissolved contaminant plumes of nitrate from conventional OWTS can travel hundreds of feet in groundwater and exceed drinking water standards (USEPA 2002). Domestic wells are often sited between 100 and 200 feet from an OWTS. The same areas of the state that have relatively high densities of OWTS also have relatively high densities of private drinking water wells, and thus have the potential for nitrate and pathogens from OWTS discharges to contaminate drinking water supplies. The site characteristics and placement of an OWTS determine how adequately viruses and bacteria (but not nitrogen) are removed from OWTS effluent before the effluent reaches groundwater. Sites that can adequately remove viruses and bacteria have the following characteristics:

► unsaturated soil with adequate amounts of organic matter (i.e., soil types other than sand and rocks),

► a suitable infiltration rate (fast enough to handle effluent loads and slow enough to enable microbial and physicochemical treatment), and

► a sufficient depth (at least 3 feet with conventional systems and 2 feet with supplemental treatment).

However, the presence of certain soil types and hydrogeologic conditions (discussed below) along with the presence of OWTS discharges substantially raises the risk of public health hazards for owners of on-site drinking water wells. In these situations, cumulative public health hazards may be significant.

OWTS discharges and other human activities that result in the release of nitrogen and pathogens into groundwater will increase over time as future related projects are implemented, especially more residential, commercial, industrial, and agricultural development. The types of cumulative public health impacts described above have the potential to be significant in the situations described above, and these will become more significant over time because the Sierra foothill and Central Valley counties are expected to experience large increases in population and development. Although the proposed project would reduce the potential (compared with existing regulations) for adverse impacts in these areas by requiring the regional water boards and the local agencies to work cooperatively together, it also would allow existing conventional systems to continue discharging and, unlike the regulations for surface water bodies listed in Attachment 2 of the Policy, would not require supplemental treatment to be used when new systems are installed or existing systems are replaced. Therefore, the proposed Policy's contributions to these potentially significant public health impacts are considerable because the proposed Policy could allow discharges from new OWTS installations, resulting in additional risk of contamination of drinking water wells.

To reduce OWTS contributions from new OWTS installations to a less-than-significant level in fractured bedrock and other groundwater environments, additional regulatory requirements or mitigation would be needed. Such mitigation could consist of requiring all new and replaced conventional systems in fractured bedrock environments to use systems that include disinfection and nitrogen removal capabilities and substantially remove nitrogen to levels that would meet total nitrogen WQOs with little or no soil treatment. In the alternative, such systems could be required only if local well samples indicate pathogens or high levels of nitrogen from human activities.

However, requiring systems with disinfection and nitrogen removal capabilities may be infeasible in many instances. These systems would be very costly and, given the uncertainty that any single OWTS may contribute to this impact, may be financially infeasible. If such systems are installed, the water quality and public health impacts associated with pathogen and nitrogen contamination from operation of all new, and replaced OWTS in fractured bedrock environments would be reduced to a **Less Than Significant** level. The State Water Board does not intend to implement these Mitigation

Measures, however, because it believes that it is infeasible to do so on a statewide basis. Several local agencies and members of the public have commented that requirements such as these would remove too much local agency flexibility and impose significant costs without a corresponding environmental benefit. Therefore, the impacts described in this section would be potentially significant.

Significance after Mitigation: **Significant and Unavoidable.**

6.3 Biological Resources

A great diversity of vegetation and wildlife resources exist in California across a broad range of physiographic regions, from the coast, inland across mountain ranges and valleys, to the deserts along the eastern border. Each of these regions can be further subdivided into many habitats and associated wildlife species. Habitat types include coastal dunes and scrub, desert and valley riparian, mixed conifer, oak woodland, riverine, and annual grassland, and more human-influenced habitats such as agricultural land, pastureland, and urban areas (Jones and Stokes 1999).

The varied habitat types within California are conducive to a great diversity of plant and animal species, many of which are endemic to the state. As a consequence of habitat conversion to agricultural, residential, and commercial development, many of these species have become rare, threatened, or endangered (CDFG 1998a, 1998b). Plant species have been listed as endangered, threatened, or rare under Section 1904 (Native Plant Protection Act of 1977) and Sections 2074.2 and 2075.5 (California Endangered Species Act of 1984) of the Fish and Game Code. Also, plant species have been federally-listed as endangered or threatened under the Federal Endangered Species Act of 1973, and other plant species are proposed or candidates for listing. Additionally, animals have been state or federally listed as threatened or endangered, while other animal species are classified as candidates for state listing or proposed for federal listing. Many others are considered special-status species by local, state, and federal agencies (SWRCB 1999).

THRESHOLDS OF SIGNIFICANCE

The potential for the OWTS regulations to result in significant environmental effects was analyzed using information and criteria provided in the California Environmental Quality Act (CEQA) Guidelines. Pursuant to the suggested thresholds in Appendix G of the State CEQA Guidelines, the proposed project would have a significant impact on biological resources if it would:

- have a substantial adverse effect, either directly or indirectly through habitat modifications, on the population of any species identified as a candidate, sensitive, or special-status species in regional or local plans, policies, or regulations, or by DFG or USFWS;

- have a substantial adverse effect on any riparian or other sensitive natural community identified in local or regional plans, policies, or regulations or by DFG or USFWS;

- have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the CWA (including, but not limited to, marsh and vernal pools) through direct removal, filling, hydrological interruption, or other means;

- interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;

- conflict with local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance; or

- conflict with the provisions of an adopted habitat conservation plan, natural communities conservation plan, or other approved local, regional, or state habitat conservation plan.

6.3.1 Impacts on Fisheries, Sensitive Habitats and Communities, Special-Status Species, and Federally Protected Wetlands from Construction of OWTS

The proposed Policy could lead to an increase in OWTS repairs, replacements, and upgrades. These changes would occur on sites that already have been disturbed and contain existing OWTS and associated residential or commercial structures, and by virtue of their ongoing use are highly unlikely to support sensitive habitat that could be affected by repairs or replacement.

New OWTS, as previously described, do not alter the local land use agency process associated with ground-disturbing activities from residential and commercial development. The proposed Policy does not dictate whether land uses associated with OWTS would be permitted. However, the proposed Policy would require most owners of who would like to install new and replaced conventional OWTS within 600 feet of water bodies listed in Attachment 2 of the Policy to potentially convert their existing systems to OWTS with supplemental treatment units. As explained above for Tiers 1, 2, and 4, local BMP requirements related to sedimentation and erosion control for construction activities disturbing less than 1 acre are required and the likelihood of uncontrolled releases of sediment from erosion or other releases of pollutants from such activities is small and their resulting impact on biological resources is even smaller. For this reason, the impacts on biological resources from disturbances of less than one acre near impaired waters is found to be **Less Than Significant.**

Where areas larger than 1 acre could be disturbed, the potential for environmental impacts, while similar to those discussed above, are simply greater in magnitude and therefore more of a threat. However, construction activities greater than one acre would be subject to the requirements of the statewide National Pollutant Discharge Elimination System General Permit for Stormwater Discharges Associated with Construction Activity. Given the adequacy of the existing NPDES and SWPPP program where applicable (for areas of disturbance of 1 acre or more) and the effectiveness of BMPs when used appropriately in such situations, the project's potential construction-related impacts on biological resources are also considered **Less Than Significant** for OWTS construction disturbing 1 acre or more.

No Mitigation required.

6.3.2 Indirect Impacts on Biological Resources from Pathogen Contamination Caused by Operation of OWTS Statewide

This section addresses potential indirect impacts on biological resources (e.g., fisheries and special-status species that occur in, or rely on, sensitive habitats or communities such as freshwater and marine ecosystems and federally protected wetlands) that would occur under the proposed Policy from pathogens contaminating surface waters through OWTS discharges. While OWTS may contaminate groundwater and surface water with pathogens, surface water contamination is of particular concern because it affects biological resources.

The degree to which pathogens found in OWTS effluent may affect wildlife is not well known. Around 2001, dead or stranded sea otters were being found along the shoreline of the Central Coast. Tissue samples of the dead otters were examined and the affects of a protozoa, Toxoplasma gondii, which is spread through domestic cat feces, was found to be lethal to the otters (Contrad *et al*. 2005). Additionally, sea otters have been infected by *Cryptosporidium*, a protozoan that causes severe diarrhea in humans (Conrad *et al*. 2005). Both these protozoa are thought to have infected the otters through stormwater runoff or sewage outfalls, not OWTS discharges. Currently, contamination by pathogens in marine and freshwater systems is monitored by examining the concentrations of *Cryptosporidium* oocysts in bivalves (e.g., mussels, clams) residing in waters contaminated by fecal matter (Conrad 2005, SWRCB 2007).

In addition, the retention and die-off of most, if not all, observed pathogenic bacterial indicators and viruses occurs within 2 – 3 feet below the soil's surface, in a properly designed and sited, normally functioning OWTS (Anderson *et al.* 1991; Anderson *et al.* 1994; Ayers Associates 1993a, 1993b; Bouma *et al.* 1972; McGaughey and Krone 1967; Van Cuyk *et al.* 2001), and most bacteria are removed with the first 1 foot vertically or horizontally from the trench-soil interface at the infiltrative surface of coarse soils with a mature biomat (University of Wisconsin-Madison 1978). Moreover, soil filtration is more likely to remove protozoa than other waterborne pathogens because protozoa are larger.

The occurrence and concentration of pathogenic microorganisms in wastewater depend on the sources contributing to the wastewater, the existence of infected persons in the population, and environmental factors that influence pathogen survival rates. Viruses and protozoa appear in septic tank effluent intermittently, in varying numbers, reflecting the combined infection and carrier status of OWTS users. Therefore, such pathogens are difficult to monitor and little is known about their frequency of occurrence and rate of survival in traditional OWTS effluent. Nevertheless, pathogens from OWTS would generally have to travel vertically through the soil and horizontally in groundwater before reaching surface waters. The likelihood of pathogens from OWTS discharges causing substantial effects on biological resources would be low because of factors that would reduce pathogen concentrations and/or viability (i.e., predation in the soil, inactivation and die-off over time, physicochemical conditions, lack of a host).

Pathogens that affect wildlife include bacteria, viruses, and parasites such as protozoa, which may exist in OWTS effluent. Therefore, impact is possible for all tiers except Tier 3. Tier 3 requires OWTS to disinfect wastewater using supplemental treatment, thereby eliminating potential impact from pathogen contamination. Tier 2 and management associated with that tier is expected to address the threat from OWTS to biological resources having proper, scientifically-based requirements that, when applied, reduce the threat of pathogens. Some examples include but are not limited to supplemental treatment and disinfection, adequate soil depth based on soil type, and program monitoring. When OWTS are sited and designed to operate properly, basin plans with more protective, yet different standards have not been found to increase the risk for that group, due to the comparable level of protectiveness and *additional* impact to biological resources is avoided. For that reason, it is found that this impact is **Less Than Significant**.

No Mitigation is Required.

6.3.3 Indirect Impacts on Biological Resources from Nitrogen Contamination Caused by Operation of OWTS Statewide

Excessive nutrient enrichment of aquatic ecosystems can lead to intensive growth of algae and aquatic macrophytes (eutrophication). The consequences of this enhanced growth include reduced sunlight underwater, hypoxic (low oxygen) conditions in the water, and a loss of habitat for aquatic plants and animals. Hypoxia can result in fish kills or cause fish to leave the area and can cause stress or kill bottom-dwelling organisms that cannot leave the hypoxic zone. Additionally, excess nutrients can result in "harmful algal blooms" (HABs). HABs are blooms of microscopic and macroscopic algae that produce biotoxins. These biotoxins can have toxic effects on humans and other organisms; physically impair fish and shellfish; and release odors and discolor waters or habitats (Boesch *et al.* 1997). Thus, introducing excessive nutrients into aquatic systems may result in conditions that could lead to mortality of sensitive fish and benthic organisms, and alteration and degradation of biological communities and sensitive aquatic habitat.

The proposed Policy encourages that OWTS in all tiers be sited and designed to operate properly. Tier 2 programs and some basin plans will allow the design of new and replaced OWTS to include shallow dispersal systems, supplemental treatment and placement in soil types that may facilitate some nitrogen removal through the process of denitrification. Additionally, Under Tier 2, use of shallow dispersal systems, including, but not limited to drip systems, at-grade systems and mound systems, may facilitate more plant uptake of nutrients discharged from OWTS because the dispersal systems could be placed within the root zone of landscape vegetation. Also, the density requirements in Tier 1, with a 2.5 acre lot minimum for new OWTS in a "new" subdivision, are expected to reduce the impact from nitrogen originating from OWTS. Discharges from OWTS are still likely to introduce nitrogen in the form of nitrates to groundwater, as noted above. While it would be unlikely that the nitrate loading contributed by a single OWTS discharge to a surface water body would excessively enrich the water with nitrogen and degrade water quality to the extent that biological resources could be affected, high densities of OWTS near a surface water body may cause or substantially contribute to eutrophication of the surface water, which in turn could negatively effect biological resources. However, the regional water boards are charged with monitoring water quality and protecting beneficial uses of surface waters. Regional water boards require compliance with regulations designed to protect those beneficial uses. Furthermore, in such an instance, those OWTS would be subject to Tier 3. Tier 3 is intended to protect the environment from such impacts. For those reasons, impacts on aquatic biological resources, including fisheries; special-status species; sensitive habitats or communities, including slow-moving streams, lakes, bays, and estuaries; or federally protected wetlands would be **Less Than Significant.**

No Mitigation Required

6.3.4 Indirect Impacts on Biological Resources from Operational Discharges of Other Constituents of Concern Caused by Operation of OWTS Statewide

Other OWTS constituents of concern were identified and discussed in section 6.2.6. Other constituents are known to occur in wastewater effluent, including OWTS effluent. The concentration of constituent may vary depending upon the level of treatment required under the tiers and the basin plan requirements, where more protective than the proposed Policy. However, no viable conclusion can be made on this issue at this time.

