ALAMEDA COUNTY
HEALTH CARE SERVICES
AGENCY
COLLEEN CHAWLA, Director

AGENDA _____ June 5, 2018

OFFICE OF THE AGENCY DIRECTOR
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May 24, 2018

The Honorable Board of Supervisors
County Administration Building
1221 Oak Street
Oakland, CA 94612

Dear Board Members:

SUBJECT: **APPROVE THE LOCAL AGENCY MANAGEMENT PROGRAM DOCUMENTS**

RECOMMENDATION:

Approve the Alameda County Local Agency Management Program documents, as amended by the San Francisco Bay Regional Water Quality Control Board.

SUMMARY:

The purpose of the Ordinance and the Local Agency Management Program (LAMP) is to provide for the safe and sanitary treatment and disposal of wastewater from structures and buildings not served by public sewer systems as required and allowed by the California State Water Resources Control Board's Water Quality Control Policy for Siting, Design, Operation, and Maintenance of Onsite Wastewater Treatment Systems (State OWTS Policy). The purpose is also to establish standards for the approval, installation, and operation of Onsite Wastewater Treatment Systems (OWTS) and Onsite Wastewater Containment Units (OWCU) within Alameda County, consistent with the State Policy and consistent with the appropriate California Regional Water Quality Control Board standards and basin plans. The standards are adopted to prevent the creation of health hazards and nuisance conditions and to protect surface and groundwater quality.

The LAMP programmatic document and Technical Manual have been approved by the San Francisco Bay Regional Water Board (Regional Water Board) with minor amendments. The formal approval of these amended documents by your board will place the County in compliance with the State OWTS Policy and allow more liberal approval of OWTS than the more prescriptive State OWTS Policy requirements.

DISCUSSION/FINDINGS:

On March 28, 2017, your board approved the final draft LAMP for submission to the Regional Water Board. Per your board's direction, the Department of Environmental Health (Department) conducted extensive public meetings prior to submission of the final draft LAMP to your board for approval to submit to the State. On March 31, 2017, the Department submitted the following revised draft LAMP documents to the San Francisco Bay Regional Water Board:

- Revised Draft Local Agency Management Program for Onsite Wastewater Treatment Systems, dated March 9, 2017;
- Revised Draft Onsite Wastewater Treatment Systems Ordinance, dated March 9, 2017; and
- Revised Draft Onsite Wastewater Treatment System Manual, dated March 30, 2017.

On March 13, 2018 the Department received comments from the Regional Water Board indicating that they were considering approval of the LAMP, with minor modifications to the OWTS Technical Manual and the LAMP programmatic document, subsequent to a formal comment period from March 13 to April 16, 2018. During the public comment period, the Regional Water Board received three comment letters however the comments did not result in any additional required changes to the LAMP. On May 21, 2018 the Department received formal approval of the LAMP from the Regional Water Board, conditioned on the completion of the following minor modifications to the Technical Manual and the LAMP programmatic document:

- Technical Manual: A single modification pertaining to the OWTS Owner Five (5) Year Reporting Requirements, shown in strikethrough, italicized and bold text below:

  > "For standard OWTS that do not require an operating permit, the property owner ~~will be asked to~~ ***shall*** submit a homeowner's questionnaire to the Department once every five (5) years with information on the System to assist the County in complying with State reporting requirements."

- LAMP Programmatic Document: A single modification to include the requirement that the Department provide notification to public water well or water intake owners and the Department of Drinking Water when failing OWTS are discovered within close proximity to drinking water supplies as required by the State OWTS Policy.

The Department has revised the Technical Manual and LAMP programmatic document as required by the Regional Water Board, in final documents dated May 24, 2018. No revisions are required by the Regional Water Board to the draft Ordinance submitted and therefore the Ordinance remains unchanged from the draft version your board approved for submittal to the State on March 28, 2017. The Ordinance had its first reading on May 22, 2018 and is scheduled for its second reading on June 5, 2018.

Per the State OWTS Policy, jurisdictions that do not adopt a State approved LAMP by May 17, 2018 must follow the State OWTS Policy prescriptive requirements for new and replacement OWTS. In order to avoid implementation of the prescriptive State OWTS Policy requirements, the Department requests your board approve the Technical Manual and the LAMP programmatic document as amended. Upon adoption, the

County's current OWTS Regulations will be replaced by the new OWTS Technical Manual. The new OWTS Ordinance is anticipated to be effective July 5, 2018.

FINANCING:

Approval of this item will have no impact on net County cost. The OWT programs are funded with fees. The Department of Environmental Health will be conducting a fee study to determine if any fees need to be changed due to these new regulations and will bring any recommended changes to fees to your Board for approval.

Very truly yours,

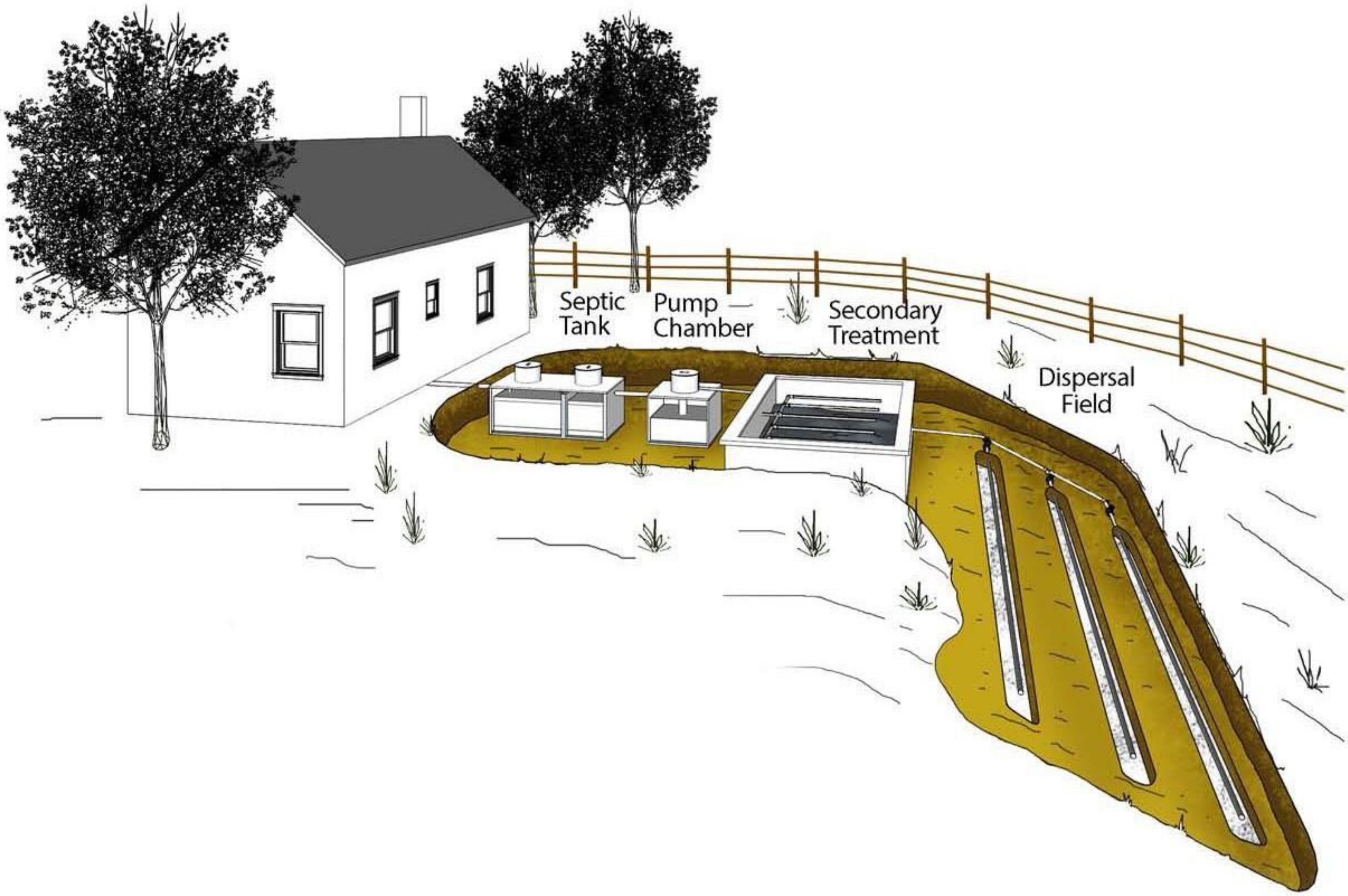
Colleen Chawla, Agency Director
Health Care Services Agency

CC:hn

cc: County Counsel

ONSITE WASTEWATER TREATMENT SYSTEMS MANUAL

June 2018



Alameda County Department of Environmental Health

1131 Harbor Bay Parkway Alameda, CA 94502

MANUAL INTRODUCTION

OVERVIEW

This Onsite Wastewater Treatment Systems Manual (Manual) provides the procedural and technical details for implementation of the provisions of the Alameda County Onsite Wastewater Treatment Systems Ordinance (the Ordinance), codified in Chapter 15.18 of the Alameda County General Ordinance Code. The provisions within this Manual are designed to protect public health, groundwater and surface water bodies from contamination, and provide safely operating Onsite Wastewater Systems through proper design, siting, installation, maintenance and monitoring. Onsite Wastewater Systems (or Systems) as referenced herein include Onsite Wastewater Treatment Systems (OWTS) as defined by the Water Quality Control Policy for Siting, Design, Operation and Maintenance of Onsite Wastewater Treatment Systems (State OWTS Policy), adopted by the State Water Resources Control Board, and which took effect on May 13, 2013 and Onsite Wastewater Containment Units (OWCU) as defined by Alameda County General Ordinance Code Chapter 15.18.

The Alameda County Department of Environmental Health (the Department) is the agency responsible for the enforcement of the Ordinance and provisions in this Manual. The California Regional Water Quality Control Boards for the San Francisco Bay Region and Central Valley Region (Regional Water Boards) are the state agencies responsible for the protection of groundwater and surface water quality in Alameda County (the County). While the Department administers the local program, the Regional Water Boards retain the authority to issue Waste Discharge Requirements for any discharge of wastewater that may affect water quality.

The requirements in this Manual shall apply to all OWCU as defined by the Ordinance and to OWTS with flows less than ten thousand (10,000) gallons per day (gpd) that accept and treat (1) domestic-strength wastewater or (2) high-strength wastewater from commercial food service buildings with a biochemical oxygen demand (BOD) less than or equal to nine hundred (900) milligrams per liter (mg/L). Owners of OWTS that receive high-strength or high-flow wastewater from non-residential facilities other than commercial food service facilities or OWTS that do not comply with the requirements of the Ordinance and this Manual shall notify the Regional Water Board and may be jointly regulated by the Regional Water Board through issuance of waste discharge requirements (WDRs) and the Department through approval of design/construction documents and issuance of installation permits.

AMENDMENTS TO THE MANUAL

The regular review and update of this Manual is necessary to keep pace with new issues, policies, procedures and technologies affecting the use and management of Onsite Wastewater Systems. Any substantive changes in requirements will require review and approval by the San Francisco Bay Regional Water Board and adoption by Resolution of the Alameda County Board of Supervisors (Board of Supervisors).

The amendments may include recommended changes originating from the Department, Regional Water Boards, Zone 7 Water Agency (Zone 7), other departments or agencies, contractors and consultants working in the Onsite Wastewater System industry or other affected groups or individuals. As changes are made to this Manual cross references throughout this Manual are also subject to change. Failure of a cross-reference to indicate the appropriate location of the requirements due to these changes does not void the applicability of the requirements.

The general process before substantive changes are made to this Manual will be as follows:

1. The Department will announce and provide copies of its proposed changes.

2. The Department will present the changes and allow opportunity for public comments at a meeting of the Onsite Wastewater Treatment System Commission or other public meeting.

3. After further review and consideration of public comments by the Department the final changes will be presented to the Board of Supervisors and then will be forwarded to the San Francisco Bay Regional Water Board for review and approval.

MANUAL ORGANIZATION

This Manual is intended to provide technical guidance for Department staff, property owners, real estate professionals, consultants and other practitioners that may be involved with the design, installation, repair, modification, operation and maintenance of new and existing Onsite Wastewater Systems.

This Manual is divided into the following parts:

Part No.	Title
1	Alameda County Onsite Wastewater System Program Overview
2	Site Evaluation Requirements
3	Site Modification and Stabilization Requirements
4	Wastewater Flow and Strength Requirements
5	Tank Requirements
6	Supplemental Treatment System Requirements
7	Subsurface Dispersal System Requirements
8	Construction Material & System Component Requirements
9	Non-Discharging Toilet Unit Requirements
10	System Design Approval, Installation/Removal & Operating Requirements
11	Existing System Requirements

REFERENCE GUIDELINES AND STANDARDS

In addition to the requirements set forth in this Manual Onsite Wastewater System practitioners should utilize applicable guidelines and reference standards including but not limited to the following:

"Onsite Wastewater Treatment Systems Manual", U.S. Environmental Protection Agency, February 2002 and as amended.

“Design Manual – Onsite Wastewater Treatment and Disposal Systems”, U.S. Environmental Protection Agency, October 1980.

“Field Book for Describing and Sampling Soils”, United States Department of Agriculture, Natural Resources Conservation Service, September 2002.

“Soil Survey Manual”, United States Department of Agriculture, Natural Resources Conservation Service, 1993 and as amended.

“Small Decentralized Wastewater Management Systems”, Crites, R., Tchobanoglous, G., 1998.

California Plumbing Code, California Code of Regulations Title 24, Part 5, California Building Standards Commission.

International Association of Plumbing and Mechanical Officials (IAPMO) Industry Standards (Guide Criteria, Installation Standards, and Material and Property Standards).

American Society for Testing and Materials (ASTM) Standards.

When this Manual does not specifically cover any subject related to the design and installation of Onsite Wastewater Systems accepted engineering practices shall be employed. When the requirements in this Manual conflict with the requirements of Onsite Wastewater System guidance documents and reference standards the requirements of the Manual shall prevail unless otherwise approved by the Department.

ALTERNATIVE MATERIALS, DESIGN AND METHODS OF CONSTRUCTION AND EQUIPMENT

The provisions of this Manual are not intended to prevent the installation of any material or prohibit any design or method of construction not specifically prescribed by this Manual provided that any such alternative has been approved by the Department. An alternative material, design or method of construction shall be approved where the Department finds that the proposed design is satisfactory and complies with the intent of the provisions of this code and that the material, method or work offered is, for the purpose intended, at least the equivalent of that prescribed in this Manual in quality, strength, effectiveness, durability and safety.

TABLES & FIGURES

Tables referenced in this Manual are located within individual chapters. A list of tables is provided in **Appendix A.**

Figures referenced in this Manual are located within individual chapters. A list of figures is provided in **Appendix B.**

ACRONYMS & ABBREVIATIONS & DEFINITIONS

The acronyms and abbreviations used in this Manual are defined in **Appendix C**. The acronyms OWTS and OWCU refer to both the singular and plural forms of the terms.

A glossary of the terms used in this Manual is provided in **Appendix D**.

APPROVALS & EFFECTIVE DATES

Regional Water Quality Control Board Approval Date: May 21, 2018

PART 1

ALAMEDA COUNTY
ONSITE WASTEWATER SYSTEM
PROGRAM OVERVIEW

CHAPTER 1
ONSITE WASTEWATER SYSTEM OVERVIEW

1.0 CHAPTER OVERVIEW

This chapter provides an overview of the Onsite Wastewater System types that may be approved for use in the County and is organized as follows:

1.1 ONSITE WASTEWATER SYSTEM TYPES

A. OVERVIEW

1. Onsite Wastewater Systems treat and/or dispose of wastewater from buildings and structures with plumbing when public sewer is not available.

2. Onsite Wastewater Systems, for the purposes of this Manual, include OWTS and OWCUs.

3. Graywater systems are a type of onsite wastewater system, and while referenced in this Manual are not governed by the Ordinance and do not replace the requirement for an OWTS or OWCU. Graywater systems are referenced in this Manual as they may be used to reduce the wastewater loading to existing OWTS on constrained sites where maximum extent practicable measures are required.

B. ONSITE WASTEWATER TREATMENT SYSTEMS (OWTS)

1. An OWTS is an Onsite Wastewater System that may include tanks, piping, treatment devices, dispersal systems or other components that convey, store, treat and dispose of wastewater and is located on the property where the wastewater originates or an adjacent or nearby property under the control of the user. OWTS types include standard OWTS and advanced OWTS as well as individual OWTS and community OWTS.

   a. **Standard OWTS**. A standard OWTS consists of a septic tank for primary treatment of wastewater followed by a system of gravity fed trenches for subsurface dispersal of wastewater into the soil (gravity trench dispersal system). A standard OWTS utilizes gravity flow to convey wastewater from the septic tank to the gravity trench dispersal system. A pump tank may be utilized to enable the installation of a gravity trench dispersal system located up-slope of the structure or building to be served. Standard OWTS can only be used for domestic-strength wastewater and require installation of dual dispersal systems.

   b. **Advanced OWTS**: An advanced OWTS utilizes primary treatment (septic tank) and supplemental treatment and/or a method of wastewater dispersal other than a gravity trench dispersal system. Advanced OWTS are designed to allow siting of an OWTS where a standard OWTS is not suitable due to site constraints or for high-strength or high-flow wastewater streams.

   c. **Individual OWTS.** An individual OWTS serves buildings or structures under the same ownership on one parcel.

d. **Community OWTS:** A community OWTS accepts wastewater from buildings or structures on two or more parcels or from buildings or structures under separate ownership whether or not they are on the same parcel. A community OWTS may be either privately or publicly owned or operated.

C. ONSITE WASTEWATER CONTAINMENT UNITS (OWCU)

1. An OWCU is a self-contained, non-discharging Onsite Wastewater System used to collect and store wastewater for removal, hauling and disposal at an approved septage receiving facility by a septage pumper registered with the Department (Septage Pumper).

2. OWCU are allowed under limited conditions where site constraints prohibit the use of an OWTS.

3. An OWCU is located on the property where the wastewater originates and includes holding tanks, vault toilets, portable toilets and waterless toilets.

a. **Holding Tanks.** A holding tank is a self-contained, watertight receptacle designed to collect and store wastewater prior to it being pumped and removed from the property by a Septage Pumper. Holding tanks are only allowed in limited circumstances as set forth in **Part 5** or otherwise in this Manual.

b. **Non-Discharging Toilets Units**. A non-discharging toilet unit is a toilet with a self-contained, watertight container used to collect and store human waste prior to it being pumped and removed from the property by a Septage Pumper. Non-discharging toilet units are only allowed in limited circumstances as set forth in **Part 9** or otherwise in this Manual. Non-discharging toilet units include vault toilets, portable toilets and waterless toilets.

(1) **Vault Toilets.** A vault toilet consists of a shelter built above a subsurface vault that collects human waste and drainage from hand washing facilities.

(2) **Portable Toilets.** A portable toilet is a chemical toilet facility that is housed within a portable toilet shelter that collects human waste and drainage from handwashing sinks.

(3) **Waterless Toilets.** A waterless toilet includes a composting toilet, incinerator toilet or similar device for the holding and processing of human waste.

D. GRAYWATER SYSTEMS

1. A graywater system is designed to collect graywater and transport it out of the building or structure for distribution in an irrigation field or a subsurface disposal area.

2. A graywater system may include tanks, valves, filter, pumps, and/or other appurtenances along with piping and receiving landscape for dispersal of graywater and is governed by the California Code of Regulations, Title 24, Part 5 (California Plumbing Code).

1.2 ONSITE WASTEWATER SYSTEM TREATMENT TRAIN COMPONENTS

A. MAJOR SYSTEM COMPONENTS

1. The major components commonly utilized in Onsite Wastewater System treatment trains include tanks, supplemental treatment systems and/or dispersal systems.

2. **Tanks.** The types of tanks approved for use in the County include:

   a. Septic tanks;

   b. Pump tanks;

   c. Flow equalization tanks;

   d. Grease interceptor tanks;

   e. Holding tanks;

   f. Vaults and chambers (non-discharging toilet units); and

   g. Other tanks approved by the Department and the Regional Water Board

3. **Supplemental Treatment.** The types of supplemental treatment systems approved for use in the County include:

   a. Proprietary treatment units (manufactured or "package" units);

   b. Intermittent sand filter systems;

   c. Recirculating sand filter systems; and

   d. Other supplemental treatment systems approved by the Department and the Regional Water Board.

4. **Subsurface Dispersal Systems.** The types of subsurface dispersal systems approved for use in the County include:

   a. Gravity trench dispersal systems;

   b. Pressure-dosed trench dispersal systems;

   c. Subsurface drip dispersal systems;

   d. At-grade dispersal systems;

   e. Mound dispersal systems;

   f. Raised sand filter bed dispersal systems (repair or replacement systems only); and

   g. Other dispersal systems approved by the Department and Regional Water Board.

B. OTHER SYSTEM COMPONENTS

1. Other components commonly utilized in Onsite Wastewater Systems include but are not limited to pumps, filters, valves, regulators, meters, control panels and alarms.

CHAPTER 2
PERMITTING PROCESS OVERVIEW

2.0 CHAPTER OVERVIEW

This chapter provides an overview of the permitting process for Onsite Wastewater Systems. Detailed information on each of the topics listed below is presented in subsequent chapters of this Manual.

This chapter is organized in the following sections:

Section 2.1: System Approval and Permitting Process Overview

Section 2.2: System Permits & Permit Exemptions

Section 2.3: Land Use, Site Development and Building Projects Requiring Department Review

2.1 SYSTEM APPROVAL & PERMITTING PROCESS OVERVIEW

A. OVERVIEW

1. The steps in the Department approval and permitting process for an Onsite Wastewater System will differ depending on the type and complexity of the System and where the System is located and may include one or more of the following:

    a. File review;

    b. Office or site consultation meeting;

    c. Review/approval of existing Onsite Wastewater System performance evaluations, as-built plans, repair/modification plans and/or corrective action plans;

    d. Review/approval of new Onsite Wastewater System design plans and design reports;

    e. Review/approval of potable water supply source testing (flow and quality of well or spring water) for new development and/or other special circumstances;

    f. Review/clearance of building, site development and/or land use permits;

    g. Issuance of Onsite Wastewater System installation, repair/modification, abandonment and/or operating permits;

    h. Interagency coordination; and/or

    i. Granting of a variance.

B. FILE REVIEW

1. To initiate a file review, an appointment to review the Department files for parcels with Onsite Wastewater Systems may be made by calling the Department via telephone or online on the Departments website at: http://www.acgov.org/aceh/landuse/index.htm.

C. SERVICE REQUEST APPLICATIONS AND FEES

1. To initiate approval and permitting for an Onsite Wastewater System, a completed Service Request application (SRA) must be submitted to the Department by the property owner or the property owner's authorized representative (Applicant) along with requisite fees and supporting documents in accordance with the provisions of the Ordinance and this Manual.

2. The SRA and supporting documents must be legible and otherwise adequate for proper review.

3. The Department will determine whether the SRA is complete in accordance with the provisions of this Manual. An incomplete SRA (missing key information and/or supporting documents) will be rejected by the Department and may be assessed a resubmittal processing fee.

4. Upon submittal of a complete SRA, supporting documents and fees, the project will be placed in the Department's review queue based on the date payment is received and the type of service requested.

5. Where warranted, due to the complexity of the project, the Department may require third party review of SRA supporting documents, the costs which are the responsibility of the Applicant.

6. The Department will issue a written response to all SRAs. If the application is deemed incomplete or denied, the Department will state the specific reasons in the response.

D. INTERAGENCY COORDINATION

1. Depending on the type of Onsite Wastewater System or project, the Department may receive referrals from or need to coordinate with other local, regional, state and federal regulatory agencies in order to issue approvals and/or permits for a System.

2. Types of projects that may require interagency coordination include but are not limited to:

    a. Building, grading and demolition permits issued by the local building department;

    b. Site development approvals and permits issued by the local planning department including but not limited to new lot creation, subdivisions, lot line adjustments, conditional use permits or other site development reviews;

    c. Commercial kitchen permits issued by the Department's commercial food unit;

    d. Complaint investigations conducted in conjunction with local code enforcement agencies;

    e. Onsite Wastewater Systems that require a permit from a regulatory agency with jurisdiction over safeguarding natural resources;

    f. Projects located in the Upper Alameda Creek Watershed above Niles for non-residential facilities or other projects served by Systems which require project approval by Zone 7;

g. Onsite Wastewater Systems permitted by a Regional Water Board through WDRs requiring design/construction document approval and issuance of installation permits by the Department; and/or

h. Onsite Wastewater Systems located within requisite setbacks to public water wells or public water system surface water intakes requiring notification to the public water system owner(s) and a fifteen (15) day comment period on the proposed System design and installation.

3. A meeting(s) with the Department, Applicant and other public agencies may be required after review of the SRA and during the approval/permitting process in order to clarify aspects of the project, determine additional information that may be required and discuss other relevant issues. Reimbursement of the Department costs for interagency meetings are the responsibility of the Applicant.

E. VARIANCES

1. A variance is required if any requirements in the Ordinance or this Manual are not met, notwithstanding a reference to approving a System or corrective actions that meet requirements "to the maximum extent practicable."

2. A variance to any requirement of this Manual may only be granted if the Applicant demonstrates all of the following criteria:

   a. Special circumstances and conditions exist on the property which deprive the owner of privileges enjoyed by other property subject to the Ordinance;

   b. The granting of the variance will not constitute a grant of special privileges inconsistent with any limitation on other property subject to the Ordinance; and

   c. The granting of the variance will not be detrimental to other persons or property (including but not limited to watercourses or wetlands or the water quality of subsurface water) or to the public health, safety or welfare.

3. The Department will review any request for a variance and may deny it. If the Department does not deny a variance request, a recommendation to grant the variance will be sent to the Board of Supervisors for final review and approval.

4. Reimbursement of the Department costs for variance processing are the responsibility of the Applicant.

2.2 SYSTEM PERMITS & PERMIT EXEMPTIONS

A. ONSITE WASTEWATER SYSTEM PERMIT TYPES

1. **Department Permits.** Permits are required from the Department for installation of new and replacement Systems, repair and modification of existing Systems, decommissioning of abandoned Systems and System operation.

a. **Installation Permits.** In order to construct a new or replacement Onsite Wastewater System the owner or Applicant shall obtain an installation permit from the Department. Unless otherwise expressly stated in writing on the permit, an installation permit shall automatically expire three (3) years after the date of issuance. The expiration date on an installation permit may be extended provided the approved System design documents referenced in the permit comply with all the requirements in effect at the time of the request for an extension. Requests for extension of an installation permit shall include submittal of a SRA and payment of fees required to process the extension based on an actual hourly basis.

b. **Repair/Modification Permits.** In order to perform repairs or modifications to any existing Onsite Wastewater System the property owner or Applicant shall obtain a permit from the Department unless the work is exempt in accordance with the criteria in **Section 2.2.B** below. Unless otherwise expressly stated in writing on the repair/modification permit, a repair/modification permit shall automatically expire twelve (12) months after the date of issuance. The expiration date on a repair/modification permit may be extended, provided the approved System design documents referenced in the permit comply with all the requirements in effect at the time of the request for an extension. Requests for extension of a repair/modification permit shall include submittal of a SRA and payment of fees required to process the extension based on an actual hourly basis.

c. **Abandonment Permits.** In order to decommission an abandoned Onsite Wastewater System the owner or Applicant must obtain an abandonment permit from the Department. Unless otherwise expressly stated in writing on the abandonment permit an abandonment permit shall automatically expire three (3) months after the date of issuance. The expiration date on an abandonment permit may be extended provided the decommissioning procedures referenced in the permit comply with all the requirements in effect at the time of the request for an extension. Requests for extension of an abandonment permit shall include submittal of a SRA and payment of fees required to process the extension based on an actual hourly basis.

d. **Operating Permits**. In order to operate an Onsite Wastewater System an annual operating permit may be required. Advanced OWTS and holding tanks require an annual operating permit. Other Onsite Wastewater Systems may require an annual operating permit if requirements or conditions contained in this Manual cannot be met. The owner is responsible for obtaining the operating permit and complying with permit conditions and renewal requirements. The operating permit renewal frequency for advanced OWTS may be extended to a period of three (3) years contingent upon compliance with all of the following conditions:

(1) The System has been functioning properly for two (2) consecutive years in compliance with the approved design plans and the operation, monitoring and maintenance (OM&M) manual; and

(2) The owner is in compliance with the terms of the operating permit including but not limited to the annual reporting requirements to the Department.

The owner of any parcel with an operating permit must notify the Department in writing of any change in property ownership. When the property changes ownership, the new owner must apply to the Department for a new operating permit on or before the anniversary of the operating permit issuance date. The new owner will not be required to pay either an application or permit fee for the transfer of ownership, however, a nominal administrative fee may be charged for transferring the operating permit. The new owner will be responsible for any annual operating permit renewal fees.

e. **Special Permits.** Special permits may be required for the use of portable toilets or waterless toilets. Special permits are not required for portable toilets on construction sites with a valid building permit.

f. **Qualifying Public Agency Permits.** In place of the permits listed above, a public agency with local full-time sanitation and water quality staff may obtain a qualifying public agency permit. The qualifying public agency permit will cover the Onsite Wastewater Systems identified in the permit and identify the installation, operating, repair, modification and abandonment requirements as applicable.

2. **Regional Water Board Permits.** In addition to permits issued by the Department, WDRs may also be required by the Regional Water Board authorizing discharges from an OWTS.

3. **Zone 7 Permits.** Applicants and owners of Onsite Wastewater Systems located within Zone 7 jurisdictional boundaries must comply with all Zone 7 requirements for System approvals. Although the Department and/or the Regional Water Board issue permits for Onsite Wastewater Systems in the County, the Applicant must additionally apply for Zone 7 permits/approvals in accordance with the requirements of the 1982 Zone 7 Wastewater Management Plan for the Unsewered, Unincorporated Area of Alameda Creek Watershed above Niles and the 1985 Zone 7 Resolution 1165. Zone 7 approval is required for the following OWTS:

a. New Onsite Wastewater Systems constructed, partially or fully, for a non-residential use;

b. Conversion of an existing residential OWTS to a non-residential use; or

c. Systems requiring a variance from the requirements of the Ordinance and this Manual and/or Zone 7 policies.

B. PERMIT EXEMPTIONS

1. Permits are not required by the Department for the following work:

a. **Septage Pumping:** Pump out and servicing of tanks by a Septage Pumper having a valid Septage Pumper registration with the Department;

b. **Routine Onsite Wastewater System Operation, Monitoring and Maintenance**: Any work to monitor and maintain an Onsite Wastewater System in proper working order in compliance with the approved design plans, the terms of an operating permit and/or other elements of the OM&M manual for the System, as applicable.

c. **Performance Evaluations:** Any work to expose, document and/or test portions of an Onsite Wastewater System in connection with a performance evaluation provided the work is done in compliance with the requirements of this Manual; and

d. **Limited Repair Work.** Repair work conducted on previously permitted Onsite Wastewater Systems provided the conditions listed below are met:

(1) Repairs are reported to the Department;

(2) A licensed Contractor conducts the work;

(3) There is no evidence of a dispersal system or tank failure;

(4) Work is conducted in accordance with the approved design and the material and installation requirements of this Manual; and

(5) Work is conducted in compliance with the requirements of other agencies.

2. Limited repair work allowed under this exemption includes:

a. **Pipes:** Clearing obstructions that are within a pipe and replacing solid pipe between tanks and the dispersal system;

b. **Tanks:** Installing, repairing and replacing risers and/or lids, effluent filters, sanitary tees and other similar components;

c. **Other Components:** Installing, repairing and replacing distribution boxes, valves and valve boxes, trench inspection ports, cleanouts and other similar components;

d. **Gravity Dispersal Trenches:** Repairing or replacing the first twenty feet of piping (measured from the edge of the trench). This does not include work to correct a soil absorption problem;

e. **Drainage and Erosion Control:** Installing, repairing or replacing drainage and erosion control measures in the tank or dispersal system areas; and/or

f. **Electrical and Mechanical Components:** Repairing or replacing float switches, pumps and wiring.

3. Repair work exemptions do not include replacement of tanks or dispersal systems, or repair/modification of advanced dispersal systems.

4. Exemptions from Department review or permits shall not be deemed to grant authorization for any work to be done in any manner that causes an impact to an existing Onsite Wastewater System or is in violation of the provisions of the Ordinance or this Manual.

C. EMERGENCY REPAIR WORK

1. Nothing in this Manual shall preclude the property owner from performing any emergency repair work necessary to protect against an imminent threat to human health and safety or the environment, however the owner must immediately thereafter apply for a permit, if applicable.

D. OTHER AGENCY PERMITS

1. No permit or approval from the Department for an Onsite Wastewater System shall relieve the permittee of responsibility for securing other permits or approvals required for work which is regulated by any other department or agency of the County, or other public agency, or for obtaining any easements or authorization for the location of Onsite Wastewater System components on property not owned by the permittee.

2.3 LAND USE, SITE DEVELOPMENT AND BUILDING PROJECTS REQUIRING DEPARTMENT REVIEW

A. LOT CREATION, SUBDIVISION AND LOT LINE ADJUSTMENTS

1. Proposed lot creation, subdivision and lot line adjustments on parcels not connected to a public sewer system must adhere to the following requirements:

   a. No lot shall be created, and no parcel, subdivision map or lot line adjustment recorded unless it is demonstrated that all proposed parcels which rely, or will rely on an OWTS have an approved site evaluation and preliminary design that demonstrates that each parcel can support a new OWTS that meets the minimum requirements contained in this Manual, the Ordinance, and in any local zoning and planning documents and Zone 7 requirements where applicable. If any parcel contains an existing OWTS that will remain in service, a performance evaluation of the OWTS shall be completed to verify suitable performance and sufficient reserve area for a future dispersal system.

   b. For any subdivision of land proposed to be served by an OWTS any parcel that will be served by an OWTS must be at least forty thousand (40,000) square feet if served by a public water supply or at least sixty thousand (60,000) square feet if served by an onsite private water supply, unless the property is located in an area where more restrictive requirements must be met.

   c. For any subdivision creating five (5) or more parcels, the subdivision proposal must be provided to the respective Regional Water Board for review.

   d. No parcel shall be created, no parcel or subdivision map shall be recorded, nor shall a lot line adjustment be approved where the lot or parcel is dependent on the use of an OWCU for wastewater disposal.

   e. No new parcel shall be created if the parcel relies on an OWTS that cannot be sited within the boundaries of the proposed parcel unless an easement on any parcel designated for the OWTS has been recorded including provisions for access for installation and ongoing OM&M.

2. **Agricultural Exemption.**

a. In the event that one or more of the parcels in a proposed subdivision are intended for agricultural purposes only and not for residential or other use which may generate wastewater, the owner or owner's authorized designee may seek an exemption from the requirements of this section by submitting to the Department a written request for an exemption under this section stating, for each such parcel, that the parcel for which an exemption is sought is intended for agricultural purposes only and not for residential or other use which may generate wastewater.

b. Written requests must be accompanied by a tentative map with express written conditions containing all of the following information:

(1) The parcel or tract number or other legal identifying information specifically identifying the property area for which exemption is requested;

(2) The intended use of the identified property area for which an exemption is sought;

(3) A statement that said area will be restricted in development such that it will not have a residence on it nor any other structure that would generate wastewater and that the area is intended for agricultural purposes only;

(4) A statement that the restrictions cannot be altered or modified without the prior written approval of the Department; and

(5) A statement that the restrictions are binding on all successors, heirs and future property owners or occupants of the parcel in accordance with California law.

c. The exemption shall not become effective until owner or designee obtains final governmental approval of the final map for the proposed subdivision and delivers to the Department a complete copy of the final map with the conditions specified above that has been endorsed and filed with the County Recorder.

B. SITE DEVELOPMENT AND BUILDING PROJECTS

1. Proposed site development and building projects on parcels not connected to a public sewer system shall be referred to the Department by the local building and/or planning department to evaluate the compatibility of the project for two main purposes:

a. The capacity of new and existing Onsite Wastewater Systems to handle the wastewater loading associated with the project; and/or

b. Potential physical impacts to existing Onsite Wastewater Systems including areas reserved for dispersal system replacement (reserve areas) and compliance with requisite setbacks from proposed site development and building projects to Onsite Wastewater System components.

2. Upon review and approval of the requisite documentation, the Department will issue:

   a. Installation or Repair/Modification Permit – a permit to install a new Onsite Wastewater System or repair/modify an existing System; and/or

   b. Project Clearance Letter – a letter issued to the local building or planning department clearing the proposed project.

3. **Work Exempt from Department Review**. Work done on existing structures that are exempt from Department review include:

   a. Repairs, modifications, remodeling, improvements and replacement to the shell of an existing building structure including the foundation, roofing, siding, walls, windows, doors, flooring, etc. provided the:

      (1) Footprint of the structure is not expanded; and

      (2) Wastewater flow is not increased due to addition of bedrooms or plumbing fixtures.

   b. Work exempt from building, grading, electrical, plumbing and mechanical permits by the local building department in accordance with the California Building Code (California Code of Regulations, Title 24, Part 2) and County or city ordinances. Although exempt from local building department permits, <u>**it is recommended**</u> that projects that have the potential to impact existing Onsite Wastewater Systems are reviewed by the Department. Projects in this category may include but are not limited to construction and installation of:

      (1) One-story detached accessory structures with a footprint less than one hundred and twenty (120) square feet;

      (2) Fences less than six (6) feet high;

      (3) Retaining walls less than four (4) feet high;

      (4) Water tanks;

      (5) Raised decks, platforms and ramps less than thirty (30) inches above the adjacent ground surface elevation;

      (6) Prefabricated swimming pools installed above ground;

      (7) Trellis, lath houses, arbors and similar shade structures;

      (8) Swings and other playground equipment; and/or

      (9) Flag poles and pole-type radio and television antennas.

c. Exemptions from Department review or permits shall not be deemed to grant authorization for any work to be done in any manner that causes an impact to existing Onsite Wastewater Systems or is in violation of the provisions of the Ordinance or this Manual.

CHAPTER 3
PRACTITIONER QUALIFICATIONS & COUNTY REGISTRATION PROGRAMS

3.0 CHAPTER OVERVIEW

This chapter provides an overview of practitioners that are qualified to conduct work and prepare documents for site evaluations and Onsite Wastewater System design, installation, repair, abandonment, and operations, maintenance and monitoring. This chapter also present an overview of County registration programs for specific classifications of practitioners including Service Providers and Septage Pumpers.

This chapter is organized in the following sections:

Section 3.1: Onsite Wastewater System Practitioner Qualifications

Section 3.2: Service Provider Registration Program

Section 3.3: Septage Pumper Registration Program

3.1 ONSITE WASTEWATER SYSTEM PRACTITIONER QUALIFICATIONS

A. PROFESSIONALS, CONTRACTORS, SERVICE PROVIDERS & SEPTAGE PUMPERS

1. Practitioners that may be involved with the design, evaluation, installation, operation, maintenance and monitoring of an Onsite Wastewater System include Qualified Professionals, Contractors, Service Providers and Septage Pumpers.

   a. **Qualified Professionals**. A "Qualified Professional" as referenced in this Manual includes:

      (1) **System Designers**. A "System Designer" is an individual licensed, registered or certified by a California state agency to conduct site evaluations and prepare Onsite Wastewater System designs. This includes an individual who is a California professional civil engineer, professional geologist or a registered environmental health specialist.

      (2) **Other Professionals.** Other Qualified Professionals include individuals licensed, registered or certified by a California state agency to practice as a professional to conduct work and prepare documents to support site evaluations and Onsite Wastewater System designs including but not limited to hydrogeological and geotechnical evaluations, topographic and property line surveys and drainage structure design as allowed under their license, registration or certification. Depending on the work to be performed and various licensing, registration and certification requirements, this may include but is not limited to an individual who is a professional geotechnical engineer, a professional land surveyor, a professional structural engineer, a certified engineering geologist, a certified hydrogeologist or a certified professional soil scientist.

   b. **Contractors.** A "Contractor" is individual licensed as a general engineering contractor, a general building contractor, a plumbing contractor or a sanitation system contractor in accordance with the provisions of the California Business and Professions Code. Contractors engaged in the evaluation, modification, repair or installation of Onsite Wastewater Systems shall possess basic knowledge and skills regarding applicable codes, siting, construction and operation of Systems.

c. **Service Providers.** A "Service Provider" is an individual registered with the Department and capable of operating, monitoring and maintaining an Onsite Wastewater System in accordance with the provisions of this Manual and under the terms of an operating permit and other elements of the OM&M manual for the System. The Department has a registration program for Service Providers as outlined in **Section 3.2** of this chapter. System Designers may also provide OM&M services as allowed under their license and registration and are exempt from registration as a Service Provider with the Department.

d. **Septage Pumpers.** A "Septage Pumper" is a person registered with the Department who is qualified to pump and haul waste from portable/vault toilets, wastewater holding tanks, tanks in an OWTS treatment train, cesspools, seepage pits, wastewater ponds, grease traps, or other wastewater source or wastewater containment unit under the California Health and Safety Code, Division 104, Part 13, Sections 117400 – 117450 and Chapter 15.18 of the Alameda County General Ordinance. The Department has a registration program for Septage Pumper businesses as outlined in **Section 3.3** of this chapter.

2. Additional information on the qualifications, licenses, registrations and certifications of Qualified Professionals, Contractors, Service Providers and Septage Pumpers and the scope of work allowed by their registration, certification or license is provided in **Table 3-1** and **Table 3-2** (included at the end of this chapter).

3. A list of Service Providers and Septage Pumpers registered in the County may be found on the Departments website at:

   http://www.acgov.org/aceh/landuse/owts_service_providers.htm.

B. DESIGNER, CONTRACTOR & SERVICE PROVIDER SYSTEM KNOWLEDGE

1. System Designers, Contractors and Service Providers should have specific training in the design, installation and operational concepts of the type of System they are providing services for.

2. Manufacturers' recommendations for system components vary between products. Design, installation and operations and maintenance knowledge and skill may be product-specific.

3.2 SERVICE PROVIDER REGISTRATION PROGRAM

A. REGISTRATION REQUIREMENTS

1. Service Providers must register with the Department every two (2) years.

2. The requirements for Service Provider registration include submittal of the following to the Department:

   a. A complete Service Provider registration application and fee;

   b. Possession of appropriate knowledge and skills regarding OM&M of Onsite Wastewater Systems;

c. Documentation of completion of an Onsite Wastewater System OM&M training course provided by a third-party organization or entity such as California Onsite Wastewater Association (COWA), National Association of Waste Transporters (NAWT) or others approved by the Department every two years; and

d. Verification of manufacturer approved training or certification where manufacturers of a proprietary treatment unit have certification or training requirements.

3.3 SEPTAGE PUMPER REGISTRATION PROGRAM

A. REGISTRATION REQUIREMENTS

1. Annual registration with the Department is required for all Septage Pumper businesses and vehicles as defined below unless exempted by California Health and Safety Code, Division 104, Part 13, Sections 117400 – 117450.

   a. **Businesses.** A business that performs the service of pumping or cleaning OWCU, tanks in an OWTS treatment train, cesspools, seepage pits, wastewater ponds, grease traps, or other wastewater source or wastewater containment unit.

   b. **Vehicles.** A vehicle that pumps wastewater from OWCU, tanks in an OWTS treatment train, cesspools, seepage pits, wastewater ponds, grease traps, or other wastewater source or wastewater containment unit and disposes of wastewater from these activities in the County. Each Septage Pumper truck that is used for this purpose in the County must be separately registered with the Department and will receive a Septage Pumper registration decal. Vehicles must display the valid registration decal to operate in the County.

B. APPLICATION

1. A Septage Pumper registration application must include the name and address of the business, the names and addresses of all owners, (if a partnership, then all names and addresses of all partners shall be disclosed), vehicle license number(s), vehicle identification number(s) and the location(s) where wastes will be disposed.

2. The application shall be submitted to the Department with the required fee.

C. SEPTAGE PUMPER TRUCK OPERATOR KNOWLEDGE

1. The Septage Pumper truck owner, operator and all employees shall have knowledge of sanitary principles and of the requirements and restrictions of Septage Pumper truck business operation and waste disposal.

2. The Department may require demonstration of employee training and knowledge of, pumping procedures, spill procedures, etc.

D. SEPTAGE PUMPER TRUCK BUSINESS COMPLIANCE

1. The Septage Pumper truck business shall observe sanitary laws, ordinances and other legal requirements.

2. Failure of the registered business to operate in compliance may result in Septage Pumper registration revocation.

E. SEPTAGE PUMPER TRUCK INSPECTION PROCEDURES

1. The Septage Pumper registration applicant and operator(s) of the Septage Pumper truck(s) shall schedule an annual inspection of each vehicle with the Department. During the inspection the applicant and operator(s) shall be required to demonstrate compliance with the following requirements for each vehicle being registered:

   a. **Vehicle Identification**. The business name and phone number shall be permanently affixed on both sides of the vehicle. The certified capacity of the tank in gallons shall be permanently affixed on both sides of the tank. The capacity as shown shall be that approved and certified by the sealer of weights and measures of the County or other approved sealer of weights and measures. All lettering and numerals shall be plain and legible and at least four inches high and shall be visible at all times.

   b. **Vehicle in Good Working Condition**. Vehicle and all hoses shall be leak proof and not show signs of deterioration that could lead to leaking.

   c. **Vehicle Equipment**. A minimum of fifty (50) feet of pumping hose and a bucket and detergent shall be carried on each pumping vehicle. All pumping hoses must be cleaned out into the truck tank or into the septic tank, OWCU or other receptacle being pumped and not onto the surface of the ground.

   d. **Vehicle Spill Kit**. A spill kit shall be carried on each vehicle at all times which shall include but not be limited to a sufficient quantity of chloride of lime or other chlorine product for disinfection purposes, absorbent material such as kitty litter, garbage bags, impervious gloves, a shovel and a spill containment barrier.

F. REPORTING REQUIREMENTS

1. On a quarterly basis, the owner of each registered Septage Pumper truck shall report the following to Department.

   a. The name and address of the owner and/or tenant of each and every location where an OWCU, tanks in an OWTS treatment train, cesspools, seepage pits, wastewater ponds, grease traps or other wastewater source or wastewater containment unit have been pumped or cleaned out;

   b. The date of service;

   c. The amount of gallons pumped;

d. Incidents where there is or was wastewater surfacing or there are other signs of Onsite Wastewater System failure; and

e. The locations where the pumped contents were disposed.

2. Immediate notification must be made to the Department if any of the following are observed at the time of pumping:

a. Surfacing wastewater that poses a clear threat to public health or the environment;

b. Existence of a cesspool; or

c. Other safety hazard associated with an Onsite Wastewater System.

3. The Department recommends that the pumper document for the property owner the condition of the Onsite Wastewater System and provide recommendations for repairs, if any.

Table 3-1
Professional, Contractor, Service Provider & Septage Pumper Licensing/Registration/Certification Requirements

Designation	Practitioner	Licensing/Registration/Certification Entity
PE	Professional Civil Engineer	Licensed by the California Board for Professional Engineers, Land Surveyors, and Geologists[1] http://www.bpelsg.ca.gov/consumers/
GE	Professional Geotechnical Engineer	
CEG	Certified Engineering Geologist	
PG	Professional Geologist	
CHG	Certified Hydrogeologist	
LLS	Professional Land Surveyor	
REHS	Registered Environmental Health Specialist	Registration by California Department of Public Health (http://www.cdph.ca.gov/certlic/occupations/Pages/REHS.aspx)
CPSS	Certified Professional Soil Scientist	Certified by the Soil Science Society of America https://www.soils.org/certifications
Licensed Contractor	Class A (General Engineering Contractor)	Licensed by the California Contractors State License Board (http://www.cslb.ca.gov/)
	Class B (General Building Contractor)	
	Class C-36 (Plumbing Contractor)	
	Class C-42 (Sanitation System Contractor)	
	Class C-57 (Well Drilling Contractor)	
----	Registered Septage Pumper	Registered with Alameda County in accordance with California Health and Safety Code 117400 et seq.
----	Registered Service Provider	Registered with Alameda County. Completion of an onsite wastewater certification training course by a third-party entity, such as the California Onsite Wastewater Association (COWA), National Association of Waste Transporters (NAWT), National Sanitation Foundation (NSF), or other acceptable training program as determined by the Department. http://www.cowa.org/ http://www.nawt.org/ http://www.nsf.org/services/by-industry/water-wastewater/onsite-wastewater

Notes:

[1]Refer to the following guides for more information:
"Consumer Guide to Professional Engineering and Professional Land Surveying" http://www.bpelsg.ca.gov/pubs/consumer_guide.pdf)
"Guide to Engineering & Land Surveying for City and County Officials" (http://www.bpelsg.ca.gov/pubs/local_officials_guide.pdf)

Table 3-2 **Professional, Contractor, Service Provider and Septage Pumper Qualifications & Scope of Work Allowed by Registration, Certification or License**		
Activity	**Required Work**	**Minimum Qualifications**
Site Evaluation	Conduct field studies and evaluate geology, soil and groundwater for System siting and design.	PE, PG, REHS, CPSS, or CHG as allowed by their registration, certification, or registration and provisions in this Manual.
Topographic Surveying	Perform site surveys, property line determinations, and generate topographic maps for System siting and design.	PE or LLS as allowed by their license
Cumulative Impact Assessment	Assess nitrate loading, groundwater mounding or other cumulative impacts of Systems for flows as required by this Manual.	PE, PG, REHS or CHG as allowed by their license and provisions in this Manual.
Geotechnical Assessment	Assess slope stability, drainage and other geotechnical issues for Systems located on slopes over thirty (30) percent and in areas of geologic instability as required by this Manual.	PE, GE, CEG
Performance Evaluation	Conduct performance evaluations of existing Systems in connection with building permits, land use projects and failure investigation.	PE, PG, REHS, or Licensed Contractor (Class A, B, C-36, or C-42) depending on the scope of work and provisions in the Manual.
Drainage Structures	Prepare plans and supporting design analysis required for permitting and installation of groundwater or surface water drainage structures.	PE
System Design	Prepare plans and supporting design analysis required for permitting and installation of Systems.	PE, PG, or REHS as allowed by their registration or license and provisions in this Manual
System Installation, Repair/Modification or Abandonment	Install, repair/modify or abandon Systems in accordance with approved plans and permit conditions issued by the Department.	Licensed Contractor (Class A, B, C-36, or C-42)
Inspection, Monitoring, Maintenance & Reporting of Systems with an Operating Permit	Perform inspection, monitoring, routine maintenance of System and annual reporting in accordance with conditions of operating permit issued by the Department.	PE, PG, REHS, or Service Provider
Inspection, Monitoring, Maintenance & Reporting of Standard Systems	Perform inspection, monitoring, routine maintenance and reporting to the Department confirming proper System functioning.	Property owner, PE, REHS, PG, Service Provider or Licensed Contractor (Class A, B, C-36, or C-42)
Well Installation or Abandonment	Install or abandon a well under permit by the well permitting agency.	Licensed Contractor (Class C-57)
Septage Pumping	Pumping or cleaning of OWCU, Tanks in an OWTS Treatment train, cesspools, seepage pits, or other wastewater source or containment units.	Registered Septage Pumper

CHAPTER 4
COMPLAINTS & INVESTIGATIONS

4.0 CHAPTER OVERVIEW

This chapter provides an overview of the complaint and investigation process and is organized in the following sections:

Section 4.1: Onsite Wastewater System Complaints

Section 4.2: Department Investigations

Section 4.3: Illegal Work

4.1 ONSITE WASTEWATER SYSTEM COMPLAINTS

A. FILING A COMPLAINT

1. A complaint regarding an Onsite Wastewater System may be filed with the Department by calling the Department via telephone or online on the Department's website at:

   http://www.acgov.org/aceh/landuse/index.htm.

4.2 DEPARTMENT INVESTIGATIONS

A. PROCEDURE

1. Upon receipt of a complaint, the Department will conduct a complaint assessment and/or investigation. The actions that the Department may take include the following:

   a. The Department will contact the complainant to collect information about the alleged violation.

   b. The Department will contact the local code enforcement agency and request assistance in contacting the owner or tenant to notify them of the complaint and request an appointment to conduct a joint site visit.

   c. If the Department is unable to contact the owner or tenant, the Department in conjunction with the code enforcement agency will attempt to ascertain whether there is a violation from observations obtained from a neighboring property or public vantage point.

   d. If the Department and the code enforcement agency are unable to contact the owner and/or tenant, the Department and code enforcement agency will send the owner and/or tenant a certified letter with details of the complaint and a request for an appointment to conduct a site visit.

   e . If the Department and code enforcement agency are unable to access the property to conduct a complaint investigation the Department will request that the code enforcement agency seek an inspection warrant from a judge.

2. If the Department determines that public health and/or the environment may be at risk, or that an Onsite Wastewater System has been installed or repaired illegally, the property owner is responsible for Department costs associated with the complaint.

3. No Person(s) shall obstruct, impede or interfere with the investigation performed by the Department in response to a complaint.

4. The Department may take photographs and videos to document conditions on the site.

4.3 ILLEGAL WORK

A. ILLEGAL SYSTEM INSTALLATION OR REPAIR WORK

1. If the Department determines that an Onsite Wastewater System has been illegally installed or work is being conducted without necessary permits, or outside of issued permit conditions, the Department may issue a "Stop Work Order". Once the order is issued, no further work shall be conducted until the Stop Work Order is released by the Department.

2. If a licensed Contractor is found performing work without necessary permits, they may be reported to the State Contractors License Board. Any Person conducting work without necessary permits is in violation of the Alameda County Ordinance and, in addition to any other fine and penalty that may be imposed, subject to a fine of double the permit fee. The fine is separate from required fees for permits and services to bring the Onsite Wastewater System or condition into compliance.

PART 2

SITE EVALUATION REQUIREMENTS

CHAPTER	TITLE
CHAPTER 5	SITE EVALUATION OVERVIEW
CHAPTER 6	SITE PLAN REQUIREMENTS
CHAPTER 7	SOIL PROFILE STUDY REQUIREMENTS
CHAPTER 8	SOIL PERCOLATION TESTING REQUIREMENTS
CHAPTER 9	GROUNDWATER LEVEL DETERMINATION REQUIREMENTS
CHAPTER 10	CUMULATIVE IMPACT ASSESSMENT REQUIREMENTS
CHAPTER 11	GEOTECHNICAL EVALUATION REQUIREMENTS

CHAPTER 5
SITE EVALUATION OVERVIEW

5.0 CHAPTER OVERVIEW

This chapter provides an overview of the site evaluation process associated with the design and permitting of Onsite Wastewater Systems and is organized as follows:

Section 5.1: Site Evaluation Overview

Section 5.2: Site Plan Overview

Section 5.3: Soil Profile Study Overview

Section 5.4: Soil Percolation Testing Overview

Section 5.5: Groundwater Level Determination Overview

Section 5.6: Cumulative Impact Assessment Overview

Section 5.7: Geotechnical Evaluation Overview

Detailed requirements for each of the above listed elements of a site evaluation are provided in subsequent chapters in **Part 2** of this Manual.

5.1 SITE EVALUATION OVERVIEW

A. GENERAL

1. A site evaluation is the first step in the design process for an Onsite Wastewater System and must be conducted by a Qualified Professional as allowed by their license or registration and in accordance the requirements of this Manual.

2. A site evaluation is an assessment of the characteristics of a parcel sufficient to determine its suitability for the installation, use and sustainability of an Onsite Wastewater System meeting the requirements of this Manual and the Ordinance.

3. A site evaluation takes into consideration soil texture, soil percolation rate, depth to groundwater and horizontal setback distances from natural land features and structures to the proposed Onsite Wastewater System and site topography.

4. The information presented in **Chapter 6** through **Chapter 11** of this Manual is primarily for new and replacement Systems and includes detailed procedures and requirements for the range of potential studies and work that might have to be done to support the System design.

5. Some level of site evaluation will be required for repairs or modifications of existing Onsite Wastewater Systems needing corrective action, but the detail and level of work will vary depending on the specific project and site conditions.

6. Site evaluations shall be performed in coordination with the Department so that Department personnel may be present for any facet of the process.

B. SYSTEM CONFIGURATION CONSIDERATIONS

1. When conducting the site evaluation the System Designer should take into consideration the System configurations and siting criteria presented in the following tables (included at the end of this chapter):

   a. **Table 5-1** (Gravity Trench Dispersal Systems)

   b. **Table 5-2** (Pressure-Dosed Trench Dispersal Systems)

   c. **Table 5-3** (Subsurface Drip Dispersal Systems)

   d. **Table 5-4** (At-Grade Dispersal Systems)

   e. **Table 5-5** (Mound Dispersal Systems)

   f. **Table 5-6** (Raised Sand Filter Bed Dispersal Systems)

2. The System Designer should also be familiar with the detailed requirements presented in **Part 7** of this Manual for each of the dispersal system types listed above.

C. HORIZONTAL SETBACK DISTANCE CONSIDERATIONS

1. When conducting the site evaluation the System Designer should take into consideration the minimum setback distances from Onsite Wastewater System components to natural land features, structures and utilities in accordance with the following criteria:

   a. **County Requirements.** The Onsite Wastewater System design and installation shall meet the minimum horizontal setback distances provided in **Table 5-7** (included at the end of this chapter), as applicable.

   b. **California Plumbing Code:** The Onsite Wastewater System design and installation shall also meet the minimum setback distances for building sewer and sanitary drainage provided in the California Plumbing Code, as applicable.

   c. **Incorporated Cities Requirement**s. Incorporated cities may also have their own requirements for setbacks that are not included in the Ordinance and this Manual. The System Designer and Applicant are encouraged to check with the local jurisdiction planning and building departments.

5.2 SITE PLAN OVERVIEW

A. GENERAL

1. An important step in the site evaluation process is preparation of a site plan to identify physical features of the parcel and adjacent parcels that may impact or limit:

a. Siting and performance requirements of a new Onsite Wastewater System;

b. Siting and performance requirements of an existing Onsite Wastewater System;

c. Proposed work associated with a local building agency permit for grading, demolition or new site construction with respect to potential impact to existing Onsite Wastewater Systems and OWTS reserve areas; and/or

d. Proposed land use projects including lot creation, lot line adjustments, subdivisions, site development review and conditional use permits with respect to new Onsite Wastewater System design or potential impact to existing Onsite Wastewater Systems and OWTS reserve areas.

2. The site plan is used as the base map for Onsite Wastewater System evaluation and design.

3. Site plan requirements are contained in **Chapter 6** of this Manual.

5.3 SOIL PROFILE STUDY OVERVIEW

A. GENERAL

1. The purpose of the soil profile study is to determine the suitability of the soil for absorption of wastewater in the area of a dispersal system to:

a. Ensure that proper soil conditions and effective soil depth exist to allow appropriate effluent retention, treatment and filtration;

b. Prevent wastewater from discharging to the ground surface or contaminating groundwater or surface water resources;

c. Inform the design of the Onsite Wastewater System; and

d. Verify that there is adequate vertical separation between the bottom of the dispersal system and bedrock, groundwater or impermeable soil strata.

2. Soil profile study requirements are contained in **Chapter 7** of this Manual.

5.4 SOIL PERCOLATION TESTING OVERVIEW

A. GENERAL

1. Subsurface dispersal systems are sized based on wastewater application rates that are representative of the soil classification and percolation rates for the soil zone corresponding to the sidewall and/or bottom of the dispersal system and the type of OWTS proposed.

2. Percolation testing is performed to provide information required to determine the potential wastewater absorption rate of soil in the dispersal system areas including the reserve areas.

3. Percolation testing does not replace the need or requirement for a soil profile study, soil

textural determination and determination of high seasonal groundwater levels.

4. Soil percolation testing requirements are contained in **Chapter 8** of this Manual.

5.5 GROUNDWATER LEVEL DETERMINATION OVERVIEW

A. GENERAL

1. Some locations in Alameda County are subject to high groundwater levels (high seasonal groundwater) which can have an adverse impact on the performance of an OWTS by eliminating or minimizing the zone of aeration in soil that is critical for wastewater treatment.

2. Installing an OWTS on a site that appears to have adequate separation to groundwater in the dry season but experiences shallow groundwater during the rainy season may result in an OWTS which functions properly only part of the year.

3. Failure to provide the required separation to high seasonal groundwater may potentially result in OWTS failure leading to:

   a. Introducing untreated wastewater to groundwater which could affect area water wells, water quality and public health;

   b. Wastewater surfacing on the ground; and/or

   c. Wastewater backing up into building or structure plumbing fixtures.

4. Groundwater level determination requirements are contained in **Chapter 9** of this Manual.

5.6 CUMULATIVE IMPACT ASSESSMENT OVERVIEW

A. GENERAL

1. Certain projects require the completion of a “cumulative impact assessment” in situations where cumulative impacts to groundwater and/or surface water from OWTS are of potential concern.

2. Cumulative impacts are defined as the persistent and/or increasing effect resulting from the density of OWTS discharges in relation to the assimilative capacity of the local environment. Examples include, but are not limited to:

   a. Nitrate and salt additions to groundwater or surface water;

   b. Rise in groundwater levels that interferes with the performance of the OWTS or results in other adverse hydrological or soil conditions affecting public health, water quality or public safety; and/or

   c. Bacteriological contamination from animal and human waste in surface water, groundwater and drinking water wells.

3. Cumulative impact issues from OWTS may occur due to the following factors:

    a. Constituent levels in wastewater (e.g., nitrogen content);

    b. Volume of wastewater flow;

    c. Density of OWTS discharges in a given area; and/or

    d. Sensitivity and beneficial uses of water resources in a particular location.

4. These issues are not necessarily addressed by conformance with standard siting and design criteria for OWTS.

5. Cumulative impact assessment requirements are contained in **Chapter 10** of this Manual.

5.7 GEOTECHNICAL EVALUATION OVERVIEW

A. GENERAL

1. Certain projects require the completion of a slope stability analysis where warranted by site topography such as steep slopes or if the System is located within an earthquake fault zone or a seismic hazard zone.

2. These issues are not necessarily addressed by conformance with standard siting and design criteria for OWTS.

3. Geotechnical evaluation requirements are contained in **Chapter 11** of this Manual.

Table 5-1
Gravity Trench Dispersal Systems
Configurations & Siting Criteria

No.	Primary and/or Supplemental Treatment	Gravity Fed or Pressure Dosed	Dispersal System Type	Depth to Bottom Infiltrative Surface (bgs)[1]	Percolation Rate	Maximum Ground Slope[2]	Minimum Effective Soil Depth (feet)[3]	Minimum Separation to High Seasonal Groundwater (feet)[3]	Wastewater Application Rate Table
1	Primary Treatment	Gravity Fed	Trench (Drain Rock or Gravelless Distribution Product)	2.5 to 5 feet	> 60 MPI	N/A	N/A	N/A	N/A
					6 to 60 MPI	30%	5 feet	5 feet	Table 25-1 (Standard)
					1 to 5 MPI	30%	5 feet	20 feet	Table 25-1 (Standard)
					< 1 MPI	N/A	N/A	N/A	N/A
2	Primary & Supplemental Treatment	Gravity Fed	Trench (Drain Rock or Gravelless Distribution Product)	2.5 to 5 feet	> 60 MPI	N/A	N/A	N/A	N/A
					6 to 60 MPI	30%	3	3	Table 25-1 (Standard)
					1 to 5 MPI	30%	3	5	Table 25-1 (Standard)
					< 1 MPI	N/A	N/A	N/A	N/A

Notes:

[1]Depth measured from native ground surface

[2]Increases of up to five (5) percent may be allowed if supported by a geotechnical evaluation

[3]Depth measured from bottom of dispersal system infiltrative surface

MPI = Minutes per inch

N/A = Not allowed

Table 5-1
Gravity Trench Dispersal Systems
Configurations & Siting Criteria

No.	Primary and/or Supplemental Treatment	Gravity Fed or Pressure Dosed	Dispersal System Type	Depth to Bottom Infiltrative Surface[1]	Percolation Rate	Maximum Ground Slope	Minimum Effective Soil Depth[2]	Minimum Separation to High Seasonal Groundwater[2]	Wastewater Application Rate Table
3	Primary Treatment	Gravity Fed With	Trench with Cover Fill (Drain Rock or Gravelless Distribution Product)	1.25 to <2.25 feet	> 60 MPI	N/A	N/A	N/A	N/A
					6 to 60 MPI	20%	5 feet	5 feet	Table 25-1 (Standard)
					1 to 5 MPI	20%	5 feet	20 feet	Table 25-1 (Standard)
					< 1 MPI	N/A	N/A	N/A	N/A
4	Primary & Supplemental Treatment	Gravity Fed	Trench with Cover Fill (Drain Rock or Gravelless Distribution Product)	1.25 to <2.25 feet	> 60 MPI	N/A	N/A	N/A	N/A
					6 to 60 MPI	20%	3	3	Table 25-1 (Standard)
					1 to 5 MPI	20%	3	5	Table 25-1 (Standard)
					< 1 MPI	N/A	N/A	N/A	N/A

Notes:

[1]Depth measured from native ground surface

[2]Depth measured from bottom of dispersal system infiltrative surface

MPI = Minutes per inch

N/A = Not allowed

Table 5-2
Pressure-Dosed Trench Dispersal Systems
Configurations & Siting Criteria

No.	Primary and/or Supplemental Treatment	Gravity Fed or Pressure Dosed	Dispersal System Type	Depth to Bottom Infiltrative Surface[1]	Percolation Rate	Maximum Ground Slope[2]	Minimum Effective Soil Depth[3]	Minimum Separation to High Seasonal Groundwater[3]	Standard Application Rate
1	Primary Treatment	Pressure Dosed	Trench (Drain Rock or Gravelless Distribution Product)	2.25 to <5 feet	> 120 MPI	N/A	N/A	N/A	N/A
					6 to 120 MPI	40%	3 feet	3 feet	Table 25-1 (Standard)
					1 to 5 MPI	40%	3 feet	5 feet	Table 25-1 (Standard)
					< 1 MPI	N/A	N/A	N/A	N/A
2	Primary & Supplemental Treatment	Pressure Dosed	Trench (Drain Rock or Gravelless Distribution Product)	2.25 to <5 feet	> 120 MPI	N/A	N/A	N/A	N/A
					60 to 120 MPI	40%	2 feet	2 feet	Table 25-1 (Standard)
								3 feet	Table 25-2 (Enhanced)
					1 to 5 MPI	40%	2 feet	3 feet	Table 25-1 (Standard)
								5 feet	Table 25-2 (Enhanced)
					< 1 MPI	N/A	N/A	N/A	N/A

Notes:

[1]Depth measured from native ground surface

[2]Increases of up to five (5) percent allowed with geotechnical evaluation

[3]Depth measured from bottom of dispersal system infiltrative surface

MPI = Minutes per inch

N/A = Not allowed

Table 5-2
Pressure-Dosed Trench Dispersal Systems
Configurations & Siting Criteria

No.	Primary and/or Supplemental Treatment	Gravity Fed or Pressure Dosed	Dispersal System Type	Depth to Bottom Infiltrative Surface[1]	Percolation Rate	Maximum Ground Slope[2]	Minimum Effective Soil Depth[3]	Minimum Separation to High Seasonal Groundwater[3]	Standard Application Rate
3	Primary Treatment	Pressure Dosed	Trench with Cover Fill (Drain Rock or Gravelless Distribution Product)	1.25 to <2.25 feet	> 120 MPI	N/A	N/A	N/A	N/A
					6 to 120 MPI	20%	3 feet	3 feet	Table 25-1 (Standard)
					1 to 5 MPI	20%	3 feet	5 feet	Table 25-1 (Standard)
					< 1 MPI	N/A	N/A	N/A	N/A
4	Primary & Supplemental Treatment	Pressure Dosed	Trench with Cover Fill (Drain Rock or Gravelless Distribution Product)	1.25 to <2.25 feet	> 120 MPI	N/A	N/A	N/A	N/A
					6 to 120 MPI	20%	2 feet	2 feet	Table 25-1 (Standard)
								3 feet	Table 25-2 (Enhanced)
					1 to 5 MPI	20%	2 feet	3 feet	Table 25-1 (Standard)
								5 feet	Table 25-2 (Enhanced)
					< 1 MPI	N/A	N/A	N/A	N/A

Notes:

[1]Depth measured from native ground surface

[2]Increases of up to five (5) percent allowed with geotechnical evaluation

[3]Depth measured from bottom of dispersal system infiltrative surface

MPI = Minutes per inch

Table 5-2
Pressure-Dosed Trench Dispersal Systems
Configurations & Siting Criteria

No.	Primary and/or Supplemental Treatment	Gravity Fed or Pressure Dosed	Dispersal System Type	Depth of Bottom Infiltrative Surface[1]	Percolation Rate	Maximum Ground Slope[2]	Minimum Effective Soil Depth[3]	Minimum Vertical Separation to High Seasonal Groundwater[3]	Wastewater Application Rate Table
5	Primary Treatment	Pressure Dosed	Pressure Dosed Sand Trench	N/A	> 120 MPI	N/A	N/A	N/A	N/A
				2.75 to <5 feet	6 to 120 MPI	40%	2 feet	2 feet[4]	Table 25-2 (Enhanced)
				3.75 to <5 feet	1 to 5 MPI	40%	2 feet	3 feet[5]	Table 25-2 (Enhanced)
				N/A	< 1 MPI	N/A	N/A	N/A	N/A
6	Primary & Supplemental Treatment	Pressure Dosed	Pressure Dosed Sand Trench	N/A	> 120 MPI	N/A	N/A	N/A	N/A
				2.25 to <5 feet	6 to 120 MPI	40%	2 feet	2 feet[6]	Table 25-2 (Enhanced)
				2.75 to <5 feet	1 to 5 MPI	40%	2 feet	2 feet[4]	Table 25-2 (Enhanced)
				N/A	< 1 MPI	N/A	N/A	N/A	N/A

Notes:

[1]Depth measure from native ground surface

[2]Increases of up to five (5) percent allowed with geotechnical evaluation

[3]Depth measured from bottom of dispersal system infiltrative surface

[4]Trench sand thickness of twelve (12) inches

[5]Trench sand thickness of twenty-four (24) inches

[6]Trench sand thickness of six (6) inches

MPI = Minutes per inch

N/A = Not allowed

Table 5-2
Pressure-Dosed Trench Dispersal Systems
Configurations & Siting Criteria

No.	Primary and/or Supplemental Treatment	Gravity Fed or Pressure Dosed	Dispersal System Type	Depth of Bottom Infiltrative Surface[1]	Percolation Rate	Maximum Ground Slope[2]	Minimum Effective Soil Depth[3]	Minimum Separation to High Seasonal Groundwater[3]	Standard Application Rate
7	Primary Treatment	Pressure Dosed	Pressure Dosed Sand Trench with Cover Fill	N/A	> 120 MPI	N/A	N/A	N/A	N/A
				1.75 to <5 feet	6 to 120 MPI	20%	2 feet	2 feet[4]	Table 25-2 (Enhanced)
				2.75 to <5 feet	1 to 5 MPI	20%	2 feet	3 feet[5]	Table 25-2 (Enhanced)
				N/A	< 1 MPI	N/A	N/A	N/A	N/A
8	Primary & Supplemental Treatment	Pressure Dosed	Pressure Dosed Sand Trench with Cover Fill	N/A	> 120 MPI	N/A	N/A	N/A	N/A
				1.25 to <5 feet	6 to 120 MPI	20%	2 feet	2 feet[6]	Table 25-2 (Enhanced)
				1.75 to <5 feet	1 to 5 MPI	20%	2 feet	2 feet[4]	Table 25-2 (Enhanced)
				N/A	< 1 MPI	N/A	N/A	N/A	N/A

Notes:

[1]Depth measure from native ground surface

[2]Increases of up to five (5) percent allowed with geotechnical evaluation

[3]Depth measured from bottom of dispersal system infiltrative surface

[4]Trench sand thickness of twelve (12) inches

[5]Trench sand thickness of twenty-four (24) inches

[6]Trench sand thickness of six (6) inches

MPI = Minutes per inch

N/A = Not allowed

Table 5-3
Subsurface Drip Dispersal Systems
Configurations & Siting Criteria

No.	Primary and/or Supplemental Treatment	Gravity Fed or Pressure Dosed	Dispersal System Type	Depth of Bottom Infiltrative Surface[1]	Percolation Rate	Maximum Ground Slope[2]	Minimum Effective Soil Depth[3]	Minimum Separation to High Seasonal Groundwater[3]	Wastewater Application Rate Table
1	Primary and Supplemental Treatment	Pressure Dosed	Subsurface Drip	0.67 to 1	> 120 MPI	N/A	N/A	N/A	N/A
					6 to 120 MPI	50%	2 feet	2 feet	Table 25-3 (Drip)
					1 to 5 MPI	50%	2 feet	3 feet	Table 25-3 (Drip)
					< 1 MPI	N/A	N/A	N/A	N/A
2	Primary and Supplemental Treatment Primary and Supplemental Treatment	Pressure Dosed Pressure Dosed	Subsurface Drip Subsurface Drip with Cover Soil	0.16 to <1	> 120 MPI	N/A	N/A	N/A	N/A
					6 to 120 MPI	20%	2 feet	2 feet	Table 25-3 (Drip)
					1 to 5 MPI	20%	2 feet	3 feet	Table 25-3 (Drip)
					< 1 MPI	N/A	N/A	N/A	N/A

Notes:

[1]Depth measured from native ground surface

[2]Increases of up to five (5) percent allowed with geotechnical evaluation

[3]Depth measured from bottom of dispersal system infiltrative surface

MPI = Minutes per inch

N/A = Not allowed

Table 5-4
At-Grade Dispersal Systems
Configurations & Siting Criteria

No.	Primary and/or Supplemental Treatment	Gravity Fed or Pressure Dosed	Dispersal System Type	Bottom Infiltrative Surface Depth[1]	Percolation Rate	Maximum Ground Slope[2]	Minimum Effective Soil Depth[3]	Minimum Separation to High Seasonal Groundwater[3]	Wastewater Application Rate Table
1	Primary Treatment	Pressure Dosed	At-Grade	0 feet	> 60 MPI	N/A	N/A	N/A	N/A
					6 to 60 MPI	20 %	3 feet	3 feet	Table 25-1 (Standard)
					1 to 5 MPI	20 %	3 feet	5 feet	Table 25-1 (Standard)
					< 1 MPI	N/A	N/A	N/A	N/A
2	Primary and Supplemental Treatment	Pressure Dosed	At-Grade	0 feet	> 120 MPI	N/A	N/A	N/A	N/A
					91 to 120 MPI	15 %	2 feet	2 feet	Table 25-1 (Standard)
					61 to 90 MPI	15 %	2 feet	2 feet	Table 25-1 (Standard)
							2 feet	3 feet	Table 25-2 (Enhanced)
					6 to 60 MPI	20 %	2 feet	2 feet	Table 25-1 (Standard)
							2 feet	3 feet	Table 25-2 (Enhanced)
					1 to 5 MPI	20 %	2 feet	3 feet	Table 25-1 (Standard)
							2 feet	5 feet	Table 25-2 (Enhanced)

Notes:

[1]Depth measured from native ground surface

[2]Increases of up to five (5) percent allowed with geotechnical evaluation

[3]Depth measured from bottom of dispersal system infiltrative surface

MPI = Minutes per inch

N/A = Not allowed

Table 5-5
Mound Dispersal Systems
Configurations and Siting Criteria

No.	Primary and/or Supplemental Treatment	Gravity Fed or Pressure Dosed	Dispersal System Type	Bottom Infiltrative Surface Depth[1]	Percolation Rate	Maximum Ground Slope[2]	Minimum Effective Soil Depth[3]	Minimum Separation to High Seasonal Groundwater[3]	Wastewater Application Rate Table
1	Primary Treatment	Pressure Dosed	Mound	0 feet	> 120 MPI	N/A	N/A	N/A	N/A
					61 to 120 MPI	15%	2 feet	2 feet	Table 25-2 (Enhanced)
					6 to 60 MPI	20%	2 feet	2 feet	Table 25-2 (Enhanced)
					1 to 5 MPI	20%	2 feet	3 feet	Table 25-2 (Enhanced)
					< 1 MPI	N/A	N/A	N/A	N/A
2	Primary Treatment and Supplemental	Pressure Dosed	Mound	0 feet	> 120 MPI	N/A	N/A	N/A	N/A
					61 to 120 MPI	15%	2 feet	2 feet	Table 25-2 (Enhanced)
					6 to 60 MPI	20%	2 feet	2 feet	Table 25-2 (Enhanced)
					1 to 5 MPI	20%	2 feet	2 feet	Table 25-2 (Enhanced)
					< 1 MPI	N/A	N/A	N/A	N/A

Notes:

[1]Depth measured from native ground surface

[2]Increases of up to five (5) percent allowed with geotechnical evaluation

[3]Depth measured from bottom of dispersal system infiltrative surface

MPI = Minutes per inch

N/A = Not allowed

Table 5-6
Raised Sand Filter Bed Dispersal Systems
Configurations & Siting Criteria

No.	Primary and/or Supplemental Treatment	Gravity Fed or Pressure Dosed	Dispersal System Type	Bottom Infiltrative Surface Depth[1]	Percolation Rate	Ground Slope[2]	Minimum Effective Soil Depth[3]	Minimum Separation to High Seasonal Groundwater[3]	Wastewater Application Rate Table
1	Primary Treatment[4]	Pressure Dosed	Raised Sand Filter Bed	0 feet	> 60 MPI	N/A	N/A	N/A	N/A
					6 to 60 MPI	30%	2 feet	2 feet	Table 25-2 (Enhanced)
					1 to 5 MPI	30%	2 feet	3 feet	Table 25-2 (Enhanced)
					< 1 MPI	N/A	N/A	N/A	N/A
2	Primary and Supplemental Treatment[5]	Pressure Dosed	Raised Sand Filter Bed	0 feet	>60 MPI	N/A	N/A	N/A	N/A
					6 to 60 MPI	30%	2 feet	2 feet	Table 25-2 (Enhanced)
					1 to 5 MPI	30%	2 feet	2 feet	Table 25-2 (Enhanced)
					< 1 MPI	N/A	N/A	N/A	N/A

Notes:

[1]Depth measured from native ground surface

[2]Increases of up to five (5) percent allowed with geotechnical evaluation

[3]Depth measured from bottom of dispersal system infiltrative surface

[4]Minimum sand fill depth of twenty four (24) inches required

[5]Minimum sand fill depth of twelve (12) inches required

MPI = Minutes per inch

N/A = Not allowed

Table 5-7
Minimum Horizontal Setback Distances

Site Feature	Minimum Horizontal Setback Distance[1] (Feet)	
	To Dispersal Field	To Tanks, Supplemental Treatment Units
Perennial and Intermittent Watercourses (from top of bank):		
• All Watercourses	100	50
• Watercourses between 1,200 to 2,500 feet from a state small water or public water system intake[2]	200	100
• Watercourses within 1,200 feet of a state small water or public water system intake[2]	400	100
Ephemeral Watercourses and Storm Water Drainage Structures:		
• Drainage Swales and Drainage Ways (from the high water mark)[3]	4 X depth	4 X depth
• Manmade Impervious Lined (concrete, asphalt or equal) Drainage Ditch or Swale (from the edge of the ditch/swale)	15	15
• Closed drain pipe or watertight culverts or conduits (from the edge of the pipe)	10	10
Edge of 100-year flood plain	0	0
Private Water Supply Wells[4] and Springs	100	50
Public Water Supply Wells	150	150
Drinking Water Reservoir or Lake (from highwater mark):		
• All Reservoirs/Lakes	200	200
• Reservoirs/lakes within 1,200 feet of a state small water or public water system intake[2]	400	400
Non-Drinking Water Ponds (unlined), Springs or Lakes	100	50
Storm Water Infiltration Ponds	50	25
Swimming Pools, Lined Ponds or Basins	25	10
Curtain Drains (measured from the centerline of the nearest dispersal trench to the centerline of the curtain drain trench)		
• Uphill of the dispersal field	5 feet + depth of trench	N/A
• Lateral to the dispersal field (along slope contour)	25	N/A
• Downhill of the dispersal field	50	N/A

Table 5-7
Minimum Horizontal Setback Distances

Site Feature	Minimum Horizontal Setback Distance[1] (Feet)	
	To Dispersal Field	To Tanks, Supplemental Treatment Units
Energy Dissipaters (measured from edge of nearest Dispersal Trench to the daylight end of outlet pipe). • Upslope • Downslope • Lateral of the System components	 50 25 25	 20 10 10
Geological Unstable Land Mass[5] (visual scarp, slump or slide)	100	100
Manmade Cut /Fill Banks (from top of cut)[5,6]	4 X h	4 X h
Natural Steep Slopes (from toe of slope)[5,7]	10	10
Property Lines	10	10
Structures and Foundations, including Footings[8]	10	5
Ground Mounted Solar Panels[9]	10	5
Edge of Road Easements, Right of Ways, Pavement, Driveways, or Areas Subjected to Vehicular Traffic[10]	5	5
Edge of Underground Utility Easements (unless easement is specifically for an OWTS)[11]	0	0

Notes:

[1]Repairs and replacement systems may be allowed to comply with horizontal setback distances to the maximum extent practicable.

[2]For areas tributary to and upstream of water supply intake, setback distance measured from high water mark. Exceptions may be allowed as follows:

a. Replacement Systems, comply to the maximum extent practicable and incorporate supplemental treatment which may be waived if there is sufficient evidence that there is no impact or significant threat to water source;

b. New Systems on pre-existing lot of record, comply to maximum extent practicable and incorporate supplemental treatment for pathogens.

[3]The required setback distance shall not be less than twenty five (25) feet nor more than fifty (50) feet from the high water mark.

[4]Setback also applies to private water supply wells that have been abandoned (i.e., a well whose original purpose and use has been permanently discontinued or which is in such a state of disrepair that it cannot be used for its original purpose) unless documentation from the well permitting agency is provided to the Department that demonstrates the well has been properly destroyed so that it will not produce water nor act as a conduit for the movement of water.

Notes (continued):

Table 5-7
Minimum Horizontal Setback Distances

[5]Setback distance may be reduced in accordance with recommendations provided in a geotechnical report prepared by a Qualified Professional.

[6]Cut bank and fill banks are considered to be any altered area of land surface where the height (h) of the manmade cut or embankment is greater than two (2) feet, with a slope greater than fifty (50) percent, and any part of which is lower in elevation than the ground surface at the nearest point of the OWTS. The required setback distance shall not be less than twenty five (25) feet nor more than fifty (50) feet from the top of the cut or embankment. Cuts supported by retaining walls or similar structures shall be included in this definition as shall steep natural ground surfaces where a sharp break in the ground slope is discernible.

[7]Steep slope is considered to be land with a slope greater than fifty (50) percent and a height of greater than ten (10) feet, and any part of which is higher in elevation than the ground surface at the nearest point of the OWTS. The required setback distance is measured from the toe of slope.

[8]Including porches, steps, breezeways, roof patios, carports, covered walkways, covered driveways, fences, retaining walls and other similar structures and appurtenances.

[9]The setback distance to the dispersal field may be reduced to four (4) feet when installed over and between dispersal trenches and design is stamped by a Registered Civil Engineer.

[10]Setback distance to tanks may be reduced to zero (0) feet where traffic rated.

[11]If sewer tight line is properly bedded or sleeved.

N/A = Not applicable

CHAPTER 6
SITE PLAN REQUIREMENTS

6.0 CHAPTER OVERVIEW

This chapter provides the requirements for preparation of site plans to support the design and permitting of Onsite Wastewater Systems and is organized as follows:

6.1. SITE PLAN OVERVIEW

A. GENERAL

1. The site plan shall be used as the base map for Onsite Wastewater System evaluation and design and shall be prepared by a Qualified Professional as allowed by their registration and license.

2. The site plan shall include data obtained by field inspection and topographic survey, and information from the Department files, local building and planning department files, well permitting agency databases, Federal Emergency Management Act (FEMA) flood maps, United States Geological Survey (USGS) maps and other available databases as applicable.

6.2. VICINITY SKETCH

A. MINIMUM CRITERIA

1. The site plans shall incorporate a vicinity sketch (not at map scale) indicating the location of the parcel relative to the principal roadways and showing the lengths and compass bearings of property boundaries of the entire parcel and adjacent parcels.

2. On large parcels the vicinity sketch must show the general location of the following features to facilitate determination of compliance with horizontal setback requirements during plan review:

   a. Existing Onsite Wastewater Systems, private and public potable water sources (wells, springs, reservoirs, etc.) and buildings and structures on the parcel; and/or

   b. Public water system wells and surface water intake points on adjacent parcels.

6.3. CONTOUR LINES, SPOT ELEVATIONS & SLOPE DESIGNATIONS

A. MINIMUM CRITERIA

1. The site plans shall provide spot elevations, slope designations (percent and direction) and contours of the earth's surface of existing terrain and proposed grading in the vicinity of existing and proposed Systems to facilitate evaluation, siting and design.

2. Contour intervals shall be adequate to verify code compliance during plan check.

6.4. SITE EVALUATION FIELD INVESTIGATION LOCATIONS

A. MINIMUM CRITERIA

1. The site plans shall show the locations of soil profile test pits, percolation test holes, geotechnical evaluation borings and test pits, groundwater monitoring wells and piezometers and any other areas of the parcel and adjacent parcels investigated during site evaluation activities.

6.5. EXISTING ONSITE WASTEWATER SYSTEM LOCATIONS

A. MINIMUM CRITERIA

1. The site plans shall show the location of the components of all existing Onsite Wastewater Systems on the parcel including but not limited to:

   a. Cesspools and seepage pits;

   b. OWCU (holding tanks, vault toilets, portable toilets);

   c. OWTS;

   d. Wastewater ponds (including wastewater from water softening processes); and

   e. Graywater systems.

6.6. BUILDING AND STRUCTRUE LOCATIONS & FOOTPRINTS

A. MINIMUM CRITERIA

1. The site plans shall show the location and footprint of all existing and proposed buildings and structures on the parcel and shall identify which buildings and structures have wastewater plumbing.

6.7. PERTINENT FEATURES RELATIVE TO HORIZONTAL SETBACK REQUIREMENTS

A. GENERAL

1. The site plans shall show pertinent features located within the horizontal setback distances that may have an impact on the System siting and design.

B. FEATURES WITHIN 50 FEET OF SYSTEM COMPONENTS

1. The following features (existing and proposed) may be relevant and must be shown on the site plans if they are within fifty (50) feet of existing and proposed Systems:

    a. Parcel lines, lengths and compass bearings (verified through pin location or boundary surveys, if required).

    b. Surface water and groundwater drainage structures (e.g., infiltration trenches, interceptor drains, roof run-off piping, sumps, swales, v-ditches, canals, culverts, energy dissipaters, outfalls, etc.);

    c. Drainage ways, drainage swales, and other ephemeral watercourses (measured from top of bank or high water mark if there is no discernible channel);

    d. Vehicle traffic and storage areas (paved or unpaved);

    e. Subsurface utility lines (existing and proposed electrical, sewer, water, gas, etc.);

    f. Landscaped/irrigated areas;

    g. Easements, access agreements, and public right-of-ways (e.g., underground utility easements, above ground utility easements, public roadway right-of-ways, private potable water supply access agreements and easements, Onsite Wastewater Systems access agreements and easements, etc.);

    h. Graded/fill areas (e.g., building pads, berms, etc.);

    i. Retaining walls;

    j. French drains or groundwater interceptor drains or cutoff walls;

    k. Hazardous materials storage areas including above ground and underground storage tanks;

    l. Trees or vegetation that pose a construction or operational concern for the Onsite Wastewater Systems; and

    m. Other site development related features and appurtenances including but not limited to patios, decks, gazebos, walkways, children's play structures, fences, driveways, bridges, decorative ponds, hot tubs/spas, pools, pool houses, ground mounted solar installations, animal pens/corrals, animal wash pads, crush pads, garbage enclosures, etc.).

C. FEATURES WITHIN 100 FEET OF SYSTEM COMPONENTS

1. The following features may be relevant and must be shown on the site plans if they are within one hundred (100) feet of existing and proposed Onsite Wastewater Systems.

    a. Steep slopes (measured from the break of slope);

b. Cut or steep embankments (measured from the top of cut);

c. Unstable land masses or any other areas subject to earth slides identified by a seismic hazard zone map or a professional civil engineer or other professional as allowed by their license, registration or certification;

d. Private existing, abandoned, and proposed potable water supply sources (springs or wells) and associated appurtenances including water storage and treatment facilities (e.g., storage tanks, pump houses, water softener ponds, etc.);

e. Perennial or intermittent watercourses (measured from the natural or levied top of bank or high water mark if no defined bank);

f. Reservoirs, lakes, ponds or other non-flowing surface water bodies (measured from the high water mark);

g. Springs;

h. Floodplain boundaries (100-year); and

i. Wetlands.

D. FEATURES WITHIN 200 FEET OF SYSTEM COMPONENTS

1. The following features may be relevant and must be shown on the site plans if they are within two hundred (200) feet of existing and proposed Onsite Wastewater Systems.

   a. Sanitary sewer lines.

E. FEATURES WITHIN 600 FEET OF SYSTEM COMPONENTS

1. The following may be relevant and must be shown on the vicinity sketch if they are within six hundred (600) feet of existing and proposed dispersal systems:

   a. Public water system wells.

F. FEATURES WITHIN 2,500 FEET OF SYSTEM COMPONENTS

1. The following may be relevant and must be shown on the vicinity sketch if they are within two thousand five hundred (2,500) feet of existing and proposed dispersal systems:

   a. Public water system surface water intake points.

CHAPTER 7
SOIL PROFILE STUDY REQUIREMENTS

7.0 CHAPTER OVERVIEW

This chapter provides the requirements for conducting soil profile studies used to support the design and permitting of Onsite Wastewater Systems and is organized as follows:

7.1 SOIL PROFILE TEST PIT REQUIREMENTS

A. DEPARTMENT OBSERVATION

1. A Qualified Professional must perform the soil profile in the presence of the Department representative. The Department may authorize the soil profile to proceed without a Department representative, however, such authorization must be in writing and, may require submittal of photo documentation.

2. Written notice must be given to the Department at least forty-eight (48) hours in advance of conducting the soil profile study. Additional time may be required to schedule the presence of the Department representative.

3. Notification and the request must include the Applicant's name and assessor's parcel number and street address of the property. Failure to provide sufficient notice may result in delay or a requirement to repeat the test.

4. All soil profile test pits must be dug prior to the Department field observation appointment.

5. If more than one site visit is required to observe the soil profile a fee may be charged for each visit.

B. SOIL PROFILE TEST PITS – NUMBER, DEPTH AND DISTRIBUTION

1. Soil profile test pits shall be sufficient in number and adequately spaced to encompass and represent the soil conditions of the entire area of the dispersal system including reserve areas.

2. A minimum of two (2) soil profiles are required:

   a. **Standard OWTS**: One (1) profile in each of the dual dispersal system areas.

   b. **Advanced OWTS**: One (1) profile in the dispersal system area and one (1) profile in the reserve area.

3. Additional soil profiles may be required if the initial soil profiles do not provide sufficient information for design and/or determination of code compliance.

C. SOIL PROFILE TEST PIT EXCAVATIONS

1. Soil profile test pits shall be excavated by a backhoe, excavator or by hand unless an exception is approved by the Department.

2. Soil profile test pits must be excavated to the appropriate depth to verify that there is adequate vertical separation from groundwater and effective soil beneath the bottom of the dispersal system.

3. The measurement of effective soil depth is taken from natural ground surface elevation and must not consider fill material or imported soil.

4. Auger test holes may be an acceptable alternative to backhoe or hand-dug soil profile test pits and may be allowed under the following conditions:

   a. The use of a backhoe or similar excavating machinery is impractical due to site access constraints or fragile soils;

   b. Testing is necessary only to verify conditions based on prior soils investigations;

   c. Soil profiles are required to be no greater than three (3) feet deep;

   d. Testing is done in connection with geologic investigation;

   e. Where verification of groundwater separation requires additional deeper subsurface exploration; or

   f. In connection with corrective actions or documentation of an existing Onsite Wastewater System.

5. When the auger method is used for new or replacement dispersal systems, at least two (2) test holes in each dispersal system area and two (2) test holes in the reserve area (for advanced OWTS) are required.

D. SOIL PROFILE OBSERVATIONS

1. The excavated sidewall of the soil profile test pit shall be picked away with a sharp instrument to expose the natural soil structure.

2. The Qualified Professional shall identify each soil horizon from ground surface to the bottom of the soil profile.

3. Soil profile observations shall be recorded on a form provided by the Department and shall include a description of the following soil features:

   a. Soil texture, color, structure, consistency, plasticity, and porosity for each soil horizon in the excavation utilizing the United States Department of Agriculture (USDA) soil classification system and soil textural triangle presented in **Figure 7-1** and **Figure 7-2** (included at the end of this chapter);

b. Depth and type of limiting layer or condition;

c. Depth of soil mottling, gleying or other evidence of periodic soil saturation;

d. Depth of effective soil; and

e. Other prominent soil features including but not limited to percentage of rock or coarse fragments, root porosity, dampness, shrinkage cracks, gopher holes or depth and type of fill or imported soil in the profile.

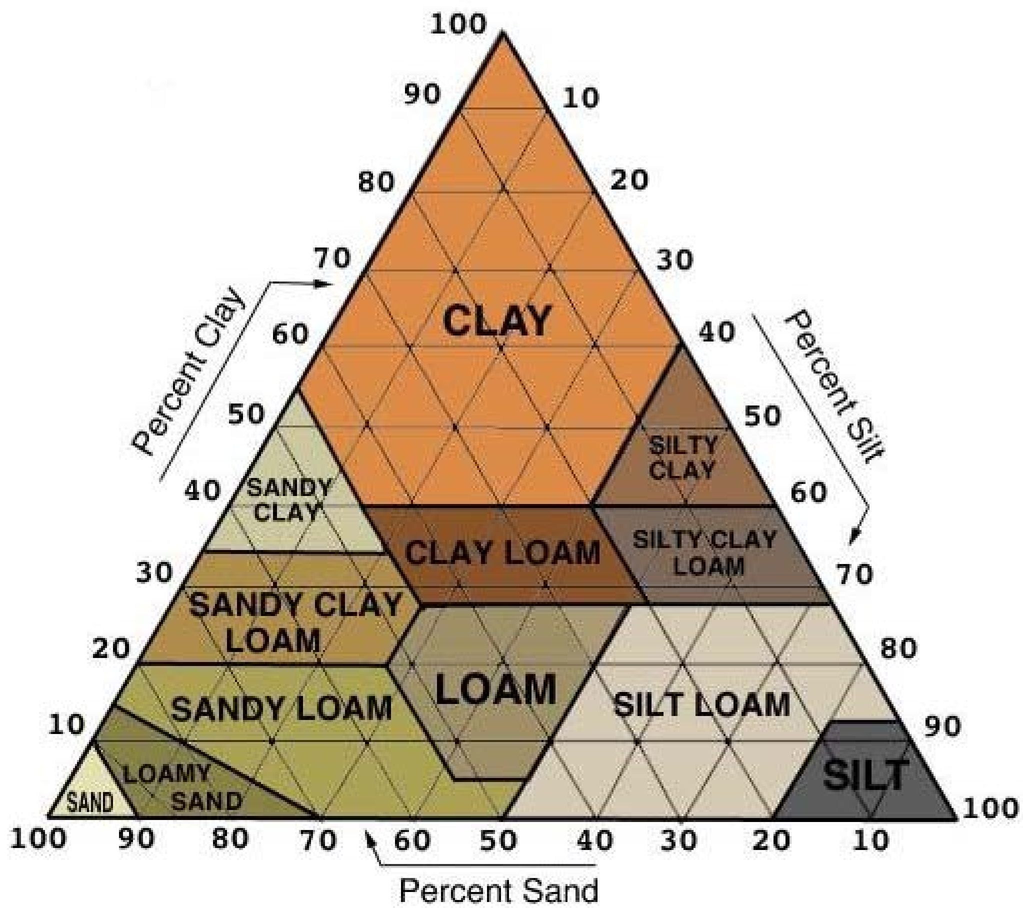
7.2 LABORATORY TESTS TO VERIFY SOIL CLASSIFICATION REQUIREMENTS

A. MINIMUM CRITERIA

1. If the classification of the soil is in question, the Department may require the Qualified Professional to provide laboratory test data to verify the actual classification of the soil including but not limited to the percentage of sand, silt, and clay and the expansive potential.

2. All samples shall be appropriately labeled and analyzed in accordance with an approved American Society of Testing and Materials (ASTM) method or USDA method by a soil mechanics laboratory.