As described in impact 6.2.6, various OWTS constituents of concern have been identified in addition to those of primary concern (nitrogen and pathogens) that are known to occur in wastewater effluent. For some constituents, not enough is known (numerous studies have been completed but they are inconclusive) about their concentration in wastewater effluent, and at what concentration they would adversely affect public health (e.g., traces of EDCs, pharmaceuticals, and personal care products). For others, the characteristics that determine the transport and fate of the contaminants and the effectiveness of properly-sited and functioning OWTS systems are sufficient to attenuate the contaminants, effectively limiting their ability to adversely affect biological resources.

Because of the lack of or inconclusive nature of information currently available about other constituents of concern in OWTS effluent, additional analysis in this SED regarding the impact associated with discharge of these constituents from new and replaced OWTS on biological resources would be speculative. The proposed policy would not impose requirements to address other constituents of secondary concern, but further research is under way on this topic by federal and state agencies and research groups. In the future, if research indicates there is a substantial public health concern associated with these constituents, the State Water Board would consider the regulatory framework for addressing attendant issues. At this time, however, no further analysis can be conducted based on the existing information and **no conclusion** can be made.

No Mitigation Required

6.3.5 Cumulative Biological Resource Impacts

OWTS have the potential to indirectly affect biological resources that may occur in or rely on surface water resources where OWTS contribute to surface water contamination. The mass loading from high densities of OWTS within a watershed, combined with inputs from other sources such as agriculture, recreation (e.g., golf courses), stormwater, or urban runoff can contribute sediment, pathogens, nutrients, and other constituents to aquatic environments. These constituents can lead to eutrophication and hypoxia, resulting in impacts on aquatic biological resources, including aquatic habitats, fish, wildlife, and other organisms.

Contributions to contamination of surface waters as a result of increased development and population throughout the state, including additional OWTS, stormwater runoff, and construction-related runoff, would be addressed through the development approval process by local jurisdictions (e.g., general plans, development project EIRs, zoning codes, construction permits) and likely would not contribute to cumulative effects. In areas where surface water bodies are identified as impaired, such contributions are addressed by existing TMDLs.

Degradation and/or eutrophication of surface waters resulting from increased pathogen and/or nutrient loading could lead to a decline in fisheries and adverse effects on other species associated with aquatic habitats, which in turn could affect the diversity and reproduction of special-status species. However, declaring these worst-case scenarios to be significant cumulative impacts would be speculative. It is more likely (although still speculative) that these contributions, while usually not beneficial to the receiving environments (habitats and affected fish and wildlife), would be incremental over time and at some point would be remediated by implementation of new regulatory authority through impairment designations and/or revised regional or local regulations.

Impacts on biological resources may be cumulatively considerable in areas where eutrophication is leading to algal blooms and degradation of aquatic habitat conditions. For the reasons previously described, most WQOs in basin plans and throughout the state should be complied with over time and therefore, in areas with full regulatory compliance (e.g., implementation of TMDLs or other regulatory measures deemed necessary) and appropriate conditions for siting OWTS, future cumulative impacts on biological resources would be **Less than Significant**.

No Mitigation Required.

6.4 Geology and Soils

As a result of California’s location along the Pacific Rim, California’s geology and its related soils and minerals are unique. California is divided into eleven Geomorphic Provinces. Each region displays unique, defining features based on geology, faults, topographic relief and climate. These geomorphic provinces are remarkably diverse (CA DOC and CGS 2002). This diversity includes the amount of soils available for OWTS use, the amount of mineral resources available for OWTS construction, and the geology and geologic process that assisted in the formation of each province.

As part of the Pacific Rim, California's future and history includes earthquakes from faults, igneous rock-forming events from volcanoes and erosion events associated with the weather patterns due its geographic location. All of these events, separately and in combination, have created the state of the State's geology, minerals and soils in addition to flat valleys, steep slopes and unstable landforms. From the deep fertile valleys that make up the basis for California's agricultural industry to specialty mining for anything from asbestos to zeolite, or structural building materials in the form of rock or gravel, the state is truly a function of its geology. This also includes landforms like bluffs and mountain-tops that provide beautiful views. Each region of California has a separate and distinct supply of these resources that make up the environment specific to that area.

THRESHOLDS OF SIGNIFICANCE:

Thresholds for determining the significance of impacts related to Geology and Soils are based on relevant provisions of CEQA, the State CEQA Guidelines, checklist questions for geology and soils set forth in Appendix G of the Guidelines, and professional standards and practices.

The proposed statewide policy for OWTS would have a significant impact on Geology and Soils if it would:

- cause Seismic-related ground failure, including liquefaction;
- cause landslides;
- result in substantial soil erosion or the loss of topsoil;
- allow the use of soils incapable of adequately supporting the use of septic tanks or alternate wastewater disposal systems where sewers are not available for the disposal of wastewater; or
- Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state.

6.4.1 OWTS Construction will Result in the Loss of Availability of a Known Mineral Resource that would be of Value to the Region and the Residents of the State

OWTS construction uses aggregate for material during septic tank placement and in the dispersal system to support trenches (Tier 1) and, often, seepage pits (Tier 2). In addition, Tier 2 dispersal systems may include mound and at-grade dispersal systems that also use gravel and, for mounds, sand as part of the treatment media. Furthermore, Tier 2 OWTS treatment systems that may require mineral resources as part of their treatment train include: sand filled trenches, sand filters, rock filters, gravel-filled subsurface wetlands, and others. Many of these OWTS technologies are allowed in areas of the state. It is, therefore believed that this practice will continue under the proposed Project.

In 2009, California was fourth in the nation for the production of nonfuel mineral resources. Sand and gravel made up the highest value product in that category (USGS 2001) at over $900,000,000. Industrial grade sand and gravel is produced much less, although still grossed $42,000,000 in sales. Accordingly, California has a lot of resources when it comes to sand and gravel.

The use of these materials for OWTS will increase, causing a diversion of sand and gravel to OWTS construction and away from other uses. However, to state that the OWTS use of sand and gravel is likely to be a significant use of sand and gravel compared to other higher volume uses, like concrete, road base, and drainage/erosion control project, would be speculative.

No Mitigation Required.

6.5 Land Use Planning and Aesthetics

This section analyzes the potential effects of the proposed statewide regulations on land use and planning.

THRESHOLDS OF SIGNIFICANCE

Thresholds for determining the significance of impacts related to land use and planning are based on relevant provisions of CEQA, the State CEQA Guidelines, checklist questions for land use and planning set forth in Appendix G of the Guidelines, and professional standards and practices.

The proposed statewide policy for OWTS would have a significant impact on land use and planning if it would:

► Physically divide an established community;

► Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect;

► Conflict with any applicable habitat conservation plan or natural community conservation plan.

► Conflict with established land uses;

►Substantially degrade visual quality in adjacent areas;

The proposed statewide policy would not result in the physical division of a community. Under current conditions, OWTS are installed within the boundaries of individual land parcels in areas throughout the state. These systems are part of the overall parcel development and do not present physical barriers that can divide communities. Implementation of the proposed statewide policy would not result in any physical change that would cause an impact relating to the physical division of a community; therefore, this issue is not discussed further in this section.

6.5.1 Conflicts with Applicable Land Use Plans, Policies, or Regulations Adopted for the Purpose of Avoiding or Mitigating an Environmental Effect

Through State of California planning law, local jurisdictions retain the authority to enact policies, programs, and ordinances to regulate how and where development may occur in local communities throughout the State. Implementation of the proposed Policy will not diminish the ability of cities and counties to exercise their land use planning functions, in accordance with State planning law. CEQA requires government agencies to consider the environmental consequences of their actions before approving plans and policies or committing to a course of action on a project. Therefore, a local jurisdiction proposing to amend its sewage disposal ordinance in a way that could result in a direct or reasonably foreseeable indirect physical change in the environment not previously addressed by this CEQA document or others would be required to evaluate the environmental effects of the proposed action, in accordance with the requirements of CEQA.

The proposed Policy would not change the regulatory framework that allows local governing bodies and regional water boards to share authority over land use decisions that could affect water quality in the State. Under the Policy Section “Responsibilities and Duties” and Section 9.0, the Policy addresses how local agencies and regional water boards retain the option of adopting guidelines and standards for OWTS, thus allowing comparable or greater levels of protection to the environment and public health than the proposed standards specified within the proposed Policy. It is possible that situations could occur where a particular siting criterion for OWTS under the basin plans or local ordinances would be different but equally or more protective of the environment than the proposed Policy; however, the resulting conflict would generally not result in a significant impact to the environment. Implementation of the proposed Policy would result in no new significant effects on the environment compared to existing conditions in local areas or regions that are presently subject to local OWTS regulations.

Land use planning functions are carried out by local jurisdictions through State of California planning laws. Of those laws that provide the basis for local jurisdictions to govern development within communities, the general plan (Government Code Section 65300 et seq.) and state zoning law (Government Code Section 65800 et seq.) are of primary use to cities and counties working to direct the type, location, and intensity of growth in an area or region. The proposed Policy for management of OWTS would not affect the authority or purpose of state planning law. For any local municipality, either one with more restrictive or less restrictive standards for siting of individual OWTS, the proposed Policy would not enable development to occur in places other than where it is allowed by the local governing body in communities throughout the state.

The following local municipalities described in Tables 5-1a and 5-1b within “Existing Regulatory Framework and Project Description” of this document are used as case studies for this analysis—Santa Cruz County, Riverside County, Sonoma County, Inyo County, and the Town of Paradise. These areas represent a range of conditions in the state where OWTS are permitted, installed, repaired, and replaced. The respective general plans for each of these communities include goals, policies, and objectives that address density of development, siting of septic systems, and limiting development to protect sensitive resources (e.g., water quality, rural and agricultural lands, and soils). Each of these municipalities has adopted a sewage disposal ordinance for the installation and management of OWTS, which must be consistent with its adopted general plan, and in accordance with the body of planning case law establishing that any action, program, or project undertaken by a city or county affecting land use and development must be consistent with the general plan. The proposed Policy would not weaken this regulatory framework. To the extent that local regulations for management of OWTS are at least as restrictive as the proposed Policy, no change would occur.

Through Tier 2 program approvals with the regional water board, local governing bodies throughout the state would use their authority to implement and enforce regulations for permitting, installation, and management of OWTS to protect water quality and public health. Local jurisdictions with a more restrictive standard for siting of OWTS (e.g., greater depth to groundwater than would be required under the proposed Policy) could propose relaxation of such a standard and be consistent with the proposed Policy. It is important to note that this CEQA document applies to changes and approvals made to basin plans and local ordinances that are consistent with the program descriptions in this proposed Policy. Any local governing body proposing to amend a sewage disposal ordinance or other type of plan that was adopted to ensure the protection of water quality and public health would be required to review this document and address any potential significant effects due to proposed requirements not addressed in this action, in accordance with the requirements of CEQA.

It has been suggested during State Water Board discussions in previous efforts that a proposed statewide Policy could increase development pressures in areas where soil conditions may be particularly well suited for installation of OWTS (e.g., high-quality agricultural lands). Potential future development proposals by local jurisdictions to annex land (e.g., rural agricultural and open space lands) to increase developable areas within local communities would be considered discretionary actions subject to environmental review under CEQA. Such proposals would be subject to review by all affected jurisdictions and possibly to approval by the applicable Local Agency Formation Commission. Potential suitability of soils for installation of OWTS would not drive decisions by local governing bodies to pursue annexation of lands at the fringe of developed areas. Rather, local governing bodies would be required to weigh far-reaching variables related to growth and development. Key variables include regional economic trends, market demand for residential and nonresidential uses, land availability and cost, the availability and quality of transportation facilities and public services, proximity to employment centers, the supply and cost of housing, and regulatory policies or conditions.

Section 21084 of the Public Resources Code requires the State CEQA Guidelines to include a list of classes of projects that have been determined not to have a significant effect on the environment and that would be exempt from the provisions of CEQA. In response to that mandate, the Secretary of Resources established classes of projects that are considered categorically exempt from the requirement to prepare environmental documents (State CEQA Guidelines Section 15300). Class 8 consists of actions taken by regulatory agencies, as authorized by state or local ordinance, to assure the maintenance, restoration, enhancement, or protection of the environment where the regulatory process involves procedures for protection of the environment. It is important to note that, "[C]onstruction activities and relaxation of standards allowing environmental degradation are not included in this exemption." (State CEQA Guidelines Section 15308). In instances where a local governing body has adopted a sewage disposal ordinance with a restriction on installation of OWTS that is more protective of the environment, CEQA does not provide a mechanism that would allow the governing body to amend its ordinance in a way that would result in a relaxation of environmental protection standards without an evaluation of the environmental impacts associated with the discretionary action not addressed by this SED.

As described in section 5.2.2, the State Water Board sets statewide policy for the implementation of state and federal laws and regulations that address protection of water quality, including the Porter-Cologne Act (Water Code Section 13000 et seq.). Section 13002 addresses the power of a city or county to adopt and enforce additional regulations limiting the disposal of waste or any other activities that could degrade waters of the state. Consistent with this mandate, local jurisdictions often exercise their authority to adopt specific guidelines and standards to achieve water quality objectives locally, while acknowledging the requirement to comply with the minimum standards contained in the respective Basin Plans.

The case studies in this analysis provide a basis for understanding the level of responsibility that county and city departments (e.g., county departments of environmental health) assume for protection of water quality and public health. Each of the local municipalities discussed in this section has an adopted sewage disposal ordinance as part of its municipal code.