Figure 7-1
USDA Soil Textural Traingle



Source: United States Department of Agriculture

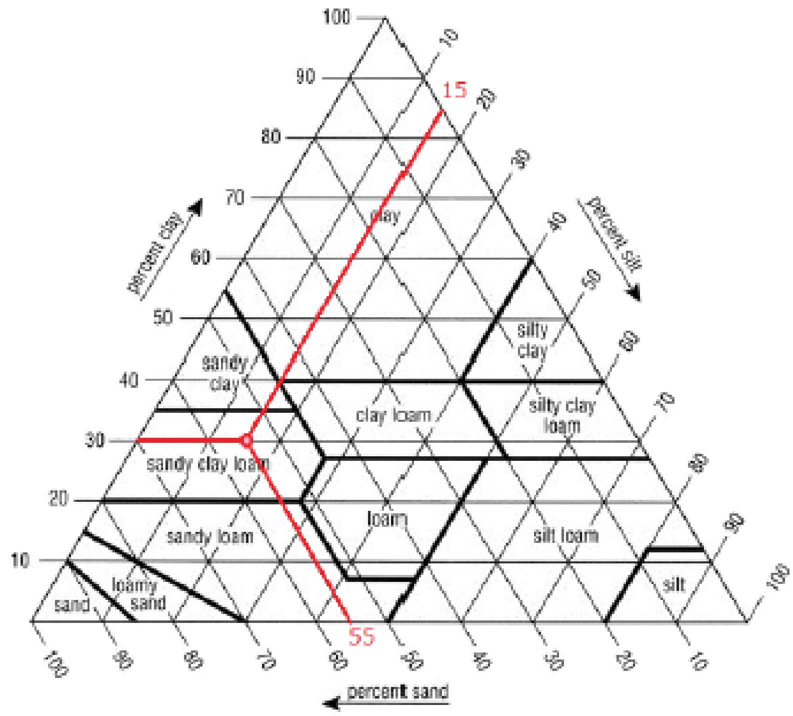
Figure 7-2

Soil Profile Classification

To classify a soil sample using the USDA Soil Textural Triangle, plot the intersection of the three lines that correspond to the proportions of clay, sand and silt. The percentages of the three components must add up to one-hundred (100) percent.

Example: Classify a soil sample that is 30% clay, 15% silt, and 55% sand.

First locate 30% on the clay axis, and draw a line horizontally from left to right. Next, locate 15% on the silt axis, and draw a line going down diagonally to the left. Finally, locate 55% on the sand axis, and draw a line going up diagonally to the left. The intersection is in a region called Sandy Clay Loam. See figure below.



CHAPTER 8
SOIL PERCOLATION TESTING REQUIREMENTS

8.0 CHAPTER OVERVIEW

This chapter provides the soil percolation testing requirements used to support the design and permitting of Onsite Wastewater Systems and is organized as follows:

8.1 SOIL PERCOLATION TESTING REQUIREMENTS

A. DEPARTMENT OBSERVATION

1. Soil percolation testing shall be performed under the responsible charge of a System Designer or other Qualified Professional as allowed by their license and registration. The Department may elect to witness the installation of the percolation test holes, verify presoaking and be present during all or part of the testing.

2. The Department may authorize the percolation tests to proceed without a Department representative, however, such authorization must be in writing.

3. Written notice must be given to the Department at least forty-eight (48) hours in advance of conducting soil percolation tests. Additional time may be required to schedule the presence of a Department representative.

4. Notification and the request must include the Applicant's name and the assessor's parcel number and street address of the property. Failure to provide sufficient notice may result in delay or a requirement to repeat the test.

5. All soil percolation test holes must be dug prior to the Department field observation appointment.

6. If more than one site visit is required to observe soil percolation tests, a fee may be charged for each additional visit.

B. PERCOLATION TESTS – NUMBER, DEPTH AND DISTRIBUTION

1. Percolation tests shall be sufficient in number and adequately spaced to encompass and represent the soil conditions of the dispersal system areas including the reserve area for advanced OWTS.

2. A minimum of six (6) percolation tests shall be conducted:

   a. **Standard OWTS**: Three (3) percolation tests in each of the dual dispersal system areas.

   b. **Advanced OWTS**: Three (3) percolation tests in the dispersal system area and three (3) in the reserve area.

3. The location of the percolation test holes shall be evenly distributed horizontally and vertically in the dispersal system areas to provide a reasonable representation of conditions within the dispersal system bottom infiltration zone and the sidewall infiltration zone (if applicable).

4. Additional percolation tests may be required if the initial tests do not provide sufficient information for design or to refine an exclusion area represented by failed percolation tests.

C. PERCOLATION TESTING WINDOW

1. Percolation testing shall normally be conducted at the time of or shortly following the soil profile investigation.

2. If the soil profile observations indicate the presence of expansive soil with high shrink-swell characteristics, percolation testing during the normal wet weather season will be required. This is because expansive, high shrink-swell soil may exhibit suitable percolation rates during the dry season due to shrinkage cracks in the soil; but, when they become wet, the same soil may swell to the point of providing little or no percolation.

    a. Other methods to bring the soil moisture content to a level representative of wet weather testing period conditions, such as application of irrigation water for an extended period of time (e.g., several days to a week or more) until appropriate conditions are achieved, may be approved by the Department in lieu of conducting wet weather percolation testing.

3. Field judgment of the need for wet weather percolation testing shall be made based on:

    a. Visual evidence of soil shrinkage cracks; and/or

    b. Soil exhibiting high clay content (e.g., exceeding forty [40] percent) in combination with massive, columnar or angular blocky soil structure.

D. PERCOLATION TEST HOLE CONSTRUCTION

1. Percolation test holes shall be hand augured or machine augured per the specifications provided below and as shown in **Figure 8-1** (included at the end of this chapter):

    a. Test holes shall be six inches (6) inches in diameter;

    b. Test hole sides shall be kept as straight as possible;

    c. The bottom and sides of the test holes shall be carefully scarified with a blunt edged instrument to remove smeared soil particles and remove loose soil material;

    d. The native soil structure shall be visible on the bottom ten (10) to twelve (12) inches of the side wall;

    e. Two (2) inches of gravel, one-half (½) to three-quarter (¾) inches in diameter, shall be placed in the bottom of the hole to protect the bottom from scouring and sediment; and

f. The test hole shall be stabilized by placing a four (4) inch perforated pipe and a one (1) inch sidewall gravel pack in the test hole to prevent silting of the bottom of the hole and sidewall cave-in.

2. An alternative method of construction as shown on **Figure 8-2** (included at the end of this chapter) may be used for deep percolation test holes.

3. Methods proposed for evaluating soil percolation rates for designing shallow subsurface drip dispersal systems must be submitted to the Department for evaluation/approval prior to use.

E. PERCOLATION TEST HOLE PRESOAKING

1. The purpose of the presoaking is to bring the soil moisture to levels representative of wet season conditions.

2. Presoaking shall consist of filling each percolation test hole with clean water to a minimum depth of twelve (12) inches above the base of the hole and refilling after drain down as necessary throughout a four (4) hour period.

   a. If more than six (6) inches of water remains above the bottom of the hole after presoaking and prior to the start of the test, this constitutes a failure without any further testing.

   b. If less than six (6) inches of water remains in the test hole after presoaking percolation testing of the hole may proceed.

3. Presoaking is required to be conducted on the day before the testing except under the following conditions:

   a. **Expansive Clay Soil.** In expansive clay soil, presoaking may occur on the same day if the testing is done during the wet weather testing period.

   b. **Sandy Soil**. In sandy soil with little or no clay content, presoaking may occur on the same day of testing and may be reduced to a minimum period of two (2) hours if after initially filling the hole twice with twelve (12) inches of water the water seeps completely away in less than ten minutes.

F. PERCOLATION TEST PROCEDURE

1. Percolation tests shall be conducted in accordance with the procedures below and results recorded on a form provided by the Department.

2. Clean water shall be added to bring the depth of water in the test hole to approximately six (6) inches above the bottom of the hole after the required presoaking period.

3. The start time and water level in the pipe shall be measured and recorded. After thirty (30) minutes have passed the time and the water level in the pipe shall be measured and recorded again.

4. Each hole shall be refilled to six (6) inches of water above the bottom of the hole. Water refill and water level drop measurement procedures shall be continued for a period of at least two (2) hours until:

   a. The water level drop stabilizes from a fixed reference point; and

   b. Three (3) consecutive water level drop readings do not vary by more than ten (10) percent or one-eighth (1/8) inch of each other.

5. If after one (1) hour the water level is dropping so rapidly to make thirty (30) minute readings infeasible, the time interval between readings shall be decreased to ten (10) minutes. The ten (10) minute tests shall be continued for at least one (1) hour and until the water level drop stabilizes in accordance with the requirements listed above. If the water drains so rapidly that ten (10) minute readings are infeasible:

   a. The interval shall be further reduced to five (5) minutes; and/or

   b. The time it takes for the water to drop exactly one (1) inch shall be measured and recorded as the resultant rate in minutes per inch (MPI)

E. ALTERNATIVE PERCOLATION TEST PROCEDURES

1. Alternate methods of measuring the percolation rate may be approved by the Department if the proposed procedures can be shown to produce a stabilized rate as described above.

8.2 DESIGN PERCOLATION RATE REQUIREMENTS

A. METHODOLGY

1. Percolation rates are first calculated for individual test holes (stabilized percolation rates) and are then adjusted (adjusted percolation rates) and averaged together for a design percolation rate.

B. INDIVIDUAL TEST HOLE PEROCLATION RATES

1. **Stabilized Percolation Rate.** A stabilized percolation rate shall be determined in accordance with the formula in **Table 8-1** for each test hole by averaging the last three (3) successive stabilized readings varying by no more than ten (10) percent or one-eighth (1/8) inch of each other.

Table 8-1 Stabilized Percolation Rate Formula
$\text{Stabilized Percolaton Rate (MPI)} = \frac{\sum(\text{Last 3 Readings})}{3}$

C. ADJUSTED PERCOLATION RATES

1. **Adjusted Percolation Rate.** An adjusted percolation rate shall then be calculated in accordance with the formula in **Table 8-2** for each test hole using a correction factor to adjust for the displacement of water by the gravel pack. The correction factor for a six (6) inch diameter hole with a four (4) inch perforated pipe and a one (1) inch thick gravel pack is 1.6.

Table 8-2 **Adjusted Percolation Rate Formula**
Adjusted Percolation Rate (MPI) = Stabilized Percolation Rate (MPI) x 1.6

D. DESIGN PERCOLATION RATE

1. The percolation rate used to determine the wastewater application rate for dispersal system design shall be calculated in accordance with the formula in **Table 8-3** as the sum of the adjusted percolation rates for each individual percolation test hole divided by the total number of percolation test holes completed.

Table 8-3 **Design Percolation Rate Formula**
$\text{Design Percolaton Rate (MPI)} = \dfrac{\sum(\text{Adjusted Percolation Rates})}{\#\ \text{Test Holes}}$

8.3 INTERPRETATION OF PERCOLATION TEST RESULTS

A. FAILING TEST RESULTS

1. If percolation rates are faster that one (1) MPI or slower than one hundred and twenty (120) MPI then the following guidelines shall be followed:

   a. If there are one (1) or two (2) failing test results, the following options are available:

      (1) Include the failing result(s) in the design percolation rate calculation and design the dispersal system accordingly;

      (2) Exclude the area represented by the failing test hole(s) in the design percolation rate calculations and design the dispersal system using the results from the other test holes. The lateral extent of the exclusion area shall be taken from the midpoint of the test hole with failing results and nearby passing test holes.

(3) Conduct additional testing in an alternate area or to refine the exclusion area represented by the failed test result(s).

b. If there are more than two (2) failing test results, additional testing will be required to define the limits of acceptable soil areas for the dispersal system and reserve area.

B. SOIL TYPE

1. Percolation rates are influenced by soil type as well as other factors such as structure, roots, gopher holes, coarse fragments and shrink-swell conditions.

2. **Table 8-4** provides a general relationship between soil type and expected percolation rate. Where percolation test results vary significantly from **Table 8-4** guidelines the System Designer shall evaluate and provide an explanation for the deviations.

Table 8-4
Soil Types & Associated Percolation Rate Guidelines

Soil Type	Soil Percolation Rate (MPI)
Coarse Sand	1 to 4
Fine Sand	5 to 10
Sandy Loam	11 to 20
Loam	21 to 30
Clay Loam	31 to 45
Silt-Clay Loam	46 to 60
Clay, Non-Swell	61 to 90
Clay, Swell	91 to 120

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FIGURE 8-1
STANDARD METHOD OF CONSTRUCTION

PERCOLATION TEST HOLE

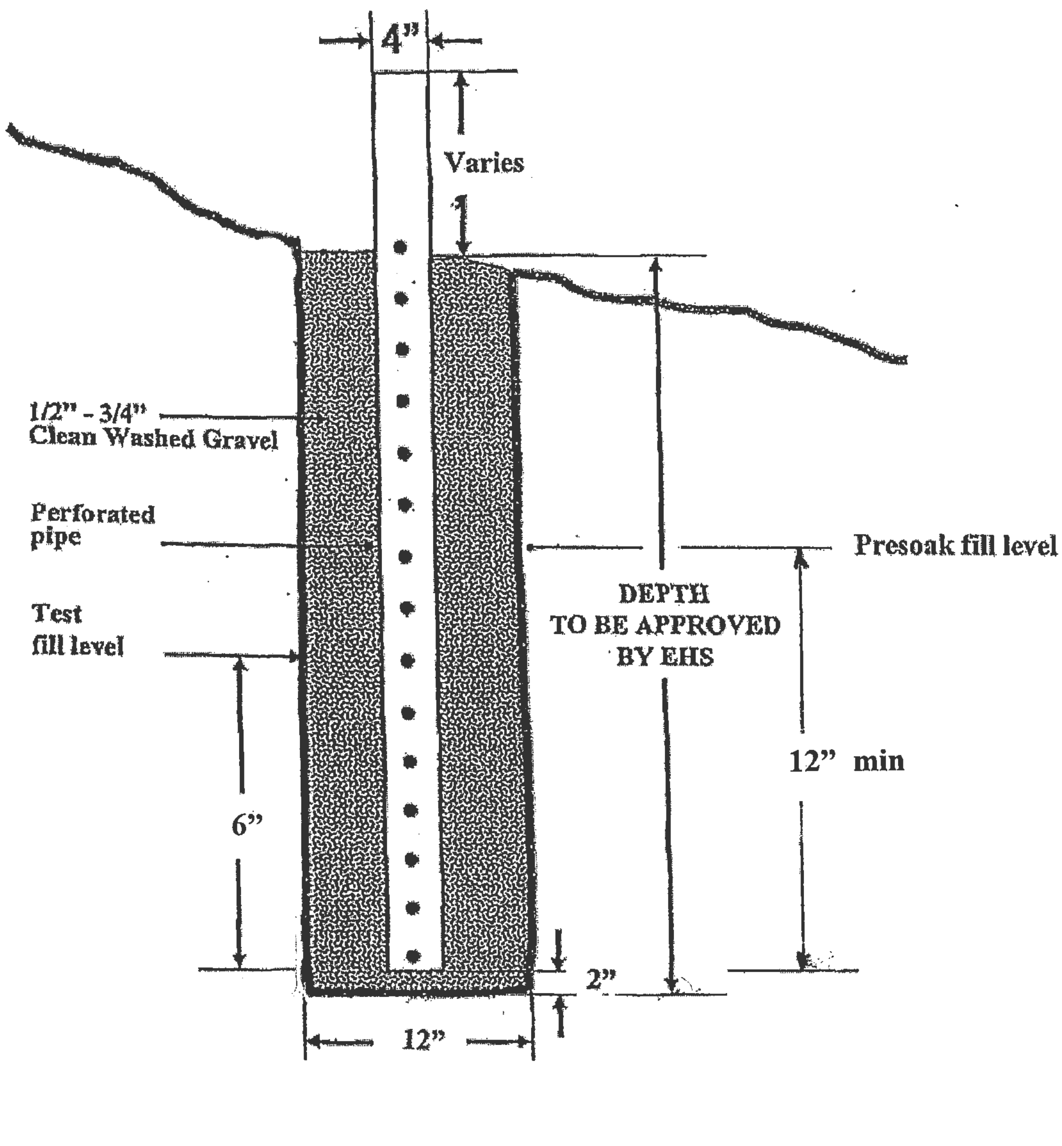
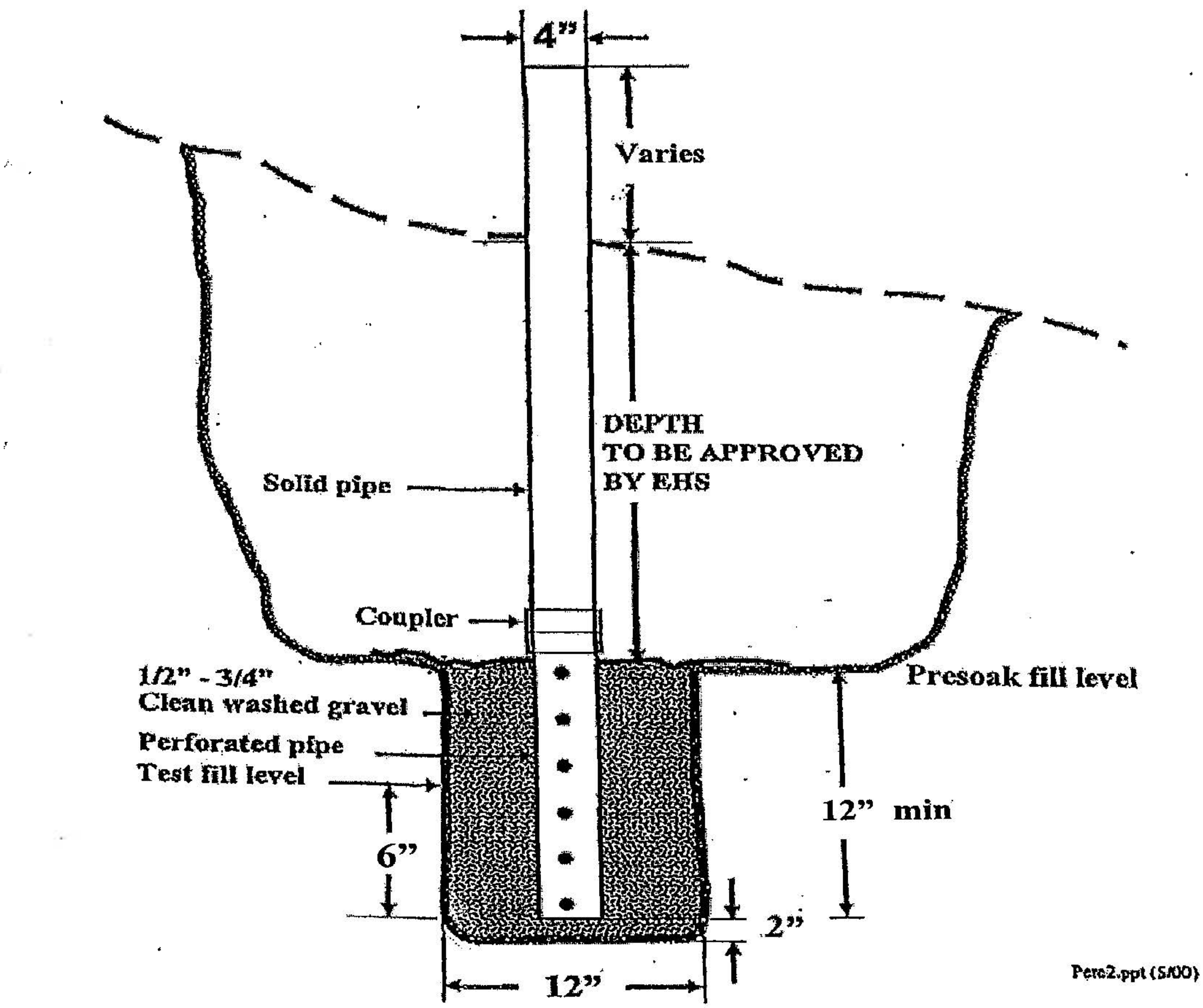


FIGURE 8-2

PERCOLATION TEST HOLE
ALTERNATIVE METHOD OF CONSTRUCTION



CHAPTER 9
GROUNDWATER LEVEL DETERMINATION REQUIREMENTS

9.0 CHAPTER OVERVIEW

This chapter provides the requirements for determining the groundwater level at a site during the site evaluation process to support design and permitting of an Onsite Wastewater System and is organized as follows:

Section 9.1: Groundwater Level Determination Requirements

Section 9.2: Wet Weather Testing Requirements

9.1 GROUNDWATER LEVEL DETERMINATION REQUIREMENTS

A. GENERAL

1. The anticipated high seasonal groundwater in the vicinity of an OWTS shall be estimated by:

   a. Visual indications observed in the soil profile study including the depth to saturated soil or free water and/or the highest extent of soil mottling and/or gleying; and/or

   b. Direct observation of groundwater levels during the time of year when the highest groundwater conditions are expected or known to occur (wet weather testing).

2. Where there is a discrepancy between the soil profile indications and direct observation, the direct observation shall govern.

9.2 WET WEATHER TESTING REQUIREMENTS

A. WHEN REQUIRED

1. Wet weather testing shall be performed by a System Designer or other Qualified Professional as allowed by their license and registration and may be required to verify the depth to the high seasonal groundwater under the following conditions:

   a. There is a discrepancy between soil profile indications (mottling or gleying) of high seasonal groundwater, data from nearby soil evaluations or groundwater observations, and other site characteristics or historical documentation indicating that a shallow groundwater table is likely to occur during the rainy season;

   b. The soil profile indicates sandy soil that lacks the necessary iron compounds required for mottling or gleying; and/or

   c. Field observations indicate high seasonal groundwater issues including but not limited to:

      (1) Landscape position, such as dispersal system location at the base of a hill, near a creek or otherwise located where water is likely to accumulate; and/or

      (2) Springs or other indications such as swampy/marshy appearance or presence of riparian or water-loving vegetation (e.g., sedges, rushes, dockweed, willows, or perennial grasses) indicating prolonged soil moisture.

d. An exception to wet weather testing may be allowed for sloping sites greater than five (5) percent where a curtain drain may feasibly be installed to intercept and remove lateral groundwater flow in the proposed dispersal system area in accordance with the design criteria in **Chapter 12**.

B. WET WEATHER TESTING PERIOD

1. Wet weather testing shall be conducted when sufficient rainfall has occurred in the area to establish the normal high seasonal groundwater table.

2. The wet weather testing period is from October through April and after at least fifty (50) percent of the average annual rainfall (as measured from October 1st through September 30th) has fallen and within a ten (10) day period following rainfall of at least one-half (0.5) inch in a forty-eight (48) hour period.

3. The wet weather testing period may be extended or shortened by the Department depending on rainfall patterns in a given year.

4. Data from local rainfall monitoring stations shall be used to determine when sufficient rainfall has occurred (e.g., California Irrigation Management Information System (CIMIS) at: http://www.cimis.waterca.gov/). The System Designer may propose a different source of historical data.

C. GROUNDWATER LEVEL MONITORING & PIEZOMETER INSTALLATION WORK PLAN REQUIREMENTS

1. Prior to conducting wet weather testing a work plan must be submitted to the Department. The work plan must include the following:

   a. **Preliminary Site Plan**. A preliminary site plan with pertinent topography and features and the proposed locations of piezometers to monitor the groundwater levels. A sufficient number of piezometers adequately spaced to encompass and represent the entire dispersal system area(s) including the reserve area for advanced OWTS shall be proposed.

   b. **Piezometer Construction Details.** Piezometer construction details including depth and screen interval.

      (1) Piezometer depth shall be equal to or greater than the required depth from the bottom of the dispersal system to groundwater.

      (2) High-flow OWTS may require installation of deeper groundwater monitoring wells to assess groundwater mounding (see **Chapter 10**).

   c. **Proposed Testing Frequency**. A proposed schedule for monitoring groundwater levels.

      (1) There must be a minimum of three (3) groundwater level readings spread equally over a minimum two (2) month period during the wet weather testing period.

(2) During the testing period there must also be at least one (1) additional reading within two (2) days of a significant rainfall event, defined as one (1) or more inches of rainfall within a twenty-four (24) hour period.

(3) More frequent observations may be necessary during elevated groundwater periods to identify maximum groundwater levels.

(4) A request may be made to the Department for an alternative testing frequency.

2. A permit may be required to install piezometers from the well permitting agency (Zone 7 Water Agency, Alameda County Water District, Alameda County Public Works or other well permitting agency). A copy of all permits must be submitted to the Department.

D. DEPARTMENT OBSERVATION

1. The System Designer or Qualified Professional must perform the wet weather testing in the presence of a Department representative. The Department may authorize the wet weather testing to proceed without a Department representative, however, such authorization must be in writing and may require submittal of photo documentation.

2. Written notice must be given to the Department at least forty-eight (48) hours in advance of conducting the wet weather testing. Additional time may be required to schedule the presence of the Department representative.

3. Notification and the request must include the Applicant’s name and assessor’s parcel number and street address of the property. Failure to provide sufficient notice may result in delay or a requirement to repeat the test.

4. If more than one site visit is required to observe the wet weather testing, a fee may be charged for each visit.

5. Piezometers must be staked and flagged so that they can be readily located for periodic observations.

E. WET WEATHER TESTING ALTERNATIVES

1. During years of low rainfall, such as drought conditions, or when wet weather testing is not practical for other reasons alternative approaches for the determination of high seasonal groundwater levels may approved.

2. Alternatives that may be approved are:

   a. **Conservative Assumption**. Adopt a highly conservative (worst case assumption) of groundwater vertical separation for the dispersal system design by extrapolating data from adjacent sites with consistent site conditions; or

   b. **Hydrogeological Report.** A complete groundwater report prepared by Qualified Professional as allowed by their license and registration may be submitted to the Department for review and approval.

      The report must contain supporting data for groundwater elevation conclusions and include an analysis of expected maximum groundwater elevations for dispersal system area. Elements of the report shall include:

      (1) Topographical and geographical characteristics of the site including slope of the land that could affect surface and subsurface drainage characteristics;

      (2) Soil classification and hydraulic conductivity of the soil;

      (3) Restrictive layers in the soil profile;

      (4) Indicators of high seasonal groundwater (e.g., gleying or soil mottling); and

      (5) Depth of observed groundwater in relationship to minimum soil depth requirements and depth of dispersal system.

CHAPTER 10
CUMULATIVE IMPACT ASSESSMENT REQUIREMENTS

10.0 CHAPTER OVERVIEW

This chapter provides the requirements for conducting cumulative impact assessments as part of the site evaluation process to support design and permitting of an Onsite Wastewater System and is organized as follows:

10.1 PROJECTS REQUIRING CUMULATIVE IMPACT ASSESSMENTS

A. WHEN REQUIRED

1. An evaluation of groundwater quality conditions and/or potential groundwater mounding beneath and in the vicinity of a site may be required as part of an Onsite Wastewater System design and installation approval.

2. Projects where cumulative impact assessments are required are listed in **Table 10-1** (included at the end of this chapter).

3. In addition to the projects listed in **Table 10-1**, the completion of a cumulative impact assessment may be required in any case where special circumstances related to the size, type or location of the OWTS warrant such analysis.

4. Criteria for assessing hydrological impacts for groundwater mounding or nitrogen loading will be considered on a case-by-case basis. The Department may rely upon Regional Water Board or Zone 7 staff or a third-party consultant to assist in the review. Costs for retaining a third-party consultant are the responsibility of the Applicant.

B. CUMULATIVE IMPACT ISSUES

1. The primary issues to be addressed in cumulative impact assessments include:

   a. **Groundwater Mounding**: A rise in the groundwater table, referred to as "groundwater mounding", that may occur beneath or downgradient of OWTS as a result of concentrated or high volume of hydraulic loading from one or more OWTS in a limited area.

   b. **Groundwater Nitrogen Loading:** Discharges from OWTS containing high concentrations of nitrogen that may contribute to rises in the nitrate level of local and regional aquifers.

2. Analysis of cumulative impact issues, other than those listed above which could pose potential water quality, public health, or safety risks may also be required.

10.2 GROUNDWATER MOUNDING ANALYSIS REQUIREMENTS

A. MINIMUM CRITERIA

1. The following is required for groundwater mounding analysis:

   a. Analysis of groundwater mounding effects shall be conducted using accepted principles of groundwater hydraulics. The cumulative impact assessment submitted to the Department shall include a description of the specific methodology and shall be supported with accompanying literature references, as appropriate.

   b. Assumptions and data used for the groundwater mounding analysis shall be stated along with supporting information.

   c. A map of the project site showing the location and dimensions of the proposed OWTS and the location of other nearby Onsite Wastewater Systems, wells and relevant hydrogeological features (e.g., site topography, watercourses, subsurface drains, etc.) shall be provided.

   d. The wastewater flow used for groundwater mounding analyses shall be the wastewater design flow, unless supported adequately by other documentation or rationale.

   e. Groundwater mounding analyses shall be used to predict the highest rise of the groundwater table and shall account for background groundwater conditions during the wet weather season.

   f. All relevant calculations necessary for reviewing the groundwater mounding analysis shall accompany the submittal.

   g. Any measures proposed to mitigate or reduce the groundwater mounding effects shall be presented and described as to their documented effectiveness elsewhere, special maintenance or monitoring requirements or other relevant factors.

   h. The maximum acceptable rise of the groundwater table for short periods of time (e.g., one [1] to two [2] weeks) during the wet weather season, as estimated from groundwater mounding analyses, shall be such that the minimum two (2) feet separation to the groundwater is maintained for all OWTS.

10.3 GROUNDWATER NITROGEN LOADING ANALYSIS REQUIREMENTS

A. MINIMUM CRITERIA

1. **Annual Chemical-Water Mass Balance.** Analysis of nitrogen loading effects shall, at a minimum, be based upon construction of an annual chemical-water mass balance. The specific methodology shall be described and supported with accompanied literature references as appropriate.

2. **Assumptions and Data.** Assumptions and data for the mass balance analysis shall be stated, along with supporting information. Such supporting information should include, at a minimum:

   a. Climatic data (e.g., precipitation, evapotranspiration rates);

   b. Groundwater occurrence, depth and flow direction(s);

   c. Background groundwater quality data, if available;

   d. Soil conditions and runoff factors;

   e. Wastewater characteristics (i.e., flow and nitrogen content); and

   f. Other significant nitrogen sources in the impact area (e.g., livestock, other waste discharges, etc.).

3. **Calculations.** All relevant calculations necessary for reviewing the nitrogen loading analysis shall accompany the submittal.

4. **Map of Project Siting.** A map of the project siting showing the location and dimensions of the proposed OWTS and the location of other nearby Onsite Wastewater Systems, wells and relevant hydrogeological features (e.g., site topography, watercourses, subsurface drains, etc.) shall be provided.

5. **Wastewater Flow and Nitrogen (N) Concentrations.** The minimum values for average wastewater flow and average wastewater nitrogen concentration of septic tank effluent used for nitrogen loading analyses shall be in accordance with the criteria in **Table 10-2** unless supported adequately by other documentation or rationale.

Table 10-2
Nitrogen Loading Analysis
Minimum Average Wastewater Flow & Nitrogen Concentration Criteria

Type of Facility	Average Wastewater Flow (gpd)	Nitrogen Concentration (mg/L)
Residential Facilities	50 per person	70
Multi-Unit Residential or Non-Residential Facilities	Project specific values	Project specific values

6. **Total Annual Nitrogen Loading Calculation**s. The total annual nitrogen loading from an Onsite Wastewater System shall be determined in accordance with the formula provided in **Table 10-3.**

Table 10-3
Total Annual Nitrogen Loading

$$N\left(\frac{\text{lb}}{\text{year}}\right) = (\text{Average Wastewater Flow, gpd}) * \left(\frac{3.785\text{L}}{\text{gal}}\right) * \left(\text{N Concentration}, \frac{\text{mg}}{\text{L}}\right) * \left(\frac{365\text{ day}}{\text{year}}\right) * \left(\frac{\text{lb}}{453{,}592\text{ mg}}\right)$$

Notes:

(1) **Dwellings with less than or equal to three (3) bedrooms.** The minimum average wastewater flow for residential dwellings with up to three (3) bedrooms shall be one hundred and fifty (150) gpd.

(2) **Dwellings with more than 3 bedrooms:** The minimum average wastewater flow for residential dwellings with more than three (3) bedrooms shall be one hundred and fifty (150) gpd for the first three (3) bedrooms plus an additional fifty (50) gpd for each additional bedroom.

(3) **Nitrogen Concentration**. The concentration of nitrogen in milligrams per liter of wastewater shall be in accordance with the criteria in **Table 10-2.**

7. **Cumulative Nitrogen Loading Criteria.** The minimum criteria for evaluating the cumulative nitrogen loading from proposed OWTS (measured in milligrams of nitrate per liter [mg-N/L]) shall not cause the groundwater nitrate-nitrogen concentration to exceed the criteria in **Table 10-4**.

Table 10-4
Minimum Cumulative Nitrogen Loading Criteria from Proposed OWTS

Water Supply	Land Use	Groundwater Nitrate-Nitrogen ($NO_3 - N$) Concentration (mg-N/L)
Areas Served by Individual Wells	Existing lots of record[1]	≤ 7.5
	New subdivsions[2]	
Areas <u>Not</u> Served by Individual Wells	Existing lots of record[1]	$\leq 10^3$
	New subdivsions[2]	

<u>Notes:</u>

[1]Concentration measured at the nearest existing or potential point of groundwater withdrawal (e.g., well location).

[2]Average concentration measured over the geographical extent of the subdivision.

[3]The United States Environmental Protection Agency (USEPA) maximum contaminant level (MCL) drinking water standards limit. Elevated nitrate can interfere with blood-oxygen levels in infants and cause methemoglobinemia or blue-baby syndrome.

8. **Use of More Conservative Values.** The Department reserves the right to require in any individual case the use more conservative values than cited above if the values are not likely to be representative of the proposed OWTS or where deemed necessary for protection of public health, or based upon specific requirements or recommendations of the Zone 7 or San Francisco Bay Regional Water Board.

9. **Nitrogen Reducing Treatment Processes.** Any measures proposed to mitigate or reduce the nitrogen loading effects shall be presented and described as to their documented effectiveness elsewhere, special maintenance or monitoring requirements or other relevant factors.

10.4 ZONE 7 GROUNDWATER NITROGEN LOADING REQUIREMENTS

A. NEW, REPLACEMENT AND MODIFIED OWTS REQUIREMENTS

1. New, replacement and modified OWTS on parcels located in the Upper Alameda Creek Watershed above Niles (Watershed) must meet the nitrogen loading requirements contained in the Zone 7 2015 Nutrient Management Plan for the Livermore Valley Groundwater Basin (NMP), issued by Zone 7 in February 2015 and adopted by the San Francisco Bay Regional Water Board in March 2016, and all subsequent changes.

B. EXISTING OWTS REQUIREMENTS

1. The Zone 7 NMP provides an exception to the nitrogen loading requirements for existing OWTS that are properly-functioning and properly-sized.

C. AREAS OF CONCERN FOR HIGH GROUNDWATER NITRATE CONCENTRATIONS

1. The NMP nitrogen loading requirements are dependent on the total size of the parcel and whether the parcel is located inside one of five (5) localized areas of concern within the Watershed with high groundwater nitrate concentrations where the use of OWTS is the predominant method for wastewater disposal.

2. The areas of concern (AOC) are shown in **Figure 10-1** (included at the end of this chapter) and include:

   a. Happy Valley, Pleasanton;

   b. Buena Vista, Livermore;

   c. Mines Road, Livermore;

   d. May School, Livermore; and

   e. Greenville, Livermore.

D. NITROGEN LOADING REQUIREMENTS

1. The NMP nitrogen loading requirements are the total maximum allowable nitrogen loading rates from all OWTS (existing and proposed) on the parcel and are based on the assumption that the nitrogen loading from one rural residential equivalent (RRE) is thirty-four (34) pounds of nitrogen per year (i.e., nitrogen loading from a typical single-family dwelling served by a standard OWTS).

2. The NMP nitrogen loading requirements include minimization of nitrogen loading from all OWTS (existing and proposed) by applying one (1) RRE provisions based on the location and size of the parcel as discussed below and in accordance with the criteria presented in the chart on **Figure 10-2** (included at the end of this chapter) and in **Table 10-5** below. The Department may be contacted to assist with determining the requirements that apply to a parcel.

    a. **Parcels Located Outside AOC.** Application of one (1) RRE per five (5) acre maximum provisions.

    b. **Parcels Located Inside AOC. A**pplication of one (1) RRE per ten (10) acre maximum provisions and requiring advanced OWTS with nitrogen-reducing treatment.

Table 10-5
Maximum Allowable Annual Nitrogen Loading Per Parcel for Parcels Located in Zone 7 Jurisdiction

Parcel Location	Parcel Size	Nitrogen Loading (lbs)
Outside AOC	Parcels ≤ 5 Acres	34
	Parcels > 5 Acres	(# Acres) * 6.8
Inside AOC	Parcels ≤ 7 Acres	23.8
	Parcels > 7 Acres	(# Acres) * 3.4
		(# Acres) * 6.8[1]

Notes:

[1]Alternative loading rate allowed if a hydrogeological study is performed that assesses current groundwater nitrate conditions beneath the site and demonstrates that the proposed project will not cause nitrate concentrations to rise.

3. **Hydrogeological Study Requirements.** The provision for increased maximum allowable annual nitrogen loading rates per parcel is intended to encourage additional hydrogeological studies that can further define the boundaries and nitrate concentrations of areas of concern. The study must show that total onsite recharge does not exceed the lower of the following concentrations:

a. Thirty-six (36) milligrams per liter (i.e., eighty [80] percent of the MCL concentration for drinking water). The eighty (80) percent MCL limit is based on Zone 7 Water Quality Policy and provides a standard buffer for not exceeding the MCL; or

b. The maximum concentration at the site as determined from groundwater monitoring data.

4. **High-Strength Wastewater and High-Flow OWTS**. In addition to the requirements in **Table 10-5**, facilities with high-strength wastewater and high-flow OWTS must demonstrate by analysis that the project will result in an improved nitrate condition beneath the site and not cause the offsite condition to worsen and must install groundwater monitoring wells to monitor nutrient loading from OWTS operation.

10.5 GROUNDWATER MONITORING WELL INSTALLATION REQUIREMENTS

A. WHEN REQUIRED

1. Installation of groundwater monitoring wells to assess the current groundwater nitrate conditions beneath the site, evaluate groundwater mounding and/or monitor nutrient loading from an OWTS may be required as part of the OWTS design and installation approval.

2. Monitoring wells are required to be installed on high-strength wastewater and high-flow OWTS for the purpose of monitoring the groundwater quality in the vicinity of the OWTS.

   a. For high-strength wastewater and high-flow OWTS, at least one monitoring well shall be constructed to a depth that will allow verification that the OWTS is functioning properly and not contaminating groundwater;

   b. Monitoring wells shall extend to one foot below the anticipated lowest seasonal groundwater level; and

   c. Monitoring wells must meet applicable standards for monitoring wells and be constructed under permit from the administrative authority for well permits.

B. WORK PLAN REQUIREMENTS

1. OWTS design documents for sites requiring an evaluation of groundwater quality conditions and/or potential groundwater mounding require submittal of a groundwater monitoring well installation work plan prepared by a Qualified Professional as allowed by their license and registration for review and approval by the Department, Zone 7 and/or the Regional Water Board.

2. Installation of groundwater monitoring wells requires a permit. Applications for permits for groundwater monitoring wells must be submitted for approval to the applicable well permitting agency (Zone 7 Water Agency, Alameda County Water District, or Alameda County public Works). A copy of permits must be submitted to the Department.

Table 10-1
Projects Requiring Cumulative Impact Assessment[1]

Type of Project	Geographic Location	Lot Size (acres)	Design Wastewater Flow (gpd)	Groundwater Mounding Analysis	Nitrogen Loading Analysis
Individual Residence	Countywide	No criteria	1,000+	No	No
	Impaired Areas	Per Area of Concern Criteria			
Residence with Second Unit	Countywide	< 1	1,000+	No	Yes
	Impaired Areas	Per Area of Concern Criteria			
Multiunit and Non-Residential	Countywide	< 1	1,000+	No	Yes
		No criteria	1,500+	Yes	No
		No criteria	2,500+	Yes	Yes
	Impaired Areas	Per Area of Concern Criteria			
Subdivisions	Countywide	> 2.5[2]	No criteria	No	No
		< 2.5[2]	No criteria	No	Yes
	Impaired Areas	Per Area of Concern Criteria			
Any System < 200 feet from a Wetland or Vernal Pool[3]	Countywide	No criteria	No criteria	Yes	Yes

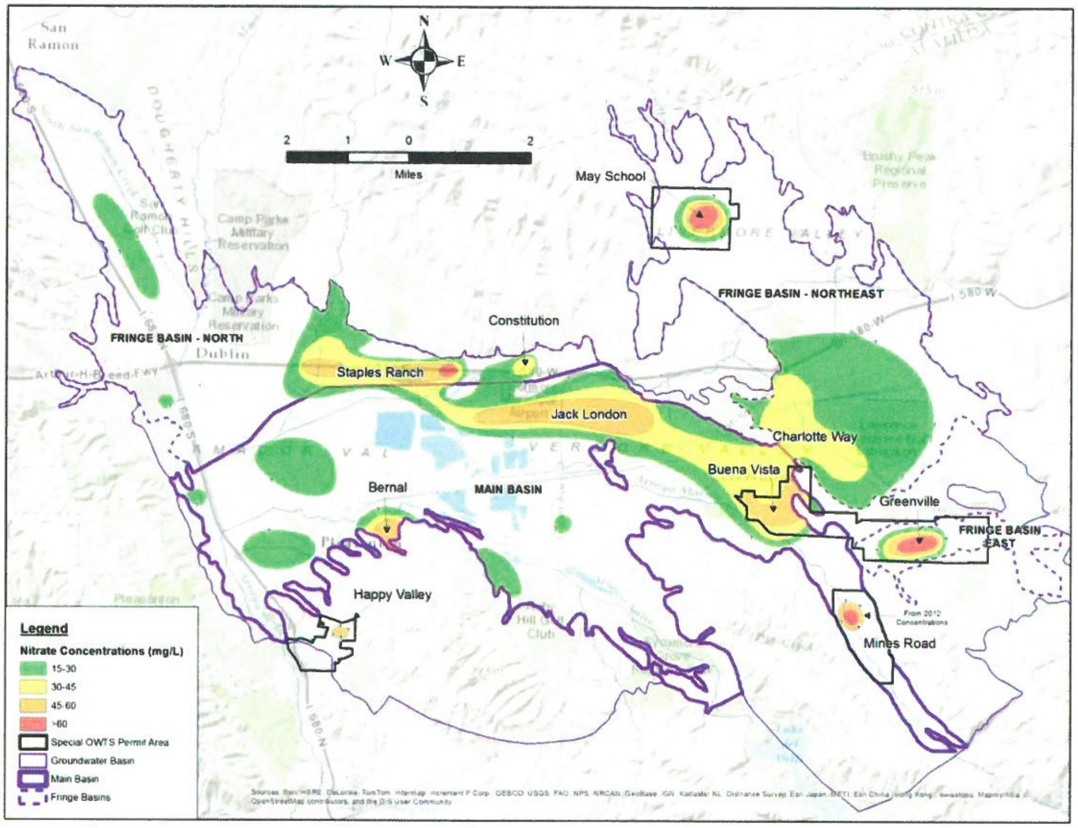
<u>Notes:</u>

[1]The Department reserves the right to require the completion of a cumulative impact assessment in any case where special circumstances related to the size, type, or location of the OWTS warrant such analysis.

[2]This is an average lot size for a subdivision.

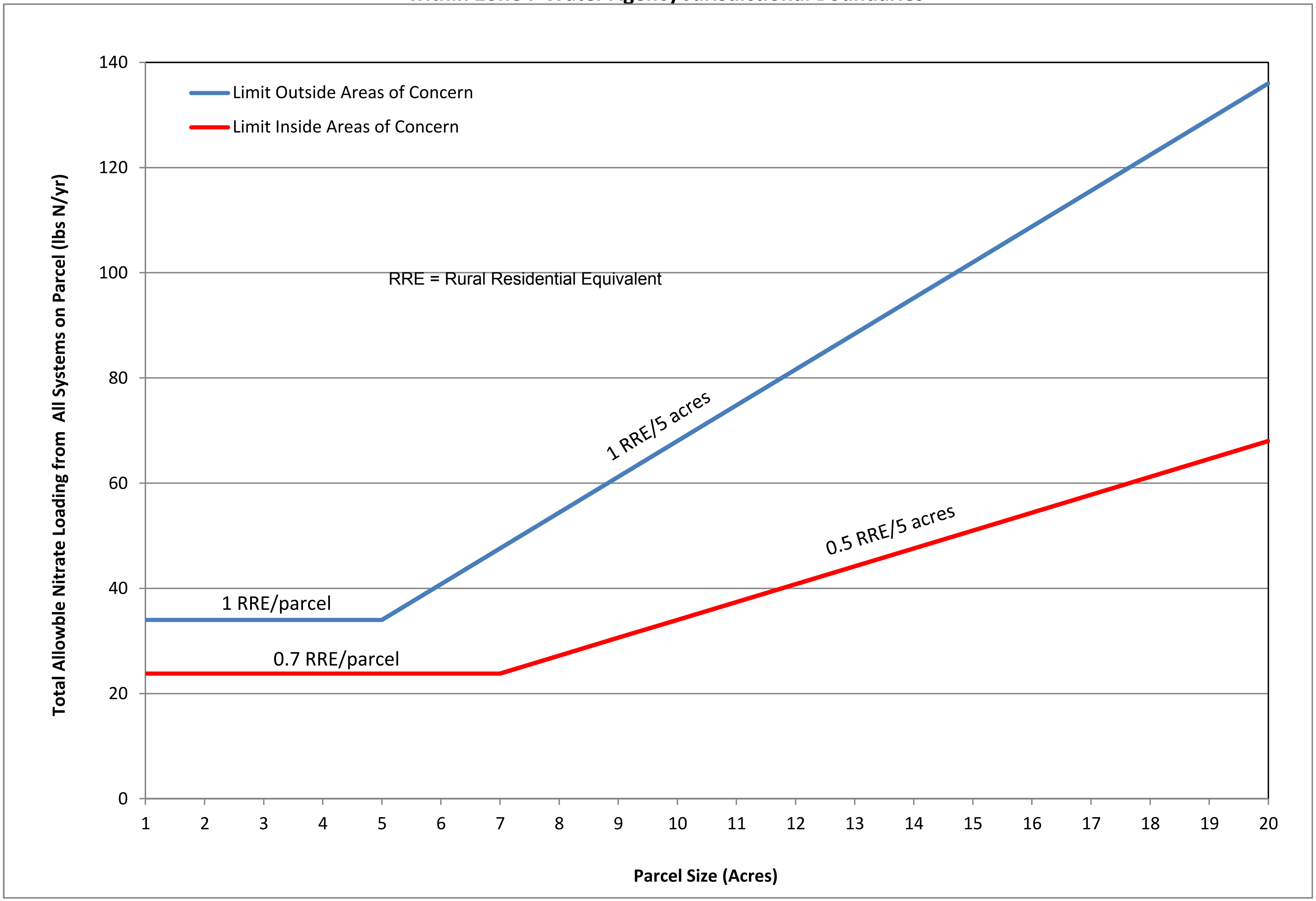
[3]The hydrological and water quality analysis requirements may be modified depending on site specific conditions and the extent to which the OWTS discharge contributes flow to any catchment area.

Figure 10-1
Nitrate Impacted Groundwater Areas of Concern
Upper Alameda Creek Watershed Above Niles



Source Zone 7 Water Agency July 2015 Nutrient Managment Plan

FIGURE 10-2
Nitrogen Loading Requirements
within Zone 7 Water Agency Jurisdictional Boundaries



Source: Zone 7 Water Agency July 2015 Nutrient Management Plan

CHAPTER 11
GEOTECHNICAL EVALUATION REQUIREMENTS

11.0 CHAPTER OVERVIEW

This chapter provides the requirements for conducting geotechnical evaluations as part of the site evaluation process to support design and permitting of an Onsite Wastewater System and is organized as follows:

11.1 PROJECTS REQUIRING GEOTECHNICAL EVALUATIONS

A. WHEN REQUIRED

1. Geotechnical evaluations shall be required in any of the following circumstances:

    a. When dispersal systems are proposed on sites with natural ground slopes greater than thirty (30) percent;

    b. When a specific type of dispersal system is proposed in an area with a slope greater than the maximum slope requirements provided in **Table 5-1** through **Table 5-6**. (increases of up to five [5] percent may be allowed);

    c. When a proposed Onsite Wastewater System is located within an earthquake fault zone or a seismic hazard zone, as delineated on the official maps published for that purpose by the USGS, or when such hazards are otherwise known or suspected in the location of the Onsite Wastewater System;

    d. When benching or fill is proposed in the dispersal system area, with the exception of fill required for an at-grade or mound dispersal system;

    e. For corrective actions or repair of an existing Onsite Wastewater System if warranted by site topography;

    f. For proposed reductions in horizontal setbacks from cuts, embankments, steep slopes or an unstable land mass; and/or

    g. As otherwise required by law.

2. The scope of geotechnical work shall include an evaluation and recommendations to support the siting of the System.

11.2 GEOTECHNICAL REPORT REQUIREMENTS

A. MINIMUM CRITERIA

1. A geotechnical report, prepared by a Qualified Professional as allowed by their license and registration, shall be used to communicate soil and geologic site conditions, interpretations, analysis and recommendations pertinent to the design, installation and operation of a System where required by this Manual.

2. The geotechnical report must specially reference the System design plan.

3. If at some future date, the System design plan is appreciably modified, an amended geotechnical report must be submitted that addresses the modified design plan.

4. The geotechnical report must discuss the following:

   a. Geology;
   b. Slope stability and seismic hazards;
   c. Soil;
   d. Groundwater;
   e. Drainage;
   f. Percolation rate;
   g. Topography;
   h. Cuts;
   i. Vegetation; and
   j. Other pertinent site features.

5. The geotechnical report shall include any recommendations deemed appropriate or necessary to mitigate potential slope stability, drainage or seepage concerns associated with the System design, installation and operation including as applicable recommended horizontal setback(s) from any cut banks, embankments, steep slopes or unstable land masses.

6. The geotechnical report shall state specifically in the conclusion that the proposed System will not (or other wording such as not likely to, risk is very low, etc.):

   a. Permit wastewater effluent to surface;
   b. Degrade water quality;
   c. Affect soil stability;
   d. Present a threat to public health or safety; and
   e. Create a public nuisance.

7. The geotechnical report shall be wet-stamped and signed by the Qualified Professional.

PART 3

SITE MODIFICATION & STABILIZATION REQUIREMENTS

CHAPTER 12
GROUNDWATER CURTAIN DRAIN DESIGN REQUIREMENTS

12.0 CHAPTER OVERVIEW

This chapter provides design criteria for site modification measures that may be used to control shallow perched groundwater and is organized as follows:

12.1 CURTAIN DRAIN OVERVIEW

A. GENERAL

1. Dispersal trenches can act as a collection area for transient subsurface water flow and in the worst case may be flooded during heavy rain events or throughout the rainy season. This reduces the dispersal system capacity during the wet season and can also contribute to a long-term decline in the dispersal system effectiveness and potential surface failures.

2. In areas where rainfall readily percolates through very permeable surface soil and perches along the contact with the less permeable substrata site drainage measures may be required to lower the groundwater level in the dispersal system area.

3. One of the most effective drainage measures is a "curtain drain" (also called "subdrain" or "french drain") which consists of a subsurface gravel trench installed upslope of a dispersal system designed to intercept shallow perched groundwater flow and divert it away from or around the dispersal system area.

4. The installation of a curtain drain may be considered for new OWTS installations as well as to rehabilitate a failing OWTS affected by high seasonal groundwater.

12.2 CURTAIN DRAIN SITING REQUIREMENTS

A. GROUND SLOPE

1. Curtain drains shall only be allowed on sites with a slope of greater than five (5) percent.

2. The use of curtain drains to dewater a flat site will not be allowed.

B. LOCATION

1. Curtain drains may be positioned upslope or to the side of a dispersal system area to intercept and drain subsurface water away from the dispersal system in accordance with the horizontal setback requirements in **Table 5-7**.

2. Curtain drains are not to be used as underdrains located downslope from the dispersal system area in an attempt to lower the groundwater table.

C. SITE INVESTIGATION REQUIREMENTS

1. Prior to approval of a curtain drain, a site investigation shall be conducted by a Qualified Professional as allowed by their license and registration to:

   a. Document soil, geologic and groundwater conditions on the site;

   b. Assess the subsurface conditions to determine the feasibility and means of controlling groundwater levels with a curtain drain including whether or not the groundwater of concern is a perched condition above a clearly definable restrictive/impermeable soil layer;

   c. Determine the appropriate depth and location for the proposed curtain drain and outlet point based on soil, groundwater and other site conditions; and

   d. Prepare a map of the site including slope contours, drainage and other pertinent site features.

12.3 CURTAIN DRAIN DESIGN & APPROVAL REQUIREMENTS

A. DESIGN REQUIREMENTS

1. **Specifications.** The curtain drain shall consist of a gravel trench constructed as shown in **Figure 12-1** (included at the end of this chapter) and designed in accordance with the following minimum specifications:

   a. **Trench Width**. Twelve (12) inches minimum.

   b. **Trench Depth**. Shall extend to a depth of at least six (6) inches into the underlying impermeable layer.

   c. **Filter Material**. Filter material shall meet the material specifications for drain rock in **Chapter 35** and shall extend from trench bottom to within six (6) to twelve (12) inches of adjacent ground surface elevation. Caltrans Class 2 permeable filter material may substituted for drain rock.

   d. **Filter Fabric**. A geotextile "filter fabric" meeting the material specifications in **Chapter 36** shall surround the drain rock. The Department may waive the requirements of a filter fabric where Caltrans Class 2 permeable filter material is used.

   e. **Perforated Collection Pipe**. Collection pipe shall consist of four (4) inch diameter perforated drain pipe meeting the material specifications in **Chapter 33**, oriented with holes down and installed on top of the drain rock approximately two (2) to four (4) inches above the trench bottom.

   f. **Backfill Material.** Native soil shall be use to backfill the trenches to match the elevation of the adjacent finished ground surface subsequent to placement of the pipe, filter fabric and filter material.

g. **Outlet Pipe**. The outlet pipe shall consist of minimum four (4) inch diameter solid (non-perforated) drain pipe meeting the material specifications in **Chapter 33**.

h. **Cleanouts**. Cleanouts shall be provided to the finished ground surface elevation: at a minimum in the following locations:

(1) at the upslope end of the drain;

(2) at bends of forty-five (45) degrees or greater; and

(3) at least every four hundred (400) feet along the length of the drain.

i. **Slope**. The trench and pipe shall be sloped for gravity flow at a minimum one (1) percent gradient throughout the trench and extending to the outlet point. The curtain drain must drain by gravity only.

j. **Outlet**. The outlet must be on the property being developed and located so the flow does not adversely affect the drainage or any existing or proposed System on the subject parcel or neighboring parcels. The downslope outlet shall be protected against blockage or damage through the use of screening, rock cover, junction box or other suitable means.

k. **Erosion Control**. Erosion control protection shall be provided at drain outlet point.

2. **Engineering Plan.** An engineering plan for the curtain drain shall be prepared by a Qualified Professional as allowed by their license and registration and shall include at a minimum:

a. Plan, profile, cross section, and details of the curtain drain, supporting data and calculations and a plan for groundwater monitoring;

b. The site map prepared to support the design and show the location of proposed and existing Systems on the parcel; and

3. The curtain drain design must be incorporated into the OWTS design plans or corrective action plans for existing OWTS.

B. FIELD DEMONSTATION REQUIREMENTS

1. Depending on the site conditions and the supporting information supplied with the engineering plan a field demonstration may be required to evaluate the effectiveness of the curtain drain prior to approval of the plans by the Department:

a. **No Field Demonstration Required.** For cases where the site investigation shows the groundwater condition to be mitigated is perched water above a clearly definable restrictive/impermeable layer (e.g., stiff, plastic clayey soil), the curtain drain plan may be approved without the need for field demonstration of its effectiveness.

b. **Pilot Demonstration Required.** For cases where the site investigation shows the groundwater condition to be mitigated is most probably perched water but there is some level of uncertainty about the extent or degree of impermeability of the identified restrictive layer, the Department may require a pilot test of a portion of the proposed curtain drain prior to approval. The pilot test, conducted by a Qualified Professional, will require the installation of a section of the curtain drain in accordance with the proposed design, along with installation of piezometers in appropriate locations (upslope and downslope of the drain) as needed to provide evidence of the effectiveness in lowering the groundwater table during the wet season. The Qualified Professional is responsible for presenting the details of the pilot demonstration, overseeing the installation, monitoring the performance and reporting the results to the Department.

c. **Full-Scale Demonstration Required.** For cases where the site investigation shows limited or questionable evidence that the groundwater condition to be mitigated is perched water above a defined restrictive layer, the Department may require a full-scale installation and monitoring of the proposed curtain drain prior to approval of the OWTS design. The full-scale test, conducted by a Qualified Professional, will require the installation of the entire curtain drain in accordance with the proposed design, along with installation of piezometers in appropriate locations (upslope and downslope of the drain) as needed to provide evidence of the effectiveness in lowering the groundwater table during an entire wet weather season. The Qualified Professional is responsible for presenting the details of the monitoring plan, overseeing the installation, monitoring the performance, and reporting the results to the Department.

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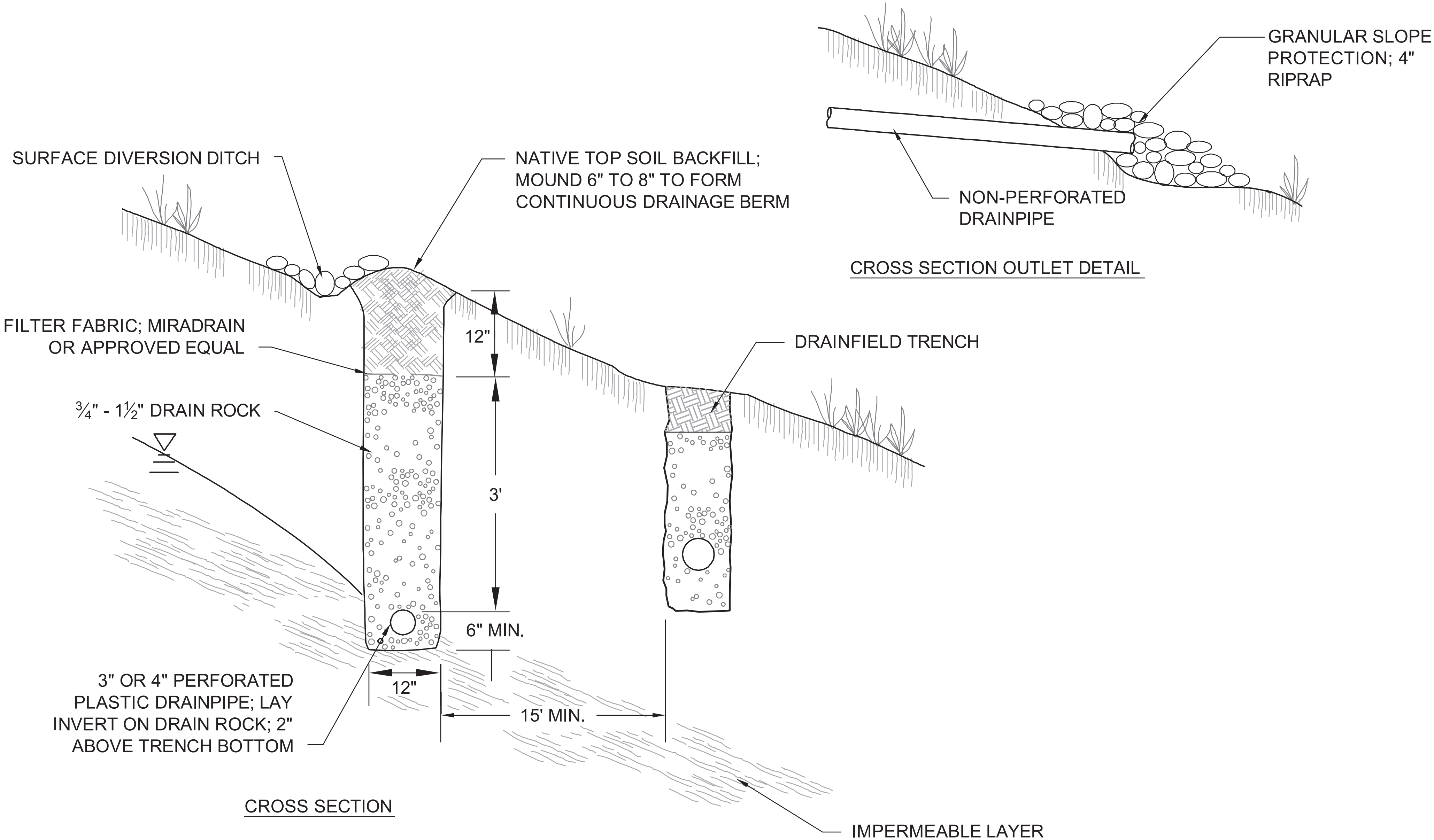

FIGURE 12-1

5 CURTAIN DRAIN SCHEMATIC DETAIL

CHAPTER 13
SURFACE WATER DRAINAGE DESIGN REQUIREMENTS

13.0 CHAPTER OVERVIEW

This chapter provides design criteria for site modification measures that may be used to control surface water drainage and is organized as follows:

Section 13.1: Surface Water Drainage Site Modifications & Stabilization Measures Overview

Section 13.2: Surface Water Drainage Structure Requirements

Section 13.3: Erosion Control Requirements

13.1 SURFACE WATER DRAINAGE SITE MODIFICATION & STABILIZATION MEASURES OVERVIEW

A. GENERAL

1. Site modifications and stabilization measures used to control surface water and stabilize the site to protect the integrity and performance of Onsite Wastewater System components may be required in certain situations.

2. Site modification and stabilization measures that may be used include but are not limited to surface water drainage structures and erosion control measures.

13.2 SURFACE WATER DRAINAGE STRUCTURE REQUIREMENTS

A. MINIMUM DESIGN CRITERIA

1. Any concentrated flow of surface water drainage that may affect an Onsite Wastewater System shall be intercepted and diverted from the System.

2. For new Onsite Wastewater Systems, drainage for the site development shall be planned and dispersed in a way that does not adversely affect the Onsite Wastewater System.

3. Surface water drainage structures proposed as part of the Onsite Wastewater System design must be designed by a Qualified Professional as allowed by their license and registration and incorporated into the site drainage and grading plan, as applicable, and OWTS design plans or corrective action plans.

4. Surface water drainage structures shall not adversely affect the drainage or any existing or proposed Onsite Wastewater System on the subject parcel or neighboring parcels.

5. Surface water drainage structure designs shall include at a minimum the following:

    a. Plan, profile, cross section, and details of the drainage structure and outlet protection.

    b. The site map prepared to support the System design showing the location of proposed and existing Systems on the parcel, the surface water drainage structures and watershed;

c. Supporting runoff and hydraulic calculations;

d. Meet horizontal setback requirements in **Table 5-7**; and

e. Meet all other requirements, including local ordinances.

6. Surface water drainage designs may require approval by the local building authority.

13.3 EROSION CONTROL REQUIREMENTS

A. MINIMUM CRITERIA

1. Design of Onsite Wastewater Systems must consider measures to protect against erosion during construction and stabilize the site at the conclusion of work.

2. Erosion control measures must be implemented and shown on the site plans in the following OWTS:

   a. Systems that include above ground dispersal systems (e.g., at-grade, mound or cover fill dispersal systems);

   b. Systems on slopes greater than twenty (20) percent;

   c. High-flow Systems;

   d. Systems located adjacent to a surface water body; and/ or

   e. Systems located in environmentally sensitive areas, as determined during the planning or building department review.

3. Erosion control plans must meet all other requirements, including local ordinances, and be approved by the local building department, as applicable.

PART 4

WASTEWATER FLOW & STRENGTH DESIGN CRITERIA

CHAPTER	TITLE
CHAPTER 14	WASTEWATER DESIGN FLOW REQUIREMENTS
CHAPTER 15	WASTEWATER DESIGN STRENGTH REQUIREMENTS

CHAPTER 14
WASTEWATER DESIGN FLOW REQUIREMENTS

14.0 CHAPTER OVERVIEW

This chapter provides the criteria for wastewater design flows used in Onsite Wastewater System design and is organized as follows:

Section 14.1: Wastewater Design Flow Requirements Overview

Section 14.2: Design Flow Requirements for Single Family Residences & Secondary Units

Section 14.3: Design Flow Requirements for Multi-Unit Residential and Non-Residential Facilities

14.1 WASTEWATER DESIGN FLOW REQUIREMENTS OVERVIEW

A. GENERAL

1. The System Designer is responsible for ensuring that the wastewater flow rate used for the design of Onsite Wastewater Systems is developed based on full consideration of projected activities, occupancy and types of facilities.

2. All system components shall be sized using the peak daily wastewater flow rate (or wastewater design flow).

3. The dispersal system may be sized using an average wastewater flow rate if a flow equalization tank is incorporated into the treatment train.

14.2 DESIGN FLOW REQUIREMENTS FOR SINGLE FAMILY RESIDENCES & SECONDARY UNITS

A. WASTEWATER DESIGN FLOW CRITERIA

1. The wastewater design flow used for design of Onsite Wastewater Systems for single family residences and secondary units (including manufactured homes) shall be based on a factor of one hundred and fifty (150) gallons per day (gal/day) per bedroom for the first three (3) bedrooms, plus seventy-five (75) gal/day for each additional bedroom, as indicated in the **Table 14-1** below.

Table 14-1
Wastewater Design Flow Criteria – Residential Facilities

No. of Bedrooms	gal/day
1	150
2	300
3	450
4	525
5	600
6	675
>6	+ 75 per bedroom

2. For residential buildings the Department may grant wastewater design flow reductions of up to twenty (20) percent where water saving devices such as low flush toilets, urinals, flow restrictors and aerators for faucets and showerheads that meet low-flow efficiency standards set by the California Energy Commission are incorporated permanently into the buildings being used.

3. The wastewater design flows for a primary residence and secondary dwelling unit shall be determined independently, regardless of whether the flows are treated separately or combined in a single Onsite Wastewater System.

14.3 DESIGN FLOW REQUIREMENTS FOR MULTI-UNIT RESIDENTIAL AND NON-RESIDENTIAL FACILITIES

A. WASTEWATER DESIGN FLOW CRITERIA

1. The wastewater design flow used for the design of Systems for multi-unit residences and non-residential facilities shall be developed based on full consideration of projected activities, occupancy and types of facilities.

2. Minimum wastewater design flows used for the design of Systems for multi-unit residences and non-residential facilities are presented in **Table 14-2** (included at the end of this chapter).

3. The Department may consider adjustment to the minimum criteria listed in **Table 14-2** for specific facilities based upon documented wastewater flow monitoring data.

4. For facilities not listed in **Table 14-2** wastewater design flows are to be estimated based on either:

    a. Appropriate literature references (e.g., USEPA) for the type of facility proposed; or

    b. Documented wastewater flow monitoring data for a comparable facility.

5. In all cases, the design plans shall include sufficient technical information to support the proposed wastewater design flow estimate.

Table 14-2
Wastewater Design Flow Guidelines
Multi-Unit and Non-Residential Facilities

Type of Business or Facility	Minimum Wastewater Design Flow Criteria (gallons per day)
Camps (per person)	
- day use (no meals served)	15
- overnight use, with flush toilets, no showers	25
- overnight use, with flush toilet and showers	35
- summer and seasonal	50
Churches (per seat)	
- sanctuary	5
- with kitchen waste	7
Dance Halls (per person)	5
Factories (per employee)	
- without showers	25
- with showers	35
- with cafeteria, add	5
Hospitals (per bed)	250
- kitchen waste only	25
- laundry waste only	40
Hotels (per bed – 2 person)	
- without kitchen	60
Institutions (per person)	
- Resident	75
- Nursing home	125
- Rest home	125
Laundromat, with self-service washing machines	
- per wash cycle	50
- commercial (per manufacturer's specifications)	
Mobile Home Parks (per space)	250
- Picnic parks (toilets only)	20
Motels (per bed space)	
- without kitchen	50
- with kitchen	60
Offices (per employee)	20

Table 14-2
Wastewater Design Flow Guidelines
Multi-Unit and Non-Residential Facilities

Type of Business or Facility	Minimum Wastewater Design Flow Criteria (gallons per day)
Parks with Picnic Areas (per person)	
- with flush toilets (only)	20
Recreational Vehicle Parks (per space)	
- without individual water hook-ups (per space)	75
- with individual water hook-ups (per space)	100
Restaurants	
- cafeterias (per space)	20
- toilet (per customer)	7
- kitchen wastes (per meal served)	6
- kitchen waste, disposable service (2 per meal)	2
- add for garbage disposal (per meal served)	1
- add for cocktail lounge (per customer)	2
Schools	
- staff and office (per person)	20
- elementary school (per student)	15
- intermediate and high school (per student)	20
- with gym and showers, add (per student)	5
- with cafeteria, add (per student)	3
- boarding school, total waste (per person)	100
Service Station, Toilets	
- 1st bay	1000
- for each additional bay	500
Stores	
- per employee	20
- public restrooms, add (per 10 square feet of floor space)	1
Swimming Pools	
- per person	10
Theaters, auditoriums	
- per seat	5
Wineries (sanitary waste only)	
- tasting room, per visitor	2.5
- per employee	15
- special events	case-by-case

Source: California Plumbing Code, 2016

CHAPTER 15
WASTEWATER DESIGN STRENGTH REQUIREMENTS

15.0 CHAPTER OVERVIEW

This chapter provides the criteria for wastewater strength used in Onsite Wastewater System design and is organized as follows:

15.1 WASTEWATER DESIGN STRENGTH REQUIREMENTS OVERVIEW

A. GENERAL

1. The System Designer is responsible for ensuring that wastewater strength in each project is properly characterized and is developed based on full consideration of projected activities, occupancy and types of facilities.

15.2 WASTEWATER TYPES

A. GENERAL

1. For the purposes of this Manual wastewater consists of blackwater, graywater and process water.

2. The design of Onsite Wastewater Systems must take into account the characteristics and strength of wastewater which are dependent on the relative composition of blackwater, graywater and/or process water in the wastewater stream.

B. BLACKWATER

1. Blackwater is defined as wastewater contaminated with human or kitchen wastes, generally originating from toilets and kitchen sinks.

2. Blackwater includes, but is not limited to, wastewater discharges from kitchen sinks, garbage grinders, water closets, toilets, urinals or similar fixtures alone or in combination with other wastewater.

C. GRAYWATER

1. Graywater is defined as untreated wastewater that has not been contaminated by any toilet discharge, and has not been affected by infectious, contaminated, or unhealthy bodily wastes, and does not present a threat from contamination by unhealthful processing, manufacturing or operating wastes (Health and Safety Code section 17922.12).

2. Graywater includes but is not limited to wastewater from bathtubs, showers, bathroom washbasins, clothes washing machines and laundry tubs.

3. Graywater does not include wastewater from kitchen sinks or dishwashers.

D. PROCESS WATER

1. Process water is generated from any manufacturing, processing institution, commercial, or agricultural operation or any operation that discharges other than domestic-strength wastewater.

2. All wastewater treatment and disposal systems for process wastewater are jointly regulated by the Regional Water Board and the Department.

15.3 WASTEWATER QUALITY PARAMETERS

A. PRIMARY PARAMETERS USED TO EVALUATE THE QUALITY OF WASTEWATER IN ONSITE WASTEWATER SYSTEM DESIGN

1. Knowledge of the constituents found in wastewater and the fate of these constituents when released to the environment are of fundamental importance in the design and operation of Onsite Wastewater Systems.

2. **Residential Facilities.** The primary analyses used to quantify the physical, chemical and biological constituents typically found in wastewater from residential facilities for use in Onsite Wastewater System design and operation include but are not limited to the following:

    a. **Biochemical Oxygen Demand (BOD).** BOD measures oxygen required for biochemical degradation of organic and inorganic material. High BOD causes an increased biochemical demand on downstream system components and may shorten the life of the System. BOD_5 is the five (5) day biochemical oxygen demand exerted after five (5) days of a BOD test.

    b. **Total Suspended Solids (TSS).** TSS are suspended solids in water and are a constituent of total solids. TSS can include a wide variety of material, such as soil particles, decaying plant and animal matter and wastewater. The total amount of TSS in liquid is determined by a laboratory test that measures the dry weight of residue retained on a filter after drying the sample and is a measure of the level of treatment being achieved. In wastewater with high TSS, inorganics are less easily broken down and can accelerate mechanical clogging of the infiltrative surface of the dispersal system.

    c. **Fats, Oil and Grease (FOG).** FOG is a measure of biological lipids and mineral hydrocarbons in wastewater. The analytical test for FOG does not measure an absolute quantity, but is useful in making comparisons of wastewater. High FOG results in increased biological demand on downstream system components and may shorten the life of the System.

d. **Nitrogen.** Nitrogen is a nutrient in wastewater that can pose a potential health risk to groundwater and surface water. Nitrogen can change form as it moves through a System and into the receiving environment. Elevated nitrate in groundwater is a concern for drinking water use because nitrate can interfere with blood-oxygen levels in infants and cause methemoglobinemia or blue-baby syndrome. Where groundwater recharges stream flow, nitrate-enriched groundwater can contribute to eutrophication, a process that leads to high algal population and growth, especially blue-green algal populations. While not directly toxic to fish life, like ammonia, nitrate can have indirect effects on fish if it contributes to this eutrophication.

(1) The principal forms of nitrogen found in wastewater are organic nitrogen (Organic-N), ammonia nitrogen (NH_3-N), ammonium nitrogen (NH_4-N), nitrite-nitrogen (NO_2-N) and nitrate-nitrogen (NO_3-N).

(2) Nitrogen is usually introduced into the OWTS as organic nitrogen (Organic-N) and ammonium nitrogen (NH_4-N).

(3) Organic-N (including feces, urea, and other animal and vegetable matter) in wastewater is converted into ammonium (NH_4-N) by the process of ammonification. In ammonification, proteins, amino acids, and other nitrogen-containing compounds are biochemically degraded by heterotrophic bacteria. Ammonification typically occurs in primary treatment (septic tank) and transport lines as well as in the supplemental treatment process. Because of this, a raw wastewater ammonia concentration may be significantly lower than the concentration of the effluent from the primary treatment (septic tank).

(4) Total Kjeldahl Nitrogen (TKN) is the sum of Organic-N and NH_3-N and thus TKN is a better measure of overall nitrogen content and should be used when determining the wastewater load to OWTS components downstream of primary treatment (septic tank).

e. **Coliform.** The biological characteristics of wastewater are of fundamental importance in the control of diseases caused by pathogenic organisms of human origin. Coliform bacteria is used as an indicator organism for the number of pathogenic organisms present in wastewater. The intestinal tract of humans contains a large population of coliform bacteria. Each person discharges from one hundred (100) to four hundred (400) billion coliform bacteria per day, in addition to other kinds of bacteria. The absence of coliform bacteria is groundwater or surface water is taken as an indication that the water is free from disease-producing bacteria.

3. **Non-Residential Facilities.** In addition to the analysis listed above, other analysis used to quantify physical, chemical and biological constituents found in non-residential wastewater must also be included in the design and operation of Onsite Wastewater Systems.

15.4 WASTEWATER STRENGTH CRITERIA

A. DOMESTIC-STRENGTH WASTEWATER

1. Domestic-strength wastewater is defined as wastewater with a measured strength less than high-strength wastewater and is defined as having a thirty (30) day average concentration in (mg/L of the constituents listed in **Table 15-1** prior to a septic tank or other OWTS treatment component:

Table 15-1
Wastewater Strength Criteria

Constituent	Domestic-Strength Wastewater (mg/L)	High-Strength Wastewater (mg/L)
TSS	≤ 330	> 330
BOD_5	≤ 300	> 300
FOG	≤ 100	> 100

2. Domestic-strength wastewater is comprised of blackwater and graywater and is normally discharged from residential plumbing fixtures, appliances and other household devices including, but not limited to toilets, bathtubs, showers, laundry facilities, dishwashing facilities and garbage disposals.

3. Domestic-strength wastewater may include wastewater from multi-unit residences (e.g., apartments, condominiums, mobile home parks) and other non-residential facilities provided the wastewater strength is comprised of blackwater and graywater that meets the criteria for domestic-strength wastewater.

4. Domestic-strength wastewater may include incidental recreational vehicle (RV) holding tank dumping but does not include wastewater consisting of a significant portion of RV holding tank wastewater such as at RV dump stations.

5. Domestic-strength wastewater does not include wastewater from industrial processes.

B. HIGH-STRENGTH WASTEWATER

1. High-strength wastewater is defined as wastewater with a measured strength greater than domestic-strength wastewater and is defined as having a thirty (30) day average concentration of the BOD_5, TSS, and FOG prior to the septic tank or an OWTS treatment component as described in **Table 15-1** above.

2. High-strength wastewater must receive supplemental treatment to lower the wastewater strength to domestic-strength wastewater before discharge into the dispersal system.

3. Guidelines for high-strength wastewater facilities are provided in **Table 15-2** (included at the end of this chapter) and are based on the type of business or facility, waste streams and usage characteristics.

4. The System Designer is responsible for ensuring that wastewater in each project is properly characterized and, whenever possible, wastewater streams should be sampled and actual values used in the design.

5. The Department may consider adjustment to the guidelines listed in **Table 15-2** for specific facilities based on submittal of technical information to support the proposed wastewater strength estimate.

6. For facilities not listed in **Table 15-2** wastewater strength is to be estimated based on either: (a) appropriate literature references (e.g., USEPA) for the type of facility proposed; or (b) documented wastewater strength monitoring data for a comparable facility.

Table 15-2
Wastewater Strength Guidelines – Multi-Unit Residential and Non-Residential Facilities

Wastewater Type	Type of Business of Facility		Wastewater Types	Primary-treated Effluent Concentrations[1]
1	• Apartments • Condominiums • Mobile Home Parks	• Residential Subdivisions • Hotels/Motels/Inns • Work Camps	Domestic Wastewater (Blend of Black and Gray Wastewater)	BOD_5: 140 to 250 mg/L TSS: 40 to 140 mg/L TKN[2]: 50 to 80 mg/L
2	• Airport • Campgrounds • Fire Departments • Golf Courses • Manufacturing Facilities	• Offices • Parks • Public Toilets/Rest Areas • RV Parks[2] • Visitor Centers	Primarily Black Wastewater	BOD_5: 300 to 500 mg/L TSS: 80 to 250 mg/L TKN[2]: 90 to 200 mg/L
3	• Churches • Schools		Primarily Black Wastewater with Surge Flows	BOD_5: 300 to 500 mg/L TSS: 80 to 250 mg/L TKN[2]: 90 to 150 mg/L
4	• Hospitals • Retirement Facilities • Veterinary Clinics		Primarily Black Wastewater with Pharmaceuticals or Toxic Inhibitors	BOD_5: 300 to 700 mg/L TSS: 100 to 350 mg/L TKN[2]: 70 to 120 mg/L
5	• Bars • Casinos • Delis • Gas Stations	• Restaurants • Shopping Centers • Strip malls	Black Water with Restaurant Waste	BOD_5: 300 to 1000+ mg/L TSS: 80 to 300 mg/L TKN[2]: 90 to 200+ mg/L

Notes:

[1]The System Designer is responsible for ensuring that wastewater in each project is properly characterized and, whenever possible, wastewater streams should be sampled and actual values used in the design.

[2]Wastewater may include incidental recreational vehicle (RV) holding tank dumping but does not include wastewater consisting of a significant portion of RV holding tank wastewater such as at RV dump stations.

PART 5

TANK REQUIREMENTS

CHAPTER 16
GENERAL TANK REQUIREMENTS

16.0 CHAPTER OVERVIEW

This chapter provides general design guidelines applicable to all tanks that may be utilized as part of the treatment train of an Onsite Wastewater System. The requirements in this chapter are applicable to all new and replacement buried and/or above ground tanks. In addition to the general design requirements in this chapter, tanks must also meet the design requirements for the specific type of tank as applicable contained in **Chapters 17** through **Chapter 21**.

This chapter is organized in the following sections:

Section 16.1: Compliance with Standards and Codes

Section 16.2: General Performance Requirements

Section 16.3: Siting Criteria Requirements

Section 16.4: Tank Installation Requirements

16.1 COMPLIANCE WITH STANDARDS AND CODES

A. REQUIREMENTS

2. All tanks in the treatment train are to be watertight and constructed of durable, corrosion resistant material and shall conform to latest version of the International Association of Plumbing and Mechanical Officials (IAPMO) and National Sanitation Foundation (NSF) or American Society for Testing and Materials (ASTM) standards and comply with state and local building codes, including the California Plumbing Code.

2. All tanks in the treatment train must have a current IAPMO or an American National Standards Institute (ANSI) accredited testing organization approval listing.

3. An exception to IAPMO or ANSI approval listing may be granted where structural design calculations for the tank are provided by a professional civil engineer qualified to perform structural design.

4. Each tank shall be permanently marked with the manufacturer's name and/or trademark and the nominal working volume in accordance with IAPMO requirements.

5. Permanent markings shall be adequately protected from corrosion so as to remain permanent and readable over the life of the tank. The product shall also bear the Uniform Plumbing Code certification mark (UPC®).

6. Sealants for sealing concrete tanks may be required and must be in accordance with manufacturer's specifications and IAPMO requirements.

16.2 GENERAL PERFORMANCE REQUIREMENTS

A. MATERIALS

1. Prefabricated tanks must meet the IAPMO material requirements for concrete, fiberglass-reinforced plastic or polyethylene tanks used in residential or non-residential Systems.

2. Use of other alternative materials or methods of construction not specifically prescribed by IAPMO or the California Plumbing Code may be approved by the Department provided the proposed design is satisfactory and complies with the intent of the provisions of IAPMO or the California Plumbing Code and that the material, method or work offered, is for the purpose intended, at least the equivalent of that prescribed by the codes in quality, strength, effectiveness, fire resistance, durability and safety.

B. STRUCTURALLY SOUND

1. Tanks shall be designed to be structurally sound to withstand the live and dead loads experienced at the site to prevent cracking or collapse.

2. The potential impacts due to structurally unsound tanks include safety of people in the proximity of the tank, the operation of the System and the formation of cracks or other openings that cause leaks.

3. Tank selection shall be based on all reasonably expected loading conditions, including burial depth, hydrostatic forces when tank is full or empty and any other reasonable expected loading conditions.

C. TANK ACCESS

1. Access to tanks shall be designed to allow maintenance and prevent injury or death caused to a human or animal due to unintended entry into the tank.

2. Access at ground level or above shall be provided for all tanks and/or components contained therein.

3. Access to each compartment of a tank for maintenance shall be provided by a minimum twenty (20) inch diameter opening or equivalent.

4. Tanks shall be installed so that manhole covers are within twenty-four (24) inches of the ground surface.

5. The riser lid must be capable of preventing accidental or unauthorized entry. Access shall be secured by bolting or locking lids or by virtue of the lids own weight. Covers, risers and lids shall be capable of bearing the expected live and dead loads. Potential loads could include people, lawn equipment or vehicles.

6. Access openings shall be located to provide visual inspection, maintenance and/or repair of sanitary tees, effluent filters, baffles and pump assemblies.

D. TANK RISERS

1. All access openings on tanks shall have risers extended a minimum of two (2) inches above the finished ground surface elevation except in areas of traffic, where they should be flush mounted.

2. Except for concrete grade rings, risers shall be installed in one continuous piece without seams.

3. All risers shall be securely attached by means of a watertight collar and/or other sealant material applied according to the manufacturer's instructions.

4. All risers shall be fitted with gastight, watertight, vermin proof, securely fastened covers that are removable with standard hand tools.

5. All covers shall be of durable construction, manufactured specifically for their intended use.

E. TANK CONNECTIONS & CLEANOUTS

1. All connections between pipes and tanks shall conform to construction standards as required by state and local building codes including the California Plumbing Code.

2. A cleanout at the finished ground surface elevation shall be provided between each structure and/or building directly connected to a tank and at other appropriate locations in the piping system.

F. WATERTIGHT

1. **Prevention of Infiltration and Exfiltration**. Tanks shall be watertight to prevent infiltration (or inflow) of groundwater and surface water and exfiltration (or outflow) of wastewater.

   a. **Inflow of Groundwater or Surface Water.** Onsite Wastewater Systems are designed to return a predetermined volume and quality of wastewater to the environment. A tank allowing inflow of groundwater or surface water into the Onsite Wastewater System can overwhelm the design capacity of the System and/or lead to hydraulic overload of the System and/or inadequate wastewater treatment. Surges of inflow can also displace solids from the tank adversely affecting the operation of the System and life expectancy of downstream components.

   b. **Outflow of Wastewater.** Leaking tanks can create a public health hazard and contaminate surface water and groundwater due to bypassing the downstream components of the treatment train.

16.3 SITING CRITERIA REQUIREMENTS

A. HORIZONTAL SETBACKS

1. All tanks must be installed to meet the horizontal setbacks for tanks provided in **Table 5-7**.

2. In areas where the site evaluation has determined that the high seasonal groundwater level is within six (6) feet or less from original ground surface elevation, tanks shall be analyzed for and properly designed to resist buoyant forces.

16.4 TANK INSTALLATION REQUIREMENTS

A. GENERAL

1. Installation depth for tanks shall be no greater than the manufacturer's specifications.

2. Excavations for tanks shall be made according to the manufacturer's requirements.

3. Excavations shall provide a level, uniform load-bearing surface free of embedded rock formations or large boulders.

4. Tanks shall be set on a level and compacted bed according to the manufacturer's requirements.

5. Wet and/or unstable soil shall be over-excavated, backfilled and compacted with an approved material suitable to stabilize and support the tank.

6. Backfilling and compaction shall be performed according to the manufacturer's specifications.

7. Backfill material shall be friable and not contain stones larger than three (3) inches in diameter or debris of any type.

8. The separation between any two tanks shall be a minimum of two (2) feet unless a closer distance is approved by the tank manufacturer.

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CHAPTER 17
SEPTIC TANK REQUIREMENTS

17.0 CHAPTER OVERVIEW

This chapter provides the design criteria for septic tanks. In addition to the requirements in this chapter, septic tanks must comply with the general tank design requirements presented in **Chapter 16**.

This chapter is organized in the following sections.

17.1 SEPTIC TANK OVERVIEW

A. PURPOSE

1. The primary purpose of the septic tank is to clarify the wastewater (i.e., separate constituents that float and sink from the other wastewater constituents).

2. A second benefit of the septic tank is that decomposition of organic material begins in the septic tank. Raw waste is reduced to sludge, scum, gases and effluent with the aid of beneficial microbes that reduce the organic material without outside energy sources.

3. Septic tanks that are properly sized and constructed provide highly efficient treatment capable of yielding effluent that is relatively free of fats, oils, greases, solids and other constituents that can clog and foul System components.

17.2 SEPTIC TANK SIZING REQUIREMENTS

A. MINIMUM CAPACITY

1. Adequate septic tankage will anaerobically digest organic material, remove settleable and floatable solids, help modulate flow, and consistently discharge effluent that meets primary treatment standards.

2. **Residential Facilities.** The minimum capacity of septic tanks for OWTS shall be determined by the number of bedrooms in the dwelling as presented in **Table 17-1**.

Table 17-1
Minimum Septic Tank Capacity Criteria – Residential Facilities

No. of Bedrooms	Gallons
1 to 2	1,000
3 to 4	1,200
5 to 6	1,500
7 to 8	2,000
9 to 10	2,500

3. **Multi-Unit Residential and Non-Residential Facilities.**

   a. The minimum capacity of septic tanks for non-residential facilities shall be one thousand five hundred (1,500) gallons or three times the wastewater design flow for the facility served, whichever is greater.

   b. Larger tankage is recommended for non-residential facilities with high-strength wastewater for optimal OWTS performance and may be required for certain proprietary treatment units.

   c. Guidelines for minimum and preferred septic tank sizing for certain facility types and certain proprietary treatment units are provided in **Table 17-2** (included at the end of this chapter).

17.3 SEPTIC TANK DESIGN REQUIREMENTS

A. MINIMUM CRITERIA

1. A septic tank system consists of the tank, riser(s) and inlet/outlet ports (see **Figure 17-1** included at the end of this chapter).

2. Septic tanks shall have a minimum of two (2) compartments.

3. The inlet compartment shall be a minimum of two-thirds (2/3) of the total liquid capacity of the tank.

4. Single compartment septic tanks may be used in series for high-flow OWTS.

5. Septic tank inlets, outlets, sanitary tees, partitions and baffles must conform to the IAPMO design requirements for septic tanks.

17.4 EFFLUENT FILTER REQUIREMENTS

A. MINIMUM CRITERIA

1. Effluent discharged from a septic tank directly to a dispersal system area or pump tank must pass through an effluent filter sized based upon the type of facility (residential or non-residential) and the wastewater design flow.

2. The outlet of the septic tank shall be fitted with an effluent filter capable of screening solids in excess of three-sixteenths (3/16) of an inch in diameter and conforming to NSF/ANSI Standard 46 or as otherwise approved by the Department.

3. All effluent filters shall be located in the outlet compartment of the septic tank, unless located in a separate tank after the septic tank and shall be easily inspected, cleaned and maintained.

4. For multiple septic tanks in series, outlet sanitary tees may be used in lieu of an effluent filter except for the last septic tank where an effluent filter is required.

Table 17-2
Grease Interceptor Tanks and Primary Tanks
Sizing Chart Guidelines
Based on Hydraulic Residence Time (HRT)

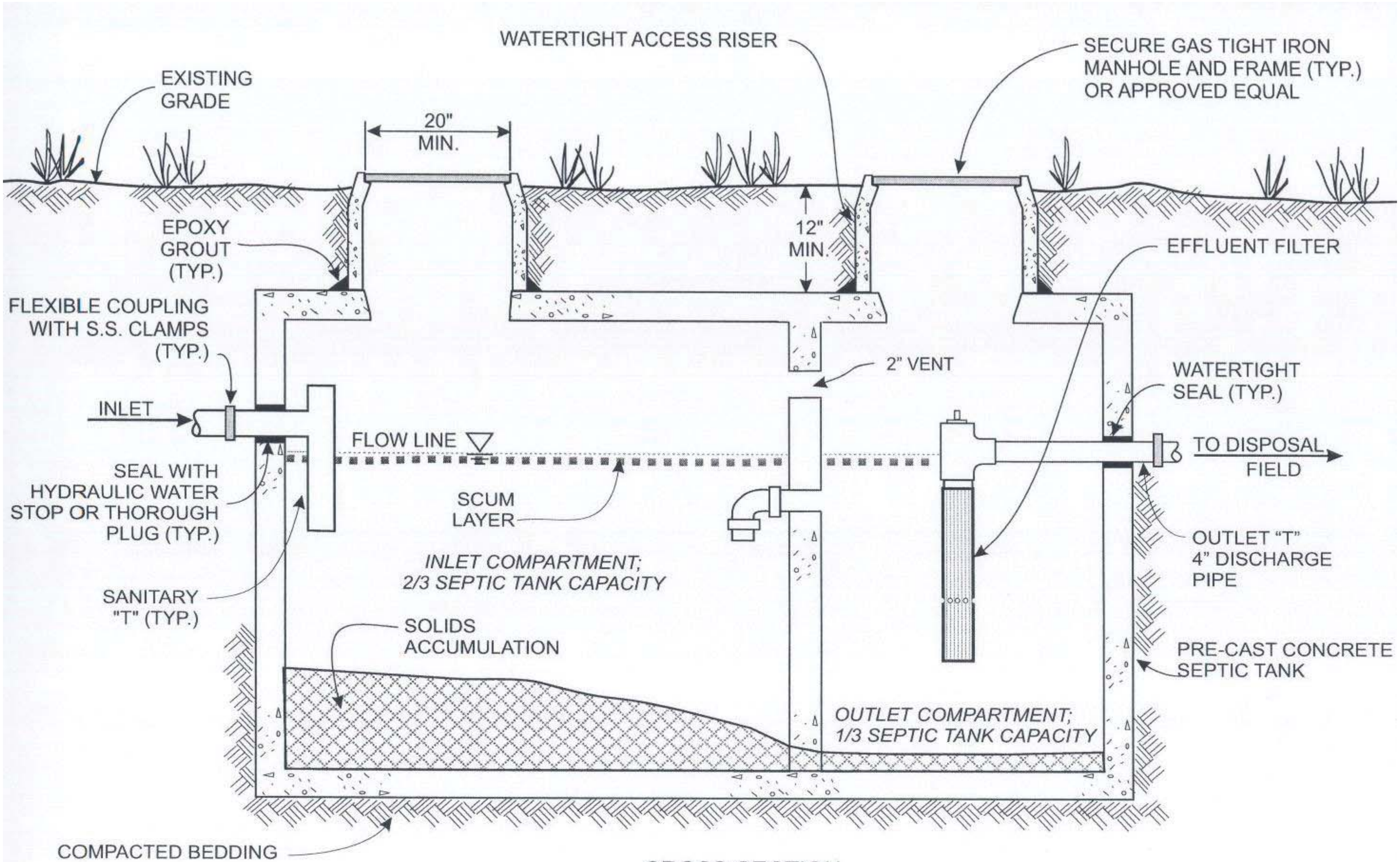
Facility	Minimum		Preferred	
	Grease Tankage[1] HRT (days)	Primary Tankage[2] HRT (days)	Grease Tankage[1] HRT (days)	Primary Tankage[2] HRT (days)
Office/Manufacturing/Light Industrial				
a) restrooms only	*n/a*	3	*n/a*	4
Restaurant/Deli				
a) restrooms and kitchen	3	4	5	5
Convenience Store/Gas Station				
a) restrooms only	*n/a*	3	*n/a*	4
b) restrooms and kitchen/deli	2	3	4	4
Hotel/Motel/Multiple Dwelling Units				
a) restrooms only	*n/a*	3	*n/a*	4
b) restrooms and restaurant/kitchen	3	3	5	4
Church				
a) restrooms only	*n/a*	2.5 + Surge	*n/a*	4 + Surge
b) restrooms and kitchen	2	2.5 + Surge	4	4 + Surge
School				
a) restrooms only	*n/a*	3 + Surge	*n/a*	4 + Surge
b) restrooms and kitchen	3	3 + Surge	5	4 + Surge
Dog Kennel/Veterinary Clinic				
a) restrooms only	*n/a*	3	*n/a*	4
b) restrooms and floor drains	*n/a*	3 + Surge	*n/a*	4 + Surge
RV Park				
a) RV spaces	*n/a*	3	*n/a*	4
b) dump station	*n/a*	8	*n/a*	10
Casino				
a) gaming floor	*n/a*	3	*n/a*	4
b) hotel/motel	*n/a*	3	*n/a*	4
c) restaurant/deli	3	4	5	5
Resort/Camp				
a) bunk houses	*n/a*	3	*n/a*	4
b) main houses	*n/a*	3	*n/a*	4
c) kitchen	2	3	4	4

Notes:
1. Grease tankage HRT is based on a separate kitchen peak flow, which is integrated into the main flow prior to introduction to the primary septic tanks.

2. Primary tankage HRT is based on total peak flow.

Tankages are based on long-term performance satisfaction (with respect to septage removal) and nominal (minimum) to high-quality (preferred) effluent. If effluent strength is higher than the expected level or if a higher level of treatment is required, greater tankage will be necessary.

Source: Orenco Systems Inc.



CROSS-SECTION

TYPICAL SEPTIC TANK

FIGURE 17-1

CHAPTER 18
FLOW EQUALIZATION TANK REQUIREMENTS

18.0 CHAPTER OVERVIEW

This chapter provides the design criteria for flow equalization tanks. In addition to the requirements in this chapter, flow equalization tanks must comply with the general tank design requirements presented in **Chapter 16**.

This chapter is organized in the following sections.

Section 18.1: Flow Equalization Tank Overview

Section 18.2: Flow Equalization Tank Sizing Requirements

Section 18.3: Requirements for Sizing of Upstream and Downstream System Components

18.1 FLOW EQUALIZATION TANK OVERVIEW

A. GENERAL

1. Flow equalization is the process of controlling the rate of wastewater flow through an OWTS by providing storage capacity to hold surges of incoming flow with timed-release of the accumulated wastewater to even-out the flow to downstream treatment and/or dispersal components.

2. Flow equalization tanks can reduce the size and cost of downstream system components.

3. Flow equalization tanks may be used for non-residential facilities that experience significant, regular and predictable fluctuations in wastewater flows and allow for flexibility and efficiency in System design.

4. Examples of applicable facilities include, but are not limited to churches, schools and special-event venues.

5. Depending on the size and complexity of the System an operating permit may be required.

18.2 FLOW EQUALIZATION TANK SIZING REQUIREMENTS

A. MINIMUM CRITERIA

1. Flow equalization tanks shall be installed following the septic tank to aid in better System performance by allowing peak surges in wastewater flow (e.g., from a weekend event) to be temporarily stored and metered into the supplemental treatment system and/or dispersal system at a relatively even ("average") rate over an extended number of days (e.g., during the subsequent week).

2. The flow equalization tank must be sized based on a mass balance analysis.

3. Design calculations and specifications must be submitted to substantiate the proposed design and operation of the flow equalization tank.

18.3 REQUIREMENTS FOR SIZING OF UPSTREAM AND DOWNSTREAM SYSTEM COMPONENTS

A. UPSTREAM SYSTEM COMPONENTS

1. Where flow equalization is incorporated in an OWTS, the septic tank capacity shall be sized based on the wastewater design flow for the facility.

B. DOWNSTREAM SYSTEM COMPONENTS

1. Where flow equalization is incorporated in an OWTS, the supplemental treatment system and/or the dispersal system may be designed based on the equalized (“average”) flow rate rather than the wastewater design flow for the facility.

CHAPTER 19
GREASE INTERCEPTOR TANK REQUIREMENTS

19.0 CHAPTER OVERVIEW

This chapter provides the design criteria for grease interceptor tanks. In addition to the requirements in this chapter, grease interceptor tanks must comply with the general tank design requirements presented in **Chapter 16**.

This chapter is organized in the following sections.

Section 19.1: Grease Interceptor Tank Overview

Section 19.2: Plumbing Fixture Connection Requirements

Section 19.3: Grease Interceptor Tank Sizing Requirements

Section 19.4: Grease Interceptor Tank Maintenance Requirements

19.1 GREASE INTERCEPTOR TANK OVERVIEW

A. WHEN REQUIRED

1. Grease interceptor tanks are required at all facilities connected to an OWTS that generate more than two hundred (200) gallons per day of wastewater and provide foodservice and/or food preparation producing wastewater containing floatable oil, wax, fats or grease.

B. EXEMPTIONS

1. A food facility or other commercial operation that demonstrates that the daily discharge of grease, floatable oil, wax or fats is less than one hundred (100) mg/L may be exempt from the minimum grease interceptor tank sizing, installation or maintenance requirements of this chapter.

    a. Sampling and testing, if required by the Department, shall be performed at the owner's expense and by an independent certified testing organization using accepted testing methods.

2. An under the counter type grease trap may be used in lieu of a grease interceptor if justifiable based on the food facility menu.

19.2 PLUMBING FIXTURE CONNECTION REQUIREMENTS

A. MINIMUM CRITERIA

1. Wastewater from plumbing fixtures where floatable oil, wax, fats or a grease may be introduced shall be plumbed separately from other plumbing fixtures into the grease interceptor tank first and then into the septic tank.

2. The following plumbing fixtures shall be connected to the grease interceptor tank:

    a. Dishwashers (kitchen dishwashing appliances should be high-temperature disinfection models only; low temperature chemical disinfection dishwashers are not recommended);

b. Three-compartment sinks;

c. Floor sinks;

d. Mop sinks; and

e. Other fixtures as determined by the Department.

3. Garbage disposals are prohibited for commercial establishments that use Onsite Wastewater Systems for wastewater disposal.

4. Plans and specifications for the plumbing system shall be submitted to the Department with the OWTS design plans.

19.3 GREASE INTERCEPTOR TANK SIZING REQUIREMENTS

A. MINIMUM CAPACITY

1. Grease interceptors for non-residential facilities shall be sized according to the formula in **Table 19-1**:

Table 19-1 **Minimum Grease Interceptor Tank Capacity Formula**
Required Grease Interceptor Capacity (gallons) = P * WF * RT * SF

Where,

P = Peak number of meals per hour

WF = Wastewater design flow rate (from **Table 14-2** in gallons per day)

RT = Retention Time:

RT = 1.5 (for single-service/disposable utensils)

RT = 2.5 (for multi-service utensils)

SF = Storage Factor (minimum capacity of 750 gallons):

SF = 1 (for hours of operation ≤ 8 hours)

SF = 2 (for hours of operation between 9 and 16 hours)

SF = 3 (for hours of operation between 17 and 24 hours)

2. The minimum capacity of the grease interceptor tank shall be eight hundred and ten (810) gallons. Larger tankage is required for optimal OWTS performance. Recommended guidelines for minimum and preferred grease interceptor tank sizing for certain facility types is provided in **Table 17-2**.

3. An interior grease recovery device meeting the requirements of Chapter 15.20 of the Alameda County General Ordinance may be approved at the discretion of the Department.

19.4 GREASE INTERCEPTOR TANK MAINTENANCE REQUIREMENTS

A. MINIMUM CRITERIA

1. Grease interceptor tanks shall be located, installed and constructed so that the temperature of wastewater will be reduced to allow separation of grease and to allow easy access for cleaning.

2. Grease interceptors shall be cleaned regularly by a Septage Pumper.

3. Written receipts of all grease interceptor and grease recovery device pumping and maintenance events shall be included in annual operating permit reports submitted to the Department. The receipts shall document the following:

   a. Name and address of the company performing the work;

   b. Date the work was performed; and

   c. Volume of grease removed.

CHAPTER 20
PUMP TANK REQUIREMENTS

20.0 CHAPTER OVERVIEW

This chapter provides the design criteria for pump tanks. In addition to the requirements in this chapter, pump tanks must comply with the general tank design requirements presented in **Chapter 16**.

This chapter is organized in the following sections.

20.1 PUMP TANK OVERVIEW

A. PURPOSE

1. Wastewater pumping systems may be considered when they offer a better alternative for the protection of public health and safety or are required for parcel development or due to site constraints.

2. Wastewater pumping systems may be utilized to enable:

    a. Installation of a System or components of a System hydraulically upgradient of the structure to be served;

    b. Pressure dosing of effluent to the dispersal system;

    c. Flow equalization;

    d. Transporting of wastewater or solids from a sump tank serving non-dwelling units to a septic tank; and/or

    e. Supplemental treatment.

20.2 PUMP TANK DESIGN REQUIREMENTS

A. MINIMUM CAPACITY

1. **Separate Pump Tank.** All wastewater pumping systems shall be separate from the septic tank.

2. **Connection to the Septic Tank.** Any wastewater pumping system transporting wastewater or solids to a septic tank shall have its own penetration into the septic tank with a three (3) inch minimum diameter sanitary tee.

a. At least three (3) feet should be provided between the connection and the septic tank to minimize turbulence in the septic tank. The pumping flow rate, in either case, should be minimized.

b. An exception to this requirement may be granted where a wye connection is provided to the gravity line.

3. **Minimum Tank Capacity.** The minimum pump tank size shall have sufficient capacity to hold the following volumes:

a. Dosing volume and the displacement volume of the pump required to deliver the design dose.

b. Emergency wastewater reserve storage volume in case of a power outage equal to one (1) day's wastewater design flow between the high level alarm and the invert of the pump tank inlet.

c. An exception to providing reserve storage capacity equal to one (1) day's wastewater design flow may be granted where the following are provided:

(1) Reserve storage capacity equal to fifty (50) percent of the wastewater design flow;

(2) Duplex pump system; and

(3) Emergency backup power capability.

d. Multiple interconnected tanks may be used to meet these requirements.

20.3 PUMP REQUIREMENTS

A. MINIMUM CRITERIA

1. All wastewater pumps shall meet the following requirements:

a. Pumps shall be rated for wastewater applications;

b. Motors shall be continuous-duty with overload protection;

c. Pumps shall have durable impellers of bronze, cast iron or other materials approved by the Department;

d. Pumps used to pump wastewater to a septic tank shall be rated as a solids handling pump and shall be able to pass two (2) inch solids. Grinder pumps are not allowed;

e. Pumps shall be sized to meet the hydraulic design requirements of the System and shall be able to provide the required gallons per minute (gpm) at the design head;

f. Pumps shall be automatically controlled with mechanical switches (or floats that are compatible with the specified pump and control panel;

g. Pumps shall be equipped with a high level alarm float, set to trigger at a liquid level approximately two (2) inches above the "on" float;

h. Float switches shall be installed such that the float switches or wires do not become entangled. Clamps shall be of non-corrosive material;

i. Pumps shall be provided with an easy, readily accessible means of electrical and plumbing disconnect and a noncorrosive lifting device as a means of removal for servicing;

j. Check valves are required at the pump;

k. Pumps shall be seated on a level and stable platform of poured concrete or cement block or placed in suspended pump assemblies;

l. Pumps or suspended pump assemblies shall be installed in accordance with the manufacturer's requirements;

m. There shall be sufficient distance from the tank bottom to the pump inlet to allow space for any solids to settle without interfering with the pump operation; and

n. Pump intake ports shall be placed in the clear liquid zone.

20.4 CONTROL AND ALARM REQUIREMENTS

A. MINIMUM CRITERIA

1. All pumps shall be connected to, and operated from, control panel assemblies manufactured specifically for their intended use.

2. Electrical components used in Systems shall comply with all applicable state and local building codes. Prior to doing any electrical work a permit must be obtained from the local building department and all permit and inspection requirements met.

3. Pump controls and alarms shall be contained in an exterior rated, water proof, non-corrosive, tamper proof control panel box that can be opened with standard hand tools. Control panels in areas accessible to the public shall be locked to prevent unauthorized access.

4. Control panels shall be equipped with a visible and audible alarm and located in accordance with the following provisions:

   a. Control panels shall be easily accessible for service and inspection;

   b. Control panels shall not be located in an environment that may damage the components;

c. Control panels shall be mounted no more than fifty (50) feet away from the residence or the common area of the non-residential building served by the System;

d. In cases where there are multiple buildings, alarms shall be located at the building that is most often occupied; and

e. If the primary alarm is not located as required above, a remote visible and audible alarm (or telemetric alarm) that notifies the owner and Service Provider or System Designer in the event of system malfunction shall be required.

5. Pumps shall have automatically resetting audible and visual high water level alarms with a manual silence switch. Only the audible alarm may be user cancelable.

6. Pumps shall have a non-resettable dose counter and/or elapsed time meter included in the control panel.

7. Pump controls and alarm floats shall be connected to separate electrical circuits.

8. There shall be a manual override switch in the electrical box to facilitate dosing control during inspections.

20.5 DESIGN SPECIFICATIONS AND CALCULATION REQUIREMENTS

A. MINIMUM CRITERIA

1. The following minimum information shall be provided on the design plans and in the design report submittal:

a. Specification sheets for pump tanks, tank risers and pumps including pump performance curves;

b. Specification sheets for float switches and the placement of the floats in the tank indicating the storage capacity between float switches;

c. Dosing volume and emergency storage volume calculations supported by manufacturer volume-depth tank rating information;.

d. Specification sheets for audio/visual alarms and the location of the control box and alarm;

e. The elevation of the pump and dispersal system pipe at the highest elevation; and

f. Calculations for total dynamic head including friction losses through the piping and valves. The System Designer shall provide friction loss tables to support the total dynamic head calculations.

CHAPTER 21
HOLDING TANK REQUIREMENTS

21.0 CHAPTER OVERVIEW

This chapter provides specifications for holding tanks. In addition to the requirements in this chapter, holding tanks must comply with the general tank design requirements presented in **Chapter 16**.

This chapter is organized in the following sections:

Section 21.1: Holding Tank General Requirements

Section 21.2: Holding Tank Siting and Design Requirements

Section 21.3: Holding Tank Installation and Permitting Requirements

21.1 HOLDING TANK GENERAL REQUIREMENTS

A. MINIMUM CRITERIA

1. A holding tank is a watertight container designed to collect and temporarily store wastewater from a building or structure, for subsequent removal by a Septage Pumper and transport to an approved treatment and disposal site.

2. A holding tank must provide safe and adequate temporary storage of wastewater with scheduled and approved pumping service and must not contaminate groundwater or surface water, expose the public to untreated wastewater or be a source of nuisance odors.

3. Depending upon the facility served or the particular set of circumstances surrounding the use of a holding tank, the expense of wastewater pumping, hauling, and disposal at an approved facility can be very costly, especially on a long-term basis.

4. In addition, the potential for operational/management problems with resulting public exposure to wastewater is significant and for this reason, the use of a holding tank is limited.

B. RESIDENTIAL DWELLINGS

1. Holding tanks for existing residential dwellings where no public sewer is available are only allowed as a temporary measure while corrective action on a failed OWTS is being completed.

2. Holding tanks for existing residential dwellings on a non-temporary basis may be allowed as a last resort when an OWTS has failed and may be permitted under the following conditions:

    a. The site cannot be approved for the installation of a replacement OWTS due to severe site constraints;

    b. No public sewer system is available; and

    c. All permit conditions are met.

3. Holding tanks shall not be used for accommodating home expansions or additions.

4. Holding tanks shall not be used as a method for wastewater disposal for creating lots and parcels.

C. NON-RESIDENTIAL FACILITIES

1. Holding tanks may in very limited circumstances be permitted for industrial, commercial, or recreational facilities where installation of an OWTS for wastewater is not feasible or allowed.

21.2 HOLDING TANK SITING AND DESIGN REQUIREMENTS

A. SITING REQUIREMENTS

1. Holding tanks must be located in such a way as to facilitate pumping while limiting the general public exposure to, or nuisance caused by, accidental wastewater spillage during pumping.

2. Holding tanks must meet the same horizontal set-backs required for tanks in the treatment train of an OWTS provided in **Table 5-7**.

B. DESIGN REQUIREMENTS

1. Holding tanks must meet the general performance requirements for tanks contained in **Chapter 16** of this Manual and requirements of applicable building codes for ancillary structures and equipment (e.g., concrete pads, impervious surfaces around the access ports, vent pipes, etc.).

2. Holding tanks and piping shall be designed by a Qualified Professional as allowed by their license and registration.

3. If installed above-ground, adequate support must be provided for all associated piping;

4. If the facility or building is to be permanently served by the holding tank incorporation of water-saving fixtures and processes where possible within the facility or dwelling is required.

5. Holding tanks shall have a minimum liquid capacity of fifteen hundred (1,500) gallons and shall be sized to accommodate a minimum of two hundred (200) percent of the wastewater design flow between anticipated pumping events in accordance with the formula in **Table 21-1**.

Table 21-1 **Holding Tank Sizing Formula**
Holding Tank Capacity (gallons) = 2 * (Wastewater Design Flow) * (#Days between Pumping Events)

6. The minimum liquid capacity can be met with multiple holding tanks. Where multiple, interconnected tanks will be installed, they must prevent breakage of connections and differential settling through use of a common slab, flexible connections or bedding.

7. Tanks shall be located and designed to facilitate visual inspection and removal of contents by pumping.

8. Holding tanks shall be equipped with both an audible and visual alarm, placed in a location acceptable to the Department to indicate when the tank is seventy-five (75) percent full. Only the audible alarm may be user cancelable.

9. Holding tanks shall have no overflow vent at an elevation lower than the overflow level of the lowest fixture served.

C. VENTING AND ODOR CONTROL

1. **Gravity Flow to Holding Tanks.** Separate venting directly from the holding tank is not required since the holding tank will vent through the building sewer. Special care shall be necessary however to assure that pumping and service access ports lids are leak-proof so all sewage gases will vent through the facility waste vent pipes.

2. **Pressure Flow to Holding Tanks.** Direct venting of the holding tank is required since gases will not adequately vent through the pressurized line from the pump. Vent pipes should terminate high enough and away from area of human activity to avoid vent stack odors and related nuisances. To assure that the gases vent through the vent stack, pumping and service access port lids must be leak proof.

D. WASH DOWN AREA

1. Design and installation of the holding tank must provide a means to "wash down" the area around the pumping access port(s) and service access(s).

2. The surface adjacent to the access port(s) and service access(s) must be impervious to wastewater and sloped so any spilled wastewater and/or associated wash down water will drain back into the holding tank.

3. If the wash down hose could enter the holding tank, a back-flow prevention device must be installed on the water supply. The back-flow preventer must be accessible for periodic servicing as needed.

21.3 HOLDING TANK INSTALLATION AND PERMITTING REQUIREMENTS

A. PERMIT CONDITIONS

1. Issuance of an installation permit is conditioned on the acceptance of the conditions that will be contained in the operating permit. An operating permit is required prior to issuance of the final installation approval.

2. The installation and operating permits are conditioned on the owner of the property connecting to a public sewer system when it becomes available and prior to the renewal date of the operating permit. An operating permit for a holding tank will not be renewed if a public sewer system is available.

3. The owner shall provide the Department with the following as a condition of the operating permit:

   a. A copy of a contract with a Septage Pumper that shows the holding tank shall be pumped at regular intervals or as needed to prevent use of greater than seventy-five (75) percent of the holding tank's capacity;

   b. A record of pumping dates, amounts pumped, and operation records including, but not limited to alarms, servicing and repairs shall be maintained by the owner, included in the annual operating report and made available to the Department upon request; and

   c. Financial guarantee for operation, such as a bond or an assignment of funds, in an amount at least equal to the cost of one year's service and/or the estimated cost of cleanup and abatement of sewage spill or prepayment of one years' service.

4. Failure to properly and regularly pump a holding tank may result in revocation or non-renewal of the operating permit which will result in red-tag of the property.

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PART 6

SUPPLEMENTAL TREATMENT SYSTEM REQUIREMENTS

CHAPTER	TITLE
CHAPTER 22	GENERAL SUPPLEMENTAL TREATMENT SYSTEMS REQUIREMENTS
CHAPTER 23	PROPRIETARY SUPPLEMENTAL TREATMENT UNIT REQUIREMENTS
CHAPTER 24	RECIRCULATING AND INTERMITTENT SAND FILTER SYSTEM REQUIREMENTS

CHAPTER 22
GENERAL SUPPLEMENTAL TREATMENT SYSTEM REQUIREMENTS

22.0 CHAPTER OVERVIEW

This chapter provides general design guidelines for supplemental treatment systems approved for use in the County.

This chapter is organized in the following sections:

22.1 SUPPLEMENTAL TREATMENT SYSTEMS OVERVIEW

A. GENERAL

1. Supplemental treatment systems may be proprietary treatment units and/or engineered filter systems that provide a specified level of treatment prior to wastewater dispersal into the dispersal system.

2. Dispersal systems receiving wastewater from a supplemental treatment unit are subject to the siting criteria for the specific type of dispersal system proposed, including any allowances for the incorporation of supplemental treatment.

3. Allowances for supplemental treatment may include reduced vertical separation distances, use of enhanced wastewater application rates or modified slope restrictions.

4. Refer to **Part 7** of this Manual for the adopted guidelines for the specific type of dispersal system for applicable requirements and supplemental treatment allowances.

22.2 GENERAL PERFORMANCE REQUIREMENTS FOR SUPPLEMENTAL TREATMENT SYSTEMS

A. MINIMUM CRITERIA

1. Supplemental treatment systems must be designed to meet the following BOD and TSS concentrations:

   a. Thirty (30) day average BOD concentration shall not exceed thirty (30) mg/L, or alternatively, a carbonaceous BOD (CBOD) in excess of twenty-five (25) mg/L.

   b. Thirty (30) day average TSS concentration shall not exceed thirty (30) mg/L.

2. Where nitrogen is identified as a water quality concern, nitrogen reducing performance requirements must also be met in accordance with the specific requirements for the area of concern (refer to **Chapter 10** for Zone 7 Water Agency nitrogen loading requirements for designated areas of concern).

B. DISINFECTION

1. Disinfection may be required when:

    a. New OWTS, installed on parcels of record existing at the time of the effective date of the Ordinance and this Manual that cannot meet the minimum horizontal setback distances from public water supply wells or surface water intake points provided in **Table 5-7** and requiring maximum extent practicable technology; or

    b. Replacement OWTS or repairs to an existing OWTS located within the minimum horizontal setback distances from a surface water body or a well and requiring maximum extent practicable technology.

2. Add-on components performing disinfection must be designed to achieve an effluent total coliform bacteria concentration, at the 95th percentile, not greater than the following:

    a. Ten (10) most probable number (MPN) per one hundred (100) milliliters (ml) prior to discharge into the dispersal system where the soil exhibits percolation rates of one (1) to ten (10) MPI or where the soil texture is sand; or

    b. One thousand (1,000) MPN per one hundred (100) ml prior to discharge into the dispersal system where the soil exhibits percolation rates greater than ten (10) MPI or where the soil texture is other than sand.

C. REMOTE NOTIFICATION

1. Where feasible, supplemental treatment systems shall be equipped with a remote notification mechanism that notifies the owner and Service Provider or System Designer in the event of System malfunction.

D. SYSTEM PERFORMANCE

1. All Systems with supplemental treatment require an operating permit.

2. The performance of Systems with supplemental treatment shall be demonstrated through the operation, maintenance, monitoring and reporting requirements as described in **Chapter 43** of this Manual.

CHAPTER 23
PROPRIETARY TREAMENT UNIT REQUIREMENTS

23.0 CHAPTER OVERVIEW

This chapter provides general design guidelines for proprietary treatment units approved for use in the County and is organized in the following sections:

Section 23.1: Proprietary Treatment Unit Overview

Section 23.2: Proprietary Treatment Unit Siting Requirements

Section 23.3: Design, Installation & Maintenance Requirements

23.1 PROPRIETARY TREATMENT UNIT OVERVIEW

A. GENERAL

1. Propriety treatment units cover a category of manufactured or "package" supplemental treatment systems specifically developed for residential and other small-scale wastewater treatment applications. Most proprietary treatment units currently available fall into the following two general categories:

    a. **Aerobic Treatment Units (ATUs).** ATUs utilize forced air to oxidize the wastewater, promoting aerobic decomposition of the wastewater solids. These systems provide supplemental treatment of wastewater for improvement in dispersal system performance; they also provide varying degrees of nitrogen removal. In general, ATUs can be relied on to produce secondary quality effluent concentrations of less than 30 mg/L BOD and TSS. ATUs are generally not as effective in reducing pathogen levels as are supplemental treatment systems that incorporate media filtration. However, some ATUs provide reduction in nitrogen levels equal to or greater than that provided by sand filters and other media filters.

    b. **Media Filters**. Media filters include proprietary designs that function similar to sand filters. In these systems the sand is replaced with an alternate media including but not limited to peat, gravel or textile. Textile and other media filters have been found to produce effluent quality reasonably similar to recirculating sand filters and provide similar capabilities in overcoming various soil and site constraints.

2. Effluent from proprietary treatment units may be discharged to gravity dispersal systems and to any type of advanced dispersal system identified in **Part 7** of this Manual.

23.2 PROPRIETARY TREATMENT UNIT SITING REQUIREMENTS

A. MINIMUM CRITERIA

1. All siting criteria for tanks, as specified in **Chapter 16** of this Manual shall also apply to proprietary treatment units and associated tanks and pumping units.

23.3 DESIGN, INSTALLATION & MAINTENANCE REQUIREMENTS

A. NSF STANDARD 40 COMPLIANCE

1. Proprietary treatment units must be listed by the NSF/ANSI, meeting the NSF/ANSI Standard 40, Class 1 performance evaluation and have a training/certification program for installers.

2. Proprietary treatment units must be manufactured and installed in accordance with the design specifications used to determine compliance to NSF/ANSI Standard 40. The NSF/ANSI Standard 40 listing is applicable to proprietary treatment units for wastewater flows of up to one thousand five hundred (1,500) gpd and is based on compliance with USEPA standards for secondary treatment of municipal wastewater, including thirty (30)-day average effluent limits of twenty-five (25) mg/L for $CBOD_5$ and thirty (30) mg/L for TSS.

3. Proprietary treatment units for flows in excess of one thousand five hundred (1,500) gpd will require certification by a third-party listing agency as complying with NSF/ANSI Standard 40 performance requirements.

B. DESIGN REQUIREMENTS

1. **Wastewater Design Flow.** Sizing and design of proprietary treatment units shall be based on the projected wastewater flow for the structures or facilities being served, determined in accordance with wastewater flow estimation guidelines in **Chapter 14** of this Manual.

2. **Tanks.** All tanks housing a proprietary treatment unit shall be structurally sound, water-tight and shall be capable of withstanding one-thousand (1,000) pounds of weight. All tanks must comply with the general tank design requirements presented in **Chapter 16**.

3. **Controls.** Control panels shall be designed and configured in such a manner that, in the event of a proprietary treatment unit malfunction, an alarm system will be triggered and discharge from the proprietary treatment unit to the dispersal system will be interrupted until the proprietary treatment unit malfunction is rectified. At a minimum, the alarm system shall include an audible and visual alarm located within fifty (50) feet of the building served by the System.

4. **Emergency Storage Provisions.** Where a proprietary treatment unit is used in conjunction with a gravity dispersal system, the system shall provide emergency storage capacity equal to at least one (1) times the wastewater design flow, consistent with requirements for pump systems provided in **Chapter 20** of this Manual.

5. **Compliance with Manufacturer Requirements.** The System Designer and installer of the proprietary treatment unit shall follow the manufacturer's design, installation, construction, and operations procedures.

6. **System Design Plans.** Design plan submittals for proprietary treatment units shall provide documentation of compliance with manufacturer requirements and sufficient design analysis to verify the appropriateness of the treatment unit for the proposed

application. System design documents shall contain specific step-by step construction guidelines and notes for use by the installer, including any manufacturer instructions.

C. INSTALLATION AND MAINTENANCE REQUIREMENTS

1. **Installer Requirements.** Anyone installing a proprietary treatment unit shall be trained and certified by the system manufacturer. Documentation verifying the training/certification shall be provided to the Department prior to system installation.

2. **Maintenance Contract**. The owner must provide proof of a written maintenance agreement with a Service Provider or System Designer for the proposed proprietary treatment unit to ensure satisfactory post-construction operation and maintenance. Proof of a written maintenance agreement is required as a condition of the operating permit.

CHAPTER 24
INTERMITTENT & RECIRCULATING SAND FILTER SYSTEM REQUIREMENTS

24.0 CHAPTER OVERVIEW

This chapter provides general design guidelines for intermittent sand filters (ISF) and recirculating sand filter (RSF) systems and is organized in the following sections:

Section 24.1: ISF and RSF Systems Overview

Section 24.2: Siting Requirements

Section 24.3: Influent Wastewater Strength Requirements

Section 24.4: Pressure Dosing Requirements

Section 24.5: Containment Structure Requirements

Section 24.6: Sand Filter Basal Area Sizing Requirements

Section 24.7: Sand Filter Media Requirements

Section 24.8: Gravel Distribution Bed Requirements

Section 24.9: Underdrain Requirements

Section 24.10: Air Manifold Requirements

Section 24.11: Internal Pump System Requirements (ISF Only)

Section 24.12: Cover Requirements

Section 24.13 Inspection Well Requirements

24.1 ISF AND RSF SYSTEMS OVERVIEW

A. DESCRIPTION

1. ISF and RSF systems are used to provide supplemental treatment of septic tank effluent prior to discharge to the dispersal system. They are used to improve or restore the capacity of the dispersal system, reduce pathogenic bacteria loading and can provide additional nitrogen removal.

2. An ISF consists of a packed-bed filter of medium-grained sand designed for single pass-through treatment of septic tank effluent; it is sometimes referred to as a "single pass filter".

3. An RSF utilizes coarse-grained sand and a recirculation system usually controlled by a timer that causes the effluent to pass through the sand media several times prior to final dispersal. RSFs have the ability to produce effluent quality similar to ISFs except that they are less effective in bacteria removal. However, RSFs typically provide greater nitrogen removal than ISFs, on the order of fifty (50) percent reduction as compared with primary treatment (septic tank) effluent.

4. Discharge of effluent from an intermittent sand filter to a dispersal system is required. Direct discharge of effluent from an intermittent sand filter to surface water or upon the ground surface is prohibited. Effluent from sand filters may be discharged to any type of dispersal system identified in this Manual.

5. Effluent from an ISF or RSF designed and operated in accordance with these guidelines will be considered to meet the criteria for supplemental treatment.

6. Schematic and cross-section diagrams of ISF are provided in **Figure 24-1** and **Figure 24-2** and a cross-section diagram of a RSF is provided in **Figure 24-**3 (included at the end of this chapter) to illustrate the key design features of ISF and RSF.

24.2 SITING REQUIREMENTS

A. MINIMUM CRITERIA

1. All siting criteria for tanks, as specified in **Chapter 16** shall also apply to ISF and RSF systems and associated tanks and pumping units.

24.3 INFLUENT WASTEWATER STRENGTH REQUIREMENTS

A. MINIMUM CRITERIA

1. ISF and RSF systems are designed for treating domestic-strength wastewater. The wastewater applied to the sand filter shall not be higher in strength than domestic-strength wastewater. Lower wastewater strengths are preferable for assuring long term operation of sand filter systems.

2. The following treatment requirements shall apply in connection with the use of ISF and RSF systems:

   a. Primary (septic tank) treatment shall be the minimum level of treatment.

   b. Supplemental treatment using an approved proprietary treatment unit identified in this Manual, shall be required for high-strength wastewater in order to reduce its strength prior to introduction into the ISF or RSF system.

24.4 PRESSURE DOSING REQUIREMENTS

A. MINIMUM CRITERIA

1. Septic tank effluent shall be applied to the ISF or RSF by pressure dosing utilizing either an automatic dosing siphon (ISF system only) or a pump.

2. The pressure distribution system shall be designed in accordance with accepted industry practices to achieve at a minimum:

   a. Uniform dosing of effluent over the surface application area of the sand filter distribution bed;

   b. Adequate flow rate, screening of effluent, suitable piping network and orifice shields to preclude solids accumulation in the pipes or clogging of discharge orifices;

   c. Suitable access provisions for inspection, testing and adjustment of the pressure distribution system;

d. At least one distribution lateral for every thirty-six (36) inches of bed width; and

e. Dosing volumes as follows:

(1) **Intermittent Sand Filters Systems**: Dosing may be either on demand or time dosing. For on demand systems the dosing volume should be designed to achieve a minimum of three (3) to five (5) doses per day at wastewater design flow conditions. For time dosed systems the volume should be sufficient to ensure complete filling of the distribution piping and even dispersal throughout the sand filter bed with each dose;

(2) **Recirculating Sand Filters**: Timed dosing to achieve a recirculation rate of approximately five to one (5:1) at wastewater design flow conditions.

3. The pump or siphon system must be designed in accordance with the pump system requirements provided in **Chapter 20** of this Manual.

4. Additional requirements for the design and construction of pressure distribution systems contained in **Chapter 26** of this Manual shall also apply.

5. Where a sand filter is used in conjunction with a gravity-fed dispersal system, the dosing pump system for the ISF or RSF system shall provide emergency storage capacity equal to at least one (1) times the wastewater design flow consistent with requirements for pump systems provided in **Chapter 20** of this Manual.

24.5 CONTAINMENT STRUCTURE REQUIREMENTS

A. CONTAINMENT LINER

1. The ISF/RSF system shall be provided with an impermeable containment liner along all sides of the filter bed to prevent lateral leakage out of or into the filter.

2. The liner shall consist of either:

   a. Synthetic membrane lined pit (30 mil plastic);

   b. Reinforced poured-in-placed concrete; or

   c. An equivalent impermeable structure or barrier.

3. Plastic liners shall meet the material specifications provided in **Chapter 36**.

4. Containment walls over four feet in height measured from the bottom of the footing to the top of the walls must be designed by a Qualified Professional as allowed by their license and registration.

B. FINISHED GRADE AND STRUCTURAL SUPPORT

1. The finished surface elevation of the sand filter shall be above the surrounding ground surface elevation and shall be structurally supported with retaining wall(s), as required.

C. SAND FILTER BED DIMENSIONS

1. The sand filter shall not be restricted as to its shape in plan view.

2. The raised sand filter bed dispersal system may be divided into compartments or multiple units.

24.6 SAND FILTER BASAL AREA SIZING REQUIREMENTS

A. MINIMUM CRITEERIA

1. The basal area of the sand filter shall be sized as follows:

   a. **Wastewater Flow.** The wastewater flow used for sizing the basal area of the sand filter shall be the wastewater design flow for the System.

   b. **Wastewater Application Rate.** The maximum wastewater application rate used for sizing the basal area of the sand filter shall be as shown in **Table 24-1** below:

Table 24-1
Maximum Wastewater Application Rate for Sand Filter Basal Area Sizing

Sand Filter Type	Individual Residential OWTS	Commercial, Industrial, Institutional and Multi-Unit Residential OWTS
ISF	1.2 gpd/ft^2	1.0 gpd/ft^2
RSF	5.0 gpd/ft^2	4.0 gpd/ft^2

Note: Reduction in the above wastewater loading rates or other provisions to ensure the long-term integrity and performance of the sand filter may be required for high-strength wastewater flows.

2. **Minimum Sizing**. The minimum size (square feet) of the basal area of the sand filter system shall be determined in accordance with the formula provided in **Table 24-2** using the applicable wastewater application rate listed in **Table 24-1** above.

Table 24-2
Sand Filter Basal Area Formula

$$\text{Sand Filter Basal Area }(\text{ft}^2) = \frac{\text{Wastewater Design Flow Rate (gpd)}}{\text{Wastewater Application Rate }(\frac{\text{gpd}}{\text{ft}^2})}$$

24.7 SAND FILTER MEDIA REQUIREMENTS

A. SAND SPECIFICATIONS

1. The sand filter media shall be a medium to coarse sand which meets the gradation specifications for ISFs or RSFs in **Chapter 35**.

2. Documentation of laboratory sieve analysis results for the proposed sand filter media material shall be provided to the Department to verify conformance with the above specifications prior to final installation approval.

B. SAND DEPTH

1. The minimum depth of sand fill below the gravel distribution bed shall be twenty-four (24) inches.

24.8 GRAVEL DISTRIBUTION BED REQUIREMENTS

B. GRAVEL SPECIFICATIONS

1. The gravel distribution bed shall consist of clean pea gravel which meets the material specifications in **Chapter 35**.

C. GRAVEL DEPTH

1. Pea gravel shall extend a minimum of six (6) inches below the invert and two (2) inches above the top of the distribution piping.

2. If the distribution piping is installed with gravelless chambers, the pea gravel depth below the distribution pipe may be reduced from six (6) inches to four (4) inches, and the two (2) inch pea gravel cover may be eliminated.

D. SILT BARRIER

1. **ISF Systems**. The gravel distribution bed shall be covered in its entirety with a geotextile ("filter fabric") silt barrier meeting the filter fabric specifications in **Chapter 36**.

2. **RSF Systems.** RSFs do not require a silt barrier.

24.9 UNDERDRAIN REQUIREMENTS

A. STORAGE VOLUME

1. The underdrain beneath the sand filter must be designed with sufficient void storage volume to provide for a single drainfield dose with reserve capacity to maintain unsaturated filter media above the underdrain system.

2. Collection pipes must be of sufficient size with adequate perforations or slots so that filtrate can flow from the void storage space into the collection pipe rapidly enough to

maintain unsaturated filter media above the underdrain system.

B. GRAVEL AND PIPE CRITERIA

1. The underdrain shall have a minimum depth of nine (9) inches and shall consist of a minimum three (3) inch layer of pea gravel over a six (6) inch medium gravel layer containing the collection pipe consisting of four (4) inch diameter perforated drain pipe installed with perforations oriented down.

2. The purpose of the pea gravel is to restrict the migration of sand into the gravel and pipe in the underdrain. The gravel surrounding the perforated pipe should be sized larger than the perforations to prevent migration of gravel into the pipe.

3. For the purpose of calculating void storage space in the medium gravel, three (3) gallons per cubic foot may be used assuming forty (40) percent void space per cubic foot.

4. The pipe and gravel shall meet the material specifications in **Chapter 33** and **Chapter 35**.

C. GRADE

1. The underdrain shall be constructed and the drain pipe set with a minimum gradient of one (1) percent toward the outlet point.

D. WATERTIGHT OUTLET BOOT

1. The underdrain shall be equipped with a watertight outlet "boot" for connection of piping to the pump tank.

2. An exception to this is for ISF systems that are equipped with an internal pump system for direct dosing to the dispersal system (see **Section 24.11** below).

E. CLEAN-OUT RISER

1. For cleanout and inspection purposes the upslope end of the perforated drain pipe in the underdrain shall be equipped with a vertical riser constructed of non-perforated pipe of equal diameter.

2. The riser shall extend to the finished surface elevation of the sand filter.

24.10 AIR MANIFOLD REQUIREMENTS

A. MINIMUM CRITERIA

1. An air manifold shall be installed within the gravel underdrain above the perforated pipe for the purpose of introducing forced air into the sand filter media, as needed, for maintenance or drainage rehabilitation.

2. The air manifold shall consist of small diameter pressure pipe meeting the material specifications in **Chapter 33**, with drilled perforations (pointed down), or an equivalent piping system, for example drip line tubing.

3. The manifold shall be connected to a vertical leader pipe that extends to the surface of the sand filter, fitted with a threaded pipe cap or plug at the top where a portable air-line can be connected.

24.11 INTERNAL PUMP SYSTEM REQUIREMENTS (ISF ONLY)

A. MINIMUM CRITERIA

1. In lieu of gravity flow from the sand filter to the dispersal system, an internal pump system may be installed within the ISF system for dosing directly to the dispersal field.

2. In such applications:

   a. The pump chamber shall be seated at or below the bottom of the underdrain;

   b. The pump operating depth shall be entirely within the depth of the underdrain; and,

   c. A storage volume equal to at least fifty (50) percent of the dispersal field dose volume shall be provided in the network of perforated drain pipes within the underdrain.

24.12 COVER REQUIREMENTS

A. ISF SYSTEMS

1. **Material**. A continuous soil cover consisting of a medium, loamy-textured soil shall be placed over the entire distribution bed.

2. **Depth**. The soil cover depth shall be a minimum of twelve (12) inches and a maximum of eighteen (18) inches over the top of the distribution bed. The soil cover shall be crowned or sloped to promote rainfall runoff.

B. RSF SYSTEMS

1. **Material**. A granular media cover shall be placed over the distribution bed, consisting of clean gravel that meets the material specifications in **Chapter 35**.

2. **Depth**. The soil cover depth shall be a minimum of twelve (12) inches and a maximum of eighteen (18) inches over the top of the distribution bed.

24.13 INSPECTION WELL REQUIREMENTS

A. MINIMUM CRITERIA

1. A minimum of one (1) inspection well shall be installed within the gravel distribution bed

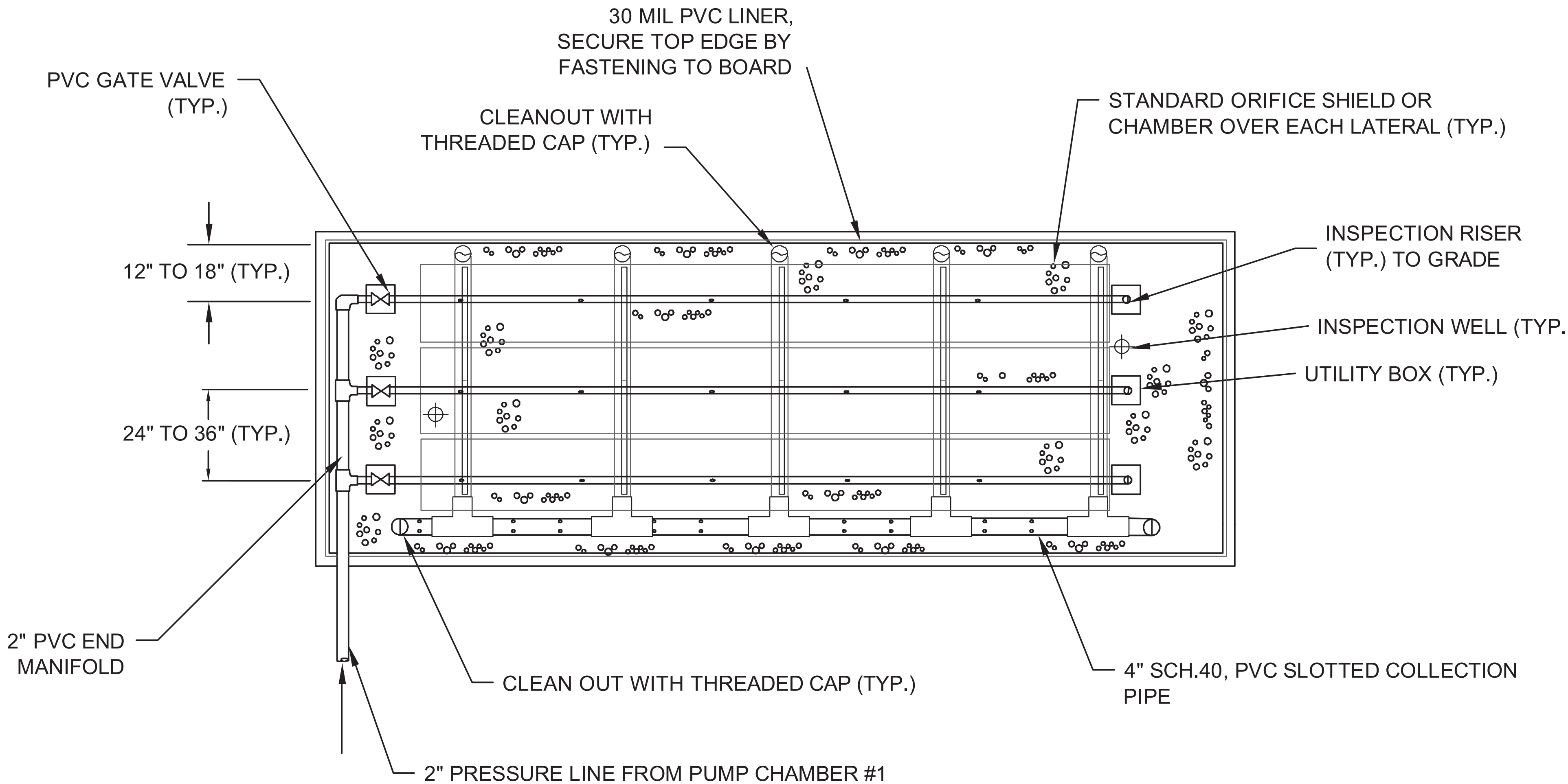
of each sand filter compartment for the purpose of checking wastewater levels and water quality sampling.

2. Inspection wells shall be constructed of two (2) inch to four (4) inch diameter pipe, equipped with a wrench-tight cap or pipe plug and a bottom cap.

3. Inspection wells shall extend from the finished surface elevation to the pea gravel-sand interface of the gravel distribution bed and shall be perforated in the gravel zone only as shown on **Figure 24-2** (ISFs) and **Figure 24-3** (RSFs).

4. Perforations shall consist of hacksaw slots at nominal one (1) inch spacing, or equivalent commercially-slotted pipe.

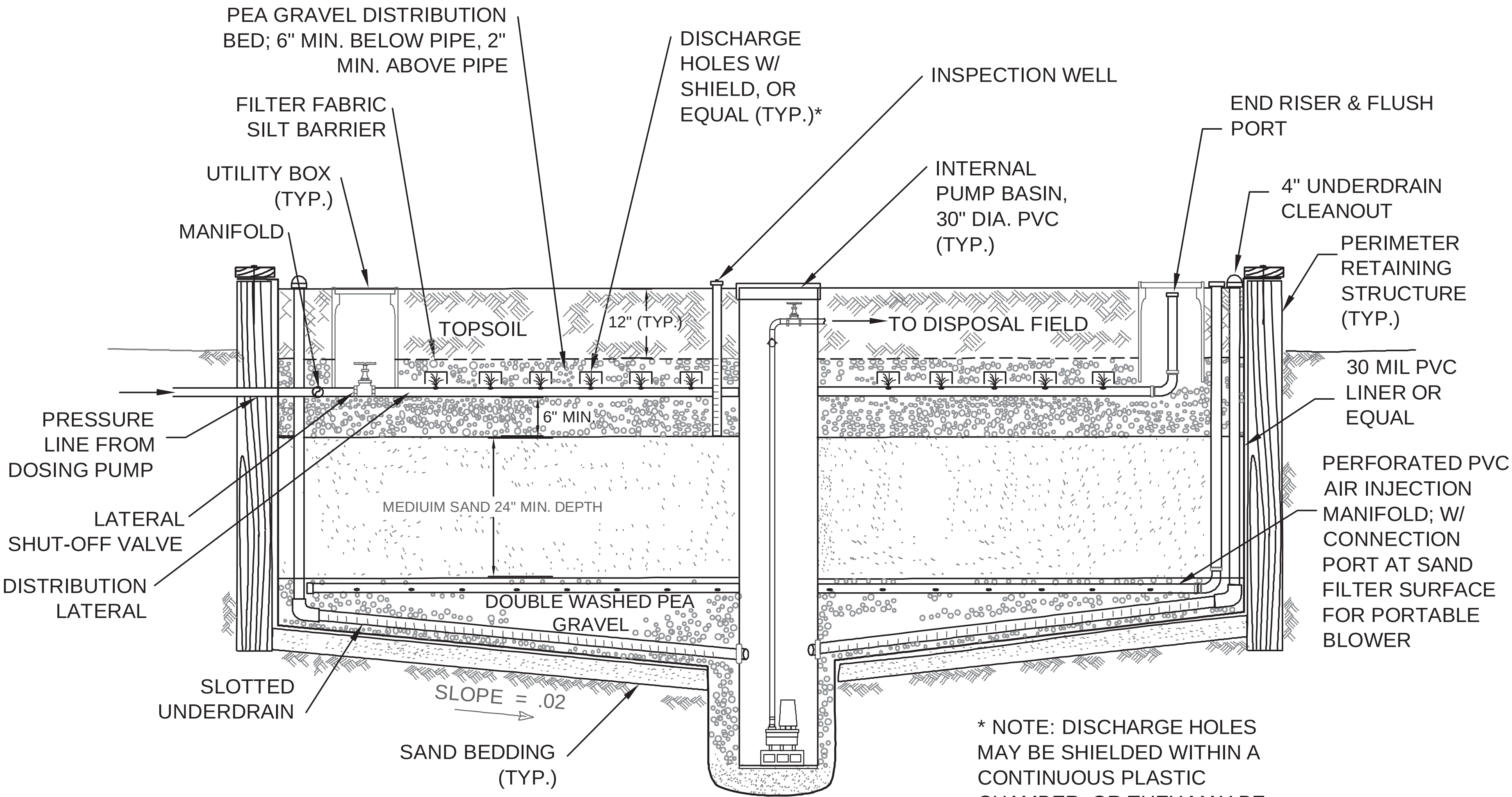
5. For ISFs, inspection wells shall be sealed to prevent surface infiltration with a bentonite or concrete annular seal (or equivalent) through the soil backfill zone.



PLAN VIEW

INTERMITTENT SAND FILTER
SCHEMATIC

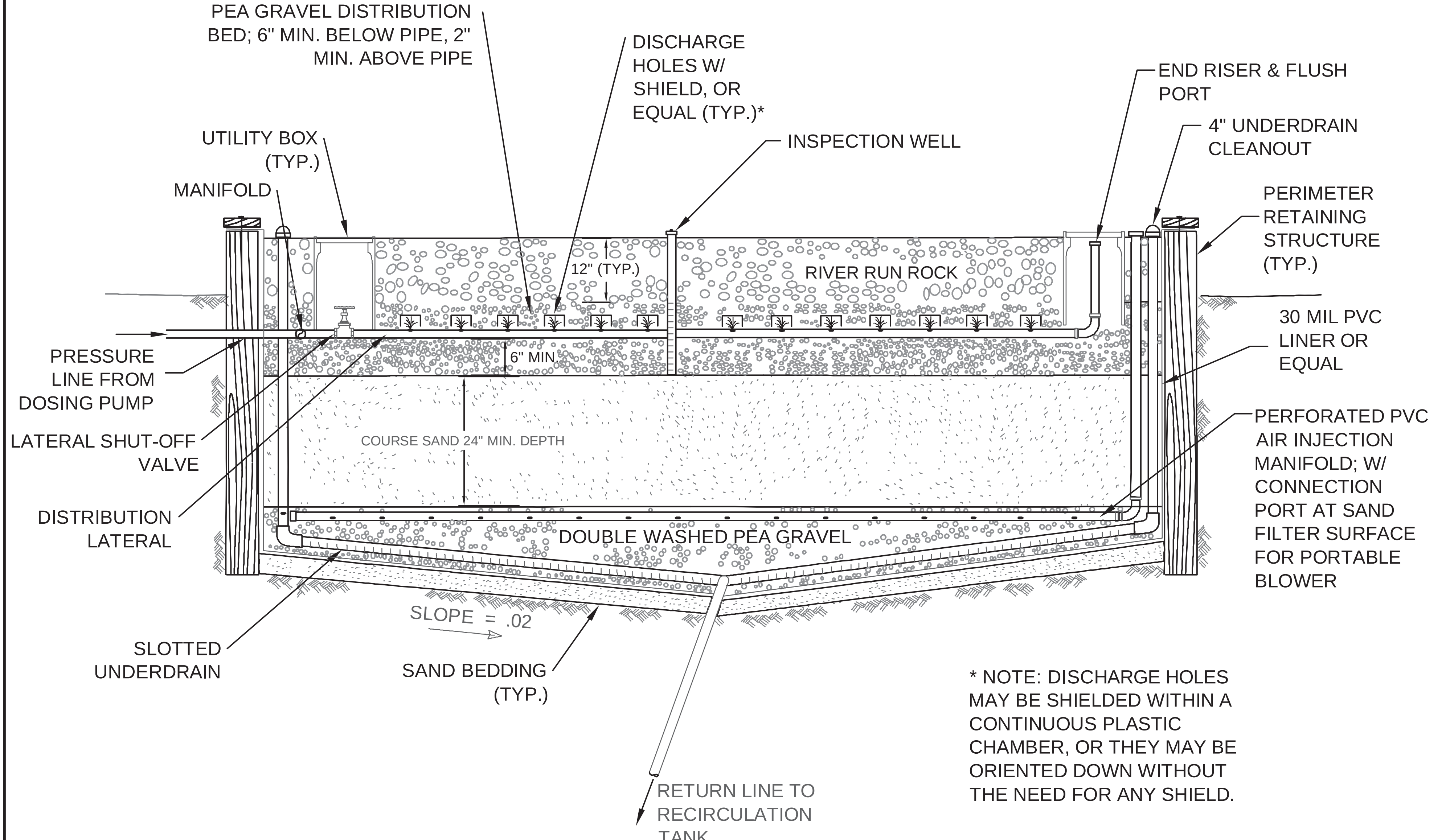
FIGURE 24-1



* NOTE: DISCHARGE HOLES MAY BE SHIELDED WITHIN A CONTINUOUS PLASTIC CHAMBER, OR THEY MAY BE ORIENTED DOWN WITHOUT THE NEED FOR ANY SHIELD.

INTERMITTENT SAND FILTER
WITH INTERNAL PUMP BASIN CROSS-SECTION

FIGURE 24-2



* NOTE: DISCHARGE HOLES MAY BE SHIELDED WITHIN A CONTINUOUS PLASTIC CHAMBER, OR THEY MAY BE ORIENTED DOWN WITHOUT THE NEED FOR ANY SHIELD.

RECIRCULATING SAND FILTER CROSS-SECTION

FIGURE 24-3

PART 7

SUBSURFACE DISPERSAL SYSTEM REQUIREMENTS

CHAPTER 25
SUBSURFACE DISPERSAL SYSTEM GENERAL REQUIREMENTS

25.0 CHAPTER OVERVIEW

This chapter provides an overview and general design criteria for subsurface dispersal systems approved for use in the County. The criteria apply to new and replacement OWTSs and modifications or repairs to existing OWTS.

This chapter is organized in the following sections:

Section 25.1: Dispersal Systems Overview

Section 25.2: Wastewater Application Rate Requirements

Section 25.3: Effective Soil Depth &Vertical Separation to Groundwater Requirements

Section 25.4: Ground Slope Requirements

Section 25.5: Horizontal Setback Requirements

Section 25.6: Dual Dispersal System Requirements

Section 25.7: OWTS Performance Well Requirements

25.1 DISPERSAL SYSTEMS OVERVIEW

A. TYPES OF SYSTEMS

1. A summary of the subsurface dispersal system types and associated treatment train configurations that may be approved for use in the County are provided in the following tables:

    a. **Table 5-1** (Gravity Trench Dispersal System Configurations);

    b. **Table 5-2** (Pressure-Dosed Trench Dispersal System Configurations);

    c. **Table 5-3** (Subsurface Drip Dispersal System Configurations);

    d. **Table 5-4** (At-Grade Dispersal System Configurations);

    e. **Table 5-5** (Mound Dispersal System Configurations); and

    f. **Table 5-6** (Raised Sand Filter Bed Dispersal System Configurations).

2. Other dispersal systems and treatment train configurations may be approved for use in the County under Regional Water Board Waste Discharge Requirements.

25.2 WASTEWATER APPLICATION RATE REQUIREMENTS

A. MINIMUM CRITERIA

1. Subsurface dispersal systems are sized based on wastewater application rates that are representative of the soil classification and percolation rates for the soil zone corresponding

to the sidewall and/or bottom of the dispersal system and the type of OWTS proposed.

2. Wastewater application rates shall be determined using the design percolation rate calculated in accordance with the procedures presented in **Chapter 8** of this Manual.

3. **Alternative Method.** Where there is a substantial variation in the individual adjusted percolation rates (i.e., an order of magnitude difference between high and low values) calculated in accordance with the procedures presented in **Chapter 8** the wastewater application rate for dispersal system design may be determined by averaging the individual wastewater application rates corresponding to each adjusted percolation rate.

B. WASTEWATER APPLICATION RATE TABLES

1. The wastewater application rate for sizing dispersal systems shall be based upon representative percolation test results for the soil zone corresponding with the depth of the sidewall and/or bottom of the dispersal system.

2. **Standard Wastewater Application Rates.** Standard wastewater application rates are presented in **Table 25-1** (included at the end of this chapter) and must be utilized with gravity trench dispersal systems and other advanced dispersal system types, as applicable.

3. **Enhanced Wastewater Application Rates.** Enhanced wastewater application rates are presented in **Table 25-2** (included at the end of this chapter). Enhanced wastewater application rates may be utilized as follows:

   a. To size pressure-dosed sand trench dispersal systems, mound dispersal systems and raised sand filter bed dispersal systems.

   b. To allow smaller dispersal system sizing of any dispersal system utilizing pressure distribution when all of the following conditions are met:

      (1) The dispersal system is preceded by supplemental treatment; and

      (2) The vertical separation to high seasonal groundwater requirement is met for the same type of dispersal system preceded by primary (septic tank) treatment only.

4. **Wastewater Application Rates for Subsurface Drip Dispersal Systems.** Wastewater application rates for subsurface drip dispersal systems are provided in **Table 25-3** (included at the end of this chapter).

5. **Table 5-1** through **Table 5-6** provide guidance on the requisite wastewater application rate table to use when sizing dispersal systems.

25.3 EFFECTIVE SOIL DEPTH & VERTICAL SEPARATION TO GROUNDWATER REQUIREMENTS

A. MINIMUM CRITERIA

1. Dispersal systems shall be designed to meet the minimum effective soil depth and vertical

separation distances from high seasonal groundwater or other limiting layer.

2. Where advanced OWTS are utilized, the minimum effective soil depth and the vertical separation to groundwater distance may be reduced from the requirements that apply to standard OWTS.

3. Minimum vertical separation distances to high seasonal groundwater and minimum effective soil depth requirements for subsurface dispersal systems that may be approved for use in the County are provided in **Table 5-1** through **Table 5-6.**

25.4 GROUND SLOPE REQUIREMENTS

A. MAXIMUM CRITERIA

1. Dispersal systems shall be designed to comply with the maximum ground slope requirements allowable for the specific type of dispersal system.

2. Maximum ground slope for OWTS configurations that may be approved for use in the County are provided in **Table 5-1** through **Table 5-6**.

3. A geotechnical report is required in accordance with the requirements of **Chapter 11** of this Manual for OWTS on sites with ground slopes greater than thirty (30) percent.

25.5 HORIZONTAL SETBACK REQUIREMENTS

A. MINIMUM CRITERIA

1. Subsurface dispersal systems must meet the horizontal setback requirements provided in **Table 5-7** as well as additional setback criteria for the specific type of dispersal system.

25.6 DUAL DISPERSAL SYSTEM REQUIREMENTS

A. WHEN REQUIRED

1. Standard OWTS must have a dual dispersal system equipped with a manual diversion device meeting the specifications in **Chapter 34** of this Manual to allow alternating use of the two systems, switching between dispersal fields every six (6) to twelve (12) months. Each dispersal field shall be designed to accept one hundred (100) percent of the wastewater design flow.

B. EXCEPTIONS FOR ADVANCED OWTS

1. In lieu of the dual dispersal system requirement, a reserve area shall be identified and preserved for future use for installation of a replacement dispersal system, if required in the future. The reserve area must be:

   a. A dedicated area of land having suitable site conditions and sufficient area for installation of a replacement dispersal system (sized for one hundred [100] percent of the wastewater design flow and able to meet all the design requirements of the system proposed);

b. Totally separate from the installed dispersal system; and

c. Fully protected to prevent damage to soil and any adverse impact on the immediate surroundings that may affect the future installation of the replacement system and its function.

25.7 OWTS PERFORMANCE MONITORING WELL REQUIREMENTS

A. WHEN REQUIRED

1. For OWTS utilizing pressure distribution for the purpose of reduced groundwater separation or where required due to soil percolation rates, OWTS performance monitoring wells shall be installed around the dispersal system in accordance with the requirements in **Table 25-4** and as shown on **Figure 25-1** (included at the end of this chapter) for the purpose of checking groundwater levels periodically and water quality sampling, if needed.

2. OWTS performance monitoring wells may also be required by the Department, for example where recommended by geotechnical report or in connection with a phased corrective action plan or setback variance or if there have been complaints about OWTS performance.

B. WELL CONSTRUCTION REQUIREMENTS

1. OWTS performance monitoring wells shall be installed in accordance with the criteria in **Table 25-4** and as summarized below:

   a. Within the dispersal system, typically near the center of the dispersal field;

   b. Upslope of the dispersal field to serve as background or control wells; and

   c. Downslope of the dispersal field to provide a representative point for monitoring the area estimated to be in the probable flow path of percolating wastewater.

2. OWTS performance monitoring wells shall extend from the ground surface to a depth of three (3) feet below the bottom of the dispersal system or to contact with impermeable materials, whichever is less.

3. OWTS performance monitoring wells shall be constructed of two (2) inch to four (4) inch diameter pipe and equipped with a wrench-tight cap or pipe plug and a bottom cap.

4. All wells shall be perforated beginning at a depth of twelve (12) to eighteen (18) inches below grade and extending to the bottom of the pipe.

5. Perforations shall consist of hacksaw slots at nominal one (1) inch spacing, or equivalent commercially-slotted pipe.

6. Wells shall be sealed with a bentonite or concrete annular seal (or equivalent) extending from the ground surface to a minimum depth of twelve (12) inches to prevent surface water infiltration.

Table 25-1

STANDARD WASTEWATER APPLICATION RATES

Percolation Rate (MPI)	Application Rate (gpd/ft^2)		Percolation Rate (MPI)	Application Rate (gpd/ft^2)
1 to 5	1.20		51	0.41
6	1.12		52	0.40
7	1.04		53	0.40
8	0.96		54	0.39
9	0.88		55	0.38
10	0.80		56	0.38
11	0.78		57	0.37
12	0.77		58	0.36
13	0.75		59	0.36
14	0.74		60	0.35
15	0.72		61	0.35
16	0.70		62	0.34
17	0.68		63	0.34
18	0.67		64	0.34
19	0.65		65	0.33
20	0.64		66	0.33
21	0.63		67	0.33
22	0.62		68	0.32
23	0.61		69	0.32
24	0.60		70	0.32
25	0.59		71	0.31
26	0.59		72	0.31
27	0.58		73	0.31
28	0.57		74	0.30
29	0.57		75	0.30
30	0.56		76	0.30
31	0.55		77	0.29
32	0.55		78	0.29
33	0.54		79	0.29
34	0.53		80	0.28
35	0.52		81	0.28
36	0.52		82	0.28
37	0.51		83	0.27
38	0.50		84	0.27
39	0.49		85	0.27
40	0.49		86	0.26
41	0.48		87	0.26
42	0.47		88	0.26
43	0.46		89	0.25
44	0.46		90	0.25
45	0.45		91-120	0.20
46	0.44			
47	0.44			
48	0.43			
49	0.43			
50	0.42			

Note: Pressure-Dosing Required for Soil Percolation Rates Greater than 60 MPI

Table 25-2
Enhanced Wastewater Application Rates

Percolation Rate (MPI)	Application Rate (gpd/ft^2)
1-24	1.20
25	1.19
26	1.17
27	1.16
28	1.15
29	1.13
30	1.12
31	1.09
32	1.06
33	1.03
34	1.00
35	0.97
36	0.94
37	0.91
38	0.89
39	0.86
40	0.83
41	0.80
42	0.77
43	0.74
44	0.71
45	0.68
46	0.67
47	0.66
48	0.65
49	0.64
50	0.63
51	0.62
52	0.61
53	0.60
54	0.59
55	0.58
56	0.57
57	0.56
58	0.55
59	0.54
60	0.53
61	0.52
62	0.51
63	0.50
64	0.49
65	0.48
66	0.47
67	0.46
68	0.46
69	0.45
70	0.44
71	0.43
72	0.42
73	0.41
74	0.40
75	0.39
76	0.38
77	0.37
78	0.36
79	0.35
80	0.34
81	0.33
82	0.32
83	0.31
84	0.31
85	0.30
86	0.29
87	0.28
88	0.27
89	0.26
90	0.25
91-120	0.20

Note:

High Strength Wastewater. Reduction in the above wastewater loading rates to insure the long-term integrity and performance of Dispersal Systems may be required for high strength waste flows.

Table 25-3
Wastewater Application Rates for Subsurface Drip Dispersal Systems

Soil Type[1]	Soil Percolation Rate (mpi)	Wastewater Application Rate (gpd/ft^2)
Coarse Sand	1 to 4	1.4
Fine Sand	5 to 10	1.2
Sandy Loam	11 to 20	1.0
Loam	21 to 30	0.7
Clay Loam	31 to 45	0.6
Silt-Clay Loam	46 to 60	0.4
Clay, non-swell	61 to 90	0.2
Clay, swell	91 to 120	0.1

Notes:

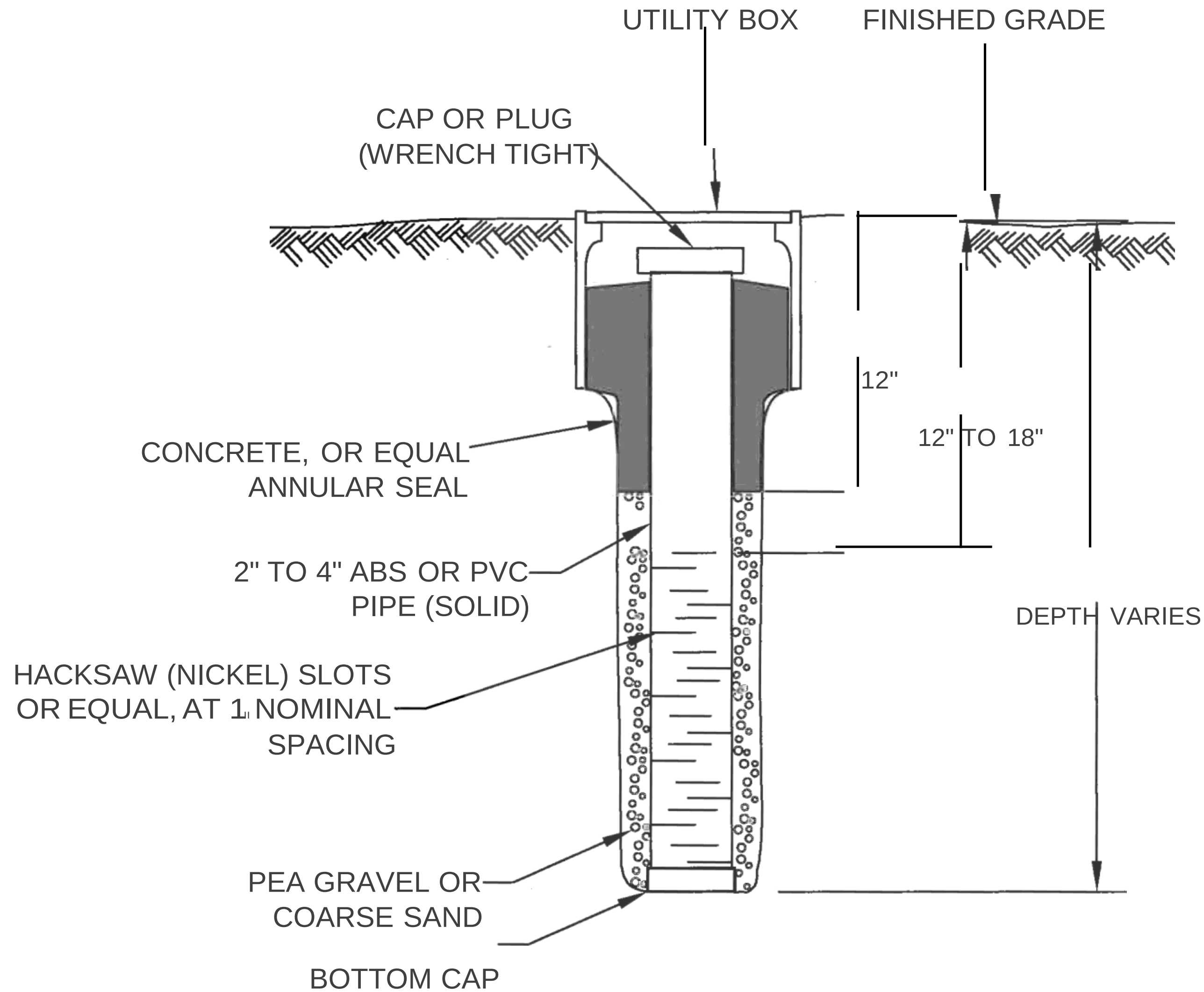
[1]Soil types listed for reference information only; design shall be based on site-specific percolation data.

TABLE 25-4
OWTS PERFORMANCE MONITORING WELL REQUIREMENTS

Dispersal System Type	Location		
	Upslope	**Within Dispersal Field**	**Downslope**
Pressure Dosed Trenches	One (1) well shall be located upslope of the dispersal field, typically 10 to 15 away, to serve as a background or control well, extending from the ground surface to a depth of three (3) feet below the bottom of the dispersal trenches or to contact with impermeable materials, whichever is less.	One (1) well shall be located within the pressure dosed dispersal field, typically between trenches near the center of the dispersal field. The well shall extend from the ground surface to a depth of three (3) feet below the bottom of the dispersal trenches or to contact with impermeable materials, whichever is less	One (1) well shall be located down-slope of the dispersal field, typically ten (10) to twenty-five (25) feet horizontally from the lowest trench(es), and positioned to provide a representative point for monitoring the area estimated to be in the probable flow path of percolating Wastewater. The well shall extend from the ground surface to a depth of three (3) feet below the bottom of the dispersal trenches or to contact with impermeable materials, whichever is less.
Drip	One (1) well shall be located ten (10) to fifteen (15) feet up-gradient of the dripfield, extending to a depth of a minimum of three (3) feet or to contact with impermeable materials, whichever is less.	One (1) well shall be located within the dripfield area, extending to a depth of a minimum of three (3) feet or to contact with impermeable materials, whichever is less.	One (1) well shall be located ten (10) to fifteen (15) feet down-gradient of the dripfield, extending to a depth of a minimum of three (3) feet or to contact with impermeable materials, whichever is less.

TABLE 25-4
OWTS PERFORMANCE & DISPERSAL SYSTEM INSPECTION MONITORING WELLS

Dispersal System Type	Location		
	Upslope	**Within Dispersal Field**	**Downslope**
At-Grade	One (1) well shall be located five (5) to ten (10) feet upslope of the dispersal field, midway along the length of the dispersal field, extending from the ground surface to a depth of three (3) feet or to contact with an impermeable substratum, whichever is less.	One (1) well shall be located near the center of the dispersal field, extending from the fill surface to the bottom of the gravel distribution bed.	One (1) well shall be located midway along the down-slope length of the dispersal field, within five (5) to ten (10) feet from the toe of the fill slope, extending from ground surface to a depth of three (3) feet or to contact with an impermeable substratum, whichever is less.
Mound	One (1) well shall be located five (5) to ten (10) feet upslope of the dispersal field, midway along the length of the dispersal field, extending from the ground surface to a depth of three (3) feet or to contact with an impermeable substratum, whichever is less.	One (1) well shall be located near the center of the dispersal field, extending from the dispersal field surface to the bottom of the gravel distribution bed. One (1) well shall be located within the effective basal area (outside of the distribution bed), extending from the mound dispersal system surface to six (6) inches into the native soil.	Four (4) wells shall be located, respectively, midway along each of the four sides of the mound dispersal system, near the toe of the slope, extending from ground surface to a depth of three (3) feet or to the depth of impermeable materials, whichever is less.
Raised Sand Filter Bed	One (1) well shall be located five (5) to ten (10) feet upslope of the dispersal system, midway along the length of the at-grade, extending from the ground surface to a depth of three (3) feet or to contact with impermeable materials, whichever is less.	One (1) well shall be located near the center of the dispersal system, extending from the fill surface to the bottom of the gravel distribution bed. One (1) well shall be located near the center of the raised sand filter bed dispersal system, extending from the fill surface to the sand-soil interface.	One (1) well shall be located midway along the downslope length of the dispersal system, within ten (10) to fifteen (15) feet from the edge of the bed, extending from ground surface to a depth of three (3) feet or to the depth of impermeable materials, whichever is less.



	OWTS PERFORMANCE MONITORING WELL (TYPICAL)	**FIGURE** **25-1**

CHAPTER 26
PRESSURE DISTRIBUTION DISPERSAL SYSTEM REQUIREMENTS

26.0 CHAPTER OVERVIEW

This chapter provides the design criteria for pressure distribution dispersal systems. The criteria apply to new and replacement OWTS and modifications or repairs to existing OWTS.

This chapter is organized in the following sections:

26.1 PRESSURE DISTRIBUTION DISPERSAL SYSTEM OVERVIEW

A. GENERAL DESCRIPTION

1. Pressure distribution dispersal systems apply wastewater effluent to the dispersal field by pressure dosing, utilizing either an automatic dosing siphon or pump system.

2. A dosing system provides for the periodic discharge of a determined volume of effluent to a dispersal field.

3. Dosing uses the principle of wetting and resting, which provides multiple daily dosing of effluent to a subsurface soil absorption system with a period of resting and re-aeration between doses.

4. This resting period is important in maintaining the aerobic condition of the soil absorption system in and around the distribution trench or bed, and thus slowing the development of a clog of soil interfaces and subsequent failure that naturally occurs over time.

5. Because the effluent is discharged in larger doses, the distribution may be more uniform throughout the dispersal field than that attained by normal gravity flow.

6. The dose-rest cycle is based either on when the dosing tank fills (demand dosing) or on a time basis (time dosing) at which point the pump or siphon discharges a specific volume to the dispersal field.

B. MAJOR COMPONENTS OF A PRESSURE DISTRIBTUION SYSTEM

1. The major components in a pressure distribution dispersal system and associated primary functions include:

   a. **Septic Tank:** Provides primary treatment of effluent, solids separation and storage;

   b. **Supplemental Treatment:** Provides secondary treatment of effluent if required.;

   c. **Screens:** Protects pumps or siphons and dispersal fields from solids;

   d. **Pumps or Siphons:** Provides storage capacity for dosing volumes and emergency storage volumes and transport of effluent from the chamber to the distribution device;

   e. **Transport Lines:** Pipelines that connect the pump to the distribution device;

   f. **Distribution Devices:** Distribution boxes or valves that distribute the flow from the transport line uniformly to the laterals by gravity or under pressure;

   g. **Distribution Laterals:** Pressure pipe that distributes effluent within the dispersal field; and

   h. **Dispersal System:** Allows the wastewater effluent from the septic tank or supplemental treatment to pass into native soil or other receiving media where various biological and physical processes provide additional treatment.

C. PRESSURE DISTRIBUTION DISPERSAL SYSTEM TYPES

1. Pressure distribution dispersal systems that may be approved for use in the County include:

   a. Pressure-Dosed Trench Dispersal Systems (**Chapter 28**);

   b. Subsurface Drip Dispersal Systems (**Chapter 29**);

   c. At-Grade & Mound Dispersal Systems (**Chapter 30**);

   d. Raised Sand Filter Bed Systems (**Chapter 31**); and

   e. Other dispersal systems may be approved for use in the County under Regional Water Board Waste Discharge Requirements.

2. In addition to the general requirements presented in this chapter, pressure distribution systems must also comply with the requirements for pump tanks in **Chapter 20** and the design and installation requirements for the specific dispersal system type presented in **Part 7** of this Manual.

26.2 PRESSURE DISTRIBUTION PIPING REQUIREMENTS

A. MINIMUM CRITERIA

1. **Material Specifications.** Pressure distribution piping shall comply with the material specifications provided in **Chapter 33** of this Manual.

2. **Pipe Sizing.** All pressure distribution pipes and fittings, including transport lines, manifolds and laterals must be adequately sized for the wastewater design flow and designed to minimize frictional losses to the maximum extent practicable.

3. **Pipe Support.** All pressure distribution piping must be uniformly supported along the trench bottom and bedded in native soil, except in rocky soil conditions in which case sand or other material approved by the Department shall be used.

4. **Thrust Blocks**. Concrete thrust blocks, or equivalent restraint, shall be provided at sharp changes in piping directions.

26.3 DISCHARGE ORIFICE REQUIREMENTS

A. MINIMUM CRITERIA

1. Orifices shall have a minimum diameter of one-eighth (1/8) inch and shall be evenly spaced at a distance between two (2) and four (4) feet.

2. Greater hole spacing may be allowed on a case by case basis subject to evaluation of design and siting factors such as those related to dose volume, effluent quality, dispersal system size and soil conditions.

26.4 VALVE REQUIREMENTS

A. MINIMUM CRITERIA

1. All valves must be adequately sized for the wastewater design flow and designed to minimize frictional losses to the maximum extent practicable.

2. **Shut-off Valves.** Distribution laterals shall be fitted with shut-off valves to adjust or terminate the flow to portions of the dispersal field. Shut-off valves may be ball or gate valves.

3. **Pump Tank Valves:** A gate valve or ball valve must be placed on the pressure distribution pipe inside or outside of the pump riser of the pump tank.

4. **Pump Check Valve:** A check valve shall be placed between the pump and the pump tank gate valve when required.

5. **Anti-Siphon Device.** An anti-siphon device must be placed on the discharge line within the pump basin when the dispersal system is located at a lower elevation than the pump.

6. **Valve Boxes.** All valves must be placed in boxes and accessible for maintenance and repair from the surface.

26.5 PUMP SYSTEM REQUIREMENTS

A. GENERAL CRITERIA

1. Dosing can be achieved by either a pump or siphon.

2. Pumps suitable for pumping wastewater must be used.

3. In lieu of pumps, automatic dosing siphons may be used for dosing where a suitable downhill gradient exists from the elevation of the siphon to the drainfield. Careful consideration must be given to manufacturer's specifications during design and installation of automatic siphons.

26.6 WASTEWATER DOSING REQUIREMENTS

A. MINIMUM CRITERIA

1. Pressure distribution dispersal systems shall be designed in accordance with accepted engineering practices to achieve uniform dosing of wastewater throughout the dispersal system.

2. The dose volume shall be sufficient to refill any part of the pressure distribution dispersal system including supply line and lateral lines plus deliver sufficient additional volume to disperse the wastewater design flow in an appropriate number of doses per day.

3. The dispersal system performance should be enhanced by dosing the wastewater design flow in smaller, more frequent doses throughout the day.
.

26.7 SYSTEM HEAD REQUIREMENTS

A. MINIMUM CRITERIA

1. Where the soil absorption area is at a higher elevation than the pump, sufficient dynamic head shall be provided for both the elevation difference and friction loss.

2. **Minimum Head Requirements.** The pressure distribution system must be designed to provide the following minimum head at the orifice farthest from the manifold:

    a. Three (3) feet where orifice holes are oriented up; or

    b. Two (2) feet where orifice holes are oriented down.

3. **Head Variation.** The pressure distribution system must be designed with no more than ten (10) percent head variation between orifices on a distribution lateral.

26.8 SYSTEM CLEANING AND HYDRAULIC TESTING REQUIREMENTS

A. MINIMUM CRITERIA

1. Pressure distribution dispersal systems shall be designed to provide:

    a. Adequate flow rate, screening of effluent and suitable piping network to preclude solids accumulation in the pipes or clogging of discharge orifices; and

    b. Access provisions for inspection, testing and adjustment of the pressure distribution system.

2. **Lateral End Riser.** The end of each lateral of a pressure distribution system must be fitted with a ninety (90) degree long sweep to facilitate line cleaning and hydraulic testing of pressure distribution system. The end riser pipe shall also be fitted with a ball valve and/or threaded end cap or plug, housed in a utility/valve box.

CHAPTER 27
GRAVITY TRENCH DISPERSAL SYSTEM REQUIREMENTS

27.0 CHAPTER OVERVIEW

This chapter provides design criteria for subsurface gravity trench dispersal systems approved for use in the County. The criteria apply to new and replacement OWTS and modifications or repairs to existing OWTS.

This chapter is organized in the following sections:

27.1 GRAVITY TRENCH DISPERSAL SYSTEM OVERVIEW

A. GENERAL DESCRIPTION

1. Gravity trench dispersal systems consist of a series of gravity-fed dispersal trenches that use perforated pipe for subsurface dispersal of effluent into the soil.

2. Gravity trench dispersal systems may be designed with drain rock, plastic chambers or other approved gravelless alternatives.

3. Schematic and cross-section diagrams illustrating the key design features of gravity trench dispersal systems constructed with drain rock are provided in **Figure 27-1** and **Figure 27-2** (included at the end of this chapter).

27.2 ONSITE WASTEWATER SYSTEM CONFIGURATION REQUIREMENTS

A. GENERAL OVERVIEW

1. Possible System configurations using gravity trench dispersal systems are presented in **Table 5-1** and summarized below.

2. **Treatment Train Requirements.**

   a. **Primary Treatment.** Primary treatment shall be the minimum level of treatment preceding a gravity trench dispersal system.

   b. **Supplemental Treatment.**

      (1) Supplemental treatment may be used to allow reduced vertical separation.

distance requirements for effective soil and high seasonal groundwater.

(2) Supplemental treatment is required to reduce high-strength wastewater to domestic strength wastewater prior to discharge to gravity trench dispersal systems.

3. **Effluent Distribution Mechanism.**

(1) **Gravity.** Effluent from the treatment tanks is gravity-fed to the dispersal trenches.

(2) **Pressurized.** Pump systems may be used in conjunction with gravity trench dispersal systems to facilitate the siting of the dispersal system at a higher elevation than the structure(s) being served.

4. **Cover Fill Option.** Shallow in-ground trench dispersal systems may be constructed with cover fill in accordance with the requirements in **Chapter 32**.

5. **Dual Dispersal System Requirements.**

a. **Standard System Configurations.** Standard System configurations must have a dual dispersal system equipped with a manual diversion device meeting the specifications in **Chapter 34** to allow alternating use of the two systems, switching between systems every six (6) to twelve (12) months. Each dispersal system shall be designed to accept one hundred (100) percent of the wastewater design flow.

b. **Advanced System Configurations.** In lieu of the dual dispersal system requirement, advanced System configurations must have a reserve area identified and preserved for future use for installation of a replacement dispersal system, if required in the future. The reserve area must be:

(1) A dedicated area of land having suitable site conditions and sufficient area for installation of a replacement dispersal system (sized for one hundred percent of the wastewater design flow and able to meet all the design requirements of the system proposed);

(2) Totally separate from the installed dispersal system;

(3) Fully protected to prevent damage to soil and any adverse impact on the immediate surroundings that may affect the future installation of the replacement system and its function.

27.3 DISPERSAL SYSTEM SITING REQUIREMENTS

A. HORIZONTAL SETBACK CRITERIA

1. Minimum horizontal setback distances from gravity trench dispersal systems to site features are specified in **Table 5-7**.

2. Setback distances are measured from the edge of the trenches or the edge of the cover fill soil, as applicable.

B. VERTICAL SEPARATION CRITERIA

1. **Depth to Groundwater**. The minimum separation to high seasonal groundwater, as measured from the bottom of the gravity dispersal trenches shall vary between three (3) and twenty (20) feet according to soil percolation rate and the level of treatment provided as specified in **Table 5-1**.

2. **Effective Soil Depth**. The minimum depth of effective soil as measured from the bottom of gravity dispersal trenches shall vary between three (3) and five (5) feet depending on the level of treatment provided as specified in **Table 5-1**.

3. Vertical separation depths must be measured from the upslope side of the gravity dispersal trench bottom.

C. MAXIMUM GROUND SLOPE CRITERIA

1. Maximum ground slope in areas used for gravity trench dispersal systems shall range between 20 (twenty) and thirty (30) percent depending on whether cover fill is used as specified in **Table 5-1**.

    a. An increase in slope of up to five (5) percent may be allowed if supported by a geotechnical evaluation.

27.4 DISPERSAL SYSTEM SIZING REQUIREMENTS

A. MINIMUM INFILTRATIVE AREA CRITERIA

1. The minimum required square footage of trench infiltrative area shall be calculated in accordance with the formula in **Table 27-1**.

Table 27-1 Gravity Trench Infiltrative Area Formula
$\textbf{Trench Infiltrative Area } (\mathbf{ft^2}) = \dfrac{\mathbf{Q}}{\mathbf{R}}$

Where:

Q = Wastewater design flow, in gpd

R = Wastewater application rate, in gallons per square foot per day (gal/ft^2-day)

2. A reduction in the minimum infiltrative area requirement of up to thirty (30) percent may be approved by the Department for IAPMO-certified plastic chambers or other gravelless alternatives in accordance with the criteria presented in **Chapter 37**.

B. MINIMUM TRENCH LENGTH CRITERIA

1. The trench length required to treat one hundred (100) percent capacity of the wastewater design flow shall be calculated in accordance with the formula in **Table 27-2**.

Table 27-2 Gravity Trench Length Formula
$$\textbf{Trench Length (feet)} = \frac{\mathbf{Q}}{\mathbf{R} * \mathbf{A}}$$

Where:

Q = Wastewater design flow, in gpd

R = Wastewater application rate, in gal/ft^2-day

A = Infiltrative area per lineal foot of trench, in square feet per foot (ft^2/ft)

C. INFILTRATIVE AREA PER LINEAL FOOT OF TRENCH CRITERIA

1. The maximum infiltrative area for gravity trench dispersal systems shall be four (4) square feet per lineal foot of trench length.

2. The infiltrative area may include any combination of trench bottom area and trench sidewall area below the invert of the distribution pipe.

3. **Exception:** The infiltrative area may be increased up to eight (8) square feet per lineal foot of trench length under the following circumstances:

    a. The ground slope of the dispersal field is less than twenty (20) percent;

    b. The soil percolation rate is between five (5) and sixty (60) MPI;

    c. The depth to groundwater is greater than or equal to five (5) feet; and

    d. All other dispersal system siting requirements are met.

D. WASTEWATER APPLICATION RATE CRITERIA

1. **Standard Wastewater Application Rates.** Standard wastewater application rates are presented in **Table 25-1** and must be utilized to size gravity trench dispersal systems.

E. TRENCH DIMENSION CRITERIA

1. Gravity trench dispersal systems constructed with drain rock and perforated pipe shall meet the design specifications provided in **Table 27-3** and the material specifications provided in **Part 8** of this Manual, as applicable.

Table 27-3
Gravity Trench Design Criteria (Drain Rock)

Parameter	Minimum	Maximum
Trenches per dispersal field	1 trench	No limit
Trench length	25 feet	100 feet
Trench bottom width[1]	24 inches	36 inches
Trench depth[1,2]	30 inches, measured on the upslope side of the trench	60 inches
Depth of soil cover over rock	12 inches, after settling	18 inches
Depth of drain rock over pipe	2 inches	3 inches
Depth of drain rock under pipe	12 inches	35 inches

Notes:

[1]Trench minimum width and depth specifications may be reduced for trenches using gravelless alternatives depending on the gravelless product dimensions.

[2]Trench depths may be reduced to a minimum of eighteen (18) inches for shallow in-ground dispersal trenches with cover fill.

F. TRENCH DEPTH CRITERIA

1. In general, gravity dispersal trenches should be kept as shallow as possible to take advantage of those soil horizons that best provide oxygen and promote microbiological activity; and within the root zone of plants to take advantage of nitrogen uptake in plants.

2. Trench depths for plastic chambers and other gravelless alternatives will depend on the dimensions of the product.

3. Shallow in-ground trench dispersal systems may be constructed with cover fill in accordance with the requirements in **Chapter 32**. In cover fill systems the trench must be installed entirely below the original ground surface elevation with a minimum of twelve (12) inches of soil backfill.

G. TRENCH SPACING CRITERIA

1. Trench spacing shall be in accordance with the requirements in **Table 27-4** below.

Table 27-4
Gravity Trench Spacing Criteria

Site Characteristics	Minimum	Maximum
For level unconstrained sites	Five (5) feet	No limit
For slopes greater than twenty (20) percent	One (1) foot additional spacing for every five (5) percent increase in dispersal field ground slope above twenty (20) percent	
For constrained sites (repair/replacement systems only)	Two (2) times the depth of rock or gravelless alternative below the pipe	

27.5 DISPERSAL SYSTEM PIPING REQUIREMENTS

A. MINIMUM CRITERIA

1. Gravity trench dispersal system piping shall meet the following requirements and the material specifications provided in **Chapter 33**.

   a. Dispersal trench drain pipe must be three (3) or four (4) inches in diameter installed with perforations down.

   b. A distribution box shall be used to equally divide the flow amongst the dispersal trenches.

   c. Alternatively, adjacent dispersal trenches on slopes may be connected with a watertight overflow line ("overflow pipe") in a manner that allows each trench to be filled with wastewater to the depth of the drain rock or gravelless alternative before the wastewater flows to the next lower trench (see **Figure 27-2**).

27.6 DISPERSAL SYSTEM INSPECTION WELL REQUIREMENTS

A. MINIMUM CRITERIA

1. Inspection wells shall be installed within each trench, preferably at the end of the trench, as a means of observing the effluent level in the trench.

2. A minimum of one (1) inspection well shall be installed within each and shall extend to the trench bottom in accordance with the requirements in **Table 25-4** and as shown on **Figure 27-1** and shall be perforated across the depth of the drain rock, plastic chamber or other gravelless alternative.

3. Inspection wells shall be constructed of two (2) inch to four (4) inch diameter pipe, equipped with a wrench-tight cap or pipe plug and a bottom cap. Perforations shall consist of hacksaw slots at nominal one (1) inch spacing, or equivalent commercially-slotted pipe. To prevent surface water infiltration, inspection wells shall be sealed with a bentonite or concrete annular seal (or equivalent) to minimum depth of twelve (12) inches.

27.7 DISPERSAL SYSTEM INSTALLATION REQUIREMENTS

A. MINIMUM CRITERIA

1. Dispersal trenches shall be placed in undisturbed earth in an accessible area and shall not be covered by paving or other impermeable or compacted surface. Natural topography shall not be graded to modify the slope in the dispersal field.

2. Dispersal trenches shall not be excavated when the soil is so wet that smearing or compaction occurs.

3. Dispersal trenches shall be installed on contour (i.e., aligned parallel to the ground surface contours) to the greatest extent practicable.

4. The bottom of a dispersal trench shall be level, with a variation of no more than two (2) inches per one hundred (100) lineal feet of trench.

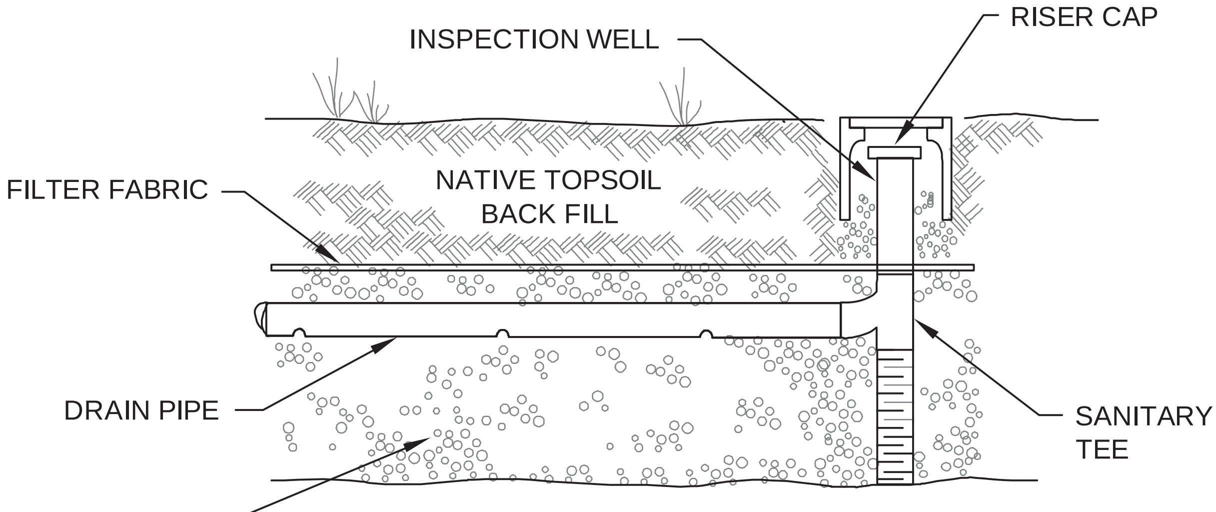
5. In clay soil when glazing occurs on the bottom and sidewall of the trench excavation, the dispersal trench surfaces shall be scarified to the depth of the glazing and the loose material removed.

6. Backfill shall be carefully placed to prevent damage to the dispersal system and mounded over the trench to compensate for expected settlement. Prior to backfilling, drain rock shall be covered with geotextile filter fabric that meets the material specifications provided in Chapter 36. Installation of filter fabric in conjunction with gravelless alternative products shall be done in accordance with manufacturer recommendations.

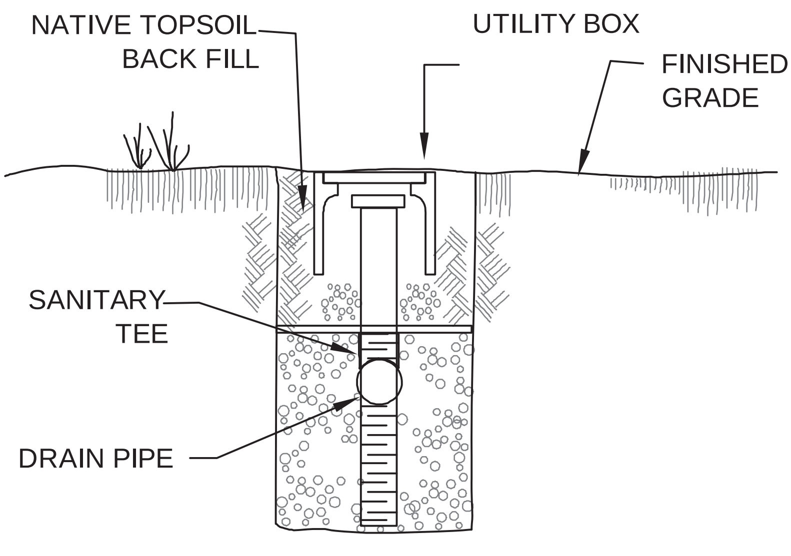
7. Backfill shall be native soil. Backfill shall be free of large stones, frozen clumps of earth, masonry, stumps, waste construction materials, or other materials that could damage the trenches.

8. Erosion control measures must be implemented following installation.

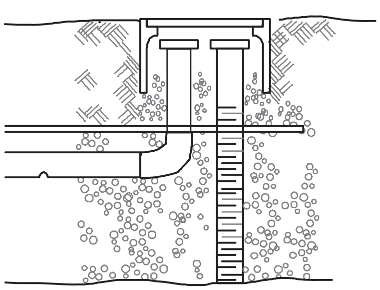
9. Additional requirements for the design and placement of cover fill used in conjunction with shallow in-ground dispersal trenches shall be in accordance with the criteria provided in **Chapter 32**.



SIDE VIEW



END VIEW



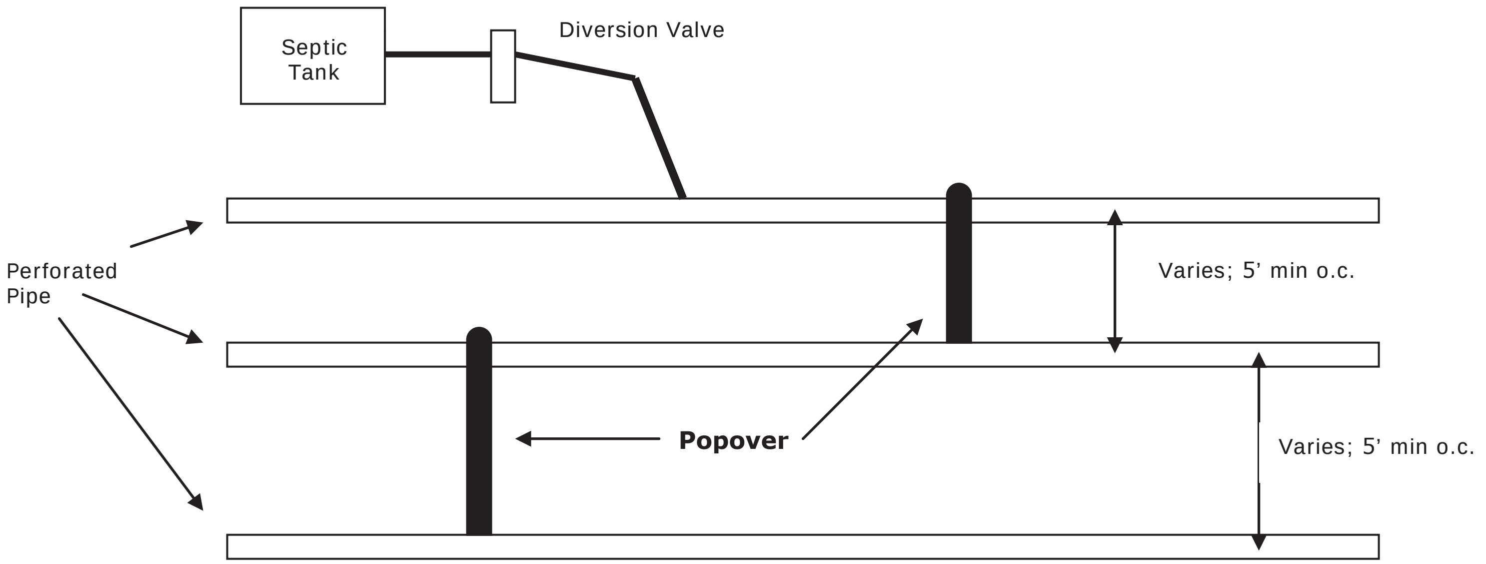
ALTERNATE END DETAIL

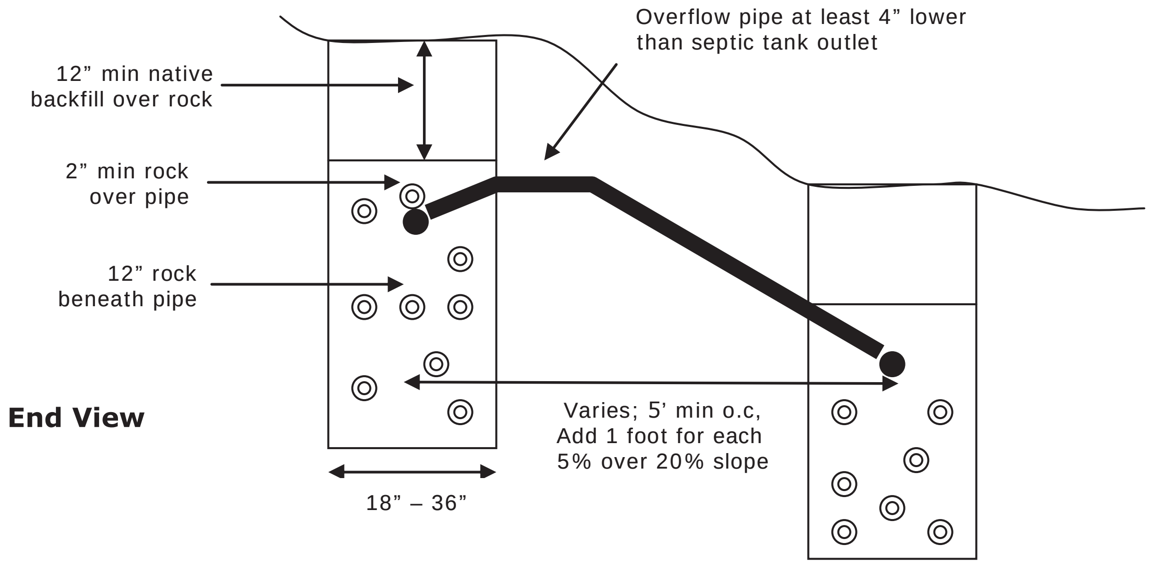
GRAVITY TRENCH DISPERSAL SYSTEM (GRAVEL TRENCH) **CROSS-SECTION**	**FIGURE 27-1**

FIGURE 27-2

GRAVITY TRENCH DISPERSAL SYSTEM (GRAVEL TRENCH)

OVERFLOW PIPE ON SLOPING SITE





CHAPTER 28
PRESSURE DOSED TRENCH DISPERSAL SYSTEM REQUIREMENTS

28.0 CHAPTER OVERVIEW

This chapter provides design criteria for subsurface pressure dosed trench dispersal systems approved for use in the County. In addition to the requirements in this chapter, pressure dosed trench dispersal systems must also comply with the general requirements for pressure distribution systems presented in **Chapter 26** of this Manual.