In Santa Cruz and Sonoma Counties, high population density, unique geophysical conditions, and historical problems with OWTS-related groundwater and surface water contamination have led to development of detailed code requirements by those two municipalities. High population density in the western half of Riverside County and the historical rate of installation and replacement of OWTS (between 1996 and 2006 it was estimated that Riverside County had 4,000–6,000 installation and replacement annually) present challenges for protection of surface and groundwater quality in that county.

The Town of Paradise in Northern California is relatively small with a population of less than 30,000 people; however, the community is unsewered and the Town has adopted local regulatory guidance for permitting, installation, and repair of OWTS through formation of its on-site wastewater disposal zone and adoption of Chapter 13.04 of the Town's municipal code. Most of the development in Inyo County is located in small communities located near Highway 395. Although some areas are sewered, others rely on septic systems that also use individual or community water wells for potable water. Through an MOU with the Lahontan Regional Water Board, the Inyo County Department of Environmental Health is authorized to oversee management of OWTS in the county. Inyo County's sewage disposal ordinance is brief and nonspecific, and the county relies primarily on guidance and standards contained in the Basin Plan for the Lahontan Regional Water Board (1995), EPA's On-site Wastewater Treatment Systems Manual (EPA 2002), and the Uniform Plumbing Code. The Inyo County General Plan addresses allowable density of development on parcels with individual sewage disposal systems.

Tables 5-1 and 5-2 compare selected criteria of the proposed Policy with local regulations for Santa Cruz County, Riverside County, Sonoma County, Inyo County, and the Town of Paradise. Under the first section, "Minimum Operating Requirements," elements of the proposed policy were selected based on their potential to affect siting of OWTS on a parcel of land. For the five municipalities examined in this section, a comparison of selected criteria leads to the following general conclusions:

► **Depth to groundwater.** For the most part, regulatory guidelines for the local agencies are at least as protective of the environment as the proposed Policy would be. Potential conflicts include the following:

• For enhanced treatment systems, Santa Cruz County may allow 1 foot of continuous unsaturated soil to seasonal high groundwater if the minimum horizontal distance to a well, stream, spring, or other water body is 51–250 feet or greater. For this particular siting requirement, implementation of the proposed policy would require the County to apply for a Tier 2 program. Under an approved Tier 2 Program, this will not be allowed, as no requirements in Tier 2 are allowed to permit groundwater separations less than two feet. The Santa Cruz County regulatory requirements for installation of OWTS are relatively complex and detailed, and while implementation of the new depth requirement may result in regulatory dialog between the county and the regional water board, it would conflict with Santa Cruz County land use regulations that have been adopted to avoid and mitigate potential effects to the environment. As such, the proposed Policy would, if anything, be more protective of the environment for groundwater protection. This, however, could cause harm to existing communities and those homeowners and business owners that have existing structures with inadequate site conditions for a replacement OWTS. This represents a conflict in local government land use policy and an impact that could have been **Potentially Significant** due to the potential for homes and businesses that may not be able to meet the two foot requirement when required to replace their OWTS. In order to address this impact, the State Water Board added section 11.5 to the Proposed Policy. This section allows for repairs that are "in substantial conformance, to the greatest extent practicable" with the applicable tier of the proposed Policy. Therefore, this impact has been reduced to **Less-Than-Significant**.

• For new standard and pretreatment systems, the Town of Paradise specifies a minimum depth of 2 feet to the temporary water table. As with the case of Santa Cruz County, under a Tier 1 program under the policy, anything below a 5-foot separation is considered inadequate. The proposed policy would require a minimum depth of 5 feet to groundwater under a Tier 1 system, but a lesser separation would be allowed under an approved Tier 2 regulatory approach. Based on the approval conditions and monitoring mutually agreed upon by the regional water quality control board and Santa Cruz County, allowing depths of less than 5 feet would not result in a notable regulatory conflict or a significant impact to the environment. This does not represent a conflict in land use for new OWTS.

• For mound systems, both Riverside and Sonoma Counties allow a minimum depth of 2 feet to groundwater from the original (or native) ground surface. Under the proposed Policy, a mound system is considered a Tier 2 type of conventional OWTS, which requires the local government and the regional board to mutually agree to a program that allows the reduced separation to groundwater. Thus, the requirement would not result in a conflict with local land use regulations that have been adopted to avoid and mitigate potential effects to the environment.

► **Limits for rocky soils.** The proposed Policy specifies that for conventional OWTS, "Rock fragment content of native soil surrounding the dispersal system shall not exceed 50 percent by volume for rock…." If this requirement cannot be met, the OWTS could still be allowed under a Tier 2 Program. Both Sonoma County and the Town of Paradise have special requirements if rock content exceeds 50%. As such, the requirement does not present a conflict or result in a significant impact to the environment.

► **Use of seepage pits.** The Town of Paradise does not allow the use of seepage pits but other counties do allow them as standard practice. As discussed above, Section 13002 of the Water Code provides that local governing bodies retain authority to adopt and enforce additional regulations limiting the disposal of waste or any other activities that could degrade waters of the State. The proposed Policy includes a provision that is consistent with this section of the State Water Code: "Regional Water Boards shall incorporate the requirements established in this Policy by amending their basin plans … shall consider whether it is necessary and appropriate to retain or adopt any more protective standards. To the extent that a regional water board determines that it is necessary and appropriate to retain or adopt any more protective standards, it shall reconcile those region-specific standards with this policy to the extent feasible, and shall provide a detailed basis for its determination that each of the more protective standards is necessary and appropriate." (Section 4.2 of the proposed Policy) Also, under an approved Tier 2 program, local agencies could allow the use of seepage pits. Therefore, no regulatory conflict would occur due to the inherent flexibility of the proposed Policy.

► **Reduction factor allowed.** The proposed Policy does not allow the use of gravel-less chambers to meet the requirements for dispersal systems in a Tier 1 program. However, in a Tier 2 program, gravel-less chambers could be permitted. Also, as shown in Tables 5-1a and 5-1b, some local agencies (e.g. Solano County) allow a 0.7 reduction factor in the size of the leachfield. In practice, the reduction factor allows the total length of a leachfield to be reduced to 70% of the original design size of the leachfield that might have otherwise been required, which may or may not affect the ability of a landowner to install a septic system on a smaller lot than would have otherwise been allowed. However, the proposed policy would not dictate whether or not a city or county could approve development of a parcel of land. In other words, the proposed Policy would not cause development to occur in places other than where it is allowed by the local governing body. Also, local regulating agencies consider various environmental factors to assess suitability of a site for a septic system. Site evaluation procedures of local governing bodies would continue in effect. In addition, the 0.7 reduction factor may be included in the Tier 2 requirements. Therefore, the proposed Policy would not result in a notable conflict with adopted regulations of local municipalities that limit siting of OWTS to avoid or minimize potential significant effects to the environment.

► **2.5 Acre Density for New OWTS in New Subdivisions.** Section 7.8 (Tier 1) of the proposed Policy requires that new OWTS in new subdivisions have an average density of one OWTS per 2.5 acres or greater. Since this requirement only applies to new OWTS in new subdivisions under a Tier 1 program, it is unlikely that this requirement represents a significant conflict with general plans and specific plans in the state. Furthermore, it is not expected to conflict with any applicable land use plan, policy, or regulation of the local agencies, where different densities are generally adopted for the purpose of avoiding or mitigating an environmental effect. If a local government implementing Tier 1 were to adopt a local plan or policy and the density requirement was less than required for the local plan or policy, that more protective standard would govern. On the contrary, if the density was less than 2.5 acres for each OWTS, the more protective requirements in the proposed Project would apply and no environmental impacts would occur. Therefore, no conflict is identified.

Table 5-3 summarizes provisions of the proposed Policy and regional water boards' basin plans. As shown in that table, the regulation of septic systems at the state level is usually governed by the basin plans. Waste discharge requirements are usually conditionally waived by the regional water board because the local governing body (e.g., the County Environmental Health Services Departments) is adequately regulating OWTS in conformance with the basin plan.

The purpose of the proposed Policy is to establish minimum requirements for the permitting, monitoring, and operation of OWTS to prevent conditions of pollution and nuisance. Consistent with the existing regulatory process, the proposed Policy could be entirely or partially implemented by a local agency through agreement. Implementation of the proposed Policy would be accomplished in part through conditional waivers of WDRs by the State Water Board or the regional water boards. Implementation of the proposed Policy would not dismantle the regulatory framework related to the permitting, siting, and management of OWTS that is shared between the regional water boards and local governing bodies in the state. In fact, it will enhance communication between the regional water boards and the local agencies within the regulatory framework.

The proposed Policy would require notification of the applicable regional water board for work to be performed on any OWTS with capacity to treat over 10,000 gpd (section 2.6.3

of the proposed Policy). However, in Santa Cruz County, the Santa Cruz County Environmental Health Services Department retains authority for regulation of septic systems in the County under an MOU with the Central Coast Regional Water Board. Santa Cruz County addresses management of septic systems in the San Lorenzo River Watershed through implementation and enforcement of requirements contained in its *Wastewater Management Plan for the San Lorenzo River Watershed* (Santa Cruz County 1995a).

The Central Coast Regional Water Board usually issues WDRs to owners of OWTS with the capacity to treat over 2,500 gpd. Ongoing work by the County to improve water quality within the San Lorenzo River watershed through implementation of the wastewater management plan provides the basis for local management of OWTS within the watershed, including those on-site treatment systems that are permitted to treat up to 20,000 gpd of wastewater. Implementation of the proposed Policy would not prevent the Santa Cruz County Environmental Health Services Department from exercising its regulatory authority over OWTS in the San Lorenzo River watershed, provided that the County continued to meet or exceed the minimum requirements of Central Coast Regional Water Board, including those that are more protective of the environment than the proposed Policy.

Table 5-1 compares selected elements of the proposed Policy with local regulations for selected local municipalities. Under the first section, “Minimum Operating Requirements,” elements of the proposed regulations were selected based on their potential to affect siting of OWTS on a parcel of land. The second section, “Local Implementation,” addresses the shared authority for oversight and implementation of the proposed regulations. Similarly, Table 5-2 compares selected criteria of the proposed Policy with the criteria for individual waste disposal systems contained in the Basin Plans for selected regional water boards. A comparison of selected criteria leads to the following general conclusions:

► **Depth to groundwater.** For depth limits, siting criteria of the Lahontan and Central Valley Regional Water Boards are equally protective of the environment. The North Coast Regional Water Board allows less than 3 feet for non-standard (e.g. mound and at-grade) dispersal systems and for OWTS that use supplemental treatment. This is allowed in Tier 2 and consistent with the proposed Policy. Also, the proposed Policy allows the regional water boards implementing the proposed Policy to retain the option of establishing requirements for OWTS that are more protective of water quality than specified. Therefore, in instances where regional water boards require greater depths to groundwater below the leaching trench or disposal facility, no regulatory conflict would occur that could result in a significant impact to the environment. Where the regional board allows lesser separation, the addition of filter media or supplemental treatment provides additional assurance of equal or more protective standards and is allowed by the Policy. Such requirements will have to be included when the regional boards reconcile their basin plans. This makes the impact to water quality planning **Not Significant.**

► **Limits for rocky soils.** The Basin Plans and related documents that address siting criteria for sewage disposal systems for the Lahontan and Central Valley Regional Water Boards do not specify limits for rock content in soil beneath the leaching trench. As discussed previously, local agencies retain the authority to adopt and enforce regulations and guidelines to achieve water quality objectives provided that minimum standards contained in the applicable basin plans are met. Because many environmental factors are considered during site testing, the limits for rocky soils in the proposed Policy would not result in a notable conflict with the regional water board basin plans.

► **Use of seepage pits.** The Basin Plans and related documents that address siting criteria for sewage disposal systems for the Lahontan and Santa Ana Regional Water Boards address the use of seepage pits. The Santa Ana Regional Water Board's *Guidelines for Sewage Disposal from Land Developments* (Santa Ana Regional Water Board 1979) addresses minimum criteria for siting of OWTS. If discharge of effluent is through a seepage pit, the percolation rate may not be less than 1.1 gallons per square foot per day. No minimum depth to groundwater below the seepage pit is specified; however, depth to high groundwater from the ground surface in the disposal area may not be less than 10 feet. If the percolation rate is faster than 5 mpi, either additional testing will be required to determine compliance with particle size specifications (depth to high groundwater may not be less than 5 feet for soils containing at least 10% particles smaller than 0.08 inches [2 millimeters]) or the minimum required depth to groundwater below the disposal facilities will be 40 feet.

The proposed Policy includes a provision that is consistent with this section of the State Water Code: "Regional Water Boards shall incorporate the requirements established in this Policy by amending their basin plans … shall consider whether it is necessary and appropriate to retain or adopt any more protective standards. To the extent that a Regional Water Board determines that it is necessary and appropriate to retain or adopt any more protective standards, it shall reconcile those region-specific standards with this policy to the extent feasible, and shall provide a detailed basis for its determination that each of the more protective standards are necessary and appropriate." (Section 4.2 of the proposed Policy) Therefore, no regulatory conflict would occur due to the inherent flexibility of the proposed Policy.

► **Reduction factor allowed.** This allows reduced dispersal field size and may result in similar or lesser treatment, depending upon soil type, due to the reduced leachfield size and the fact that it appears that no regional water board seems to include this allowance explicitly in their basin plans at this time, based from Table 2-2. However, scientific literature exists that supports the claim that no lesser treatment of OWTS effluent will result with smaller gravel-less leachfields reduced at levels 70 percent or even less (Siegrist 2000). Furthermore, regional boards could decide to retain more protective standards where it is determined that a lesser leachfield size would not be appropriate. Therefore, an allowance for reduced leachfield size based on scientific literature poses no significant conflict with regional water board planning.