This chapter is organized in the following sections:

Section 28.1: Pressure Dosed Trench Dispersal System Overview

Section 28.2: Onsite Wastewater System Configuration Requirements

Section 28.3: Dispersal System Siting Requirements

Section 28.4: Dispersal System Sizing Requirements

Section 28.5: Pressure Distribution System Requirements

Section 28.6: Trench Inspection Well Requirements

Section 28.7: OWTS Performance Monitoring Well Requirements

Section 28.8: Dispersal System Installation Requirements

28.1 PRESSURE DOSED TRENCH DISPERSAL SYSTEM OVERVIEW

A. GENERAL DESCRIPTION

1. Pressure dosed trench dispersal systems are an alternative to gravity trench dispersal systems and use a pump or dosing siphon and small diameter pressure piping to achieve broad and uniform distribution of wastewater for improved soil absorption and better treatment of percolating effluent.

2. Pressure dosed trench dispersal systems may be designed with:

   a. Drain rock;

   b. Plastic chambers or other approved gravelless alternatives; or

   c. Sand and pea gravel to improve treatment of effluent (pressure dosed sand trenches).

3. **Pressure Dosed Sand Trenches (PDST).** A PDST is a combined treatment component and soil dispersal component.

   a. Sand lined trenches provide biodegradation or decomposition of wastewater constituents by bringing the wastewater into close contact with a well-developed aerobic biological community attached to the surfaces of the filter media.

   b. This process requires unsaturated downward flow of the effluent through the filter media. As a departure from the intermittent or recirculating sand filter, the media is not contained in a watertight vessel, instead the media is placed in trenches in the native soil.

4. Schematic and cross-section diagrams illustrating the key design features of pressure-dosed trench dispersal systems are provided in the following figures (included at the end of this chapter):

   a. All trenches: **Figure 28-1**

   b. Drain rock trenches: **Figure 28-2**

   b. Pressure-dosed sand trenches: **Figure 28-3**

28.2 ONSITE WASTEWATER SYSTEM CONFIGURATION REQUIREMENTS

A. GENERAL REQUIREMENTS

1. Possible System configurations using pressure dosed trench dispersal systems are presented in **Table 5-2** and summarized below.

2. **Treatment Train Requirements.**

   a. **Primary Treatment.** Primary treatment shall be the minimum level of treatment preceding a pressure dosed trench dispersal system.

   b. **Supplemental Treatment.**

      (1) Supplemental treatment may be used to allow reduced vertical separation distance requirements for effective soil and high seasonal groundwater.

      (2) Supplemental treatment is required to reduce high-strength wastewater to domestic strength wastewater prior to discharge to pressure dosed trench dispersal systems.

3. **Effluent Distribution Mechanism.** Effluent from the treatment tanks is pressure dosed to the dispersal trenches.

4. **Cover Fill Option.** Shallow in-ground trench dispersal systems may be constructed with cover fill in accordance with the requirements in **Chapter 32**.

5. **Dispersal System Reserve Area Requirements.** In lieu of the dual dispersal system requirement for standard System configurations, pressure dosed trench dispersal systems must have a reserve area identified and preserved for future use for installation of a replacement dispersal system, if required in the future. The reserve area must be:

   a. A dedicated area of land having suitable site conditions and sufficient area for installation of a replacement dispersal system (sized for one hundred percent of the wastewater design flow and able to meet all the design requirements of the system proposed);

   b. Totally separate from the installed dispersal system; and

c. Fully protected to prevent damage to soil and any adverse impact on the immediate surroundings that may affect the future installation of the replacement system and its function.

28.3 DISPERSAL SYSTEM SITING REQUIREMENTS

A. HORIZONTAL SETBACK REQUIREMENTS

1. Minimum horizontal setback distances from pressure dosed trench dispersal systems to site features are specified in **Table 5-7**.

2. Setback distances are measured from the edge of the trenches or the edge of the cover fill soil, as applicable.

B. VERTICAL SEPARATION REQUIREMENTS

1. **Depth to Groundwater**. The minimum separation to high seasonal groundwater, as measured from the bottom of the trenches, for pressure dosed trenches shall vary between two (2) and five (5) feet depending on the soil percolation rate and the level of treatment provided as specified in **Table 5-2**.

2. **Effective Soil Depth**. The minimum depth of effective soil, as measured from the trench bottom for pressure-dosed dispersal systems shall vary between two (2) and three (3) feet depending on the level of treatment provided as specified in **Table 5-2.**

3. Vertical separation depths must be measured from the upslope side of the pressure dosed dispersal trench bottom.

C. MAXIMUM GROUND SLOPE REQUIREMENTS

1. Maximum ground slope in areas used for pressure dosed trench dispersal systems shall range between 20 (twenty) and forty (40) percent depending on whether cover fill is used as specified in **Table 5-2**.

    a. An increase in slope of up to five (5) percent may be allowed if supported by a geotechnical evaluation.

2. Any pressure dosed trench dispersal system located on slopes greater than thirty (30) percent shall require the completion of a geotechnical report and slope stability analysis as specified in **Chapter 11** of this Manual.

28.4 DISPERSAL SYSTEM SIZING REQUIREMENTS

A. MINIMUM INFILTRATIVE AREA (SQUARE FEET)

1. The minimum required square footage of trench infiltrative area shall be calculated as in accordance with the formula provided in **Table 28-1**.

Table 28-1 Pressure Dosed Trench Infiltrative Area Formula
$$\textbf{Trench Infiltrative Area}\ (\mathbf{ft^2}) = \frac{\mathbf{Q}}{\mathbf{R}}$$

Where:

Q = Wastewater design flow, in gpd

R = Wastewater application rate, in gal/ft^2-day

2. A reduction in the minimum infiltrative area requirement of up to thirty (30) percent may be approved by the Department for IAPMO-certified plastic chambers or other gravelless alternatives in accordance with the criteria presented in **Chapter 37**.

B. MINIMUM TRENCH LENGTH

1. The trench length required to treat one hundred (100) percent capacity of the wastewater design flow shall be calculated in accordance with the formula in **Table 28-2**.

Table 28-2 Pressure Dosed Trench Length Formula
$$\textbf{Trench Length}\ (\textbf{feet}) = \frac{\mathbf{Q}}{\mathbf{R} * \mathbf{A}}$$

Where:

Q = Wastewater design flow, in gpd

R = Wastewater application rate, in gal/ft^2-day

A = Infiltrative area per lineal foot of trench, in ft^2/ft

C. INFILTRATIVE AREA PER LINEAL FOOT OF TRENCH

1. **Trenches with Drain Rock or Gravelless Alternatives.**

   a. The maximum infiltrative area for pressure dosed trench dispersal systems utilizing drain rock or gravelless trenches shall be four (4) square feet per lineal foot of trench length.

   b. The infiltrative area may include any combination of trench bottom area and trench sidewall area below the invert of the distribution pipe.

   c. **Exception:** The infiltrative area may be increased up to eight (8) square feet per lineal foot of trench length, under the following circumstances:

      (1) The ground slope of the dispersal field is less than twenty (20) percent;

      (2) The soil percolation rate is between five (5) and sixty (60) MPI;

(3) The depth to groundwater is greater than or equal to five (5) feet; and

(4) All other dispersal system siting requirements are met.

2. **PDST**. The maximum infiltrative area for PDST shall be calculated based on the bottom area only, up to a maximum of three (3) square feet per lineal foot of trench.

D. WASTEWATER APPLICATION RATE CRITERIA

1. **Drain Rock & Gravelless Alternative Trenches**

a. **Standard Wastewater Application Rates.** Standard wastewater application rates are presented in **Table 25-1** and must be utilized to size pressure-dosed dispersal systems using drain rock or gravelless trenches.

b. **Enhanced Wastewater Application Rates.** Enhanced wastewater application rates may be utilized with pressure-dosed trench dispersal systems to allow smaller dispersal system sizing when all of the following conditions are met:

(1) The dispersal system is preceded by supplemental treatment; and

(2) The vertical separation to high seasonal groundwater requirement is met for the same type of dispersal system preceded by primary treatment only.

c. **Table 5-2** provides guidance on the requisite wastewater application rate table to use when sizing pressure-dosed trench dispersal systems.

2. **PDST.** Wastewater application rates used for PDST sizing must include consideration of both the pea gravel-sand interface and the sand-soil interface using the bottom area of the trench only. The more restrictive (or conservative) of the criterion shall govern PDST sizing.

a. **Pea Gravel-Sand Interface.** The wastewater application rate used for sizing the pea gravel-sand interface shall be determined in accordance with the criteria in **Table 28-3**.

Table 28-3
PDST Gravel/Sand Interface
Wastewater Application Rate Criteria

Facility Type	Wastewater application Rate
Individual Residential	1.2 gpd/ft^2
Multi-Unit Residential and Non-Residential	1.0 gpd/ft^2

b. **Sand-Soil Interface.** The wastewater application rate used for sizing the sand/soil interface shall be selected in accordance with the criteria provided in **Table 5-2**.

3. Reduction in the wastewater application rates or other provisions to ensure the long-term integrity and performance of pressure dosed trench systems may be required for high-strength wastewater flows.

E. TRENCH DIMENSIONS & SPECIFICATIONS

1. **Drain Rock & Gravelless Alternatives.** Pressure dosed trench dispersal systems utilizing drain rock and small diameter pressure pipe shall meet the design specifications provided in **Table 28-4** and the material specifications provided in **Part 8** of this Manual, as applicable.

Table 28-4
Pressure Dosed Trench Design Criteria (Drain Rock)

Parameter	Minimum	Maximum
Trenches per dispersal field	1 trench	No limit
Trench length	25 feet	100 feet
Trench bottom width[1,3]	24 inches	36 inches
Trench depth[2,3]	30 inches, measured on the upslope side of the trench	60 inches
Depth of soil cover over rock	12 inches, after settling	18 inches
Depth of drain rock over pipe	2 inches	3 inches
Depth of drain rock under pipe	12 inches	35 inches

Notes:

[1]Trench widths may be reduced to twelve (12) inches for Systems with supplemental treatment.

[2]Trench depths may be reduced to a minimum of eighteen (18) inches for shallow in-ground dispersal trenches with cover fill.

[3]Trench minimum width and depth specifications may be reduced for trenches using gravelless alternatives depending on the gravelless product dimensions.

2. **PDST.** Pressure-dosed sand trench dispersal systems shall be constructed with drain rock, pea gravel, sand filter media and pressure pipe and shall meet the specifications provided in **Table 28-5** below and the material specifications provided in **Part 8** of this Manual, as applicable.

Table 28-5 PDST Trench Design Criteria		
Parameter	**Minimum**	**Maximum**
Trenches per dispersal field	1 trench	No limit
Trench length	25 feet	100 feet
Trench depth	33 inches, measured on the upslope side of the trench	60 inches
Depth of soil cover over rock	12 inches, after settling	18 inches
Depth of drain rock over pipe	2 inches	3 inches
Depth of pea gravel under pipe	6 inches	11 inches

a. **Minimum Sand Depth.** The minimum depth of sand below the pea gravel shall be dependent on the level of wastewater treatment (primary or supplemental) and the soil percolation rate as specified in **Table 28-6** below.

Table 28-6 PDST - Sand & Gravel Depth Criteria		
Thickness of Medium Sand Fill Under Pea Gravel		
Primary treatment effluent	12 inches (6 to 120 MPI)	39 inches
	24 inches (1 to 5 MPI)	27 inches
Supplemental treatment effluent	6 inches (6 to 120 MPI)	45 inches
	12 inches (1 to 5 MPI)	39 inches
Trench Width		
Primary treatment effluent	18 inches	36 inches
Supplemental treatment effluent	12 inches	36 inches

F. TRENCH DEPTHS (ALL TRENCHES)

1. In general, pressure dosed dispersal trenches should be kept as shallow as possible to take advantage of those soil horizons that best provide oxygen and promote microbiological activity; and within the root zone of plants to take advantage of nitrogen uptake in plants.

2. Trench depths for plastic chambers and other gravelless alternatives will depend on the dimensions of the product,

3. Shallow in-ground trench dispersal systems may be constructed with cover fill in accordance with the requirements in **Chapter 32**. In cover fill systems the trench must be installed entirely below the original ground surface elevation with a minimum of twelve (12) inches of soil backfill.

G. TRENCH SPACING (ALL TRENCHES)

1. Trench spacing shall be in accordance with the requirements in **Table 28-7** below.

Table 28-7 Pressure Dosed Trench Spacing Criteria (All Trenches)		
Site Characteristics	**Minimum**	**Maximum**
For level unconstrained sites	Five (5) feet	No limit
For slopes greater than twenty (20) percent	One (1) foot additional spacing for every five (5) percent increase in dispersal Field ground slope above twenty (20) percent	
For constrained sites	Two (2) times the depth of rock below the pipe allowed for repairs	

28.5 PRESSURE DISTRIBUTION SYSTEM REQUIREMENTS

A. MINIMUM CRITERIA

1. The pressure distribution system and pump chamber must be designed in accordance with the material specifications provided in **Chapter 20** and **Part 8** of this Manual and the pressure distribution systems design requirements provided in **Chapter 26**.

28.6 TRENCH INSPECTION WELL REQUIREMENTS

A. MINIMUM CRITERIA

1. Inspection wells shall be installed within each trench, preferably at the end of the trench, as a means of observing the effluent level in the trench.

2. **Conventional and Gravelless trenches.** A minimum of one (1) inspection well shall be installed within each trench in pressure-dosed trench dispersal systems utilizing drain rock or gravelless trenches. The inspection well shall extend to the trench bottom in accordance with the requirements in **Table 25-4** and as shown on **Figure 28-2** and shall be perforated across the depth of the drain rock, plastic chamber or other gravelless alternative product.

3. **Sand Trenches.** A minimum of two (2) inspection wells shall be installed within each trench in pressure-dosed sand trench dispersal systems in accordance with the requirements in **Table 25-4** as shown on **Figure 28-3.**

   a. One (1) well shall extend to the pea gravel-sand fill interface and shall be perforated in the pea gravel layer

   b. One (1) well shall extend to the trench bottom and shall be perforated in the sand fill layer.

4. Inspection wells shall be constructed of two (2) inch to four (4) inch diameter pipe, equipped with a wrench-tight cap or pipe plug and a bottom cap. Perforations shall consist of hacksaw slots at nominal one (1) inch spacing, or equivalent commercially

slotted pipe. To prevent surface water infiltration, inspection wells shall be sealed with a bentonite or concrete annular seal (or equivalent) to minimum depth of twelve (12) inches.

28.7 OWTS PERFORMANCE MONITORING WELL REQUIREMENTS

A. MINIMUM CRITERIA

1. OWTS performance monitoring wells shall be installed around the pressure dosed trench dispersal system in accordance with the requirements in **Table 25-4** and as shown on **Figure 25-1** for the purpose of checking groundwater levels periodically and water quality sampling, if needed.

28.8 DISPERSAL SYSTEM INSTALLATION REQUIREMENTS

A. MINIMUM CRITERIA

1. Dispersal trenches shall be placed in undisturbed earth, in an accessible area, and shall not be covered by paving or other impermeable or compacted surface. Natural topography shall not be graded to modify the slope in the dispersal field.

2. Dispersal trenches shall not be excavated when the soil is so wet that smearing or compaction occurs.

3. Dispersal trenches shall be installed on contour (i.e., aligned parallel to the ground surface contours) to the greatest extent practicable.

4. The bottom of a dispersal trench shall be level, with a variation of no more than two (2) inches per one hundred (100) lineal feet of trench.

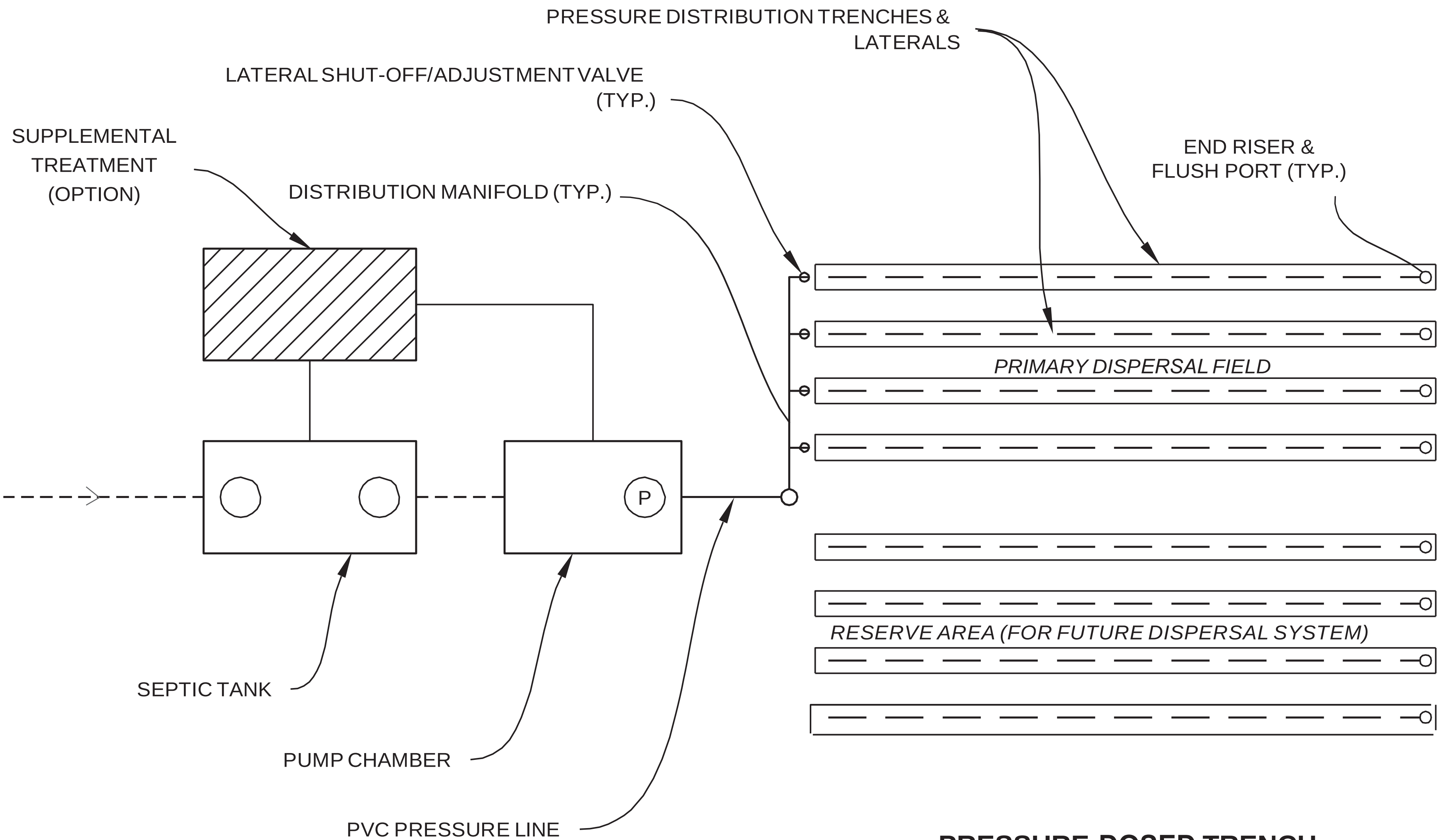
5. In clay soil when glazing occurs on the bottom and sidewall of the trench excavation, the dispersal trench surfaces shall be scarified to the depth of the glazing and the loose material removed.

6. Backfill shall be carefully placed to prevent damage to the dispersal system and mounded over the trench to compensate for expected settlement. Prior to backfilling, drain rock shall be covered with geotextile filter fabric that meets the material specifications provided in **Chapter 36**. Installation of filter fabric in conjunction with gravelless alternative products shall be done in accordance with manufacturer recommendations.

7. Backfill shall be native soil. Backfill shall be free of large stones, frozen clumps of earth, masonry, stumps, waste construction materials, or other materials that could damage the trenches.

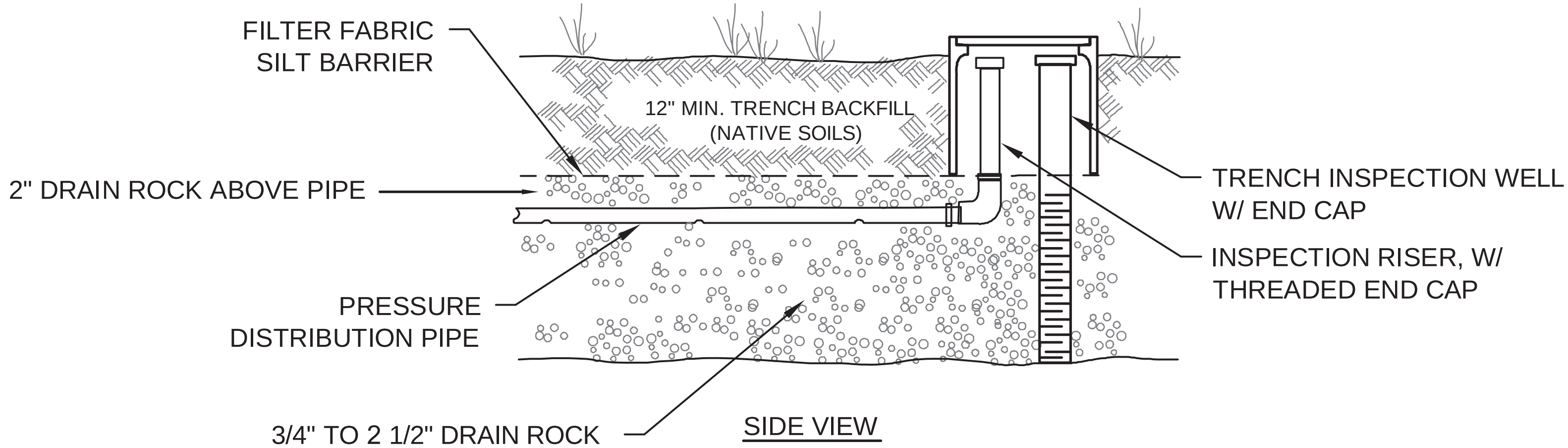
8. Erosion control measures must be implemented following installation.

9. Additional requirements for the design and placement of cover fill used in conjunction with shallow in-ground dispersal trenches shall be in accordance with the criteria provided in **Chapter 32**.



PRESSURE-DOSED TRENCH DISPERSAL SYSTEM SCHEMATIC

FIGURE 28-1



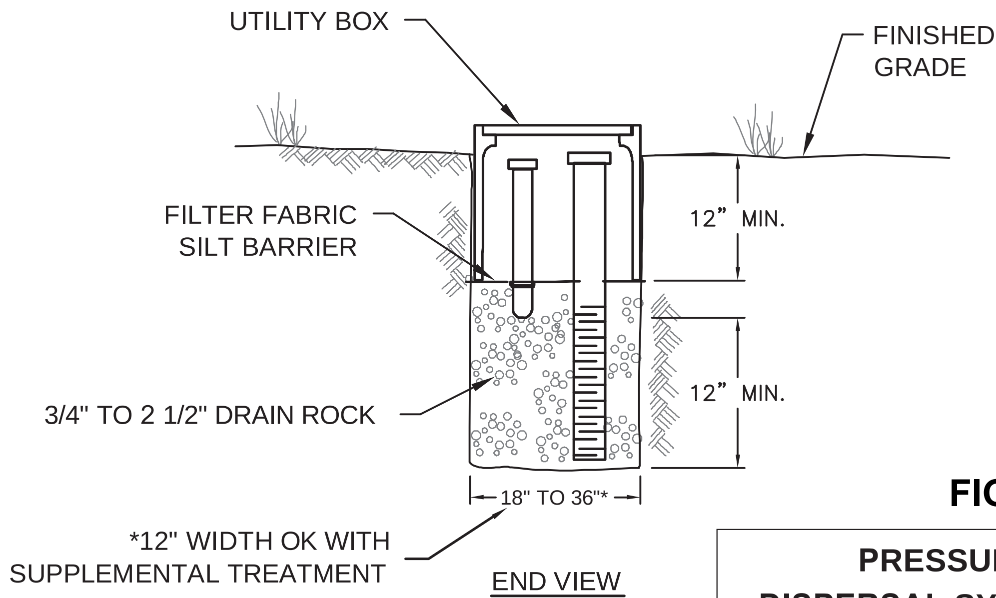
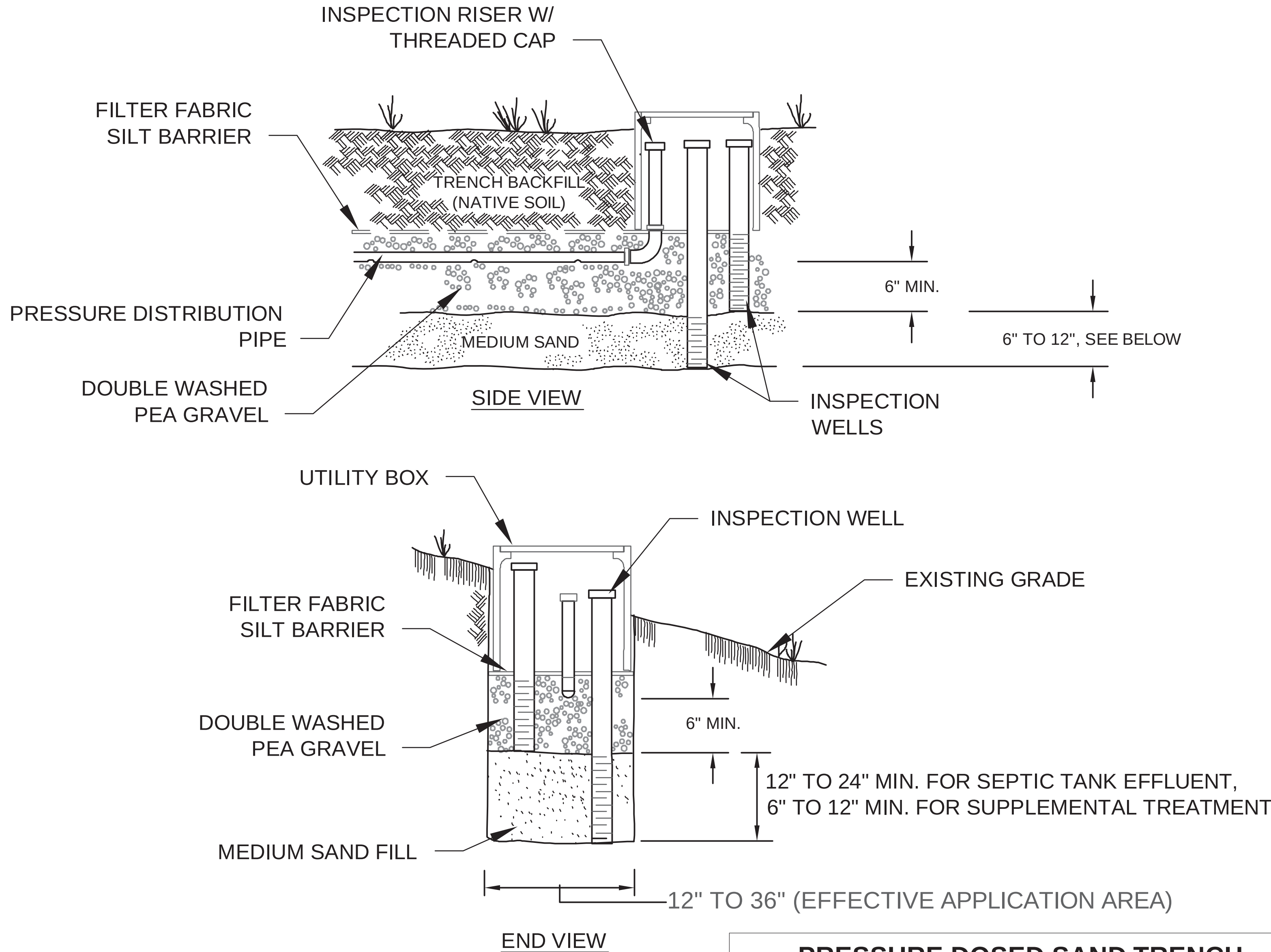


FIGURE 28-2

PRESSURE-DOSED TRENCH DISPERSAL SYSTEM (GRAVEL TRENCH) CROSS-SECTION



PRESSURE DOSED SAND TRENCH
DISPERSAL SYSTEM CROSS-SECTION
FIGURE 28-3

CHAPTER 29
SUBSURFACE DRIP DISPERSAL SYSTEM REQUIREMENTS

29.0 CHAPTER OVERVIEW

This chapter provides design criteria for subsurface drip dispersal systems for new and replacement OWTS and modifications or repairs to existing OWTS. In addition to the requirements in this chapter, subsurface drip dispersal systems must also comply with the general requirements for pressure distribution systems presented in **Chapter 26** of this Manual.

This chapter is organized in the following sections:

29.1 SUBSURFACE DRIP DISPERSAL SYSTEM OVERVIEW

A. GENERAL DESCRIPTION

1. A subsurface drip dispersal system is a method for disposal of treated wastewater that uses special drip tubing designed for use with wastewater.

2. The dripline is normally placed eight (8) to twelve (12) inches below ground surface and makes use of the most biologically active soil zone for distribution, nutrient uptake and evapotranspiration of the wastewater.

3. A subsurface drip dispersal system is comprised of small diameter laterals (“driplines”), one-half (½) inch to one (1) inch in diameter, usually spaced twenty-four (24) inches apart, with small-diameter emitters (one-eighth [1/8] inch) located at twelve (12) to twenty-four (24) inches on-center along the dripline.

4. Effluent is conveyed under pressure to the laterals, normally with timed doses. Prior to dispersal the effluent requires supplemental treatment.

5. Schematic and detail diagrams are provided in **Figure 29-1** and **Figure 29-2** (included at the end of this chapter) to illustrate the key design features of subsurface drip dispersal systems.

B. ADVANTAGES

1. Drip dispersal has several advantages to other to other dispersal systems, including:

   a. Installation of dripline is less site-intrusive and simpler than installation of conventional gravel trenches. A backhoe is not needed, nor is gravel or geotextile;

   b. Dripline can be effective in very shallow soil conditions since it distributes the wastewater very uniformly to substantially all of the available soil in the dispersal field;

   c. Flexible dripline can be installed in grid or irregular patterns as needed to accommodate contours on sloped sites, irregularly shaped areas, difficult site conditions or landscape irrigation applications;

   d. Dripline can be installed in multiple small discontinuous "zones" allowing the hydraulic load to be spread widely rather than concentrated in one main area;

   e. Dripline can be installed on steeper slopes since it causes less soil disturbance and erosion or slope stability hazards;

   f. Low flow rates allow for longer lateral runs than can be obtained with conventional piping;

   g. Shallow placement of dripline can enhance treatment by maximizing soil depth and delivering effluent to a point in the soil profile where there is typically more oxygen and organic material;

   h. A vegetative cover over the dripfield (usually turf) can provide additional treatment and reuse through plant evapotranspiration;

   i. Slow, controlled emitter discharge combined with multiple daily dosing enhances aerobic conditions in the soil and results in frequent drainfield resting periods; and

   j. Water movement away from the drip emitters is primarily by unsaturated/capillary flow which maximizes contact with and treatment by the soil.

C. DISADVANTAGES

1. A number of significant design, installation and management issues must be addressed in order for drip technology to be successful.

2. Some of the challenges involved in drip system design and technical solutions are provided in **Table 29-**1 (included at the end of this chapter).

29.2 ONSITE WASTEWATER SYSTEM CONFIGURATION REQUIREMENTS

A. GENERAL REQUIREMENTS

1. Possible System configurations using subsurface drip dispersal systems are presented in **Table 5-3** and summarized below.

2. **Treatment Train Requirements.** Supplemental treatment shall be the minimum level of treatment preceding a subsurface drip dispersal system.

3. **Effluent Distribution Mechanism.** Subsurface drip dispersal systems must be pressure-dosed.

4. **Cover Fill Option.** Cover fill may be used in conjunction with subsurface drip dispersal systems in accordance with the design and construction requirements contained in **Chapter 32** of this Manual.

5. **Dispersal System Reserve Area Requirements.** In lieu of the dual dispersal system requirement for standard System configurations, pressure dosed trench dispersal systems must have a reserve area identified and preserved for future use for installation of a replacement dispersal system, if required in the future. The reserve area must be:

   a. A dedicated area of land having suitable site conditions and sufficient area for installation of a replacement dispersal system (sized for one hundred percent of the wastewater design flow and able to meet all the design requirements of the system proposed);

   b. Totally separate from the installed dispersal system; and

   c. Fully protected to prevent damage to soil and any adverse impact on the immediate surroundings that may affect the future installation of the replacement system and its function.

29.3 DISPERSAL SYSTEM SITING REQUIREMENTS

A. HORIZONTAL SETBACK REQUIREMENTS

1. Minimum horizontal setback distances from subsurface drip dispersal systems to site features are specified in **Table 5-7**.

2. Setback distances are measured from the edge of the driplines or the edge of the cover fill soil, as applicable.

B. VERTICAL SEPARATION REQUIREMENTS

1. **Depth to Groundwater**. The minimum separation to high seasonal groundwater, as measured from the bottom of the dripline, shall vary between two (2) and three (3) feet according to soil percolation rate as specified in **Table 5-3**.

2. **Effective Soil Depth**. The minimum depth of effective soil as measured from the bottom of the dripline shall be two (2) feet as specified in **Table 5-3**.

C. MAXIMUM GROUND SLOPE REQUIREMENTS

1. Maximum ground slope in areas used for subsurface drip dispersal systems shall range between twenty (20) and fifty (50) percent depending on whether cover fill is used as specified in **Table 5-3**.

2. Any subsurface drip dispersal system located on slopes greater than thirty (30) percent shall require the completion of a geotechnical report and slope stability analysis as specified in **Chapter 11** of this Manual.

29.4 DISPERSAL SYSTEM SIZING REQUIREMENTS

A. WASTEWATER APPLICATION RATES

1. Wastewater application rates used for sizing subsurface drip dispersal systems shall be based on soil percolation rate in accordance with the criteria in **Table 25-3**.

2. The wastewater application area refers to the ground surface area encompassed by the subsurface drip dispersal system**.**

B. MINIMUM INFILTRATIVE AREA

1. The minimum required square footage of the drip field area shall be calculated in accordance with the formula in **Table 29-1**.

Table 29-2 Dripfield Infiltrative Area Formula
$\mathbf{Trench\ Infiltrative\ Area}\ \left(\mathbf{ft^2}\right) = \frac{\mathbf{Q}}{\mathbf{R}}$

Where:

Q = Wastewater design flow, in gpd

R = Wastewater application rate, in gal/ft^2-day

2. For sizing purposes, the effective infiltrative area used for drip field sizing calculations shall be limited to no more than four (4) square feet per drip emitter.

   a. For example, two hundred (200) lineal feet of dripline with emitters at two (2) foot spacing would provide a total of one hundred (100) emitters (200/2) and could be used for dispersal to an effective infiltrative area of up to four hundred (400) square feet (100 emitters x 4 square feet per emitter).

   b. Conversely, if wastewater flow and percolation test design information indicate the need for an effective infiltrative area of one-thousand (1,000) square feet, the dripline design and layout would have to be configured to provide a minimum of two hundred and fifty (250) emitters spaced over the required one-thousand (1,000) square foot dispersal area.

29.5 DISTRIBUTION NETWORK REQUIREMENTS

A. DRIPLINE CONFIGURATION CRITERIA

1. Driplines must be installed in original, undisturbed soil.

2. Driplines rows must be installed as level as possible and parallel to contours on sloped sites.

3. Drip lines on sloped sites must be designed and installed to prevent low-level drainage to lower dripline or other lower level components such as tanks, valve boxes, etc. Low level drainage can be prevented by:

   a. Installing check valves on manifolds between dripline laterals;

   b. Feeding dripline from above;

   c. Constructing earth dams where dripline is connected to manifolds;

   d. Installing dripline at a lower elevation than manifolds; and

   e. Connecting driplines to manifolds up gradient to the dripline contour.

4. Drip lines shall be installed at a depth between eight (8) and twelve (12) inches below original ground surface elevation. Deeper placement of driplines may be considered by the Department on a case-by-case basis.

5. Line and emitter spacing shall be designed as appropriate for soil conditions, slope and contour. Typical dripline installations have emitters spaced two (2) feet apart and dripline installed on two (2) foot centers with increased separation distances on sloped sites.

   a. Where soils are compacted or cemented the Department may require a bulk density test and additional emitters or greater emitter/dripline spacing if warranted.

6. The maximum drip line length shall be designed in accordance with accepted industry practices and in accordance with the manufacturer's criteria and recommendations to ensure equal distribution.

   a. Manufacturer recommended maximum dripline runs are generally much longer than maximum lateral lengths allowed for conventional pressure systems.

   b. Dripline runs depend on emitter spacing and applied pressure. Greater lengths are possible with increasing pressure (within manufacturer's recommendations).

7. Emitter discharge may be controlled either by use of pressure-compensating emitters or with a pressure regulator.

   a. The maximum allowable flow variance between any two emitters in a distribution zone is (10) percent.

b. When turbulent flow emitters are used, the maximum elevation difference between any two emitters in the same distribution field shall be five (5) feet. The discharge from pressure compensating emitters is relatively constant even when emitter elevations vary. Discharge from turbulent flow emitters even when used with a pressure regulator can be affected by elevation differences.

8. Emitters shall be located at no less than twelve (12) inches from the supply and return manifolds.

B. DRIPFIELD ZONE CRITERIA

1. Drip fields may be divided into multiple zones which may be located in different areas of a site as desired or needed to provide the required drip field size.

2. Differences in soil conditions and percolation rate characteristics from one zone to another may require the use of correspondingly different wastewater application rates and drip field sizing for each zone.

3. For systems with one thousand (1000) emitters at least two (2) separate distribution zones are required. Separate zones are also recommended for Systems installed in any silt loams, sandy clay loams, clay loams, silty clay loams.

4. Dosing must be automatically alternated between each zone with a distributing valve or actuated valve and a controller.

29.6 PRESSURE DOSING REQUIREMENTS

A. GENERAL CRITERIA

1. Effluent treated by a supplemental treatment system shall be delivered to the dripfield by pressure from a pump system and timed dosing. A minimum number of twelve (12) equally spaced doses per day is required in all soil types.

2. The pressure distribution systems shall be designed in accordance with accepted industry practices and manufacturer recommendations for subsurface drip dispersal systems to achieve, at a minimum:

   a. An adequate dosing volume and pressure per manufacturer's guidelines;

   b. A means of automatically flushing the filter and driplines at regular intervals;

3. Emitter discharge rates should be matched with soil conditions (slower discharge rates work best in finer textured soils) to avoid effluent surfacing during dosing.

4. Additional requirements for design and construction of pump systems and pressure distribution systems are contained in **Chapter 26** of this Manual.

29.7 SYSTEM FLUSHING REQUIREMENTS

A. GENERAL CRITERIA

1. Subsurface drip dispersal systems must include a means to backwash filters and flush

driplines and manifolds.

2. Both supply and return manifolds are required on all systems.

3. Automated filter backwash and dripline flushing is recommended for all drip systems.

4. Filter backwash / line flush debris must be returned to primary treatment (septic tank). A gravity return to the septic tank or primary treatment unit is recommended wherever possible but may be delivered under pressure if necessary.

5. Hose bibs are not allowed for use as a flushing component (to prevent cross contamination of potable water supply).

29.8 COMPONENT REQUIREMENTS

A. ROOT INHIBITOR CRITERIA

1. All subsurface drip dispersal systems must include a USDA approved root growth inhibitor incorporated into a component (dripline or filter) during the manufacturing process to prevent root intrusion into emitters.

B. DRIPLINE CRITERIA

1. Driplines shall be manufactured and intended for use with supplemental treatment systems, with minimum forty-five (45) mil tubing wall thickness, bacterial growth inhibitor(s) and means of protection against root intrusion.

2. Dripline must be color coded purple to identify that the pipe contains non-potable water from a wastewater source.

3. Dripline may have either pressure compensating or turbulent flow emitters.

4. Driplines must incorporate emitters with a maximum nominal rated discharge of 1.3 gallons per hour.

C. FILTER CRITERIA

1. All subsurface drip dispersal systems shall include a filtering device (disk or fine-mesh screen type) capable of filtering particles in accordance with the dripline manufacturer specifications;

2. Filters shall be located downstream of the supplemental treatment system.

3. The manufacturer must warrant filters for use with wastewater (resistant to corrosion).

4. All filters must be sized to operate at a flow rate at least equal to the maximum design discharge rate of the system.

5. Filter backwash must be included in calculating the maximum discharge rate (where applicable).

6. System flush volume and velocity must be in accordance with filter specifications.

7. Filters may require backwashing in accordance with manufacturer's recommendations or may be the continuously self-cleaning type.

8. All filters must be readily accessible for inspection and servicing.

D. AIR/VACUUM RELIEF VALVE CRITERIA

1. Air/vacuum relief valve(s) must be installed at the high point of each distribution sector.

2. All valves must be installed in a valve box with access to grade and include a gravel sump.

E. SUPPLY AND RETURN MANIFOLD CRITERIA

1. Supply and return manifolds must be installed to distribute effluent to driplines and to collect filter backwash and line-flushing debris and return it to the primary treatment unit.

2. Supply and return manifolds and fittings must be schedule 40 or better.

F. FLOW METER CRITERIA

1. A flow meter or other means to monitor flow must be installed in a readily accessible location for reading and servicing.

2. Flow meters must be warranted by the manufacturer for use with wastewater and be accurate within the expected flow range of the installed system.

G. CHEMICAL INJECTION PORT CRITERIA

1. A chemical injector port must be installed to facilitate future connection of a chemical injector pump if/when needed.

2. A mild acid solution can be injected to help scour scale accumulations and a mild chlorine solution can combat bacterial slime accumulations.

3. If chemicals are injected, the flushed liquid must be returned to the primary treatment tank.

H. CONTROLLERS

1. A controller capable of timed dosing is required for all systems.

2. Additional controller functions such as automatic line/filter flushing are recommended for all systems.

3. Automatic control of actuated valves is required for systems with multiple distribution zones.

I. VALVES

1. Valves must be readily accessible for inspection and/or service (such as in a valve box with access to grade).

J. FITTINGS

1. Fittings used to join dripline to the distribution and flush manifolds must be in accordance with manufacturer's recommendations.

2. Both compression and barb fittings may be specified, depending on the manufacturer recommendations and system operating pressure.

29.9 FINAL GRADING AND LANDSCAPING REQUIREMENTS

A. EROSION CONTROL & COVER FILL SYSTEM CRITERIA

1. Requirements for the design and placement of cover fill used in conjunction with drip dispersal systems (if applicable) shall be in accordance with the criteria provided in **Chapter 32.**

2. Erosion control measures must be implemented following installation.

B. LANDSCAPING CRITERIA

1. A ground cover (turf or other appropriate landscaping) must be planted over the dripfield after installation to prevent erosion of the dripfield area.

29.10 OWTS PERFORMANCE MONITORING WELL REQUIREMENTS

A. MINIMUM CRITERIA

1. OWTS performance monitoring wells shall be installed around the dripfield in accordance with the requirements in **Table 25-4** and as shown on **Figure 25-1** for the purpose of checking groundwater levels periodically and water quality sampling, if needed.

29.11 DISPERSAL SYSTEM INSTALLATION REQUIREMENTS

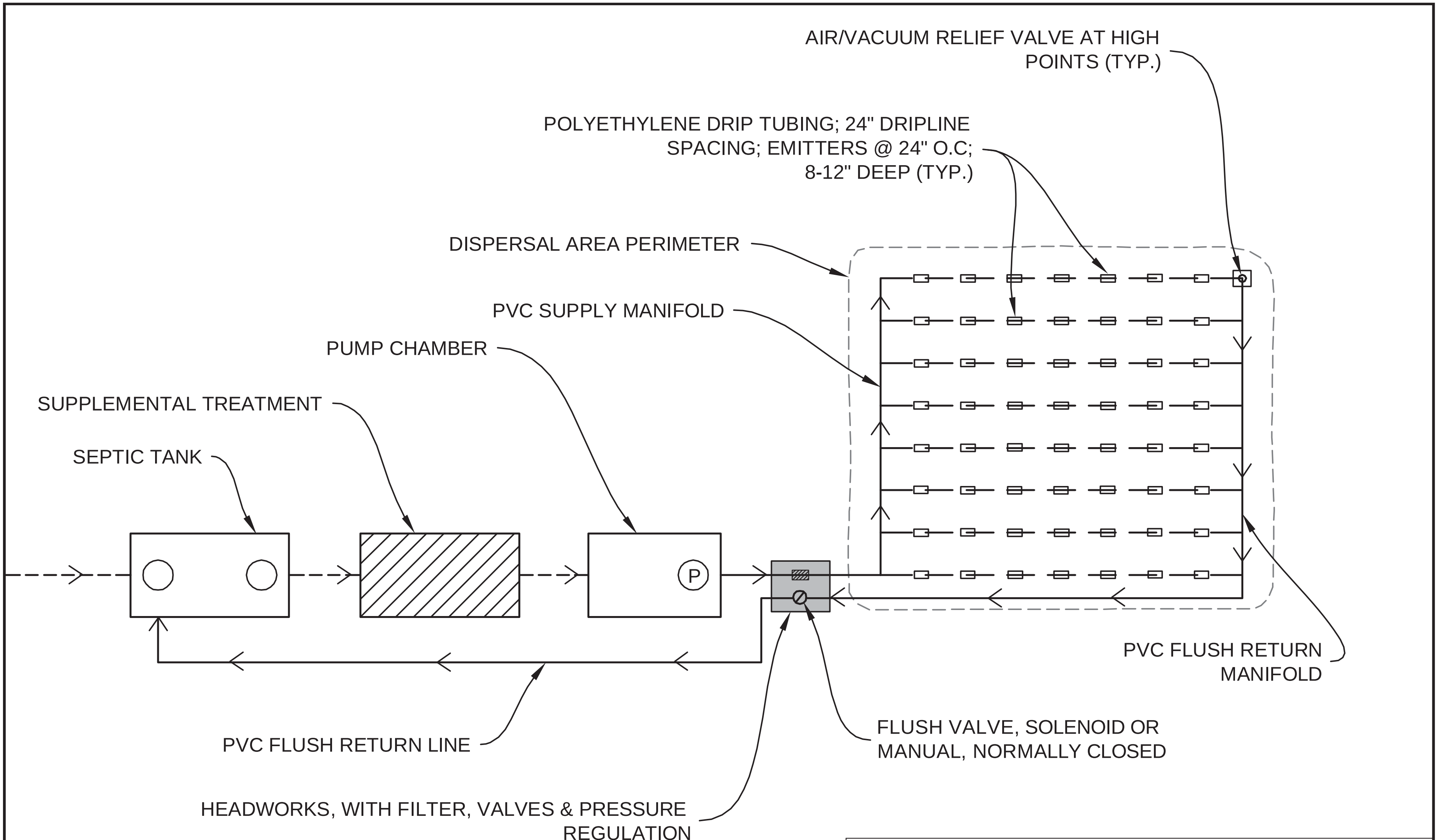
A. GENERAL

1. Dripline installation methods are presented in **Table 29-1**. It is recommended that System Designers specify the installation method.

2. Installation techniques that pull or stretch dripline are prohibited.

3. Disturbing the soil may affect the pore structure of the soil and create hydraulic conductivity problems.

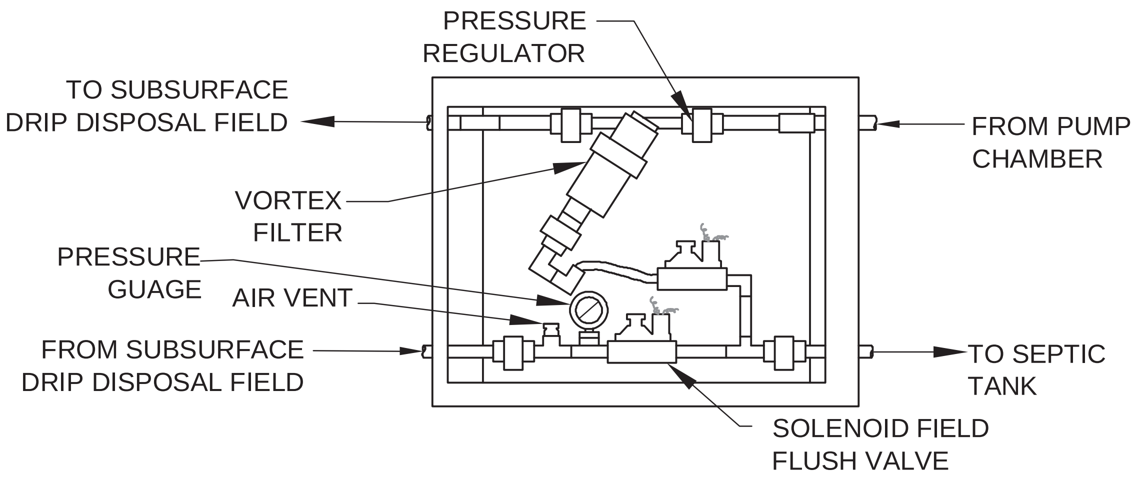
Table 29-1 Dripline Installation Methods		
Insertion Method	**Advantages**	**Disadvantages**
Hand Trenching	• Handles severe slopes and confined areas • Uniform depth	• Slow • Labor intensive • Disrupts existing turf and ground • Back fill required
Oscillating or Vibrating Plow. (Use the type that inserts the dripline directly in place, not one that pulls the dripline through the soil.)	• Fast in small to medium installations • Minimal ground disturbance • No need to back fill the trench	• Depth has to be monitored closely • Cannot be used on steeper slopes >20% • Requires practice to set and operate adequately • Tends to "stretch" pipe. • Shorter runs are required
Trenching Machine: Ground Hog, Kwik-Trench, E-Z Trench	• Faster than hand trenching • May use the 1" blade for most installations • Uniform depth	• Slower, requires labor • Disrupts surface of existing turf • Back fill required
Tractor with Proprietary Dripline Insertion Tool	• Fast • Little damage to existing turf because of the turf knife • Minimal ground disturbance • Does not stretch drip line • Adaptable to any tractor	• The installation tool is designed specifically for this purpose and is available from at least one of the dripline manufacturers
Tractor Mounted 3-point Hitch Insertion Implement	• Fastest. Up to four plow attachments with reels • A packer roller dumps back soil on top of the pipe	• Suitable for large installations only



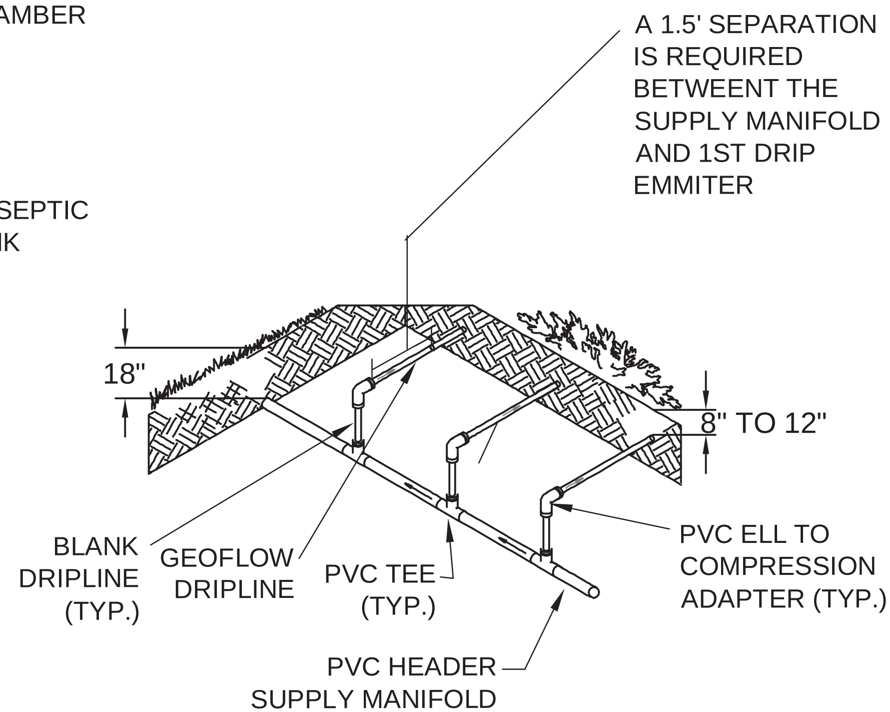
SUBSURFACE DRIP DISPERSAL SYSTEM

SCHEMATIC

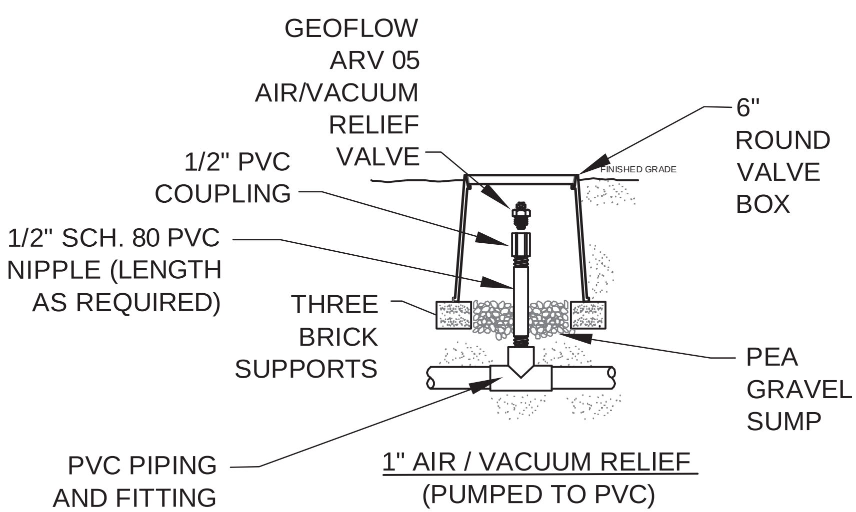
FIGURE 29-1



AUTOMATIC HEADWORKS



END FEED/ FLUSH MANIFOLD



1" AIR / VACUUM RELIEF
(PUMPED TO PVC)

SUBSURFACE DRIP DISPERSAL SYSTEM DETAILS

FIGURE 29-2

CHAPTER 30
AT-GRADE & MOUND DISPERSAL SYSTEM REQUIREMENTS

30.0 CHAPTER OVERVIEW

This chapter provides design criteria for at-grade and mound dispersal systems for new and replacement OWTS and modifications or repairs to existing OWTS. In addition to the requirements in this chapter, at-grade and mound dispersal systems must also comply with the general requirements for pressure distribution systems presented in **Chapter 26** of this Manual.

This chapter is organized in the following sections:

30.1 AT-GRADE AND MOUND DISPERSAL SYSTEM OVERVIEW

A. DESCRIPTION

1 . An at-grade dispersal system consists of an elevated gravel distribution bed with pressurized perforated pipes designed to distribute effluent evenly into the gravel distribution bed and into the underlying native soil. The gravel distribution bed is placed directly on the soil surface and is covered by soil fill. The discharge or infiltrative surface of the at-grade system is at the interface of the gravel distribution bed and the preconstruction ground surface elevation of the native soil.

2. A mound dispersal system is similar to an at-grade dispersal system, except that it includes a sand bed (filter media) between the native soil and the gravel distribution bed to provide treatment (sand filtration) of effluent before it reaches native soil.

3. Mound and at-grade dispersal systems utilize the shallow surface soil for broad distribution of effluent, and can be used in areas with a high groundwater table and shallow soil conditions on flat or gently sloping terrain.

4. Schematic and cross-section diagrams are provided in **Figure 30-1** and **Figure 30-2** (included at the end of this chapter) to illustrate the key design features of at-grade dispersal systems.

5. Schematic and cross-section diagrams are provided in **Figure 30-3** through **Figure 30-9** (included at the end of this chapter) to illustrate the key design features of mound dispersal systems.

30.2 ONSITE WASTEWATER SYSTEM CONFIGURATION REQUIREMENTS

A. GENERAL REQUIREMENTS

1. Possible System configurations using an at-grade or mound dispersal system are presented in **Table 5-4** (at-grade systems) and **Table 5-5** (mound systems) and summarized below.

2. **Treatment Train Requirements.**

   a. **Primary Treatment.** Primary (septic tank) treatment shall be the minimum level of treatment for at-grade and mound dispersal systems for wastewater meeting the definition of domestic-strength wastewater per the criteria provided in **Chapter 15** and in accordance with the criteria presented in **Table 5-4** (at-grade systems) and **Table 5-5** (mound systems).

   b. **Supplemental Treatment.**

      (1) Supplemental treatment may be used to allow reduced vertical separation distance requirements for effective soil and high seasonal groundwater.

      (2) Supplemental treatment is required to reduce high-strength wastewater to domestic strength wastewater prior to discharge to pressure dosed trench dispersal systems.

3. **Effluent Distribution Mechanism.** Effluent from the treatment tanks is pressure dosed to at-grade and mound dispersal beds.

4. **Dispersal System Reserve Area Requirements.** In lieu of the dual dispersal system requirement for standard System configurations, pressure dosed trench dispersal systems must have a reserve area identified and preserved for future use for installation of a replacement dispersal system, if required in the future. The reserve area must be:

   a. A dedicated area of land having suitable site conditions and sufficient area for installation of a replacement dispersal system (sized for one hundred percent of the wastewater design flow and able to meet all the design requirements of the system proposed);

   b. Totally separate from the installed dispersal system; and

   c. Fully protected to prevent damage to soil and any adverse impact on the immediate surroundings that may affect the future installation of the replacement system and its function.

30.3 DISPERSAL SYSTEM SITING REQUIREMENTS

A. HORIZONTAL SETBACK REQUIREMENTS

1. The minimum horizontal setback distances specified in **Table 5-7** apply to the at-grade and mound dispersal systems (as measured from the edge of cover soil) except where modified below:

    a. The setback distances to buildings, structures, parcel lines and underground utility easements shall be:

        (1) Upgradient and laterally: Ten (10) feet; and

        (2) Downgradient: Twenty-five (25) feet.

B. VERTICAL SEPARATION REQUIREMENTS

1. **Depth to Groundwater**. The minimum separation to high seasonal groundwater for at-grade and mound dispersal systems, as measured from ground surface, is provided in **Table 5-4** (at-grade systems) and **Table 5-5** (mound systems).

    a. **At-Grade Dispersal Systems.** The minimum separation to high seasonal groundwater for at-grade dispersal systems shall vary between two (2) and five (5) feet according to the level of treatment and the soil percolation rate.

    b. **Mound Dispersal Systems.** The minimum separation to high seasonal groundwater for mound dispersal systems shall vary between two (2) and three (3) feet according to the soil percolation rate.

2. **Effective Soil Depth**. The minimum effective soil depth for at-grade and mound dispersal systems, as measured from ground surface, is provided in **Table 5-4** (at-grade systems) and **Table -5-5** (mound systems). Effective soil depth requirements shall apply within the dispersal field and in the adjacent area extending a distance of twenty-five (25) feet down-slope of the edge of the soil cover on sloping sites, and a distance of fifteen (15) feet from the edge of the soil cover on all sides on level sites.

    a. **At-Grade Dispersal Systems.** The minimum effective soil depth for at-grade dispersal systems shall vary between two (2) and three (3) feet according to the level of treatment.

    b. **Mound Dispersal Systems.** The minimum effective soil depth for mound dispersal systems shall be two (2) feet.

C. MAXIMUM GROUND SLOPE REQUIREMENTS

1. The maximum ground slope for at-grade and mound dispersal systems is provided in **Table 5-4** (at-grade systems) and **Table 5-5** (mound systems) and shall be as follows:

a. **Soil Percolation Rates Between One (1) and Sixty (60) MPI:** The maximum ground slope in areas used for at-grade and mound dispersal systems with average soil percolation rates between one (1) and sixty (60) MPI shall be twenty (20) percent.

b. **Soil Percolation Rates Greater than 60 MPI:** The maximum ground slope in areas used for at-grade and mound dispersal systems with average soil percolation rates greater than sixty (60) MPI shall be fifteen (15) percent.

c. Where a geotechnical report including slope stability evaluation is provided an increase in slope of up to five (5) percent over the slope maximums listed above may be allowed.

30.4 PRESSURE DOSING REQUIREMENTS

A. MINIMUM CRITERIA

1. Wastewater effluent, from the septic tank or supplemental treatment system shall be applied to the at-grade or mound dispersal system by pressure dosing utilizing a pump system.

2. The pressure distribution system shall be designed in accordance with accepted industry practices and in accordance with the following minimum standards:

   a. Uniform dosing of treated effluent over the surface application area of the at-grade or mound gravel distribution bed;

   b. Pressure manifolds shall enter only from the uphill side or end of the at-grade or mound dispersal system;

   c. Distribution laterals shall have a maximum length of one hundred (100) feet, shall be spaced at least twenty-four (24) inches apart and be located at least eighteen (18) inches from the end and sides of the gravel distribution bed;

   d. Orifices shall face upward and shall be protected with orifice shields; and

   e. Perforated distribution laterals shall have a balancing valve at the beginning of the lateral and a purge valve at the end of the lateral.

3. Additional requirements for design and construction of pump systems and pressure distribution systems are contained in **Chapter 26** of this Manual, as applicable.

30.5 GRAVEL DISTRIBUTION BED REQUIREMENTS

A. GRAVEL DISTRIBUTION BED DESIGN CRITERIA

1. **Material.** The gravel distribution bed shall consist of pea gravel meeting the material

specifications provided in **Chapter 35**.

2. **Depth.** Pea gravel shall extend a minimum of six (6) inches below the invert and two (2) inches above the top of the distribution piping.

3. **Level (Mound Only).** The bottom of the gravel distribution bed in a mound dispersal system shall be level.

4. **Natural Contour of Ground**. The gravel distribution bed shall be parallel to the contour of the natural ground and shall not deviate more than three (3) inches vertically per one-hundred (100) feet horizontally.

5. **Gravel Distribution Bed Configuration.** The gravel distribution bed shall be as long and narrow as possible to limit the linear loading rate of effluent to assure that all the effluent infiltrates into the natural soil before it reaches the toe of soil cover of the at-grade or mound dispersal system.

B. GRAVEL DISTRIBUTION BED DESIGN CALCULATIONS.

1. **Basal Area Calculation.** The minimum basal area of the gravel distribution bed (i.e., the infiltration area of the bottom infiltrative surface of the bed) in at-grade and mound dispersal systems shall be sized according to the following formula in **Table 30-**1 below.

Table 30-1 **At-Grade and Mound Dispersal System** **Gravel Bed Basal Area Sizing Formula**
$\text{Gravel Bed Basal Area } (\text{ft}^2) = \dfrac{\text{Wastewater Flow Rate (gpd)}}{\text{Wastewater Application Rate } (\frac{\text{gpd}}{\text{ft}^2})}$

2. **Wastewater Flow Rate.** The wastewater flow rate used for sizing the gravel bed basal area in at-grade and mound dispersal systems shall be the wastewater design flow rate for the OWTS.

3. **Wastewater Application Rate.** The wastewater application rates used for sizing the gravel bed basal area in at-grade and mound dispersal systems shall correspond to the infiltrative surface (i.e., gravel/native soil infiltrative surface for at-grade dispersal systems and gravel/sand infiltrative surface for mound dispersal systems) and shall be as follows:

   a. **At-Grade Dispersal Systems.** The wastewater application rate at the native soil infiltrative surface shall vary according to the soil percolation rate and the level of wastewater treatment proceeding the at-grade dispersal system in accordance with the criteria in **Table 5-4.**

   b. **Mound Dispersal Systems.** The wastewater application rate at the gravel/sand infiltrative surface shall be in accordance with the criteria in **Table 30-2**.

Table 30-2
Wastewater Application Rate Criteria for Sizing Mound Dispersal System Gravel Bed Area

Facility Type	Wastewater Application Rate (gpd/ft^2)
Individual Residential	1.2
Non-Residential and Multi-Unit Residential	1.0

c. Reduction in the above wastewater application rates to ensure the long term integrity and performance of at-grade and mound distribution systems may be required for high-strength wastewater flows or if warranted by soil conditions.

4. **Basal Width & Length Calculations.** The maximum width (A) and effective length (B) of the gravel distribution bed basal area of at-grade and mound dispersal systems shall be determined in accordance with the formula in **Table 30-3**.

Table 30-3
Gravel Bed Distribution Sizing Formulas

$A = \text{Basal Width} = 10 \text{ feet (maximum)}$
$B = \text{Effective Length (ft)} = \dfrac{\text{Wastewater Flow Rate (gpd)}}{\text{Linear Loading Rate (gpd/lineal foot)}}$

a. **Wastewater Flow Rate.** The wastewater flow rate used for determining the effective length of the basal area for at-grade and mound dispersal systems shall be in accordance with the criteria in **Table 30-4** below.

Table 30-4
Waste Water Flow Rate for Sizing Gravel Bed Basal Area

Facility Type	Wastewater Flow Rate (gpd)
Residential	100 gpd/bedroom
Non-Residential and Multi-Unit Residential	Wastewater Design Flow

b. **Linear Loading Rate.** The linear loading rate is defined as the wastewater flow rate (in gpd) divided by the effective length of the dispersal system measured along the slope contour. Maximum linear loading rates for at-grade and mound dispersal systems vary according to ground slope, effective soil depth and percolation rate in accordance with the criteria in the **Table 30-5** (at-grade systems) and **Table 30-6** (mound systems). If a variance from these criteria is proposed, it must be supported by detailed groundwater mounding analysis carried out in accordance with accepted methodology and/or scientific references dealing with water movement in soil and utilizing site specific hydraulic conductivity data.

(1) **At-Grade Dispersal Systems Maximum Linear Loading Rate.** The maximum linear loading rate for at-grade dispersal systems shall be in accordance with the criteria in **Table 30-5** below.

Table 30-5
Maximum Linear Loading Rate for At-Grade Dispersal Systems

Effective Soil Depth (feet)	**Ground Slope (%)**	**Linear Loading Rate (gpd/lineal foot)**		
		Percolation Rate (MPI)		
		1 - 30	31 - 60	61 - 120
2.0 to 3.0	0 - 10	5	4	3
	11 - 20	6	5	4
3.1 to 4.0	0 - 10	7	6	5
	11 - 20	8	7	6
4.1 to 5.0	0 - 10	9	8	7
	11 - 20	10	9	8
>5.0	0 - 10	11	10	9
	11 - 20	12	11	10

(2) **Mound Dispersal Systems Maximum Linear Loading Rates.** The maximum linear loading rate for mound dispersal systems shall be in accordance with the criteria in **Table 30-6** below.

Table 30-6 Maximum Linear Loading Rate for Mound Dispersal Systems				
Effective Soil Depth (feet)	**Ground Slope (%)**	**Linear Loading Rate (gpd/lineal foot)**		
		Percolation Rate (MPI)		
		1 - 30	31 - 60	61 - 120
2.0 to 2.5	0 - 10	5	4	3
	11 - 20	6	5	4
2.6 to 3.0	0 - 10	7	6	5
	11 - 20	8	7	6
3.1 to 4.0	0 - 10	9	8	7
	11 - 20	10	9	8
>4.0	0 - 10	11	10	9
	11 - 20	12	11	10

30.6 SAND FILL REQUIREMENTS (MOUND SYSTEMS ONLY)

A. SAND SPECIFICATIONS

1. The sand media shall be a medium to coarse sand which meets the gradation specifications in **Chapter 35**.

2. Documentation of laboratory sieve analysis results for the proposed sand fill material shall be supplied to the Department to verify conformance with the above specifications.

B. SAND DEPTH

1. The minimum depth of sand fill below the gravel distribution bed shall be twelve (12) inches.

2. The minimum depth of sand fill shall be increased to twenty-four (24) inches for sites where the average percolation rate is between one (1) and five (5) MPI.

C. NATURAL CONTOUR OF THE GROUND

1. The sand fill shall follow the natural contour of the ground surface and not deviate more than three (3) inches vertically per one-hundred (100) feet horizontally.

D. TOP AND SLOPE OF SAND FILL

1. The dimensions of the top and slopes of the sand fill bed shall be determined as follows and in accordance with the formula in **Table 30-7** and as shown on **Figure 30-8** and **Figure 30-9** (included at the end of this chapter):

   a. **Level Sites.** On level sites the top of the sand fill shall extend horizontally beyond the gravel distribution bed a minimum of twenty-four (24) inches in all directions, then slope uniformly as determined by the mound dimensions.

   b. **Sloping Sites.** On sloping sites, the twenty-four (24) inch sand fill dimension on the upslope side of the gravel distribution bed may be reduced to twelve (12) inches, then slope uniformly as determined by the mound dimensions. The downslope and upslope width of the sand fill shall be adjusted in accordance with the formula in **Table 30-7** and the slope length correction factors for mound dispersal systems in **Table 30-8** (included at the end of this chapter).

   c. The maximum side slope of the top of the sand surface shall be three (3) horizontal to one (1) vertical.

E. SAND FILL DESIGN CALCULATIONS

1. The sand fill basal area and the effective infiltrative area shall be sized in accordance with the formulas provided in **Table 30-7** and as shown on **Figure 30-8** and **30-9**.

   a. **Basal Area Calculation.** The total sand fill basal area at the sand/soil interface is dependent on the length and width of the gravel distribution bed, sand filter media depth and side slopes of the filter media.

   b. **Effective Infiltrative Area Calculation.** The minimum effective infiltrative area for wastewater dispersal into native soil shall be determined according to the formula in **Table 30-9**.

Table 30-9 Effective Infiltrative Area Formula
$\text{Effective Infiltrative Area}(\text{ft}^2) = \dfrac{\text{Wastewater Flow Rate (gpd)}}{\text{Wastewater Application Rate }\left(\frac{\text{gpd}}{\text{ft}^2}\right)}$

(1) **Wastewater Flow Rate.** The wastewater flow rate used for sizing the effective infiltrative area of the sand fill shall be the wastewater design flow rate for the OWTS.

(2) **Wastewater Application Rate**. The wastewater application rate used for sizing the effective infiltrative area of the sand fill shall be based on the soil percolation rate in the upper twelve (12) to twenty-four (24) inches of

soil depth in accordance with **Table 25-2** (enhanced wastewater application rates).

(3) **Reduction in Wastewater Application Rates.** Reductions in the above wastewater application rates to ensure the long term integrity and performance of mound distribution systems may be required for high-strength wastewater or if warranted by soil conditions.

(4) **Level Sites.** For level dispersal fields the effective infiltrative area is equal to the total sand fill basal bed area (O).

(5) **Sloping Sites.** For sloping dispersal fields the effective infiltrative area (P) includes the area beneath the gravel distribution bed and the area immediately downslope from the gravel distribution bed. The upslope and end slopes transmit very little of the effluent on sloping sites, and are therefore disregarded.

30.7 SOIL COVER REQUIREMENTS

A. MATERIAL

1. A continuous soil cover shall be placed over the entire gravel distribution bed (for at-grade dispersal systems) and the gravel distribution bed and sand fill (for mound dispersal systems).

2. The soil cover shall consist of a medium, loamy-textured soil.

B. SILT BARRIER

1. The gravel distribution bed and sand fill shall be covered in their entirety with a geotextile filter fabric silt barrier meeting the material specifications provided in **Chapter 36**.

C. DEPTH

1. The soil cover depth shall be a minimum of twelve (12) inches and a maximum of eighteen (18) inches over the top of the gravel distribution bed, and twelve (12) inches minimum over the side slopes of the gravel or sand fill portion of the dispersal system.

2. The soil cover over the distribution bed shall be crowned to promote rainfall runoff, and compacted by track-rolling with a minimum of two passes.

D. LATERAL EXTENSION

1. The soil cover shall extend a minimum of four (4) feet beyond the perimeter edge of the gravel bed in at-grade dispersal systems or the sand fill in mound dispersal systems in all directions.

2. On sloping sites the soil cover of at-grade dispersal systems shall extend further beyond the down-slope edge of the gravel bed and shall vary according to the native ground slope

in accordance with the criteria in **Table 30-10**.

Table 30-10
At-Grade Dispersal System Soil Cover Lateral Extension Lengths

Ground Slope (%)	Soil Fill Extension (feet)
0 to 2	4
3 to 4	6
5 to 6	8
7 to 8	10
9 to 10	12
11 to 12	14
13 to 14	16
15 to 16	18
17 to 20	20

30.8 DISPERSAL SYSTEM CONFIGURATION REQUIREMENTS

A. PLACEMENT CRITERIA

1. On sloping sites (greater than two [2] percent), at-grade and mound dispersal systems shall be aligned with their longest dimension parallel to the natural ground surface site contours so as not to concentrate the effluent into a small area as it moves laterally down slope.

2. The longest dimension of at-grade and mound dispersal systems shall not be aligned perpendicular to the contours of the earth's surface in the dispersal system area.

3. At-grade and mound dispersal systems shall not be placed in a concave landscape position.

B. MULTIPLE DISTRIBUTION BED CRITERIA

1. Where multiple distribution beds are used for dispersal of the effluent, beds may be placed end-to-end or upslope/down-slope of one another, subject to meeting minimum sizing requirements determined from basal area and linear loading criteria.

2. Where any portion of the distribution beds overlap in an upslope/downslope configuration and are within twenty five (25) feet of each other the linear loading analysis must account for the combined flow from the overlapping portions.

3. The beds may be placed with one continuous soil cover fill or with independent soil cover fill.

4. The minimum lateral (i.e., end-to-end) separation distance for distribution beds with one continuous soil cover fill shall be six (6) feet.

C. OVERLAP OF DISPERSAL AREAS CRITERIA

1. In determining the necessary space for the reserve area for future replacement of the at-grade or mound dispersal system the entire basal area (soil cover basal area) of the installed dispersal system and the reserve area dispersal system shall not overlap.

D. SITE DRAINAGE CRITERIA

1. Site drainage shall be provided so that rainfall and runoff is directed away from or around the at-grade or mound dispersal system. On sloped sites surface water or groundwater drainage structures may be required to divert runoff away from the dispersal field.

30.9 DISPERSAL SYSTEM INSPECTION WELL REQUIREMENTS

A. INSPECTION WELL CONSTRUCTION

1. Inspection wells shall be constructed of two (2) inch to four (4) inch diameter pipe, equipped with a wrench-tight cap or pipe plug and a bottom cap. Perforations shall consist of hacksaw slots at nominal one (1) inch spacing, or equivalent commercially-slotted pipe. To prevent surface water infiltration, inspection wells shall be sealed with a bentonite or concrete annular seal (or equivalent) through the soil backfill zone.

B. AT-GRADE DISPERSAL SYSTEMS

1. A minimum of one (1) inspection well shall be installed near the center of the at-grade dispersal system, extending from the surface of the soil cover to the bottom of the gravel distribution bed and screened across the gravel bed, for the purpose of checking effluent levels in accordance with the requirements in **Table 25-4** and as shown on **Figure 30-1** and **Figure 30-2**.

C. MOUND DISPERSAL SYSTEMS

1. A minimum of two (2) inspection wells shall be installed within the mound dispersal system for the purpose of checking effluent levels in accordance with the requirements in **Table 25-4** and as shown on **Figures 30-5 through 30-7**.

   a. One (1) inspection well shall be installed near the center of the mound dispersal system extending from the mound surface to the bottom of the gravel distribution bed and screened across the gravel bed.

   b. One (1) inspection wells shall be installed within the effective sand basal area (outside of the gravel distribution bed), extending from the mound surface to six (6) inches into the native soil and screened across the sand fill bed.

30.10 OWTS PERFORMANCE MONITORING WELL REQUIREMENTS

A. MINIMUM CRITERIA

1. OWTS performance monitoring wells shall be installed around the at-grade or mound dispersal systems in accordance with the requirements in **Table 25-4** and as shown on **Figure 30-1** and **Figure 30-2** (for at-grade systems) and **Figure 30-4** through **Figure 30-9** (for mound systems) for the purpose of checking groundwater levels periodically and water quality sampling, if needed.

30.11 DISPERSAL SYSTEM INSTALLATION REQUIREMENTS

A. GENERAL CRITERIA

1. The use of wheeled vehicles is prohibited for the purpose of ripping or chisel plowing, driving on areas that have been ripped or chisel plowed, driving on the sand fill, placing or moving the soil cover, or anytime the soil conditions are wet, moist, or saturated.

2. Surface vegetation shall be mowed to native ground and the clippings removed.

3. The soil surface shall be ripped or chisel plowed to a depth of eight (8) to ten (10) inches, with rippers set eight (8) to ten (10) inches apart. Initial ripping shall be performed in a path parallel to the contour of the land and only within the limits of the gravel distribution bed (for at-grade systems) or the limits of the gravel distribution bed and the sand fill base (for mound systems). The interface of the native soil and the soil cover shall be ripped after the gravel and/or sand has been placed and just prior to soil cover placement. On steeper sloping sites, soil cover may be keyed into the native soil in lieu of ripping the soil at the System Designer’s discretion.

4. The sand fill (in mound dispersal systems) shall be uniformly placed and compressed by track rolling to a neat line to the elevation and slope specified on the plans with a horizontal tolerance not exceeding one-quarter (1/4) foot horizontally.

5. No traffic is permitted on any ripped surface until after the gravel, sand or soil cover has been placed.

6. Temporary form boards required for the placement of material shall be removed prior to placement of the soil cover.

7. Finished soil cover surface elevation of the at-grade or mound dispersal systems shall be established by track rolling and grooming by hand. Soil cover shall be conditioned with sufficient moisture to allow track rolling to a firm and cohesive surface.

8. The soil cover shall be landscaped or seeded with shallow-rooted, drought tolerant plants, shrubs or grasses.

30.12 REFERENCE GUIDELINES

A. GENERAL

1. Additional guidelines for at-grade and mound dispersal system design are contained in the following references

   a. “Design and Construction Manual for Wisconsin Mounds”, Small Scale Waste Management Project, University of Wisconsin, Madison, January 2000, including any amendments.

   b. "Wisconsin At-grade Soil Absorption System Siting, Design and Construction Manual”, Small Scale Waste Management Project, University of Wisconsin-Madison, 1990.

   c. “At-grade Component Using Pressure Distribution Manual for Private Onsite Wastewater Treatment Systems”, State of Wisconsin, Department of Commerce, 1999.

2. When the requirements in this Manual conflict with the requirements of the reference guidance documents the requirements of the Manual shall prevail unless otherwise approved by the Department.

TABLE 30-7
MOUND DISPERSAL SYSTEM
SAND FILL SIZING

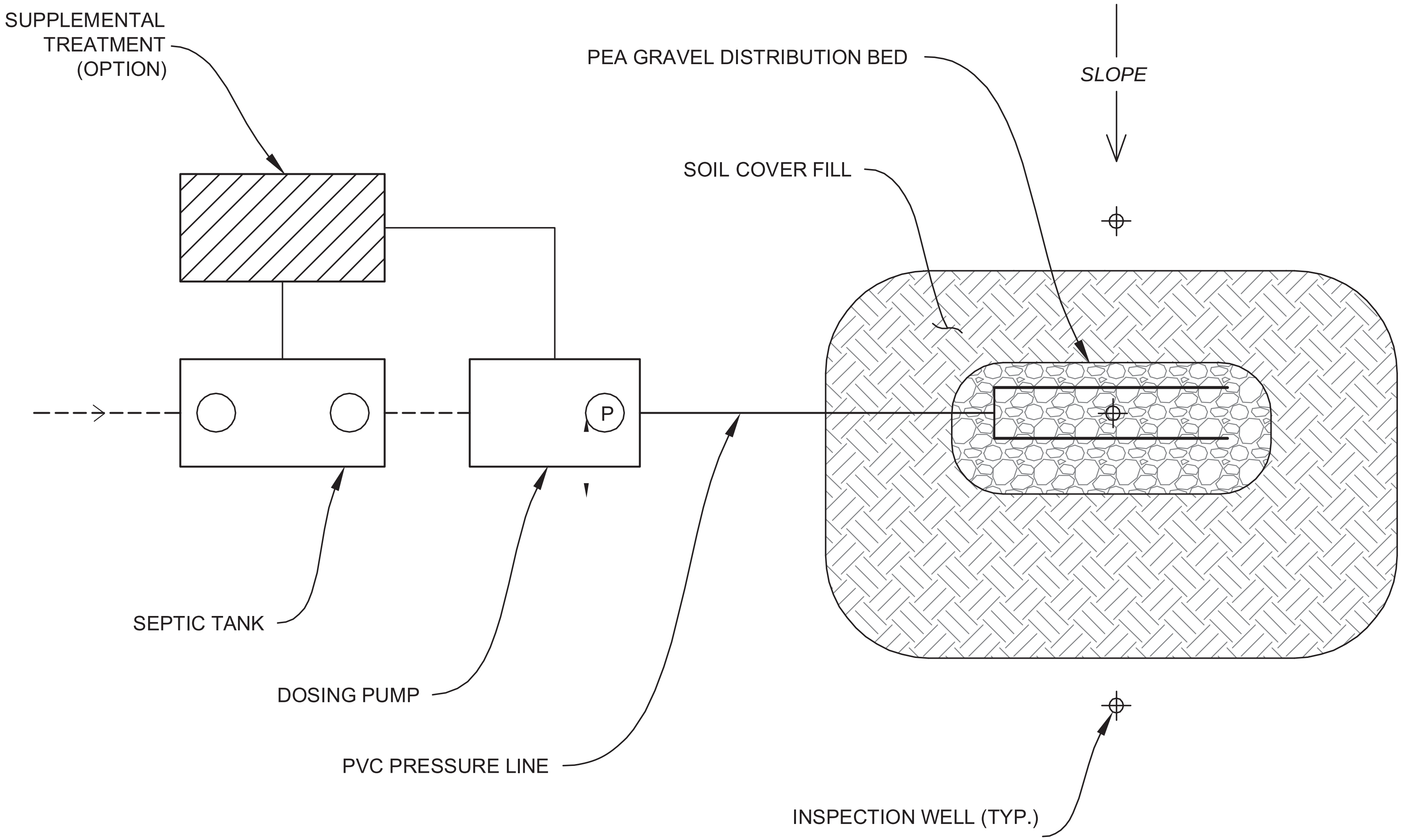
(Refer to Figures 30-8 and 30-9)

Variable	Name	Dimension (Value/Formula)
Gravel Distribution Bed Dimensions		
A	Gravel Distribution Bed Width	A = 10 Feet (maximum)
B	Gravel Distribution Bed Length	B = Wastewater Flow Rate/Wastewater Application Rate
F	Gravel Distribution Bed Thickness	9 inches (0.75 feet) (2 inches above and 6 inches below distribution piping)
Sand Fill Dimensions		
D	Sand Fill Thickness at Upslope Edge of Gravel Bed	12 inches (6 to 120 MPI)
		24 inches (1 to 5 MPI)
E	Sand Fill Thickness at Downslope Edge of Gravel Bed	Level Sites ≤ 2%: E = D
		Sloping Sites >2%: E = D + [(% of natural slope) * (A)]
I	Sand Fill Downslope Width	I = 2 + [3 * (E + F) * (Slope Correction Factor)]
J	Sand Fill Upslope Width	Level Sites ≤ 2%: J = I
		Sloping Sites >2%: J = 1 + [3 * (D + F) * (Slope Correction Factor)]
K	Sand Fill End Slope Length	K = 2 + 3[(D+E)/2 + F]
L	Sand Fill Basal Area Length	L = B + 2K
M	Sand Fill Basal Area Width	M = J + A + I
N	Sand Fill Basal Area	N = L x M
O	Sand Fill Effective Application Area (Flat Terrain)	N = L x M
P	Sand Fill Effective Application Area (Sloping Terrain)	P = B * (A+I)

Note: All dimensions in formulas must be in feet

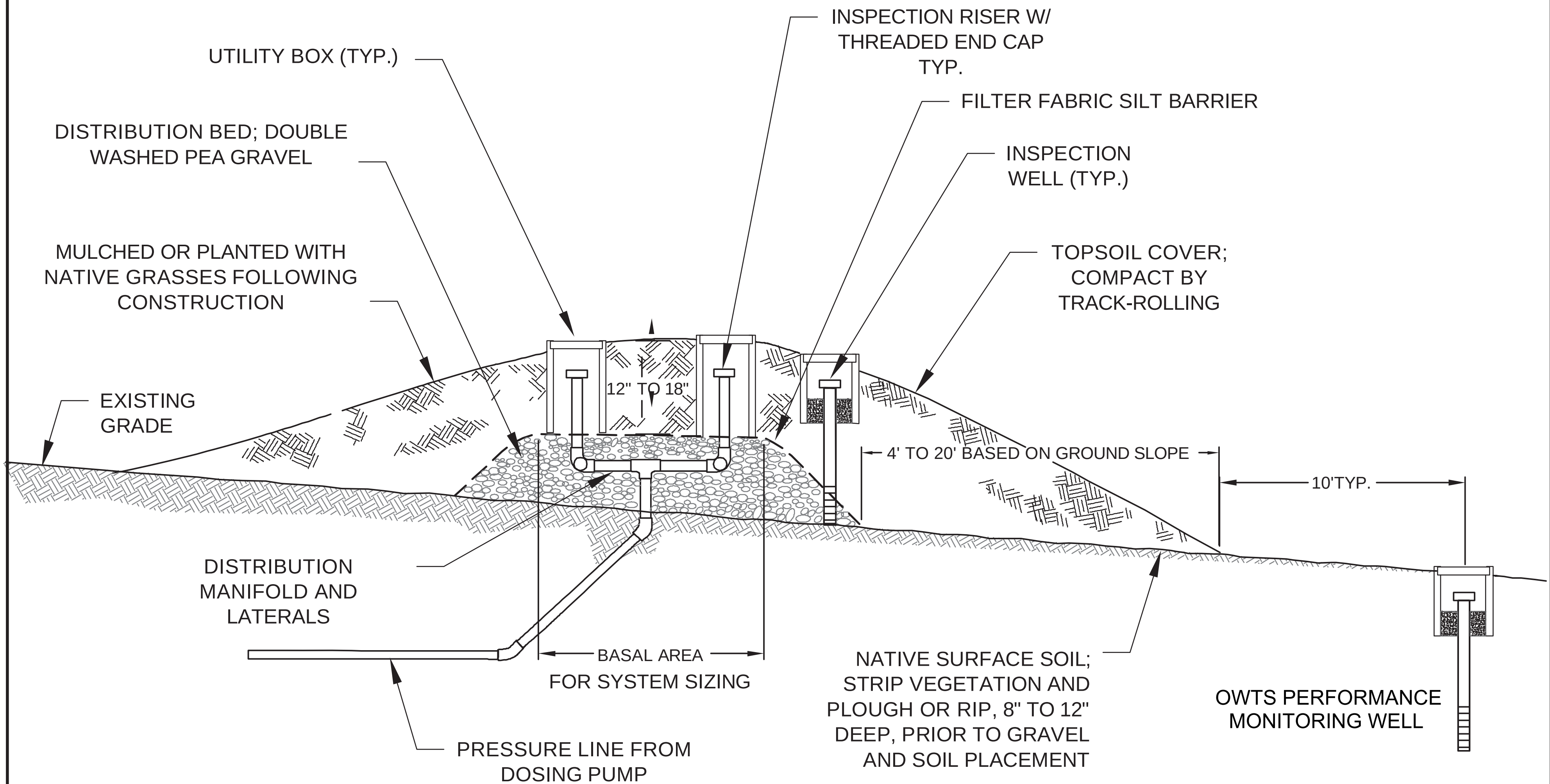
TABLE 30-8
MOUND DISPERSAL SYSTEM
SLOPE CORRECTION FACTORS

Slope (%)	Down Slope Correction Factor	Up Slope Correction Factor
0	1.0	1.00
1	1.03	0.97
2	1.06	0.94
3	1.10	0.92
4	1.14	0.89
5	1.18	0.88
6	1.22	0.85
7	1.27	0.83
8	1.32	0.80
9	1.38	0.79
10	1.44	0.77
11	1.51	0.75
12	1.57	0.73
13	1.64	0.72
14	1.72	0.71
15	1.82	0.69
16	1.92	0.68
17	2.04	0.66
18	2.17	0.65
19	2.33	0.64
20	2.50	0.62
21	2.70	0.61
22	2.94	0.60
23	3.23	0.59
24	3.57	0.58
25	4.00	0.57