► **2.5 Acre Density for New OWTS in New Subdivisions.** Section 7.8 (Tier 1) of the proposed Policy requires that new OWTS in new subdivisions have an average density of one OWTS per 2.5 acres or greater. Some basin plans do contain different density requirements (e.g. Santa Ana River Regional Water Board has 1 dwelling per one acre). However, since this clause only applies to new OWTS in new subdivisions, this policy does not conflict with subdivisions already allowed by the regional water board. If a regional water board basin plan were to currently contain a basin plan or policy with a density requirement that is less than required for the policy, that more protective standard would replace it. On the contrary, if the density was greater than 2.5 acres for each OWTS, the requirements in the proposed Project would be trumped and fewer environmental impacts would occur based on the more protective standard. Therefore, no conflict is identified.

Implementation of the proposed Policy would not change the existing general regulatory framework related to the permitting, siting, and management of OWTS that is shared between the regional water boards and local governing bodies throughout much of the state, other than requiring that local agencies submit any proposed local agency management programs, consistent with Tier 2, to the regional water boards for approval. This impact is **less than significant**.

No Mitigation Required

6.5.2 Conflicts between Adopted Habitat Conservation Plans or Natural Community Conservation Plans

This land use analysis includes representative overviews of the local and regional planning environments for selected municipalities. As an example, Santa Cruz County and the City of Scotts Valley have been coordinating with USFWS to develop a draft Interim Programmatic Habitat Conservation Plan (IPHCP) that proposes an off-site mitigation program for landowners in the Sandhills region of Santa Cruz County whose properties are zoned residential within existing residential areas on parcels smaller than 1 acre. An off-site mitigation site is being planned to protect selected species. USFWS is preparing an environmental assessment on the IPHCP, which is part of the 3- to 5-year project to develop a regional HCP.

In another example, the Riverside County Board of Supervisors adopted the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) in June 2003, which is focused on conservation of species and their associated habitats in western Riverside County. The MSHCP area encompasses approximately 1.26 million acres. It is one of several large, multi-jurisdictional habitat planning efforts in Southern California with the overall goal of maintaining biological and ecological diversity within an urban region. Large-scale Habitat Conservation Plan (HCP) planning efforts have been completed in San Diego and Orange Counties and a similar effort is underway in the Coachella Valley in Riverside County. As previously described, the Western Riverside

County MSHCP policies govern development standards with regard to the MSHCP plan area.

Similar habitat management planning efforts are being pursued in other parts of the state. The process to adopt and implement HCPs and Natural Community Conservation Plans (NCCPs) involve discretionary actions by local municipalities that require separate environmental review under CEQA and/or the National Environmental Policy Act (NEPA). All feasible mitigation for any significant environmental effects would be implemented with adoption of the HCP or NCCP.

As discussed previously in this SED, California State law has established the general plan as the basic land use charter that embodies fundamental land use decisions and governs the direction of future land uses at the local level. (*City of Santa Ana v. City of Garden Grove* [1979] 100 Cal.App.3d 521, 532; *see also DeVita*, 9 Cal. 4th at 763.) Any decision by a city or county that will affect land use and development must be consistent with the adopted general plan. Otherwise, an amendment to the general plan would be required, in accordance with Government Code Section 65350 et seq.

For example, the Riverside County Integrated Project (RCIP) includes the Western Riverside County MSHCP, and the Riverside County General Plan. The open space element of the General Plan includes Policy OS 17.1, which states, "Enforce the provisions of applicable MSHCP's, if adopted, when conducting review of development applications." The RCIP is a collection of policies, guidelines, and implementation measures, which have been adopted to achieve common goals related to development and growth within Riverside County. No aspect of the proposed Policy would preempt the authority of local jurisdictions to guide the ultimate patterns of development for communities throughout the state, as shown by the examples provided for Santa Cruz County and Riverside County.

Implementation of the proposed Policy would affect siting of OWTS by requiring compliance with minimum standards, which include maintaining certain depths of continuous unsaturated soil to meet minimum depth requirements. However, no aspect of these or other proposed regulatory requirements of the proposed Policy would conflict with policies or guidelines contained in HCPs or NCCPs in the state, which have been adopted as tools to avoid environmental degradation of sensitive habitat areas that are critical to species survival.

Implementation of the proposed Policy would not lead to preemption of guidelines, policies, or regulations that local planning agencies have in place to direct development in a way that avoids impacts to sensitive habitats and protected species, including HCPs or NCCPs. This impact is **less than significant**.

No Mitigation Required

6.5.3 OWTS Placement, because of Siting and Design, Could Substantially Degrade Visual Quality in Adjacent Areas

The establishment of new or replacement OWTS within designated scenic areas may have an adverse effect on scenic resources. OWTS under Tier 0 will have no new impacts on scenic resources since these systems are already in place. New systems under Tier 1, Tier 2, or Tier 3 will be installed along with the development of homes or other facilities that will need approval from local authorities. Most local authorities have ordinances in place dictating the character and appearance of developments within scenic areas that assure that the scenic character of the area is preserved. The proposed Policy will not affect these requirements and impacts on scenic resources are not expected due to the development of new OWTS.

Existing OWTS that need to be replaced to Tier 1 or Tier 2 standards and/or repaired under Tier 4 or modified under Tier 3 within designated scenic areas may require the clearing of land for installation of new leach fields. For example, the City of Calabasas has identified failing OWTS within designated scenic highway areas that would require the removal of established trees in order to install new leach fields (Pers. Comm., Maureen Tamuri, Community Development Director, City of Calabasas). Although this may have a significant effect on scenic resources, many local authorities have native tree protection ordinances that require mitigation where no other feasible alternative exists to the removal of native trees. Mitigation includes the planting of replacement trees on site at some established ratio. If on-site mitigation is infeasible, off-site mitigation or an in-lieu fee, where the fees are used to fund restoration or creation of native habitat within the local area, is required (City of Malibu 2002; Ventura County 2011). With the mitigation required by local ordinances, impacts to scenic resources should be reduced to **Less Than Significant** levels. In those cases where the impacts will still be significant, the local agencies will need to address those projects during the environmental review of the permits for tree removal.

No Mitigation Required.

6.5.4 Cumulative Land Use Impacts

The proposed Policy does not affect land use planning functions of local jurisdictions throughout the state; these functions are retained by local jurisdictions through State of California planning laws. Of those laws that provide the basis for local jurisdictions to govern development within communities, the general plan (Government Code Section 65300 et seq.) and state zoning law (Government Code Section 65800 et seq.) are of primary use to cities and counties working to direct the type, location, and intensity of growth in an area or region. The proposed Policy for OWTS would not affect the authority or purpose of state planning law. Nor would the proposed Policy affect the land use planning processes of local governing bodies that are undertaken in accordance with state planning law. For any local municipality, regardless of which tier they operate under, the proposed Policy would not enable development to occur in places other than where it is allowed by the local governing body in communities throughout the state. Development will continue to occur in some areas and not in other areas throughout the state, based on regulatory and planning decisions made by the local jurisdictions, and cumulative land use impacts may result from those decisions. However, the proposed

Policy would not control those development decisions or contribute to any resulting cumulative land use impacts. For that reason, cumulative impacts on Land Use Planning are found to be **Less than Significant.**

No Mitigation Required.

6.6 Cultural Resources

Thresholds of Significance

According to CEQA, an impact is considered significant if it would disrupt or adversely affect a prehistoric or historic archaeological site or a property of historic or cultural significance to a community or an ethnic or social group. The State CEQA Guidelines define a significant historical resource as a resource listed or eligible for listing in the California Register of Historical Resources (CRHR) (Pub. Res. Code Section 5024.1). A historical resource may be eligible for inclusion in the CRHR if it:

- is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage
- is associated with the lives of persons important in the state's past;
- embodies the distinctive characteristics of a type, period, region, or method of construction, represents the work of an important creative individual, or
- possesses high artistic values; or
- has yielded, or may be likely to yield, information important in prehistory or history.

If a project proponent agrees to avoid affecting cultural resources identified in the project area, evaluation of these resources for their potential to be listed in the CRHR is not required. If avoidance or protection of a significant cultural resource is not possible, mitigation measures must be implemented, as set forth in Public Resources Code 21083.2(c)-(l). A cultural resource that does not meet the criteria to be considered significant need not be given further consideration (Pub. Res. Code Section 21083.2[h]).

6.6.1 Indirect Impacts to Cultural Resources from Construction of OWTS

The construction of OWTS in areas where disturbance has already occurred (e.g., areas that are actively farmed or where an active business) would not represent a new impact on cultural resources. Therefore, significant cultural resources, as defined by CEQA, would not be affected on lands currently under agricultural production.

However, if OWTS are constructed on lands not previously disturbed, then cultural resources, either known or unknown, could be affected. However, the construction and use of an OWTS must conform to all local land use plans and zoning. Such planning and zoning actions must also comply with CEQA at the time of approval. For this reason, this impact is considered **less than significant**.

However, OWTS construction could result in the unearthing of previously unknown cultural resources on lands currently in use and previously surveyed for cultural resources. If human remains of Native American origin are uncovered, this impact could be **potentially significant**. While this may seem to contradict the above finding, this SED finds that there is always an unknown component to impact assessments when digging is involved. Thus, this SED does not exclude the remote possibility that historic or cultural resources may be encountered during construction of an OWTS, even if the area was previously disturbed or an initial evaluation for cultural resources was conducted.

Mitigation Measure 6.6.1.
Require compliance with State Laws regarding disposition of Native American burials, if such remains are found. If human remains of Native American origin are discovered during project activities, it is necessary to comply with state laws relating to the disposition of Native American burials, which are under the jurisdiction of the Native American Heritage Commission (Pub. Res. Code Section 5097). If human remains are discovered or recognized in any location other than a dedicated cemetery, excavation or disturbance of the site or any nearby area reasonably suspected to overlie adjacent human remains will stop until:

- the county coroner has been informed of the discovery and has determined that no investigation of the cause of death is required; and
- if the remains are of Native American origin:
    - the descendants of the deceased Native Americans have made a recommendation to the landowner or the person responsible for the excavation work, for means of treating or disposing of the human remains and any associated grave goods with appropriate dignity, as provided in Public Resources Code Section 5097.98, or
    - the Native American Heritage Commission is unable to identify a descendant or the descendant failed to make a recommendation within 24 hours after being notified by the commission.

According to the California Health and Safety Code, six or more human burials at one location constitute a cemetery (Section 8100), and disturbance of Native American cemeteries is a felony (Section 7052). Section 7050.5 requires that construction or excavation be stopped in the vicinity of discovered human remains until the coroner can determine whether the remains are those of a Native American. If the remains are determined to be Native American, the coroner must contact the California Native American Heritage Commission.

Implementation: This mitigation measure is an existing law, so compliance with this mitigation measure is already the responsibility of all persons, including local agencies and regional water boards involved in overseeing the construction of OWTS.

Significance after Mitigation: Compliance with this law mitigates this impact to **less than significant**.

6.6.2 Indirect Impacts from Population Growth in Other Areas Because of Restrictions on Housing Developments in Certain Areas

It has been suggested during State Water Board discussions in previous efforts that a proposed statewide Policy would increase development pressures in areas where soil conditions may be particularly well suited for installation of OWTS (e.g., high-quality agricultural lands). Similarly, local jurisdictions may annex land (e.g., rural agricultural and open space lands) to increase developable areas, changing population growth within local communities. Such actions in themselves would be considered discretionary actions subject to environmental review under CEQA. Such proposals would also be subject to review by neighboring jurisdictions and possibly subject to approval by an applicable Local Agency Formation Commission.

Potential suitability of soils and other requirements in the proposed Policy for installation of OWTS would not drive decisions by local governing bodies to pursue annexation of lands at the fringe of developed areas. Rather, local governing bodies would be required to weigh far-reaching variables related to growth and development. Key variables include regional economic trends, market demand for residential and nonresidential uses, land availability and cost, the availability and quality of transportation facilities and public services, proximity to employment centers, the supply and cost of housing, and regulatory policies or conditions.

Land use planning functions are carried out by local jurisdictions through State of California planning laws. Of those laws that provide the basis for local jurisdictions to govern development within communities, the general plan (Government Code Section 65300 et seq.) and state zoning law (Government Code Section 65800 et seq.) are of primary use to cities and counties working to direct the type, location, and intensity of growth in an area or region. The proposed Policy would not affect the authority or purpose of state planning law. Nor would it affect the land use planning processes of local governing bodies that are undertaken in accordance with state planning law. For any local municipality, either one with more restrictive or less restrictive standards for siting of individual OWTS, the proposed Policy would not enable development to occur in places other than where it is allowed by the local governing body in communities throughout the state. For these reasons, the impact of this issue is considered **less than significant**.

No Mitigation is Required

6.7 Utilities and Service Systems

The proposed Policy would require an assessment of conventional OWTS in Tier 3 (near impaired waters) to determine if OWTS are contributing to the pollution of nearby surface waters. OWTS that are found to be contributing pollution, conceivably an entire watershed full of homes and businesses, would have to retrofit their OWTS to install supplemental treatment or possible convert the community to centralized sewage collection and treatment. In those cases where supplement treatment or centralized sewage treatment is required, impacts would possibly occur under Tier 3. Converting existing conventional systems to centralized sewage collection and treatment would require extensive planning and construction (digging, trenching, grading, and other earthwork) depending on whether the location needs to be connected to an existing centralized sewage collection and treatment system or a new wastewater treatment system.

In addition, the Scoping Document indicated a need to address increased septage disposal as a result of the proposed Policy. Septage is a result of wastewater treatment. Septage consists of settleable material at the bottom of the septic tank mixed with the scum layer floating inside the tank with water inside the septic tank. It is mixed at the time that the septage is pumped from the tank.

THRESHOLDS OF SIGNIFICANCE

Thresholds for determining the significance of impacts related to utilities and service systems are based on relevant provisions of CEQA, the State CEQA Guidelines, checklist questions for utilities and service systems set forth in Appendix G of the Guidelines, and professional standards and practices.