AT-GRADE DISPERSAL SYSTEM SCHEMATIC

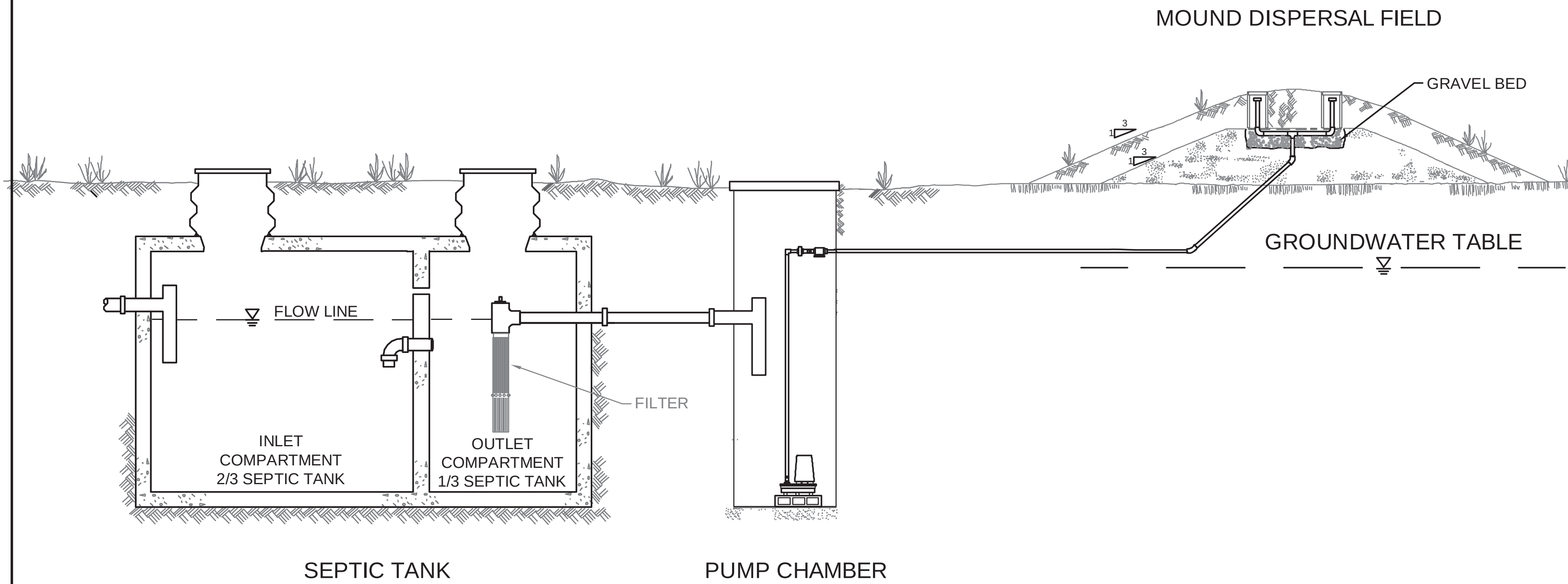
FIGURE 30-1



AT-GRADE DISPERSAL SYSTEM

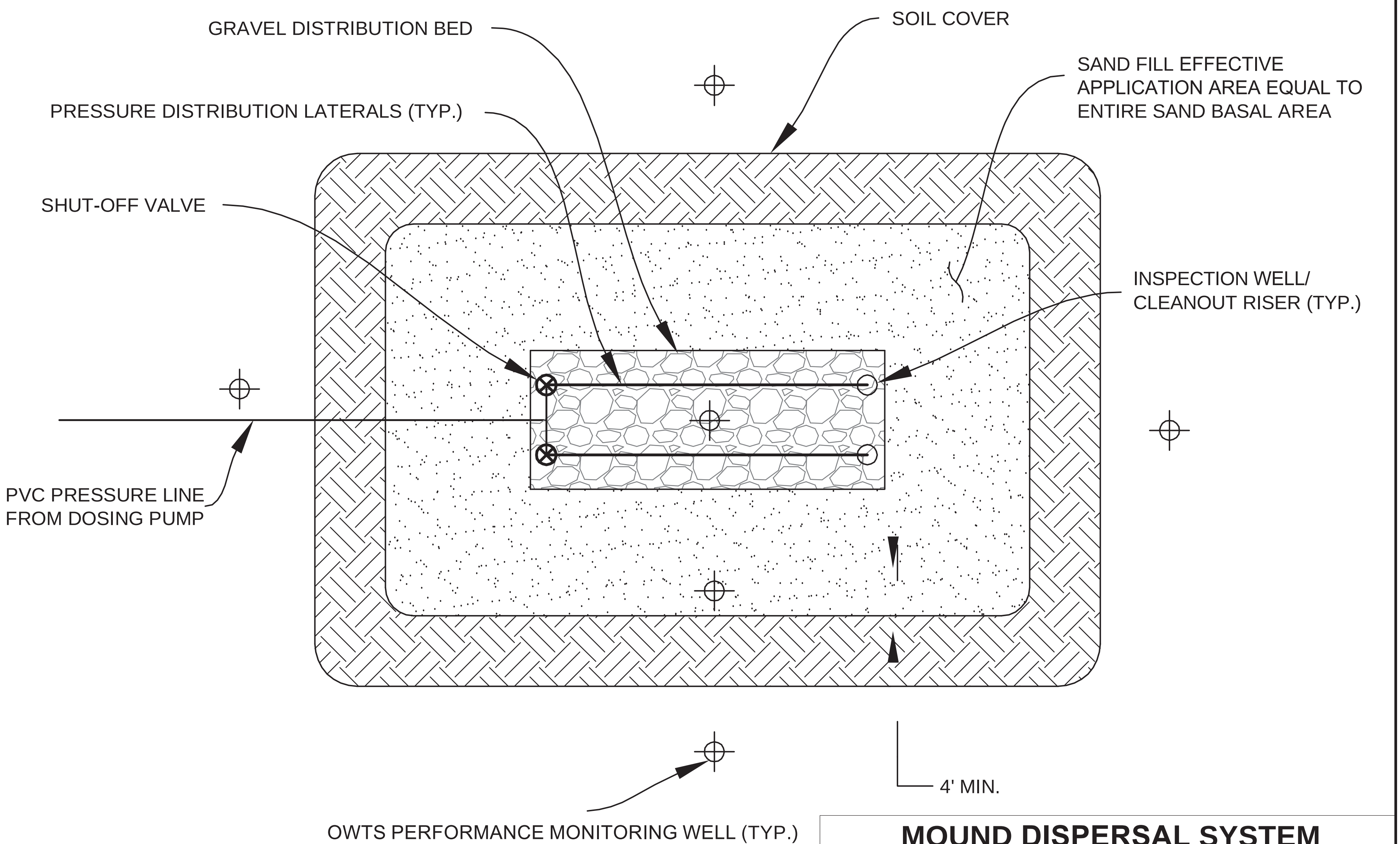
CROSS-SECTION

FIGURE 30-2



MOUND DISPERSAL SYSTEM CROSS SECTION

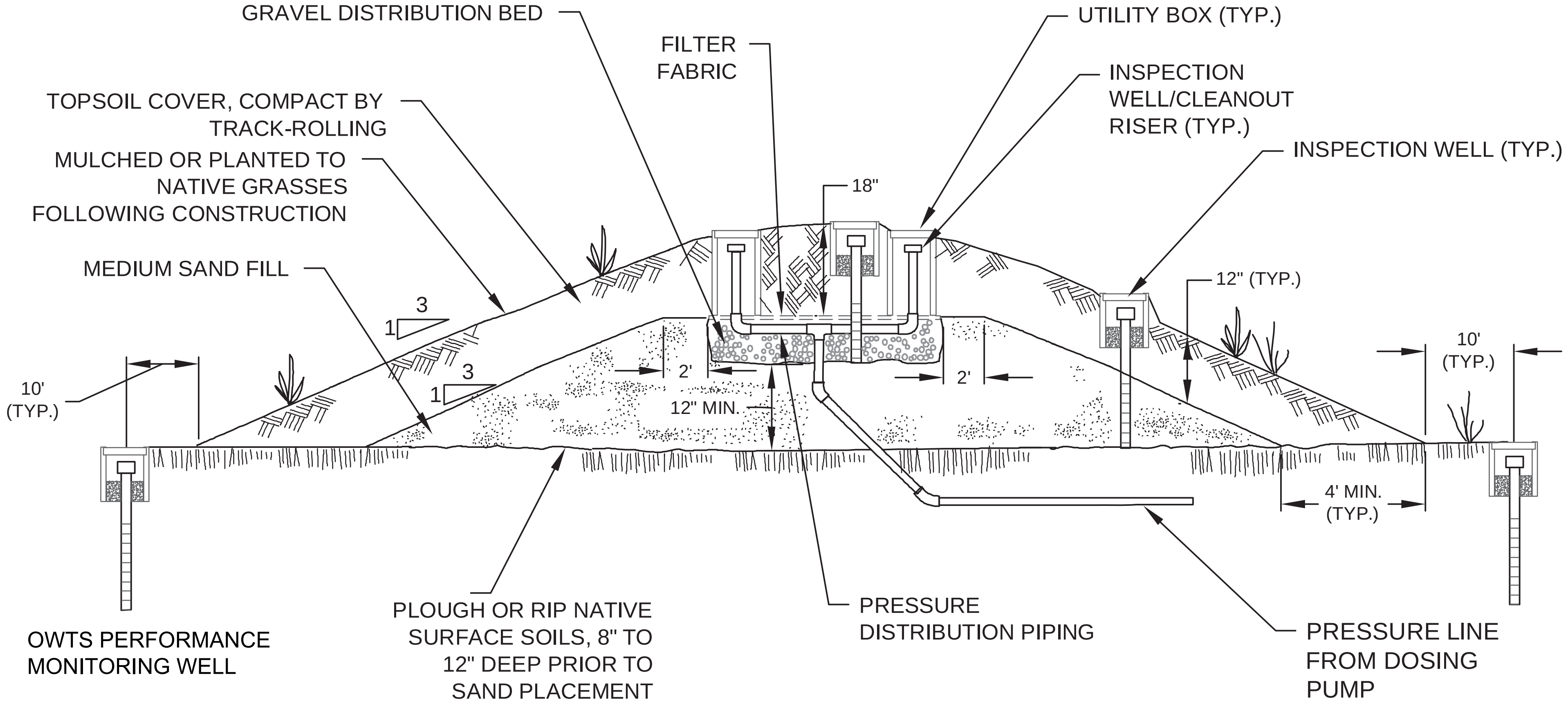
FIGURE 30-3



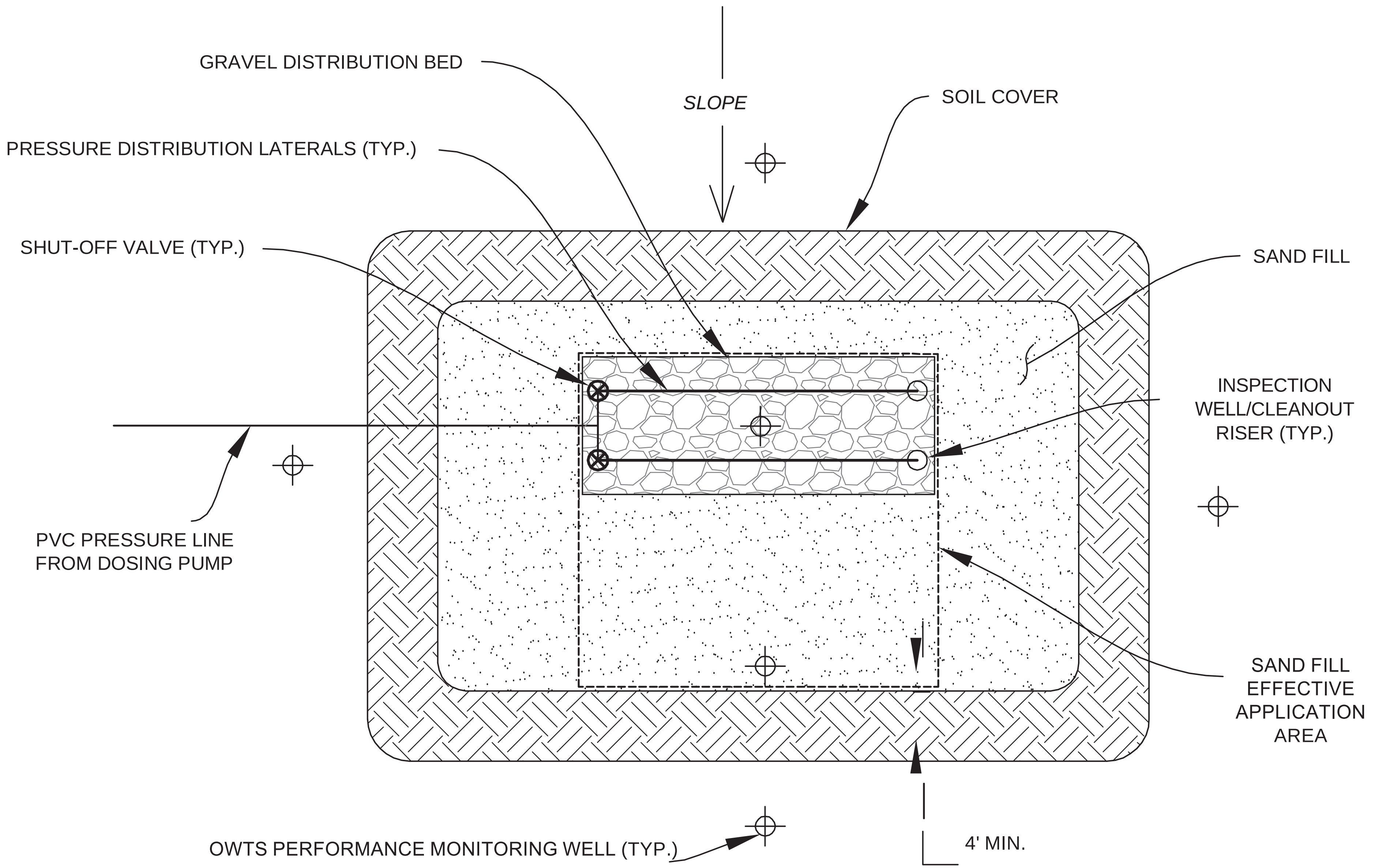
MOUND DISPERSAL SYSTEM

SCHEMATIC - LEVEL SITE

FIGURE 30-4

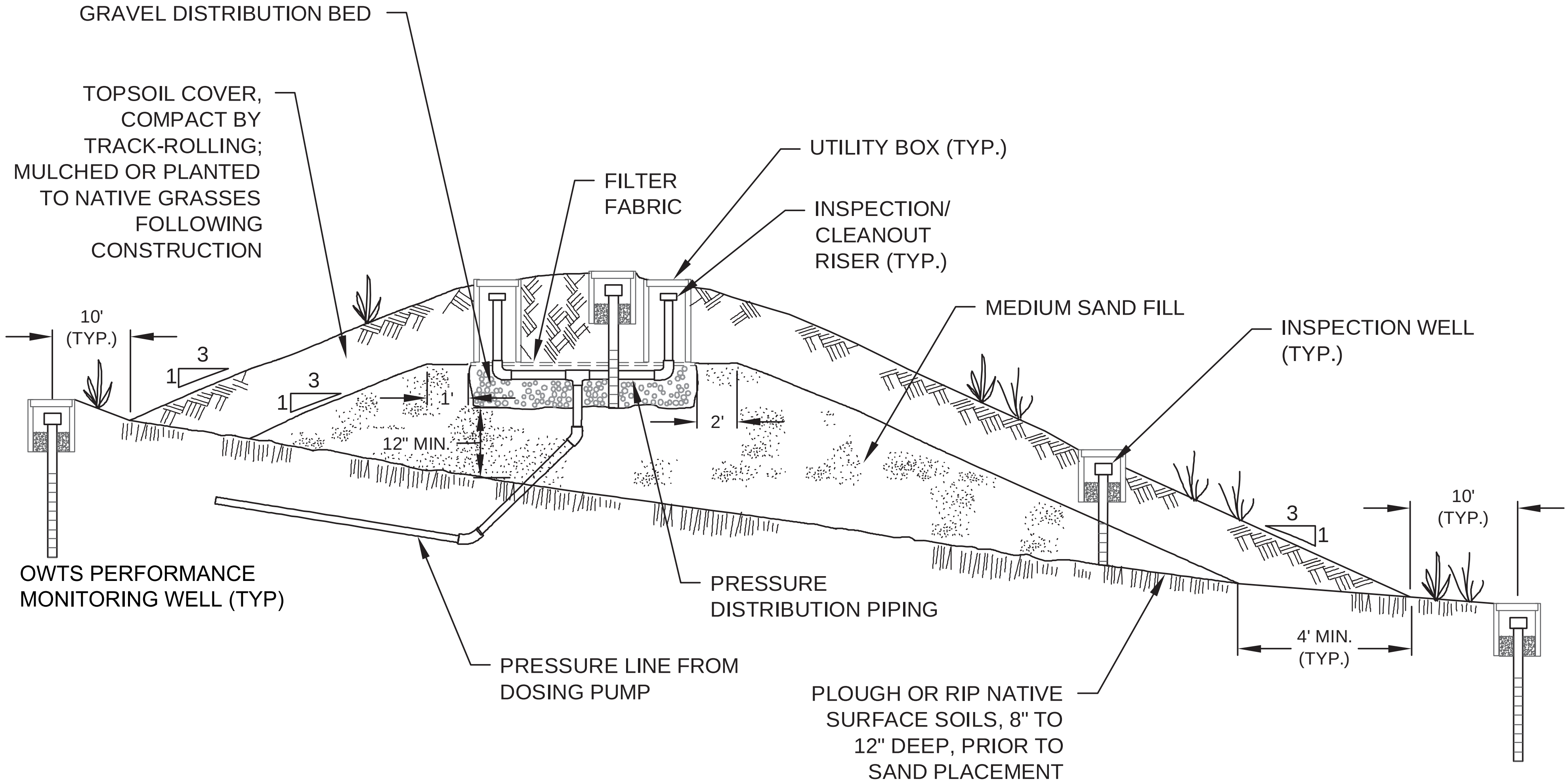


MOUND DISPERSAL SYSTEM
CROSS SECTION - LEVEL SITE
FIGURE 30-5



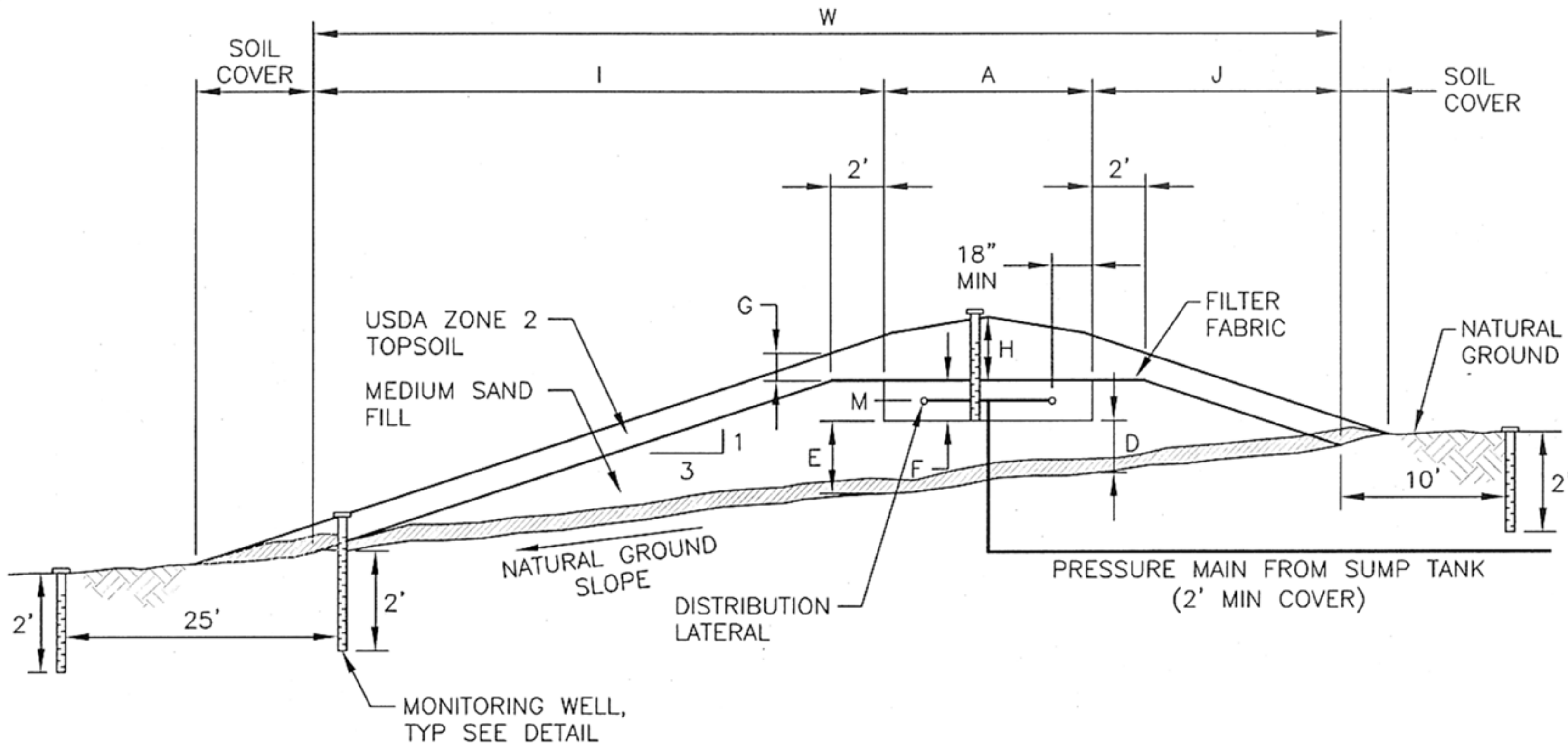
MOUND DISPERSAL SYSTEM SCHEMATIC - SLOPING SITE

FIGURE 30-6



MOUND DISPERSAL SYSTEM
CROSS SECTION - SLOPING SITE

FIGURE 30-7

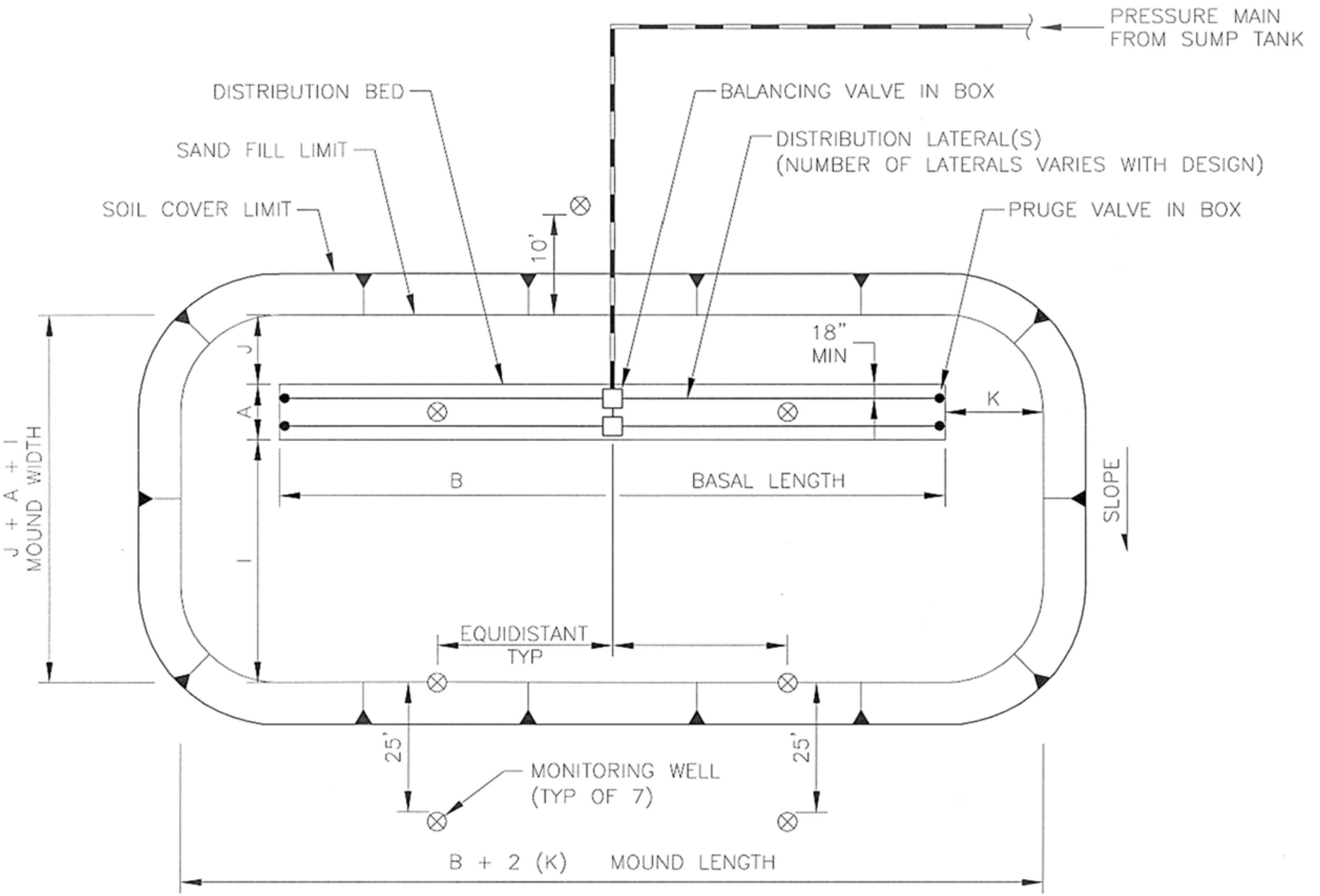


CROSS SECTION

DIMENSIONS (SLOPING SITE)

MOUND DETAIL

FIGURE 30-8



MOUND - PLAN VIEW

DIMENSIONS (LEVEL & SLOPING SITES)

FIGURE 30-9

CHAPTER 31
RAISED SAND FILTER BED DISPERSAL SYSTEM REQUIREMENTS

31.0 CHAPTER OVERVIEW

This chapter provides design criteria for raised sand filter bed systems. The criteria apply to replacement and repair or modification of existing OWTS requiring corrective action. Raised sand filter bed dispersal systems are allowed under limited circumstances and are subject to the requirements of an operating permit.

This chapter is organized in the following sections:

31.1 RAISED SAND FILTER BED DISPERSAL SYSTEM OVERVIEW

A. GENERAL DESCRIPTION

1. Raised sand filter bed dispersal systems will be approved only for repair or other corrective action of existing OWTS on severely constrained sites where site specific conditions limit treatment and dispersal options.

2. A raised sand filter bed dispersal system, sometimes referred to as a bottomless sand filter, combines features of an intermittent sand filter system and a mound dispersal system. It consists of a raised or terraced sand bed, commonly supported by a low retaining wall or bulkhead, where the bottom surface is even with or slightly below ground surface and forms the absorption surface. The raised sand filter bed dispersal system provides additional polishing treatment of effluent and final dispersal of wastewater into native soil.

3. Schematic and cross-section diagrams are provided in **Figure 31-1** (included at the end of this chapter) to illustrate the key design features of raised sand filter bed dispersal systems.

31.2 ONSITE WASTEWATER SYSTEM CONFIGURATION REQUIREMENTS

A. GENERAL

1. Possible System configurations using raised sand filter bed dispersal systems are presented in **Table 5-6** and summarized below.

2. **Treatment Train Requirements.**

    a. **Primary Treatment.** Primary treatment shall be the minimum level of treatment preceding a raised sand filter bed dispersal system.

    b. **Supplemental Treatment.**

        (1) Supplemental treatment may be used to allow reduced vertical separation distance requirements for effective soil and high seasonal groundwater.

        (2) Supplemental treatment is required to reduce high-strength wastewater to domestic strength wastewater prior to discharge to pressure dosed trench dispersal systems.

3. **Effluent Distribution Mechanism.** Effluent from the treatment tanks is pressure dosed to the raised sand filter bed dispersal system.

4. **Exception to Dispersal System Reserve Area Requirements.** Raised sand filter bed dispersal systems are allowed only on severely constrained sites where a reserve area is not available.

31.3 DISPERSAL SYSTEM SITING REQUIREMENTS

A. HORIZONTAL SETBACK REQUIREMENTS

1. Minimum horizontal setback distances from raised sand filter bed dispersal systems to site features are specified in **Table 5-7**.

2. Setback distances are measured from the edge of the containment structure.

B. VERTICAL SEPARATION REQUIREMENTS

1. **Depth to Groundwater**. The minimum separation to high seasonal groundwater, as measured from the bottom of the raised sand filter bed shall vary between two (2) and three (3) feet depending on the soil percolation rate and the level of treatment provided as specified in **Table 5-6**.

2. **Effective Soil Depth**. The minimum depth of effective soil, as measured from the bottom of the raised sand filter bed, shall be two (2) feet as specified in **Table 5-6.**

C. MAXIMUM GROUND SLOPE REQUIREMENTS

1. Maximum ground slope in areas used for raised sand filter bed dispersal systems shall be thirty (30) percent as specified in **Table 5-6**.

   a. An increase in slope of up to five (5) percent may be allowed if supported by a geotechnical evaluation.

31.4 PRESSURE DOSING REQUIREMENTS

A. MINIMUM CRITERIA

1. Effluent shall be applied to the raised sand filter bed dispersal system by pressure dosing utilizing a pump system.

2. The pressure distribution system shall be designed in accordance with accepted industry practices to achieve, at a minimum:

   a. Uniform dosing of treated effluent over the surface application area of the raised sand filter bed dispersal system;

   b. At least one distribution lateral for every thirty-six (36) inches of distribution bed width; and

   c. Additional requirements for design and construction of pressure distribution systems and pump systems contained in **Chapter 26** of this Manual, as applicable.

31.5 CONTAINMENT STRUCTURE REQUIREMENTS

A. CONTAINMENT LINER

1. The raised sand filter bed dispersal systems shall be provided with an impermeable containment liner along all sides of the filter bed to prevent lateral leakage out of or into the filter.

   a. The liner shall extend a minimum of twelve (12) inches below the original ground surface elevation.

   b. The liner shall consist of either:

      (1) thirty (30) mil plastic;

      (2) reinforced poured-in-placed concrete; or

      (3) an equivalent impermeable structure.

2. Plastic liners shall meet the material specification provided in **Chapter 36.**

B. RETAINING WALL

1. The finished surface elevation of the raised sand filter bed dispersal system shall be above the surrounding ground elevation and shall be structurally supported with retaining wall(s), as required.

2. Containment walls over four feet in height measured from the bottom of the footing to the top of the walls must be designed by a Qualified Professional as allowed by their license and registration.

C. BED DIMENSIONS

1. The maximum width of the sand bed shall be ten (10) feet.

2. The raised sand filter bed dispersal system shall not be restricted as to its shape in plan view.

D. MULTIPLE UNITS

1. The raised sand filter bed dispersal system may be divided into compartments or multiple units.

31.6 SAND FILTER REQUIREMENTS

A. SAND SPECIFICATIONS

1. The sand media shall be a medium to coarse sand which meets the gradation specifications for raised sand filter beds dispersal systems in **Chapter 35**.

2. Documentation of laboratory sieve analysis results for the proposed sand filter media material shall be supplied to the Department to verify conformance with the specifications.

B. SAND DEPTH

1. The minimum depth of sand fill, below the gravel distribution bed, shall be:

   a. Twenty-four (24) inches for septic tank effluent.

   b. Twelve (12) inches for supplemental treatment effluent.

C. SAND FILL BASAL AREA SIZING

1. **Basal Area Sizing.** The minimum size (square feet) of the basal area of the raised sand filter bed dispersal system shall be determined in accordance with the formula in **Table 31-1.**

Table 31-1 Raised Sand Filter Bed Sizing Formula
$\text{Sand Fill Basal Area}(\text{ft}^2) = \dfrac{\text{Wastewater Flow Rate (gpd)}}{\text{Wastewater Application Rate }(\frac{\text{gpd}}{\text{ft}^2})}$

a. **Wastewater Flow.** The flow used for sizing the basal area of the sand filter bed shall be the wastewater design flow for the OWTS.

b. **Wastewater Application Rate.** The wastewater application rate used for sizing the basal area of the sand filter bed shall be based on soil percolation rates in the upper (12) to twenty- four (24) inches of soil depth in accordance with the criteria in **Table 25-2** (enhanced wastewater application rates). Reduction in the wastewater loading rates or other provisions to ensure the long term integrity and performance of the raised sand filter bed dispersal system may be required for high-strength wastewater flows.

2. **Effective Length.** The effective length (L) of the raised sand filter bed system shall be the total length of the raised bed along the downslope edge. The length shall be calculated in accordance with the formula in **Table 31-2**.

Table 31-2 Raised Sand Filter Bed Effective Length Formula
$\text{Effective Length (ft)} = \dfrac{\text{Wastewater Design Flow Rate (gpd)}}{\text{Linear Loading Rate (gpd/lineal ft)}}$

a. **Linear Loading Rate.** The maximum linear loading rate for raised sand filter bed dispersal systems sizing shall vary according to available effective soil depth, ground slope, and percolation rate as indicated in **Table 31-3** below. If a change from these criteria is proposed it must be supported by detailed groundwater mounding analysis carried out in accordance with accepted methodology and/or scientific references dealing with water movement in soil and utilizing site specific hydraulic conductivity data.

Table 31-3
Raised Sand Filter Bed Linear Loading Rates

Effective Soil Depth (feet)	**Ground Slope (%)**	**Linear Loading Rate (gpd/lineal foot)** Percolation Rate (MPI) 1-30	31-60	61-120
2 to 2.5	0-10	5	4	3
	11-20	6	5	4
2.5 to 3	0-10	7	6	5
	11-20	8	7	6
3 to 4	0-10	9	8	7
	11-20	10	9	8
> 4	0-10	11	10	9
	11-20	12	11	10

b. **Wastewater Flow (Q)**. The wastewater flow used for determining the effective length shall be in accordance with the criteria in **Table 31-4** below.

Table 31-4
Wastewater Flow Rate for Determining Linear Loading Rates

Facility Type	**Q (gpd)**
Residential	100 gpd/bedroom
Non-Residential and Multi-Unit Residential	Wastewater design flow rate

31.7 GRAVEL DISTRIBUTION BED REQUIREMENTS

A. MATERIAL

1. The distribution bed shall consist of pea gravel meeting the material specifications in **Chapter 35**.

B. DEPTH

1. Pea gravel shall extend a minimum of six (6) inches below the invert and two (2) inches above the top of the distribution piping. If the distribution piping is installed with gravelless chambers, the pea gravel depth below the distribution pipe may be reduced from six (6) inches to four (4) inches, and the two (2) inch pea gravel cover may be eliminated.

C. SILT BARRIER

1. The gravel distribution bed shall be covered in its entirety with a geotextile filter fabric silt barrier meeting the material specifications in **Chapter 36**.

31.8 SOIL COVER REQUIREMENTS

A. MATERIAL

1. A continuous soil cover consisting of a medium, loamy-textured soil shall be placed over the entire gravel distribution bed.

B. DEPTH

1. The soil cover depth shall be a minimum of twelve (12) inches and a maximum of eighteen (18) inches over the top of the gravel distribution bed.

2. The soil cover shall be crowned or sloped to promote rainfall runoff.

31.9 DISPERSAL SYSTEM INSPECTION WELL REQUIREMENTS

A. MINIMUM CRITERIA

1. A minimum of two (2) inspection wells shall be installed within the raised sand filter bed dispersal system for the purpose of checking effluent levels in accordance with the requirements in **Table 25-4** and as shown on **Figure 31-1**.

    a. One (1) inspection well shall be installed near the center of the raised sand filter bed dispersal system extending from the fill surface to the bottom of the gravel distribution bed and screened within the pea gravel fill.

    b. One (1) inspection well shall be installed near the center of the raised sand filter bed dispersal system extending from the fill surface to the soil-sand interface and screened within the sand fill.

2. Inspection wells shall be constructed of two (2) inch to four (4) inch diameter pipe, equipped with a wrench-tight cap or pipe plug and a bottom cap. Perforations shall consist of hacksaw slots at nominal one (1) inch spacing, or equivalent commercially-slotted pipe. To prevent surface water infiltration, inspection wells shall be sealed with a bentonite or concrete annular seal (or equivalent).

31.10 OWTS PERFORMANCE MONITORING WELL REQUIREMENTS

A. MINIMUM CRITERIA

1. OWTS performance monitoring wells shall be installed around the raised sand filter bed dispersal system in accordance with the requirements in **Table 25-4** and as shown on **Figure 31-1** for the purpose of checking groundwater levels periodically and water quality sampling, if needed.

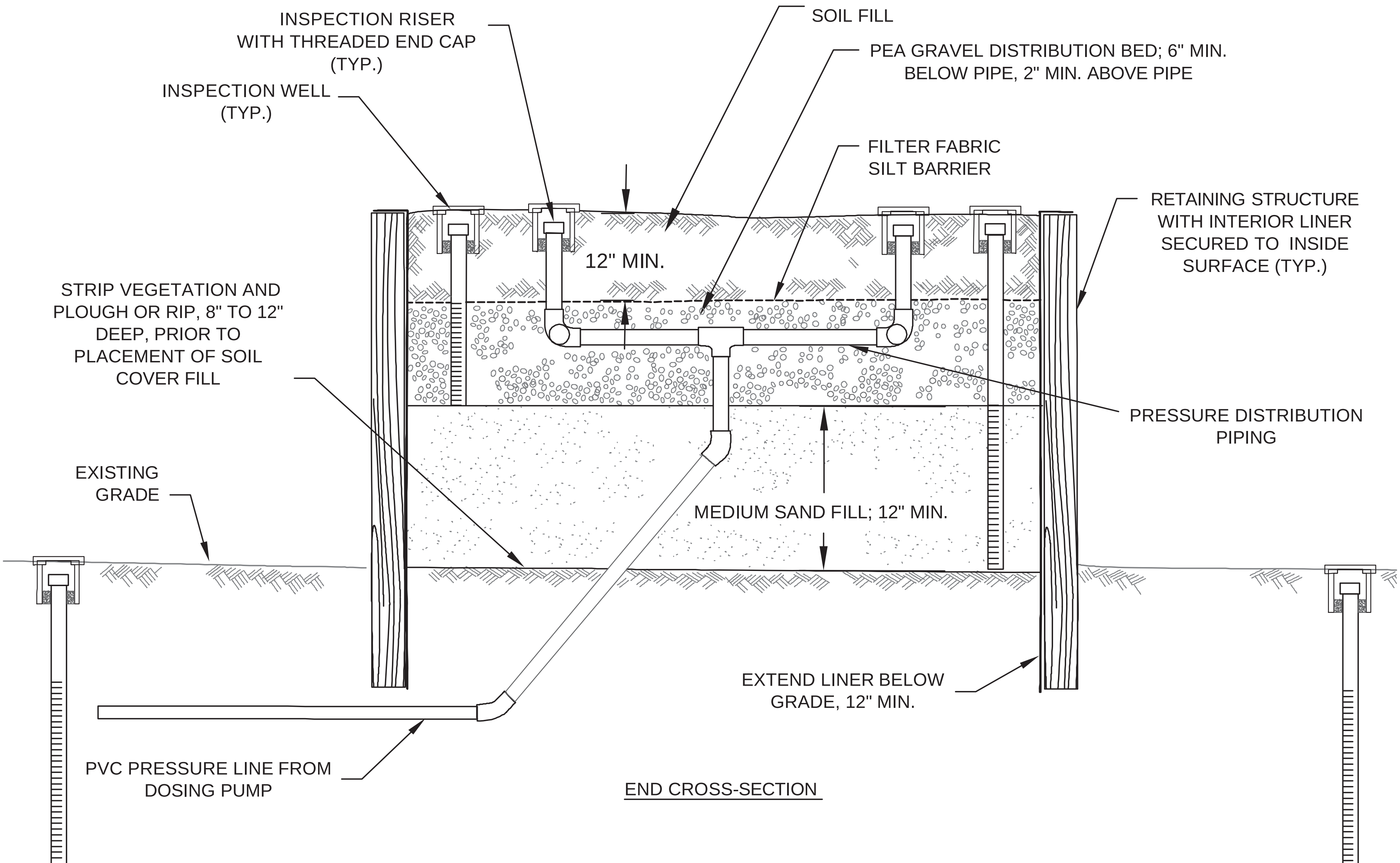
31.11 DISPERSAL SYSTEM INSTALLATION REQUIREMENTS

A. MINIMUM CRITERIA

1. The soil infiltrative surface should be broken up with the backhoe teeth to minimize the formation of a distinct layer between the sand and the original, undisturbed soil.

2. Sand filter media must have a uniform density throughout and shall be installed in accordance with the criteria provided in **Chapter 35** of this Manual in order to prevent differential settling when the raised sand filter bed dispersal system is put into service.

3. Plastic liners shall be installed in accordance with the criteria provided in **Chapter 36** of **this Manual.**



RAISED SAND FILTER BED CROSS-SECTION

FIGURE 31-1

CHAPTER 32
COVER FILL REQUIREMENTS

32.0 CHAPTER OVERVIEW

This chapter provides design criteria for cover fill that may be used in conjunction with gravity trench dispersal systems, pressure dosed trench dispersal systems and subsurface drip dispersal systems presented in **Chapters 27** through **Chapter 29** of this Manual. The requirements of this chapter are for new and replacement OWTS and modifications or repairs to existing OWTS.

This chapter is organized in the following sections:

Section 32.1: Cover Fill Dispersal System Overview

Section 32.2: Dispersal System Siting Requirements

Section 32.3: Design and Construction Requirements

32.1 COVER FILL DISPERSAL SYSTEM OVERVIEW

A. GENERAL DESCRIPTION

1. The term "cover fill" refers to a trench dispersal system or subsurface drip dispersal system where the dispersal trenches or dripline are excavated entirely below the natural ground surface elevation, but up to twelve (12) inches of soil fill is placed on top of the original ground surface to provide the required backfill cover over the trenches or driplines.

2. The wastewater is dispersed into the native soil, not into the fill soil. The purpose of cover fill systems is to allow for shallower dispersal system depths where necessary or desirable to meet soil depth and groundwater separation requirements.

3. Cover fill systems provide for improved use of the absorption capacity of the near surface soil, which tend to be most permeable and most effective for absorption and treatment of wastewater effluent.

4. A cross-section diagram of a cover fill trench dispersal system is provided in **Figure 32-1** (included at the end of this chapter) to illustrate the key design features of cover fill dispersal systems.

32.2 DISPERSAL SYSTEM SITING REQUIREMENTS

A. HORIZONTAL SETBACK REQUIREMENTS

1. Minimum horizontal setback distances for dispersal systems using cover fill to site features are specified in **Table 5-7**. Setback distances are measured from the edge of the cover fill soil.

B. VERTICAL SEPARATION REQUIREMENTS

1. **Depth to Groundwater**. The minimum separation to high seasonal groundwater, as measured from the bottom of the trench or dripline, shall vary between two (2) and five (5) feet depending on the type of dispersal system as specified in **Table 5-1** through **Table 5-3**.

2. **Effective Soil Depth**. The minimum depth of effective soil as measured from the bottom of the trench or dripline shall vary between two (2) and three (3) feet depending on the type of dispersal system as specified in **Table 5-1** through **Table 5-3**.

C. MAXIMUM GROUND SLOPE REQUIREMENTS

1. Maximum ground slope in areas used for cover fill systems shall be twenty (20) percent as specified in **Table 5-1** through **Table 5-3**.

   a. An increase in slope of up to five (5) percent may be allowed if supported by a geotechnical evaluation.

32.3 DESIGN AND CONSTRUCTION REQUIREMENTS

A. DISPERSAL TRENCHES & DRIPLINES

1. Trenches and driplines shall be installed entirely below the original ground surface elevation.

2. All other aspects of the dispersal system shall be in accordance with requirements for the particular type of system (e.g., pressure-dosed trench, subsurface drip dispersal system, etc.).

B. SITE PREPARATION

1. Prior to placement of fill material, all vegetation shall be removed and the ground surface ripped or ploughed to a depth approximately six (6) to ten (10) inches to permit good mixing of native soil and fill material.

C. FILL MATERIAL

1. The soil used for fill shall be similar in texture to the native surface soil in the dispersal system area.

2. Sand, gravel or rock do not qualify as acceptable material for cover fill.

3. Particle size analysis of proposed soil cover material shall be required and submitted to the Department for review and approval, except in cases where the soil cover material is obtained from similar soil on the parcel.

D. SEQUENCING

1. The cover soil fill shall be placed prior to dispersal trench or dripline excavation and installation of dispersal piping and appurtenances.

E. AREAL COVERAGE

1. The cover soil fill shall be continuous and constructed to provide a uniform soil cover.

2. The cover soil fill (in combination with the trench backfill, if applicable), shall achieve a total thickness of at least twelve (12) inches over the dispersal system piping and/or gravel.

3. The fill shall extend a minimum distance of fifteen (15) feet from the edge of the dispersal system trenches or dripline in the down-slope direction and ten (10) feet in the upslope and side-slope directions.

4. On level sites, the fill shall extend a minimum of ten (10) feet in all directions.

5. The toe of the fill shall be tapered at no less than a three (3) horizontal to one (1) vertical slope, beginning at the required fifteen (15) foot or ten (10) foot distance, as applicable.

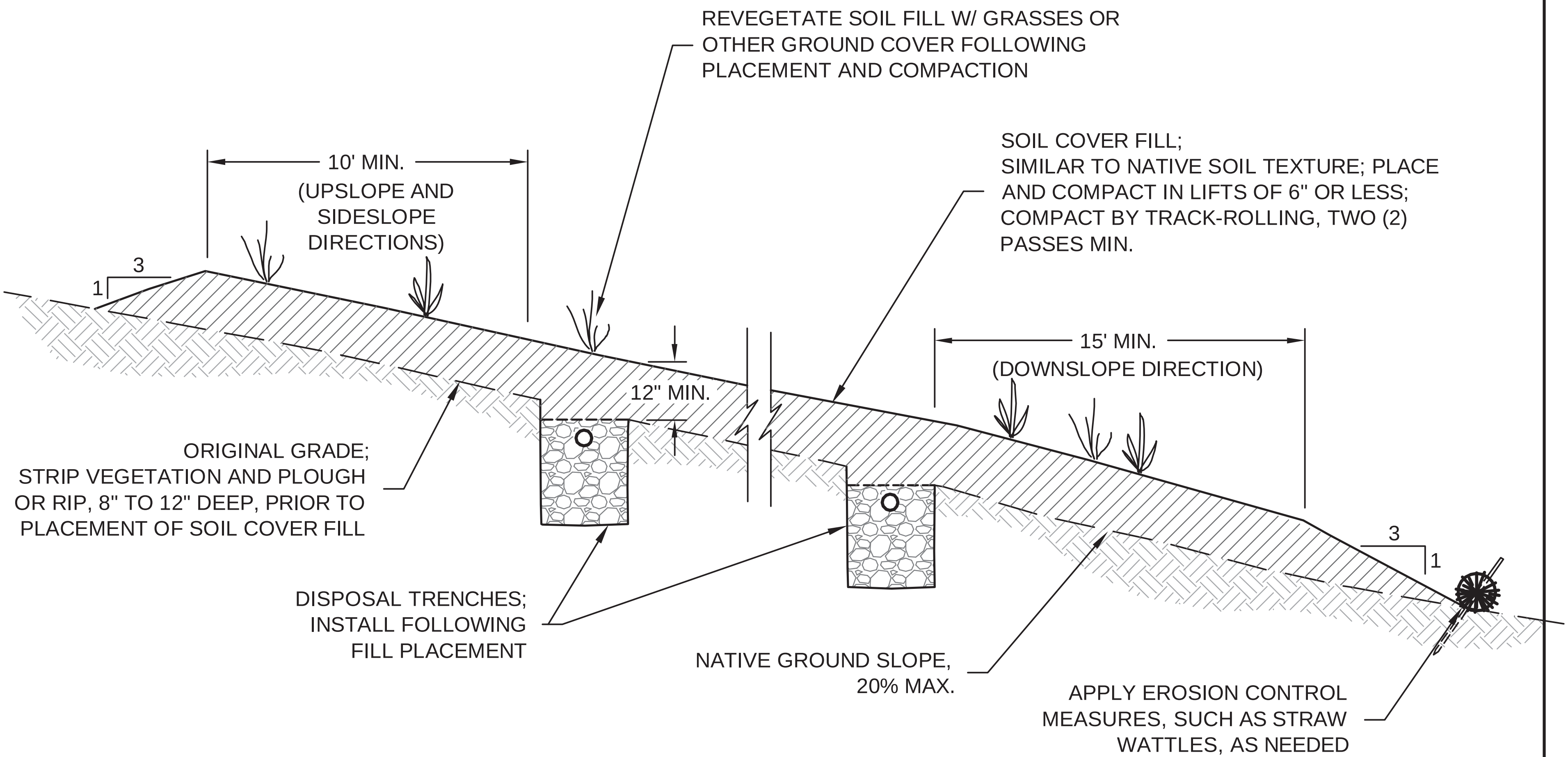
6. Where dual dispersal systems are installed and adjacent to one another, the cover fill should be continuous over both fields.

F. FILL COMPACTION

1. Fill shall be placed in layers ("lifts") of not more than six (6) inches and compacted to approximately the same dry density as the native soil.

2. Normal compaction procedures to achieve this requirement shall consist of track-rolling each lift with a minimum of two (2) passes.

3. Alternative compaction procedures may be allowed by the Department in accordance with recommendations and supporting technical data supplied by the System Designer.



COVER FILL TRENCH DISPERSAL SYSTEM (CONVENTIONAL TRENCH) CROSS-SECTION

FIGURE 32-1

PART 8

CONSTRUCTION MATERIAL & SYSTEM COMPONENT REQUIREMENTS

CHAPTER 33
PIPE REQUIREMENTS

33.0 CHAPTER OVERVIEW

This chapter provides requirements for pipes used in the construction of Systems. The criteria apply to new and replacement Systems and modifications or repairs to existing Systems.

This chapter is organized in the following sections:

33.1 MATERIAL & CONSTRUCTION REQUIREMENTS

A. MINIMUM CRITERIA

1. Unless otherwise specified, building sewers and wastewater piping shall conform to the standards of the most recent edition of the California Plumbing Code and with the following criteria:

    a. **Labeling.** All pipe throughout the Systems shall be clearly labeled and installed so that the labeling can be readily identified by the Department.

    b. **Solid Pipe, Joints and Connections:** Solid (non-perforated) pipe for Systems must conform to the standards of the most recent edition of the California Plumbing Code.

    c. **Perforated Distribution Pipe:** Perforated pipe for gravity trench dispersal systems must conform to the California Plumbing Code and must be three (3) or four (4) inches in diameter.

    d. **Tightlines under Traffic Areas:** Tightlines under traffic areas must be installed to prevent deformation, which may include use of appropriate piping materials, burial depth and sleeving.

    e. **Building Sewer Requirements:** The building sewer from the structure to the septic tank must meet California Plumbing Code requirements.

    f. **Setback Requirements.** Wastewater piping shall conform to the California Plumbing Code setback (horizontal and vertical) requirements to other utility piping.

CHAPTER 34
DISTRIBUTION DEVICE, VALVE, METER & GAUGE REQUIREMENTS

34.0 CHAPTER OVERVIEW

This chapter provides requirements for distribution devices, valves, meters and gauges used in System design. The criteria apply to new and replacement Systems and modifications or repairs to existing Systems.

This chapter is organized in the following sections:

34.1 DISTRIBUTION DEVICE REQUIREMENTS

A. MINIMUM CRITERIA

1. Effluent distribution may be accomplished by the use of commercially available pressurized flow splitter devices, distributing valves or by conventional distribution boxes.

2. Distribution devices shall be of sound construction, watertight, not subject to excessive corrosion, and designed for the intended use.

3. Distribution devices must be fitted with risers and watertight lids or covers, extending to grade, which will permit unobstructed access for maintenance, inspection and operation.

4. Distribution devices shall be designed to accommodate the necessary distribution laterals and expected flows and placed in non-traffic areas.

5. Pressure distribution valves shall be designed to apply effluent uniformly over the entire dispersal system.

B. DISTRIBUTION BOXES

1. Distribution boxes may be installed to divide effluent flows evenly among dispersal system laterals.

2. Distribution boxes must be installed level to assure that each lateral in the drainfield is receiving an equivalent amount of effluent.

3. Measures must be taken to dissipate the velocity of the wastewater delivered by a pump or siphon and to prevent direct flow of effluent across the distribution box resulting in unequal distribution among the outlets.

4. Distribution devices must be placed at a high point so that flow is by gravity in all lines following the device.

5. The distribution box should be placed on a concrete pad or otherwise solidly anchored to prevent it from tilting or shifting in place.

C. LEVELING DEVICES

1. The use of commercially available outlet pipe leveling devices can compensate in elevation differences in outlets and facilitate leveling adjustments.

2. Because of their constant radius and ease of adjustment, leveling devices may improve the accuracy with which a distribution box can be leveled initially and in the future.

D. FLOW SPLITTING VALVES

1. A pressurized flow splitting device such as a pressure manifold can be used to provide uniform distribution regardless of the drainfield lateral length or elevation.

2. Fitting the manifold with orifices sized to permit the percentage of flow desired accommodates different lengths of laterals.

3. An air-release valve (swing-check valve installed in reverse) located at the high point(s) is required if siphoning can occur through the device.

.

E. DISTRIBUTING VALVES

1. A pressurized distributing valve can be used as a means for distributing effluent to multiple drainfield laterals or zones.

2. The water pressure in the transport line activates the distributing valves. Each time the pump is turned on the distributing valve rotates to dose the next drainfield.

3. Distributing valves must be designed with the following features:

    a. Unions to allow easy removal of the valve;

    b. Clear sections of pipe for visual inspection of valve operation; and

    c. A ball valve on the inlet for quick testing of valve operation.

4. The best location of a distributing valve for reliable operation is at the high point in the system.

5. The transport line between the pump and valve should be kept full if possible. If the line is empty at the beginning of each cycle, pockets of air during filling can cause random rotation of the valve. To minimize air pockets, the transport line between the pump and valve should be kept full, short and laid at a constant grade.

6. Because of the mechanical movements of distributing valves it is necessary to take steps to prevent solids from reaching the valves, which may impede operation. Without adequate septic tank effluent screening, distributing valves have very little chance of reliable long term operation. Installation of a distributing valve should not be considered unless a system monitoring program is required for inspecting the valve on a routine frequency. Inspections are necessary to prevent system failure if the valve stops working properly.

7. Because liquid flow through a distributing valve passes fairly small openings with several changes in direction head losses through the valve are high. To assure enough head is available for proper system operation it is recommended that high head turbine pumps be used to pressurize the valve. High pressures through the valve provide a large force for proper seating of the rubber flap disk thus lowering the leakage that can occur through the openings that are not being pressurized. High head turbine pumps are also recommended because the use of a distributing valve typically requires more frequent pump cycling. The System Designer should check with the manufacturer to determine the minimum required flow rate through the valve to also assure proper seating of the rubber flap disk.

34.2 VALVE, METER & GAUGE REQUIREMENTS

A. DIVERSION VALVES

1. All diversion valves regardless of the type of distribution used (gravity or pressure) must:

   a. Provide for independent flow to dual dispersal systems, but not both;

   b. Be fitted with risers and watertight lids or covers, extending to grade, which will permit unobstructed access for maintenance, inspection, and operation;

   c. Have a valve box and either suitable length valve stems or long-handled keys or tools so that they may be easily operated from the ground surface;

   d. Be corrosion resistant, watertight, and designed to accommodate the inlet and outlet pipes; and

   e. Have a positive stop.

B. OTHER VALVES

1. The design, materials and construction of other valves (including but not limited to purge valves, check valves, air/vacuum relief valves, pressure regulators) shall comply with all requirements of the California Plumbing Code.

C. METERS AND GAUGES

1. Meter and gauge design, materials and construction (including but not limited to flow meters and pressure regulators) shall comply with all requirements of the California Plumbing Code.

CHAPTER 35
DRAIN ROCK, PEA GRAVEL & SAND FILTER MEDIA REQUIREMENTS

35.0 CHAPTER OVERVIEW

This chapter provides requirements for gravel and sand used in sand filters and dispersal systems. The criteria apply to new and replacement Systems and modifications or repairs to existing Systems.

This chapter is organized in the following sections:

35.1 GRAVEL SPECIFICATIONS

A. GENERAL

1. Gravel should be uniformly graded (particles of wide ranges of sizes) to maximize pore space.
2. Gravel shall be clean, washed, non-deteriorating and substantially free of fines (defined as less than one [1] percent fines passing the No. 200 sieve).
3. Gravel must be accepted by the System Designer prior to placement.

B. DRAIN ROCK (DISPERSAL TRENCHES)

1. Gravel used for drain rock in trench dispersal systems shall be three quarter (¾) inch to two and one-half (2½) inches in diameter.

C. FILTER/BACKFILL MATERIAL (CURTAIN DRAINS)

1. Gravel used as filter/backfill material in curtain drains shall be three-quarter (¾) to one and one-half (1½) inches in diameter.
2. Caltrans Class 2 permeable filter material may be substituted for the gravel.

D. PEA GRAVEL FILTER MATERIAL (ISF, RSF, PDST, MOUND, AT-GRADE & RAISED SAND FILTER BED SYSTEMS)

1. Pea gravel used for pressure-dosed sand trench dispersal system filter material (below the distribution pipe), gravel distribution beds and underdrains in ISF and RSF systems, and gravel distribution beds in at-grade, mound and raised sand filter bed dispersal systems shall be three eighths (3/8) inch double-washed pea gravel.

E. GRANULAR MEDIA COVER (RSF)

1. Granular Media used for cover over the gravel distribution bed in RSF systems shall range in size from three-eights (3/8) inch pea gravel to two and one-half (2 1/2) inch rounded rock.

35.2 SAND SPECIFICATIONS & PLACEMENT GUIDELINES

A. SAND FILTER MEDIA

1. **Sieve Analysis.** Sand filter materials used in ISF/RSF systems and PDST, raised sand filter bed and mound dispersal systems shall fall within the limits of the specifications shown in the **Table 35-1** for the amounts of material retained/passing (by weight).

Table 35-1
Sand Filter Media Specifications

Sieve Size	Percent Passing Sieve	
	ISF & RSF Systems	PDST, Mound & Raised Sand Filter Bed Dispersal Systems
3/8	100	100
#4	90 to 100	90 to 100
#10	62 to 100	82 to 100
#16	45 to 62	45 to 82
#30	25 to 55	25 to 55
#50	5 to 20	5 to 20
#60	0 to 10	0 to 10
#100	0 to 4	0 to 4
#200	0 to 2	0 to 2

2. **Additional Requirements for Recirculating Sand Filter Systems.** The following additional sand specifications shall apply for RSF:

   a. Effective size of sand/gravel, D_{10}: 1.5 to 2.0 millimeters (mm)

   b. Uniformity coefficient, $U_c < 2.5$

3. Documentation of laboratory sieve analysis results for the proposed sand fill material shall be supplied to the Department to verify conformance with the above specifications prior to placement.

B. SAND FILTER PLACEMENT GUIDELINES

1. In order to prevent differential settling when the sand filter is put into service, the filter media must have a uniform density throughout.

2. Uniform density may be accomplished one of two ways, depending on the moisture content of the filter media during construction.

a. If the filter media is so dry that it can be poured (like salt or sand in an hourglass), it can be poured to fill the sand filter frame, then settled lightly (not compacted) to allow about five (5) percent settling (i.e., volume reduction).

b. If the filter media is moist enough that it cannot be poured, it should be placed in successive six (6) inch lifts with each lift lightly settled.

3. The intent of the light settling in both cases is to eliminate large voids in the media that may collapse later when effluent is added.

4. The light settling may be accomplished by walking on the sand, then raking (with hand tools) into the corners, along the sides, around the pump well (if applicable) and around inspection wells. Higher densities will reduce infiltration rates and oxygen exchange potential.

CHAPTER 36
GEOSYNTHETIC MATERIAL REQUIREMENTS

36.0 CHAPTER OVERVIEW

This chapter provides requirements for geosynthetic materials used in sand filters and dispersal systems. The criteria apply to new and replacement Systems and modifications or repairs to existing Systems.

This chapter is organized in the following sections:

36.1 GEOTEXTILE FILTER FABRIC REQUIREMENTS

A. MINIMUM CRITERIA

1. Geotextile filter fabric shall either be polyester, nylon or polypropylene, or any combination thereof, and shall be suitable for use in subsurface dispersal systems and underdrain applications.

2. The fabric shall be free of any chemical treatment or coating which reduces permeability and shall be inert to chemicals commonly found in soil.

3. Filter fabric shall be non-woven, shall not act as a wicking agent and shall be permeable and shall meet or exceed the specifications listed in **Table 36-1**.

Table 36-1
Geotextile Specifications – Minimum Average Roll Values

Property	Test Procedure	Unit	Minimum Value
Grab Strength	ASTM D4632	lb	60
Puncture Tear	ASTM D4833	lb.	18
Trapezoid Tear	ASTM D4533	lb.	25
Apparent Opening Size	ASTM D4751	Sieve	See Note (1),(2)
Flow Rate	ASTM D4491	gal/ft^2/min	100

Notes:

(1) For soil with fifty (50) percent or less particles by weight passing the No. 200 sieve, the Apparent Opening Size (AOS) shall be less than 0.6 mm (greater than the No. 30 Sieve).

(2) For soil with more than fifty (50) percent particles by weight passing the No. 200 Sieve, the AOS shall be less than 0.297 mm (greater than the No. 50 Sieve).

36.2 POLYVINYL CHLORIDE (PVC) LINER REQUIREMENTS

A. MINIMUM CRITERIA

1. PVC liners used in sand filter design shall meet or exceed the specifications provided in **Table 36-2.**

Table 36-2
Polyvinyl Chloride Liner Specifications

Property	Test Method	Value
Thickness	ASTM D1593, Para 9.1.3	30 mil minimum
Specific Gravity (Minimum)	ASTM D792 Method A	
Minimum Tensile Properties (each direction)	ASTM D882	
Breaking Factor (pounds/inch width)	Method A or B (1 inch wide)	69
Elongation at Break (percent)	Method A or B	300
Modulus (force) at 100% elongation (pounds/inch width)	Method A or B	27
Tear Resistance (pounds, minimum)	ASTM D1004, Die C	8
Low Temperature	ASTM D1790	-20°F
Dimensional Stability (each direction, percent change maximum)	ASTM D1204, 212°F, 15 min.	± 5
Water Extraction	ASTM D1239	-0.35% max
Volatile Loss	ASTM D1203, Method A	0.7% max
Resistance to soil Burial (percent change maximum in original value)	ASTM D3083	
Breaking Factor		-5
Elongation at Break		-20
Modulus at 100% Elongation		±10
Bonded Seam Strength (factory seam, breaking factor, ppi width	ASTM D3083	55.2
Hydrostatic Resistance	ASTM D751, Method A	82

B. INSTALLATION GUIDELINES

1. **Site Considerations and Preparation**.

   a. The supporting surface slopes and foundation to accept the liner shall be stable and structurally sound including appropriate compaction. Particular attention shall be paid to the potential of sink hole development and differential settlement;

   b. Potentially abrasive soil stabilizers such as cementations or chemical binding agents shall not adversely affect the membrane.

c. The liner must be protected by being fully buried to avoid deterioration caused by exposure to weather or sunlight. In cases where portions of the liner may be subject to direct exposure to the weather (e.g., in an ISF or RSF system in which the top edges of the liner may not be buried due to system design requirements) the exposed portions of the liner must be covered (e.g., by construction of a finish rim over the exposed liner); and

d. Strain (or elongation) shall be minimized anywhere in the flexible membrane liner. Non-reinforced liners have high elongation and can conform to irregular surfaces and follow settlements within limits. Unreasonable strain reduces thickness and may reduce life expectancy by lessening the chemical resistance of the thinner (stretched) material.

2. Construction and Installation.

a. The bottom of the pit shall be graded to provide a sloping liner surface from the outer edge of the filter toward the point of underdrain collection.

b. The sides of the pit shall be smooth and free of possible puncture points.

c. The liner shall be protected from puncture by placing a minimum of three (3) inches of sand or non-woven needle-punched geotextile fabric in the bottom of the pit prior to liner placement;

3. Climatic Conditions.

a. **Temperature.** The desirable temperature range for membrane installation shall be in accordance with the manufacturer's recommendations. Placing liner outside the desirable temperature range shall be avoided to prevent adverse effects on transportation, storage, field handling and placement, seaming, backfilling and attaching boots and patches.

b. **Wind.** Wind may have an adverse effect on liner installation. Placing the liner in high wind shall be avoided to prevent damage to the liner and cleanliness of areas for boot connection and patching.

c. **Precipitation.** Seaming, patching and attaching 'boots' shall be done under dry conditions. When field seaming is adversely affected by moisture, portable protective structures and/or other methods shall be used to maintain a dry sealing surface to facilitate proper surface preparation for bonding boots and patches.

4. **Boots:** When boots are used (required when using a gravity-flow underdrain), the boot and exit pipe must be installed with the following criteria:

b. The boot shall be installed by the manufacturer or the manufacturer's representative;

c. The boot outlet shall be bedded in sand;

d. The boot shall be sized to accommodate a four (4) inch underdrain outlet pipe;

e. The boot shall be secured to the four (4) inch outlet pipe with two (2) stainless steel bands and screws and sealant strips as recommended by the manufacturer;

f. An inspection port must be installed in the pipe from the sand filter to the dispersal field;

g. The trench from the sand filter to the drainfield must be backfilled with a minimum five (5) lineal feet clay dam to prevent the trench from acting as a conduit for ground water movement towards the dispersal field;

h. Performance testing of the sand filter/boot for leakage must be conducted if the boot may be submerged in a seasonal high water table; and

i. Testing of the sand filter/boot for leakage must be conducted in accordance with the following protocol:

(1) Fill the underdrain gravel with water;

(2) Measure and record elevation of water through observation/inspection port;

(3) Let stand for twenty four (24) hours minimum;

(4) Measure and record elevation of water through observation/inspection port;

(1) There shall not be any loss of water in the twenty four (24) hour test period.

5. Liner Placement.

a. **Size.** The final cut size of the liner shall be determined and ordered to generously fit the container geometry without field seaming or excess straining of the liner material.

b. **Transportation, Handling and Storage**. Transportation, handling and storage procedures shall be planned to prevent material damage. Material shall be stored in a secured area and protected from adverse weather.

c. **Site Inspection.** A site inspection shall be carried out by the System Designer and the installation Contractor prior to liner installation to verify surface conditions.

d. **Deployment.** Panels shall be positioned to minimize handling. Seaming should not be necessary. Bridging or stressed conditions shall be avoided with proper slack allowances for shrinkage. The liner shall be secured to prevent movement and promptly backfilled.

e. **Anchoring Trenches.** The liner edges shall be secured in backfilled trenches or with manufacturer recommended fastening devices.

f. **Field Seaming.** Field seaming, if absolutely necessary, shall only be attempted when weather conditions are favorable. The contact surfaces of the materials should be clean of dirt, dust, moisture or other foreign materials. The contact surfaces shall be aligned with sufficient overlap and bonded in accordance with the suppliers recommended procedures. Wrinkles shall be smoothed out and seams should be inspected by non-destructive testing techniques to verify their integrity. Field seams shall be inspected continuously and any faulty area repaired immediately.

g. **Field Repairs.** Traffic on the lined area shall be minimized. Any necessary repairs to the liner shall be patched using the same lining material and following the recommended procedure of the supplier.

h. **Final Inspection and Acceptance.** Completed liner installations shall be visually checked by the System Designer for punctures, rips, tears and seam discontinuities before placement of any backfill. The installation contractor shall also manually check all factory and field seams with an appropriate tool. In lieu of or in addition to manual checking of seams by the installer, either of the following tests may be performed:

(1) **Wet Test.** The lined basin shall be flooded to the one (1) foot level with water after inlets and outlets have been plugged. There shall not be any loss of water in a twenty four (24) hour test period; or

(2) **Air Lance Test.** Bonded seams shall be checked using a minimum fifty (50) pounds per square inch (gauge) air supply directed through a three sixteenths (3/16) inch (typical) nozzle held not more than two (2) inches from the seam edge and directed at the seam edge. Riffles indicate unbonded areas within the seam or other undesirable seam construction.

CHAPTER 37
GRAVELLESS DISTRIBUTION PRODUCT REQUIREMENTS

37.0 CHAPTER OVERVIEW

This chapter provides specifications for gravelless distribution products that may be used as alternatives to gravel in dispersal systems or sand filter systems. The criteria apply to new and replacement Systems and modifications or repairs to existing Systems.

This chapter is organized in the following sections:

37.1 GRAVELLESS DISTRIBUTION PRODUCT OVERVIEW

A. GENERAL

1. Gravelless distribution products may be used in subsurface dispersal systems in lieu of gravel-filled trenches or beds.

2. Gravelless distribution products include pipe, chamber, gravel-substitute and geocomposites.

(3) Plastic chamber systems or other gravelless alternatives substituted for drain rock in dispersal systems or sand filters must be certified by IAPMO, UPC, NSF or other nationally recognized certification organization.

(4) Trench dimensions and specifications for gravity and pressure-dosed trench dispersal systems provided in **Chapter 27** and **Chapter 28** shall apply to trenches with drain rock alternatives, as applicable.

B. ADVANTAGES

1. Gravelless dispersal systems can be advantageous when gravel is either unavailable, expensive, or where site conditions make gravel placement difficult or time consuming.

2. The use of gravelless distribution products address some of the concerns associated with gravel including but not limited to:

   a. The detrimental effect of gravel impacting and compressing the infiltrative surface when dumped into the dispersal system area from the front-end loader of a backhoe, which may lower the infiltrative capacity of the soil.

   b. A reduction in infiltrative capacity if the quality of the gravel washing process is poor. Silt particles remaining on the surface of the gravel may be washed off when the dispersal system is placed into use, resulting in a silt layer on the infiltrative surface and thereby reducing its infiltrative capacity.

c. The damaging effect that the transportation of gravel across yards can have on landscaping and the reduced air transport to the infiltrative surface from compacted soils due to the weight of the material and size of the heavy equipment needed to transport the gravel from the stock pile to the dispersal system area.

37.2 TYPES OF GRAVELLESS DISTRIBUTION PRODUCTS

A. GRAVELLESS CHAMBERS OVERVIEW

1. Gravelless chambers are plastic molded chambers of various dimensions.

2. The chambers replace the gravel-supported void space with chamber-supported void space.

3. The trench, or bed bottom infiltrative surface is fully exposed; sidewalls are generally louvered and the top is generally solid.

4. The chambers are connected end-to-end in the bottom of the trench (or placed side-by-side in a bed) and backfilled with native material or as otherwise directed by the manufacturer depending upon soil conditions.

5. Solid end plates are installed at the end of each trench or bed chamber line for structural support and as a barrier to soil backfill.

6. The use of a geotextile barrier between the chamber and the soil backfill varies from manufacturer to manufacturer and model to model depending upon sidewall louver design and the type of soil in which the dispersal system is installed.

B. GRAVELLESS PIPE OVERVIEW

1. Gravelless pipes are corrugated slotted plastic pipes covered by a geotextile fabric.

2. Pipe-based gravelless dispersal fields are typically installed in single-pipe or multiple pipe configurations.

   a. Single-pipe gravelless dispersal systems typically consist of large diameter pipe, typically ten (10) to twelve (12) inch outside diameter, wrapped in a layer of geotextile material. Serial distribution (drop boxes or crossovers) is more commonly used than parallel distribution (distribution boxes).

   b. Multiple-pipe gravelless dispersal systems typically consist of medium diameter pipe typically four (4) inch outside diameter, bundled together in groups in various configurations to accommodate different widths and depths of trenches or beds.

C. GRAVEL SUBSTITUTE OVERVIEW

1. Gravel substitute media may be loose or contained in bundles that are held together with netting for ease of installation and/or as an element of design.

2. The particular shape and configuration of the substitute media may provide additional void space within the trench or bed depending on how the units are placed and the depth and width of the dispersal system trench or bed.

D. GEOCOMPOSITE OVERVIEW

1. Geocomposites consist of geogrid and geotextile products.

2. Dispersal system void space is created by the assembly of multiple layers of geogrid and geotextile bundled together in size and shape to facilitate handling and placement.

3. Structural integrity is imparted by the design and material elements of the geocomposites.

4. Geocomposite dispersal systems may incorporate a layer of sand media between the geogrid/geotextile bundle and the bottom and sides of the dispersal system trench or bed.

5. A geotextile material is placed on top of the geocomposite drain field as a barrier to soil backfill infiltration.

37.3 PERFORMANCE CRITERIA

A. GENERAL REQUIREMENTS

1. Gravelless distribution technologies are, for the most part, proprietary. As such, other than the performance criteria identified below there are few specific design requirements for the manufactured products.

2. Gravelless distribution products shall meet or exceed the following attributes provided by gravel in gravel filled dispersal systems:

   a. Be constructed or manufactured from materials that are nondecaying and nondeteriorating and do not leach chemicals when exposed to wastewater and the subsurface soil environment;

   b. Provide liquid storage volume at least equal to the storage volume provided within the thirty (30) percent void space in a twelve (12) inch layer of drain rock in a drain rock filled dispersal system. This storage volume must be established by the gravelless distribution products, system design and installation and must be maintained for the life of the system. This requirement may be met on a lineal-foot, or on an overall system design basis;

   c. Provide suitable effluent distribution to the infiltrative surface at the soil interface; and

   d. Maintain the integrity of the trench or bed. The material used, by its nature and its manufacturer-prescribed installation procedure, must withstand the physical forces of the soil sidewalls, soil backfill and the weight of equipment used in the backfilling.

37.4 GRAVELLESS DISPERSAL SYSTEM DESIGN REQUIREMENTS

A. GENERAL

1. With the exception of the infiltrative surface area reductions and inspection well requirements provided below, all other dispersal system design features (e.g., trench separation, maximum lateral lengths, maximum width of trench or bed, minimum depth of soil backfill, cover material, setbacks, etc.) must meet the dispersal system requirements provided in **Part 7** of this Manual.

B. INFILTRATIVE SURFACE AREA PER LINEAL FOOT

1. The lineal amount of gravelless distribution product required to provide the total dispersal system area depends on the amount of bottom area infiltrative surface area per lineal foot provided by the gravelless distribution product. The maximum infiltrative surface allowed for dispersal systems using gravelless distribution products shall meet the requirements for the gravel dispersal systems.

   a. **Gravelless Chambers.** The infiltrative surface area per lineal foot shall be equivalent to the outside dimensional width of the chamber in contact with the bottom of the trench or bed. Gravelless chambers with louvered sidewalls may include a portion of the sidewall area.

   b. **Single-Pipe Gravelless Distribution Products.** The infiltrative surface area per lineal foot shall be equivalent to the outside diameter of the pipe in contact with the bottom of the trench and allowable sidewall area for trench distribution system or the bottom of the bed.

   c. **Multiple-Pipe Gravelless Distribution Products.** The infiltrative surface area per lineal foot shall be equivalent to the outside dimensional width of the bottom layer of pipe bundle(s) in contact with the bottom of the trench and allowable sidewall area for trench distribution systems or the bottom of the bed.

   d. **Gravel Substitute Distribution Products.** The infiltrative surface area per lineal foot shall be equivalent to the width of bottom of the trench and allowable sidewall area for trench distribution systems or the width of the bed covered by the gravel substitute.

   e. **Geocomposite Distribution Products.** The infiltrative surface area per lineal foot shall be equivalent to the outside dimensions of the bundle(s) in contact with the bottom of the trench and allowable sidewall area in trench dispersal systems or the bottom of the bed. If a sand layer is required between the geocomposite and the infiltrative surface at the bottom of the trench or bed by the manufacturer the infiltrative area per lineal foot shall be equal to the outside bottom dimensions of the bundle(s) in contact with the sand layer.

C. ALLOWABE REDUCTIONS IN INFILTRATIVE SURFACE AREA

1. When proposing the use of a gravelless distribution product in a dispersal system the System Designer may choose to install less than one hundred (100) percent of the total required infiltrative area for a gravel dispersal system.

2. Reductions may be considered for the following types of gravelless distribution products:

    a. Chambers;

    b. Gravel Substitutes; or

    c. Geocomposites.

3. Dispersal system size reductions for gravelless distribution products may not be combined with drainfield size reductions based on effluent quality.

4. Dispersal system size reductions of up to thirty (30) percent are allowed. The reserve areas shall be sized to at least one hundred (100) percent of the required gravel dispersal system size.

5. When a gravelless distribution product is used in a treatment component, such as an intermittent sand filter, and media is used to meet a treatment level, no size reduction can be taken for the treatment component.

6. The System Designer should evaluate on a case by case basis the appropriateness of using manufacturer literature suggested allowances for dispersal system area reductions based on soil and site characteristics.

7. System design, layout and installation using gravelless distribution product reductions must be done in a manner easily facilitating the installation of additional gravelless dispersal system area if future conditions necessitate such action.

8. For Systems using pressure distribution, if additional dispersal system area is needed in the future, elements of the System (such as the pump or controls) may need to be modified in order to meet the hydraulic performance requirements of pressure distribution throughout the expanded dispersal system.

D. INSPECTION WELLS

1. The installation of inspection wells in gravelless dispersal fields is for the purpose of monitoring system status and aiding in problem analysis.

2. To be effective inspection wells must be installed in a representative location on each dispersal system line.

3. Some lines may require additional inspection wells to achieve observations representative of the entire dispersal system.

4. Inspection wells must provide visual access to the trench-bottom in gravelless dispersal systems as follows:

    a. Single-Pipe: to the interior of the pipe;

    b. Multiple-Pipe: to the infiltrative surface;

c. Chamber: to the interior of the chamber;

d. Gravel Substitute: to the infiltrative surface; or

e. Geocomposite: to the infiltrative surface.

37.5 INSTALLATION REQUIREMENTS

A. GENERAL

1. Gravelless distribution products must be installed according to the manufacturer's instructions, in a manner that is consistent with the standards in this Manual.

2. If the manufacturer's instructions and the standards in the Manual are in conflict, the matter must be discussed with, and decided by the Department.

PART 9

NON-DISCHARGING TOILET UNIT REQUIREMENTS

CHAPTER 38
VAULT TOILET REQUIREMENTS

38.0 CHAPTER OVERVIEW

This chapter provides guidelines for vault toilets. Vault toilets are allowed under limited circumstances and are subject to the requirements of an operating permit.

This chapter is organized in the following sections:

38.1 VAULT TOILET OVERVIEW

A. DESCRIPTION

1. A vault toilet is a non-discharging toilet unit and consists of a structure with a self-contained, watertight subsurface vault used to collect and store human waste and drainage from its hand washing sink prior to it being pumped and removed from the property by a Septage Pumper.

38.2 VAULT TOILET REQUIREMENTS

A. SITING CRITERIA

1. Vault toilets shall only serve non-residential facilities and non-commercial facilities in areas where it is the preferable method of wastewater disposal for the protection of public health and environmental resources due to such factors as remote location, limited water supply and site constraints for an OWTS.

2. Limited use application examples include but are not limited to primitive type picnic grounds, campsites, camps and remote recreation areas.

3. Vault toilets shall not be used for seasonal dwellings, non-residential facilities or single family dwellings.

4. Vault toilets shall meet the same horizontal setbacks requirements for tanks as provided in **Table 5-7**.

B. GENERAL REQUIREMENTS

1. The vault shall be watertight and tested for water tightness at the time of installation using the methods in **Chapter 42** for tank water tightness.

2. All handwashing within a vault shelter must be plumbed to the vault. No other water-carried wastewater may be piped to or placed in vault toilets.

3. The capacity of the vaults shall be adequately sized to accommodate the proposed usage and frequency of pumping.

4. Vault toilets shall be designed and installed in accordance with applicable building codes.

5. Vaults toilets must be installed in accordance with the manufacturer's recommendations.

C. PERMIT REQUIREMENTS

1. Vault toilets require an installation and operating permit.

2. Vault toilets shall be installed and maintained in accordance with the manufacturer's recommendations.

3. Vault toilets shall be maintained to prevent health hazards and contamination of soil, surface water and groundwater.

4. Wastewater shall be regularly pumped from the vault by a Septage Pumper as necessary to prevent overflow. The vault shall not be allowed to fill with waste above the manufacturer recommended level.

5. Vault toilet structures shall display the business name and phone number of the owner and the Septage Pumper that is responsible for servicing the vault toilet.

CHAPTER 39
PORTABLE TOILET REQUIREMENTS

39.0 CHAPTER OVERVIEW

This chapter provides guidelines for portable toilets. Portable toilets are allowed under limited circumstances and are subject to the requirements of a special permit.

This chapter is organized in the following sections:

39.1 PORTABLE TOILET OVERVIEW

A. DESCRIPTION

1. A portable toilet is any self-contained chemical toilet facility that is housed within a portable toilet shelter that collects human waste and any drainage from its hand washing sink.

39.2 PORTABLE TOILET REQUIREMENTS

A. SITING CRITERIA

1. Portable toilets may be allowed for temporary or limited use areas, such as construction sites (for use by on site employees), mobile or temporary agricultural uses, temporary campsites and special events.

2. Portable toilets must meet the same horizontal setback requirements for tanks provided in **Table 5-7**.

3. When associated with a land use permit issued by a local planning department, a copy of the land use permit must be provided to the Department with a site plan which indicates the placement of the portable toilets relative to required setbacks.

4. Portable toilets shall not be allowed for seasonal dwellings, non-residential facilities or single-family dwellings.

B. GENERAL REQUIREMENTS

1. All handwashing within a portable toilet shelter must be plumbed to the waste detention chamber. No other water-carried wastewater may be piped to or placed in portable toilets.

2. Documentation shall be provided to the Department on the minimum number of portable toilets required determined based on the site use and/or estimated attendees and duration of events and relevant published industry guidance such as the Portable Sanitation Association International Special Event Extended Chart Breakdown.

3. Biocides and oxidants must be added to waste detention chambers at rates and intervals recommended by the manufacturer.

C. PERMIT REQUIREMENTS

1. A special permit is required for the use of portable toilets. An exception to this requirement may be allowed for temporary use (less than seven [7] days) of portable toilets and in agricultural field activities.

2. Portable toilets shall be installed and maintained in accordance with the manufacturer's recommendations.

3. Portable toilet shelters shall display the business name and phone number of the owner and the Septage Pumper that is responsible for servicing the portable toilet.

3. Wastewater shall be regularly pumped from the portable toilet by a Septage Pumper as necessary to prevent overflow. The portable toilet shall not be allowed to fill with waste above the manufacturer recommended level.

4. Portable toilets shall be maintained to prevent health hazards and contamination of soil, surface water and groundwater.

CHAPTER 40
WATERLESS TOILET REQUIREMENTS

40.0 CHAPTER OVERVIEW

This chapter provides guidelines for waterless toilets. Waterless toilets are allowed under limited circumstances and are subject to the requirements of a special permit.

This chapter is organized in the following sections:

Section 40.1: Waterless Toilet Overview

Section 40.2: Waterless Toilet Requirements

40.1 WATERLESS TOILET OVERVIEW

A. DESCRIPTION

1. A waterless toilet includes a composting toilet, an incinerating toilet or similar device for the holding and processing of wastewater from a toilet.

40.2 WATERLESS TOILET REQUIREMENTS

A. SITING CRITERIA

1. Waterless toilets are only allowed in limited instances for example outbuildings not used as a residence or sleeping quarter or as part of a corrective action for repair or replacement of a failed OWTS on severely constrained sites.

2. Waterless toilets must meet each the following conditions:

   a. Five (5) acre minimum parcel size;

   b. Setbacks from the unit and the burial area (if applicable) must meet the minimum requirements for OWTS dispersals system setbacks provided in **Table 5-7** with the additional requirement that setbacks from the all property lines must be at least one hundred (100) feet;

   c. The parcel is not located in a designated Area of Concern as identified in **Chapter 10**; and

   d. The waterless toilet does not create a public nuisance.

3. A Qualified Professional must conduct a site evaluation in the area of the proposed burial area of the waterless toilet waste. The site evaluation shall verify a vertical separation of at least five (5) feet to groundwater or other limiting layer from the bottom of the burial area.

B. GENERAL REQUIREMENTS

1. Waterless toilets shall be installed and maintained in accordance with the manufacturer's recommendations.

2. The waterless toilet shall be certified and currently listed by the NSF under NSF/ANSI Standard 41.

3. The model of the waterless toilet shall be appropriate for the number of users and intended demand.

4. The Applicant or designee shall submit the following documentation to the Department for approval:

    a. Site map demonstrating compliance with the siting requirements;

    b. Waterless toilet manufacturer specification sheet showing that the toilet is appropriately sized for the planned use; and

    c. An OM&M manual for the waterless toilet and, if applicable, the burial area. The OM&M Manual must include the following:

        (1) Manufacturer's name and model number;

        (2) Manufacturer's NSF listing and certification;

        (3) Manufacturer's recommended operational capacity;

        (4) Manufacturer's operation and maintenance guidance;

        (5) Minimum burial depth;

        (6) The location of the burial area;

        (7) Schedule and timing for burial;

        (8) Method of handling and site for disposal of the waste product of the waterless toilet;

        (9) Manufacturer contact information in case of the need of repair or replacement;

        (10) Trouble-shooting information; and

        (11) Other items as requested by the Department.

C. PERMIT REQUIREMENTS

1. A special permit is required for use of a waterless toilet. The owner must renew the special permit on an annual basis.

2. No material shall be placed in a waterless toilet other than the material for which it has been designed.

3. The owner must maintain the waterless toilet in accordance with the OM&M manual and comply with all of the special permit conditions.

4. A person selling a parcel on which there is a special permit for a waterless toilet must notify the Department of the transfer and disclose to the prospective purchaser the presence of the waterless toilet and the requirements to maintain a special permit. A special permit for a waterless toilet is issued to the owner of the property and any change in ownership requires a new permit application be filed with the Department and a new permit be issued, which is done at the discretion of the Department.

5. The waste product of the waterless toilet shall only be handled and disposed of after the digestion process is complete as specified in the manufacturer's instructions.

6. The waste product of the waterless toilet digestion must be transported and/or disposed of in a manner that does not create a public nuisance and is in accordance with the requirements of the OM&M manual.

PART 10

SYSTEM DESIGN APPROVAL, INSTALLATION/REMOVAL & OPERATING REQUIREMENTS

CHAPTER 41
SYSTEM DESIGN APPROVAL REQUIREMENTS

41.0 CHAPTER OVERVIEW

This chapter provides the submittal requirements for Department approval of Onsite Wastewater System designs and issuance of installation or repair/modification permits.

This chapter is organized in the following sections:

Section 41.1: Design Plan Requirements

Section 41.2: Basis of Design Report Requirements

Section 41.3: OM&M Manual Requirements

41.1 DESIGN PLAN REQUIREMENTS

A. GENERAL REQUIREMENTS

1. The Onsite Wastewater System design plans must include sheets with scaled plan views, profile views, cross sections, and details sufficient to allow:

    a. Review by Department staff for compliance with the requirements of the Ordinance and this Manual.

    b. Onsite Wastewater System installation, operation, monitoring and maintenance.

B. SPECIFIC REQUIREMENTS

1. The design plans must be prepared in accordance with the following requirements.

    a. **Sheet Size.** Plans must be clearly and legibly drawn to scale on ANSI "D" sized sheets measuring twenty-two (22) inches by thirty-four (34) inches. Other sheet sizes may be allowed for consistency with building permit plan sets.

    b. **Title Block.** The title block shall include the following information:

        (1) Assessor's parcel number and address of the parcel;

        (2) Name, address, telephone number, signature and wet stamp of the System Designer;

        (3) Name, address, telephone number and signature of the individual who prepared the site plan and topographic base map and the date of the survey, if different from the System Designer;

        (4) Date of design plans and subsequent revisions on each plan sheet; and

        (5) Name, address, and telephone number of the property owner.

c. **Scale.** The scale of the plans must not be smaller than one (1) inch equals twenty (20) feet and shall correspond to a scale provided on an engineer's scale to facilitate Department plan review. The design plans shall include a statement of the nominal scale as a ratio or fraction and provide a bar scale to represent the nominal scale.

d. **North Arrow.** The plans shall include a north arrow.

2. The plans must present at a minimum the following information, as applicable:

a. **Site Plan.** The plans shall utilize the site plan prepared in accordance with the requirements of **Chapter 6** of this Manual as the base map. If the site plan is prepared by a Qualified Professional other than the System Designer a copy of the site plan and topographic base map, signed and stamped by the individual who prepared the plan, must be provided to the Department with the design documents.

b. **Treatment Train Components.** The plans shall show:

(1) The layout and location of all existing and proposed System components including but not limited to OWTS dispersal system reserve areas; tanks, supplemental treatment systems, dispersal systems, flow divider assemblies, valves, distribution boxes, meters and gauges, alarms and control panels; and

(2) A treatment train schematic.

c. **Tanks Details.** The plans shall provide plan views, cross-sections and details of the tanks in the treatment showing tank configurations and depths, working volumes, emergency storage volumes, nominal tank sizing charts and slope of finished ground surface in the vicinity of tank(s) to demonstrate adequate grading to prevent storm water infiltration.

d. **Dispersal System Details.** The plans shall provide plan, profile and cross sections views and details of the dispersal system area that show the ground slope, dispersal line dimensions, material specifications including gravelless distribution product information if applicable (e.g., trench lengths, number of chambers, length of chambers, length of endcaps, total length of chamber system, etc.) and any benching necessary to install the system.

e. **Pump System Details.** The plans shall show pump system components, float settings, dosing calculations (i.e., volumes, pumping rate and runtime, frequency, drawdown per dose cycle, etc.) and control panel programming and timer functions.

f. **Pipe Alignments**. The plans shall show:

a. Building sewer and lateral alignments, gradient designations and direction of flow for piping from all structures connected to the System and between the tank(s) and the dispersal system; and

b. Cross sections of pipe trenches with the dimensions of the trench, depth of pipe burial, backfill specifications and vertical distances between wastewater piping and other site utilities.

g. **Performance Monitoring Components.** The plans shall provide plan views and cross section details showing the location, design and depths of OWTS performance monitoring and inspection wells and groundwater monitoring wells.

h. **Material Specifications.** The plans shall provide specifications for all construction materials.

i. **Manufacturer Specifications.** The plans shall specify the make, model and manufacturer of all System components.

j. **Horizontal Setback Distances.** The plans shall provide horizontal dimensions from System components to pertinent features to facilitate determination of compliance with horizontal setback requirements in **Table 5-7**.

k. **Vertical Separation to Groundwater Distances and Effective Soil Depth.** The plans shall provide cross-sections showing the vertical separation to groundwater and effective soil depth beneath the bottom of OWTS dispersal systems.

l. **Slope Designations.** The plans shall show slope designations in the vicinity of tanks and dispersal systems (percent and arrows for direction).

m. **System Sizing Calculations.** The plans shall show the design wastewater flow and strength characteristics, dispersal sizing reduction allowances (e.g., low flow fixtures, gravelless chambers, etc.), wastewater application rates, effective infiltration area, flow equalization calculations, tank and dispersal system sizing, etc.

n. **System Hydraulic Calculations.** The plans shall show:

(1) Spot elevation data to confirm the hydraulic design of the System;

(2) Elevations of building sewers as they exit building(s) or structure(s) connected to the System to demonstrate adequate fall to the septic tank or other appurtenances;

(3) Tank outlet invert elevations;

(4) Pump pickup elevations or siphon invert elevations;

(5) Friction loss data including pipe lengths/diameters/material, number and type of pipe fittings and friction coefficients and head loss data for pipes, fittings, valves, distribution components, orifices etc.;

(6) Total dynamic head;

(7) Pump curves with system operating points; and

(8) Orifice dimensions and spacing.

o. **Electrical Wiring Diagrams.** The plans shall show electrical wiring diagrams specific to the project.

p. **Site Modification Measures.** The plans shall provide plan, profile and cross section views showing lateral and vertical dimensions and details of site modification measures including but not limited to surface drainage structures and curtain drains.

q. **Erosion Control Plans.** The plans shall include an erosion control plan, incorporating measures consistent with guidelines and requirements contained in Chapter 15.36 (grading, erosion and sediment control) of the Alameda County General Ordinance.

r. **Geotechnical Report Recommendations.** The plans must incorporate applicable recommendations contained in associated geotechnical reports regarding the avoidance or mitigation of slope stability concerns, including, as applicable, recommended horizontal setback distance(s) from cut banks, embankments, steep slopes or any identified unstable land masses within the horizontal setback requirements for dispersal systems and tanks.

s. **System Protection Measures.** The plans shall include guidelines and notes for use by the owner and Contractors during:

(1) Installation of the System;

(2) Site development activities. Measures shall be identified to protect existing Systems or proposed System areas during site demolition and development activities such as installation of construction fencing, stockpiling prohibitions, etc.; and/or

(3) Prohibited activities on the dispersal system.

t. **System Installation Notes.** The plans shall include a list of critical control point inspections and requisite testing.

u. **Other Pertinent Information.** The plans shall include other pertinent information and features that could affect System installation and performance.

v. **List of Non-Compliance.** The plans shall include a list of items that do not comply with the requirements of the Ordinance and this Manual and that will require granting of a variance.

41.2 BASIS OF DESIGN REPORT REQUIREMENTS

A. REQUISITE ELEMENTS

1. System design plans shall be accompanied by a design report documenting the basis of the System design. The basis of design report shall include but not be limited to the following:

   a. Legible field data sheets documenting the results of the soil profile, percolation tests, wet weather testing, etc.;

   b. Manufacturer specification sheets, installation instructions and warranty information for System components;

   c. Hydraulic calculation sheets;

   d. Supporting calculations for storm water diversion structures; and

   e. Other pertinent data required to support the System design.

2. Reports documenting geotechnical evaluations, cumulative impact assessments, hydrogeological studies, curtain drain installation or other evaluations must be appended to the basis of design report.

41.3 OM&M MANUAL REQUIREMENTS

A. REQUISITE ELEMENTS

1. An OM&M manual shall be submitted with the System design plans and the basis of design report.

2. The content of the OM&M manual will differ depending on the type and complexity of the System.

3. The OM&M manual shall include requisite maintenance, monitoring and reporting activities for the System, including the following elements as applicable:

   a. Diagrams of the System and list of components;

   b. Manufacturer name and model number for key equipment and proprietary system components;

   c. Explanation of general System function, operational expectations, owner responsibility, etc.;

   d. Specifications of all electrical and mechanical components installed;

   e. Names and telephone numbers of the System Designer, installation Contractor, the Department, component manufacturer and/or the management entity to be contacted in the event of a failure;

f. Half sized copy (11 inch x 17 inch) of the design plans, updated with as-built plans as applicable at the conclusion of System installation (any changes must be approved by the Department);

g. Routine maintenance schedule; and

h. Information on troubleshooting common operational problems that might occur with the specific System. This information should be as detailed and complete as needed to assist the System owner to make accurate decisions about when and how to attempt corrections of operational problems and when to call for professional assistance.

4. The OM&M manual must be supplemented or updated by a System Designer as appropriate including after repairs or modifications to the System.

CHAPTER 42
SYSTEM INSTALLATION & REMOVAL REQUIREMENTS

42.0 CHAPTER OVERVIEW

This chapter provides the requirements for System Designer and Department inspections and approval of System installation, repairs, modifications and tank abandonment.

This chapter is organized in the following sections:

Section 42.1: Department Inspection Requirements

Section 42.2: Tank Destruction/Removal Requirements

Section 42.3: Tank Installation Requirements

Section 42.4: System Installation Requirements

Section 42.5: Final System Installation Approval Requirements

42.1 DEPARTMENT INSPECTION REQUIREMENTS

A. GENERAL

1. Department inspections of System installation and abandonment are required to ensure conformance with the standards in this Manual. The System must be ready for the type of inspection requested or specified in each step in the installation process.

2. If more than one site visit is required to observe a requisite inspection, a fee may be charged for each additional visit.

3. No portion of the System shall be covered without prior inspection and approval by the Department unless specific written authorization has been provided.

4. Written notice must be given to the Department and an inspection requested at least forty-eight (48) hours prior to reaching required System installation or tank destruction/removal destruction inspection points. Additional time may be required to schedule the presence of a Department representative.

4. Notification and the request must include the Applicant's name, assessor's parcel number, street address and installation or repair/modification permit number. Failure to provide sufficient notice may result in delay of System installation or tank removal/destruction and/or duplication of work.

5. The Department may authorize System installation and/or tank destruction/removal to proceed without a Department representative, however, such authorization must be in writing.

42.2 TANK DESTRUCTION/REMOVAL REQUIREMENTS

A. PERMIT REQUIRED

1. Destruction or removal of a tank requires an abandonment permit from the Department.

2. Tanks shall be destroyed or removed under an abandonment permit from the Department within thirty (30) days from the date of one of the following circumstances:

   a. When a System is permanently disconnected from the building or structure served and has not been approved for subsequent use by another building or structure;

   b. When the building sewer has been disconnected from the System and connected to a sanitary sewer that is part of a municipal treatment works; and/or

   c. When the tank has been determined to be failing and cannot be repaired.

3. Abandoned tanks that have not been properly destroyed or removed can pose hazards and create undesirable situations.

   a. Tanks that have collapsed pose safety hazards for people, pets and other animals.

   b. Tanks that are not properly destroyed may fill with water over time and cause an entrapment or drowning hazard.

4. Improperly destroyed tanks may not be able to support the weight of vehicular traffic, building foundations or other structures built on the property.

B. TANK DESTRUCTION/REMOVAL PROCEDURE

1. Tank destruction/removal shall be done under the responsible charge of a Contractor.

2. The procedures for the tank destruction or removal shall be as follows:

   a. The tank shall be pumped by a Septage Pumper and all contents removed and disposed of at a permitted facility;

   b. All equipment (e.g., pumps, filters, vaults, etc.) shall be removed from the tank;

   c. Electrical connections shall be disconnected;

   d. For tank destruction, several holes shall be made in the tank bottom and the tank lid shall be completely broken and placed in the tank pit;

   e. For tank removals, the tank lid and tank shall be completely removed from the excavation;

   f. Hydrated lime or chlorine shall be spread over the tank or excavation area;

   g. After inspection by the Department, the tank or void shall be completely filled with soil, sand, gravel, concrete or other suitable material and then completely covered with soil or material similar to that at the surface in the immediate surrounding;

h. When the tank is to be destroyed or removed and subsequently covered with a foundation or other structure, a Qualified Professional as allowed by their registration and license shall determine the method of destruction and backfill;

i. Tank pieces removed from the excavation shall be taken to a permitted sanitary landfill or appropriate facility for recycling. A copy of the receipt shall be submitted to the Department; and

j. The building or structure wastewater plumbing system shall be permanently capped unless the building or structure is connected to an approved Onsite Wastewater System or a public sewer system. If the building or structure is not connected to an approved Onsite Wastewater System or a public sewer system all plumbing fixtures and all water inlets shall be removed from the structure.

42.3 TANK INSTALLATION REQUIREMENTS

A. PERMIT REQUIRED

1. Tank installation requires an installation permit from the Department.

2. Tank installation may be done in conjunction with replacement of a failed tank, System upgrades or a new System installation.

B. INSTALLATION INSPECTIONS AND FUNCTIONAL TESTING REQUIREMENTS

1. Tank installation inspections and functional testing requirements are dependent on the type and complexity of the tank and associated pump and treatment systems.

2. Tank watertightness tests shall be conducted under the oversight of the System Designer in accordance with the procedure below. A watertight test certification form must be submitted by the System Designer prior to the Department granting final approval of the tank installation.

C. WATERTIGHTNESS TEST PROCEDURE

1. **New Tanks**. Watertight testing for new tanks shall be done in accordance with the following procedures:

   a. Tanks, inlet and outlet connections, risers and riser covers shall be completely watertight.

   b. The watertightness test shall be performed after tank installation is complete including connecting inlet and outlet piping (with caps) and installing risers (if applicable);.

c. Whenever possible, risers shall be installed as one continuous piece.

d. Backfill may or may not be in place depending on whether the backfill is integral to the structural design of the tank.

e. The tank shall be filled with water to two (2) inches above the highest connecting inlet or outlet piping or the tank and riser connection (if installed). If multiple riser connections or concrete grade rings are used, water shall be added to two (2) inches above the highest riser connection.

f. The level of the water in the tank or riser shall be marked and after a predetermined “test time” applicable to the material or assembly, the water level in the tank (or riser) shall be checked and a visual inspection shall be made on the outside of the tank for leakage (if possible).

g. If no visual evidence of leaking and no measurable loss of water is observed the tank shall be considered watertight.

(1) **Fiberglass or Plastic Tanks**. If there is no measurable loss of water in the tank or one (1) hour and no visual signs of leakage, the tank is considered watertight.

(2) **Concrete Tanks.** Concrete tanks shall be left for twenty-four (24) hours after filling the tank to allow for a period of time for natural absorption into the material prior to beginning the watertightness test. After twenty-four (24) hours the tank shall be refilled to two (2) inches above the piping or riser connection. If there is no measurable loss after one (1) hour and no visual signs of leakage, the tank is considered watertight.

2. **Existing Tanks**. If watertightness testing of existing tanks is required due to System modifications or repairs, the tank shall be pumped by a Septage Pumper to remove its contents prior to conducting the test (as described above).

3. **Tank Repairs.** Repairs can be made to tanks failing the watertightness test provided the structural integrity has not been compromised and the tank passes the watertightness test after the repairs have been made. If the bedding under the tank is uneven or has rocks protruding, the tank may crack causing failure of the test.

42.4 SYSTEM INSTALLATION REQUIREMENTS

A. PERMIT REQUIRED

1. System installation requires an installation permit from the Department.

2. **Protection of Utilities.** The Contractor shall be responsible for the prevention of damage to any public or private utilities or services.

3. **Protection of Adjacent Property.** The Contractor shall be responsible for the prevention of damage to adjacent property. No person shall excavate on land sufficiently close to the property line to endanger any adjoining public roadway, right-of-way, private or public property, without first supporting and protecting such property from damage that might result.

4. **Construction Site Control.** The Contractor shall implement seasonally appropriate best management practices for the control of erosion, the control of storm water run-on and run-off, the control of sediment, good site management, and the control of non-storm water discharges from the site.

B. REQUIRED INSTALLATION INSPECTIONS

1. The type and number of System installation inspections and functional testing is dependent on the type and complexity of the System design.

2. System installation inspections are required to be performed by the System Designer.

3. The Department may be at each inspection, or may respond to an inspection request by approving that the System Designer may proceed with the inspection and notify the Department of the results. The Department may combine one or more required inspections into a single field visit if possible.

4. Inspection cannot occur until the Department has confirmed that it will be attending or that the inspection may proceed. The Department may require specific documentation be provided (such as photos) by the System Designer if the Department allows an independent inspection.

5. System installation inspections shall include, but not be limited to the following, as applicable depending on System type:

   a. **Preconstruction Meeting.** At the time of the preconstruction meeting the Contractor shall have the ground in the System area marked with the layout of the System components, including but not limited to tanks, dispersal systems, pipes and transport lines. The footprints of all proposed buildings, structures or utilities which could affect the System and reserve area must also be marked. Minimum horizontal setbacks must be confirmed during the preconstruction meeting.

   b. **Open Excavation and Material Inspection.** At the time of open excavation and material inspection all the following shall be completed:

      (1) All excavations necessary for System installation are complete at designed depth, width and length;

      (2) Bottom of the dispersal trenches/beds are level and all smeared or compacted surfaces have been corrected;

      (3) Clearing and ripping/plowing of the soil basal area of at-grade, mound, raised sand bed filter dispersal systems is complete; and

(4) Drain rock, pea gravel and sand is stockpiled onsite and available for inspection.

c. **System Installation Inspection(s).** At the time of System installation inspections all the following shall be completed:

(1) Dispersal trenches/beds filled with drain rock, pea gravel or sand to the specified level (or gravelless distribution products installed);

(2) Dispersal system piping installed level in trenches/beds with ends capped and trench inspection wells and cleanout sweeps installed;

(3) All other pipe installed with proper gradient and sealing to adjacent components;

(4) Distribution boxes/assemblies and covers installed level on undisturbed soil and at the proper elevation;

(5) All tanks in the treatment train set level in place on undisturbed soil, risers installed and sealing to tank complete;

(6) All components of the pressure distribution system installed; and

(7) Containment structure/liner and/or underdrain system installed, as applicable (i.e., sand filter systems and raised sand bed dispersal systems).

d. **Functional Testing.** At the time of functional testing inspection all test preparation activities must be complete. The Department may elect to be present during all or part of the functional testing.

(1) **Water Tightness Tests.** Watertightness testing of tanks and System components.

(a) System components required to be filled with water to the flow line prior to requesting inspection. All seams or joints shall be left exposed and the System components and tanks shall remain watertight.

(b) Watertightness testing of tanks shall be done in accordance with the test procedures in **Section 42.3.**

(2) **Flow & Hydraulic Squirt Tests.** Flow tests and hydraulic squirt tests (for pressure distribution systems) of the System. All lines and components shall be watertight and distribution to dispersal system according to the approved System design.

(3) **Control Panel Setting**. Functional testing and setting of all System control devices and alarms.

(4) **Treatment System Testing.** Testing of proprietary treatment units in accordance with manufacturer requirements.

(5) **Other System Testing.** Other System testing if required as a permit condition by the Department complete.

e. **Final Inspection**. Final inspection to verify that all construction elements are in conformance with the approved plans and specifications, functional testing is complete, tank venting systems, lids, covers and locking mechanisms are installed, inspection wells and OWTS performance monitoring wells are installed and backfill and erosion control has been completed.

C. PERMITS REVISIONS OR CHANGES

1. If revisions or changes are proposed to the approved System design during construction (e.g., different type of system, new system location, etc.), they must be approved by the Department prior to performing the work.

2. Any changes in the approved system design are subject to the following:

   a. **Minor Revisions.** A minor change in tank location, a change in distribution box location or line location adjustments for contour or obstructions within the approved dispersal system area shall be considered minor revisions. Minor revisions shall be drawn clearly and to-scale on the original approved system design plans and signed and stamped by the System Designer and Contractor as an "as-built" of the system.

   b. **Major revisions.** Changes in the design or location of major system components shall be considered major revisions. A revised system design shall be prepared, showing these major revisions, and shall be re-approved by the Department prior to any work being performed.

3. **Requirements of Submitting As-Built Plans**. If changes have been made to the approved System design, at completion of construction and prior to receiving final approval by the Department, the Contractor and System Designer shall provide to the Department and System owner, a set of as-built drawings of the completed System installation.

4. All revisions are subject to an additional review fee and new permit conditions may be required.

42.5 FINAL SYSTEM INSTALLATION APPROVAL

1. **General**. Final System installation approval is issued by the Department in the form of a letter that indicates the System was installed in compliance with the requirements of this Manual and relevant County codes, and all installation permit conditions of approval have been fulfilled, including issuance of any required operating permit.

2. Prior to the issuance of the final installation approval by the Department the following must occur:

   a. The System Designer and installation Contractor have submitted written certification that the System has been installed in accordance with the approved System design and permit conditions and is operating in conformance with the design specifications.

   b. For Systems with an operating permit a copy of an executed agreement for maintenances services with a Service Provider or System Designer.

   c. The System Designer has provided the owner with an OM&M manual that outlines the operation of the System, including the owner's responsibilities for maintaining the System.

CHAPTER 43
SYSTEM OM&M REQUIREMENTS

43.0 CHAPTER OVERVIEW

This chapter provides an overview of operation, maintenance, monitoring and reporting requirements for Onsite Wastewater Systems.

This chapter is organized in the following sections:

Section 43.1: General System Performance Requirements

Section 43.2: System Inspection and Monitoring Requirements

Section 43.3: System Operating Permit Requirements

Section 43.4: System Reporting Requirements

43.1 GENERAL SYSTEM PERFORMANCE REQUIREMENTS

A. ALL SYSTEMS

1. All Systems shall be operated in compliance with applicable performance requirements particular to the type of system, the facility served and the site conditions.

2. All Systems shall function in such a manner as to**:**

   a. Be sanitary and not create a health hazard or nuisance;

   b. Prevent backup or release of wastewater into the building and structure(s) being served by the System; and

   c. Prevent release of wastewater onto the ground surface or into surface water, or in such a manner that groundwater may be adversely impacted.

3. All Systems and the individual components shall meet the performance requirements for the specific site conditions and applications for which they are approved.

B. STANDARD OWTS

1. All components of the OWTS shall be functional and in proper working order.

2. All septic tanks shall be:

   a. Structurally sound;

   b. Watertight;

   c. Provide clarified effluent;

   d. Have adequate space available for sludge and scum storage;

   e. Operate in such a manner as to not create odors or vector attraction;

f. Be properly vented; and

g. Have a functional baffle(s).

3. Dispersal systems shall:

a. Have adequate dispersal capacity for the structures and/or uses served;

b. Not result in seepage or saturated soil conditions within twelve (12) inches of the ground surface in or adjacent to the dispersal system;

c. Be free from soil erosion or instability; and

d. Not have effluent continuously pond at a level above the invert (bottom) of the perforated distribution pipe in the dispersal trench or serial distribution overflow line, as applicable.

C. ADVANCED OWTS

1. In addition to the requirements in A and B above, advanced OWTS shall also comply with the requirements listed below, as applicable.

2. **Pressure Distribution Systems.** Pressure distribution systems shall comply with the following:

a. Pump tanks, risers and lids shall be structurally sound, watertight and store wastewater effluent in such a manner as to not create odors or vector attraction.

b. Pumps, floats, alarms and associated controls shall be in good condition and operate in accordance with design specifications.

c. Dispersal systems and components shall:

(1) Be operable and in good condition;

(2) Maintain uniform distribution of effluent throughout the dispersal system;

(3) Not result in continuously ponded effluent in the dispersal trench (or bed) to a level above the invert of the distribution pipe; and

(4) In the case of pressure-dosed sand trenches, not result in continuously ponded effluent above the sand interface.

3. **Subsurface Drip Dispersal Systems**. Subsurface drip dispersal systems and components shall:

a. Not result in seepage or saturated soil conditions above the depth of the dripline within or anywhere along the perimeter of the dripfield;

b. Be free from erosion, slumping or any other soil disturbance that threatens to expose or cause damage to drip dispersal tubing or appurtenances;

c. Conform to applicable requirements for pressure distribution in item C.2 above; and

d. Be operated and maintained in accordance with manufacturer recommendations.

4. **Mound, At-Grade and Raised Sand Bed Dispersal Systems.** Mound, at-grade and raised sand filter bed dispersal systems shall:

a. Not result in seepage or saturated soil conditions within twelve (12) inches of the ground surface anywhere along the perimeter toe or edge of the system;

b. Be free from erosion, slumping or damage to the soil cover;

c. Not result in continuously ponded effluent within the gravel distribution bed or in the sand fill (for mounds and raised sand bed systems); and

d. Conform to applicable requirements for pressure distribution in item C.2 above.

5. **Proprietary Treatment Units.** Proprietary treatment units shall comply with the following:

a. The unit and its components shall be structurally sound, free from defects, be watertight, and not create odor or vector attraction nuisance; and

b. The unit shall be operated in accordance with the approved manufacturer and certification/listing organization standards.

6. **Sand Filter Systems.** Sand filter systems shall:

a. Be operated to maintain uniform effluent distribution throughout the sand filter bed;

b. Not result in continuously ponded effluent on the distribution bed infiltrative surface;

c. Be operated and maintained to prevent channeling of flow, erosion of the sand media or other conditions that allow short-circuiting of effluent through the OWTS;

d. Not result in leakage of effluent through the sand filter liner or supporting structure; and

e. Conform to applicable requirements for pressure distribution.

D. OWCU

1. All components of an OWCU shall be functional and in proper working order in compliance with the requirements listed in **Chapter 21** (holding tanks) and **Part 9** (non-discharging toilet units) of this Manual.

43.2 SYSTEM INSPECTION AND MONITORING REQUIREMENTS

A. INSPECTION FREQUENCY REQUIREMENTS

1. Systems shall meet the inspection frequencies and maintenance checks as specified in **Table 43-1**, or as otherwise required by the operating permit.

   a. Nothing contained in this provision shall prevent the Department from requiring more frequent inspections and maintenance checks for Systems with operating permits as deemed necessary to ensure proper System performance or to protect water quality or public health.

   b. Complexity and frequency of inspection will be related to the complexity and maintenance requirements of the System components, recommendations of the manufacturer and industry standards.

2. System components shall be inspected and monitored at a minimum in accordance with the criteria listed in **Table 43-2** and **Table 43-3**, as applicable. The monitoring requirements will vary depending on the specific System.

B. COMPLIANCE MONITORING REQUIREMENTS

1. Supplemental treatment systems shall be inspected and monitored for performance at a minimum annually. Specific monitoring requirements will be contained in each operating permit however, the following guidelines will generally be followed:

   a. **Individual Residential OWTS.** For individual residential OWTS semiannual sampling and analysis for BOD and TSS of effluent for the first two years of operation is required. Thereafter sampling frequency may be reduced or eliminated based on satisfactory OWTS performance and reporting. The sampling is recognized to be a spot check of OWTS operation and not to be interpreted for purposes of compliance of thirty (30) day average performance standards.

   b. **Multi-Unit Residential and Non-Residential OWTS.** For multi-unit residential and non-residential small OWTS (less than one thousand five hundred [1,500)] gallons per day) semiannual sampling and analysis for BOD and TSS of wastewater effluent for the first two years of operation is required. Thereafter sampling frequency may be reduced to annual based on satisfactory OWTS performance and reporting. The sampling is recognized to be a spot check of OWTS operation and not to be interpreted for purposes of compliance of thirty (30) day average performance standards.

c. **High-Strength and High-Flow OWTS.** For high-strength wastewater and high-flow OWTS, sampling parameters will include at least sampling and analysis for BOD and TSS of wastewater effluent and may also include nitrogen, FOG and other constituents as applicable. Sampling frequency may be increased and will be dependent on the size, location and features of the OWTS. Sampling may include analysis used for both spot check as well as compliance with performance standards.

d. **OWTS Near Public Water Supplies.** For OWTS within the setbacks for a public water supply intake or well, testing of wastewater treated by disinfection units for total fecal coliform shall be required.

2. **Effluent Quality**. Effluent produced by OWTS requiring supplemental treatment systems shall comply with the maximum constituent limitations provided in **Table 43-4.**

Table 43-4
Effluent Quality Maximum Constituent Concentrations

Constituent	All Systems	Where Pathogen Removal Required
BOD (mg/L)	30	30
TSS (mg/L)	30	30
Fecal Coliform (MPN/100 ml)	N/A	200

a. When compliance monitoring results exceed the operating permit system performance limits the following will typically be required.

(1) Repeat sampling and analysis until compliance is demonstrated; and

(2) If needed, adjustments to the OWTS operations to bring wastewater quality into conformance with performance limits.

C. GROUNDWATER QUALITY MONITORING REQUIREMENTS

1. Groundwater monitoring wells must be sampled for nitrates at least annually or as frequently as determined by the Department.

2. Sampling may be required for other contaminants at the discretion of the Department.

3. An OWTS is considered to be failing or having an adverse effect on groundwater quality when monitoring well nitrate levels are above ten (10) milligrams per liter (mg/l) of nitrate as nitrogen.

43.3 SYSTEM OPERATING PERMIT REQUIREMENTS

A. MINIMUM CRITERIA

1. All advanced OWTS and all OWCU require an annual operating permit or qualifying public agency permit.

2. Maintenance and performance monitoring shall be performed by a Service Provider or System Designer.

3. Permit Exemptions.

   a. Standard OWTS do not require an operating permit unless required as a condition of approval for corrective action(s) on an existing OWTS.

   b. An operating permit is not required for: (1) temporary use (less than seven [7] days) of portable toilets, and (2) use in temporary agricultural field activities.

4. Prior to issuance of a final approval of the system installation the property owner shall obtain an operating permit from the Department.

   a. The operating permit shall be renewed annually and any required fees shall be paid. The owner of the property shall keep the operating permit valid for the life of the System.

   b. The operating permit renewal frequency for advanced OWTS may be extended to a period of three (3) years contingent upon compliance with all of the following conditions:

      (1) The System has been functioning properly for two (2) consecutive years in compliance with the approved design plans and the operation, monitoring and maintenance (OM&M) manual; and

      (2) The owner is in compliance with the terms of the operating permit including but not limited to the annual reporting requirements to the Department.

5. The property owner shall notify the Department, in writing, of any change in property ownership within ten (10) days of the change and provide the name and contact information for the new owner.

   a. When the property changes ownership, the new owner must apply to the Department for a new operating permit on or before the anniversary of the operating permit issuance date.

b. The new owner will not be required to pay either an application or permit fee for the transfer of ownership, however, a nominal administrative fee may be charged for transferring the operating permit. The new owner will be responsible for any annual operating permit renewal fees.

c. The Department strongly encourages the new property owner to submit an application as soon as possible and not wait until the renewal date, in order for the Department to have all the information required in the application.

6. All Systems issued an operating permit shall be operated, maintained, and monitored pursuant to the requirements of the standards/conditions found in the Ordinance and this Manual and the issued operating permit.

7. A monitoring program is required and shall be included in the OM&M manual and as a condition of the operating permit. The monitoring program may be amended at the time of a permit renewal.

8. The permit holder is responsible for contracting with a Service Provider or System Designer for monitoring to ensure that the System is functioning satisfactorily to protect water quality and public health and safety.

B. NON-COMPLIANCE WITH OPERATING PERMIT REQUIREMENTS

1. Non-compliance with System operating permit requirements may result in enforcement action and administrative fines and penalties.

2. Actions that may be taken by the Department include:

a. Issuance of notice of non-compliance to the System owner with:

(1) Request to participate in an informal meeting with the Department to review the lack of compliance and corrective actions;

(2) Requirements for the owner to conduct additional testing, inspections, or other monitoring until the Onsite Wastewater System is compliant; and/or

(3) Restriction or prohibition of the use of the Onsite Wastewater System.

43.4 SYSTEM REPORTING REQUIREMENTS

A. SYSTEMS WITHOUT OPERATING PERMITS

1. For standard OWTS that do not require an operating permit, the property owner shall submit a homeowner's questionnaire to the Department once every five (5) years with information on the System to assist the County in complying with State reporting requirements.

a. The Department will send at least one notice to the property owner requesting submittal of the homeowner's questionnaire.

b. Failure to submit the questionnaire to the Department may result in a requirement to provide the information by the Regional Water Board.

B. SYSTEMS WITH OPERATING PERMITS

1. For Systems with operating permits, the property owner must submit an annual report prepared by the Service Provider or System Designer to the Department, or as otherwise required by the operating permit. Reports will typically include the following:

   a. Actual wastewater flows for operating permit period, or an estimate based on water usage.

   b. Inspection findings of the System components submitted on a form provided by the Department, or similar documentation.

   c. Information requested by the State.

      (1) Failure to submit information required by the State may result in fines or penalties.

      (2) Prior to any fine or penalty the Department will send at least one notice to the property owner and direction to provide the required information.

Table 43-1
OWTS Required Inspection Frequency

Inspection Interval	Residential Standard Gravity System	Pressure Dosed	Non-Residential Standard Gravity System or Pressure Dosed	Steep Slope, Mound or Sand Filter	Proprietary Supplemental Treatment Unit	Disinfection Units
First 6 weeks						PL or SP (required)
First 3 Months		PL or PU or SP or Installer (recommended)	SP (recommended)	SP (required)	PL or SP (required)	
Monthly						PL or SP (if no telemetry) (required)
Annually			SP (recommended)	SP (required)		
As required by the manufacturer or NSF, but not less than once per year		PL or PU or SP or Installer (recommended)			PL or SP (required)	PL or SP (with telemetry) (required)
Every 3-7 years	PU or SP (recommended)					

Notes:

(1) Supplemental Treatment Systems, other than single pass Sand Filters, used for Treatment prior to disinfection must be monitored monthly for the first year of operation and longer if necessary to assure Treatment requirements are reliably met

PL= Proprietary Device Licensee (also must be an approved Service Provider)

PU= Septage Pumper

SP= Service Provider

Table 43-2
System Inspection Requirements

Element	Description of Work
Site Inspection	Inspect site to assess current site development (buildings, structures, decks, fences, ponds, pools, spas, ground-mounted solar panels, driveways, retaining walls, animal pens, etc.) against conditions on approved System plans.
	Inspect site topography in the vicinity of System components including cut/fill areas, steep slopes, and graded areas for signs of instability or effluent seepage.
	Verify horizontal setbacks to site development structures for compliance with System plans and the requirments of this Manual.
	Inpect the site in the vicinity of the System components for cave-in or exposed components and wastewater odors.
Wastewater Plumbing Inspection	Inspect site to ensure that all graywater and blackwater plumbing is routed to the System or for graywater to an permitted graywater systems.
	Inspect plumbing fixtures for leakage.
	Verify if garbage disposal is routed to the System.
	Verify if a water treatment appliance backflushes to the System.
Drainage Inspection	Inspect site in vicinity of System components for drainage issues including location and integrity of stormwater diversion structures (swales, inlets, dissipation devices, etc), sump pumps, foundation drains, roof runoff and other drainage related features that could impact or be impacted by the System.
Dispersal System Inspection	Inspect dispersal system for compliance with approved System plans. Inspect surface conditions in dispersal system area (including downslope and surrounding areas) for odors, effluent leakage, wet areas, soil erosion, burnt out grass or ground staining, gopher holes, abnormal vegetation, trees, landscaping, irrigation, signs of heavy objects or vehicular traffic (impressions or tracks), etc.
Tanks and Risers Inspection	Inspect area around tank(s) for odors, effluent leakage, wet areas, soil erosion, drainage/infiltration, abnormal vegetation, signs of vehicular traffic, landscaping, irrigation, etc.
	Inspect conditon of risers for integrity, accessibiltiy, secure covers, etc. and compliance with approved System plans.
	Inspect tank(s) for compliance with approved System plans. Inspect conditon of tanks, baffles, inlet and outlet tees, effluent filters etc. for integrity, signs of water intrusion, material/component type and tanks size.
Supplemental Treatment System Inspection	Inspect proprietary treatment unit components for compliance with approved plans and manufacturer's specifications.
	Inspect sand filter systems for compliance with approved System plans. Inspect surface conditions in sand filter system area (including downslope and surrounding areas) for effluent leakage, wet areas, soil erosion, gopher holes, abnormal vegetation, trees, landscaping, irrigation, signs of vehicular traffic, etc.
Pumps, Control Panels, Telemetry Systems and Alarms	Inspect pumps, float switches, control panels, alarms, electrical wiring and other appurtenances for compliance with the approved System Plans.
Other System Components Inspections	Inspect pipes, valves, headworks, valve boxes, distribution boxes, OWTS performance monitoring wells, inspection wells, groundwater monitoring wells, etc. for integrity, functionality and compliance with approved System plans.

Table 43-3
System Maintenance & Monitoring Requirements

Element	Description of Work
Routine Maintenance Activities	Perform all maintenance work as recommended by System Designer or equipment Manufacturer.
	Replace all components as necessary with equivalent materials and/or equipment in accordance with the requirements of this Manual.
	Purge and balance laterals.
	Clean and check operation of valves to ensure functionality and repair and/or replace as necessary.
	Perform all maintenance work on pumps and siphons, float switches, hose and valve assemblies, and other pump related components.
	Check functionality of alarms (audio and visual), flow meters, and control boxes and replace and/or repair as necessary. Record flow, dose counter, and/or elapsed time meter readings.
	Remove and clean and/or replace filters.
	Measure liquid, scum and sludge levels in tanks and have tanks pumped by a Septage Pumper as required. In a properly functioning OWTS, the level in the septic tank should be even with the invert of the outlet pipe. If the liquid level is below the outlet pipe, the tank may be leaking. If the liquid is above the pipe, the dispersal field may either be flooded or the line to the field obstructed or possibly set with an improper gradient.
	Uncover and/or replace damaged valve boxes and tank riser covers.
	Repair irrigation and storm water diversion structure problems in the vicinity of System components creating storm water run-on or run-off problems, infiltration, erosion or other deleterious effects to System components.
	Control rodents causing damage to System components.
	Maintain fill area landscape vegetation and erosion control measures.
Repairs and Corrective Action	Report findings to the Department and perform System repairs or corrective action work after obtaining requisite approvals and/or permits from the Department.
	In the case of emergency or System failure conditions, immediately perform corrective actions necessary to abate human health, water quality, or other environmental impacts and immediately report to the Department.
Water Monitoring & Sampling	Measure and record water levels in OWTS performance monitoring wells and inspection wells located in and around dispersal system and sand filter areas.
	Obtain and analyze water samples from OWTS performance monitoring wells and inspection wells, as applicable, per operating permit requirements.
	Measure and record water levels in groundwater monitoring wells and obtain and analyze water samples per operating permit requirements.
	Obtain water samples from surfacing liquid in the vicinity of System components and analyze for bacteria indicator parameters (total coliform, fecal coliform and e. coli).

PART 11

EXISTING SYSTEM REQUIREMENTS

CHAPTER	TITLE
CHAPTER 44	EXISTING SYSTEM PERFORMANCE EVALUATION REQUIREMENTS
CHAPTER 45	EXISTING SYSTEM CORRECTIVE ACTION REQUIREMENTS

CHAPTER 44
EXISTING SYSTEMS PERFORMANCE EVALUATION REQUIREMENTS

44.0 CHAPTER OVERVIEW

This chapter provides procedures and requirements for conducting performance evaluations of existing Onsite Wastewater Systems and is organized in the following sections:

Section 44.1: Performance Evaluation Overview

Section 44.2: Level of Evaluation Required

Section 44.3: Records Search Guidelines

Section 44.4: Site & System Inspection Requirements

Section 44.5: Hydraulic Load Test Guidelines

Section 44.6: Pump Test Guidelines

Section 44.7: System Evaluation Criteria

Section 44.8: Reporting with Findings and Recommendations

44.1 PERFORMANCE EVALUATION OVERVIEW

A. PURPOSE

1. The purpose of a performance evaluation is to determine, on an individual basis, whether an existing Onsite Wastewater System is safe and functional, is in compliance with permitted conditions, can be repaired/modified to meet the minimum performance standards in this Manual and/or requires replacement.

2. Nothing contained in this Manual shall be deemed a requirement to alter, change, reconstruct, remove or demolish an existing Onsite Wastewater System provided the system meets all of the following criteria:

   a. Was installed in accordance with any applicable law in effect at that time;

   b. Continues to comply with previously imposed permitting conditions; and

   c. Is properly functioning and appropriately sized.

44.2 LEVEL OF EVALUATION REQUIRED

A. WHEN REQUIRED

1. A performance evaluation of an existing Onsite Wastewater System may be required in connection with:

   a. Corrective action of a System; or

b. Site development and/or building permit applications.

2. A performance evaluation may also be useful and is recommended for other circumstances such as System inspections in connection with property transfers for lending institutions, etc.

B. LEVEL OF EVALUATION REQUIRED

1. Performance evaluation tasks and reporting requirements are dependent on the purpose of the performance evaluation.

   a. **Site Development and Building Projects.** Performance evaluations conducted to support proposed site development and building projects must evaluate the compatibility of the project with existing and/or proposed Onsite Wastewater Systems for two main purposes:

      (1) **Design and Capacity of System.** Evaluation of the capacity of existing and/or proposed Systems to handle the wastewater loading associated with the project including but not limited to the sizing and design of the System to treat the wastewater strength and flow from existing and proposed site usage; and/or

      (2) **Physical Impacts to the System.** Evaluation of potential physical impacts to existing Systems including areas reserved for dispersal system replacement (reserve areas) and compliance with requisite setbacks from proposed site development and building projects to System components.

   b. **Corrective Actions on Existing Systems.** Performance evaluations conducted to evaluate an existing System requiring corrective action and support recommended repairs, modifications or replacement of the System. Evaluations to support repairs and modifications to an existing System must be conducted in accordance with the site evaluation activities presented in **Part 2** of this Manual and the corrective action criteria presented in **Chapter 45** of this Manual, as applicable.

2. Performance evaluation tasks and reporting requirements are also dependent on whether System design documents/permits are on file with the Department.

   a. **Documented Systems.** Performance evaluations of existing Systems with design documents/permits on file with the Department must be conducted to evaluate the System and current site conditions for compliance with the design documents/permits. If discrepancies are found between the System design documents/permits and site conditions, additional steps for the evaluating the discrepancies will be required in accordance with the procedures for evaluating undocumented Systems below.

b. **Undocumented Systems.** Performance evaluations of undocumented Systems must be conducted to evaluate the siting and construction of the System. These additional tasks may include but not be limited to:

(1) Selective exploration including probing with a metal rod, potholing or excavation, camera or tracer line inspections or other similar methods to locate subsurface components; and/or

(2) A site evaluation in accordance with the criteria presented in **Part 2** of this Manual to determine at a minimum:

(a) Vertical separation distance to groundwater from the bottom of the dispersal system;

(b) Effective soil depth;

(c) Horizontal setback distances from System components to site features; and

(d) Replacement area for future dispersal systems replacement.

C. PRACTITIONER QUALIFICATIONS

1. Performance evaluations of existing Systems may be conducted by a Contractor or a System Designer with the exception of the following activities which must only be conducted by a System Designer:

a. Site evaluation tasks as defined in **Part 2** of this Manual to evaluate the siting of existing dispersal system(s) and reserve areas; and

b. Evaluation of the sizing or design of an existing System to determine its capacity to treat wastewater from existing or proposed site usage.

44.3 RECORDS SEARCH GUIDELINES

A. GENERAL

1. Prior to conducting a performance evaluation, the owner, Contractor or System Designer should compile and review all available background information pertaining to the property and structures connected to Onsite Wastewater Systems.

2. Information that should be reviewed includes records of the System design and permit information, System as-built plans, prior inspection results or reports, site plans, site development and building permit plans, etc.

3. Databases that may have pertinent information include but are not limited to the owner records, Department files, building department files and the County assessor's office records. The level of database search is dependent on the records available as listed below:

   a. **System Permits Located.** If System permits are located, then proceed with site and System inspection (see **Section 44.4**); else proceed to **Item 3.b** below.

   b. **System Permits Not Located.** If System permits are not located, then search for building permits for the structure(s) connected to the System. If permits for the structure(s) are found then proceed with site and System inspection (see **Section 44.4**); else proceed to **Item 3.c** below.

   c. **System Permits and Structure Permits Not Located.** If permits for the System and for the structure(s) connected to the System are not located, then search the County assessor's office database for records of the structure. If records for the structure(s) are found then proceed with site and System inspection (see **Section 44.4**); else procced to **Item 3.d** below.

   d. **System Permits, Structure Permits, and Assessor Records Not Located.** If permits for the System and for the structure(s) connected to the System are not located, and the structure(s) are not recorded with the County's assessor's office then contact the local building department for requirements regarding the buildings or structure(s) before proceeding with the site and System inspection.

44.4 SITE & SYSTEM INSPECTION REQUIREMENTS

A. GENERAL

1. After a records search is completed, a site inspection must be performed by a Contractor or System Designer.

2. Depending on the purpose of the performance evaluation and whether there are design document/permits on file with the Department a System inspection and/or System design evaluation may also be required.

3. If imminent health hazards and/or unsafe conditions are observed during site and System inspection activities, the Department must be notified within twenty-four (24) hours and immediate emergency repair work completed to abate the risk, provided the owner immediately thereafter applies for a repair/modification permit, if applicable.

B. MINIMUM REQUIREMENTS

1. A site and System inspection shall be performed by a Contractor or System Designer in accordance with the requirements of this chapter and the inspection requirements presented in **Chapter 43.** The performance evaluation inspections shall include but not be limited to:

a. Locating the System components including tanks, supplemental treatment systems, the extents of the primary and secondary/replacement dispersal system area(s) and location of associated components (distribution boxes, valves, inspection ports, OWTS monitoring wells, etc.). If the location of the System components are undocumented or cannot be identified from design document/permits then selective exploration must be conducted as part of a System inspection;

b. Verifying field conditions and reconciling discrepancies between records of the System and buildings, structures and property features (if any);

c. Verifying that the System is adequately sized and functioning properly and is in compliance with approved design documents/permits (if available) or other minimum standards as applicable;

d. Identifying conditions that may suggest an existing or impending failure; and

e. Identifying and conducting System testing to verify the functionality and performance of the System including but not limited to hydraulic load testing, pump testing and other testing required by an operating permit, if applicable.

44.5 HYDRAULIC LOAD TEST GUIDELINES

A. OVERVIEW

1. A subsurface dispersal system may be undersized for the buildings or structures it serves or may lose hydraulic capacity due to excessive flows or waste strengths, crushed pipes, root intrusion or blockages or other causes.

2. A hydraulic load test may be used to assess the hydraulic capacity and effectiveness of a gravity dispersal system to absorb and treat wastewater.

3. The results of the test must be interpreted within the context of the entire site, OWTS inspection and current site use. A hydraulic load test may give unreliable results under the following conditions:

   a. When the structure is unoccupied during the last twelve (12) months, or for a continuous period of one month or more; and/or

   b. When there is evidence that the OWTS has had a procedure (usually evidenced by chemical scouring or a bleached-out appearance on concrete components) indicating an attempt to fix a major OWTS failure.

4. If a system is showing signs of failure, certain hydraulic load test procedures may actually aggravate the problem and should not be performed.

B. HYDRAULIC LOAD TESTING PROCEDURE

1. The hydraulic load test should be designed to approximate the peak one (1) hour flow. For a residential structure, the peak one-hour flow shall be estimated to reflect the number of bedrooms. For a typical residential structure the test should be conducted with approximately one hundred and fifty (150) gallons of water over a twenty (20) to thirty (30) minute period. Building occupants should refrain from using plumbing fixtures during the test.

2. Prior to starting the test the following shall be determined:

   a. Depth of both the scum and sludge layers. If the OWTS appears to be in good working order, the flow test volume may be added via either the inlet (using water from plumbing fixtures) or the outlet of the septic tank. If inspection of the septic tank indicates backflow from the dispersal system area, evidence of solids carryover, or other situations of concern, the test should be conducted by running water through the tank outlet. The test <u>should not be conducted</u> at the inlet by using water from plumbing fixtures.

   b. Flow rate from the hose (e.g., with 5-gallon bucket and stop watch) to properly gauge the amount of surcharge water added to the tank. Alternatively, a portable water meter can be installed between the house faucet and the hose to directly measure the water volume added.

   c. Location (measurement) of the static water line in the septic tank (at the outlet side) for use as an initial reference point.

3. The hydraulic load test should then proceed in accordance with the following procedure:

   a. Surcharge the tank with water to start the hydraulic load test. If a garden hose is used to discharge into the outlet side of the tank, the hose outlet should remain at least twelve (12) inches above the water level in the tank to prevent cross-contamination.

   b. During surcharging, observe rises in the liquid level at the outlet pipe and measure the final level at the end of filling. Typically, the liquid level will rise one (1) or two (2) inches, at which point the liquid level should stabilize for the reminder of filling, and then return to the initial level in a matter of minutes after filling is stopped.

   c. After the filling cycle is finished, observe the water level decline in the septic tank until the initial level is reached and the time to achieve this is recorded. If the initial level is not attained within thirty (30) minutes, the test should be terminated and the final water level noted. The time it takes to add the flow test volume should be recorded, or alternatively, if water begins to back up (i.e., rises more than two inches above the outlet bottom), the time it took for this to occur.

4. At the completion of the hydraulic load test, the dispersal system area and downslope areas should be checked again for indications of surfacing wastewater, wetness or odors. If any of these conditions exist as a result of the hydraulic load test, this would likely be considered evidence of dispersal system failure.

5. If the field observations of wetness are not obviously the result of the hydraulic load test, further investigation may be needed by a System Designer to determine if the dispersal system is failing and the cause of the failure.

6. Although not always conclusive, tracer dye added to the tank may be used to assist in investigating the possible contribution of wastewater where surface wetness/seepage is suspected or observed.

C. OWTS RATING BASED ON HYDRAULIC LOAD TEST

1. A hydraulic performance rating shall be assigned to the OWTS based upon the water level readings during the hydraulic load test in accordance with the guidelines in the **Table 44-1** below.

Table 44-1
Hydraulic Load Test Rating Guidelines

Rating	Septic Tank Response To Hydraulic Loading
Excellent	No noticeable rise in water level during filling.
Satisfactory	Maximum water level rise of about two (2) inches, with decline to initial level within about fifteen (15) minutes after end of filling.
Marginal	Maximum water level rise of about three (3) inches, with decline to initial level within about thirty (30) minutes after end of filling.
Poor	Water level rise of more than three (3) inches, with decline not reaching initial level within 30 minutes after end of filling.
Failed	Water level rise of more than three (3) inches, with no noticeable decline within thirty (30) minutes after end of filling.

2. If an OWTS receives a marginal rating, a more detailed examination by a System Designer will be required to determine the cause of the sluggishness.

3. The hydraulic performance ratings in **Table 44-1** are guidelines only; special circumstances may be cause for modifying the evaluation and rating of a particular system. An OWTS receiving a "failed" rating will likely require corrective action and/or additional investigation by a System Designer to determine the underlying cause(s).

44.6 PUMP SYSTEM TEST GUIDELINES

A. OVERVIEW

1. A pump test is conducted to assess the functionality of a pump system, integrity of the pressure piping system and pressure-dosing of the dispersal field.

B. PROCEDURE

1. Prior to starting the test the pump access cover and basin lid should be removed and signs of scum or sludge buildup, indications of previous pump failure (such as scum line above the high water alarm switch) or evidence of soil or roots entering the basin observed.

2. The float controls should be inspected to see that they have free movement and the electrical junction box (if located in the basin or access riser) checked for signs of corrosion.

3. If the water level in the basin is normal (i.e., between the high and low water controls) the testing of the pump system should proceed according to the following steps:

   a. Add sufficient water to the basin to activate the pump "ON" control, and observe the performance of the system over at least one pumping cycle. The total amount of water added should be about one hundred and fifty (150) gallons to approximate the same hydraulic loading of the dispersal field as for gravity dispersal systems.

   b. The water may be added to the outlet side of the septic tank or directly to the pump basin. If filling the basin directly, care should be taken to minimize turbulence and disturbance of sediment or sludge that may have collected in the basin. This can be best accomplished by directing the stream of water against the interior side of the chamber rather than directly toward the bottom of the pump chamber.

   c. Observe the filling of the basin and note and measure the point at which the pump is activated. Immediately stop the filling operation and observe the pumping cycle until the pump shuts off.

   d. While the pump is discharging, examine the piping system (where exposed) for any leaks. Even small leaks could be a forewarning of possible breaks in the pressure line at some point in the future; and these should be corrected as soon as possible.

   e. Note and measure the depth at which the pump shuts off and calculate the volume of water between the "ON" and “OFF” measurements. Compare this dose with the design dose volume specified for the System. If the dose is too high or too low, float controls should be adjusted to correct the dose.

   f. The pumping cycle (from "ON" to "OFF') level should be timed and the pump discharge rate determined (in gpm).

g. Test the pump system audio and visual alarm to confirm that it can be heard at the house if mounted at the pump tank.

4. Typically, if the pump is sized and operating properly, pump operation lasts about one (1) to five (5) minutes per dose. Pump cycles lasting longer than this may indicate a flooded dispersal field and/or pump or piping deficiencies. If this is observed, it should be noted and further investigation of the pump and dispersal field should be conducted by a System Designer to determine the specific cause. The observed pump rate should be checked against the design requirement for the System and any discrepancy noted.

5. If during filling of the pump basin, the pump does not activate when the water reaches the high liquid level control (i.e., "ON" float), discontinue the pump test. This indicates a pump failure, defective float switch or wiring problems and may require the repair service of a Contractor. The pump system failure should be noted, communicated immediately to the owner and followed up with prompt corrective action.

44.7 SYSTEM EVALUATION CRITERIA

A. MINIMUM PERFORMANCE CRITERIA

1. **Evaluation of System Functionality.** The site and System inspection and functional testing results must document that the System meets the following minimum criteria:

   a. There is no surfacing effluent at any time.

   b. There is always positive flow to the dispersal system from the septic tank with no backup to the tank or building/structure plumbing.

   c. Tanks are watertight, structurally sound and serviceable.

   d. There is no indication that the existing System is adversely affecting surface water or groundwater.

2. **Additional Testing Required by Operating Permit (if applicable).** Additional criteria must also be met for Systems with operating permits. Compliance with these conditions must be evaluated in the performance evaluation or documented in an annual OM&M report.

3. **Evaluation of System Design and Capacity.** An evaluation of the System by a System Designer may also be required to verify that the System is:

   a. Adequately sized and designed to treat the wastewater flow and strength from existing and/or proposed uses. System evaluation may require collection of information on the wastewater influent to the System including but not limited to:

      (1) Flow volume and wastewater type from each structure connected to the System based on the number of bedrooms for residential structures, flow

and wastewater characteristics from multi-unit residential and non-residential facilities; water use/wastewater flow rates for the property, etc.; and

(2) Flow volumes of graywater diverted from the wastewater stream to permitted systems.

b. In compliance with approved design documents/permits (if available) or other minimum standards as applicable.

(1) **Systems with approved System design documents/permits**: The System must comply with the approved System design documents/permits on file with the Department; or

(2) **Systems where approved System design documents/permits could not be located but building permits for structures are available.** The Department may consider use of the minimum standards contained in the building or California Plumbing Code in effect at the time the structure(s) were permitted; or

(3) **Systems where approved System design plans or building permits for the structure could not be located, but the structure is recorded with the Assessor's Office**. The Department may consider use of the minimum standards contained in the building or California Plumbing Code in effect at the time the structure(s) was first recorded in the County Assessor's database. If the date of the recording of the structure predates 1946 (the date when the County began issuing building permits) then the System may be evaluated against criteria established in the 1952 Plumbing Code adopted by Alameda County Board of Supervisors through Ordinance 644.

44.8 REPORTING WITH FINDINGS AND RECOMMENDATIONS

A. REPORT REQUIREMENTS

1. A performance evaluation report documenting the findings of the performance evaluation and recommendations must be prepared and filed with Department. The performance evaluation report must contain the following as applicable:

a. Record search results;

b. Site and System inspection findings;

c. System functional testing results;

d. Site map and System as-built plans; and/or

e. System evaluation findings and recommendations.

2. Performance evaluations conducted to support building or development permits must also submit the following:

   a. A statement certifying that the proposed project will not impact existing Systems on the site; or

   b. Recommendations for additional site assessment and/or corrective action if necessary for project clearance by the Department for site development or building permits.

3. If the System requires corrective action or replacement the results of the performance evaluation may be incorporated into the design documents for repairs/modifications to the existing System or a replacement System.

B. SITE MAPS AND SYSTEM AS-BUILT PLANS

1. A site map must be prepared for undocumented Systems or permitted Systems where site conditions were observed that differ from the approved System design documents/permits but do not negatively impact or encroach on the approved System or dispersal system replacement area(s).

2. The site map must be a **s**caled drawing utilizing site development, building plans, topographic maps, and/or aerial photographs as a base map if available and must include the following:

   a. Location of System components;

   b. Extent of the primary and secondary/replacement dispersal area(s) and subsurface dispersal system details, as applicable;

   c. Setbacks to site structures and development features, wells/springs, surface water bodies, and other pertinent features in the vicinity of the System and replacement area(s); and

   d. Any other conditions which may affect the functionality of the System.

CHAPTER 45
EXISTING SYSTEMS CORRECTIVE ACTION REQUIREMENTS

45.0 CHAPTER OVERVIEW

This chapter provides the requirements for existing Onsite Wastewater Systems that require corrective action and is organized in the following sections:

45.1 SYSTEMS REQUIRING CORRECTIVE ACTION

A. REQUIREMENTS

1. An existing Onsite Wastewater System that requires corrective action is defined by the State OWTS Policy as a System that exhibits any of the following conditions:

   a. **Dispersal System Failure.** Any System that has pooling wastewater, discharges wastewater to the surface or has wastewater backed up into plumbing fixtures, because its dispersal system is no longer adequately percolating the wastewater is deemed to be failing and is no longer meeting its primary purpose to protect public health.

   b. **Tank Failure.** Any tank failure, such as a baffle failure, tank structural integrity failure such that either wastewater is exfiltrating or groundwater is infiltrating or other failure such that the tank is not functioning as designed is deemed to be failing and is no longer meeting its primary purpose to protect public health.

   c. **Component Failure.** Any System that has a failure of one of its components other than a dispersal system or tank failure such as a distribution box or broken piping connection is deemed to be failing and no longer meeting its primary purpose to protect public health.

   d. **Groundwater or Surface Water Degradation.** Any System 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.

45.2 CORRECTIVE ACTION REQUIREMENTS

A. POTENTIAL REMEDIES

1. Corrective action may include repair, modification, replacement or abandonment of the System or components of the System.

2. Potential remedies may include but not be limited to the following:

a. **Source Control Measures:** Potential source control measures include but are not limited to:

(1) Modification of water use habits;

(2) Installation of low, ultra-low flow plumbing fixtures;

(3) Repair or replacement of leaking plumbing lines, fittings, etc;

(4) Installation of flow equalization tanks in the treatment train;

(5) Installation of pump systems to time-dose the dispersal system;

(6) Installation of graywater systems;

(7) Installation of waterless toilets; and/or

(8) Maintenance pumping of tanks.

b. **Site Modifications:** Potential site modifications include but are not limited to:

(1) Removal of trees, conflicting landscaping, irrigation, or structures;

(2) Installation of surface water drainage diversion structures; and/or

(3) Installation of curtain drains or other measures to intercept/divert groundwater from the dispersal system.

c. **Tank Repairs/Modifications/Replacement.** Potential improvements to tanks include but are not limited to:

(1) Installation of effluent filters;

(2) Repair or replacement of risers and lids;

(3) Repair or replacement of inlet and outlet tees and baffles;

(4) Installation of waterproofing materials; and/or

(5) Replacement of tanks with watertight tanks.

d. **Treatment Improvements:** Potential improvements to the treatment train include but are not limited to:

(1) Installation of supplemental treatment; and/or

(2) Installation of sand filtration dispersal systems to provide additional wastewater polishing prior to dispersal to the ground (e.g., mound dispersal systems; raised sand bed filter systems, pressure-dosed sand trenches).

e. **Dispersal System Improvements:** Potential improvements to existing dispersal systems include but are not limited to:

(1) Increasing the capacity of the dispersal system by installing additional dispersal trenches or beds;

(2) Utilizing reserve areas or other suitable area (e.g., installation of additional dispersal trenches, etc.);

(3) Reconstructing or modifying existing trench systems by:

(a) Converting gravity trench dispersal systems to pressure distribution systems;

(b) Replacing drain rock with new rock;

(c) Replacing drain rock with gravelless distribution products to allow dispersal area sizing reductions;

(d) Using cover fill with shallow in-ground trenches to provides requisite soil cover depth; and/or

(e) Replacing the existing dispersal system with a new dispersal system.

f. **Discharge Elimination**. Installation of holding tanks and regular pumping by a Septage Pumper or abandonment of the System and connection to the sewer.

B. MAXIMUM EXTENT PRACTICABLE STANDARDS ON CONSTRAINED SITES

1. On constrained sites where site specific conditions including but not limited to small parcel size, site development, poor soil characteristics, steep slopes, close proximity to surface water bodies and shallow groundwater table conditions limit treatment and dispersal System options, corrective action measures must be made to the maximum extent practicable with the requirements of this Manual.

2. Reduced horizontal setbacks from System components to sensitive receptors and vertical separation to groundwater distances may be allowed subject to Department approval, incorporation of supplemental treatment and/or advanced dispersal systems and compliance with the following criteria:

a. The setback from System components to property lines may be reduced to less than ten (10) feet provided the location of the property line is identified by a Qualified Professional as allowed by their license or registration and impacts to the adjacent property have been evaluated and appropriate mitigation measures proposed.

b. All existing tank deficiencies must be repaired so the tanks are watertight, structurally sound and in good operating condition.

c. The System must incorporate advanced dispersal systems and/or supplemental treatment unless sufficient evidence is provided to support that there is no impact or significant threat to groundwater or surface water or a monitoring program is proposed and approved by the Department as part of a phased corrective action plan to monitor surface water and/or groundwater conditions and modify the System at a later date if warranted by monitoring data.

d. An OWTS may not be located any closer to any well, spring or surface drainage or other sensitive receptor than the existing OWTS.

e. In no case shall a repair create the potential of an increased threat to groundwater or surface water than that of the existing OWTS.

f. For a new System on an existing lot of record that is tributary to and upstream of a public water supply intake the System must incorporate supplemental treatment for pathogens (i.e., disinfection) in accordance with the State OWTS Policy.

3. In determining the level of corrective action required, the following factors shall be taken into consideration, generally according to the following priorities:

a. Public health and safety;

b. Soil characteristics and groundwater separation;

c. Setbacks from wells and streams;

d. Ground slope and horizontal setback from unstable landforms;

e. System sizing standards; and

f. Other setback criteria (e.g., foundations, pipelines, trees, etc.).

C. FLOOD PROTECTION MEASURES

1. Where suitable area outside of the horizontal setback distances and flood hazard areas is not available, repairs to existing OWTS located with floodplains shall include design features to prevent damage to the System components by associated flood events and infiltration of flood waters into the OWTS or discharge from the OWTS into flood waters.

2. The flood plain measures must be incorporated into the design plans for replacement Systems or corrective action plans for existing Systems and must include:

a. Protection of OWTS components from flood damage using structural tie-downs;

b. Elevation of critical components above the one hundred (100) year flood level;

c. Prevention of wastewater discharge into flooded dispersal system areas from pump systems (e.g., using flood-activated float switches to override/disable pump operation during high water conditions);

d. Additional emergency storage capacity for flood periods; and

e. Plan, profile and cross sections delineating the flood plain.

45.3 CORRECTIVE ACTION PERMITTING PROCESS REQUIREMENTS

A. CORRECTIVE ACTION PLAN SUBMITTALS

1. Proposed corrective action design documents must be submitted to the Department for approval.

2. Repairs and modifications to an existing System must be supported by a performance evaluation of the existing System conducted in accordance with the criteria presented in **Chapter 44** and site evaluation activities conducted in accordance with the criteria presented in **Part 2** of this Manual as applicable.

B. PERMIT REQUIREMENTS

1. Permit requirements for Onsite Wastewater System corrective action will depend on the nature of the failure condition, the property location, the type of occupancy and the type of corrective work needed.

   a. In order to perform corrective actions on an existing System the property owner or designee shall obtain a repair/ modification permit from the Department except where exempt as described in **Chapter 2**.

   b. If an existing System cannot be repaired or modified but can be replaced with a new System the property owner or designee shall obtain an installation permit from the Department;

   c. If an existing System cannot be repaired, modified or replaced with a new System the property owner or designee shall eliminate wastewater discharge at the site by obtaining:

      (1) An installation permit for a holding tank with regular pumping by a Septage Pumper; or

      (2) An abandonment permit of the System and connection to the sewer.

C. CORRECTIVE ACTION IMPLEMENTATION TIMELINE

1. Owners of Onsite Wastewater Systems shall address any corrective action requirements as soon as is reasonably possible and must comply with the time schedule of any corrective action notice received from the Department.

2. **Interim Measures.** Interim measures such as installation of a holding tank and pumping of septage may be required for failed Systems that require replacement and submittal of a design plans for repair, modification or replacement.

3. **Emergency Repair Work.** Nothing in this chapter shall preclude the property owner from performing any emergency repair work necessary to protect against an imminent threat to human health and safety or the environment provided the owner immediately thereafter applies for a permit if applicable.

4. **Phased Corrective Action Plan.** A phased corrective action plan may be submitted to the Department for consideration to allow property owners time to plan for the costs of implementing corrective action measures. Phased corrective action plans shall be prepared by a System Designer and shall include immediate, intermediate and long-term recommendations, as applicable, based on the results of system inspections, performance evaluations and site evaluations. Phased corrective action plan approvals will be conditioned upon issuance of an operating permit with monitoring and reporting requirements during the period of corrective action implementation.

   a. **Immediate Measures.** Immediate measures shall be implemented within one (1) to three (3) months and shall include measures to eliminate surface discharge and safety issues and may include but not be limited to source control measures, plumbing and tank repairs and pump and haul by a Septage Pumper.

   b. **Intermediate Measures.** Intermediate measures shall be implemented within one (1) year and may include but are not limited to additional source control measures, site modifications, septic tank replacement, dispersal system repairs/modifications, monitoring well installation and continued pump and haul as needed.

   c. **Long-Term Measures**. Long-term measures shall be implemented within one (1) to three (3) years and may include but are not limited to additional source control measures such as installation of graywater systems, treatment train modifications including but not limited to addition of flow equalization tanks, pump tanks, supplemental treatment, and/or dispersal system redesign or replacement. Longer time frames (up to nine [9] years) may be approved for communities with plans for a public sewer system or community OWTS.

5. **Regional Water Board Oversight**

   a. If the owner of the Onsite Wastewater System is not able to comply with corrective action requirements of this chapter, the Regional Water Board may require the owner of the System to submit an application and information (Report of Waste Discharge) to the Regional Water Board for evaluation on a case-by-case.

45.4 FAILED SYSTEMS & ABATEMENT REQUIREMENTS

A. OWNER REQUIRMENETS

1. A property owner must immediately abate conditions that pose a threat to human health and/or the environment due to a failing Onsite Wastewater System. At a minimum the owner must hire a Contractor, Septage Pumper and/or Qualified Professional to assist in immediately implementing the following interim abatement measures:

   a. Stop all wastewater flows to the System;

   b. Collect surfacing or ponding wastewater (must be done by a Septage Pumper);

   c. Contain surfacing wastewater as close as practical to the failed System through the use of berms or other measures;

   d. Isolate storm drain collection systems if wastewater has the potential to enter inlets;

   e. Conduct general cleanup measures including removing all impacted debris;

   f. Prevent public contact with wastewater by installing fencing or hazard tape and warning signs around the impacted area;

   g. Wash down impacted impervious surfaces and collect and dispose of wash water in a sanitary sewer;

   h. Notify adjacent property owners that have the potential to be directly affected by the failed System and or cleanup activities; and

   i. Take other actions as directed by the Department.

2. Depending on the extent of the failing or failed System impacts, the owner may be required to implement additional measures including but not limited to:

   a. Investigation and/or monitoring the source and/or movement of wastewater;

   b. Collection of well water, surface water, and/or soil samples for analysis of fecal indicator bacteria to determine the extent of the release and threat to public health and the environment;

   c. Identification of appropriate cleanup action(s). Depending on the extent of impact of the wastewater release to the environment, oversight by other regulatory agencies may be required including but not limited to the Regional Water Board, State Water Board, California Department of Fish and Wildlife, or the U.S. Army Corp of Engineers; and

   d. Implementation of additional soil cleanup measures including but not limited to covering the impacted area with clean soil, excavation, aeration, or disinfection of the impacted soil.

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LIST OF ACRONYMS

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Acronym	Definition
AOC	Areas of concern
AOS	Apparent opening size
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
ATU	Aerobic Treatment Unit
BOD	Biochemical oxygen demand
BOD_5	Biochemical oxygen demand exerted after a five days of a BOD test
$CBOD_5$	Carbonaceous biological oxygen demand
CIMIS	California Irrigation Management Information System
COWA	California Onsite Wastewater Association
D_{10}	Effective size
FEMA	Federal Emergency Management Act
FOG	Fats, oil and grease
ft^2/ft	Square feet per lineal foot
gpd	Gallons per day
gal/ft^2	Gallons per square foot
gal/ft^2-day	Gallons per square foot per day
gal/ft^2-min	Gallons per square foot per minute
gpm	Gallons per minute
IAPMO	International Association of Plumbing and Mechanical Officials
ISF	Intermittent sand filter
L/gal	Liters per gallon
lb/mg	Pounds per milligram
lb/year	Pounds per year
MCL	USEPA maximum contaminant level drinking water standard
mg/L	Milligrams per liter
Mg-N/L	Milligrams of nitrate per liter
ml	Milliliters
MPI	Minutes per inch
MPN	Most probable number
NAWT	National Association of Waste Transporters
N	Nitrogen
NH_3-N	Ammonia nitrogen
NH_4-N	Ammonium nitrogen
NMP	Zone 7 Nutrient Management Plan
NO_2-N	Nitrite-nitrogen
NO_3-N	Nitrate-nitrogen
NSF	National Sanitation Foundation
OM&M	Operations, monitoring and maintenance
Ordinance	Alameda County Onsite Wastewater Treatment Systems Ordinance
Organic-N	Nitrogen
OWCU	Onsite Wastewater Containment Unit

Acronym	Definition
OWTS	Onsite Wastewater Treatment System
PDST	Pressure Dosed Sand Trench
RV	Recreational Vehicle
ROWD	Report of waste discharge
RRE	Rural residential equivalence
RSF	Recirculating sand filter
SRA	Service request application
TKN	Total Kjeldahl Nitrogen
TSS	Total suspended solids
Uc	Uniformity coefficient
UPC	Uniform Plumbing Code
USDA	United States Department of Agriculture
USGS	United States Geological Survey
USEPA	United States Environmental Protection Agency
Zone 7	Zone 7 Water Agency

APPENDIX D

DEFINITION OF TERMS

DEFINITION OF TERMS

Definitions are provided for terms used in this Manual.

Abandoned system: An OWTS or OWCU that will no longer be used to receive effluent or the Department has issued notice to destroy the OWTS or OWCU. Also referred to as Abandoned OWTS or OWCU.

Abandoned well: A well whose original purpose and use has been permanently discontinued or which is in such a state of disrepair that it cannot be used for its original purpose. If an abandoned well has been properly destroyed so that it will not produce water nor act as a conduit for the movement of water, it will not be subject to well setback requirements.

Abandonment permit: The administrative document issued by the Department allowing abandonment of an existing OWTS or OWCU.

Advanced OWTS: An Advanced OWTS utilizes either a method of Wastewater treatment or supplemental treatment other than a septic tank and/or a method of wastewater dispersal other than a gravity trench dispersal system. Advanced OWTS are designed to allow siting of an OWTS where a standard OWTS is not suitable due to site constraints or wastewater strength.

Applicant: A property owner or the property owner's authorized representative that applies for a permit for an OWTS or OWCU.

Application: Service Request Application

As-built plans: Scaled plan(s) prepared by a Contractor and/or Qualified Professional identifying the location and configuration of the installed System components and the horizontal setbacks to structures and other features on the property. As-built plans are submitted to the Department if changes have been made to the approved OWTS design, at completion of construction and prior to receiving final approval by the Department and to support performance evaluations of undocumented or unpermitted Systems.

At-grade dispersal system: A dispersal system with a discharge point located at the preconstruction grade (ground surface elevation). The discharge from an at-grade system is always subsurface.

Authorized representative: A person or persons authorized by the property owner to act on the property owner's behalf on matters pertaining to application for permits and services, or holder of an easement sufficient to authorize the work on the land on which the System is to be installed, in order to represent the owner's or easement holder's interests.

Average annual rainfall: The average of the annual amount of precipitation for a location over a year as measured by the nearest National Weather Service station for the preceding three decades. For example the data set use to make a determination in 2012 would be the data from 1981 to 2010.

Basis of design report. A bound design report documenting the basis of the OWTS or OWCU design. Reports documenting geotechnical evaluations, cumulative impact assessments, hydrogeological studies or other evaluations must be appended to the basis of design report. Also referred to as design report.

Biochemical oxygen demand (BOD): The amount of dissolved oxygen needed by aerobic biological organisms in a body of water to break down organic material present in a given water sample at certain temperature over a specific time period. BOD_5 is the five (5) day biochemical oxygen demand exerted after five (5) days of a BOD test.

Blackwater: Wastewater contaminated with human or kitchen wastes, generally originating from toilets and kitchen sinks. It includes, but is not limited to, wastewater discharges from kitchen sinks, garbage grinders, water closets, toilets, urinals or similar fixtures alone or in combination with other wastewater.

Building: A structure built, erected and framed of component structural parts designed for the housing, shelter, enclosure or support of persons, animals or property of any kind.

Building department: A local building agency of a city or county which has the jurisdiction to issue building permits to construct, alter, repair or destroy structures.

Building sewer: The drainage piping which conveys sewage from a building to the septic tank or public sewer. That part of the horizontal piping of a drainage system that extends form the end of the building drain and that receives the discharge of the building drain and conveys it to a public sewer, private sewer or Onsite Wastewater System.

California Plumbing Code: Part 5 of the California Code or Regulations, Title 24 also referred to as the California Building Standards Code, published in its entirety every three years by order of the California legislature with supplements published in intervening years. A city, county or city and county may establish more restrictive building standards reasonably necessary because of local climate, geological or topographic conditions.

Cesspool: An excavation in the ground receiving wastewater designed to retain the organic matter and solids while allowing the liquids to seep into the soil. Cesspools differ from seepage pits because cesspool systems do not have septic tanks. The term cesspool does not include pit-privies and out-houses.

Chemical toilet facility: See portable toilet.

Cleanout: A fitting inserted into a piping system with a removable plug whereby access to the pipe is obtained for the purpose of cleaning or clearing blockages.

Community OWTS: An OWTS that accepts wastewater from buildings or structures on two or more parcels or an OWTS shared by buildings or structures under separate ownership whether or not they are on the same Parcel. A community OWTS may be either privately or publicly owned or operated.

Composting toilet: A type of dry toilet that uses a predominantly aerobic processing system to treat human excreta by composting or managed aerobic decomposition.

Constrained sites: Sites where specific conditions including but not limited to small parcel size, poor soil characteristics, close proximity to surface water bodies and shallow groundwater table conditions limit treatment and dispersal system options. May require maximum extent practical measures to be implemented during corrective actions due the inability to meet vertical separation to groundwater and horizontal setback distance requirements.

Contamination: Impairment to the quality of the waters of the State from wastewater to a degree which creates a hazard to public health through toxicity or through the spread of disease. Contamination shall include any equivalent effect resulting from the disposal of wastewater, whether or not waters of the state are affected.

Contractor: An individual licensed as a General Engineering Contractor (Class A), a General Building Contractor (Class B), a Plumbing Contractor (Class C-36) or a Sanitation System Contractor (Class C-42) license in accordance with the provisions of the California Business and Professions Code. Contractors engaged in the modification, repair or installation of Onsite Wastewater Systems are expected to possess basic knowledge and skills regarding applicable codes, siting, construction and operation of Onsite Wastewater Systems.

Corrective action plan: A written document supporting a repair/modification permit application describing corrective actions required to return an OWTS to a properly functioning system. The corrective action plan may include a timeline for phased implementation.

County. Alameda County.

Cover fill dispersal system: Dispersal systems that use “cover fill” or soil fill placed on top of original grade to provide the required backfill cover over the pipe and drain rock in trench dispersal systems or subsurface drip dispersal systems where the dispersal trenches or driplines are excavated entirely below grade. The wastewater is dispersed into the native soils, not into the fill soil.

Cumulative impacts: The persistent and/or increasing effect resulting from the density of OWTS discharges in relation to the assimilative capacity of the local environment. Examples include, but not limited to:

- Nitrate, salt additions, or other indicator of human excreta to groundwater or surface water; and/or
- Rise in groundwater levels that interfere with the performance of the OWTS, causing drainage problems or results in other adverse hydrological or soil conditions affecting public health, water quality or public safety; and/or
- Bacteriological Contamination from animal and human waste in surface water, Groundwater, and drinking water wells.

Curtain drain: A sub-surface gravel-filled trench installed uphill of a dispersal system designed to intercept shallow perched groundwater flow and divert it away from or around the dispersal field.

Cut or embankment: Any altered area of land surface where the height (h) of the manmade cut or embankment is greater than two (2) feet, with a slope greater than fifty (50) percent, and any part of which is lower in elevation than the ground surface at the nearest point of the System. The required setback distance shall not be less than twenty five (25) feet nor more than fifty (50) feet from the top of the cut or embankment. Cuts supported by retaining walls or similar structures shall be included in this definition as shall steep natural ground surfaces where a sharp break in the ground slope is discernible.

Department: See Department of Environmental Health.

Department of Environmental Health (Department): The Alameda County Department of Environmental Health.

Design plans: The OWTS or OWCU design plans prepared by a System Designer utilizing the site map as a base map and presenting the engineering details of the OWTS or OWCU design. Also referred to as OWTS or OWCU Design Plans.

Design report: See basis of design report.

Director of Environmental Health: The director of the Department of Environmental Health or his or her designated representative.

Dispersal field: The area occupied by the OWTS Dispersal System.

Dispersal system: The OWTS dispersal system including a trench, subsurface drip, at-grade, mound, raised sand filter bed, evapotranspiration and infiltration bed, or other type of system for final wastewater treatment and subsurface discharge.

Dispersal trench: A trench with vertical sides and substantially flat bottom designed to receive effluent and disperse the effluent into the surrounding soil through the bottom and/or sidewall area of the trench. It may also be referred to as a trench.

Domestic-strength wastewater: Wastewater with a measured strength less then high-strength wastewater and is the type of wastewater normally discharged from, or similar to, that discharged from plumbing fixtures, appliances and other household devices including, but not limited to toilets, bathtubs, showers, laundry facilities, dishwashing facilities, and garbage disposals. Domestic wastewater may include wastewater from commercial buildings such as office buildings, retail stores, and some restaurants, or from industrial facilities where the domestic wastewater is segregated from the industrial wastewater. Domestic wastewater may include incidental recreational (RV) holding tank dumping but does not include wastewater consisting of a significant portion of RV holding tank wastewater such as at RV dump stations. Domestic wastewater does not include wastewater from industrial processes.

Drainage swale: Any course of concentrated drainage water that has formed over time by either natural or man-made forces or where flow of water is either at or near the ground surface. For purposes of this Manual, drainage swales are treated as ephemeral watercourses. OWTS and OWCU horizontal setback distances are measured from the high water mark.

Drainage way: An unlined channel with definite bed or banks which conveys storm water runoff and provides surface hydraulic continuity with either intermittent or perennial watercourses. For purposes of this Manual, drainage ways are treated as ephemeral watercourses. OWTS and OWCU horizontal setback distances are measured from the high water mark.

Dump Station: A facility intended to receive the discharge of wastewater from a holding tank installed on a recreational vehicle (RV). A dump station does not include a full hook-up sewer connection similar to those used at a RV park.

Dwelling: Any structure or building or any portion thereof which is used, intended, or designed to be occupied for human living purposes including, but not limited to, houses, houseboats, boathouses, mobile homes, travel trailers, hotels, motels and apartments.

Effective infiltrative area: The surface area measured in square feet that is required/allowed, for design purposes, to be considered for receiving the wastewater effluent dispersal in the dispersal system.

Effective soil: Permeable, unsaturated soil located beneath the bottom of the dispersal system having suitable texture and other properties for absorption and adequate filtration of effluent. It is the undisturbed unsaturated naturally occurring soil located beneath the bottom of the dispersal system and above the high seasonal groundwater level and/or other the limiting layer.

Effluent: Untreated, partially or completely treated wastewater flowing out of a septic tank, supplemental treatment system, dispersal system or other OWTS component.

Ephemeral watercourse. See Watercourse.

Existing lot of record: A lot or parcel legally created prior to the effective date of this Manual.

Existing OWTS or OWCU: An OWTS or OWCU that was in place, operating, and properly functioning on the effective date of Alameda County's Local Agency Management Plan (LAMP). Also referred to as an Existing Onsite Wastewater System or System.

Expansion: An increase in the size or capacity of an OWTS for the purpose of accommodating a planned or potential increase in the amount or strength of wastewater flow from the facility or facilities served by the OWTS.

Expansive clay soil: Soil that swells and shears when wet and shrinks and develops cracks when dry, forming slickened sides and wedge-shaped structures. Expansive clay soil is very hard or extremely hard when dry, very firm when moist and very sticky and very plastic when wet. When dry, there is normally clear visual evidence of soil shrinkage cracks. When wet, expansive clay soil is massive and cracks and structure are not evident. Expansive, high shrink-swell soil may exhibit suitable soil percolation rates during the dry season due to shrinkage cracks in the Soil; but when it becomes wet, the same soil may swell to the point of providing little or no percolation.

Failed OWTS or OWCU: A failed OWTS or OWCU requires corrective action, in some cases repair in others replacement. Also referred to as a failed System.

Final approval: The document, issued by the Department that certifies the OWTS or OWCU was installed in compliance with the provisions of this Manual and all permit conditions of approval have been met, including issuance of an operating permit, as applicable.

Flood hazard area: The greater of the following two areas:

- The area within a floodplain subject to a one (1) percent or greater chance of flooding in any given year.
- The area designated as a flood hazard area on a community's flood hazard map, or otherwise legally designated.

Flow equalization: The process of controlling the rate of wastewater flow through an OWTS by providing storage capacity to hold surges of incoming flow, with timed-release of the accumulated wastewater to even-out the flow to downstream Treatment and/or dispersal components.

Flow equalization tank. Flow equalization tanks are installed following the septic tank to aid in better OWTS performance by allowing peak surges in wastewater flow (e.g., from a weekend event) to be temporarily stored and metered into the supplemental treatment system and/or dispersal system at a relatively even ("average") rate over an extended number of days (e.g., during the subsequent week).

Flowing water body: A body of running water flowing over the earth in a natural water course, where the movement of the water is readily discernible or if water is not present it is apparent from review of the geology that when present it does flow, such as in an ephemeral drainage, creek, stream, or river.

Geotechnical report: A written document prepared by a Qualified Professional used to communicate soil and geologic site conditions, interpretations, analysis and recommendations pertinent to the design, installation and operation of an OWTS where required by this Manual.

Grade: The slope or fall of a line of pipe in reference to a horizontal plane. In drainage, it is usually expressed as the fall in a fraction of an inch or percentage of slope per foot length of pipe.

Gravity trench dispersal system: A dispersal system consisting of a series of gravity-fed trenches that use perforated pipe for subsurface dispersal of effluent into the soil.

Graywater: Pursuant to Health and Safety Code Section 17922.12, graywater means untreated wastewater that has not been contaminated by any toilet discharge, has not been affected by infectious, contaminated, or unhealthy bodily waste and does not present a threat of contamination by unhealthful processing, manufacturing or operating wastes. Graywater includes but is not limited to wastewater from bathtubs, showers, bathroom washbasins, clothes washing machines and laundry tubs, but does not include Wastewater from kitchen sinks or dishwashers.

Graywater system: A system designed to collect graywater to be treated onsite for reuse or distribution to an irrigation or disposal field. A graywater system may include onsite treated non-potable water devices or equipment, tanks, valves, filters, pumps or other appurtenances along with piping and receiving landscape.

Grease interceptor: A passive interceptor that has a rate of flow exceeding fifty (50) gallons per minute and that is located outside a building. Grease interceptors are used for separating and collecting oil and grease from wastewater.

Grease interceptor tanks: Tanks used to collect fats, oils and greases (FOG) before they enter the septic tank.

Groundwater: Water below the land surface that is at or above atmospheric pressure.

Groundwater mounding: A rise in the groundwater table which may occur beneath or down-gradient of an OWTS dispersal system as a result of the concentrated or high volume of hydraulic loading (wastewater discharge) from one or more OWTS in a limited area.

Groundwater table. That level of groundwater where the hydraulic pressure is zero. It may also be described as the upper surface of the zone of saturation.

High-flow OWTS: An OWTS with a wastewater design flow greater than one thousand five hundred (1,500) gallons per day.

High-strength wastewater: Wastewater having a thirty (30) day average concentration of biochemical oxygen demand (BOD) greater than three hundred (300) milligrams-per-liter (mg/L) or of total suspended solids (TSS) greater than three hundred and thirty (330) mg/L or a fats, oil, and grease (FOG) greater than one hundred (100) mg/L prior to the septic tank or other treatment component.

High seasonal groundwater: The highest level of saturation in the soil in a year with normal rainfall.

Holding tank: A self-contained watertight receptacle used to collect and store wastewater prior to it being pumped and removed from the property by a Septage Pumper and are only allowed in limited circumstances.

Horizontal setbacks: Minimum horizontal distance requirements from pertinent features to OWTS or OWCU components.

Incinerator toilet: A type of dry toilet that burns human feces instead of flushing them away with water.

Individual OWTS: An OWTS that serves building(s) or structure(s) under the same ownership on one Lot or parcel.

Industrial wastewater: Liquid or water-borne waste from industrial or commercial processes, except domestic wastewater.

Inspection well: Wells installed within dispersal systems and sand filter systems for the purpose of checking effluent levels periodically.

Installation permit: The administrative document issued by the Department that conveys approval of and conditions for the installation of an OWTS or OWCU or component thereof.

Installer: A person meeting the definition of Contractor as defined this Manual.

Intermittent sand filter (ISF) system: A sand filter system is used to provide supplemental treatment of septic tank effluent prior to discharge to the dispersal system. They are used to improve or restore the capacity of the dispersal system, reduce pathogenic bacteria loading and can provide additional nitrogen removal. An ISF consists of a packed-bed filter of medium-grained sand designed for single pass-through treatment of septic tank effluent; it is sometimes referred to as a "single pass filter".

Intermittent watercourse: See Watercourse.

Limiting layer or condition: A subsurface layer or condition that can severely limit the function of a dispersal system. Includes hardpan, claypan, fragipan, saprolite, clay soil, permeable fractured rock, compacted soil, soil containing rock or coarse fragments greater than fifty (50) percent, sandy or gravelly soil with very rapid permeability, high seasonal groundwater and other subsurface conditions such as buried foundations, abandoned dispersal Systems, piping, etc. (Reference the USDA Natural Resources Conservation Service Soil Survey Manual for definition of soil terms).

Listed (third-party certified): Equipment or materials included in a list published by a listing agency (accredited conformity assessment body) that maintains periodic inspection on current production of listed equipment of materials and whose listing states either that the equipment or material complies with approved standards or has been tested and found suitable for use in a specified manner.

Listing agency: An agency accredited by an independent and authoritative conformity assessment body to operate a material and product listing and labeling (certification) system which is in the business of listing or labeling. The system includes initial and ongoing product testing, a periodic inspection on current production of listed (certified) products, and that makes available a published report of such listing in which specific information is included that the material or product is in accordance with applicable standards and found safe for use in a specific manner.

Lot: A legally recognized and defined area of land that can be sold individually, as described on an instrument or a map recorded or filed with the County Recorder. A lot may also be referred to as a parcel. A single or individual parcel or area of land legally recorded or validated by other means acceptable to the authority having jurisdiction on which is situated a building or which is the site of any work regulated by this code, together with the yards, courts, and unoccupied spaces legally required for the building or works, and that is owned by or is in the lawful possession of the owner or the building or works.

Manual: See Onsite Wastewater Treatment System Manual.

Mound dispersal system: An aboveground dispersal system (covered sand bed with effluent leachfield elevated above original ground surface inside) used to enhance soil treatment, dispersal and absorption of effluent discharges from an OWTS treatment unit such as a septic tank. Mound systems have a subsurface discharge.

Multi-Unit Residences: Apartments, condominiums, mobile home parks, etc.

National Sanitation Foundation (NSF): A non for profit non-governmental organization that develops health and safety standards and performs product certification.

New Onsite Wastewater System: An OWTS or OWCU permitted after the effective date of Alameda County's Local Agency Management Plan (LAMP).

Non-discharging toilet unit: A self-contained, watertight container designed to hold wastewater until it is pumped out and hauled to an approved receiving facility for disposal. A non-discharging toilet unit includes but is not limited to a vault toilet, portable toilet and waterless toilet.

Non-residential facility: Any structure or building (excluding single-family residential units) or any portion thereof intended for commercial or industrial use.

Nuisance: Includes, but is not limited to:

- A public nuisance known at common law or in equity jurisprudence.
- Where work regulated by this Manual and the Ordinance is dangerous to human life or is detrimental to health and property.
- Inadequate or unsafe water supply or Wastewater disposal system.

Onsite Wastewater Containment Unit (OWCU): A self-contained, non-discharging unit used to collect and store wastewater for removal, hauling and disposal at an approved septage receiving facility, and includes holding tanks, vault toilets, portable toilets and waterless toilets. The short form of the term may be singular of plural.

Onsite Wastewater Systems: Onsite Wastewater Systems (or Systems) as referenced herein include Onsite Wastewater Treatment Systems (OWTS) as defined by the State OWTS Policy and Onsite Wastewater Containment Units (OWCU) as defined by Alameda County General Ordinance Code Chapter 15.18.

Onsite Wastewater Treatment System(s) (OWTS): Individual disposal systems, community collection and disposal systems, and alternative collection and disposal systems that use subsurface disposal. The short form of the term may be singular or plural. OWTS do not include "graywater" systems pursuant to Health and Safety Code Section 17922.12.

Onsite Wastewater Treatment System Manual (Manual): The document developed, maintained and amended by the Alameda County Department of Environmental Health containing policy, procedural and technical details for implementation of the Chapter 15.18 of the County Ordinance as approved by the San Francisco Bay Regional Water Quality Control Board and adopted by the Board of Supervisors of Alameda County.

Operating permit: The administrative document issued by the Department authorizing the initial and/or continued use of OWTS or OWCU in conformance with the provisions of the Ordinance and this Manual and may contain both general and specific conditions of use.

Operation, maintenance and monitoring (OM&M) manual: A manual prepared by a System Designer in connection with the development of an OWTS or OWCU that provides technical information and guidance for the owner and Service Provider regarding the components, operation and maintenance of the OWTS or OWCU, including recommended inspections, monitoring and/or servicing to ensure long-term performance and water quality and public health protection.

Ordinance: Alameda County Onsite Wastewater Treatment Systems Ordinance codified in Chapter 15.18 of the Alameda County General Ordinance Code.

Owner: Any person who alone, or with others:

- Has legal title to any single parcel, dwelling, dwelling unit, non-residential facility or an easement sufficient to allow installation and maintenance of an Onsite Wastewater System; or

- Has care, charge or control of any real property as Applicant, executor, executrix, administrator, trustee or other holder of legal title.

OWTS performance monitoring well: A monitoring well installed upslope, downslope or laterally from the dispersal system for the purpose of monitoring fluctuations in groundwater levels, quality of groundwater or the concentration of contaminants in groundwater.

Parcel: See lot.

Percolation rate: The liquid absorption rate of soil in the dispersal field as determined by a percolation test used for designing the dispersal system.

Percolation test (or testing): A method of testing water absorption of the soil. The test is conducted with clean water and test results can be used to establish the dispersal system design.

Perennial watercourse: See Watercourse.

Performance evaluation. A System inspection and evaluation to determine, on an individual basis, whether an existing OWTS is functional and meets minimum standards of performance contained in this Manual.

Performance evaluation report. A written document prepared by a Qualified Professional documenting the findings of a performance evaluation of an existing System and recommendations for corrective action(s), if applicable.

Permit: A document issued by the County or Regional Water Board that allows the installation and use of an OWTS or OWCU.

Person: Any individual, firm, association, organization, partnership, corporation, business trust, company, state agency or department or unit of local government.

Piezometers: An observation well installed in the dispersal field to measure high seasonal groundwater levels during wet weather testing.

Planning department: A local agency of a city or county which has the jurisdiction over land use approvals including but not limited to lot creation, subdivisions, lot line adjustments, conditional use permits, or other site development reviews;

Plans. OWTS or OWCU design plans, repair/modification plans, corrective action plans or as-built plans.

Plumbing fixture: An approved-type installed receptacle, device or appliance that is supplied with water or that receives liquid or liquid-borne wastes and discharges such wastes into the drainage system to which it may be directly or indirectly connected. Industrial or commercial tanks, vats and similar processing equipment are not plumbing fixtures, but may be connected to or discharged into approved traps or plumbing fixtures where and otherwise provided for elsewhere in this code.

Plumbing system: Includes all potable water, building supply and distribution pipes; all plumbing fixtures and traps; all drainage and vent pipes; and all building drains and building sewers including their respective joints and connections, devices, receptors and appurtenances within the property lines of the premises.

Portable toilet: A portable toilet is a chemical toilet with a self-contained watertight container housed within a portable toilet shelter that collects wastewater from the toilet and/or hand washing facilities. A portable toilet is a non-discharging toilet unit.

Potable water: Water that is satisfactory for drinking, culinary and domestic purposes and that meets the requirements of the health authority having jurisdiction.

Premises: A building and the area of land that it is on.

Pressure distribution: A method of effluent distribution to a supplemental treatment system (such as a sand filter) and/or a dispersal system designed to spread the effluent equally and evenly throughout the distribution area by placing the Effluent under pressure in a small diameter piping network. It may also be referred as pressure dosing.

Pressure distribution system: A system employing pressure distribution that includes the following elements:

- Pump or dosing siphon that generates pressurized flow and a prescribed dose volume;
- Transport piping that conveys the effluent from the pump or dosing siphon to the distribution area;
- Manifold and fittings that divide the flow from the transport piping amongst a series of laterals;
- Lateral pipes placed throughout the supplemental treatment system or dispersal system with a prescribed number, sizing and spacing of drilled holes (orifices) along the length of each lateral pipe to release the effluent evenly under pressure to the distribution area during each dosing cycle.

Pressure-dosed sand trench dispersal system: A variation of a pressure-dosed trench dispersal system that utilizes pea gravel and a medium-grade sand in lieu of a portion of the drain rock in the dispersal trench to improve treatment of effluent.

Pressure-dosed trench dispersal system: A trench dispersal system that uses a pump or dosing siphon and small-diameter pressure piping to achieve broad and uniform distribution of effluent for improved soil absorption and better treatment of effluent as compared to a gravity trench dispersal system.

Primary treatment: Wastewater treatment occurring in the septic tank.

Process water: Wastewater that is generated from any manufacturing, processing institution, commercial, or agricultural operation, or any operation that discharges other than blackwater and graywater.

Property: See Lot

Proprietary treatment units: A category of manufactured or "packaged" supplemental treatment systems specifically developed for residential and other small-scale wastewater treatment applications.

Public health hazard: A condition created by a discharge of biological, chemical, physical and/or radiological agents which are likely to cause human illness, disorders or disability or as otherwise defined by law.

Public nuisance: Includes but not be limited to, anything which:

- Is injurious to public health or is indecent or offensive to the senses or any obstruction to the free use of property so as to interfere with the comfortable enjoyment of life or property; and

- Affects at the same time an entire community or neighborhood or any considerable number of persons, although the extent of the annoyance or damage inflicted upon individuals may be unequal; and

- Is an attractive nuisance which may prove detrimental to children or others, whether in a building, on the premises of a building or upon an unoccupied lot. This may include, for example, any abandoned but improperly decommissioned well, OWTS or OWCU, cesspool, or open seepage Pit; and

- Is dangerous to human life or is detrimental to health, as determined by the Director of Environmental Health; and

- Inadequate or unsanitary or unapproved wastewater or plumbing facilities.

Public sewer system: Any sanitary sewer system constructed, installed, maintained, operated and owned by or for a municipality or other public entity having authority for collection, treatment and disposal of wastewater.

Public water system: A water system regulated by the California Department of Public Health of a Local Primacy Agency pursuant to Chapter 12, Part 4, California Safe Drinking Water Act, Section 116275(h) of the California Health and Safety Code.

Public water well: A groundwater well serving a public water system. A spring which is not subject to the California Surface Water Treatment Rule (SWTR), California Code of Regulations CCR Title 22, Sections 64650 through 64666 is a public well.

Pump tank: A watertight tank constructed of approved materials designed to receive and temporarily collect and store wastewater and serves as a temporary reservoir for a pump that doses or discharges the collected effluent to a subsequent OWTS component by means of a pump or automatic dosing siphon.

Qualified Professional: An individual licensed or certified by a State of California agency to design Onsite Wastewater Systems and to practice as professionals for other associated reports, as allowed under their license or registration. Depending on the services to be performed and the various licensing and registration requirements, this may include an individual who possesses a registered environmental health specialist certificate or is currently licensed as a professional engineer or professional geologist.

Qualifying public agency: A public agency with local, full-time sanitation and water quality staff who are trained and have the capability to operate and maintain OWTS and OWCU.

Raised sand filter bed dispersal system: A dispersal system that combines features of an intermittent sand filter system and a mound dispersal system. It consists of a raised or terraced sand bed, commonly supported by a low retaining wall or bulkhead, where the bottom surface is even with or slightly below ground surface and forms the absorption surface. The raised sand filter bed dispersal system provides additional polishing treatment of effluent and final dispersal of wastewater into native soil. Raised sand filter bed dispersal systems will be approved only for repair or other corrective action of existing OWTS on severely constrained sites where site specific conditions limit treatment and dispersal options.

Recirculating sand filter (RSF) system: A sand filter system used to provide supplemental treatment of septic tank effluent prior to discharge to the dispersal system. RSFs are used to improve or restore the capacity of the dispersal system, reduce pathogenic bacteria loading and can provide additional nitrogen removal. An RSF utilizes coarse-grained sand and a recirculation system, usually controlled by a timer that causes the effluent to pass through the sand media several times prior to final dispersal. RSFs have the ability to produce effluent quality similar to intermittent sand filter systems, except that they are less effective in bacteria removal. However, RSFs typically provide greater nitrogen removal than ISFs, on the order of fifty (50) percent reduction as compared with standard tank effluent.

Recreational vehicle (RV): A vehicular-type unit primarily designed as temporary living quarters for recreational, camping, travel or season use that either has its own motive power, or is mounted on or towed by another vehicle. The basic entities are camping trailer, fifth-wheel trailer, motor home, park trailer, travel trailer and truck camper.

Regional Water Board: The Regional Water Quality Control Boards designated by Water Code Section 13200. Any reference to an action of the Regional Water Board in this Manual also refers to an action of its Executive Officer, including the conducting of public hearings, pursuant to any general or specific delegation under Water Code Section 13223. The San Francisco Bay and Central Valley Regional Water Boards have jurisdiction over Alameda County.

Repair/Modification Permit. The administrative document issued by the Department allowing repairs or modifications to an existing OWTS or OWCU.

Replacement OWTS: A new OWTS replacing an existing failing OWTS.

Report of waste discharge (ROWD): Application, technical information and filing fee submitted to Regional Water Board to receive waste discharge requirements (or a permit) authorizing operation and OWTS discharges.

Reserve area: A dedicated area of land having suitable site conditions and sufficient area for installation of a replacement dispersal system (sized for one hundred (100) percent of the wastewater design flow and able to meet all the design requirements of the dispersal system proposed) should it be required in the future.

Restrictive layer: See Limiting layer

Rural residential equivalent (RRE): Zone 7 Water Agency groundwater nitrogen loading estimate of thirty-four (34) pounds of nitrogen per year from a typical, single family home served by a standard OWTS.

Sand filter system: A packed-bed sand filter to treat septic tank effluent to an "advanced level" prior to dispersal into the soil. The sand filter system consists of a lined excavation or structure filled with uniform clean sand, with an under-drain system at the bottom to collect and direct the water for dispersal or additional treatment. In some cases, sand filter systems may have an open bottom to allow percolation directly into the soil below where conditions are suitable.

Scum: A mass of organic or inorganic materials floating on the surface in a septic tank, largely comprised of oil and grease from animal and vegetable fats.

Seepage Pit: A drilled or dug excavation that receives the effluent discharge from a septic tank or other OWTS treatment unit for dispersal. Seepage pits are not authorized in Alameda County.

Septage: Accumulated wastewater solids and liquid in OWCU or OWTS tanks that require periodic removal, hauling and disposal at an approved septage receiving facility.

Septage Pumper: A person who is qualified to pump and haul waste from OWCU and OWTS. To operate in Alameda County a Septage Pumper must be registered pursuant to the California Health and Safety Code.

Septic Tank: A watertight, covered receptacle designed for primary treatment of wastewater and constructed to:

- Receive wastewater discharged from a wastewater drainage system;
- Separate settleable and floating solids from the liquid;
- Digest organic matter by anaerobic bacterial action;
- Store digested solids; and
- Clarify wastewater for further treatment with final subsurface discharge.

Serial Distribution: The distribution of effluent to the dispersal system by gravity flow that progressively loads one section of the dispersal system to a predetermined level before overflowing to the succeeding lower section(s).

Service Provider. An individual capable of operating, monitoring and maintaining an Onsite Wastewater System in accordance with the provisions of this Manual. To operate in Alameda County a Service Provider must be registered with the Department.

Single family residence: A dwelling designed for and commonly occupied exclusively by one household or family.

Site: See Parcel or Lot.

Site evaluation: An assessment of the characteristics of a parcel sufficient to determine its suitability for an OWTS to meet the requirements of this Manual.

Slope: The rise or fall in feet per one hundred (100) feet of horizontal distance. Slope is expressed as a percent of grade. For example: a land surface with a rise of one hundred (100) feet over a horizontal distance of one hundred (100) feet (45-degree angle) has a slope of 100 percent. Also referred to as grade.

Sludge: The residual, semi-solid material that is produced as a byproduct of wastewater treatment.

Soil: The naturally occurring body of porous mineral and organic materials on the land surface, which is composed of unconsolidated materials, including sand-sized, silt-sized and clay-sized particles mixed with varying amounts of larger fragments and organic material. The various combinations of particles differentiate specific soil textures identified in the soil textural triangle developed by the USDA.. .

Soil profile: An evaluation of the characteristics of a vertical section of the soil extending through all its horizons into the underlying parent material. It is conducted in areas proposed for wastewater dispersal, including reserve area(s), to ascertain its suitability for that purpose. Characteristics of soil examined in a soil profile may include structure, texture, color, impervious layers, and evidence of groundwater as determined by direct observation or presence of indicators, such as mottling. Also referred to as a soil profile study.

Soil profile study. See Soil profile.

Soil profile test pits: An excavation dug for the purpose of a soil profile study of sufficient size and depth to allow thorough examination of the soil to evaluate its suitability for wastewater dispersal.

Soil texture: The relative proportions of sand, silt and clay particles found in a mass of Soil, as described by the twelve (12) basic textural classes defined by the United States Department of Agriculture (USDA).

Special permit: The administrative document issued by the Department for approval and conditions for use of portable toilets and waterless toilets.

Standard OWTS: An OWTS comprised of primary (septic tank) treatment and gravity-fed trenches (gravity trench dispersal system) installed in native soil below original grade. Effluent flows to the dispersal trenches by gravity or may be pumped to the first distribution box of the dispersal system.

State OWTS Policy: The Water Quality Control Policy for Siting, Design, Operation and Maintenance of Onsite Wastewater Treatment Systems adopted by the State Water Resources Control Board on June 19, 2012, which became effective May 13, 2013.

Storm water: Water that originates during precipitation events and snow/ice melt. Storm water can soak into the soil (infiltrate), be held on the surface and evaporate or runoff and end up in nearby surface waterbodies.

Subdivision: Subdivision as defined by the Subdivision Map Act of the State (Government Code Section 66410 et seq.).

DEFINITION OF TERMS

Subsurface drip dispersal system: A method for disposal of treated wastewater that uses special drip tubing (dripline) designed for use with wastewater. The dripline is placed normally eight (8) to twelve (12) inches below ground surface and makes use of the most biologically active soil zone for distribution, nutrient uptake and evapotranspiration of the wastewater.

Sump: A tank that receives liquid waste and which is located below the normal grade of the gravity system and which must be emptied by mechanical means.

Supplemental treatment systems. Any OWTS or component of an OWTS, except a septic tank or dosing tank, that performs additional wastewater treatment so that the effluent meets a predetermined performance requirement prior to discharge of effluent into the dispersal field.

Surface water drainage structures: Manmade structures such as lined drainage ditches, infiltration/percolation trenches, vegetated swales, non-perforated drain pipes, watertight culverts or conduits, etc., used for dispersal of roof runoff or other Site drainage, OWTS and OWCU horizontal setback distances are measured from the edge of the conveyance structure.

Swale: See Drainage swale.

Systems: See Onsite Wastewater Treatment Systems.

Total suspended solids (TSS): Suspended solids in water and are a constituent of total solids. TSS can include a wide variety of material such as soil particles, decaying plant, animal matter and wastewater. The total amount of suspended solids in a liquid is determined by a laboratory test that measures the dry weight of TSS residue retained on a filter after drying the sample and is a measure of the level of treatment being achieved. TSS can be inorganic particles, which are difficult for biological processes to break down, resulting in mechanical clogging. In wastewater with high TSS, inorganics are less easily broken down and can accelerate mechanical clogging of the infiltrative surface of the dispersal system.

Treatment: Any process or action that accomplishes a measureable reduction in wastewater strength or separation of liquid from solids, such as in the reduction of solids or organics, dewatering, coagulation, settling, filtration, aeration or disinfection.

Trench(es). See Dispersal trench.

Unstable land mass: Land prone to subsidence, erosion or movement as indicated by evidence of historical landslide events, published maps or reports, or evidence of characteristics such as surface rupture, scarps, creep or other irregularities in ground slope conditions

Variance: An administration exception to the provisions of the Ordinance and the Manual.

Vault toilet: A structure used for disposal of human waste without the aid of water. It consists of a shelter built above a subsurface vault into which human waste is deposited. A vault toilet has no water connection and is a non-discharging toilet unit.

Vertical separation: The measured depth of effective soil for effluent absorption and filtration that exists between the bottom of a dispersal system and the restrictive or limiting layer or groundwater.

Waste discharge requirement (WDR): An operation and discharge permit issued by a Regional Water Board for the discharge of waste pursuant to Section 13260 of the California Water code.

Wastewater: Water-carried waste that is intended to be removed and generally produced by fixtures such as toilets, sinks, showers or bathtubs, clothes washing machines, dish washing machines, floor drains or other fixtures or fittings intended to drain organic or inorganic waste material from residential and non-residential (including commercial and industrial) processes. The term wastewater as referenced in this Manual includes both untreated, partially treated and treated wastewater.

Wastewater design flow: The quantity of peak daily wastewater flow assigned to a building or structure for the purpose of sizing an OWTS or OWCU. For OWTS with flow equalization tanks, the wastewater design flow used for sizing the supplemental treatment system and/or the dispersal system may be based on the equalized ("average") flow rate rather than the peak daily flow rate for the building or structure;

Watercourse: A body of running water flowing over the earth in a natural watercourse, where the movement of water is readily discernible or if water is not present it is apparent from review of the geography that when present it does flow.

- **Ephemeral watercourse:** A watercourse that may or may not have a well-defined channel that is dry most of the year and flows only during or briefly following a period of rainfall in the immediate locality. Ephemeral watercourses receive no water from springs or groundwater and no sustained supply from melting snow or other surface source. Ephemeral watercourses are not defined on United States Geological Survey (USGS) topographic maps and must be identified in the field based on characteristic features. For purposes of this Manual, ephemeral watercourses includes drainage swales and drainage ways. Horizontal setback distances are measured from the high water mark.

- **Intermittent watercourse.** A natural watercourse with a well-defined channel with bed and banks in which water flows for only part of the year, typically during winter and spring when the bed is below the groundwater table, during years of normal rainfall. The flow may be heavily supplemented by storm water runoff. For purposes of this Manual, intermittent watercourses are identified as dotted blue lines on USGS topographic maps. Horizontal setback distances are measured from the natural or levied top of bank).

- **Perennial watercourse:** A watercourse with a well-defined channel with bed and banks that has continuous flow all year round during years of normal rainfall. The channel bed is located below the groundwater table for most of the year. Groundwater is the primary source of water for a perennial watercourse, but it also carries storm water runoff. For purposes of this Manual, perennial watercourses are identified as solid blue lines on USGS topographic maps. Horizontal setback distances are measured from the natural or levied top of bank).

Waterless toilet: A composting toilet, incinerator toilet or similar device for the holding and processing of waste from a toilet. A waterless toilet is a non-discharging toilet unit.

Water supply system: The building supply pipe, the water distribution pipes, and the necessary connecting pipes, fittings, control valves, backflow prevention devices and all appurtenances carry or supply potable water in or adjacent to the building or premises.

Well: A groundwater well that provides water for human consumption and is not regulated by the California Department of Public Health.
Wet weather season: See wet weather testing period.

Wet weather testing: Direct observation of groundwater levels during the time of year when the highest groundwater conditions are expected or known to occur.

Wet weather testing period: The period from October through April and after at least fifty (50) percent of the average annual rainfall (as measured from October 1st through September 30th) has fallen and within a ten (10) day period following rainfall of at least one-half (0.5) inch in a forty-eight (48) hour period. The wet weather testing period may be extended or shortened by the Department depending on rainfall patterns in a given year. Also referred to as wet weather season.

Zone 7: Alameda County Zone 7 Water Agency.

Local Agency Management Program
for
Onsite Wastewater Treatment Systems

Alameda County, California

County of Alameda
Department of Environmental Health

June 5, 2018

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Introduction and Background

Introduction

This document presents the proposed Local Agency Management Program (LAMP) pertaining to the oversight of onsite wastewater treatment systems (OWTS) within the County of Alameda, California. This document, along with its partner documents the Onsite Wastewater Treatment System Manual and the Onsite Wastewater Treatment System Ordinance (hereinafter referred to collectively as the LAMP) are the major components of Alameda County's LAMP, prepared in accordance with the requirements of the State Water Resources Control Board's (State Water Board) *Water Quality Control Policy for Siting, Design, Operation, and Maintenance of Onsite Wastewater Treatment Systems*, dated June 19, 2012, also referred to as the "State OWTS Policy".

The State OWTS Policy provides a multi-tiered strategy for management of OWTS in California. This LAMP has been prepared by Alameda County to obtain approval for OWTS management under Tier 2 of the OWTS Policy. As such, it is intended to allow the County to continue providing local oversight of OWTS by implementing practices that: (a) are suited to the conditions in Alameda County; (b) demonstrate standards that achieve the same purpose as the OWTS Policy, which is to protect water quality and public health; and (c) ensure the best opportunity for coordinated and comprehensive management of OWTS, public health and water quality in Alameda County.

This LAMP is intended to apply to all OWTS within Alameda County having wastewater design flows up to 10,000 gallons per day (gpd). Any OWTS with a design flow exceeding 10,000 gpd and/or where the wastewater includes industrial process wastewater, or a community system serving multiple discharges under separate ownership would be regulated jointly by Alameda County and the respective California Regional Water Quality Control Board (Regional Water Board), San Francisco Bay or Central Valley Region. All cities within the County, with the exception of the City of Berkeley, have designated the County's Health Officer as their jurisdictions' health officer. The Alameda County Health Officer has designated the Director of Environmental Health as a Deputy Health Officer for the purpose of enforcing State and local environmental health law.

Geographical Area

Alameda County is located in the San Francisco Bay Area and encompasses approximately 738 square miles. The county is bordered on the west by San Francisco Bay and on the north, east and south by Contra Costa, San Joaquin and Santa Clara Counties, respectively. The County seat and largest city is Oakland. The Berkeley hills form part of the northeastern boundary and reach into the center of the county roughly dividing the county into two halves – western and eastern.

A coastal plain several miles wide borders the bay in the western half. The Livermore Valley occupies a large portion of the eastern half of the county.

Regulation of Onsite Wastewater Treatment Systems

The Alameda County Department of Environmental Health (the Department) is responsible for regulating OWTS throughout the unincorporated areas of the county. The Department also administers OWTS regulations in the various cities in the county as discussed further below. OWTS are used largely for properties located outside of municipal sewer service boundaries, although there are still many isolated properties within the incorporated areas that have not been connected to sewers, and continue to use OWTS. More than half of the properties served by OWTS are in the eastern portions of the county within the Upper Alameda Creek Watershed. The largest concentrations are in the unincorporated community of Sunol and on the fringes of Pleasanton, Livermore and Castro Valley. Overall there are currently estimated to be approximately 2,500 OWTS in Alameda County.