The proposed statewide policy for OWTS would have a significant impact on utilities and service systems if it would:

a) Result in an exceedence of wastewater treatment requirements issued by the applicable Regional Water Quality Control Board.

b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental impacts.

c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental impacts;

d) Require new water supplies to serve the project from existing entitlements and resources, or require new or expanded entitlements;

e) Result in a determination by the wastewater treatment provider that serves or may serve the project that it demands additional capacity beyond the provider’s existing commitments;

f) Require additional landfill space under the existing permitted capacity to accommodate the project’s solid waste disposal needs; or

g) Result in a violation of a federal, state, or local statutes and regulations related to solid waste.

6.7.1 Communities and Groups of Properties using Conventional OWTS Found to be Contributing to the Impairment of Surface Waters, Requiring those Properties to Convert to Centralized Sewage Collection

While the proposed Policy is not expected to increase the number of OWTS installed over time, it could lead to an expansion of existing centralized sewage collection and treatment systems or the construction of new centralized sewage collection and treatment systems. The construction of new collection systems as opposed to individual OWTS or an expansion of an existing sewer system conveyance capacity or in the capacity of centralized treatment plants are possible outcomes of the proposed Policy. Such possibilities could result if the cost of supplemental treatment is greater than the cost of centralized sewage collection and treatment. The relatively high costs of most supplemental treatment OWTS, which can often be twice the cost of conventional systems, may make the option of constructing community collection systems and consolidating financial resources attractive to members of a neighborhood or community where local siting conditions are challenging or not appropriate for individual systems.

Thus, the proposed Policy could lead to the construction of more centralized sewage collection and treatment systems or the expansion of existing sewer lines or treatment plant capacities. Such construction or expansion activities have the potential to cause significant environmental impacts. However, construction or either new or additional capacity is not expected and is, at best, speculative because OWTS operate independently of the centralized wastewater treatment facilities. While similar issues have occurred in the state, similar to that planned at Monte Rio, CA along the Russian River in the past, a determination that the proposed Project would result in either new or additional centralized sewage collection and treatment is speculative. Even if this wasn't speculative, the potential environmental impacts associated with the expansion of existing centralized sewage collection and treatment systems or any conversion of OWTS to centralized sewage collection and treatment systems would require its own environmental assessment. Therefore, no further consideration is required.

No Mitigation Required

6.7.2 The Proposed Policy Would Result in Additional Waste Needing Disposal in a Landfill with Sufficient Permitted Capacity to Accommodate the Project's Solid Waste Disposal Needs

OWTS require periodic maintenance in the form of septage pumping and disposal. The proposed Policy could increase the amount of OWTS septage that would be treated at centralized treatment if such maintenance has been deferred and occurs within a short time period as a result of enlightened awareness regarding proper care of OWTS and due to the proposed Policy. Septage is disposed at wastewater treatment plants or disposed in lined septage ponds in compliance with Title 27, or through prescribed land application in accordance to permitting requirements and the Part 503 regulations in Title 40 of the Code of Federal Regulations. Treatment of septage at centralized treatment plants would generate a solid waste byproduct referred to as biosolids. Biosolids are typically disposed of in landfills; if existing landfill capacities are not sufficient, the proposed Policy could indirectly cause an expansion in landfill capacities.

The proposed Policy will not result in a net increase in septage over time; as such an occurrence is necessarily associated with an increase in the population. A survey done in California (SWRCB 2002) indicates that more than 230 million gallons of septage are being treated and disposed annually in California. The quantity of septage received by the type of facility is distributed as follows; 84% wastewater treatment plants, 2% land application, 2% independent treatment facilities (proprietary systems), and 11% septage ponds. The same survey indicated that the amount of anticipated septage correlated well with the number of OWTS. This indicates that it is unlikely that increased enlightenment regarding OWTS maintenance will result in increased septage. Accordingly, the proposed Policy would not result in additional waste needing disposal in a landfill with sufficient permitted capacity to accommodate the proposed Policy's solid waste disposal needs. This impact is found to be **less than significant.**

No Mitigation Required.

6.8 Cumulative Air Quality and Greenhouse Gas Emission Impacts

The operation of OWTS systems typically generates small amounts of some criteria air pollutants, primarily hydrogen sulfide and possibly oxides of nitrogen (an ozone precursor) if the OWTS includes denitrification, as well as methane, a greenhouse gas (GHG). The amounts of these pollutants emitted by an individual OWTS are minimal. Methane, for example, is produced in the septic tank during decomposition of solids; an individual system produces approximately 0.13 pound per day of methane (CH_4), with the 1.2 million systems in California producing approximately 76 tons per day. Currently, most air basins in California are in non-attainment for ozone (i.e., the standard was violated during the latest 3-year period), and only a small portion of the Mojave Desert Air Basin (in San Bernardino County) is in non-attainment for H_2S emissions (ARB 2006). Although CH_4 is acknowledged to be a GHG and a significant contributor to climate change, it is not a criteria pollutant regulated by air basins in California.

In September 2006, Governor Arnold Schwarzenegger signed Assembly Bill (AB) 32, the California Global Warming Solutions Act of 2006 (Chapter 488, Statutes of 2006, enacting Sections 38500–38599 of the Health and Safety Code). AB 32 establishes regulatory, reporting, and market mechanisms to achieve quantifiable reductions in GHG emissions and a cap on statewide GHG emissions. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by 2020. This reduction will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012.

To effectively implement the cap, AB 32 directs the California Air Resources Board (ARB) to develop and implement regulations to reduce statewide GHG emissions from stationary sources. AB 32 specifies that regulations adopted in response to AB 1493 (which regulates GHG emissions from vehicles, but is currently the subject of litigation) should be used to address GHG emissions from vehicles. However, AB 32 also includes language stating that if the AB 1493 regulations cannot be implemented, then ARB should develop new regulations to control vehicle GHG emissions under the authorization of AB 32. AB 32 does not specifically apply to the proposed Project.

Senate Bill 97, signed in August 2007 (Chapter 185, Statutes of 2007, enacting Sections 21083.05 and 21097 of the Public Resources Code), acknowledges that climate change is a prominent environmental issue that requires analysis under CEQA. This bill directed the OPR to prepare, develop, and transmit guidelines for the feasible mitigation of GHG emissions or the effects of GHG emissions to the California Resources Agency. OPR developed a technical advisory suggesting relevant ways to address climate change in

CEQA analyses. The technical advisory also lists potential mitigation measures, describes useful computer models, and points to other important resources. In addition, amendments to CEQA guidelines implementing Senate Bill 97 became effective on March 18, 2010.

Previously adopted state regulations include AB 1493 (Chapter 200, Statutes of 2002) (amending Section 42823 of the Health and Safety Code and adding section 43018.5 of the Health Safety Code), which requires that ARB develop and adopt, by January 1, 2005, regulations that achieve “the maximum feasible reduction of greenhouse gases emitted by passenger vehicles and light-duty trucks and other vehicles determined by ARB to be vehicles whose primary use is noncommercial personal transportation in the state.” In 2005, Executive Order S-3-05 was signed by Governor Schwarzenegger; this executive order stated that GHG emissions are to be reduced to the 2000 level by 2010, the 1990 level by 2020, and to 80% below the 1990 level by 2050. Executive Order S-3-05 directed the Secretary of the California Environmental Protection Agency to coordinate a multi-agency effort to reduce GHG emissions to the target levels.

The proposed project would not affect applicable air quality plans. Although OWTS contribute a small amount of greenhouse gas emissions (e.g., methane), the proposed Policy would not affect the volume of methane production by OWTS, the number of OWTS, or the volume of wastewater discharged to OWTS. Therefore, the proposed Project’s contribution to cumulative air quality impacts would not be considerable. Other sources of air emissions, such as transportation, industrial activities, and power generation, are the major contributors to significant cumulative air quality impacts.

6.9 Cumulative Traffic Impacts

The proposed Project would increase the installation of supplemental treatment units and increase maintenance requirements for OWTS in California. Such activities could result in additional traffic on local and rural roadways. This increase in traffic would be minimal and on an infrequent basis. It is possible that operation and maintenance activities could occur as a result of the proposed Policy, including inspections and increased potential for pumping. That would impact roads where traffic loads are relatively light. The major contribution to cumulative traffic impacts would be from other sources: future development projects and associated growth. Mitigation may be needed in some areas to address cumulative increases in traffic resulting from development, but such mitigation would be addressed by local land use planning and transportation agencies independently of the proposed project. The proposed Project’s contribution to any cumulative traffic impacts would not be considerable.

7 Alternatives Analysis

The guiding principles for the selection of alternatives for analysis in this Substitute Environmental Document (SED) are provided by California Code of Regulations, title 23, section 3777 of Regulations for Implementation of the Environmental Quality Act of 1970 for Exempt Regulatory Programs, which require an analysis of reasonable alternatives to the project to avoid or reduce any significant or potentially significant adverse environmental impacts while still meeting the Project objectives. The main Project objectives are based on the requirements of Water Code section 13291 and consist of the following:

- As required by AB 885, adopt statewide OWTS regulations or standards and a statewide conditional waiver that are consistent with other provisions of the Porter-Cologne Water Quality Control Act and related state water quality control plans and policies adopted by the State Water Board.
- Help to ensure that public health and beneficial uses of the state's waters are protected from OWTS effluent discharges.
- Establish an effective implementation process that considers economic costs, practical considerations for implementation, and technological capabilities existing at the time of implementation.

The significant and potentially significant adverse environmental impacts of the proposed Policy are discussed above, and include:

1. Impacts related to construction of new and replaced OWTS:
    a. Direct water quality impacts in Tier 3 or near impaired water bodies, although with mitigation this becomes less than significant.
    b. Indirect biological resource impacts, although with mitigation this becomes less than significant.
    c. Indirect impacts on cultural resources, although with mitigation this becomes less than significant.
2. Impacts related to siting and operation of OWTS:
    a. Direct potential impacts to health and water quality from nitrogen and pathogens (significant and unavoidable).
    b. Direct water quality impacts from other constituents of concern (no conclusion can be made at this time).
3. Indirect impacts related to relaxation of existing local regulations, although mitigation in the proposed Policy reduces this impact to less than significant.

The alternatives have been identified by the State Water Board using input received during project stakeholder meetings, scoping meetings, and informal discussions with Regional Water Board staff; federal, state, and local agencies; and other stakeholders. The process of proposing, identifying, and developing alternatives to the proposed Policy has been taking place since the State Water Board received its initial mandate through the passage of AB 885 in September 2000. Based on this broad range of input beginning in 2000, the State Water Board has identified five alternatives for analysis in this SED:

1. No-Project (Status Quo) Alternative

   With the No-Project (Status Quo) Alternative, the proposed statewide OWTS Policy would not be implemented and the current regulatory setting as summarized in Chapter 5 and Table 5-1, Table 5-2, and Table 5-3 would continue into the future. The existing OWTS-related requirements in the regional water boards' water quality control plans (basin plans) and local agency ordinances would continue to be inconsistent from one jurisdiction to another and would be the primary means by which OWTS are regulated. OWTS siting, design, and construction standards would continue to vary around California, along with corrective actions, exemption criteria, minimum monitoring requirements, and requirements for determining when a system is subject to major repair. This alternative does not accomplish the project objective to adopt statewide OWTS regulations or standards.

2. Prescriptive Alternative

   The Prescriptive Alternative would include an OWTS management and risk-level table to guide local and regional agencies in managing a wide range of site conditions and establishing appropriate management levels, similar to Tier 2 of the proposed Policy. However, the requirements for local and regional agencies under the Prescriptive Alternative would be more detailed than the requirements of the proposed Policy. The table would specify management actions that permitting agencies must take (including use of different types of treatment, disinfection, and dispersal systems and acquisition of operating permits, monitoring, and other management actions) based on the complexity of the treatment system, environmental sensitivity, and public health risks identified for a specific OWTS. OWTS would be placed into different levels that have various monitoring and treatment requirements.

   Similar to the proposed project, the intent of the Prescriptive Alternative would be to help ensure that consistent, minimum design, siting, and operating standards are used throughout California. While some local and regional agencies would still enforce their own OWTS regulatory requirements (because they would be more environmentally protective than those included in this alternative), this alternative would require some local and regional agencies to implement OWTS standards that are more environmentally protective than the ones they currently enforce. The Prescriptive Alternative does not meet the project objective to establish an effective implementation process that considers economic costs and practical considerations for implementation because due to the highly detailed and expensive requirements, the Prescriptive Alternative would put undue burden on OWTS owners to comply.

3. Matrix Alternative

   The intent of the Matrix Alternative is twofold: (1) to minimize the potential for OWTS to contaminate groundwater because systems (particularly OWTS with supplemental treatment components) are sited in areas with inadequate depth to groundwater, and (2) to reduce the potential for OWTS to be sited at a density that could overwhelm the ability of the soil to provide adequate treatment of effluent before it reaches groundwater. The Matrix Alternative focuses on these issues primarily through two mechanisms: restrictions on the size of lots and density of development at which OWTS are permitted, and more strict regulations for the siting and performance of OWTS with supplemental treatment components. It is called the "Matrix" Alternative because the lot size and density restrictions would be presented in a matrix format to accommodate the number of variables that would need to be considered. This alternative is not feasible because it would interfere with local agency planning requirements.

4. Supplemental Treatment Alternative

   The Supplemental Treatment Alternative would require all new and replaced OWTS throughout the state to use supplemental treatment for nitrogen, BOD, and TSS after adoption of the regulations, and all existing conventional OWTS in the state to upgrade to supplemental treatment components for nitrogen, BOD, and TSS within 9 years from the effective date. The Supplemental Treatment Alternative does not meet the project objective to establish an effective implementation process that considers economic costs and practical considerations for implementation. It is unreasonable to expect all OWTS owners to install supplemental treatment.