The County has historically operated its onsite wastewater systems program under the authority granted by two Regional Water Boards: (1) the San Francisco Bay Region for those areas that drain to San Francisco Bay; and (2) the Central Valley Region for the small portion of the County that drains easterly to the Sacramento-San Joaquin Delta. **Figure 1-1** is a map of Alameda County showing the distribution of OWTS in the unincorporated areas of the county, Regional Water Board boundaries, cities/sewered area and the major roadway network.

OWTS located within the incorporated areas in the county have been regulated by the County by informal agreements with each city. Under this LAMP, the County of Alameda Department of Environmental Health is responsible for permitting the installation and regulation of OWTS within the County's jurisdictional boundaries.

Two of the largest landholders in Alameda County, especially in the unincorporated area, are the East Bay Regional Park District (EBRPD) and the San Francisco Public Utilities Commission (SFPUC). A map showing their landholdings is provided in **Figure 1-2**. Many of the EBRPD landholdings support recreational facilities that require OWTS or pump-and-haul vault systems that are under the regulatory authority of Alameda County Department. SFPUC properties include watershed lands around Calaveras Reservoir and other sites used mostly in connection with support facilities for water facilities or leased to private entities for a variety of uses including quarry operations. Historically, wastewater facilities on SFPUC properties have not been regulated by the Department, but will now need to be regulated under the County's LAMP, except where permitted separately under waste discharge requirements issued by the Regional Water Board.

Zone 7 of the Alameda Flood Control and Water Conservation District (Zone 7 Water Agency or Zone 7) was established in 1957 to manage water resources in the Upper Alameda Creek Watershed above Niles. Initially, Zone 7's focus was directed toward resolving groundwater overdraft, water supply imports and flood control and drainage issues within the watershed. This

Figure 1-1. Distribution of OWTS

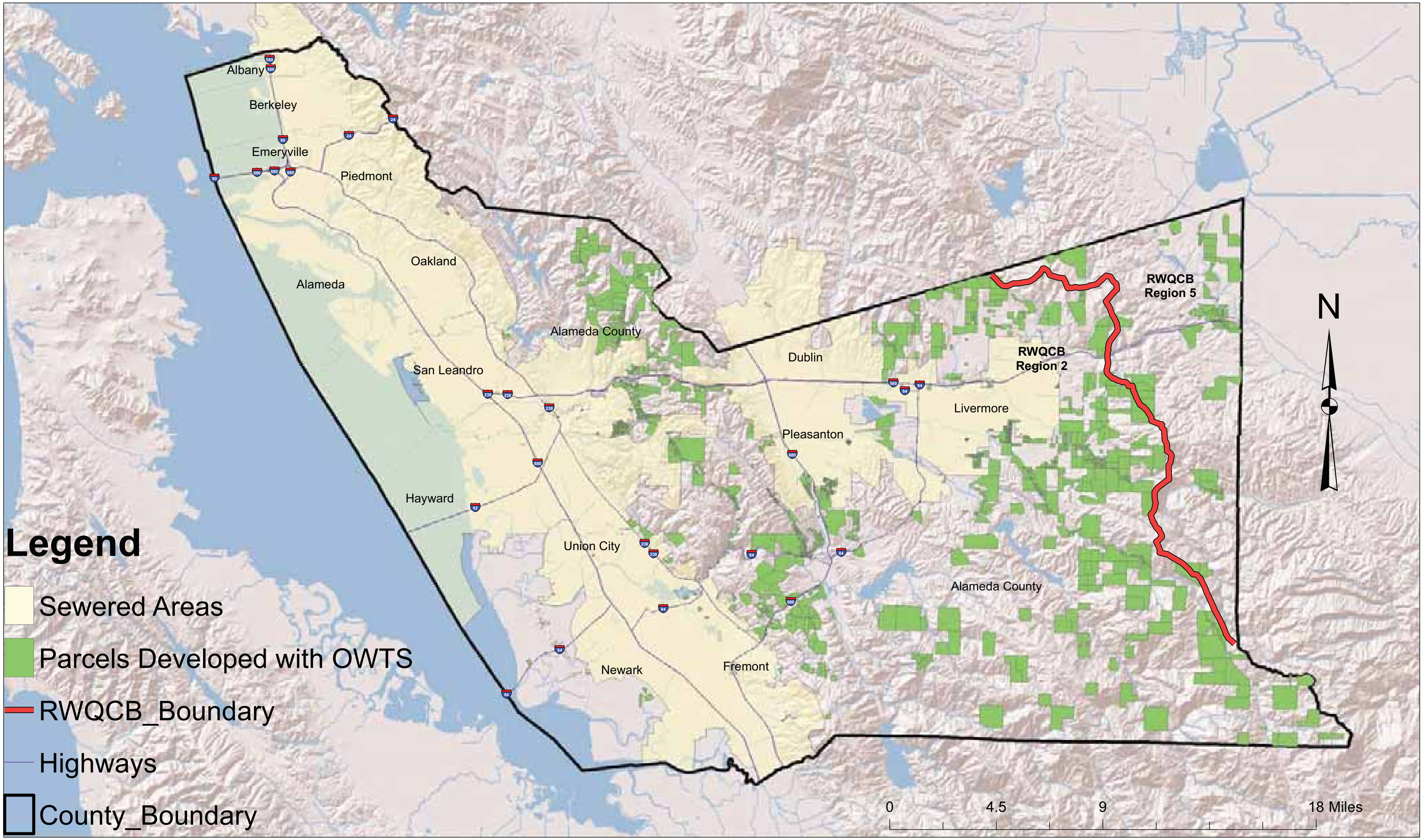
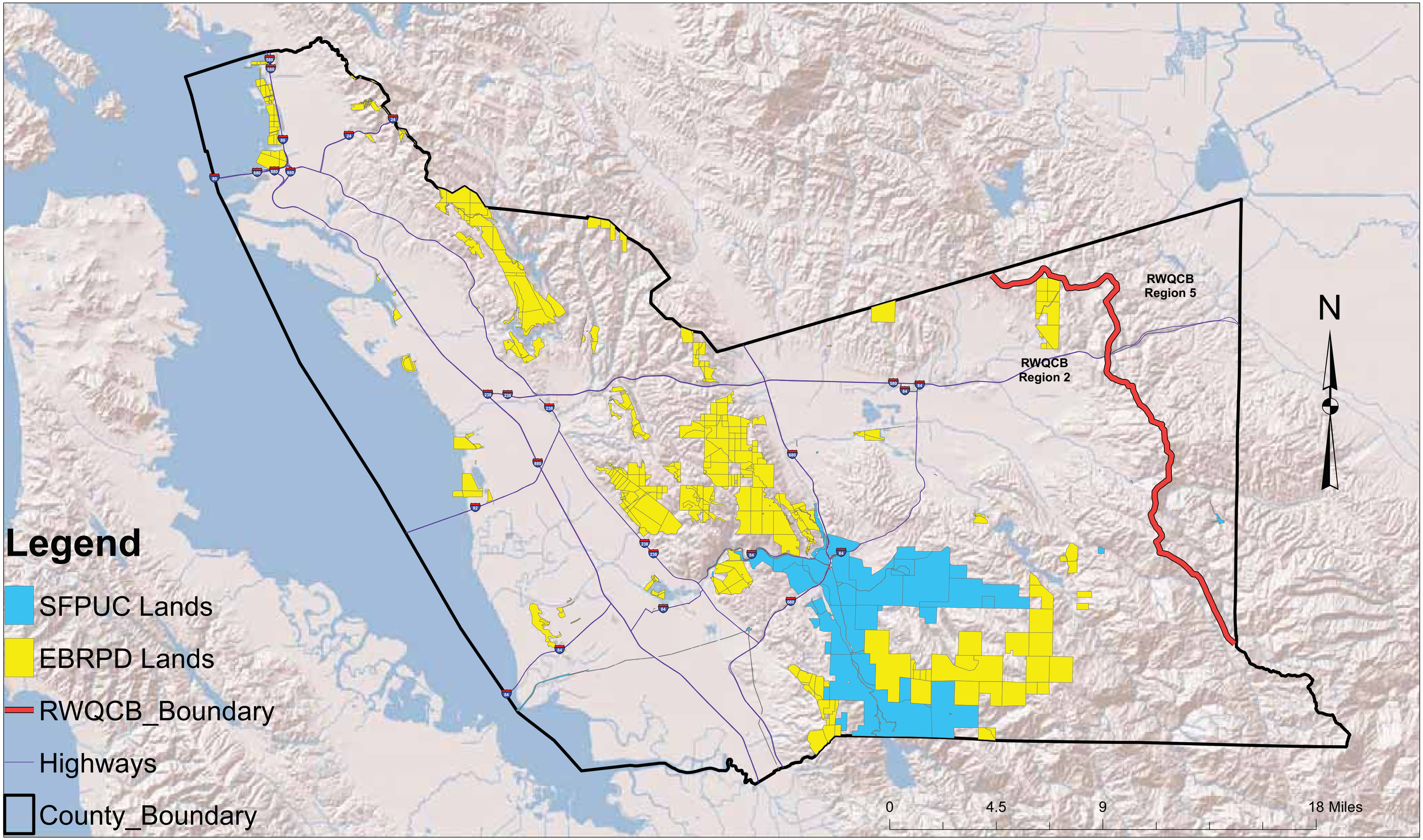


Figure 1-2. EBRPD and SFPUC Lands



led later to activities related to water quality and wastewater management. In 1982, Zone 7 completed the Wastewater Management Plan for the Unsewered, Unincorporated Area of Alameda Creek Watershed above Niles, and since that time has been active in supporting the County Department and helping to guide OWTS requirements and management activities as they relate to development and wastewater discharge impacts within their jurisdiction. Zone 7 does not have permitting authority for OWTS; however requires special approval for OWTS located within the watershed for: (1) new OWTS for a commercial or industrial use; (2) conversion of a residential OWTS to a commercial or industrial use; or (3) new residential OWTS that discharge greater than one rural residential equivalence of wastewater per 5 acres. Zone 7 and the County work cooperatively in the planning and implementation of OWTS requirements, ongoing water quality monitoring and assessment, with Zone 7 providing technical assistance and review of specific project proposals and issues of concern within the Upper Alameda Creek Watershed.

Zone 7 is the designated groundwater basin manager for the development and implementation of Salt and Nutrient Management Plans for the Livermore Valley Groundwater Basin, which includes recommendations relating to OWTS nitrogen loading, a key water quality issue in the basin. Alameda County Water District (ACWD) serves in a similar capacity as basin manager for the Niles Cone Groundwater Basin. Both of these agencies also are responsible for regulation of well drilling permits in their respective jurisdictions. **Figure 1-3** shows Zone 7 and ACWD jurisdictional boundaries, as well as the well drilling permit areas covered by Alameda County Public Works and City of Berkeley.

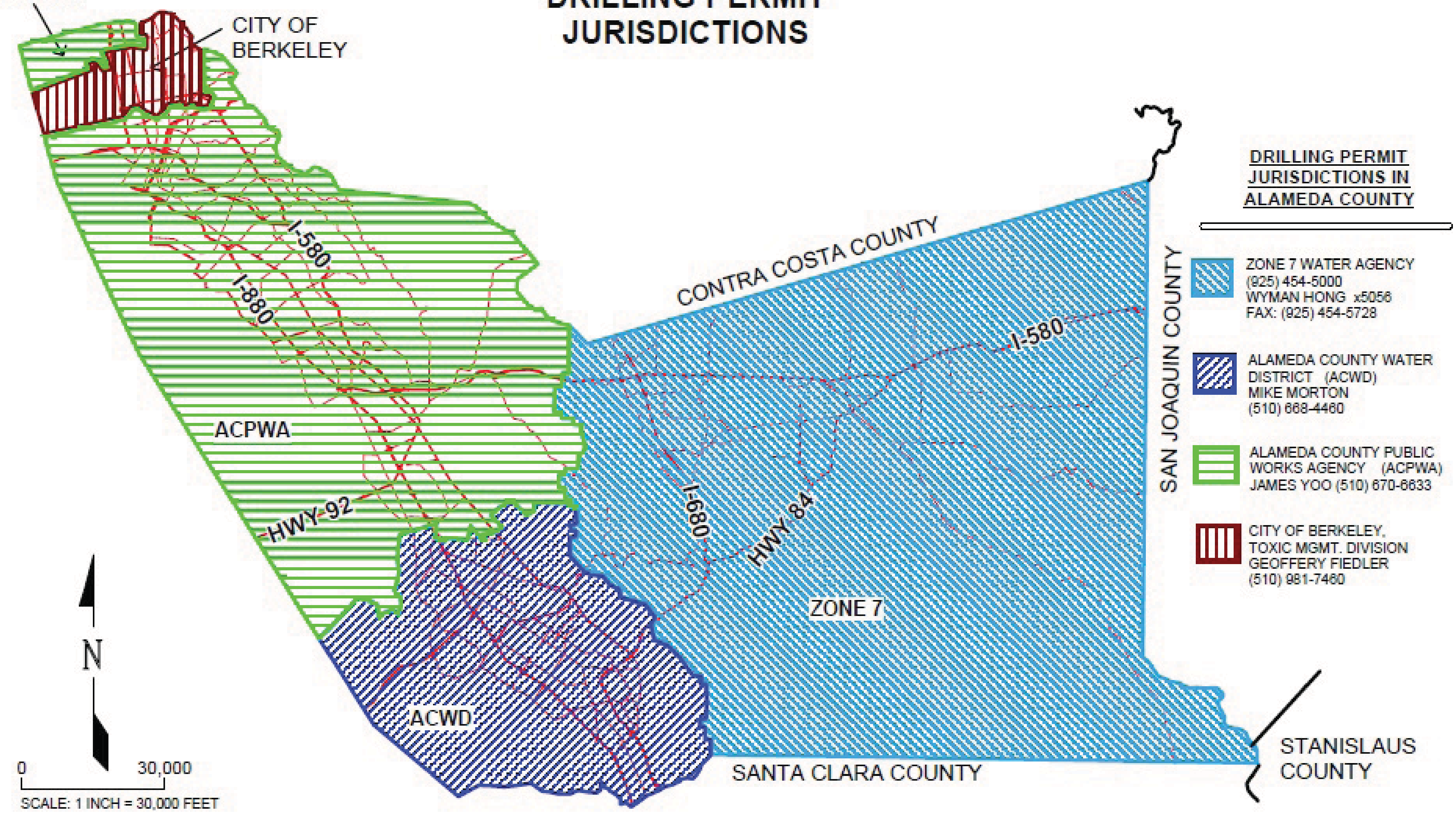
Alameda County OWTS Requirements

Requirements for the installation, use and maintenance of OWTS in Alameda County are contained in two primary documents, the Onsite Wastewater Treatment Systems Ordinance (Onsite Systems Ordinance or Ordinance) and the Onsite Wastewater Treatment Systems Manual (Onsite Wastewater Treatment Systems Manual or Manual), which accompany and form the basis for this LAMP. The OWTS Ordinance and OWTS Manual provide the policy, procedural and technical details for implementation of the LAMP.

Onsite Wastewater Treatment Systems Ordinance (Chapter 15.18)

The County Onsite Wastewater Treatment System Ordinance establishes standards for the approval, installation and operation of OWTS within Alameda County consistent with the County's overall responsibility to prevent the creation of health hazards and nuisance conditions and the protection of surface and groundwater quality. A copy of the Ordinance accompanies and is an integral part of this LAMP. Any change to the Ordinance requires approval by the Alameda County Board of Supervisors.

DRILLING PERMIT JURISDICTIONS



PERMIT JURISDICTION FOR ADJACENT COUNTIES

CONTRA COSTA COUNTY:	SANTA CLARA COUNTY:	SAN JOAQUIN COUNTY:	STANISLAUS COUNTY:
ENVIRONMENTAL HEALTH DIVISION CIA COURT (510) 646-5225	SANTA CLARA VALLEY WATER DISTRICT BILL CAMERON (408) 265-2607 x2654	PUBLIC HEALTH SERVICES MIKE HUGGINS (209) 468-3437 or (209) 468-3420	ENVIRONMENTAL HEALTH JOHN AUD or TOM WOLFE (209) 525-6756

DATE:	3/17/2016
PROJECT:	Alameda County LAMP
PROJECT NO.:	1300096
SOURCE:	www.zone7water.com
APPROVED:	NH

QUESTA ENGINEERING CORP

Water Agency and Drilling Permit Jurisdictions

FIGURE 1-3

Onsite Wastewater Treatment Systems Manual

The Onsite Wastewater Treatment Systems Manual provides the procedural and technical details for implementation of the Ordinance. The Manual contains siting, evaluation, design, construction, and operating requirements for OWTS for residential and non-residential uses including Standard and Advanced Systems and Non-Discharging Wastewater Disposal Units. The Manual also contains procedural information on permitting of OWTS, the evaluation of OWTS proprietary treatment train components and qualifications and registration requirements of OWTS practitioners. The Onsite Wastewater Treatment Systems Manual will be reviewed and updated from time-to-time to keep pace with new issues, policies, procedures, and technologies affecting the use and management of onsite systems in Alameda County. The Onsite Wastewater Treatment Systems Manual will be maintained by the Department. Any substantive changes to the Manual will require review and approval by the San Francisco Bay Regional Water Board and adoption by Resolution of the Alameda County Board of Supervisors.

Organization of this LAMP

This LAMP is organized to present a comprehensive explanation of the various requirements, policies, procedures and measures used to regulate and oversee the use of OWTS in Alameda County. It is also structured as much as possible to address the items listed in the State OWTS Policy pertaining to Local Agency Requirements and Responsibilities (Section 3.0 of the OWTS Policy) and Local Agency Management Program for Minimum OWTS Standards (Section 9.0 of the OWTS Policy). Reference is made throughout this LAMP to the County's OWTS Ordinance and Onsite Wastewater Treatment Systems Manual, which are attached as part of this LAMP. The following briefly summarize the contents of this document.

- ***Section 1 - Introduction and Background.*** This introductory section describes the overall purpose, scope, geographical coverage and overview of the key elements of the LAMP.

- ***Section 2 - Environmental Conditions, OWTS Usage and Water Quality Management in Alameda County.*** This section provides background information on environmental conditions pertinent to the use and suitability of OWTS in the County, extent of OWTS usage in the County, and a summary of OWTS management approaches and requirements adopted for protection of water quality in Alameda County.

- ***Section 3 - OWTS Siting, Design, and Construction Requirements.*** This section summarizes key requirements of the County Ordinance and Onsite Wastewater Treatment Systems Manual pertaining to siting, design and construction of OWTS, per the requirements of section 9.2 and covering applicable items listed under Tier 1 (Sections 7.0 and 8.0) of the State OWTS Policy.

- **Section 4 – Special Management Issues.** This section describes the provisions contained in the Alameda County LAMP corresponding with special OWTS management issues listed in Sections 9.2.1 through 9.2.12 of the SWRCB OWTS Policy.

- ***Section 5 - Prohibitions*.** This section describes the provisions contained in the Alameda County LAMP corresponding with the required prohibitions set forth in Section 9.4 of the State OWTS Policy.

- ***Section 6 – Program Administration.*** This section presents the County's plan for addressing the administrative aspects of the LAMP, including record keeping, on-going assessment of water quality issues related to OWTS, and reporting to the Regional Water Board, as required under Section 9.3, of the OWTS Policy.

- ***Appendix A – Supporting Rationale.*** This appendix presents a discussion of the supporting rationale (including literature sources) for the various siting and design requirements, focusing on vertical separation requirements for Standard and Advanced OWTS and comparison with Tier 1 standards of the OWTS Policy.

- ***Appendix B – OWTS Usage and Wastewater Loading Estimates.*** This appendix describes the process followed to develop estimates of the number and distribution of OWTS in Alameda County, along with estimates made of wastewater discharge volumes and nitrate loading contributions to groundwater from OWTS in 12 localized areas of OWTS usage that have either been designated as Areas of Concern or are anticipated to be a primary focus for the long-term OWTS management program in Alameda County based on the number and/or density of OWTS or other factors (Focus Areas). Maps of these areas are provided. This information will provide the baseline for the County's ongoing assessment of water quality impacts from OWTS.

- ***Appendix C - Supplemental OWTS Data and Mapping for Oakland Hills, Department File Records.*** This appendix presents various maps and data summaries related to OWTS in Oakland Hills based on information contained in current records on file with the Alameda County Department.

- ***Appendix D - Section 6 of the Zone 7 Water Agency Nutrient Management Plan.*** This appendix reproduces Section 6 of the recently adopted Nutrient Management Plan for the Livermore Valley Groundwater Basin.

Section 2: Environmental Conditions, OWTS Usage and Water Quality Management in Alameda County

This section provides background information on environmental conditions, OWTS usage and management approaches adopted for protection of water quality in Alameda County.

Geographical Setting

Alameda County can be viewed geographically as made up of two halves. The western half, consists of relatively flat urban frontage along the eastern shore of San Francisco Bay, transitioning up to the Berkeley Hills (part of the Pacific Coast range) trending northwest to southeast roughly parallel to the Bay shoreline. The urban shoreline plains, commonly referred to as the “East Bay”, extend from the City of Berkeley in the north to the City of Fremont near the southern tip of the Bay. Then from Berkeley to Oakland, San Leandro to Fremont and also in Castro Valley, the urban areas extend eastward into the mountainous upland areas. Along the Berkeley Hills is the Hayward fault, Wildcat Fault and Calaveras Fault, where there are a great number of public lands, parks and trails making up the majority of the uplands. Since the majority of the western half of the county is urban or public, there is relatively minimal development using OWTS except in the remote canyon lands near Castro Valley, the ridge areas of Hayward, and scattered pockets on the fringes or within urban development, such as in the Oakland Hills.

To the east of the Berkeley Hills, roughly half of the County forms the Upper Alameda Creek Watershed and flat basin area of the Livermore Valley. The Livermore Valley extends north into Contra Costa County, and is bounded on the south and southeast by the northern tip of the Diablo Range. East of the Livermore Valley the elevation gently rises across grassy rangeland and wind farms through the Altamont Pass, located in the eastern portion of the County, before descending into the Central Valley and immediately into San Joaquin County.

Draining almost the entirety of the eastern half of the county, the streams forming the Upper Alameda Creek Watershed converge near the Town of Sunol, where Alameda Creek then drains to the important bayside freshwater Niles Cone Groundwater Basin in Fremont. South and southeast of Pleasanton and Livermore is where the majority of the incorporated areas of the eastern half of Alameda County are developed using OWTS. Also to the south of Livermore Valley in the Diablo Range are three major water supply reservoirs: Lake Del Valle, San Antonio Reservoir and Calaveras Reservoir (lying mostly in Santa Clara County). These surface water reservoirs are used to store runoff and imported water. The streams, Altamont Creek, Arroyo las Positas, Arroyo Mocho, Arroyo Del Valle, Arroyo de Laguna, Vallecitos Creek, and Alameda Creek, are used to transport runoff and stored and imported water to Zone 7, Alameda County Water District, and the City of San Francisco Public Utilities Commission Water Department facilities.

Surface Water Hydrology

There are two major watersheds that drain the unincorporated areas of Alameda County - Alameda Creek and San Lorenzo Creek. It is estimated that approximately 90% of the OWTS in the County are located in these two watersheds. **Figure 2-1** provides a map of the county showing the delineation of these two watersheds, along with major lakes and reservoirs, significant watercourses draining the Oakland hills, and the drainage divide in the Altamont Hills, which is the jurisdictional boundary between the San Francisco Bay and Central Valley Regional Water Boards.

Alameda Creek Watershed

The Alameda Creek Watershed is the largest drainage in the southern San Francisco Bay, covering an area of approximately 700 square miles within Alameda, Contra Costa and Santa Clara Counties. Alameda Creek originates in the mountains of northeastern Santa Clara County and from there flows northwesterly through the hills of the Coast Range, merging with drainage from the Livermore-Amador Valley in the Sunol Valley, then flowing westerly through Niles Canyon and across the San Francisco Bay plain, ultimately discharging into San Francisco Bay near Coyote Hills Regional Park in Union City. Major water bodies in the watershed include Del Valle, Calaveras and San Antonio Reservoirs. Major tributary streams include Arroyo Mocho, Arroyo las Positas, Arroyo del Valle, Arroyo de Laguna, San Antonio Creek, Sinbad Creek and Stonybrook Creek. Water from Alameda Creek is used for recharging the Niles Cone groundwater basin at Quarry Lakes Park, managed by the Alameda County Water District. Zone 7 Water Agency operates similar groundwater recharge facilities in the Livermore-Pleasanton area. There are an estimated 1,288 existing OWTS in the Alameda Creek Watershed (above Niles).

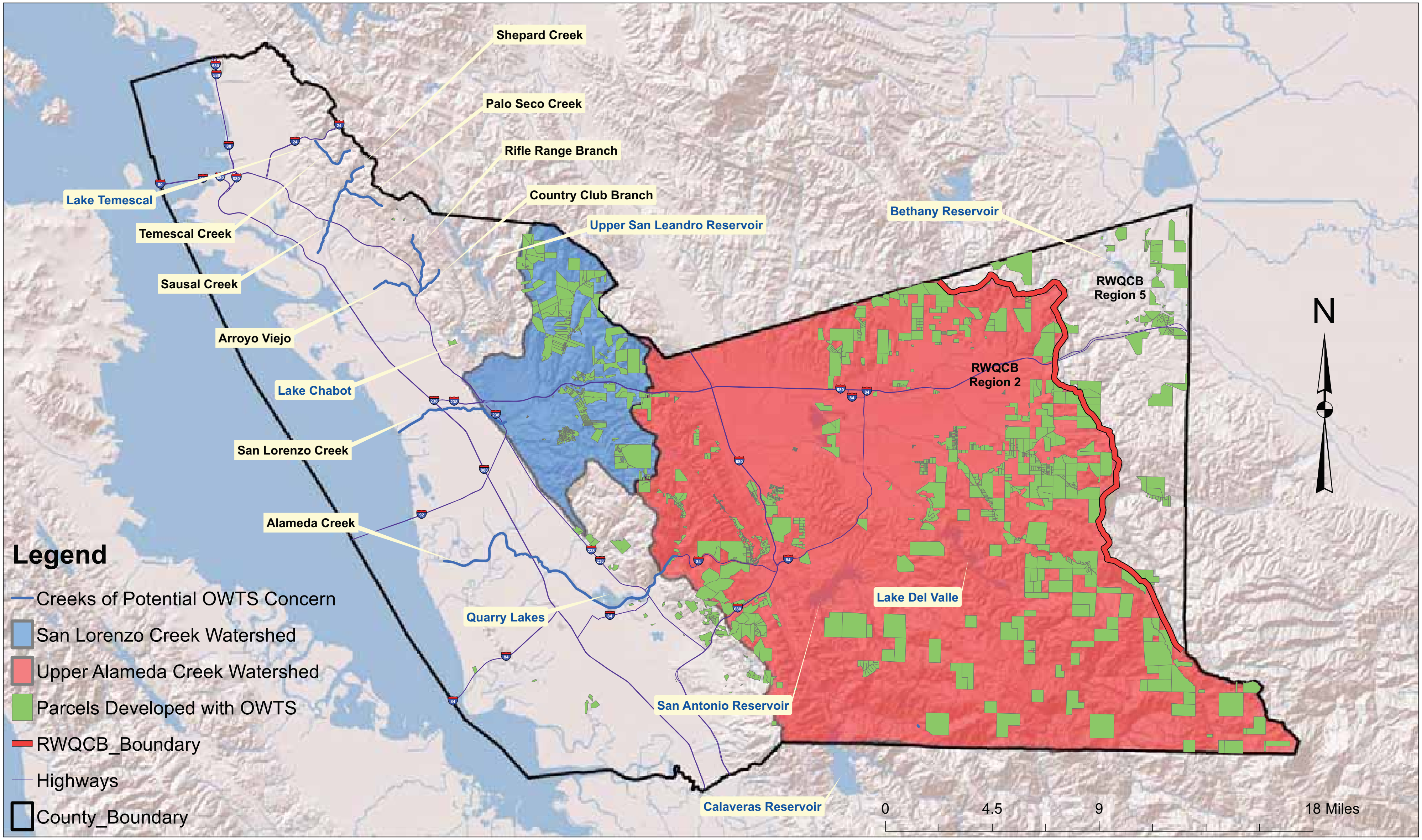
San Lorenzo Creek Watershed

San Lorenzo Creek drains an approximately 60-square mile fan-shaped watershed area originating in the hills to the north, south and east of Castro Valley. Major tributaries to San Lorenzo Creek include Cull Creek and Crow Creek to the northeast, and Palomares Creek to the southeast. These and other tributary drainages flow through steep, narrow canyons carved into the coastal hills, rising from elevations of about 200 feet above sea level at Castro Valley up to 1,850 feet above sea level at the ridgeline divides. From the confluence of streams at Castro Valley, the San Lorenzo Creek flows westerly across the San Francisco Bay plains, discharging to San Francisco Bay about three miles south of the Oakland Airport. There are an estimated 483 existing OWTS in the San Lorenzo Creek Watershed.

Oakland and Berkeley Hills

The Oakland and Berkeley Hills stretch northwest-southeast for a distance of about 15 miles along the border with Contra Costa County. The hills rise up from the East Bay plains to elevations of 1,000 to 1,400 feet above sea level and form the headwaters of numerous creeks and drainages that flow westerly through urban areas and eventually to Bay. The east side of the hills

Figure 2-1. Major Surface Water Features



consists primarily of open space park and watershed lands, most of which drain through Contra Costa County to San Leandro Creek, which in turn feeds Upper San Leandro Reservoir and Lake Chabot north of Castro Valley. Use of OWTS in the Oakland and Berkeley Hills (close to 100 systems) is primarily in various pockets of residential development within the City of Oakland along Skyline Boulevard and other areas where building took place before public sewers were extended into the hills. Streams draining the hills have steep gradients and many flow only intermittently, during the wet season or in response to rainfall events. Some of the notable streams draining areas of OWTS usage in the hills above Piedmont include Shepard and Palo Creeks, which are tributaries of Sausal Creek. The area south of Skyline High School drains to Rifle Range and Country Club Branches of Arroyo Viejo Creek, joining in the vicinity of Golf Links Road before flowing westerly past Castlemont High School and eventually to the Bay near the Oakland-Alameda County Coliseum. The hills near the junction of Highways 13 and 24 are drained by Temescal Creek, which feeds Lake Temescal, a popular recreational lake operated by the East Bay Regional Park District.

Lakes and Reservoirs

As indicated in **Figure 2-1** and summarized in **Table 2-1**, there are several important lakes and reservoirs in Alameda County. In addition, throughout the county there are a number of smaller lakes and water storage reservoirs (open and covered) used in connection with water distribution systems and agricultural operations. Also, Zone 7 and the ACWD operate large spreading basins for artificial recharge of the Livermore Valley and Niles Cone groundwater basins, some of which also provide recreational uses.

Table 2-1. Major Lakes and Reservoirs in Alameda County

Name	Watershed Area	Uses	Approximate Capacity (acre-feet)	Operated By
Calaveras Reservoir	Alameda Creek	Water Supply	100,000	SFPUC
San Antonio Reservoir	Alameda Creek	Water Supply	50,000	SFPUC
Lake Del Valle	Alameda Creek	Water Supply, Flood Control, Recreation	77,000	DWR
Upper San Leandro Reservoir	San Leandro Creek	Water Supply, Recreation	41,000	EBMUD
Lake Chabot	San Leandro Creek	Emergency Water Supply, Recreation	10,000	EBMUD
Bethany Reservoir	California Aqueduct	Water Supply, Recreation	5,000	DWR
Lake Temescal	Temescal Creek	Recreation	<100	EBRPD

Groundwater Basins

There are six distinct groundwater basins in Alameda County, as identified by the California Department of Water Resources (DWR, 2003). **Table 2-2** provides a list of the groundwater basins and **Figure 2-2** provides a map of the county showing the location and extent of these groundwater basins. The groundwater basins in the Livermore-Amador and Sunol Valleys, and in the Niles Cone, are invaluable, particularly during drought periods, as storage basins for domestic water. On average, groundwater provides about one third of the urban and agricultural demands of the Livermore valley.

Table 2-2. Groundwater Basins in Alameda County

Basin Number*	Groundwater Basin Name	Sub-basin Names
2-9.04	Santa Clara Valley	East Bay Plain
2-9.01	Santa Clara Valley	Niles Cone
2-10	Livermore Valley	Castle, Bernal, Amador, Mocho, Livermore Uplands, Spring, May, Cayetano, Cain, Dublin, Bishop, Livermore Uplands
2-08	Castro Valley	-
2-11	Sunol Valley	-
5-22.15	San Joaquin Valley	Tracy

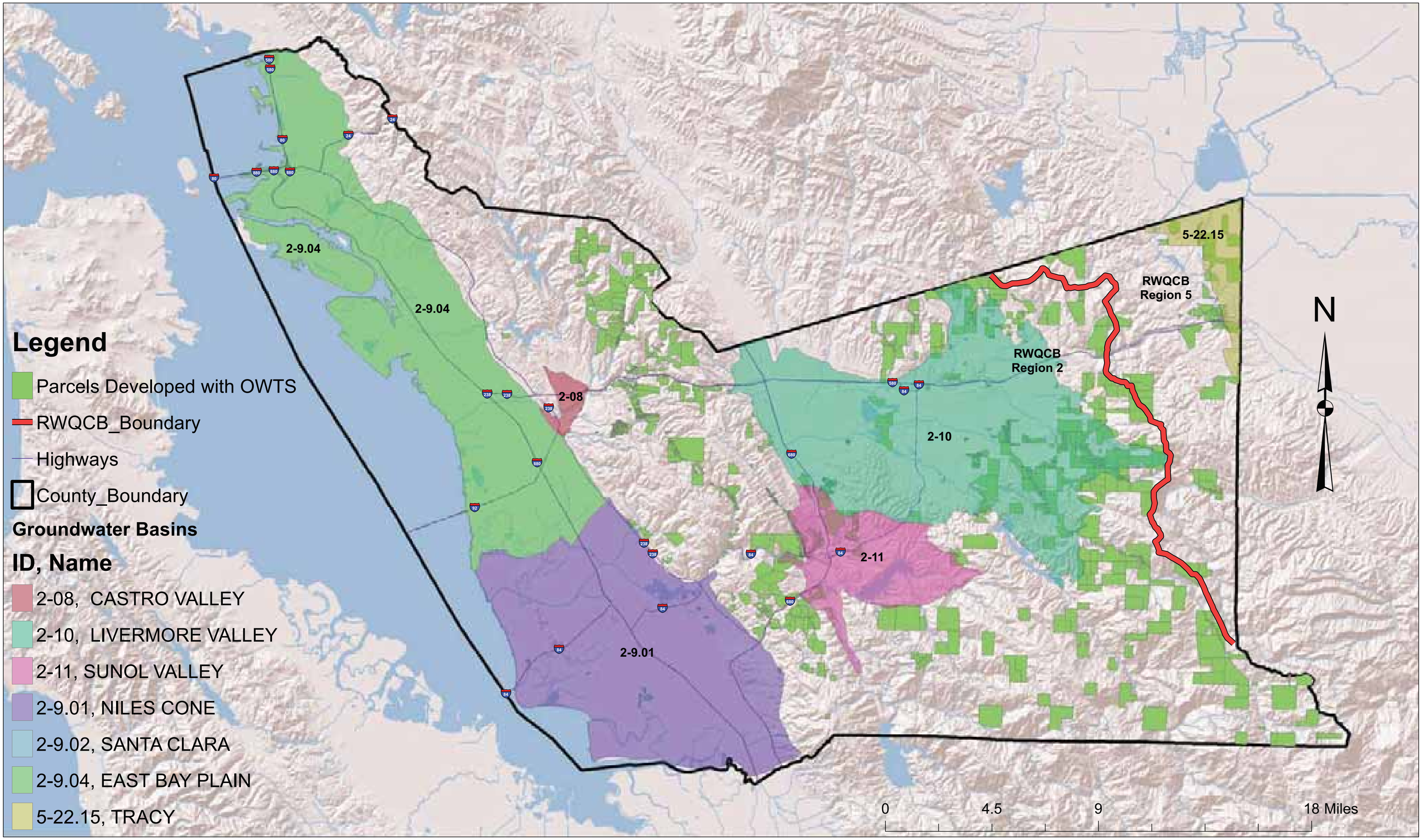
*Per DWR, Bulletin 118

Recent Groundwater Legislation Relevant to OWTS

In 2009, the State Water Board adopted the "Policy for Water Quality Control for Recycled Water" (Recycled Water Policy). The Recycled Water Policy requires among other things, that Salt and Nutrient Management Plans (SNMPs) be completed for all groundwater basins in California to manage salts and nutrients in a manner that ensures attainment of water quality objectives and protection of beneficial uses.

In 2014, the State Water Board adopted the Sustainable Groundwater Management Act (SGMA), effective January 1, 2015, which gives local agencies the authority to manage groundwater in a sustainable manner and allows for limited state intervention when necessary to protect groundwater resources. For SGMA DWR prioritizes groundwater basins with the greatest water supply importance (ranked as high- and medium-priority). Statewide 43 groundwater basins are ranked as high-priority and 84 are ranked as medium-priority basins. Alameda County has four distinct medium-priority groundwater basins: (1) Niles Cone Sub-basin; (3) East Bay Plain Sub-basin; and (3) Livermore Valley Basin and (4) a small portion of the Tracy Sub-basin. Sunol Valley and Castro Valley basins are ranked as very low-priority groundwater basins.

Figure 2-2. Major Groundwater Basins



The SGMA requires the creation of groundwater sustainability agencies (GSAs) to develop and implement local plans allowing 20 years to achieve sustainability. GSAs responsible for high- and medium priority basis must adopt Groundwater Sustainability Plans (GSPs) for the management and use of groundwater without causing undesirable results, including but not limited to degradation of water quality. The SGMA designates Alameda County Water District and Zone 7 as the GSAs for the Niles Cone Sub-basin and the Livermore Valley Basin, respectively. It is anticipated that one of the San Joaquin Valley Basin GSAs will manage the small portion of the Tracy Sub-basin that is within Alameda County.

The two major groundwater basins of significance in Alameda County with respect to OWTS are the Livermore Valley and the Niles Cone basins, and to lesser extent the Sunol Valley and Tracy Sub-basin.

Livermore Valley Groundwater Basin

The Livermore Valley Groundwater Basin lies within a structural trough of the Diablo Range, extending from east to west from the Pleasanton Ridge to the Altamont Hills, and south to north from the Livermore Upland to the Orinda Upland. The groundwater basin extends over a surface area of approximately 109 square miles (69,600 acres), including lands primarily in Alameda County and a small portion in Contra Costa County. Zone 7 Water Agency manages groundwater in the basin under authority from the California Water Code, and adopted a groundwater management plan in 2005. Zone 7 is also the designated GSA and is currently working on preparing a GSP for the Livermore Valley Basin.

The basin has a total estimated storage capacity of about 500,000 acre-feet, with current groundwater in storage at roughly half the total capacity. Under average hydrologic conditions the basin is estimated to be in balance, with annual inflows and outflows totaling roughly 23,600 acre-feet (ac-ft). Primary inflows are from natural and artificial recharge operation (19,500 ac-ft/year); primary outflows are for urban water supply (12,700 ac-ft/yr) and evaporation from gravel mining operations (6,900 ac-ft/yr).

The water-bearing materials in the basin consist of continental deposits from alluvial fans, outwash plains and lakes. Depths of domestic wells range from about 100 to 350 feet; municipal and irrigation well depths range from about 300 to 800 feet. Well yields are generally moderate to high, on the order of 500 to 4,500 gallons per minute (gpm) in the Main Sub-basin, and 2 to 300 gpm in the Fringe Sub-basin.

Water quality in the groundwater basin is generally suitable for all uses; however, monitoring by Zone 7 has determined localized areas of high nitrate concentrations related to overlying land uses activities. Groundwater nitrate conditions and recommended management activities to correct impairments are addressed in the "*Nutrient Management Plan - Livermore Groundwater Basin"* (NMP), issued by Zone 7 in February 2015, and adopted by the San Francisco Bay Regional Water Board in March 2016. Specific recommendations for OWTS are covered in the NMP.

Niles Cone Groundwater Subbasin

Niles Cone is a structural subbasin of the larger Santa Clara Valley Groundwater Basin. The Niles Cone occupies about 103 square miles (65,800 acres) beneath the San Francisco Bay plains in the southern part of Alameda County. The basin is bounded to the east by the hills of the Diablo Range and on the west by San Francisco Bay. It extends north to south from about Hayward to the Alameda County-Santa Clara County border. The Alameda County Water District (ACWD) is responsible for management of the Niles Cone Groundwater Sub-basin under the authority from the Water Code and adopted the "Alameda County Water District Groundwater Management Policy" in 1989. ACWD is also the designated GSA and is currently working on preparing a SNMP and a GSP for the Niles Cone Sub-basin.

The Niles Cone is comprised mainly of the alluvial fan formed by Alameda Creek where it leaves the coastal hills (Niles Canyon) and spreads across the San Francisco Bay plains. Groundwater in storage above sea level is estimated to be about 38,000 acre feet. Annual inflows to the basin total approximately 45,000 ac-ft/yr, with 75% provided by artificial groundwater recharge operations conducted by ACWD principally supplied by runoff from Alameda Creek diverted to percolation ponds (Quarry Lakes Park). Outflows from the basin include approximately 23,000 ac-ft/yr for municipal supplies, 6,300 ac-ft/yr for saline water extraction (aquifer reclamation), and 6,000 -7,400 ac-ft/yr outflow to the Bay.

Average depth of water supply wells is about 200 feet. Well yields are typically moderate to high, ranging from 650 to about 3,000 gpm for municipal/irrigation wells. Management of salinity is the primary challenge for this groundwater basin. Water quality monitoring data indicate few incidences of elevated nitrate concentrations. There are very few OWTS located within the land area overlying the groundwater basin. However, since runoff from the Alameda Creek Watershed is an essential source of recharge to the groundwater basin, land use and wastewater management activities within the Alameda Creek Watershed can impact the Niles Cone groundwater.

Sunol Valley Groundwater Basin

The Sunol Valley Groundwater Basin occupies a structural trough in the hills of the Diablo Range with a surface area of approximately 41 square miles (26,240 acres). Streams in the contributing drainage area include Upper Alameda, La Costa, Sinbad, Indian, Vallecitos and San Antonio Creeks, and Arroyo de la Laguna. The principal source of recharge is infiltration of surface water along Arroyo de la Laguna and Alameda, San Antonio and Vallecitos Creeks. The general direction of groundwater movement is from the upland areas toward Alameda Creek and then westward toward Niles Canyon, the outlet of the basin.

Water bearing materials in the basin consist of unconsolidated to semi-consolidated continental deposits of gravels, sand, silts and clays laid down in alluvial fans, outwash plains and lakes. Well yields for domestic and municipal wells are reported to in the range of 2 to 50 gpm, with well depths typically in the range of 200 to 350 feet, based on approximately 70 well completion reports on file with the DWR. Shallow depth to groundwater on the order of 20 to 30 feet below ground surface is typical in the valley areas. Water quality is generally good to excellent, limited in some areas high mineral content. High nitrate concentration in some shallow wells indicates degradation from surface sources (DWR, 1974). Mean annual precipitation in the basin ranges from 17 to 20 inches. There is currently no significant groundwater management in the Sunol basin, however Zone 7 is designated the exclusive GSA for all groundwater basins in its jurisdiction of which Sunol Valley Basin is, by SGMA, for when a groundwater sustainability plan becomes a requirement.

East Bay Plain Groundwater Subbasin

The East Bay Plain is a subbasin of the Santa Clara Valley Groundwater Basin. It underlies the urban western portions of Alameda and Contra Costa Counties, extending from San Pablo Bay in the north to Niles Cone Groundwater Subbasin in the south, with a surface area of about 77 square miles. The predominant water bearing materials are unconsolidated alluvial deposits, in places extending as deep as 1,000 feet. The basin is recharged largely from the numerous streams that originate in the East Bay hills and flow across the urban areas to the Bay. Some of the streams drain watersheds that support development using OWTS, e.g., Sausal Creek and Arroyo Viejo Creek. Although it is not a primary water resource for the area, there are several hundred wells that supply domestic, municipal and agricultural uses. Production amounts are indicated by the DWR (2004) to be on the order of about 2,500 ac-ft/yr for municipal supply and about 1,000 ac-ft/yr for agriculture. Typical well depths are in the range of 30 to 600 feet, with yields of 100 to 1,000 gal/min. Water quality is generally suitable for all uses; however, the Regional Water Board has identified more than a dozen areas of major groundwater pollution in shallow groundwater zones attributable to release of fuels and solvents in the heavily urbanized areas.

Castro Valley Groundwater Basin

Castro Valley Groundwater Basin is a small alluvial basin located north of Hayward and bisected by Interstate 580, with a surface area covering about 1,800 acres (three square miles). Natural recharge to the basin occurs principally as seepage from streams that drain the upland areas and by direct percolation of precipitation that fall on the basin floor. San Lorenzo Creek and its tributaries principally drain the basin and discharge to San Francisco Bay. The basin has been developed with only a small number of wells and, according to DWR (2004) there is no published information on aquifer conditions, water budget or water quality. Well yields are low, and considered suitable mainly for garden and lawn irrigation. The high permeability and near surface proximity of the thin alluvial deposits make them susceptible to contamination and should eliminate consideration as a source of drinking water. Mean annual precipitation in the basin ranges from 18 to 24 inches.

Tracy Sub-basin

A very small portion of the Tracy Sub-basin extends into the northeastern corner of Alameda County on the east side of the Altamont Hills. The Tracy Sub-basin covers 539 square miles (345,000 acres) mostly in San Joaquin County and is a part of the larger San Joaquin Valley Groundwater Basin. It is comprised of largely of alluvium and flood plain deposits, and is drained by the San Joaquin River. It represents a very small part of the groundwater resources in Alameda County in an area with sparse development and OWTS usage.

Upland and Highland Regions

In the upland and highland areas of the county groundwater conditions vary locally, depending on specific geologic conditions. The occurrence of groundwater is dependent on the presence of porous, permeable rock stratum capable of storing and transmitting water. In hard and fine-grained rock formations, as occur in the Diablo Range, water available to wells is commonly from the secondary permeability and porosity, which results from deep weathering, shearing and fracturing of the rock. Groundwater of sufficient quantity to supply individual domestic wells and springs can also occur locally in deep colluvial and landslide deposits in the upland and highland regions of the county.

Soils and OWTS Suitability Mapping

General Soils Map

Figure 2-3 presents a General Soils Map of Alameda County compiled from information contained in soil surveys and mapping published by the U.S. Department of Agriculture (USDA), which include: (1) Soil Survey of Alameda County, California, 1966; and (2) Online soils data base maintained by the Natural Resources Conservation Service (NRCS). The General Soils Map contained in the 1966 Soil Survey of Alameda County provided the baseline groupings of general soil associations, which were extended to cover other portions of the County, as shown in **Figure 2-3**.

Soils in the County can be grouped into general landform classifications as follows:

(1) **Urban Areas (0).** Soils found in the flat portions of the East Bay that occur in sewered areas were not analyzed.

(2) **Soils of the Uplands (1, 2, 3)**. Soils found in the uplands are shallow to moderately deep, well drained to excessively drained loams and gravelly loams. Constraints of steep slopes, shallow soils over rock, erosion and local landslides may be potentially overcome by alternative treatment and/or shallow dispersal designs in these areas.

(3) **Terraces, Alluvial Fans and Floodplains (4, 5, 6, 7).** Soils of the floodplains, alluvial fans and terraces are formed in alluvium weathered from sedimentary rocks. Many OWTS are

Figure 2-3. Alameda County General Soils Map

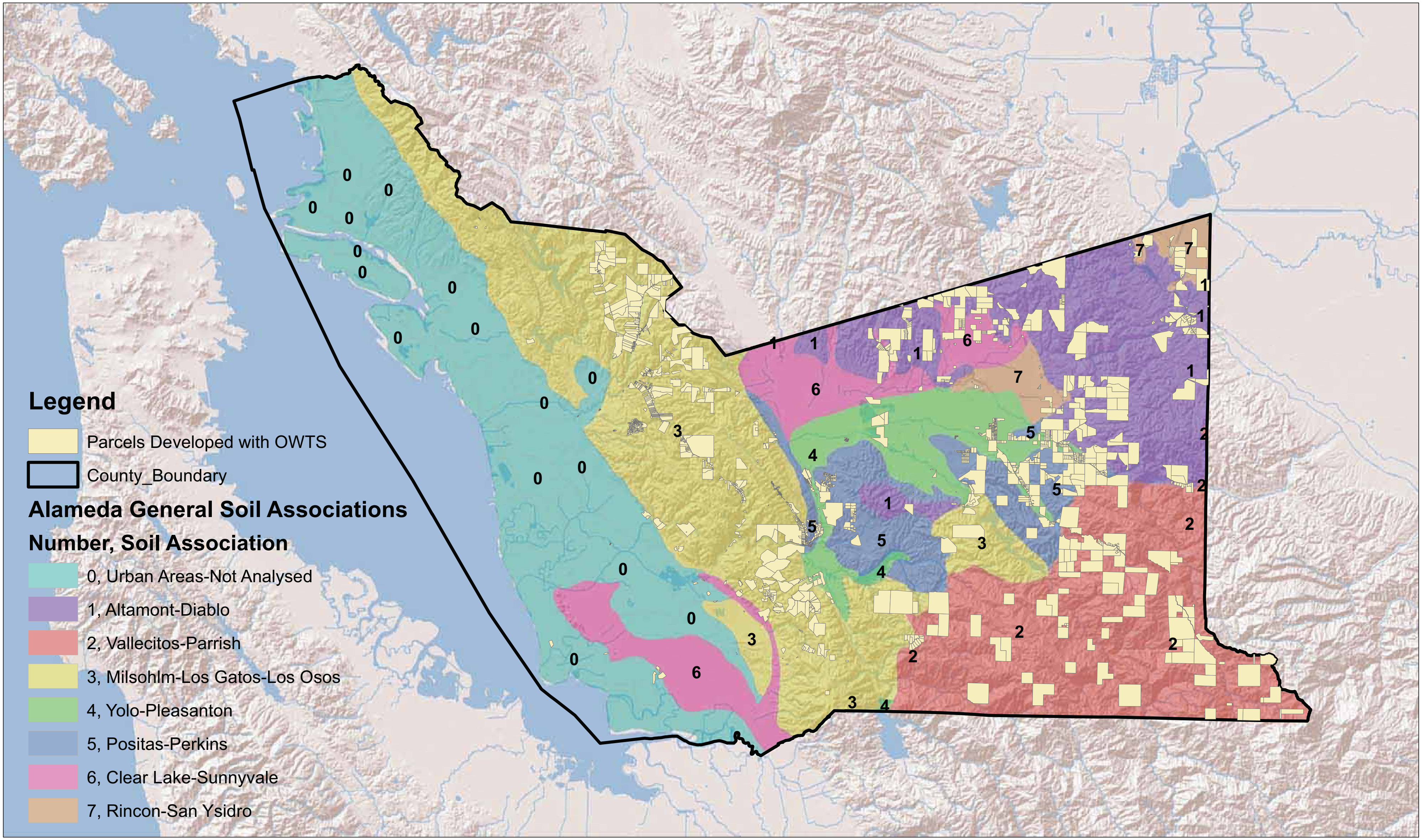


Table 2-3: Alameda County General Soil Associations

Legend No.	Soil Association Name	Description	Soil Depth	Slope	Drainage	Soil Texture	Suitability and Constraints for OWTS	Estimated Number of OWTS
1	**Altamont-Diablo**	**Soils formed in material weathered from interbedded sedimentary rock found in the smooth, rounded uplands north and east of Livermore Valley**	moderately deep	moderately sloping to very steep along streams	well drained to excessively drained	clay to gravelley loam and clay loam underlain by soft sandstone	Suitable conditions for conventional OWTS; some inclusions of low permeability and perched GW favoring shallow dispersal designs	202
2	**Vallecitos-Parrish**	**Soils formed in material weathered from metasedimentary and basic igneous rocks found in the uplands of the southeast county**	shallow to moderately deep	moderately steep and very steep	well drained to excessively drained	loam to gravelley loam	Moderately constrained by steep slopes and shallow soils, potentially requiring advanced treatment and/or shallow dispersal designs	105
3	**Milsohlm-Los Gatos-Los Osos**	**Soils formed in material weathered from moderately hard sedimentary rocks found in the uplands from Calveras Reservoir to Upper San Leandro Reservoir**	very shallow to moderately deep	strongly sloping to very steep	well drained to excessively drained	very gravelley sandy loam and sandy clay loam	Moderately constrained by steep slopes and shallow soils, potentially requiring advanced treatment and/or shallow dispersal designs. Erosion and landslide hazards locally.	820
4	**Yolo-Pleasanton**	**Soils formed in alluvium weathered from sedimentary rocks found on flood plains and terraces**	very deep	nearly level to sloping	well drained	clay to gravelley course sandy loam	Suitable conditions for conventional OWTS; some inclusions of low permeability and perched GW favoring shallow dispersal designs	356
5	**Positas-Perkins**	**Soils formed in alluvium weathered from sedimentary rocks found on high terraces south of Livermore Valley**	shallow to moderately deep	nearly level to strongly sloping	well drained	gravelly loam underlain by claypan soils	Suitable conditions for conventional OWTS; some inclusions of rapid percolation, potentially requiring advanced treatment and/or shallow dispersal designs.	362
6	**Clear Lake-Sunnyvale**	**Soils formed in alluvium weathered from sedimentary rocks found in floodplains, basin areas and on low terraces east of Dublin, and also on low terraces in the southwest Urban area of the county**	very deep	nearly level to gently sloping	well drained to imperfectly drained	clay to clay loam	Suitable conditions for conventional OWTS; some inclusions of low permeability and perched GW favoring shallow dispersal designs	64
7	**Rincon-San Ysidro**	**Soils formed in alluvium weathered from sedimentary rocks found in the northeast corner of the county and in the Livermore Valley**	shallow to very deep	nearly level	well drained	clay loam to loam	Suitable conditions for conventional OWTS; some inclusions of low permeability and perched GW favoring shallow dispersal designs	39

found in the Livermore Valley, where the floodplain soils may range from slowly permeable clays to rapidly permeable gravelly loams. Beneath the surface soils, it is not uncommon to find at shallow depth a restrictive layer, with low permeability and/or perched groundwater conditions, which favor shallow dispersal system designs. Some of the high terraces south of Livermore and west of Pleasanton (the Positas-Perkins Soil Association, 5) consist of gravelly loams underlain by claypan soils, which may be constrained locally by rapid percolation which can reduce the effectiveness of soil treatment.

Soil-OWTS Suitability

The general mapping of soil conditions takes into account location and landform conditions, soil depth above bedrock, slope, subsurface texture, and drainage conditions of the soils, which are all key factors that can affect the suitability of the soils for onsite wastewater treatment. **Table 2-3** was developed from the published soil survey information, summarizing the soil characteristics of the general soil associations mapped in **Figure 2-3**.

The second to last right-hand column in **Table 2-3** highlights the key constraints and overall suitability designation for OWTS for each general soil association. The designations were developed and assigned based on the USDA soils information and best professional judgment. This is provided as a general assessment tool and is not a substitute for site-specific investigation of and planning for onsite wastewater treatment systems. It provides a general indication of the management and design issues likely to be encountered in each area. It does not take into account local constraints such as steep slopes, setback or other anomalous conditions that may be found on particular sites. The last column in the table gives the estimated number of residential OWTS within each general soil area, determined by merging the parcel data reflecting OWTS usage estimates (see below) with the soil mapping boundaries.

OWTS Usage Estimates

Parcel Development Status

Since a comprehensive inventory of existing OWTS usage in Alameda County does not exist, estimates were made by Questa Engineering. The geographic area covered in the analysis includes all of Alameda County, with the parcel data analysis focused mainly on the unincorporated lands within the county. All incorporated property within the various cities (except for Oakland Hills, discussed below) was excluded, as was unincorporated property known to be within a sewer district. The analysis included a systematic geographic information system (GIS) based inventory to determine the development status (i.e., developed or vacant) of all parcels in non-sewered areas of the County; the evidence of a “building” (from assessor records) was used as the best indicator of the likely probability of an OWTS on the property. The step-by-step methodology followed to develop estimates of the number and distribution of OWTS in the county is provided in **Appendix B**. The analysis produced the totals below for the non-sewered unincorporated areas of the County; the locations of parcel development with OWTS are shown in **Figure 2-4**.

- Developed Parcels (OWTS): 1,983
- Vacant Parcels: 3,156

Total Parcels: 5,139

From County records there are known to be pockets and scattered individual OWTS in some urban areas, most notably in portions of the Oakland Hills. Utilizing records contained in Department files, the Department staff developed estimates and maps of OWTS usage in the Oakland Hills, which are provided in **Appendix C**. The Department inventory showed an estimated 85 existing developed properties using OWTS in the Oakland Hills; and this was added to the GIS-based inventory by Questa (above), bringing the total existing OWTS estimate to 2,068.

Based on County files, there are estimated to be more OWTS in other cities serving properties that, for one reason or another, never connected to available public sewers. However, these OWTS are assumed to be widely scattered and were not inventoried for the purposes of the County's LAMP. It is understood that municipal sewer systems either are currently or potentially available to all or most all of these parcels; and Ordinance requirements will generally lead to eventual sewer connection for these parcels in the future.

Areas of Concern and Focus Areas

In locations where there are special environmental or geographical concerns, additional evaluation, standards and requirements must be followed as set forth in the Ordinance and the Manual. Several Areas of Concern have been formally designated by Zone 7 and the San Francisco Bay Regional Water Board in the 2015 Nutrient Management Plan for the Livermore Valley Groundwater Basin due to nitrate impacted groundwater in these areas. Other Areas of Concern may be proposed for inclusion in the future as a result of information obtained during the development and/or implementation of this LAMP. **Table 2-4** presents a list and brief descriptions of 12 localized areas of OWTS usage that have either been designated as Areas of Concern or are anticipated to be a primary focus for the long-term OWTS management program in Alameda County based on the number and/or density of OWTS or other factors (Focus Areas). To assist with present and future management of OWTS and water quality assessments in these areas, GIS data, along with Department information for the Oakland Hills properties, have been compiled to give estimates of the number of OWTS in each area, along with median and average parcel size, which are presented in **Table 2-5**. From the OWTS/parcel data, estimates were then made of the approximate wastewater discharge volumes from OWTS as well as the associated loading of nitrogen to the soil and groundwater environment for each area, which are also given in **Table 2-5**. The locations of these areas are indicated in **Figure 2-4**; detailed GIS maps of each area are provided in **Appendix B** for further reference. Mapping of OWTS in the Oakland Hills is provided in **Appendix C**. As can be seen, these areas account for an estimated 1,241 OWTS, nearly 60% of the total OWTS in the unincorporated (plus Oakland Hills) areas of the county.

Figure 2-4. OWTS Areas of Concern & Focus Areas

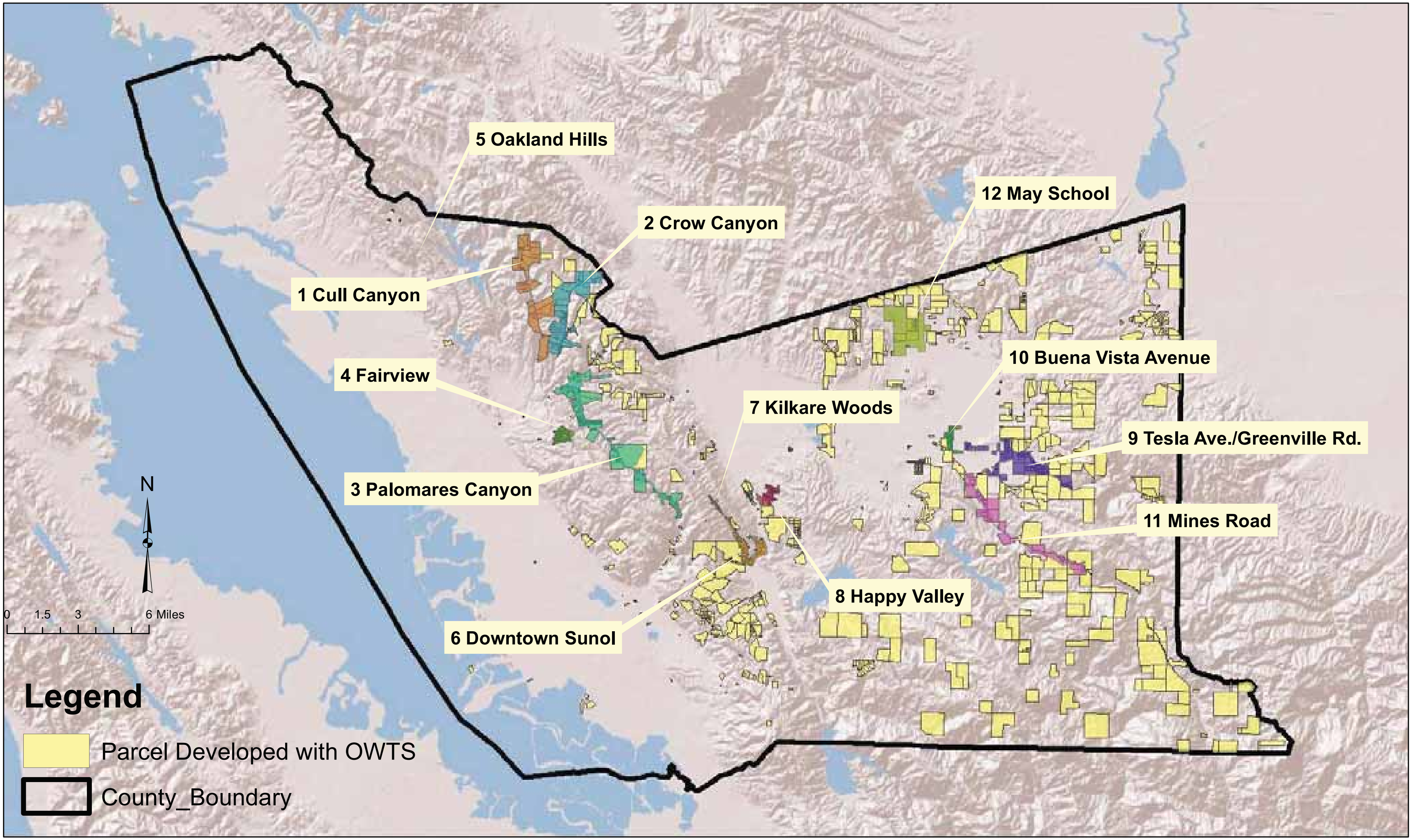


Table 2-4. Designated Areas of Concern & Focus Areas for OWTS in Alameda County

No.	Area of Concern Status	Area Name	Nearest City or Community	Affected Watercourses or Groundwater Basin	OWTS Issues
1		Cull Canyon	Castro Valley	Cull Creek, San Lorenzo Creek	Development in steep-sided canyon, rocky soils, steep terrain, encroachment within stream terraces, limited replacement area
2		Crow Canyon/Norris Canyon	Castro Valley	Crow Creek, San Lorenzo Creek	Development in steep-sided canyon, rocky soils, steep terrain, encroachment within stream terraces and stream-bank areas (Norris Canyon); limited replacement area;
3		Palomares Road	Castro Valley	Palomares Creek, San Lorenzo Creek	Dense development within steep-sided canyon, steep terrain, encroachment within stream terraces, limited replacement area
4		Fairview	Hayward	Ward Creek, Sulphur Creek, San Lorenzo Creek	100+ homes on ridge-top area; OWTS in some areas constrained by shallow soils over bedrock, limited replacement area, steep terrain
5		Oakland Hills	Oakland	East Bay Plain GW Basin, Sausal Creek	High number of failing systems, public sewer connection available using low pressure sewage systems (grinder pumps or STEP systems)
6		Downtown Sunol	Sunol	Sinbad Creek, Arroyo de la Laguna, Alameda Creek, Sunol GW Basin	Large concentration of residences (150+) and small commercial district at confluence of several drainages; generally suitable lot sizes and favorable soils for OWTS; cumulative wastewater loading impacts on groundwater a potential issue.
7		Kilkare Woods	Sunol	Sinbad Creek	Historical development dating to 1920s; summer cabins converted over the years to full-time residences; very small lot sizes, densely developed in steep, wooded terrain and stream terraces with minimal setbacks; many antiquated and non-conforming OWTS.
8	Designated	Happy Valley	Pleasanton	Livermore Valley GW Basin	Moratorium area established in 1973; high density of OWTS in area of localized nitrate-impacted groundwater.
9	Designated	Tesla Ave/Greenville Rd	Livermore	Livermore Valley GW Basin	Area with generally gravelly basin soils overlying localized nitrate-impacted groundwater
10	Designated	Buena Vista Ave	Livermore	Livermore Valley GW Basin	Area with generally gravelly basin soils overlying localized nitrate-impacted groundwater
11	Designated	Mines Rd	Livermore	Livermore Valley GW Basin	Area with generally gravelly basin soils overlying localized nitrate-impacted groundwater
12	Designated	May School	Livermore	Livermore Valley GW Basin	Area with generally gravelly basin soils overlying localized nitrate-impacted groundwater

Table 2-5. Alameda County Designated Areas of Concern & Focus Areas, OWTS Discharges and Loading Estimates

No.	Name	Area of Concern Status	Gross Acresage of Focus Area (ac)	Number of Developed Parcels with OWTS	Median Parcel Size (ac)	Area-wide OWTS Density (ac/OWTS)	Estimated Daily OWTS Discharge* (gpd)	Estimated OWTS Discharge		Estimated Annual Nitrogen Loading**	
								Daily Discharge per Acre (gpd/ac)	Annual Total (Mgal/yr)	Total Loading (lbs/yr)	Per Acre (lbs/ac-yr)
1	Cull Canyon		2,072	36	26.0	58	5,400	2.61	1.97	1,151	0.56
2	Crow/Norris Canyon		1,943	105	2.5	19	15,750	8.11	5.75	3,356	1.73
3	Palomares Canyon		2,818	196	4.4	14	29,400	10.43	10.73	6,265	2.22
4	Fairview		278	125	1.3	2	18,750	67.45	6.84	3,995	14.37
5	Oakland Hills		113	85	1.12	1.33	12,750	112.83	4.65	2,717	24.04
6	Downtown Sunol		556	162	1.2	3	24,300	43.71	8.87	5,178	9.31
7	Kilkare Woods		46	99	0.2	0.46	14,850	322.83	5.42	3,164	68.79
8	Happy Valley	Designated	293	92	1.3	3	13,800	47.10	5.04	2,941	10.04
9	Tesla Ave. Greenville Rd.	Designated	1,556	121	5.5	13	18,150	11.66	6.62	3,868	2.49
10	Buena Vista Avenue	Designated	224	98	1.4	2	14,700	65.63	5.37	3,132	13.98
11	Mines Road	Designated	1,589	72	5.1	22	10,800	6.80	3.94	2,301	1.45
12	May School	Designated	1,071	28	5.2	38	4,200	3.92	1.53	895	0.84
	Total			**1,219**			**182,850**	**703.06**	**66.74**	**38,963**	

** Based on 150 gpd/residence*

*** Based on 70 mg-N/L total nitrogen concentration*

Water Quality Management Measures

The following summarizes how key site suitability, land use and development factors have been addressed in the OWTS requirements of Alameda County's LAMP for protection of water quality. This summary is organized to correspond with the elements listed under Section 9.1 of the SWRCB OWTS Policy.

Groundwater Quality Protection

(1) **Soil Conditions.** Soil suitability is the single most critical aspect of onsite wastewater treatment and dispersal. The soil provides the medium for the absorption and treatment of wastewater discharged through sub-surface dispersal systems. This is accomplished mainly through a combination of physical filtering, biological and chemical processes, and dilution. Protection of underlying groundwater relies on provision of an adequate depth of permeable soil below the dispersal field (zone of aeration) for absorption and treatment to occur. The Alameda County OWTS Ordinance and Manual require detailed site evaluation to document suitable soil characteristics and depth for each OWTS installation consistent with industry practices and appropriate for the conditions and requirements in Alameda County (see **Section 3**). The observed depth and percolation characteristics of the soil are used to select the appropriate location, sizing and design of the OWTS to achieve proper effluent dispersal and groundwater protection.

(2) **Geologic Factors.** Geology is important to the suitability and performance of OWTS due to its influence on topography and landforms, the type and characteristics of soils that develop at the surface, the occurrence and movement of sub-surface water, and slope stability. A large number of OWTS in Alameda County are located in the valley-alluvial areas, where geology plays a relatively small role. Geologic conditions are of greater significance in the hills and mountainous regions, where the rock formations may influence the suitability for and effects of OWTS. Geologic factors are addressed for new OWTS based on: (a) information from basic site evaluations for all installations; and (b) for systems located on slopes over 30%, near areas of unstable land masses, or where otherwise required by the Department, the completion of a geotechnical study, including assessment of hydrogeologic conditions, water movement and slope stability.

(3) **Groundwater Conditions.** Groundwater conditions are of high importance for OWTS usage in Alameda County due to the extensive reliance on local aquifers for both public and private water supplies. This is especially true in the Upper Alameda Creek Watershed, where the great majority of OWTS are located. Site evaluation practices include requirements for documenting groundwater conditions, which include procedures for wet weather observations. Documentation of groundwater levels, in combination with observation of soil texture in soil profiles, hydrometer analysis test results, and soil permeability (percolation rate) test results, provide the basis for selection of the appropriate OWTS design required to maintain the requisite vertical separation distance between the point of effluent dispersal and the water table for protection against

pathogen impacts. Siting and design criteria addressing groundwater separation requirements have been developed to provide the following:

- Vertical separation distance of 5 to 20 feet for Standard OWTS;
- Reduced vertical separation distance of 3 feet for OWTS utilizing Advanced (supplemental) treatment or Advanced dispersal methods, such as pressure distribution;
- Reduced vertical separation distance of 2 feet for OWTS utilizing Advanced (supplemental) treatment and pressure distribution;
- No provision for vertical separation distance of less than 2 feet.

Appendix A provides further discussion of the supporting rationale, including literature sources, for the OWTS groundwater separation requirements adopted by Alameda County.

(4) **Areas with High Usage of Domestic Wells.** Water supply for incorporated areas in Alameda County is provided by public water systems. However, there are many rural regions of the county outside of municipal water service areas where water is supplied by individual domestic wells and sanitation is provided by OWTS. With the exception of Kilkare Woods, Downtown Sunol, Fairview Castle Homes, and Buena Vista Avenue, which are supplied by public water, the majority of areas with OWTS in Alameda County use private wells in large part for potable water supply. Also, groundwater flowing beneath areas with OWTS may reach municipal supply wells located downgradient of the OWTS areas. Measures to assure protection of existing, downgradient and new domestic water supply wells from the effects of OWTS include the following:

- Minimum horizontal setback distances between OWTS and private and public water supply wells;
- Water well testing, review and approval by the Department for new development; Zone 7 Water Agency, Alameda County Water District and Alameda County Public Works handle well drilling permits;
- Minimum 40,000 or 60,000 square foot lot size limitations for parcels using OWTS and public water supply or private water supply, respectively, in areas of the County outside of the Upper Alameda Creek Watershed;
- Minimum 5-acre lot size limitations for new single-family dwellings using OWTS in the Upper Alameda Creek Watershed;

- Maximum discharge limitations of 34 lbs total nitrogen per 5 acres for commercial OWTS in areas outside of Areas of Concern in the Upper Alameda Creek Watershed;

- Provisions for implementing standards for nitrogen removal in designated Areas of Concern (due to high nitrate concentrations) as outlined in Zone 7's 2015 Nutrient Management Plan for the Livermore Valley Groundwater Basin.

- Regulations requiring completion of cumulative impact analysis (nitrate loading, groundwater mounding) for certain types of projects posing additional concerns regarding groundwater or surface water impacts.

- Availability of Advanced treatment and dispersal technologies to mitigate documented or potential impacts to groundwater in areas of high domestic well usage and high nitrate concentrations, and for high flow OWTS.

Surface Water Quality Protection

(1) **Minimum watercourse/water body setback requirements.** The primary measure for protection of surface water quality is the establishment of safe horizontal setback buffers between OWTS components (treatment tanks and dispersal fields) and various water and landscape features. The requirements contained in the Alameda County OWTS Ordinance and Manual are consistent with current and historical policies of Alameda County and guidelines of the San Francisco Bay and Central Valley Regional Water Boards. They address setbacks to perennial and intermittent streams, springs, ponds, lakes (100 feet to dispersal fields, 50 feet to tanks), as well as ephemeral streams, swales, and drainage ways (25 to 50 feet, depending on the depth of the high water mark, from dispersal fields and tanks). A 200 to 400-foot setback to water supply reservoirs has been added to conform to the State OWTS Policy.

Additionally, Alameda County has enacted a water course protection ordinance (Code Chapter 13.012) to safeguard and preserve watercourses, including among other things, control of erosion and sedimentation, preservation of riparian habitat, and restricting the discharge of polluted materials to enhance recreational and beneficial uses of watercourses. A primary mechanism is the establishment of setback distances from the edge of the 100-year floodplain (or top of bank, if greater) for any new development, including OWTS.

(2) **Advanced treatment and dispersal technologies.** The County OWTS Ordinance and Manual include standards for Advanced treatment and dispersal technologies that provide greater flexibility and options for system repairs than can be achieved with Standard OWTS. This has two positive effects for surface water quality protection: (1) the use of Advanced treatment technologies, producing higher quality effluent, can compensate for reduced amount of soil absorption area where the repair system on an older non-conforming development site encroaches within the normal setback buffer;

and (2) Advanced dispersal methods and sizing criteria can reduce the amount of encroachment into the setback area by making more portions of the property (e.g., shallow soil areas) potentially feasible for wastewater dispersal, while also reducing the overall amount of land area needed for the dispersal system.

(3) **Erosion control measures.** Depending upon site conditions and system design, construction of an OWTS may pose a threat of soil erosion and impacts on downstream receiving waters from excavations for tanks, trenching for pipelines and dispersal trenches, and associated clearing and grading activities. Historically, erosion control measures for OWTS installations have not been mandated by Alameda County Regulations, nor are they addressed in the SWRCB OWTS Policy. The County's updated Ordinance and Manual require that erosion control measures be implemented in connection with the installation of OWTS under certain circumstances, based on the type and size of the system and the prevailing ground slope conditions. Final approval/certification of the OWTS installation is contingent upon confirmation that the specified erosion control measures have been implemented.

(4) **Flood protection measures.** The County's updated Ordinance and Manual include provisions for evaluation and incorporation of special design measures for systems located within areas subject to inundation by the 100-year flood. Specifically, the measures require: (a) protection for OWTS supplemental treatment, pressure distribution and/or drip dispersal components from flood damage, such as structural tie-downs and/or elevating critical components above the 100-year flood level; (b) prevention of discharge of wastewater into flooded dispersal areas from pump systems (e.g., using flood-activated float switches to override/disable pump operation during high water conditions); and (c) additional emergency storage capacity for flood periods.

(5) **Enhanced protection for Water Supply Watersheds.** Areas of Alameda County warranting special concern and enhanced water quality protection are the reservoirs that serve as a local source of supply for drinking water, along with the land uses and activities in the source watershed areas. The major reservoirs in Alameda County include Lake Temescal, Lake Chabot and Upper San Lorenzo Reservoir in the western side of the county, and Lake Del Valle, Bethany, San Andreas and Calaveras Reservoirs in the eastern side of the county. In accordance with the requirements of State OWTS Policy, Alameda County has adopted increased setback standards for any OWTS located in an area tributary to and within 1,200 feet and within 2,500 feet of a public water supply surface water intake. The provisions for identifying and notifying public water system owners of pending OWTS applications are discussed in **Sections 4** and **5** of this LAMP, along with the applicable requirements for OWTS design when the dispersal system must be located within the prescribed setback buffer, e.g., for a replacement system or pre-existing lot of record.

Impaired surface waters (nitrogen or pathogens)

Currently there are no surface water bodies in Alameda County listed as impaired for nitrogen or pathogens pursuant to Section 303(d) of the Clean Water Act. Therefore, at this time no special provisions related to impaired water bodies have been adopted for OWTS in Alameda County.

High Density of OWTS, parcel size and cumulative impacts

Consideration of OWTS density, parcel size and potential cumulative OWTS impact issues (e.g., groundwater mounding, nitrate loading, fecal coliform contamination) is addressed in Alameda County primarily through requirements for identified Areas of Concern under the Ordinance and the Manual as well as requirements that call for the completion of cumulative impact assessments for certain types of projects or locations. The requirements for the designated Areas of Concern are derived from Zone 7 Water Agency recommendations contained in the 2015 Nutrient Management Plan for the Livermore Valley Groundwater Basin. They impose additional OWTS requirements for nitrogen removal in certain groundwater-impacted areas of the county, with the overall goal of reducing the nitrate loading from OWTS that may have contributed to localized high groundwater-nitrate conditions.

There is also a lot size limitation of 5 acres (minimum) for new single family dwellings in the Upper Alameda Creek Watershed area, and a lot size limitation of 60,000 square feet for parcels being served by a private water supply and 40,000 square feet for parcels being served by a public water supply in other areas of the county, specifically aimed at controlling cumulative impacts of new OWTS discharges. The results of cumulative impact assessment (per above) may dictate larger lot sizes or other measures (e.g., supplemental treatment) to address potential water quality impacts associated with density of OWTS.

The existing requirements identify circumstances requiring cumulative impact studies, minimum qualifications of those conducting the work, typical data needs and assumptions, analytical methods, and evaluation criteria. The Ordinance authorizes Department to apply the requirements to any project of concern, and to amend or expand the guidelines as new information or issues/Areas of Concern arise.

Additionally, the Ordinance provisions allowing the use of Advanced treatment and dispersal technologies provide opportunities to mitigate nitrate loading (e.g., with supplemental treatment systems) and hydraulic mounding (e.g., with pressure distribution or drip dispersal designs).

Geographic areas with many older non-conforming OWTS installations and setbacks.

Older, non-conforming OWTS are common in throughout much of Alameda County. Some of the highest concentrations of non-conforming OWTS installations are in the development known as Kilkare Woods, located in the upper reaches of the Sinbad Creek watershed. Properties were originally developed for seasonal/recreational cabins nearly 100 years ago, and have converted over the years to year-round residences. Many of the properties are very small (<1/4 to 1/2 acre in size), with OWTS constructed prior to the modern codes. Some systems consist of cesspools, and repairs and replacement systems tend to be very challenging. Non-conformance with adopted setback requirements (e.g., from structures, water features, etc.) are also common in some areas.

Measures contained in the County's Ordinance and Manual that will aid significantly in addressing problems of older, non-conforming OWTS are:

(1) Availability of Advanced treatment and dispersal system designs to provide more effective upgrades and repairs for lots having limited area, soil limitations or other constraints for Standard OWTS;

(2) Greater County focus on bringing about compliance with existing County requirements through submittal of Homeowner Questionnaires every five-year providing information on existing Standard OWTS in the County;

(3) New requirements for septic tank pumper inspections, which will aid in identifying and bringing about the correction of existing cesspools, system failures, and impending problems that might otherwise go unnoticed or unattended; and

(4) Continuation of the County's current outreach and support to OWTS communities and properties faced with aging OWTS, in the form of technical resources, funding and facilitation of efforts to explore community wastewater solutions, connection to public sewers and other approaches to improve OWTS management.

Section 3:
OWTS Siting, Design, and Construction Requirements

Siting Criteria

Siting criteria for OWTS are specified in in the Alameda County OWTS Ordinance and Manual.

General. Siting criteria applicable to all OWTS address the following:

(1) **Slope, stability and cut and fill.** Maximum ground slope in the dispersal field area, placement in native soils, and geotechnical evaluation requirements for grading or other stability issues;

(2) **Soil and depth to ground water.** Minimum depth of effective soil and vertical separation to high seasonal groundwater below the dispersal field for Standard and Advanced OWTS;

(3) **Soil percolation rates**. Minimum and maximum soil percolation rates for Standard and Advanced OWTS;

(4) **Horizontal setbacks.** Minimum horizontal setback distances between OWTS components and wells, watercourses, and various other site features.

Additional Geographical Area Requirements. Additional siting requirements apply to new, upgraded, or replacement OWTS located in the Upper Alameda Creek Watershed above Niles, in areas both inside and outside the designated Areas of Concern contained in the 2015 Nutrient Management Plan for the Livermore Valley Groundwater Basin to minimize nutrient loading from current and future development in unsewered areas of the basin. The additional requirements do not apply to existing, properly-working and properly-sized OWTS; however, they are designed to reduce existing loading in the Areas of Concern over time by replacing Standard OWTS with new treatment systems when the opportunities arise. A summary of the additional requirements for new or replacement OWTS in the Upper Alameda Creek Watershed above Niles is provided below. Details of the requirements are included in Figure 6-6 of Appendix D.

(1) **Outside Areas of Concern**. Minimize nitrogen loading from new OWTS by applying one rural residential equivalence of wastewater (RRE) per 5-acre maximum limitation.

(2) **Inside Areas of Concern**. Minimize or when practical, reduce the overall nitrogen loading to the property by installing only new, advanced OWTS with nitrogen-reducing treatment. Encourage or require hydrogeological studies as part of new commercial developments. Cap nitrogen loading at one RRE per 10-acres when no study is provided.

(3) **High-strength and High Flow Systems**. Install groundwater monitoring wells to monitor nutrient loading from onsite operations.

Site Evaluation Requirements for OWTS

Site evaluation requirements for OWTS are specified in Alameda County Ordinance and Manual addressing the following:

(1) **Site evaluation and map.** For all locations where an OWTS is proposed to be installed, a site evaluation shall be conducted and a topographic site map prepared prior to permit approval to verify conformance with applicable horizontal setbacks, ground slope, soils, percolation and groundwater requirements.

(2) **Soil profiles.** Soil profiles, performed by a Qualified Professional, are required in the primary and secondary/replacement dispersal field areas to verify adequate soil characteristics, depth and other limiting factors for sewage disposal. More in-depth soils investigation may be required on a case-by-case basis as determined by the Department.

(3) **Percolation testing.** Percolation tests, performed under the supervision of a Qualified Professional, are required in the primary and secondary/replacement dispersal field areas. Wet weather testing is required in areas of expansive (shrink/swell) soils.

(4) **Groundwater determinations.** Determination of the anticipated highest level of groundwater is required based on either estimation from soil profile inspection (evidence of mottling) or direct observation during the wet weather season.

(5) **Geotechnical slope stability analysis.** Geotechnical slope stability analysis is required on a case-by-case basis for any OWTS proposed (as a variance) on slopes exceeding 30% or within an area identified on a seismic hazard zone map, for site grading work involving significant cuts in or near the dispersal field, or other conditions where slope stability is deemed a potentially significant concern.

(6) **Cumulative impact analysis**. For certain projects, typically non-residential and large flow OWTS, the completion of additional technical studies, termed "cumulative impact assessment", may be required. This is to address the cumulative impact issues (mainly groundwater mounding and nitrogen loading) from OWTS that can result from such factors as the constituent levels in the wastewater (e.g., nitrogen content), the volume of wastewater flow, the density of OWTS discharges in a given area, and/or the sensitivity and beneficial uses of water resources in a particular location. The Manual provides guidelines and criteria for cumulative impact and analysis and identifies the following situations where the requirement will apply:

   a. OWTS with flows of greater than 1,500 gpd;
   b. OWTS deemed "high strength";
   c. High concentration of flow in a limited area;

d. New development in Upper Alameda Creek Watershed not in conformance with lot size limitations per Section 3;

e. OWTS in areas of known groundwater degradation;

f. Other situations where OWTS judged by Department to have a potential significant cumulative impact on groundwater or surface water, e.g., clustering of OWTS near parcel boundaries.

(7) **Subdivisions**. For new divisions of land proposing the use of OWTS, soil profiles and percolation tests are required to demonstrate conformance with applicable siting criteria for all proposed OWTS locations. For any subdivision creating five (5) or more parcels, the proposal must be provided to the respective Regional Water Board for review.

Wastewater Flows for OWTS Design

Wastewater flow requirements for OWTS design are covered in the Ordinance and Manual and include the following provisions:

(1) **Peak daily flow.** All OWTS sized for peak daily flow;

(2) **Residential OWTS.** Based on a minimum factor of 150 gpd per bedroom, with provision for 20% reduction (to 120 gpd per bedroom) where approved water conserving plumbing installed.

(3) **Non-Residential and Multi-Unit Residential OWTS.** Based on consideration of projected activities, occupancy, and facilities and estimating factors (unit flows). Alternative flows may be based on other appropriate literature references (e.g., EPA Manuals) or documented wastewater flow for a comparable facility, as deemed acceptable by Department.

(4) **Flow Equalization.** Flow equalization may be used for non-residential and mixed use facilities that experience significant, regular and predictable fluctuations in wastewater flows, such as churches, schools, and special event venues. Flow equalization is the process of controlling the rate of wastewater flow through an OWTS by providing surge capacity storage and timed-dosing of the incoming flow. It allows peak surges (e.g., weekend usage) to be spread out over several subsequent days to aid in overall OWTS performance.

Design and Construction Requirements

Onsite Wastewater Containment Units (OWCU)

Onsite Wastewater Containment Units (holding tanks, vault toilets, portable toilets and waterless toilets) requirements, where such waste handling methods are allowed, are provided in the Ordinance and the Manual and summarized below.

(1) Holding Tanks may only be permitted under the following conditions:

a. On a temporary measure for existing residential dwellings while corrective action on a failed OWTS is being completed;

b. On a non-temporary basis as a last resort when an OWTS has failed and the Site cannot be approved for the installation of a replacement OWTS due to severe site constraints such as lack of effective soil, high ground water, etc., and no public sewer system is legally and physically available;

c. The tank is intended to serve only non-residential or small occasional use industrial, commercial, or recreational facility where installation of an OWTS for sanitary or process wastewater is not feasible or allowed.

(2) Vault toilets will only be allowed for non-residential and non-commercial, limited use applications, such as primitive type picnic grounds, campsites, camps and recreation areas where OWTS are not practicable due to factors such as remote location, limited water supply, and site constraints for an OWTS as determined by a site evaluation.

(3) Portable Toilets may be allowed for temporary or limited use areas, such as construction sites (for use by onsite employees), mobile or temporary agricultural uses, temporary campsites, and special events.

(4) Non-discharging wastewater disposal units shall meet the same horizontal setback requirements as for tanks specified in the Manual and will require operating permits.

Standard OWTS

Where an OWTS is required, it shall, at a minimum, consist of a septic tank and subsurface gravity fed trench dispersal system for absorption and leaching of the effluent into the soil (Standard OWTS). The septic tank and effluent dispersal system must be designed, permitted, and so constructed as to meet the requirements prescribed by the County OWTS Ordinance and Manual.

All Standard OWTS require submittal of a Homeowner Questionnaire to the Department by the property owner every five years reporting on the condition of the system. The five year reporting requirement is intended to assist the County in complying with State reporting requirements.

Key design and construction requirements detailed in the Manual include the following.

Septic Tank Requirements.

(1) **Materials for Construction –** concrete or alternative durable material.

(2) **Size of tank -** 1,000 gal minimum; increased capacity per bedroom count or daily design flow.

(3) **Design –** 2-compartment; IAPMO or equal; traffic-rated as needed; access risers; effluent filter.

(4) **Location and Installation –** minimum 10 feet from building; accessible for maintenance and repair; level, solid bedding; no more than 24 inches cover; and water-tightness testing in place.

Standard Leachfield Requirements.

(1) **Trench Specifications -** Width, spacing, diversion valve, piping, distribution box, max length, materials.

(2) **Leachfield Sizing -** Based on design wastewater flow, percolation rate and table of wastewater application rates; effective infiltrative area limited to four (4) square feet per lineal foot utilizing bottom and sidewall area; dual, 200% capacity required (primary and secondary fields, with diversion valve).

(3) **Trench Construction -** level trenches, on contour, drainage and grading to promote runoff away from field, no paving or soil compaction that may impair functioning.

Advanced OWTS

General. Alameda County Ordinance and Manual allow for, and in some cases require, the use of an "Advanced OWTS" which is defined as a OWTS that: "…utilizes either a method of wastewater treatment or supplemental treatment other than a septic tank and/or a method of wastewater dispersal other than a gravity trench dispersal system. Advanced OWTS are designed to allow siting of an OWTS where a Standard OWTS is not suitable due to site constraints or wastewater strength."

General requirements guiding the use of Advanced OWTS include the following:

(1) Types of Advanced OWTS permitted are limited to those identified in the Manual for which siting and design standards have been adopted and approved by the Board of Supervisors and the Regional Water Board as part of the County's LAMP.

(2) All Advanced OWTS must be designed by a Qualified Professional (RCE, PG or REHS) as allowed by their registration and installed by a contractor duly licensed by the Contractors State License Board of the State of California to install OWTS (A, B, C-42 or C-36).

(3) All Advanced OWTS require the issuance of a renewable annual operating permit which is in addition to the construction permit issued for system installation. Operating permits are intended to serve as the basis for ensuring on-going maintenance, and require that such work be performed by a Qualified Professional or qualified Service Provider registered with the County.

(4) Monitoring and reporting requirements to verify adequate performance of Advanced OWTS are implemented as conditions of the operating permit and vary according to the type of system and site condition/location.

Types of Advanced OWTS. The types of Advanced OWTS approved for use in Alameda County include the following:

(1) **Supplemental Treatment:**

a. Intermittent and recirculating sand filters;

b. Proprietary Systems

(2) **Advanced Subsurface Dispersal Systems**

a. Trench dispersal systems with pressure distribution

b. At-grade dispersal systems

c. Mound dispersal systems

d. Subsurface drip dispersal systems

e. Raised sand filter bed systems

Siting, Design and Construction Requirements. Siting, design, and construction requirements are provided in the Manual for each respective type of Advanced OWTS.

Performance monitoring requirements. Performance monitoring requirements and frequencies for Advanced OWTS are provided in the Manual and are dependent on the type and complexity of the system, treatment train components, and dispersal system. Performance monitoring may include but not be limited to the following:

(1) Installation and regular inspection of water levels in OWTS inspection wells and performance monitoring wells;

(2) Water/wastewater flow readings;

(3) Operational inspection of the OWTS;

(4) Annual inspections of pump systems;

(5) Inspections of sludge and scum and/or pumping of tanks

(6) Sampling and analysis of water from OWTS inspection wells and performance monitoring wells;

(7) Sampling and analysis of influent and effluent

(8) Submission of annual monitoring report to Department.

Commercial, High Strength and High Flow OWTS

All requirements for Advanced OWTS also apply to OWTS classified as Non-Residential or Multi-unit Residential, High Strength or High Flow systems, which are defined briefly as follows:

(1) Non-Residential or Multi-unit Residential OWTS – serving a business or other non-residential occupancy;

(2) High Strength – having wastewater characteristics of higher strength than domestic wastewater, such as BOD >300 mg/L and/or TSS >330 mg/L and/or fats, oils and grease >100 mg/L.

(3) High Flow – having peak wastewater flow >1,500 gpd.

Additional requirements for High Strength and High Flow OWTS include installation of groundwater monitoring wells and analysis of water samples from those wells to monitor effects on groundwater quality in the area of the discharge.

Section 4:
Special OWTS Management Issues

The following describe the provisions contained in the Alameda County LAMP corresponding with special OWTS management issues listed in sections 9.2.1 through 9.2.12 of the State OWTS Policy.

OWTS Inspection, Monitoring, Maintenance and Repair

Alameda County Ordinance and Manual requirements pertaining to operational inspections, monitoring, maintenance and repair of OWTS are summarized in **Table 4-1** below.

Table 4-1. Summary of Alameda County Provisions for OWTS Inspection, Monitoring, Maintenance and Repairs

Activity	Inspections	Monitoring	Maintenance & Repairs*
Building Permits	Performance evaluation for existing systems required at time of application for site development or building permit; verify that proposed work will not impact the integrity of the system; verify safe & effective operation (i.e., prevent environmental degradation including pollution of surface water and groundwater and protect public health, safety and welfare), no surfacing effluent, & positive flow to septic tank and to dispersal system).	May involve water-tightness tests, documentation of system components, water sampling, dye testing, other monitoring, or preparation of as-built conditions.	Maintenance, and/or corrective action may be required as a result of performance evaluation findings.
Five Year Reporting	Basic inspection of OWTS and submittal of Homeowner Questionnaire by property owner, septic system contractor or Qualified Professional.	N/A	Maintenance and/or repair work may be recommended or required as a result of inspection findings.
Operating Permit	Performance monitoring requirements and frequencies for Advanced OWTS and OWCU are dependent on the type and complexity of the system, treatment train components, and dispersal system.	Monitoring of OWTS or OWCU, including flows, water levels, pump-out volumes, and water quality sampling, as applicable.	Maintenance and/or repair work may be required from time-to-time based on observations during routine inspections or as part of normal system servicing.
Complaint Investigations (Abatement)	Inspections of OWTS or OWCU by Qualified Professional in response to complaints or observed violation(s).	May involve water-tightness tests, water sampling, dye testing or other monitoring.	Maintenance, repair, and/or corrective action work may be required as a result of inspection findings.

OWTS Near Impaired Surface Water Bodies

Currently there are no surface water bodies in Alameda County listed as impaired pursuant to Section 303(d) of the Clean Water Act; therefore, no special provisions for advanced protection management requirements related to impaired surface water bodies have been adopted for OWTS in Alameda County.

Variances and Exceptions

Ordinance Code

Provisions for variances to OWTS and OWCU requirements are specified in the Ordinance, which reads as follows:

A. A variance to any requirement may only be granted if the applicant demonstrates all of the following criteria:

   1. Special circumstances and conditions exist on the property which deprive the property owner of privileges enjoyed by other property subject to the Ordinance;

   2. The granting of the variance will not constitute a grant of special privileges inconsistent with any limitation on other property subject to the Ordinance;

   3. The granting of the variance will not be detrimental to other persons or property (including but not limited to watercourses or wetlands or the water quality of subsurface water) or to the public health, safety or welfare.

B. The Department will review any request for variance and may deny it. If the Department does not deny a variance request, a recommendation to grant the variance will be sent to the Board of Supervisors for final review and approval.

OWTS Repairs and Corrective Actions

OWTS that require corrective action to address a current or threatened failure condition shall be repaired in a manner, approved by the Department that brings the OWTS into substantial conformance with County Ordinance and Manual to the greatest extent practicable. For systems that can be repaired, the work shall be implemented as soon as is reasonably possible and in accordance with any time limits issued by the Department.

The overall goal with all OWTS repairs is to obtain a practical, timely and effective long-term correction to the failure condition. In determining the level of corrective work required, the Department will take into consideration a variety of factors, generally according to the following priorities:

(1) public health and safety

(2) soil characteristics and groundwater separation

(3) setbacks from wells and streams

(4) ground slope and setback from unstable landforms

(5) OWTS sizing standards

(6) other setback criteria, e.g., foundations, pipelines, trees

Interim measures such as installation of a non-discharging holding tank and pumping of septage may be required for failed systems that require replacement and submittal of a new system design plans. Submittal requirements for OWTS repairs may vary case-by-case, and will depend on the nature of the failure condition, the property location and type of occupancy, and the type of corrective work needed.

A phased corrective action plan may be submitted to the Department for consideration to allow property owners time to plan for the costs of implementing corrective action measures. Phased corrective action plans shall be prepared by a Qualified Professional and shall include immediate, intermediate and long-term recommendations, as applicable, based on the results of system inspections, performance evaluations and site evaluations. Phased corrective action plan approvals will be conditioned upon issuance of an Operating Permit with monitoring and reporting requirements during the period of corrective action implementation.

- Immediate measures shall be implemented within 1 to 3 months and shall include measures to eliminate surface discharge and safety issues and may include but not be limited to source control measures, plumbing and tank repairs, and pump and haul by a septage pumper registered with the County.

- Intermediate measures shall be implemented within 1 year and may include but are not limited to additional source control measures, site modifications, septic tank replacement, dispersal system renovations/expansion, monitoring well installation and continued pump and haul as needed.

- Long-term measures shall be implemented within 1 to 3 years and may include but are not limited to additional source control measures such as installation of graywater systems, treatment train modifications including addition of flow equalization tanks, dosing tanks, supplemental treatment, and/or dispersal system redesign or replacement. Longer time frames (up to nine years) may be approved for communities with plans for a public sewer or community wastewater system.

Potential corrective action remedies may include:

- **Source Control Measure and Maintenance:** Modification of water use habits, installation of low, ultra-low flow plumbing fixtures, flow equalization, timed-dosing, installation of graywater systems, installation of waterless toilets, and/or maintenance pumping of tanks.

- **Site Modifications:** Removal of trees, conflicting landscaping, irrigation, or structures; diversion of surface water drainage; and/or interception/diversion of groundwater.