5. 2008 Draft Regulations Alternative

   This alternative would establish minimum requirements for the permitting, monitoring, and operation of OWTS for preventing conditions of pollution and nuisance. This alternative would require existing OWTS to comply with more extensive requirements than the proposed Policy, regardless of whether the OWTS is contributing to water quality degradation. This alternative would also require OWTS within 600 feet of impaired water bodies to upgrade to supplemental treatment if a TMDL has been adopted for OWTS.

   The 2008 Draft Regulations alternative could cause a financial burden on owners of existing OWTS who have to comply with extensive regulations when there is an unknown and possibly absent pollution problem. For this reason, the alternative does not meet the project objective of establishing an effective implementation process that considers economic costs and practical considerations for implementation. In addition, this alternative would affect fewer OWTS near impaired water bodies, where OWTS are likely contributing to water quality degradation. For this reason, the alternative does not meet the project objectives of helping to ensure that public health and beneficial uses of the state's waters are protected from OWTS effluent discharges.

7.1 Alternatives Eliminated from Further Consideration

This section describes those regulatory options and other alternatives that the State Water Board considered as potential alternatives to the proposed Project but rejected because they did not meet most of the project objectives, and/or because they are infeasible for economic, technological, environmental, or other reasons, as discussed below.

7.1.1 CCDEH Alternative Regulations

CCDEH has been an early and longstanding participant in the process of developing the AB 885 regulations. As an interest group representing the directors of county environmental health departments, CCDEH has an important and influential perspective on the implementation of statewide OWTS regulations. The group has participated in all stakeholder meetings and conferences at which input has been provided to the State Water Board on regulatory approach and specific details of the draft regulations. In August 2005, as part of the scoping process for the EIR, CCDEH submitted an alternate version of draft regulations (titled version 8.3.05) that addressed concerns of the organization regarding the State Water Board's regulatory approach.

State Water Board staff carefully reviewed the CCDEH alternative regulations and featured them in a presentation to the board in December 2005. Based on direction provided by the board at that meeting, State Water Board staff determined that the CCDEH alternative regulations would not substantially comply with the mandate of AB 885 to provide "Requirements for impaired waters," as stated in point 2 of the legislation, or "Minimum monitoring requirements," as stated in point 5. Because these are essential components of the project objectives as required by AB 885, State Water Board staff determined that the CCDEH alternative regulations do not, as a separate set of regulations, constitute a feasible alternative for consideration in this EIR.

7.1.2 Model Code-Based Alternative

Another organization that has been involved in the development and review of the AB 885 regulations is the now closed California Wastewater Research and Training Center (CWTRC). CWTRC was created to assist in improving water quality in California by seeking, developing, and promoting effective, multidisciplinary solutions to wastewater and waste management issues in California. It was involved in stakeholder meetings and provided input throughout the process of creating the regulations and identifying issues to be addressed in the EIR during the scoping period. Staff members of the CWTRC kept abreast of developments in the 2008 regulations through workshops and updates at annual meetings.

Early in the process of drafting the 2008 regulations, CWTRC provided the State Water Board with model regulations that could have been used as a model for the new OWTS regulations in California. The model regulations were based on management guidelines prepared by the U.S. Environmental Protection Agency.

State Water Board staff reviewed the model code provided by CWTRC. However, the California Water Code required elements to be included in statewide OWTS regulations that were not addressed in the model code provided by CWTRC. For this reason, the alternative as proposed by CWTRC would not meet major objectives of the project as required by AB 885. As such, State Water Board staff determined that this alternative would not constitute a feasible alternative for consideration in this EIR.

7.1.3 Plumbing Code Alternative

This alternative was recommended during the scoping sessions. In this alternative, the state would work with the California Code Commission to establish OWTS rules for adoption in Appendix K of the California Plumbing Code. This alternative was rejected because Appendix K is generally oriented to plumbing fixture installation and sizing, whereas the minimum standards necessary to comply with the California Water Code include monitoring and special provisions for OWTS near water listed under Section 303(d) of the Clean Water Act. Those types of requirements go beyond what is intended for and commonly found in the California Plumbing Code.

7.1.4 Watershed-Based Regulations Alternative

An alternative was recommended during the scoping session for the state to consider watershed-based regulations in lieu of statewide regulations. This alternative was considered and rejected because it would not meet the primary project objective of fulfilling the statutory requirements for statewide minimum standards. However, regional or local governmental entities may establish such controls where they are more protective than the proposed Policy.

7.2 No Project (Status Quo) Alternative

The purpose of assessing a No-Project Alternative in an environmental document such as this SED is to allow decision makers and the public to compare the impacts of approving the proposed project with the impacts of not approving the proposed project. The No-Project Alternative would involve the State Water Board deciding not to approve any statewide Policy for OWTS.

There are several scenarios that could arise if the State Water Board decided not to approve the proposed project. The California Legislature could pass new legislation that supersedes AB 885 and removes the statewide requirements of California Water Code section 13291. This would result in continuation of the existing regulatory environment (continuation of the status quo). Alternatively, the California State Legislature could pass new legislation that supersedes AB 885 with new requirements for statewide OWTS regulation, and the process would start over at the State Water Board. Still another possibility is that the California Legislature could pass legislation that contains its own regulations for OWTS.

Attempting to predict the State Legislature's actions is speculative. Passing new legislation is outside the control of the State Water Board, and requires that the State Assembly or Senate draft and pass a bill, and that it receive approval from the Governor. However, for the purposes of presenting a No-Project Alternative, it is assumed that the State Water Board would be able to convince the California Legislature to rescind passage of AB 885 and the existing regulatory environment would continue with no new statewide OWTS Policy implemented.

The existing regulatory conditions for OWTS are described in Table 5-1, Table 5-2 and Table 5-3. One of the major differences between the existing regulatory conditions and the proposed Policy are requirements for OWTS that are within certain distances of water bodies impaired for nutrients and/or pathogens. The proposed Policy would require OWTS within 600 feet of water bodies impaired for pathogens and nutrients under section 303(d) of the Clean Water Act to install supplemental treatment. The No-Project (Status Quo) Alternative would not require supplemental treatment for OWTS next to water bodies impaired for nutrients or pathogens.

The proportion of OWTS using supplemental treatment in the future is expected to increase by approximately 1% through 2013 (TCW 2008) in most areas statewide under both the No-Project Alternative and the proposed Policy. However, it is predicted that the proportion of OWTS with supplemental treatment in impaired areas would be substantially lower under the No-Project Alternative relative to the proposed Policy. Thus, the number of OWTS with supplemental treatment that would be installed under the No-Project Alternative would be substantially less than the number of such systems installed under the proposed project.

Similar regulatory pressures could operate on homeowners to install supplemental treatment under both the No-Project (Status Quo) Alternative and the proposed Policy. However, the requirement to add supplemental treatment in the proposed Policy is mandatory and tied to a time frame. However, any restrictions or conversion requirements that the regional water boards impose under the No-Project (Status Quo) Alternative could take several years to be adopted and implemented. Therefore, under the No-Project (Status Quo) Alternative, fewer supplemental treatment systems would be installed in the watersheds of impaired water bodies than under the proposed Policy. Fewer OWTS with supplemental treatment means that the No-Project Alternative could have a greater impact on the environment, especially in areas near water bodies impaired for nutrients and pathogens, due to effluent not being treated to sufficient standards to protect hydrological resources, biological resources, and public health.

Other differences between the No-Project Alternative and the proposed Policy include various regulatory requirements in the proposed Policy that are not typically found in existing OWTS regulations of most local and regional agencies, such as:

- mandatory use of septic tank effluent filters and septic tank risers for new and replaced OWTS,
- allowance of seepage pits only where other types of OWTS are not feasible,
- disallowance of cesspools for new development or to replace existing OWTS,
- minimum statewide performance standards for supplemental treatment units, and
- mandatory visual or audible alarm systems on all supplemental treatment units to be activated in the event of system failure.

For the reasons described above, the State Water Board determines that this is not a feasible alternative.

7.3 Prescriptive Alternative

The major differences between the Prescriptive Alternative and the proposed Project are the level of detail and comprehensiveness of the minimum siting, design, and operating requirements included. The Prescriptive Alternative includes detailed requirements such as:

- Performance standards for OWTS that do not have supplemental treatment.
- Septic tank design standards including minimum diameter tank access openings and two access openings instead of one.
- Detailed soil testing procedures when siting and designing OWTS.

The environmental impacts of the Prescriptive Alternative would for the most part be the same as, or similar to, those resulting from the proposed project. A few unique impacts would be associated with this alternative, and they would likely be limited to those counties where OWTS regulatory requirements are less environmentally protective than the standards included in this alternative.

The potential water quality and public health impacts of this alternative would be indirect, fairly diffuse, and would vary from one jurisdiction to another. In those areas where OWTS regulations are currently less environmentally protective than the different types of prescriptive requirements included in the Prescriptive Alternative, the more comprehensive and protective requirements included in the Prescriptive Alternative would likely result in some benefits to water quality and public health, similar to those identified for the proposed Project, for new systems and in instances where OWTS owners would be required to upgrade or replace their systems to comply with the new standards (i.e., primarily for malfunctioning systems requiring replacement or major repair).

Relative to the proposed Policy and the other alternatives, the Prescriptive Alternative would provide more specific guidance on how much vertical separation is needed between the bottom of a dispersal field and groundwater levels under a wide variety of soil types. More extensive soil testing would be required during the OWTS siting process than is currently conducted in many areas of the state. In those areas where existing OWTS requirements are less environmentally protective than those contained in the Prescriptive Alternative, this alternative could lead to a reduction in some contaminant concentrations before they reach groundwater.

Another way in which the Prescriptive Alternative could lead to indirect water quality and public health benefits would involve the OWTS management and risk-level table that would be adopted as part of this alternative, which is similar to Tier 2 of the proposed Policy. This table would present management actions for local and regional agencies to follow based on site conditions, environmental sensitivity, and susceptibility of nearby receptors (e.g., requiring OWTS owners to use supplemental treatment or conduct monitoring in certain specific circumstances or requiring permitting agencies to implement an OWTS operating permit process). This table would be similar to one originally developed by the U.S. Environmental Protection Agency (USEPA) in 2003 to help guide permitting agencies throughout the country.

By adopting a detailed and specific table of management options tied to risk levels of various siting and environmental conditions, the Prescriptive Alternative could potentially result in more closely controlled benefits to water quality and public health in some areas of the state, especially in those areas where the regulatory requirements would be more environmentally protective than those used by local or regional agencies under existing regulations or under the proposed Policy. These management options would provide statewide standards that are more clearly delineated in their requirements than those required by Tier 2 of the proposed Policy. Overall, however, the regulatory mechanisms and technologies relied on in the Prescriptive Alternative would be essentially the same as those identified for the proposed Policy.

Similar concerns would result from the Prescriptive Alternative with regard to the inability of OWTS to adequately treat discharges to a degree that would allow them to meet WQOs. The Prescriptive Alternative would have similar impacts to those identified for the proposed Project, including impacts relating to violation of WQOs for nitrogen that could be mitigated by upgrading all OWTS to include denitrification. This could be mitigated, like the project, by supplemental treatment for all systems; however, this mitigation may be considered costly given that it would be needed regardless of whether a *specific* OWTS has a likelihood of causing an impact. If the State Water Board were to determine that this mitigation is infeasible, the impact would be significant and unavoidable.

As with the proposed Project, the Prescriptive Alternative would likely result in some benefits to aquatic biological resources compared to existing conditions as a result of improvements in the quality of effluent reaching groundwater through more protective siting and technological requirements, for new systems and in instances where OWTS owners would be required to upgrade or replace their systems to comply with the new standards (i.e., primarily for malfunctioning systems requiring replacement or major repair). Effluent would continue to be discharged to groundwater that fails to meet WQOs; however, the mass loading of nitrogen and its contribution to surface waters is too speculative to assess on a statewide basis. Environmental and regulatory processes already in place statewide would also reduce the potential that groundwater impacts could lead to impacts on biological resources. The Prescriptive Alternative would more closely control siting and technological requirements based on specific site conditions, environmental sensitivity, and susceptibility of nearby receptors, and these more detailed requirements would likely result in additional benefits with regard to protection of aquatic resources.

Overall, the Prescriptive Alternative would result in similar impacts on biological resources as would be expected to occur with the proposed project. Many of the relative improvements in biological resource impacts associated with the proposed project would also occur with the Prescriptive Alternative. These benefits include reduced contamination of groundwater leading to lower levels of pollutants in surface waters as a result of:

- the use of alarms to indicate malfunctioning supplemental treatment units, and
- the use of septic tank filters on all new and replaced systems.

The Prescriptive Alternative would result in similar impacts on land use as would be expected to occur with the proposed Project. Compared to some existing local or regional OWTS regulations, the Prescriptive Alternative would establish consistent statewide setback requirements based on siting considerations and environmental sensitivity that are intended to provide protection of existing and planned land uses, including nearby and utility-related infrastructure, and residential and commercial land uses. Like the proposed Project, the Prescriptive Alternative would not diminish the ability of cities and counties to exercise their land use planning functions, and would not change the regulatory framework that allows local governing bodies and regional water boards to share authority over land use decisions that could affect water quality in the state. However, specific siting restrictions could limit the buildability of some previously developable lots that would be unable to meet setbacks or other siting requirements or that might be required to use more expensive forms of treatment. This could shift land development to alternative areas.

For the reasons described above, the State Water Board determines that this is not a feasible alternative.

7.4 Matrix Alternative

The most prominent difference between the Matrix Alternative and the proposed Project and other alternatives are land use restrictions relating to lot size and density of development. The Matrix Alternative would create an OWTS regulatory environment notably different from the existing land use planning and OWTS approval process currently found in most of the state. In most areas of the state, regional water boards and/or local agencies do not have lot size or density restrictions in their OWTS-related permitting process (the exceptions are the Lahontan and Santa Ana Regional Water Boards, the local agencies found in those regions, and a few other local agencies, including Santa Cruz and Sonoma Counties). This alternative also would not allow any type of OWTS to be used on parcels created after adoption of the statewide Policy if such parcels are less than 1 acre in size if they have private wells or less than one-half acre in size if they rely on a community water supply system.

OWTS also would not be allowed in some locations based on observed soil percolation rates (i.e., rates faster than 5 minutes per inch or slower than 120 minutes per inch). OWTS would be allowed on parcels created before adoption of the alternative if they have percolation rates as slow as 240 minutes per inch, and regional water boards would be allowed to make exceptions to the percolation rate requirements of this alternative on a case-by-case basis. In general, regions of California where percolation rates are slower than 120 minutes per inch are found in some locations in the slow-draining clay soils of the Central Valley, while the desert and volcanic regions found in southeastern and northeastern California may have areas with rates faster than 5 minutes per inch.

Construction and operation of OWTS may also be restricted in some areas by another regulatory requirement included in the Matrix Alternative. Engineered fill could be used to meet vertical separation requirements when certain restrictions are followed; however, such fill could not be used to meet vertical separation requirements on parcels created after the effective date of the alternative.

There are other aspects of this alternative that differ from the proposed Policy and the other alternatives described in this section. Like the Prescriptive Alternative, this alternative also includes an additional pathogen performance standard for OWTS with supplemental treatment components that are not designed for disinfection or nitrogen reduction. This standard would apply to both existing and new systems and could require many owners to install relatively expensive sand filter systems if they decide not to use disinfection or nitrogen reduction systems. This alternative would also limit the use of supplemental treatment components with disinfection by allowing their use only on existing lots of record, and by requiring an additional 1 foot of vertical separation to groundwater (six feet instead of five feet as required in the proposed Policy).

Regional water boards and local permitting agencies would have more discretion under this alternative with respect to total nitrogen performance standards. Instead of using the total nitrogen standard of 50% reduction in total nitrogen in effluent compared to the 30-day average influent concentration included in the proposed Policy, this alternative would allow local permitting agencies, in consultation with regional water boards, to establish their own nitrogen performance standards. This is similar to the Tier 2 requirements of the proposed Policy.

New special districts would be created at the local level to oversee maintenance and repairs of OWTS with supplemental treatment components; the proposed Project and other alternatives would not create any new agencies. The special districts would oversee such systems where they are used at new land developments of five or more lots, and where any lot is smaller than 3 acres. Existing developments using OWTS with supplemental treatment components, or developments where all of the lots are greater than 3 acres, would not need to be managed by a special district but would need to be inspected by the permitting agency during periods of high groundwater.

Similar to the proposed Project, the Matrix Alternative includes procedures for determining the level of seasonal groundwater before siting OWTS. However, the procedures specified in this alternative include more detailed requirements for determining the level of seasonal groundwater in locations where soil mottling observations cannot be made or lead to unreliable conclusions. As determined by regional water boards, measurements of depths to seasonal high groundwater would be made periodically for lots created after adoption by assuming:

- 100% or greater average annual precipitation for conventional systems, and
- 125% or greater average annual precipitation for supplemental treatment systems.

Measurements of depths to seasonal high groundwater would be made periodically for lots existing at the time of adoption by assuming:

- 60% or greater average annual precipitation for conventional systems in areas with less than 25 inches per year average annual precipitation, or 80% or greater average annual precipitation where average annual precipitation is greater than 25 inches; and
- 80% or greater average annual precipitation for supplemental treatment systems.

Finally, the Matrix Alternative would require additional groundwater monitoring for new systems that would have less than 5 feet of separation between the bottom of the dispersal field and seasonally high groundwater levels. Such monitoring could rely on telemetry and would be conducted during the period of highest groundwater levels (as determined by regional water boards), and if it is determined that vertical separation is less than five feet for more than one week, or less than 2 feet at any time, then annual bacteria monitoring would be required.

Given the restrictions relating to land use, soil percolation rate, and supplemental treatment performance requirements that are included in the Matrix Alternative, this alternative would likely restrict the number of new OWTS constructed in some areas of the state. Because OWTS are often constructed in relatively remote areas where construction or expansion of centralized sewer collection and treatment systems are typically not feasible, the restrictions included in this alternative could result in some lots not being developed at all and, in some areas, a shift in the construction of OWTS onto larger lots and in less dense development patterns than would occur under the proposed Project and other alternatives.

Any widespread limitation on the total number of OWTS constructed or on the density of development patterns in developing areas would reduce OWTS discharges and associated contaminants reaching groundwater. Lower OWTS densities would reduce OWTS contributions to cumulative water quality impacts. Because an estimated 50% of people with OWTS also rely on private drinking water wells, this alternative could also result in reduced public health risks in lower density developments with new OWTS.

Several features of this alternative dealing with supplemental treatment components would cause additional improvements to water quality and public health compared to the proposed project. First, the Matrix Alternative includes a more environmentally protective pathogen standard for all OWTS with supplemental treatment that are not designed for active disinfection or nitrogen removal. The Matrix Alternative would also allow regional water boards to establish their own nitrogen performance standards for OWTS with supplemental treatment designed to reduce nitrogen. Secondly, the formation of new special districts at the local level to oversee maintenance of these more complex systems and to determine when repairs are needed would provide additional oversight to ensure that these systems are operating properly.

Overall, some elements of the Matrix Alternative would be more protective of groundwater and public health than the proposed Project because siting and density requirements would restrict the number of new OWTS. The Matrix Alternative would include comprehensive setback requirements from surface water bodies, land surface features, wells, and other infrastructure. These setbacks are generally consistent with existing setbacks contained in local requirements. The proposed Project would have similar setback requirements. Therefore, there is little difference between the Matrix and the Project regarding setbacks.

The Matrix Alternative has the potential to create conflicts with existing land use policies, plans, and regulations in jurisdictions throughout the state. With its restrictions relating to land use, soil percolation rate, engineered fill, and supplemental treatment performance requirements, the Matrix Alternative could limit the ability of cities and counties to exercise their land use planning functions. While some local agencies already have lot size or density restrictions related to OWTS, the Matrix Alternative would remove the ability of agencies to approve development projects that plan to use OWTS on lots that are less than 1 acre if they have private wells, or less than one-half acre if they are on a community water supply. This would change development patterns in some areas, possibly resulting in more open space and less residential and business development. Conflicts with existing land use policies, plans, or regulations could occur in those jurisdictions that currently allow development on smaller lots or allow the use of engineered fill to help meet vertical separation requirements.

For the reasons described above, the State Water Board determines that this is not a feasible alternative.

7.5 Supplemental Treatment Alternative

Overall, the Supplemental Treatment Alternative would theoretically provide a greater degree of environmental protection than the proposed Policy because it would require all new and replaced OWTS throughout the state to use supplemental treatment for nitrogen, BOD, and TSS. Other requirements of the Supplemental Treatment Alternative are similar to or the same as the proposed Policy, such as the requirement to have supplemental treatment maintained by a service provider under contract.

One of the environmental benefits of the Supplemental Alternative includes reduction in the concentration of contaminants found in OWTS effluent, leading to improved water quality as well as a reduction in public health risks and impacts on biological resources. Supplemental treatment reduces the amount of pollutant loading to receiving water, including groundwater. In particular, supplemental treatment components designed to reduce nitrogen would be especially beneficial, because even soils ideal for treating OWTS effluent naturally have trouble removing nitrogen. Significant and unavoidable nitrogen-related impacts from the proposed Policy would, in most cases, be reduced to a less-than-significant level with the Supplemental Treatment Alternative.

Another benefit of the Supplemental Treatment Alternative is reduction in the rate of conversion of agricultural land to residential use. According to a California State University, Chico (Schiffman *et al.* 2003), pressures will increase to convert farmland in relatively level areas with good soil to residential uses that rely on conventional OWTS because the valley's population is expected double over the next 30 years. Much of this development pressure could be redirected to foothill areas with more marginal soils and steeper slopes if supplemental treatment is used instead of conventional systems, thus helping to preserve valuable farmland.

The Supplemental Treatment Alternative would require all new and replaced OWTS throughout the state to use supplemental treatment for nitrogen, BOD, and TSS, which could restrict development in areas where OWTS owners cannot afford higher costs associated with supplemental treatment. The Supplemental Treatment Alternative could indirectly affect development patterns and restrict growth because of the greater expense that would be imposed on all OWTS owners statewide. Although this impact would not be a direct result of the requirement for statewide supplemental treatment, large areas of the state could be affected by the additional cost to property owners to meet this requirement.

By requiring all new and replaced OWTS in the state to use supplemental treatment for nitrogen, BOD, and TSS, the Supplemental Treatment Alternative could also result in development of land with marginal soils and steeper soils. The Supplemental Treatment Alternative could cause the use of supplemental treatment components to become more commonplace and reliable in the long run, which could lead to more development of land with previously unsuitable soil for OWTS. This is especially possible if local governments adopt the appropriate zoning needed to help redirect such development and implement OWTS policies that encourage the use of supplemental treatment systems. Such a change in development patterns could be facilitated by this alternative because conventional systems would no longer be a choice for homeowners, and the widespread use of supplemental treatment could help make the technology more reliable and affordable over time. If local governments support the development of nonagricultural land instead of agricultural land, such a change in development patterns would benefit wildlife and other natural resources that benefit from agricultural and watering practices; on the other hand, developing the wilder portions of the foothill areas, instead of agricultural lands, would cause environmental impacts in those areas.

This alternative would also impose unwarranted costs, as described in Section 8. New and replacement OWTS would cost an additional $22,000 to add supplemental treatment for a three-bedroom house. The addition of supplemental treatment for all existing conventional OWTS owners within nine years, would be in the range of approximately $30 billion to $60 billion dollars statewide. Finally, the addition of supplemental treatment for all OWTS statewide would increase energy consumption by a significant, but undetermined amount. For the reasons described above, the State Water Board determines that this is not a feasible alternative.

7.6 2008 Draft Regulations Alternative

Compared to the proposed Policy, some requirements in the 2008 Draft Regulations Alternative could be more protective of the environment, while others could be less protective. One example of how the 2008 Draft Regulations Alternative could be less protective of the environment is the increased number of OWTS that would be allowed to operate without supplemental treatment within 600 feet of water bodies impaired for nitrogen and pathogens. The 2008 Draft Regulations Alternative would require a TMDL to be developed for OWTS prior to requiring supplemental treatment for new and replaced OWTS near impaired water bodies, while the proposed Policy would not. The reduced use of supplemental treatment could result in increased release of pollutants near impaired water bodies, leading to lower water quality as well as an increase in public health risks and impacts on biological resources.

Under the 2008 Draft Regulations, it was estimated that approximately 2,798 existing OWTS would be required to upgrade to supplemental treatment (EDAW Draft PEIR, 2008). Under the proposed Policy, it is estimated that over 64,000 parcels could be affected by the supplemental treatment requirements, but only to the extent that new or replaced OWTS are proposed[9]. It is assumed that the number of new OWTS required to have supplemental treatment under the proposed Policy would also outnumber the number of new OWTS required to have supplemental treatment under the 2008 Draft Regulations Alternative. The 2008 Draft Regulations Alternative would require fewer OWTS to install supplemental treatment than the proposed Policy, which would result in an increase of direct impacts to water quality and public health associated with nitrogen and pathogen contamination from insufficiently treated OWTS effluent.

The 2008 Draft Regulations Alternative could result in environmental impacts, but it could also result in environmental benefits compared to the proposed Policy. For example, the 2008 Draft Regulations Alternative could result in decreased impacts to water quality due to a soil depth requirement for existing OWTS. The 2008 Draft Regulations Alternative would require at least three feet of continuous, unsaturated, undisturbed, earthen material with less than 30% of that material by weight containing mineral particles greater than 0.08 inches in size (i.e., rock) beneath the dispersal systems of all OWTS (existing, new and replaced). The proposed Policy would not have depth requirements for existing OWTS. The lack of a minimum depth to groundwater requirement for existing OWTS in the proposed Policy could potentially impact water quality more than the 2008 Draft Regulations Alternative due to continued discharge of effluent from OWTS with insufficient depth to groundwater.

However, the minimum depth to groundwater requirement in the 2008 Draft Regulations Alternative would require OWTS owners to assess their OWTS and possibly upgrade or replace their OWTS if the minimum depth to groundwater did not comply with the requirements. The replacing and upgrading activities would have environmental impacts that would be avoided in the proposed Policy. In addition, requiring all OWTS owners to assess the depth to groundwater, and then requiring those that aren't in compliance to upgrade would be a financial burden on OWTS owners. The proposed Policy would not put this burden on OWTS owners.

The proposed Policy would have some safeguards against existing OWTS pollution in that OWTS would not be allowed to have surfacing effluent and would not be allowed to use a dispersal system that is in inundated or saturated soil. In addition, the depths to groundwater requirements for new and replaced OWTS under the proposed Policy would be more stringent than the 2008 Draft Regulations Alternative. The proposed Policy would require new and replacement OWTS to have depths to groundwater ranging from five feet to 20 feet as dependent on soil percolation rates. Other depths could be authorized by a Local Management Program under Tier 2 of the proposed Policy.

Another environmental benefit of the 2008 Draft Regulations Alternative is a decrease in adverse environmental impacts from construction and installation of OWTS near impaired water bodies. The construction and installation of new and replaced OWTS with supplemental treatment could potentially decrease under the 2008 Draft Regulations Alternative compared to the proposed Policy since more OWTS would be required to

[9] It should be noted that the draft PEIR prepared in 2008 used the 2006 303(d) list while this document uses the 2010 303(d) list which includes more water bodies identified as impacted by pathogens and nutrients than the 2006 list.

install supplemental treatment under the proposed Policy than the 2008 Draft Regulations. As a result, environmental impacts related to construction and installation of OWTS such as soil erosion, greenhouse gas emissions, and deposition of hazardous materials on and off site would be fewer under the 2008 Draft Regulations than the proposed Policy.

However, construction and installation impacts are temporary, and the environmental benefit of better water quality from increased treatment of OWTS effluent (as a result of more OWTS with supplemental treatment under the proposed Policy) outweigh the adverse environmental impacts from construction and installation. In addition, mitigation measures would be required when installing supplemental treatment for new and existing OWTS under the proposed Policy.

Another environmental benefit of the 2008 Draft Regulations is increased protection of water quality due to more stringent performance standards for supplemental treatment. The 2008 Draft Regulations Alternative would have more stringent performance standards for supplemental treatment than the proposed Policy (Table 7-1). This could result in greater water quality protection than the proposed Policy. However, the 2008 Draft Regulations Alternative could also result in fewer OWTS converting to supplemental treatment than the proposed Policy. It is possible that a greater number of OWTS with supplemental treatment under the proposed Policy would have greater environmental benefits than fewer OWTS converting to supplemental treatment under the 2008 Draft Regulations Alternative, despite more stringent performance standards.

For the reasons described above, the State Water Board determines that this is not a feasible alternative.

Table 7-1: Comparison of Performance Standards in 2008 Draft Regulations Alternative and Proposed Policy

Analytical Parameter	2008 Draft Regulations Alternative	Proposed Policy
CBOD	<25 mg/L (30-day average), OR BOD <30 mg/L (30-day average)	No standard
TSS (for supplemental treatment not designed for disinfection or nitrogen reduction)	<30 mg/L (30-day average)	No standard
TSS (for supplemental treatment designed for disinfection or nitrogen reduction)	<10 mg/L (30-day average)	<30 mg/L (30-day average)
Total coliform bacteria	<10 (MPN) per 100 mL where percolation rates >1 and <10 MPI or where the soil texture is sand; OR <1000 MPN per 100 mL where percolation rates >10 MPI or where soil consists of texture other than sand	<200 MPN per 100 mL
Total Nitrogen	<10 mg/L as nitrogen (30-day average)	50% reduction in total nitrogen when comparing 30-day average influent to 30-day average effluent

8 Methods of Compliance and Cost Analysis

8.1 Methods of Compliance

The proposed Policy requires action on the part of the regional water boards; the local agencies that review, inspect, and approve the design of OWTS and oversee the construction of the design; and the greater public, including public agencies, that use OWTS to dispose of wastewater. Under the proposed Policy, the State Water Board has requirements that it too must fulfill to comply.

8.1.1 State Water Board Requirements

As the state agency ultimately responsible, explicitly under state law, the State Water Board has functions that oversee implementation and take actions needed for continuation of the proposed Policy. Specifically, these duties are to:

- ► periodically review and renew the Policy;
- ► approve or reject regional water board basin plans incorporating the proposed Policy;
- ► adjudicate disputes between the regional water boards and the local agencies negotiating an approvable local program; and
- ► accept and consider requests for modification or revocation of local agency management programs.

8.1.2 Regional Water Board Requirements

The regional water boards are responsible for implementing the requirements of the proposed Policy. Ultimately, the regional water boards will incorporate and implement the proposed Policy with the local agencies, although each of their roles is different. For several regional water boards, this type of work (similar but different) is being addressed, as most regions have issued waste discharge requirements or waivers for OWTS and some have memoranda of understanding (MOUs) with their local agencies. Specifically, the regional water boards are required to:

- ► incorporate the Policy into the basin plan within 12 months of adoption;
- ► approve or reject local agency management programs;
- ► accept and consider requests for modification or revocation of local agency management programs;
- ► issue or deny waste discharge permits that do not meet standards;
- ► implement Tier 3, requiring pollution assessment and OWTS upgrades, as necessary; and

- ► adopt waste discharge requirements or waivers to exempt individual discharges from this proposed Policy.

8.1.3 Local Agency Requirements

Local agencies have been performing OWTS design review and approval for decades. Since local agencies are also the entity to issue a building permit, they are also the entities that have overseen the installation and construction of most of the OWTS in the state. In 2003, survey respondents from 39 county departments indicated that the 39 counties had a cumulative staffing level in the OWTS Program at about 110 full time positions (CWTRC 2003). In many cases, local agencies have worked with their respective regional water boards to integrate both of their requirements, allowing one permitting and inspection agency to oversee the program. In those cases, the additional work is less than those that have not been working closely with the Regional Water Boards. Also, the direction of the effort will vary amongst the local agencies, making estimating the cost to comply compared to what they are already doing speculative. The proposed Policy requires the local agencies to:

- ► determine which tier their local jurisdiction will be allowed to perform under (Tiers 0 thru 4);
- ► work in cooperation with the state to protect the state's waters and safeguard public health by coordinating the existing local program with the regional board basin plans;
- ► report annually to the regional water board on issues regarding complaints, number of repair permits, and the number and location of new permits issued within the year;
- ► retain reporting records;

8.1.4 Requirements for the Public

The public is ultimately the group that demands the use of OWTS. Whether for a business, public facility or residence, OWTS serve those structures and the public that use them as a method to dispose of waste in a manner that is protective of public health and generally believed by the public to be without significant environmental damage. The proposed Policy allows a wide variety of OWTS that the public at large can purchase to comply with the policy. The cost of such OWTS are discussed below in Section 8.2. Overall, the type of compliance needed depends upon under which tier the public must comply. These are outlined below:

8.1.4.1 Tier 0

Tier 0 represents existing systems that are not obviously causing pollution and appear to be operating as designed. Nothing more is needed for the public to comply with the proposed Policy.

8.1.4.2 Tier 1

Tier 1 applies to OWTS that are being constructed new or that are being replaced. Under this Tier, OWTS must comply with siting and design requirements that the conditions for a standard OWTS. Only standard OWTS are allowed under Tier 1. Standard systems consist of a septic tank and leachfield.

8.1.4.3 Tier 2

Tier 2 applies to OWTS that are being constructed new or that are being replaced. Under this Tier, OWTS must comply with siting and design requirements contained in local management agency programs. Those programs will contain conditions for siting and design of an OWTS. The regional water board or State Water Board approves a Tier 2 management program. A Tier 2 program may allow a wide variety of OWTS, such as those listed in Table 8-1.

8.1.4.4 Tier 3

Tier 3 applies to OWTS that are near specifically identified surface waters that are known to be impaired by pathogens and/or nitrogen. Surface waters that fall into this category are listed pursuant to the Clean Water Act and identified in Attachment 2 of the Policy. The proposed Policy requires that those OWTS within 600 feet of a specifically identified impaired water body be addressed by an implementation plan prepared as part of a TMDL, or special provisions included in a Local Agency Management Program and approved by a regional water board. Actions required may range from inspections and regular monitoring to a requirement for OWTS to be upgraded to perform nitrogen removal and/or pathogen disinfection by replacing the septic tank with a supplemental treatment system. Supplemental treatment units that remove pathogens and nitrogen include those listed under “treatment systems” in Table 8-1. However, for disinfection, the bottom row called “disinfection” would have to be combined with one of the other treatment trains.

8.1.4.5 Tier 4

Tier 4 requires OWTS owners replace their failing OWTS (e.g. collapsed septic tank, overflowing leachfield) with a new component that will operate correctly. Replacement components (e.g. septic tank or drainfield) would have to meet the new standards, rather than out of date standards.

8.2 Cost Analysis

The proposed Policy addresses existing, new, replaced and upgraded OWTS. The methods of compliance and cost will vary, depending on the tier under which an OWTS is managed. The tiers are discussed in more detail in Section 3.0 Project Description in this SED. Cost of compliance is estimated using values found from existing literature (RSMeans 2006 and RSMeans 1990). Throughout the following discussion, it is important to note that replacement is only required for a major repair, not for any lesser malfunction. Hence, a rag-blocked or crushed sewer line would not trigger a major repair under the proposed Policy.

8.2.1 Tier 0

Under Tier 0, the means and cost to comply with the proposed Policy is zero, since the owners of existing systems not within the zones of a polluted water body defined in Tier 3 are not subject to any requirements resulting from the proposed Policy. With no change in management or regulatory requirements, there would be no change in the requirements or the cost.

8.2.2 Tier 1

Tier 1 will have potential costs resulting from implementation of the proposed Policy. This is because Tier 1 requires new and replaced OWTS to meet the standards specified in Sections 7.0 and 8.0 in the proposed Policy. From an assessment standpoint, the costs, although real, may be less than those required by current requirements because local governments with more restrictive requirements are likely to require more than what is contained in Sections 7.0 and 8.0 of the proposed Policy. At those locations, Tier 1 imposes no additional costs. Even though that may be true, the estimated cost for complying with Tier 1 standards is estimated in Table 8-2. The range in values for the replaced leachfield is due to the sizing criteria in the proposed Policy. Soils that are more permeable (e.g. sands) result in smaller leachfields, whereas the opposite is true for finer, less permeable soils (e.g. clays). Also shown in Table 8-2, the cost for a homeowner under Tier 1 is significantly less than that of OWTS serving larger flows, such as schools and restaurants. This, too, is related to the size of the system, as well as the variation in wastewater (e.g. restaurant).

8.2.3 Tier 2

Tier 2 is written to allow variability in local programs while retaining comparable standards to maintain the function of OWTS in protecting the environment and human health through institutional controls and management. Conceptually, Tier 2 Programs

Table 8-1: Tier 2 Treatment Systems and Dispersal (H. Leverenz, et. al)

Supplemental Treatment Systems	Dispersal Systems
Suspended Growth Aerobic Treatment Systems	At-grade and Mound Systems
Attached Growth Aerobic Treatment Systems	Bed and Trench Systems
Composting Systems	Bottomless Packed Bed Systems
Anoxic and Anaerobic Systems	Upflow Biofilter System
Combined Suspended and Attached Growth Aerobic Treatment Systems	Seepage Pit Systems
Solar, Aquatic, and Plant Based Treatment Systems	Shallow Subsurface Drip System
Incineration Systems	Gravelless Trench Systems
Disinfection Systems	Pressure Distribution System

will consist of local programs with varying degrees of changes to current existing programs and practices. The additional cost to the local agencies of developing and administering a local agency management program will depend on the extent of the changes that are necessary to each local agency's existing programs and practices. It is expected that some or all of any such additional costs will be passed on to the owners of OWTS in the form of permit fees. An OWTS under Tier 2 management may consist of a variety of technological designs for both the treatment and dispersal system. The selection of the technology would be made to accommodate site constraints, in order to ensure that the design provides adequate protection given the site's slope, groundwater level, soil conditions, topographic location, and other natural barriers. Table 8-1 lists different supplemental treatment systems that would be allowable under a Tier 2

Program. Generally, these treatment systems are required by local government to mitigate site constraints and minimize the probability that pollution from pathogens or nitrogen will occur.

Table 8-2: Estimated Cost of Tier 1 Compliance

	Replaced Septic Tank	Replaced Leachfield	Whole New OWTS
Home	$2,600	$3,300-$7,400	$5,600-$10,000
Restaurant (213 meals per day)	$13,800	$29,500-$66,000	$43,300-79,800
School (716 Students)	$13,000	$50,300-$199,000	$63,300-$212,000

The potential costs associated with constructing or repairing a system under Tier 2 may be anywhere from that similar to a standard Tier 1 system (e.g. septic tank with seepage pit or leachfield installation) to the higher cost associated with an OWTS to provide supplemental treatment to remove pollutants before release to the environment, similar to a Tier 3 situation with the high cost of supplemental treatment. Generally, a standard OWTS for a three bedroom home with 2 bathrooms is expected to cost approximately $10,000, including design and construction (SWRCB 2011). The cost for an OWTS for the same type of home using supplemental treatment is expected to cost approximately $26,000 for the supplemental treatment system in addition to the leachfield cost. Larger systems and more complex systems could cost more. State Water Board staff estimate that the costs associated with a restaurant or school would have a significant range too, estimated at $63,300 to $212,000 for a school and $43,300 to $79,800 for a restaurant, with the variation due to the size of the leachfield. If supplemental treatment is required by the local agency management program, costs would depend on what the appropriate level of treatment the local regulators and the designer determined was needed.

8.2.4 Tier 3

Tier 3 represents a departure from current practice. It may require that OWTS be upgraded to meet performance standards for nitrogen, pathogens or both where surface waters are polluted resulting, in part, from OWTS discharges. Overall, this may require the use of supplemental treatment systems like those listed in Table 8-1. An assessment of the site, assuming it includes groundwater monitoring with three wells to assess whether the OWTS is contributing to the impairment (by determining pollutant concentrations in the groundwater and groundwater flow direction), could cost as much as $5,000 dollars (RSMeans 2006). Assuming that such testing confirmed the need for advanced treatment, Tier 3 cost of inspection and upgrade of the septic tank to a supplemental treatment system like those listed in Table 8-1 could cost $22,000 dollars for a three bedroom home or more, where the OWTS is larger or more complex. For a school serving 716 students and including 34 faculty and 11 administrators and support staff, compliance using the same supplemental technology is estimated at over $560,000.

A restaurant serving 213 meals per day would require similar supplemental treatment at a cost of over $151,000.

In some cases, supplemental treatment may be required for OWTS within Tier 3. Supplemental treatment includes pumps and other electrical equipment associated with system operation. After reviewing some of these technologies, State Water Board staff has estimated operational costs for supplemental treatment ranges from $44-$336 per year depending on the system.

8.2.5 Tier 4

Tier 4 requires that failing OWTS be repaired. Such repairs will consist of whatever is appropriate under Tier 1, Tier 2, or Tier 3. Similarly, the costs associated with Tier 4 would be the same as the respective Tier under which the OWTS is found appropriately fit.

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