- **Plumbing and Tank Repairs/Modifications/Replacement.** Repair or replacement of plumbing lines, fittings, vents, equipment, etc.; installation of effluent filters; and/or repair or replacement of tanks with watertight tanks.

- **Treatment Improvements:** Installation of supplemental treatment.

- **Dispersal System Improvements:** Increase capacity of existing dispersal system by utilizing "reserve area" or other suitable area (e.g., installation of additional dispersal trenches, etc.); reconstruct or modify existing trench systems (e.g., convert gravity systems to pressure distribution systems, replace rock with new rock or install chambers to allow dispersal area sizing reductions, use of cover fill with shallow in-ground trenches to increase vertical separation distance to groundwater, etc.); or replace existing dispersal system with new system.

Prohibitions

No variances or exceptions are permitted to prohibitions 1 through 9 listed in **Section 5** of this LAMP.

Prohibition 10 in **Section 5,** relating to OWTS in proximity to public water wells and/or water supply intakes, contains specific exception clauses applicable to OWTS repairs and new or replacement OWTS on existing legal lots of record.

Appeals

The Ordinance sets forth a tiered process for appeals of an OWTS decision; this may include issues related to variances or exceptions to Ordinance requirements. The first level of appeal is to the Director and the last level of appeal is to the Board of Supervisors.

Professional, Contractor and Maintenance Provider Qualifications

Alameda County OWTS Ordinance requirements and Regulations pertaining to qualifications for OWTS professionals, contractors and service providers are summarized in **Table 4-2**.
The qualification notations and terminology in **Table 4-2** have the following meanings:

- CEG: Certified Engineering Geologist
- CHG: Certified Hydrogeologist
- CPSS Soil Scientist: Certified Professional Soil Scientist, Soil Science Society of America
- GE: Professional Geotechnical Engineer
- LLS: Licensed Land Surveyor
- Licensed Contractor: Possessing valid California Contractor's license A, B, C-36, C-42 or C-57
- PE: Professional Civil Engineer
- PG: Professional Geologist
- REHS: Registered Environmental Health Specialist
- Registered Septage Tank Pumper: Registered with Alameda County in accordance with California Health and Safety Code 117400 et seq
- Service Provider: An individual registered with Department and having experience in the design, construction and/or operation of OWTS as evidenced by the either of the following:
    - Qualified Professional
    - Completion of an onsite wastewater certification training course by a third-party entity, such as the California Onsite Wastewater Association (COWA), National Association of Waste Transporters (NAWT), National Sanitation Foundation (NSF), or other acceptable training program as determined by the Department.

Table 4-2. Qualifications for OWTS Practitioners

OWTS Activity	Required Work	Minimum Qualifications
Site Evaluation	Conduct field studies and evaluation of geology, soils, percolation, groundwater, slopes and other factors for design and use of OWTS	PE, REHS, PG, NRCS Soil Scientist, or Licensed Contractor (percolation testing) under the oversight of a PE, REHS, PG or CPSS as allowed by their registration, certification, license and provisions in the Manual
Topographic Surveying	Perform site surveys, property line determinations, and generate topographic maps for system siting and design	PE or LLS as allowed by their license

Cumulative Impact Assessment	Assess nitrate loading, groundwater mounding or other cumulative impacts of OWTS for flows as required by the Manual	PE, PG or CHG as allowed by their registration, certification, license and provisions in the Manual
Geotechnical Assessment	Assess slope stability, drainage and other geotechnical issues for OWTS located on slopes over 30 percent and in areas of geologic instability	PE, GE, CEG
Performance Evaluation	Conduct performance evaluation of OWTS in connection with building permits, land use project, annual operating permit, failure investigation or as otherwise required by Department	PE, REHS, PG or Contractor depending on the scope of work and provisions in the Manual
System Design	Prepare plans and supporting design analysis required for permitting and installation of OWTS and OWCU	PE, REHS or PG as allowed by their registration
Drainage Structures	Prepare plans and supporting design analysis required for permitting and installation of groundwater or surface water drainage structures	PE
System Installation, Repair, Modification or Abandonment	Install, repair, modify or abandon OWTS or OWCU in accordance with approved plans and permit conditions issued by Department	General Engineering Contractor License (Class A, Class B, Class C-42 or Class -36)
Inspection and Monitoring of Systems with an Operating Permit	Perform inspection, monitoring and annual reporting of OWTS and OWCU in accordance with conditions of operating permit issued by Department	PE, REHS, PG or Service Provider registered with the Department
Inspection and Monitoring of Standard OWTS	Perform inspection, monitoring, or functionality testing and five year reporting to Department confirming proper functioning	Property owner, PE, REHS, PG or Licensed Contractor, depending on the system type and as allowed by their registration or license
Septage Pumping	Pumping or cleaning of vault/portable toilets, holding tanks, tanks in an OWTS treatment train, cesspools, seepage pits, or other wastewater source or containment unit	Registered Septage Pumper
Groundwater Monitoring Well Installation or Abandonment	Install or abandon a well under permit by the well permitting agency	Licensed Contractor (C-57)

Education and Outreach

Alameda County's LAMP includes the following provisions for education and outreach regarding OWTS.

(1) **Website - Informational Material.** The Department maintains a website including up-to-date information on various OWTS matters, such as: (a) regulatory issues; (b) permitting requirements, procedures, fees, forms, etc; (c) meetings and other announcements; and (d) OWTS user information, guidelines and references.

(2) **Onsite Wastewater Treatment System Commission.** The Alameda County Board of Supervisors has established an "Onsite Wastewater System Commission", which meets several times a year to provide a public forum to hear, discuss and review various matters related to the regulation, planning and status of OWTS in the county. This Commission played an important role during the development of the LAMP by providing a forum for community input to the Department.

(3) **Outreach with Local Community Working Groups.** The Department makes routine outreach efforts to keep local citizen groups and committees in the county informed about policies and other matters related to OWTS. During LAMP preparation, numerous meetings were held with groups such as those listed below, forming the foundation for continued OWTS outreach and education in the future.

- Alameda County Agricultural Advisory Committee
- Castro Valley Municipal Advisory Council
- Agriculture Advisory Committee
- District 4 Agriculture Committee
- Cattleman's Association
- Fairview Community Stakeholders
- Sunol Citizens Advisory Council
- Sunol Septic Working Group
- Livermore Valley Winegrowers Association
- Local Agency Formation Commission
- Unincorporated Services Committee
- East County Community

Septage Management

Septic tank pumping in Alameda County is currently provided by approximately a half-dozen registered septic tank pumper contractors. Based on a phone survey (February 2016), the number of septic tank pump-outs conducted in the County is estimated to be in the range of about 600 to 900 per year. This equates to an average pumping frequency of roughly once every 3 to 4 years for the estimated 2,700 existing OWTS in Alameda County, which is consistent with normally recommended septic tank serving frequency for residential OWTS. These estimates do not include pumping of vault toilets, such as those at park facilities in the County.

The primary receiving location for hauled septage in Alameda County is the East Bay Municipal Utility District (EBMUD) Wastewater Treatment Plant in Oakland. The EBMUD plant processes a wide range and large volume of trucked wastes from many different sources, and receives wastes 24 hours a day, 365 days a year. The EBMUD facility, with overall treatment capacity of more than 300 million gallons per day (MGD), has more than ample capacity to handle current and projected septage volumes of a few thousand gallons per day generated from pump-outs of Alameda County OWTS.

Onsite Maintenance Districts

Presently, there are no onsite wastewater maintenance districts in Alameda County. Some of the key functions of an onsite wastewater management district are already covered on a county-wide basis by requirements and activities under the County's OWTS Ordinance, Manual and the provisions of this LAMP, including: (a) five year reporting for Standard Systems without operating permits, (b) operating permits for Advanced, Multi-unit Residential and Non-Residential, High Strength and High Flow OWTS and Non-discharging wastewater units; and (c) requirements for water quality assessment and reporting to the Regional Water Board.

However, the Ordinance and Manual provide for the identification of Areas of Concern, in consultation with the Regional Water Board, Zone 7 Water Agency and other agencies, as applicable. Areas so identified may then be subject to additional standards and OWTS oversight to address special environmental concerns, which could include increased requirements for OWTS maintenance. As described in Section 2 of this LAMP, several Areas of Concern have been formally identified. Other Areas of Concern may arise in the future out of the background studies conducted for the development of this LAMP and through the implementation of on-going monitoring and reporting activities required under the State OWTS Policy.

The County recognizes that some designated Areas of Concern or focus areas, especially those with a large number and high density of OWTS, may be candidates for considering a community wastewater management solution. Examples are the Kilkare Woods and Downtown Sunol areas, where a local working group has been formed to begin discussions of a community approach to long-term wastewater management. For these and other cases that may follow, it is anticipated that feasibility studies would include (as a project alternative) consideration of the formation of an onsite wastewater maintenance district ("zone"), in accordance with the provisions of Health and Safety Code (Sections 6950-6982).

Regional Salt and Nutrient Management Plans

Salt Management Plan

The Salt Management Plan (SMP) for the Livermore Valley Groundwater Basin was developed and issued by Zone 7 Water Agency in 2004, and incorporated into Zone 7's Groundwater Management Plan (GWMP) for the Basin in 2005. The SMP reported a gradual increase in salt (total dissolved solids, TDS) concentrations on the order of 10 mg/L per year. The primary sources of salt loading to the main groundwater basin are estimated to be natural and artificial recharge operations (48%), percolation of urban irrigation water (35%), and subsurface inflow from fringe groundwater areas (13%). Percolating water from OWTS contributes a small amount to the overall salt additions to the groundwater basin, but it was not identified as a significant source in the SMP. Therefore, no specific limitations or control measures were recommended for management of salt additions from OWTS.

Nutrient Management Plan

The Nutrient Management Plan (NMP) for the Livermore Valley Groundwater Basin was developed and issued by Zone 7 Water Agency in February 2015, and incorporated in Zone 7's GWMP for the Basin, along with the SMP. The NMP provides an assessment of the existing and future groundwater nutrient concentrations related to recycled water projects, and also specifically addresses nitrogen loading from OWTS in high groundwater nitrate Areas of Special Concern.

Sections 6.1.5.2 and 6.1.5.3 of the NMP outline recommended implementation measures related to control of nitrate loading from OWTS. The key points are summarized below. Additional details are contained in Section 6 of the NMP, which is copied and provided for reference in **Appendix D**.

(1) **Section 6.1.5.2. General Septic Tank Program.** The NMP recommends continued application of existing OWTS regulations that limit: (a) new parcel creation for single family residential dwellings to 5-acre minimum lot size; and (b) commercial OWTS discharges to maximum of one (1) RRE per 5 acres. Additionally, the NMP recommends:

- Continued cooperation between the Department and Zone 7 regarding groundwater issues and OWTS approvals consistent with NMP goals and objectives;
- Continued collaboration on review and approval of commercial OWTS on a case-by-case basis;
- Continued collaboration on review of any OWTS variances.

(2) **Section 6.1.5.3. Septic Tank Management in Areas of Concern.** The NMP identifies five Areas of Concern, where OWTS discharges are believed to be or potentially be a significant contributor of nitrogen to the existing high groundwater-nitrate levels. The NMP recommends adoption of planning, design and management practices aimed at reducing the level of nitrogen discharge from current conditions. General recommendations are:

- Zone 7 to coordinate further characterization of groundwater information and monitoring well installations;
- Zone 7 to continue efforts to inform and participate in review of projects proposing OWTS in Areas of Concern;
- County and City planning entities and others to continue to pursue opportunities to convert areas from OWTS to municipal sewers in Areas of Concern, when feasible;
- Department, Zone 7 and Regional Water Board work together on development, approval and implementation of LAMP, including measures aimed at reducing nitrogen loading and ongoing regional groundwater monitoring.

The NMP identified five Areas of Concern where connection to municipal sewers appears unlikely, and recommended specific requirements for OWTS to be implemented to achieve long-term reductions in nitrate loading. The five Areas of Concern are listed below; the recommended management requirements are summarized in **Table 4.3**, as presented in the NMP.

- Happy Valley
- Buena Vista
- Mines Road
- May School
- Greenville

Briefly, the recommendations include requirements for incorporating additional supplemental treatment providing nitrogen removal for new and expanded residential and non-residential development, with limited exemptions granted for:

- Existing residences, as is, with no building or OWTS permitting activity;
- Existing residences with OWTS repair involving no building additions or increase in OWTS capacity;

Table 4-3. Excerpt from Nutrient Management Plan for Livermore Valley Groundwater Basin

FIGURE 6-6
PROPOSED OWTS PERMIT REQUIREMENTS
FOR SPECIAL OWTS REQUIREMENT AREAS
NUTRIENT MANAGEMENT PLAN

OWTS Scenario	Parcel Size	New Requirement	Max Nitrogen Loading Rate[2]
New, upgraded, or replacement OWTS required by County OWTS Ordinance[1]	*≤ 7 acres*	*Must install/upgrade/replace with code-compliant nitrogen-reducing system(s).*	*23.8 lbs/year Per Parcel*
	> 7 acres	*Total nitrogen loading on the parcel must not exceed the Maximum Nitrogen Loading Rate. Commercial uses must also install/upgrade/replace with code-compliant nitrogen-reducing system(s).*	*3.4 lbs/year Per Parcel Acre*
		OR	
		Prepare hydrogeologic study that assesses current groundwater nitrate conditions beneath the site and demonstrates that nitrate concentration of total onsite recharge[3] does not exceed 36 mg/L (80% of MCL) or the maximum concentration at the site, whichever is lower.	*6.8 lbs/year Per Parcel Acre*

[1] Does not apply to existing, properly-working and properly-sized OWTS.

[2] Loading rates calculated based on 1 RRE = 34 lbs/yr.

[3] Assume that 18% of rainfall naturally recharges to groundwater unless study demonstrates otherwise.

ACEH = Alameda County of Environmental Health
OWTS = Onsite Wastewater Treatment System
RRE = Rural Residential Equivalence
MCL = Maximum Conaminant Level (NO_3 = 45 mg/L)

- Existing residences with proposed building additions/remodeling, but triggering no expansion or replacement of OWTS.

Watershed Management Coordination

(1) **Zone 7 Water Agency.** Alameda County Department works closely with Zone 7 Water Agency in regard to both groundwater and watershed management issues related to OWTS discharges in the Upper Alameda Creek Watershed, where more than half the OWTS in the county are located. Over the past 30+ years, Zone 7 has been a key partner with the County in evaluating and developing OWTS management requirements for OWTS relative to issues affecting groundwater quality. For example, Zone 7 has been instrumental in identifying "Areas of Special Concern", recommending specific OWTS development standards and practices, and monitoring and evaluating water quality impacts within their jurisdiction. Zone 7 will continue to be important partner in the County's ongoing and future responsibilities to track, assess and report on the status and water quality impacts of OWTS in the county.

(2) **Alameda County Resource Conservation District and NRCS.** The Alameda County Resource Conservation District (ACRCD) and the USDA Natural Resources Conservation Service (NRCS) collaborate to provide technical and educational services for natural resource conservation and agriculture enhancement strategies. They have been a key player in stream restoration projects in Alameda County, including some in urban settings, but also in rural watershed areas where OWTS are used. Historically, the Department has not had occasion to interact and coordinate OWTS activities with the ACRCD. However, future coordination with the ACRDD and partner groups, such as the Alameda Creek Watershed Forum, may be useful in connection with surface water quality monitoring, assessment, and community wastewater management planning efforts in areas like Sunol and other Areas of Special Concern.

Evaluating Proximity to Public Sewers

Evaluating the proximity to public sewers for new and replacement OWTS is accomplished by the following:

(1) OWTS permit instructions advise applicants of the code requirement for connection to public sanitary sewer where the property is within 200 feet of an available sewer.

(2) Department permit review includes sewer proximity as a checklist item.

(3) Department maintains GIS-based information on the location of public sanitary sewers in the County, which facilitates the review of permit applications for new and replacement OWTS, as well as may be needed from time-to-time in handling repairs of existing OWTS.

Additionally, the Department is actively involved and in communication with cities, sanitary districts, community groups and individuals in certain key areas of the county to advance the opportunities for conversion from OWTS to sanitary sewers where it is either a necessary or favored long-term wastewater solution.

OWTS Notification to Public Water System Owner(s)

The Ordinance and Manual provides special horizontal setback requirements apply to OWTS located in the proximity of public water supply wells and public water system surface water intakes. Providing adequate notification to the owner(s) of public water systems about OWTS installations near their facilities will be accomplished by the following procedures:

(1) Department will rely upon the following information to determine the locations and respective owner(s) of water wells and public water system surface water intake locations in Alameda County:

   a. **Local Small Drinking Water Systems.** Alameda County Department regulates local small systems under the State Small Water Systems Program. A local small water system is a water system that serves more than one but less than five service connections, fewer than 25 year-long residents, any number of non-residents less than 60 days per year, and less than 25 non-resident users greater than 60 day per year. Information on the location of public water wells and public water system surface water intakes for local small water systems will be maintained by Department and will be routinely available for review in connection with applications for new and replacement OWTS.

   b. **Other Public Water Systems.** The State Water Board Drinking Water Division (DDW) regulates all other public water systems in Alameda County. This includes water systems that serve 5 or more service connections or 25 people daily for at least 60 days out of the year. Department will rely on information provided by the DDW regarding the location of and respective owner(s) of public water wells and surface water intakes associated with large drinking water systems in the County. Department will also rely on information from Alameda County Water District and Zone 7 Water Agency for information regarding the location of public water wells and surface water supply intakes.

(2) At the time of permit application for any new or replacement OWTS, Department staff will review the location of the proposed OWTS in relation to known public water wells and surface water intakes.

(3) Where Department staff determines the proposed OWTS dispersal system is closer than 150 feet to a public water well, or closer than 1,200 feet to a public water system surface water intake in a location tributary to the intake, notification of the proposed OWTS application will be sent to the water system owner(s). The notification will be

accompanied by a copy of the permit application and supporting OWTS design information, including documented soils, topography, groundwater and percolation data.

(4) The owner(s) receiving notification of proposed OWTS installations per (3) above will be afforded a 15-day period in which to submit comments on the proposed OWTS application.

(5) Prior to issuing an OWTS installation permit for any system per (3) above, the Department will review and consider any comments and recommendations submitted by affected water system owner(s) per (4) above.

(6) Upon issuance and/or denial of an OWTS installation permit per (3) above, the Department will provide notification to the affected water system owner(s) of the action taken.

(7) Upon discovery of a failing OWTS, the Department will notify public water well or water intake owners and the State Water Resources Control Board - Division of Drinking Water of the failure, as soon as practicable, but no later than 72 hours.

Procedures for Dispersal Field Located Within Public Well/Intake Setback

New OWTS

In cases where a new OWTS is proposed on a lot created prior to the effective date of the State OWTS Policy (May 13, 2013), and the dispersal field does not meet the specified OWTS horizontal setbacks (per Regulations, Section 12, Table 1) from public water wells and public water supply intakes, the OWTS may be permitted subject to complying with the following requirements to address possible water source impacts:

(1) The dispersal field shall be sited to comply with the setback requirements to the maximum extent practicable;

(2) The OWTS shall incorporate supplemental treatment, including pathogen removal;

(3) Pathogen removal is defined as achieving an effluent fecal coliform bacteria concentration less than or equal to 200 Most Probable Number (MPN) per 100 milliliters;

(4) Minimum vertical separation to groundwater shall be three (3) feet below the bottom of the dispersal field;

(5) The minimum dispersal field soil cover shall be 12 inches;

(6) Other measures as specified by the Department.

Repair/Replacement OWTS

For repair or replacement of an existing OWTS where the dispersal field does not meet the specified OWTS horizontal setbacks from public water wells and public water supply intakes, the OWTS may be permitted subject to complying with the following requirements to address possible water source impacts:

(1) The dispersal field shall be sited to comply with the setback requirements to the maximum extent practicable;

(2) The OWTS shall incorporate supplemental treatment or other mitigation measures specified by the Department, unless he/she finds no evidence of an existing or potential threat of impact to the public water source by the OWTS based on topography, soil depth and groundwater conditions.

Phase-Out of Cesspool Usage

The use of cesspools for sewage disposal is not authorized under Alameda County Ordinance. Cesspools are deemed failing systems and must be immediately corrected. Due to the age of many homes in the County (>50 years old) a number of cesspools still exist and continue to be discovered from time-to-time. Historically, discovery and abandonment of existing cesspools has come about: (a) voluntarily by the property owner; (b) in response to complaints; or (c) through OWTS inspections associated with property transfers or building addition or remodeling projects. In Alameda County the Septage Pumper reporting requirements is expected to accelerate the identification and gradual phase-out of the remaining cesspools in the county.

Section 5:
Prohibitions

The following describe the provisions contained in the Alameda County LAMP corresponding with the required prohibitions set forth in section 9.4 of the SWRCB OWTS Policy.

(1) **Cesspools, Seepage Pits, and Dry Wells.** The use of cesspools, seepage pits and dry wells for sewage disposal is not authorized in Alameda County per requirements adopted in the Ordinance. Cesspools are deemed failing systems and must be immediately corrected.

(2) **OWTS over 10,000 gpd capacity.** The Alameda County Ordinance applies to any OWTS where the maximum daily flow volume of waste produced is 10,000 gpd or less. If the amount of waste produced is more than 10,000 gpd or where a community system serving multiple discharges under separate ownership is proposed, joint oversight by the Department and the San Francisco Bay Regional Water Board or the Central Valley Regional Water Board, as applicable, is required for design, installation and operation approvals.

(3) **OWTS with surface discharge.** Subsurface discharge of wastewater is authorized by the County Ordinance in accordance with State OWTS Policy. If surface discharge of wastewater is proposed, joint oversight by the Department and the San Francisco Bay Regional Water Board or the Central Valley Regional Water Board, as applicable, is required for design, installation and operation approvals.

(4) **OWTS on slopes greater than 30% without slope stability report**. The Alameda County Onsite Wastewater Ordinance and Manual require that OWTS dispersal fields located on slopes greater than 30% include an assessment and technical report addressing slope stability.

(5) **Sizing reductions for IAPMO certified dispersal systems.** The Alameda County OWTS Manual allows the use of IAPMO-approved gravelless chamber dispersal systems with no more than a 20-percent reduction in dispersal system sizing requirements.

(6) **Supplemental treatment systems without monitoring.** Alameda County Manual defines "supplemental treatment" as an advanced system and, as such, is required to be inspected and monitored under an annual operating permit issued by the Department per the requirements of the Ordinance and Manual.

(7) **OWTS for RV Dump Stations.** Treatment and dispersal of domestic wastewater is authorized by the Manual in accordance with State OWTS Policy. Domestic wastewater may include incidental RV holding tank discharges, e.g., at the owner's residence/storage location. Any proposals for RV Dump Stations will be referred to the appropriate Regional Water Board for joint permitting by Department and the San Francisco Bay or Central

Valley Regional Water Board, as applicable. This limitation does not apply to full hook-up sewer connections similar to those used at a recreational vehicle park.

(8) **Groundwater separation less than two (2) feet, or less than 10 feet for seepage pits.** The Alameda County OWTS Manual sets forth minimum siting requirements for OWTS dispersal fields and requires a minimum vertical separation distance from the bottom of the dispersal system to the seasonal high water table of 24 inches or greater below the bottom of the dispersal trench or bed. The Alameda County OWTS Ordinance does not authorize the use of seepage pits for the dispersal of wastewater effluent.

(9) **Where public sewer connection is available.** For any property where the installation of a new, expanded or replacement OWTS is proposed, the Alameda County OWTS Ordinance requires connection to an available public sewer when it is within 200 feet of a building being served.

(10) **Proximity to public water system wells and surface water intakes.** The Alameda County Onsite Wastewater Manual sets forth minimum horizontal setback requirements for OWTS that include the following restrictions for OWTS dispersal systems located in the proximity of public water supply wells and public water system surface water intakes.

a. **Public water well:**

- 150 feet setback for any dispersal system (no greater than 8-feet deep)
- Dry wells, seepage pits, cesspools, and dispersal systems deeper than 8 feet are not authorized

b. **Public water system surface water intake:**

- 400 feet setback from edge of watercourse/water body where OWTS dispersal field is <1,200 feet to water supply intake
- 200 feet setback from edge of watercourse/water body where OWTS dispersal field is >1,200 feet to water supply intake

c. **Exceptions for replacement OWTS.** For replacement OWTS unable to meet the horizontal setback requirements of (A) or (B) above, the replacement dispersal field shall meet the setback requirements to the greatest extent practicable. Additionally, the Department will require the replacement OWTS to incorporate supplemental treatment and other measures, as appropriate, unless he/she finds no evidence of an existing or potential threat of impact to the public water source by the OWTS based on topography, soil depth and groundwater conditions.

d. **Exceptions for new OWTS.** For new OWTS on parcels created prior to May 13, 2013, that are unable to meet the horizontal setback requirements of (A) or (B) above, the new dispersal field shall meet the setback requirements to the greatest extent practicable. Additionally, the Department will require the new OWTS to incorporate Advanced (“supplemental”) treatment, including pathogen removal, plus other requirements noted below. In accordance with State OWTS Policy, pathogen removal in this case is defined as achieving an effluent fecal coliform bacteria concentration less than or equal to 200 Most Probable Number (MPN) per 100 milliliters. Other requirements include:

- providing a minimum vertical separation to groundwater of three (3) feet below the bottom of the dispersal field;
- providing a minimum dispersal field soil cover of 12 inches;
- completion of a cumulative impact analysis regarding nitrate loading effects if the setback issue involves a public water well; and
- other measures as specified by the Department.

On a case-by-case basis, the Department may establish alternative OWTS siting and operational requirements to those listed above where it is determined by the Department that the alternate requirements will provide a similar level of protection against adverse impact to the public water source.

Section 6:
Program Administration

OWTS Permitting Records

The Department will retain permanent records of OWTS permitting actions and will make those records available within 10 working days upon written request for review by either the San Francisco Bay or Central Valley Regional Water Board. This includes:

(1) Design approvals for new, repair and replacement OWTS;

(2) Installation permits issued for new, repair and replacement OWTS;

(3) OWTS variances and/or exemptions issued, including number, location and description;

(4) Annual operating permits issued for Advanced OWTS, Multi-unit Residential and Non-Residential, High Strength or High Flow OWTS, or other OWTS where the Department has determined the need for an operating permit;

(5) Five year reporting for Standard OWTS without operating permits.

Water Quality Assessment Program

Objectives

The Department will maintain an OWTS water quality assessment program having three primary objectives: (1) to determine the general operational status of OWTS in the county; (2) assess possible impacts of OWTS on groundwater and surface water quality, and their associated beneficial uses; and (3) identify areas for changes to existing OWTS management practices.

Areas of Special Concern

It is anticipated that the OWTS-water quality assessment will be organized generally according to the various Areas of Special Concern delineated and described in this LAMP. This will allow the existing GIS-based mapping, OWTS inventories, and nitrate loading analyses to be utilized and built-upon. Other localized Areas of Special Concern within Alameda County may be delineated in the future if warranted. Also, some Areas of Special Concern may be dropped in the future if alternative wastewater management solutions (e.g., connection to public sewers, community system) are implemented.

Operational Status of OWTS

The general operational status of OWTS will be assessed through compilation and review of the following types of information:

(1) Septage pumper reports;

(2) Complaints and abatement activities for failing OWTS;

(3) Variances issued for new and/or repaired OWTS;

(4) Performance evaluations of existing OWTS in connection with building permits, land use projects, or property transactions;

(5) inspection of existing Standard OWTS without operating permits as reported under five year reporting requirements;

(6) Monitoring reports for Advanced OWTS and other OWTS under an operating permit.

The data review and assessment will focus on both positive and negative findings, apparent trends, and areas for changes in practices. The assessment will maintain and update the existing inventory records of OWTS in the county.

Water Quality Assessment

The water quality assessment will include the following:

(1) **Water Quality Parameters of Concern.** The initial focus of the water quality assessment program will be on two key water quality parameters – pathogens and nitrate-nitrogen. Other parameters of concern may be added if warranted.

(2) **Wastewater Discharge Volumes.** Estimates of annual wastewater discharge estimates from OWTS will be updated based upon the running inventory of OWTS per above.

(3) **Nitrate Loading.** Nitrate loading estimates (for Areas of Special Concern) will be maintained and updated based on the running inventory of OWTS in the county.

(4) **Water Quality Data Sources**. Relevant water quality monitoring data for (pathogens and nitrate-nitrogen will be compiled from available sources, anticipated to include:

- Receiving water quality monitoring data reported under operating permits for High Strength and High Flow OWTS and others;
- Water quality data from cumulative impact studies;
- Zone 7 Water Agency monitoring data and reports;
- Domestic water well potability testing or other;
- Public water system raw water quality data from monitoring reports;
- Reservoir or stream water quality sampling data from Zone 7, Alameda County Water District and other watershed special studies;

- Receiving water sampling performed as part of a of a National Pollutant Discharge Elimination system (NPDES) permit or waste discharge requirements (WDR);
- Groundwater sampling performed as part of WDR;
- Data from the California Water Quality Assessment Database; and
- Groundwater data collected as part of the Groundwater Ambient Monitoring and Assessment Program available in the Geotracker Database.

(5) **Assessment.** In addition to periodically updating the OWTS nitrate loading estimates for the county, it is anticipated that assessment of the data will include a collaborative review with Zone 7 Water Agency to: (a) determine relevance of the various data to OWTS; (b) identification of any obvious water quality degradation attributable to OWTS warranting follow-up investigation or action; (c) identification of any water quality degradation where OWTS may be implicated as a possible source; (d) identification of water quality data/areas where no apparent issues of concern related to OWTS; and (e) assessment of the assimilative capacity for nitrate in certain OWTS areas.

Reporting to Regional Water Board

Annual Report

An annual report pertaining to OWTS activities in Alameda County for submission to the San Francisco Bay Regional Water Quality Control Board by February 1st of each year, with a copy also sent to the Central Valley Regional Water Quality Control Board and Zone 7. The annual report will, at a minimum, include the following information, organized in a tabular spreadsheet format:

(1) Number and location of complaints pertaining to OWTS operation and maintenance, and identification of those which were investigated and how they were resolved;

(2) Number, location and description of permits issued for new and replacement OWTS, including any variances and/or exemptions issued;

(3) Number, location and results of septage pumper reports;

(4) List of applications and registrations issued as part of the local septage pumper registration program pursuant to Section 117400 et seq. of the California Health and Safety Code;

(5) Number and location of advanced systems and summary of their performance (I.e., effluent concentrations).

The report will include: (a) a summary of whether any further actions related to OWTS are warranted to protect water quality or public health; and (b) any other information deemed appropriate by the Department.

5-Year Water Quality Assessment Report to Regional Water Board

Every five (5) years the annual report to the Regional Water Board will be accompanied by a Water Quality Assessment Report that summarizes the information and findings from the Department Water Quality Assessment Program described above. The report will present an overall assessment regarding any evidence of water quality impacts from OWTS along with any recommended changes in the LAMP to address the identified impacts. Additionally, any groundwater water quality data generated by the Department from monitoring activities will be submitted in electronic data format (EDF) for inclusion in Geotracker, and any surface water quality data will be submitted to CEDEN in a SWAMP comparable format.[1]

[1] CEDN stands for California Electronic Data Exchange Network; SWAMP stands for Surface Water Ambient Monitoring Program

Appendix A

Supporting Rationale for Alameda County OWTS Siting and Design Criteria

Appendix A

Supporting Rationale for Alameda County OWTS Siting and Design Criteria

Following is a discussion of the supporting rationale (including literature references) for the various siting and design requirements for OWTS contained in Alameda County's LAMP for those items that differ from the Tier 1 requirements of the SWRCB OWTS Policy. The topic areas addressed include: (1) groundwater separation requirements beneath dispersal systems; (2) dispersal trench sizing; (3) horizontal setbacks; and (4) allowable OWTS densities (lot size) for new subdivisions. Additionally, highlighted at the end of the discussion are the various requirements and management practices contained in Alameda County's LAMP that constitute a higher level of water quality and environmental protection by advanced OWTS relative to the Tier 1 requirements for standard OWTS.

1. Pathogen Removal and Groundwater Separation Requirements

Bacteria, viruses, and other pathogens are present in great numbers in sewage and represent an ongoing threat to public health. Preventing the transmission of disease is the foremost concern associated with the treatment and dispersal of sewage and is the basis for many of the established standards that dictate how, where and when wastewater treatment and dispersal can occur. Ground waters and surface waters are afforded protection from OWTS contamination through the establishment of specific criteria pertaining to the soil properties, vertical separation (i.e., the distance from the bottom of the dispersal trench to the seasonal high groundwater below), and horizontal (surface water) setback requirements. The level of wastewater treatment (prior to dispersal) and the design of the dispersal system can also play a role in pathogen removal. The soil is critical, but the factors are complex, and there is no simple rule for proper design and operation. Attenuation and removal of pathogens in the soil is accomplished through such mechanisms as microbial predation, filtration, adsorption, and die-off.[2] Related factors include the depth, texture, and structure of the soil, hydraulic loading rate, and other physicochemical properties such as moisture, temperature, oxygen and pH.

It is well known that soils have a tremendous capacity to remove bacteria from percolating wastewater. The retention and die-off of most, if not all, pathogenic bacteria occur within 2 to 3

[2] "microbial predation" refers to consumption by other soil microbes; "filtration" refers to physical trapping between soil particles; "adsorption" refers to attachment to the surfaces of soil particles; "die-off" refers to degradation or inactivation due to the inability of the pathogen to sustain itself in the soil environment.

feet of the soil infiltrative surface in a properly functioning OWTS (Anderson et al, 1994; Washington Dept. of Health, 1990). Viruses can also be retained and eliminated within a few feet, depending on the soil conditions; but it is generally accepted that they can persist longer and travel farther in the soil than bacteria (Anderson, et al, 1991; Ayres and Associates, 1993). Unlike bacteria, viruses are not always present in individual residential OWTS discharges, since it depends on the health status of the residents. Viruses are more likely to be consistently present at some level in commercial and community wastewater systems, which accept wastes from a broader segment of the population. Once reaching the water table, bacteria and viruses have been found to survive and travel significant distances with the groundwater (potentially hundreds of feet), depending on the rate of groundwater movement. Survival time in soil and groundwater is typically on the order of days to weeks for bacteria, and weeks to months for viruses.

Consistent with current knowledge and practices for preventing pathogen impacts from OWTS, the Alameda County LAMP includes a combination of siting and design requirements including: soil depth and percolation characteristics, minimum vertical separation to groundwater, minimum horizontal setbacks to various water/landscape features, dispersal field design/sizing criteria based on percolation rates, and, for some situations, options for use of Advanced treatment and dispersal designs. Horizontal setbacks are the same for all OWTS (Standard and Advanced) and are consistent with long-standing criteria contained in the guidelines of the San Francisco Bay and Central Valley Regional Water Quality Control Boards. The setback requirements also include more restrictive requirements for public water wells and public water system surface water intakes per the 2012 SWRCB OWTS Policy.

The key issue related to potential pathogen impacts from OWTS is the vertical separation below the bottom of the dispersal system to the seasonally high groundwater level (i.e., water table). **Table A-1** lists the depth to groundwater requirements for Standard OWTS in Alameda County, along with the corresponding groundwater separation requirements contained in the historical guidelines of the San Francisco Bay Regional Water Board and the Tier 1 requirements in the SWRCB OWTS Policy. As indicated, the adopted approach utilizes a standard depth to groundwater distance of 20 feet for 1 to 5 mpi, 5 feet for 6 to 60 mpi, and does not permit Standard OWTS in areas of percolation rates slower than 60 mpi. The County requirements for Standard OWTS are more restrictive than the historical guidelines of the SF Bay Regional Water Board, and similar but not exactly equivalent to Tier 1 criteria.

Table A-1
Comparison of Depth to Groundwater Requirements for Standard OWTS
(feet, below trench bottom)

Percolation Rate (min per inch)	Alameda County	SF Bay Regional Water Board Guidelines	SWRCB OWTS Policy Tier 1 Requirements
1-5	20	20	20
6-30	5	3	8
31-60	5	3	5
61-120	Not permitted	3	5

Under the historical practices and this LAMP, the County allows reduced groundwater separation distances for different types of Advanced treatment and dispersal systems as shown in **Table A-2**, also including the requirements for Standard OWTS for comparison.

Table A-2
Depth to Groundwater Requirements, Alameda County

Type of OWTS	Percolation Rate (MPI)	Min. Depth to Groundwater (feet)[1]			
		2	3	5	20
• Primary Treatment & Gravity Dispersal Trench	1-5 6-60			 X	X
• Primary Treatment & Pressure Dosed Trench (Conventional Trench)	1-5 6-120		 X	X 	
• Primary Treatment & Pressure Dosed Sand Trench	1-5 6-120	 X	X 		
• Primary Treatment & At-Grade Dispersal System	1-5 6-60	 X	X 		
• Supplemental Treatment & Pressure Distribution Trenches • Supplemental Treatment & At-Grade Dispersal System • Primary Treatment & Mound Dispersal System • Supplemental Treatment & Drip Dispersal System	1-5 6-120	 X	X 		
• Supplemental Treatment & Mound Dispersal System	1-120	X			

[1] Measured from the bottom of the dispersal system

The supporting rationale for the reduced vertical separation requirement for the various Advanced OWTS designs is derived from research studies done over the past 30 to 40 years, largely funded by the USEPA and referenced in the *On-site Wastewater Treatment Systems Manual* (US EPA, 2002). These studies have documented how various advanced treatment and dispersal methods can improve the operation and treatment effectiveness of OWTS as compared with Standard septic tank-gravity dispersal trench designs. A major focus of the research efforts has been on finding methods to augment or improve the natural pollutant removal processes in the soil (especially related to pathogens) to help overcome limited soil depth and high groundwater conditions, which are a common constraint virtually everywhere OWTS are used. The following is a review of some of the key findings and principles that have emerged from the research and have supported changes in OWTS siting and design criteria.

a. **Pressure Distribution.** There is strong evidence and agreement in the professional literature that pressure distribution improves the performance of any soil absorption system as compared with Standard gravity distribution, and should be the distribution method of choice (US EPA, 2002). This is due to two main factors: (1) pressure distribution disperses the wastewater flow uniformly over the entire available soil infiltrative surface, which allows the maximum absorption potential to be realized for any given soil condition; and (2) creation of wetting and draining cycles (via effluent dosing) promotes the maintenance of aerobic soil conditions at the infiltrative surface, which improves biodegradation and reduces the potential for soil clogging caused by the buildup of organic matter. The professional literature also notes that uniform spreading of the effluent discharge to the soil with the use of pressure distribution (or drip dispersal), ideally with timed-dosing, is critical to assure effective pathogen reduction in situations where the vertical separation is reduced.

b. **Supplemental (Advanced) Treatment.** Pathogen removal efficiencies can vary greatly amongst the different types of supplemental treatment systems that would be permitted and used under the County Ordinance. The greatest removal efficiencies are generally attributed to intermittent sand filters. Crites and Tchobanoglous (1998) present data showing fecal coliform removal efficiencies of 97.9 percent to 99.9 percent for intermittent sand filters. Leverenz, et al (2002) estimate intermittent sand filters as having the ability to produce effluent with fecal coliform concentrations <800 MPN/100 ml. For comparison, the fecal coliform concentration in effluent from a Standard septic tank is similar to that in raw sewage, and typically ranges from about 10,000 to 100,000 MPN/100 ml. (Crites and Tchbanoglous, 1998). Additionally, however, an important purpose of the supplemental treatment unit in combination with the dispersal system design is to establish and maintain aerobic/unsaturated conditions in the soil absorption field. Maintenance of aerobic soil conditions is conducive to pathogen removal and an improvement over the operational conditions of Standard gravity dispersal fields, which are designed to allow a saturated (anaerobic) soil-infiltrative surface. Research has demonstrated that aerobic effluent: (a) promotes the growth of aerobic soil microflora that can have antagonistic effects on viruses; and (b) reduces the amount of organic compounds that compete for adsorption sites with viruses and bacteria (Potts, 2003).

c. **Pathogen Removal in Soils.** The retention and die-off of most, if not all, pathogenic bacteria occur within 2 to 3 feet of the soil infiltrative surface in a properly functioning OWTS (Anderson et al, 1994; Washington State DOH, 1990). Viruses can also be retained and eliminated within a few feet, depending on the soil conditions; but it is generally accepted that they can persist longer and travel farther in the soil than bacteria (Anderson et al, 1991; Ayres Associates, 1993). Studies have shown that vertical separation distances to groundwater of 12 to 18 inches are sufficient to achieve good fecal coliform removal where the wastewater receives supplemental treatment prior to soil application along with pressure distribution or drip dispersal methods (Converse and Tyler, 1998; Duncan et al, 1994). Additionally, most of the research studies of OWTS pathogen removal have focused on sandy soil types; and the results of these studies have formed the basis for the soil depth criteria, such as those contained in the EPA Design Manual (2 to 4 feet unsaturated soil depth). Consequently, the soil depth criteria are already oriented toward the "worst case" conditions (sandy, permeable soils), and there is a built-in safety factor, with respect to pathogen removal, for finer textured soils with higher silt and clay fractions.

As previously noted, while there is no simple rule or absolute formula for OWTS-groundwater separation, the Alameda County depth to groundwater criteria related to type of OWTS and percolation rates are similar to standards adopted and followed in many other counties in Northern California over the past 10 to 20+ years (for example, Marin, Sonoma, Napa, Contra Costa, Mendocino, Placer, Nevada, among others).

Additionally, an important aspect of siting and design of OWTS under these criteria is the process for determining seasonally high groundwater levels in the dispersal field area. The requirements in Alameda County specify field observation methods for groundwater determination consistent with best industry practices. These requirements have been in effect for a number of years and will continue under the County LAMP.

Finally, the LAMP includes an operating permit program for all Advanced OWTS that will ensure ongoing inspection and monitoring of OWTS for verification of proper performance.

Based on the above considerations, the criteria relative to the depth to groundwater requirements and use of Advanced treatment and dispersal methods are consistent with the current state of knowledge and best management practices and would provide suitable protection against pathogen impacts from onsite wastewater treatment systems.

2. Dispersal Trench Sizing

Dispersal trench sizing (i.e., length) is commonly based on three factors: (a) design wastewater flow; (b) trench infiltrative surface dimensions (width and depth); and (c) wastewater application rates (gpd/ft^2) related to percolation rate or soil type. Alameda County requirements differ in some respects from the State OWTS Policy Tier 1 criteria, but overall provide a more conservative (safe) design approach, as follows:

a. Alameda County specifies the use of <u>peak daily wastewater flow</u> for dispersal system sizing; Tier 1 specifies the use of <u>average daily wastewater flow</u> (8.1.3). As a rule of thumb, average daily flow is typically about 50% of peak wastewater flow, resulting in 100% greater sizing/safety factor in the Alameda County design approach.

b. The standard allowance for infiltrative surface in Alameda County requirements is trench bottom areas, up to 4 ft^2 per lineal foot of trench, which conforms with the 4 ft^2 per lineal foot specified in the Tier 1 requirements (8.1.6). Alameda County also includes limits on the use of Standard trenches to sites having percolation rates up to 60 mpi, compared with allowance for percolation rates up to 120 mpi in Tier 1.

c. **Table A-3** below shows a comparison of the wastewater application rate criteria based on percolation rate for a range of values, including Alameda County requirements, Tier 1 criteria, US EPA and other SF Bay Area Counties, and the historical guidelines of the SF Bay Regional Water Board. As can be seen, there are similarities and differences among all of the criteria. Alameda County requirements are patterned after US EPA guidelines, which have been followed in several other SF Bay Area counties for the past 20+ years. Alameda County requirements agree with Tier 1 in the lower (faster) percolation range, but differ for slower percolation rates. However, Alameda County does not permit Standard trench design beyond 60 mpi percolation rates, making the requirements more restrictive compared to Tier 1.

Table A-3
Wastewater Application Rates for OWTS Dispersal Field Sizing (gpd/ft^2)

Percolation Rate (mpi)	Alameda County LAMP	SWRCB OWTS Policy Tier 1	USEPA Design Manual & SF Bay Counties	SF Bay Regional Water Board Guidelines
1-5	1.20 – 1.086	1.20	1.20 – 1.086	1.58 – 0.82
10	0.80	0.80	0.80	0.64
24	0.60	0.60	0.60	0.39
30	0.56	0.533	0.56	0.30
45	0.45	0.367	0.45	0.25
60	0.35	0.2	0.35	0.22
90	Not permitted	0.1	0.20	0.22
91-120	Not permitted	0.1	0.20	0.22

Additionally, it should be noted that Alameda County requires the installation of dual (200%) dispersal fields, whereas Tier 1 requires 100% installation plus a set-a-side 100% reserve area for future replacement. A dual system installation gives a significant built-in safety factor for public health and water quality protection not provided by the Tier 1 approach.

3. Horizontal Setbacks

Alameda County's OWTS Ordinance includes horizontal setback distances that equal or exceed the State OWTS Policy Tier 1 requirements in all respects except for Tier 1 item 7.5.5 which specifies a 200-ft setback from "… vernal pools, wetlands, lakes, ponds, or other surface waters…". Alameda County requirements treat these water bodies the same as "watercourses", with a 100-ft horizontal setback requirement, which is consistent with Regional Water Board guidelines and requirements found in all other jurisdictions reviewed. The State Water Board's rationale for the 200-ft setback distance is not known.

The County's 100-ft setback distance is meant to protect beneficial uses of both watercourses and water bodies, which primarily include contact and non-contact recreation and aquatic resources. Consistent with the State OWTS Policy, Alameda County includes a 200-ft to 400-ft setback for surface waters in proximity to public water supply intakes – a beneficial use of water warranting a higher level of protection from waste sources.

The Tier 1 200-ft setback in Item 7.5.5 appears to be without substantial merit and is at odds with other setback requirements – e.g., 100-ft setback from a domestic water supply well. The possible justification for a 200-ft setback from stock watering <u>ponds</u>, golf course <u>lakes</u>, and <u>wetlands</u> (that may or may not have any surface water features) is not known.

4. Allowable Densities for New Subdivisions

Tier 1 (section 7.8) specifies that average development density (i.e., acres per dwelling unit/OWTS) be based on a sliding scale (0.5 to 2.5 acres) related to average rainfall. Alameda County requirements are more conservative (safe) in that they specify a minimum lot size of 5 acres in the Upper Alameda Creek Watershed Area, based on groundwater-nitrate and OWTS loading studies conducted by Zone 7 Water Agency. For all other areas of the county, minimum lot size for new lot creation is 40,000 square feet where public water is provided and 60,000 square feet for areas reliant on private water supply. However, cumulative impact assessment (e.g., nitrate loading) is also required, the results of which would be the basis for increasing minimum lot size or imposing other mitigation measures (e.g., supplemental treatment providing nitrogen removal), where warranted on a case-by-case basis. This would meet the same objective of Section 7.8, but would be done on the basis of site specific conditions and analysis.

5. More Protective Aspects of Alameda County LAMP

The following highlight the more protective aspects of the Alameda County LAMP as compared with the Tier 1 requirements of the SWRCB OWTS Policy.

- **Advanced OWTS.** Establishes requirements for Advanced OWTS, providing better options, design guidance and a managed system for dealing with repairs/replacement for the approximately 2,500 – 2,700 existing OWTS in the county.

- **Operating Permits.** Establishes operating permit program for Advanced, Multi-Unit Residential and Non-Residential, High Strength and High Flow OWTS to ensure a higher level of performance monitoring and regular reporting to the County.

- **Cumulative Impact Assessments.** Includes requirements and guidelines for conducting cumulative impact assessments related to nitrate loading, groundwater mounding or other issues or locations of concern; mandatory for High Strength and High Flow OWTS (over 1,500 gpd). Tier 1 allows OWTS designs up to 3,500 gpd with no comparable requirements.

- **Minimum Lot Size Requirements.** Includes a 5-acre minimum lot size requirement for new lot creation in the area of the county (Upper Alameda Creek Watershed) most reliant on OWTS; this compares with a 2.5 acre minimum lot size under Tier 1. For all other areas of the county, minimum lot size for new lot creation is 40,000 square feet where public water is provided and 60,000 square feet for areas reliant on private water supply. Additionally, however, cumulative impact assessment (e.g., nitrate loading) is also required, the results of which would be the basis for increasing minimum lot size, where warranted.

- **Areas of Special Concern.** Includes identification of Areas of Special Concern within the county based on groundwater-nitrate impacts, along with imposition of Advanced treatment requirements for nitrogen removal; Tier 1 criteria would allow Standard OWTS in many of the identified areas.

- **Septage Pumper Inspection & Reporting Requirements.** Institutes a program for basic inspection of OWTS at the time of septic tank servicing, and reporting of results to the County.

- **Dual (200%) Dispersal System.** Requires installation of dual (200%) dispersal fields for Standard OWTS rather than 100% installed, 100% reserve.

- **Seepage Pits.** Prohibits the use of seepage pits; Tier 1 identifies seepage pits as an alternative for OWTS repairs (8.1.6).

- **Pump Systems.** Includes design guidance and requirements for pump systems.

- **Pressure Distribution Systems.** Treats pressure distribution systems as an "Advanced" OWTS, including requirements for operating permit and performance monitoring/reporting. Tier 1 (8.1.4) implies that pressure distribution is a Standard trench design option.

- **Cut Banks and Steep Slopes.** Includes horizontal setback requirement for cut banks and steep slopes, which represent potential avenues for effluent seepage.

- **Maximum Trench Depth.** Specifies maximum depth of 5 feet for dispersal trench, compared with 10 feet allowed by Tier 1.

- **Peak vs Average Flow.** Dispersal system design based on peak, rather than average wastewater flow as provided in Tier 1.

- **Erosion Control.** Includes requirements for OWTS installations for certain slopes, type and size of project.

- **Floodplains.** Includes setback and design requirements related to floodplains.

- **Performance Evaluation Guidelines.** Provides procedures and criteria to guide performance evaluations of OWTS in connection with building remodel projects, property transfers, abatement investigations, etc.

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Appendix B
OWTS Usage and Loading Estimates for Alameda County
Prepared by Questa Engineering Corporation – March 2016

General Approach and Scope

The following describes the process used to develop an inventory of the total number and distribution of residential OWTS in Alameda County, organized and integrated with hydrologic and soils mapping information. The analysis was completed by Questa Engineering using GIS parcel data supplied by County of Alameda, along with soils and hydrological data primarily from the USDA National Resource Conservation Service (NRCS) and California Department of Water Resources (DWR).

There were five basic elements of this analysis as follows:

1. **Parcel Development Status.** Conduct a systematic GIS-based inventory to determine the development status (i.e., developed or vacant) of all parcels in non-sewered areas of the County. Note: the analysis did not attempt to distinguish between OWTS serving single family residences and those serving commercial occupancies or other non-residential uses. The vast majority of OWTS in the county are for residential use. Non-residential OWTS may be significant locally in some cases, and may warrant separate analysis in the County's future OWTS management program.

2. **Watershed Areas.** Delineate the two major watershed areas of OWTS significance in the County – Upper Alameda Creek and San Lorenzo Creek - consistent with State databases, in a GIS format compatible with parcel data.

3. **Groundwater Basins.** Delineate the three major groundwater basins of significance for OWTS in Alameda County – Livermore Valley, Sunol Valley and Niles Cone, including GIS map files compatible with parcel data.

4. **General Soil/OWTS Suitability Mapping.** Define and construct GIS map of general soil associations for the County, focused on factors pertinent to the use of OWTS.

5. **Potential Areas of Concern.** Identify potential geographical areas of concern related to the high numbers and/or concentration of OWTS in certain areas, and develop for each area estimates of the total OWTS, lot size/density factors, wastewater volumes and nitrogen loading to the soil/groundwater environment.

The geographical area covered in the analysis included the southern and eastern portions of Alameda County, the primary areas where OWTS are in use; parcel data analysis focused only on the unincorporated lands. All incorporated property within the various cities was excluded, as well as all unincorporated property within a sewer district, under the assumption that municipal sewer systems either currently serve or are potentially available to all parcels in these areas.

Parcel Development Status

The first step in the analysis was to identify and create an inventory of the non-sewered parcels in the County along with their development status (i.e., developed or vacant). It was found that this information is not readily available from any County department. Therefore, this was done according to the following process using the County GIS database.

1. Identify Non-sewered Parcels

- First, we obtained and applied city and sanitary district boundaries to the County-wide GIS data base to create a composite map of parcels located within areas known to be served by public sewers. This included mainly incorporated lands, but it also included some unincorporated areas of Hayward and Castro Valley (e.g. Oro Loma and CVSAN sanitary districts) which are served by municipal wastewater facilities.

- We excluded parcels within the GIS map of sewered areas determined above, leaving an inventory of parcels that may currently or potentially be developed with OWTS.

- From the above analysis, the total number of non-sewered parcels in the County was determined to be 5,139.

2. Determine Development Status.

- County Assessor's information and other GIS parcel data were reviewed and found not to have any designation indicating whether or not a particular property is developed or vacant.

- Per discussions with knowledgeable County staff, the Tax Roll data fields for the following were judged to be the most reasonable indicators of developed vs vacant status: (1) number of bedrooms, (2) number of buildings, (3) improvement value, and (4) parcels with an assigned street address (and street number).

- A separate analysis was made for each Tax Roll data field above, with the following results:

    1) 1,404 parcels having >0 bedrooms
    2) 1,983 parcels having >0 buildings
    3) 2,134 parcels having >0 improvement value
    4) 2,733 parcels with a street listing (of which 2,345) parcels also included an actual street number)

- The County DEH provided GIS-based data indicating 2,459 parcels which have some type of record on file at DEH. However, DEH cautioned that the records are not necessarily related to the permitting or existence of an OWTS on the property; they could pertain to OWTS abandonments at time of sewer connection; or they may be related to other environmental health matters and property may be connected to sewer. We sorted the County file data according to sewered vs non-sewered delineations from step 1 above, and found 718 pertained to sewered areas, and 1,741 pertained to non-sewered areas.

- We then spot-checked satellite imagery against the findings from each of the above "developed status" indicators, and against the County DEH records data based; we found the best apparent match to be the Assessor's entry for "buildings", i.e., >0 buildings;

- The indicators as derived above were then assigned to the County-wide GIS inventory of unincorporated non-sewered parcels giving the best estimate of developed parcels/OWTS vs undeveloped as follows:

1) Developed/OWTS Parcels:	1,983
2) Vacant Parcels:	3,156
Total Parcels:	5,139

- From County records there are known to be pockets and scattered individual OWTS in some urban areas, most notably in portions of the Oakland hills. Utilizing records contained in DEH files, the DEH staff developed estimates and maps of OWTS usage in the Oakland hills, which are provided in **Appendix C**. The DEH inventory showed an estimated 85 existing developed properties using OWTS in the Oakland hills; and this was added to the GIS-based inventory by Questa (above), bringing the total existing OWTS estimate to 2,068.

Watershed Areas

Watershed Mapping. Alameda County lies almost entirely within the jurisdiction of the San Francisco Bay Regional Water Quality Control Board (Region 2). A small portion of the county, east of the Altamont Hills, lies in the Central Valley Region 5. The two main watersheds of significance for OWTS are the Upper Alameda Creek and San Lorenzo Creek (Castro Valley Area). **Figure B-1** provides a map of the county showing the location and extent of these watersheds, based on boundaries established by the California Department of Water Resources (DWR); also shown is the drainage divide between the S.F. Bay and Central Valley Regions.

OWTS Distribution by Watershed. The watershed mapping information was merged with the GIS parcel status data to determine the distribution of developed unincorporated parcels (i.e., OWTS) according to their location in different watershed areas in the county. The results are summarized in **Table B-1** below. The OWTS parcels lying in the Central Valley Region were tallied and listed under the heading "Eastside Altamont Hills". The OWTS parcels in the remainder of the county are listed under "Other".

Major Surface Water Features

Alameda County LAMP Fig. B-1

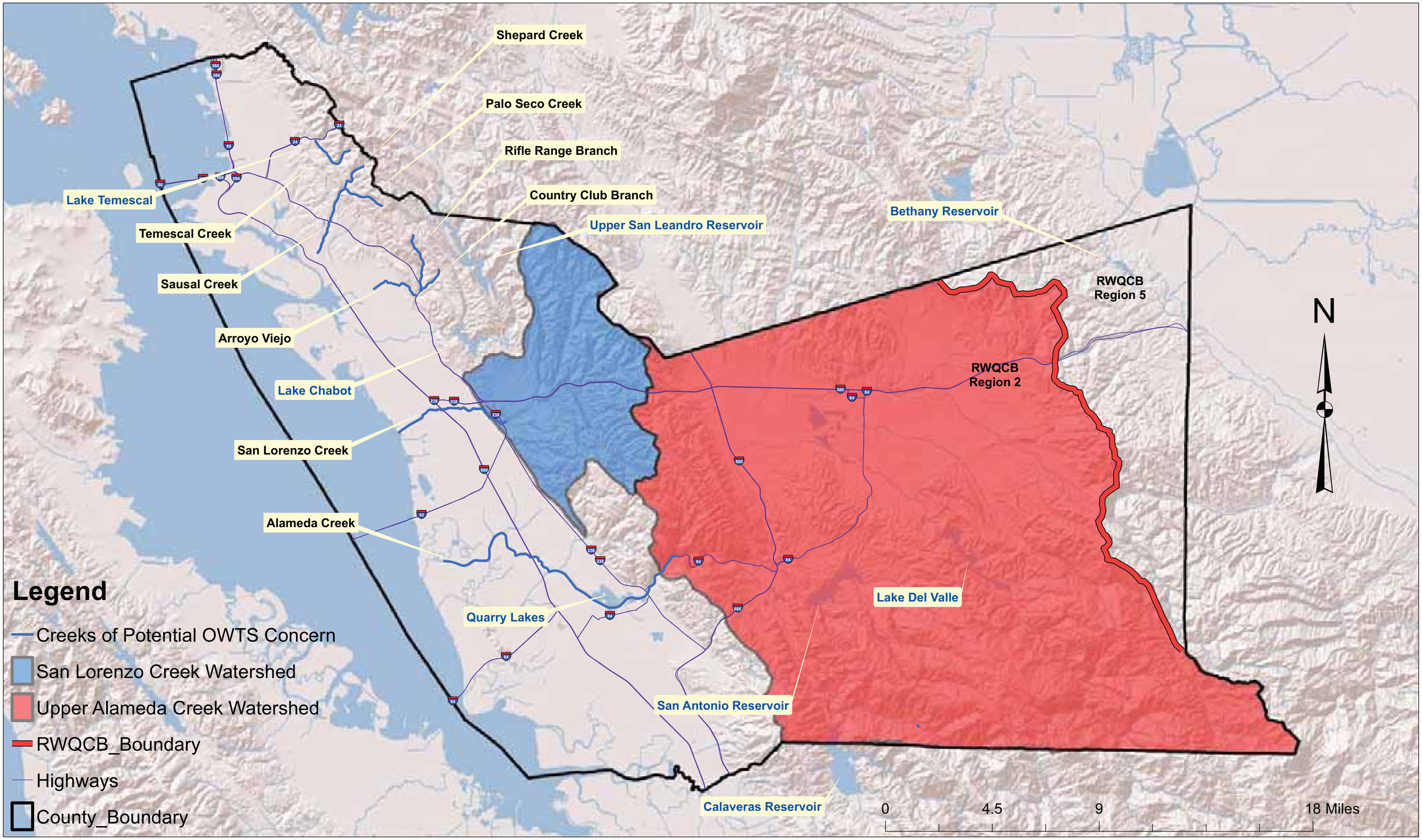


Table B-1. Estimated OWTS by Watershed Area

Watershed	Watershed Area (sq miles)	Estimated Number of OWTS Within Watershed
Upper Alameda Creek	351	1,288
San Lorenzo Creek	53	483
Oakland Hills	-	85
Eastside Altamont Hills	69	85
Other	N/A	127
Total		**2,068**

Groundwater Basins

Groundwater Basin Mapping. The three major groundwater basins in Alameda County of significance for OWTS management are the Livermore Valley Groundwater Basin, Sunol Valley Groundwater Basin and the Niles Cone Sub-basin. **Figure B-2** provides a map of the county showing the location and delineation of these three groundwater basins according to boundaries established by the California Department of Water Resources (DWR).

OWTS Distribution by Groundwater Basin. In an analysis similar to conducted by watershed area, the groundwater basin boundaries were merged with the GIS parcel status data to obtain estimates of the number of developed unincorporated parcels/ OWTS overlying each of these three major groundwater basins of interest. The results are summarized in **Table B-2** below.

Table B-2. Estimated OWTS Distribution by Groundwater Basin

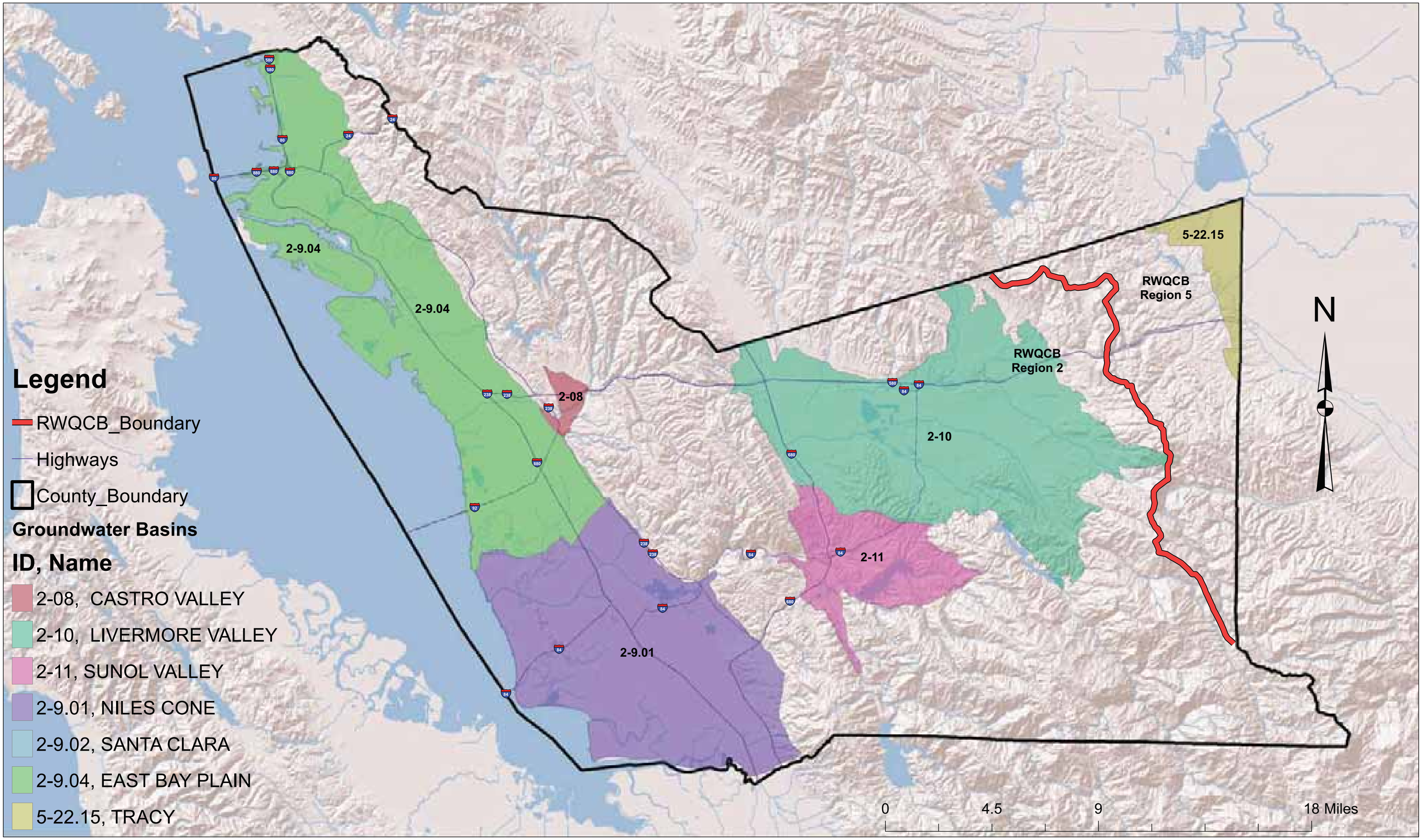
Groundwater Basin	Basin Area (sq miles)	Estimated Number of OWTS Within Basin
Livermore Valley	167	612
Sunol Valley	41	189
Niles Cone	144	41
Oakland Hills	-	85
Eastside Altamont Hills	69	85
Other	N/A	1,056
Total		**2,068**

Soils/ OWTS Suitability Mapping

General Soils Map. Figure B-3 presents a General Soils Map of Alameda County compiled from information contained in several soil surveys and mapping published by the U.S. Department of Agriculture, which include: (1) Soil Survey of Alameda County, California, 1966;

Major Groundwater Basins

Alameda County LAMP Fig. B-2



and (2) Online soils data base maintained by the Natural Resources Conservation Service (NRCS). The General Soils Map contained in the 1966 Soil Survey of Alameda County provided the baseline groupings of general soil associations, which were extended to cover other portions of the County, as shown in **Figure B-3**.

Soils in the County can be grouped into general landform classifications as follows:

- **Urban Areas (0).** Soils found in the flat portions of the East Bay that occur in sewered areas were not analyzed.

- **Soils of the Uplands (1, 2, 3)**. Soils found in the uplands are shallow to moderately deep, well drained to excessively drained loams and gravelly loams. Constraints of steep slopes, shallow soils over rock, erosion and local landslides may be potentially overcome by alternative treatment and/or shallow dispersal designs.

- **Terraces, Alluvial Fans and Floodplains (4, 5, 6, 7).** Soils of the floodplains, alluvial fans and terraces are formed in alluvium weathered from sedimentary rocks. Many OWTS are found in the Livermore Valley, where the floodplain soils are clays to gravelly loams that are generally shallow above a limiting layer, with inclusions of low permeability and/or perched groundwater favoring shallow dispersal designs.

Soil-OWTS Suitability and OWTS Distribution. The general mapping of soil conditions takes into account location and landform conditions, depth to bedrock, slope, subsurface texture, and drainage conditions of the soils, which are all key factors that can affect the suitability of the soils for onsite wastewater treatment. **Table B-3** was developed from the published soil survey information, summarizing the soil characteristics of the general soil associations mapped in **Figure B-3.**

The second to last right-hand column in **Table B-3** highlights the key constraints and overall suitability designation for OWTS for each general soil association. The designations were developed and assigned based on the USDA soils information and best professional judgment. This is provided as a general assessment tool and is not a substitute for site-specific investigation of and planning for onsite wastewater treatment systems. It provides a general indication of the management and design issues likely to be encountered in each area. It does not take into account local constraints such as steep slopes, setback or other anomalous conditions that may be found on particular sites.

The last column gives the estimated number of developed OWTS parcels within each general soil area, determined by merging the GIS parcel data with the soil mapping boundaries, as similarly done and presented above for watershed areas and groundwater basins.

Potential Areas of Concern

In locations where there are special environmental or geographical concerns, additional evaluation, standards and requirements must be followed as set forth in the Ordianace and the Manual.

General Soils Map

Alameda County LAMP Fig. B-3

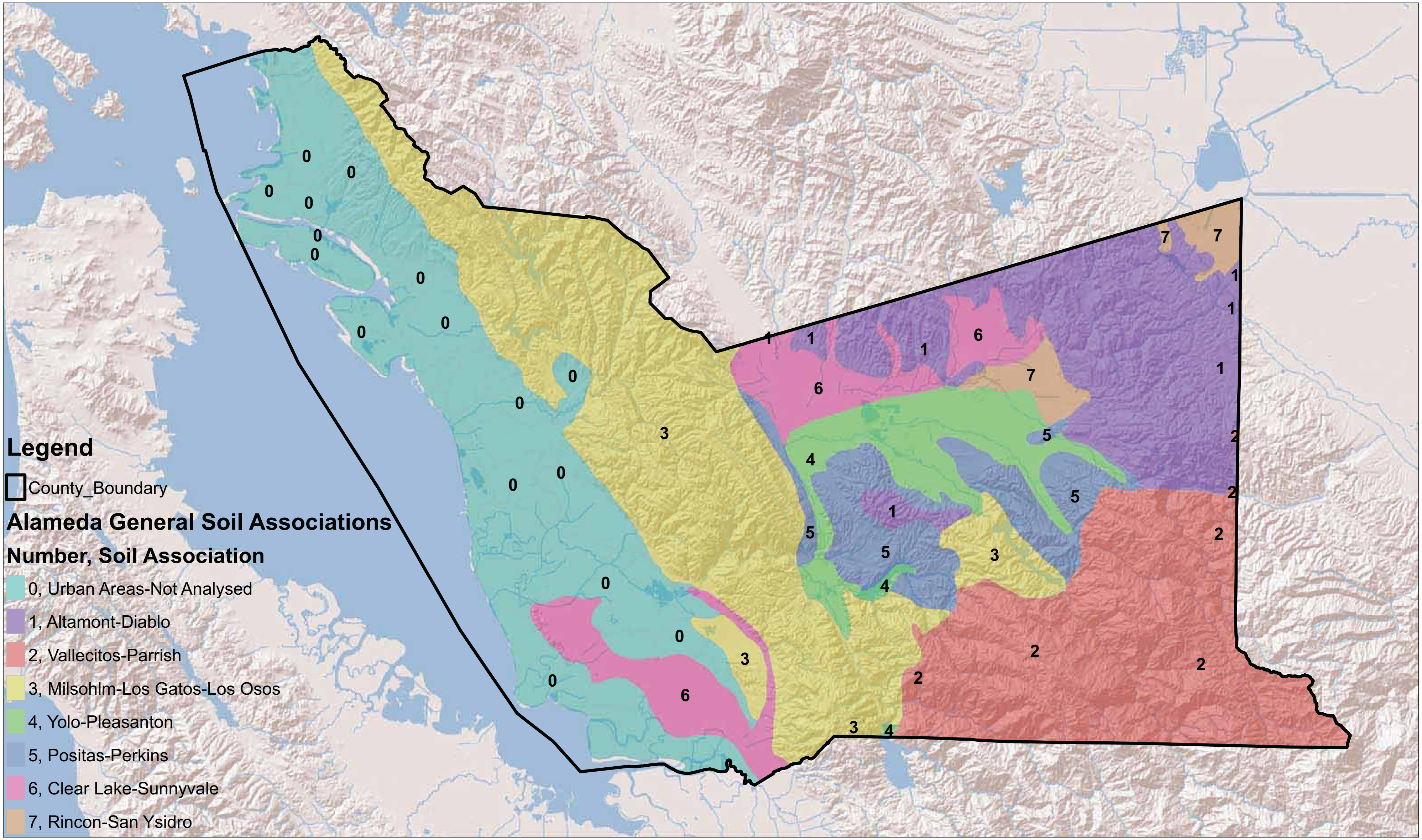


Table B-3: Alameda County General Soil Associations

Legend No.	Soil Association Name	Description	Soil Depth	Slope	Drainage	Soil Texture	Suitability and Constraints for OWTS	Estimated Number of OWTS
1	**Altamont-Diablo**	**Soils formed in material weathered from interbedded sedimentary rock found in the smooth, rounded uplands north and east of Livermore Valley**	moderately deep	moderately sloping to very steep along streams	well drained to excessively drained	clay to gravelley loam and clay loam underlain by soft sandstone	Suitable conditions for conventional OWTS; some inclusions of low permeability and perched GW favoring shallow dispersal designs	202
2	**Vallecitos-Parrish**	**Soils formed in material weathered from metasedimentary and basic igneous rocks found in the uplands of the southeast county**	shallow to moderately deep	moderately steep and very steep	well drained to excessively drained	loam to gravelley loam	Moderately constrained by steep slopes and shallow soils, potentially requiring advanced treatment and/or shallow dispersal designs	105
3	**Milsohlm-Los Gatos-Los Osos**	**Soils formed in material weathered from moderately hard sedimentary rocks found in the uplands from Calveras Reservoir to Upper San Leandro Reservoir**	very shallow to moderately deep	strongly sloping to very steep	well drained to excessively drained	very gravelley sandy loam and sandy clay loam	Moderately constrained by steep slopes and shallow soils, potentially requiring advanced treatment and/or shallow dispersal designs. Erosion and landslide hazards locally.	820
4	**Yolo-Pleasanton**	**Soils formed in alluvium weathered from sedimentary rocks found on flood plains and terraces**	very deep	nearly level to sloping	well drained	clay to gravelley course sandy loam	Suitable conditions for conventional OWTS; some inclusions of low permeability and perched GW favoring shallow dispersal designs	356
5	**Positas-Perkins**	**Soils formed in alluvium weathered from sedimentary rocks found on high terraces south of Livermore Valley**	shallow to moderately deep	nearly level to strongly sloping	well drained	gravelly loam underlain by claypan soils	Suitable conditions for conventional OWTS; some inclusions of rapid percolation, potentially requiring advanced treatment and/or shallow dispersal designs.	362
6	**Clear Lake-Sunnyvale**	**Soils formed in alluvium weathered from sedimentary rocks found in floodplains, basin areas and on low terraces east of Dublin, and also on low terraces in the southwest Urban area of the county**	very deep	nearly level to gently sloping	well drained to imperfectly drained	clay to clay loam	Suitable conditions for conventional OWTS; some inclusions of low permeability and perched GW favoring shallow dispersal designs	64
7	**Rincon-San Ysidro**	**Soils formed in alluvium weathered from sedimentary rocks found in the northeast corner of the county and in the Livermore Valley**	shallow to very deep	nearly level	well drained	clay loam to loam	Suitable conditions for conventional OWTS; some inclusions of low permeability and perched GW favoring shallow dispersal designs	39

Several Areas of Concern have been formally designated by Zone 7 and the San Francisco Bay Regional Water Board in the 2015 Nutrient Managment Plan for the Livermore Valley Groundwater Basin due to nitrate impacted groundwater in these areas; others areas may be proposed for inclusion in the future as a result of information from the development and/or implementation of the County's LAMP. **Table B-4** presents a list and brief descriptions of 12 localized areas of OWTS usage that have either been designated as Areas of Concern or are anticipated to be a primary focus for the long-term OWTS managmeent program in Alameda County, based on the number and/or density of OWTS or other factors. The locations of these areas are indicated in **Figure B- 4**; detailed GIS maps of each area are attached for reference. Additional details and mapping of the OWTS areas in the Oakland Hills developed by Department staff are included in Appendix C.

To assist with present and future management of OWTS and water quality assessments in these areas, GIS data were compiled to give estimates of the number of OWTS in each area, along with median and average parcel size, which are presented in **Table B-5.** These areas of concern account for an estimated 1,241 OWTS, about 60% of the total OWTS in the unincorporated areas of the county.

From the OWTS/parcel data, estimates were then made of the approximate wastewater discharge volumes from OWTS, based on the assumption of an average daily discharge of 150 gpd per OWTS (3 persons per dwelling @ 50 gpd/person). Using an assumed total nitrogen concentration of 70 mg-N/L appropriate for 50 gpd/person wastewater generation (Crites and Tchobanoglous, 1998), estimates of total loading of nitrogen to the soil and groundwater environment were developed for each area and also listed in **Table B-5**.

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Designated OWTS Areas of Concern & Focus Areas

Fig B-4

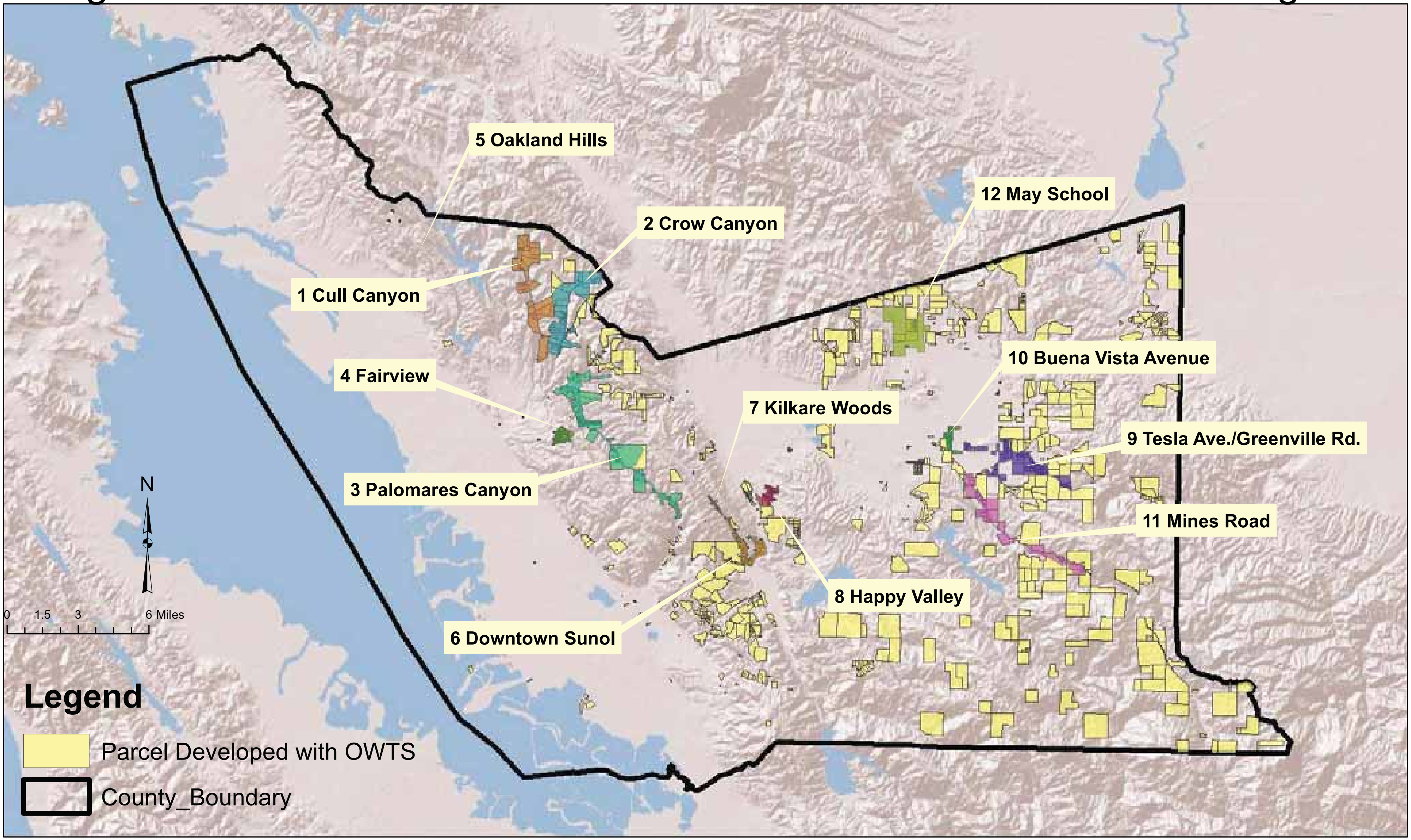


Table B-4. Designated Areas of Concern & Focus Areas for OWTS in Alameda County

No.	Area of Concern Status	Area Name	Nearest City or Community	Affected Watercourses or Groundwater Basin	OWTS Issues
1		Cull Canyon	Castro Valley	Cull Creek, San Lorenzo Creek	Development in steep-sided canyon, rocky soils, steep terrain, encroachment within stream terraces, limited replacement area
2		Crow Canyon/Norris Canyon	Castro Valley	Crow Creek, San Lorenzo Creek	Development in steep-sided canyon, rocky soils, steep terrain, encroachment within stream terraces and stream-bank areas (Norris Canyon); limited replacement area;
3		Palomares Road	Castro Valley	Palomares Creek, San Lorenzo Creek	Dense development within steep-sided canyon, steep terrain, encroachment within stream terraces, limited replacement area
4		Fairview	Hayward	Ward Creek, Sulphur Creek, San Lorenzo Creek	100+ homes on ridge-top area; OWTS in some areas constrained by shallow soils over bedrock, limited replacement area, steep terrrain
5		Oakland Hills	Oakland	East Bay Plain GW Basin, Sausal Creek	High number of failing systems, public sewer connection available using low pressure sewage systems (grinder pumps or STEP systems)
6		Downtown Sunol	Sunol	Sinbad Creek, Arroyo de la Laguna, Alameda Creek, Sunol GW Basin	Large concentration of residences (150+) and small commercial district at confluence of several drainages; generally suitable lot sizes and favorable soils for OWTS; cumulative wastewater loading impacts on groundwater a potential issue.
7		Kilkare Woods	Sunol	Sinbad Creek	Historical development dating to 1920s; summer cabins converted over the years to full-time residences; very small lot sizes, densely developed in steep, wooded terrain and stream terraces with minimal setbacks; many antiquated and non-conforming OWTS.
8	Designated	Happy Valley	Pleasanton	Livermore Valley GW Basin	Moratorium area established in 1973; high density of OWTS in area of localized nitrate-impacted groundwater.
9	Designated	Tesla Ave/Greenville Rd	Livermore	Livermore Valley GW Basin	Area with generally gravelly basin soils overlying localized nitrate-impacted groundwater
10	Designated	Buena Vista Ave	Livermore	Livermore Valley GW Basin	Area with generally gravelly basin soils overlying localized nitrate-impacted groundwater
11	Designated	Mines Rd	Livermore	Livermore Valley GW Basin	Area with generally gravelly basin soils overlying localized nitrate-impacted groundwater
12	Designated	May School	Livermore	Livermore Valley GW Basin	Area with generally gravelly basin soils overlying localized nitrate-impacted groundwater

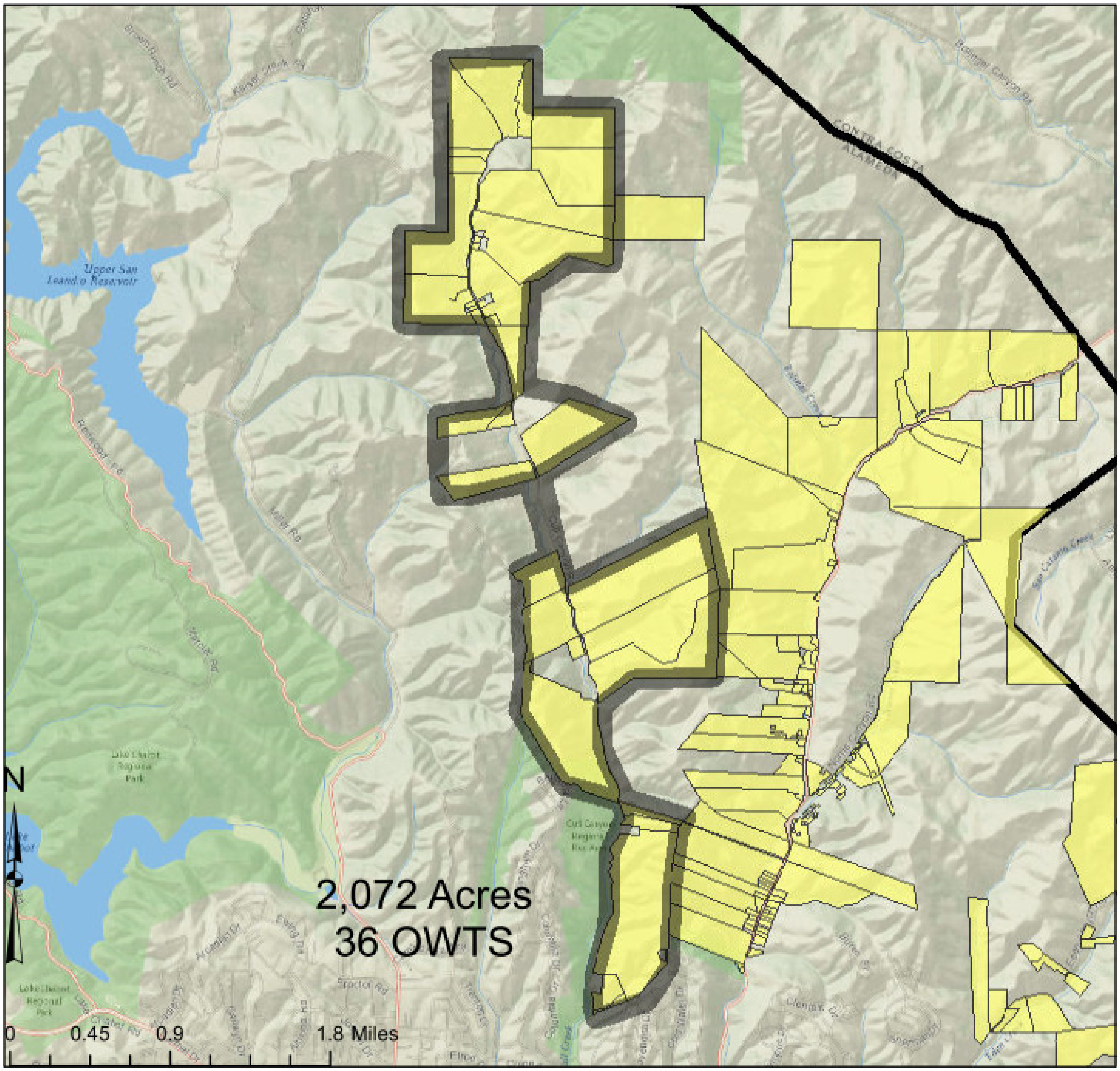
Table B-5. Alameda County Designated Areas of Concern and Focus Areas, OWTS Discharges and Loading Estimates

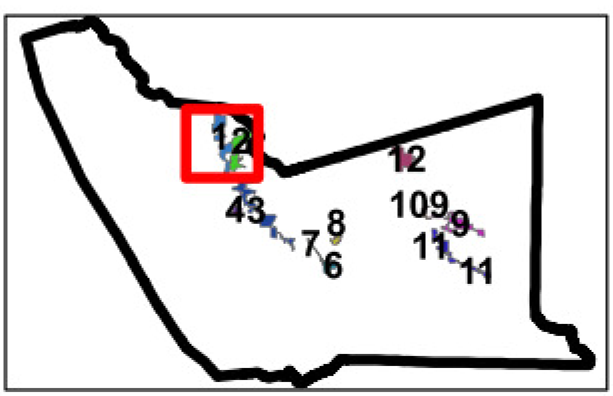
No.	Name	Area of Concern Status	Gross Acresage of Focus Area (ac)	Number of Developed Parcels with OWTS	Median Parcel Size (ac)	Area-wide OWTS Density (ac/OWTS)	Estimated Daily OWTS Discharge* (gpd)	Estimated OWTS Discharge		Estimated Annual Nitrogen Loading**	
								Daily Discharge per Acre (gpd/ac)	Annual Total (Mgal/yr)	Total Loading (lbs/yr)	Per Acre (lbs/ac-yr)
1	Cull Canyon		2,072	36	26.0	58	5,400	2.61	1.97	1,151	0.56
2	Crow/Norris Canyon		1,943	105	2.5	19	15,750	8.11	5.75	3,356	1.73
3	Palomares Canyon		2,818	196	4.4	14	29,400	10.43	10.73	6,265	2.22
4	Fairview		278	125	1.3	2	18,750	67.45	6.84	3,995	14.37
5	Oakland Hills		113	85	1.12	1.33	12,750	112.83	4.65	2,717	24.04
6	Downtown Sunol		556	162	1.2	3	24,300	43.71	8.87	5,178	9.31
7	Kilkare Woods		46	99	0.2	0.46	14,850	322.83	5.42	3,164	68.79
8	Happy Valley	Designated	293	92	1.3	3	13,800	47.10	5.04	2,941	10.04
9	Tesla Ave. Greenville Rd.	Designated	1,556	121	5.5	13	18,150	11.66	6.62	3,868	2.49
10	Buena Vista Avenue	Designated	224	98	1.4	2	14,700	65.63	5.37	3,132	13.98
11	Mines Road	Designated	1,589	72	5.1	22	10,800	6.80	3.94	2,301	1.45
12	May School	Designated	1,071	28	5.2	38	4,200	3.92	1.53	895	0.84
	Total			**1,219**			**182,850**	**703.06**	**66.74**	**38,963**	

** Based on 150 gpd/residence*

*** Based on 70 mg-N/L total nitrogen concentration*

Alameda County OWTS Focus Areas 1





Legend

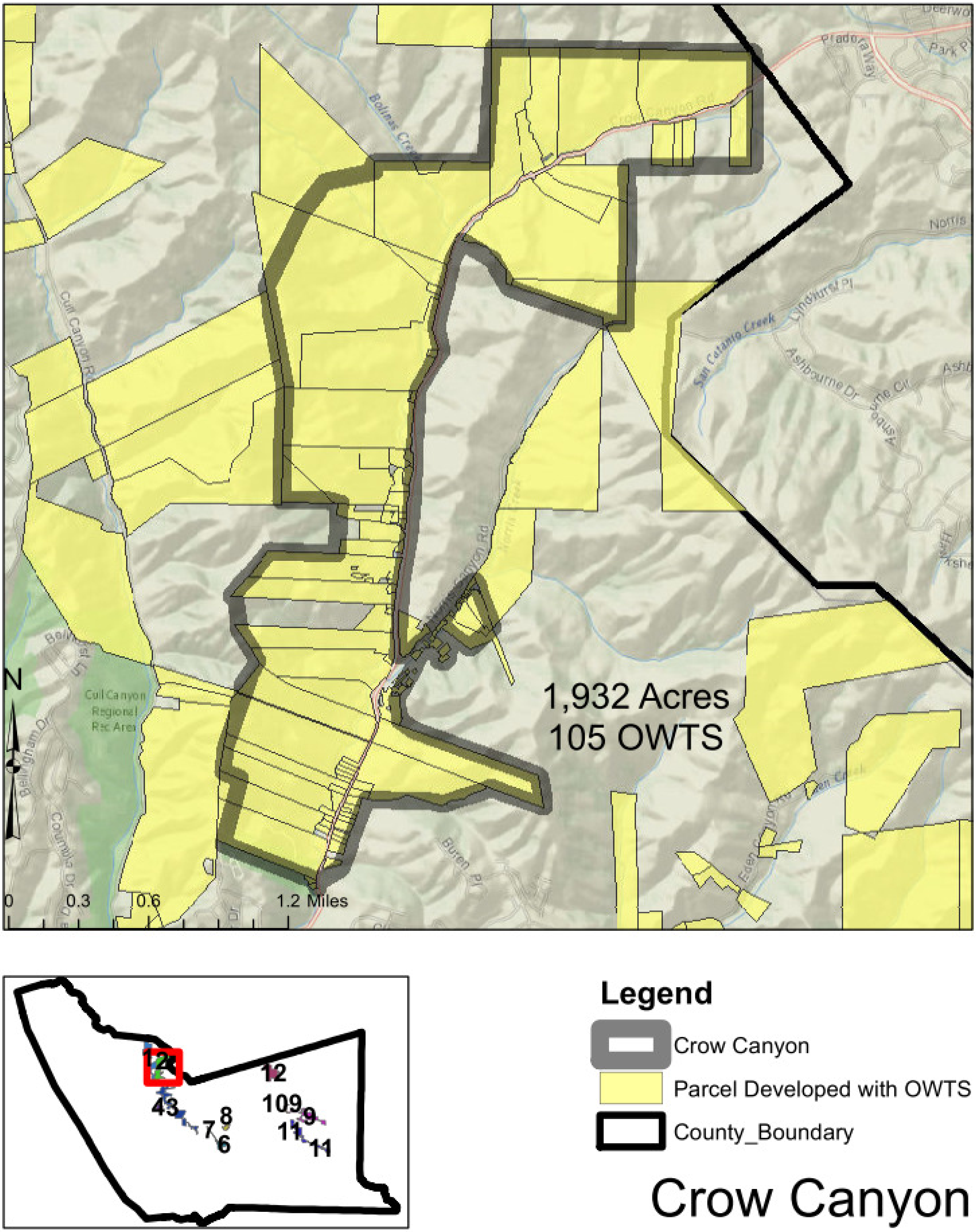
Cull Canyon

Parcel Developed with OWTS

County_Boundary

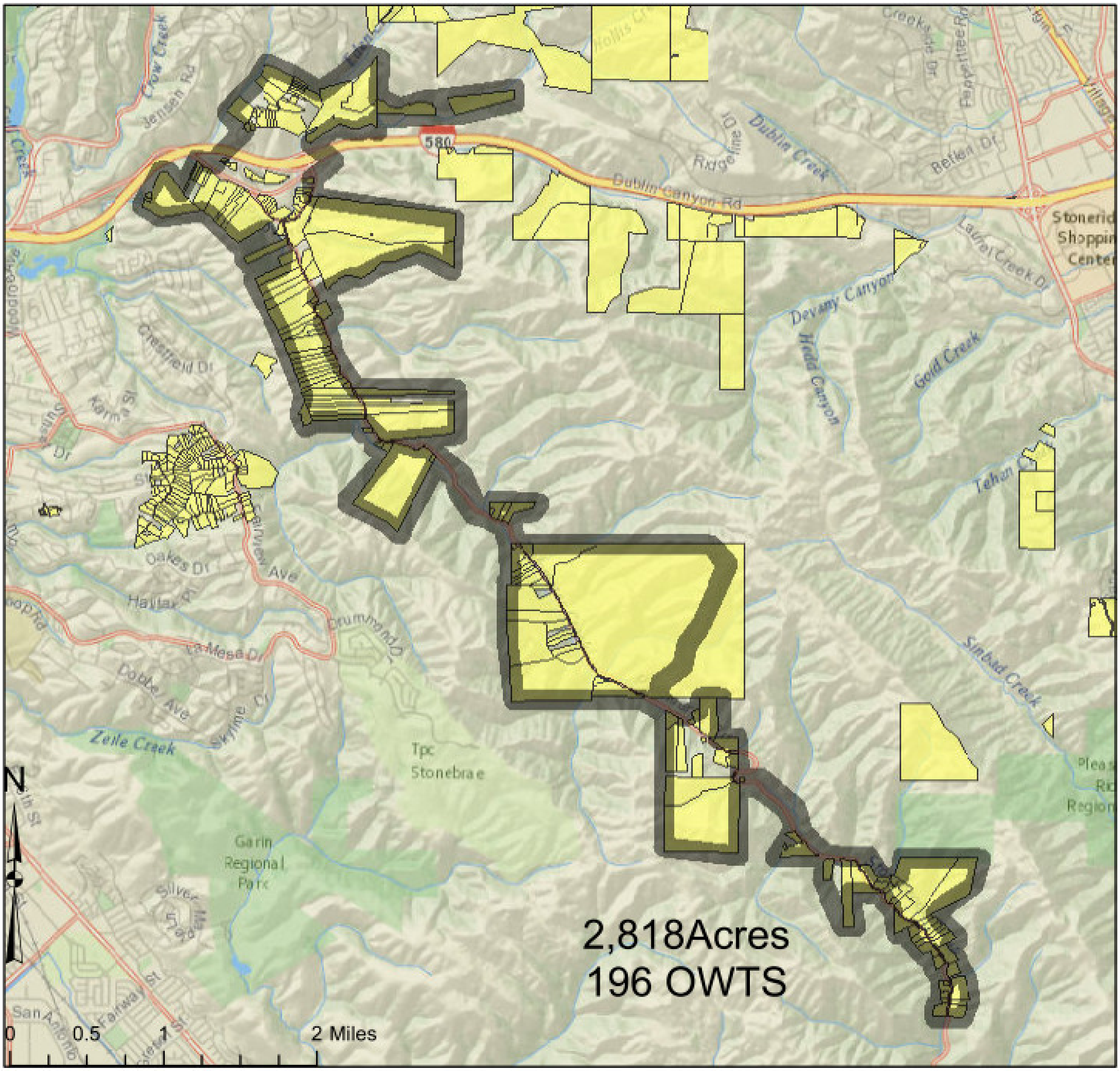
Cull Canyon

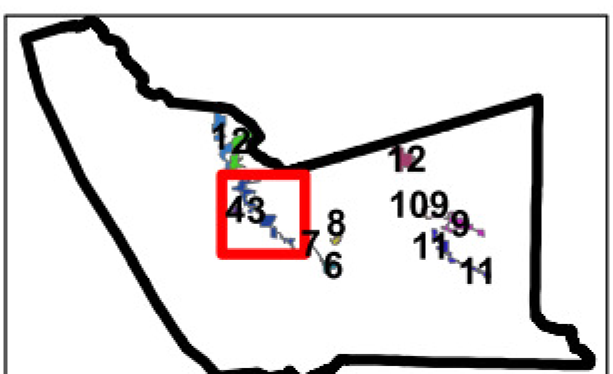
Alameda County OWTS Focus Areas 2



Crow Canyon

Alameda County OWTS Focus Areas 3



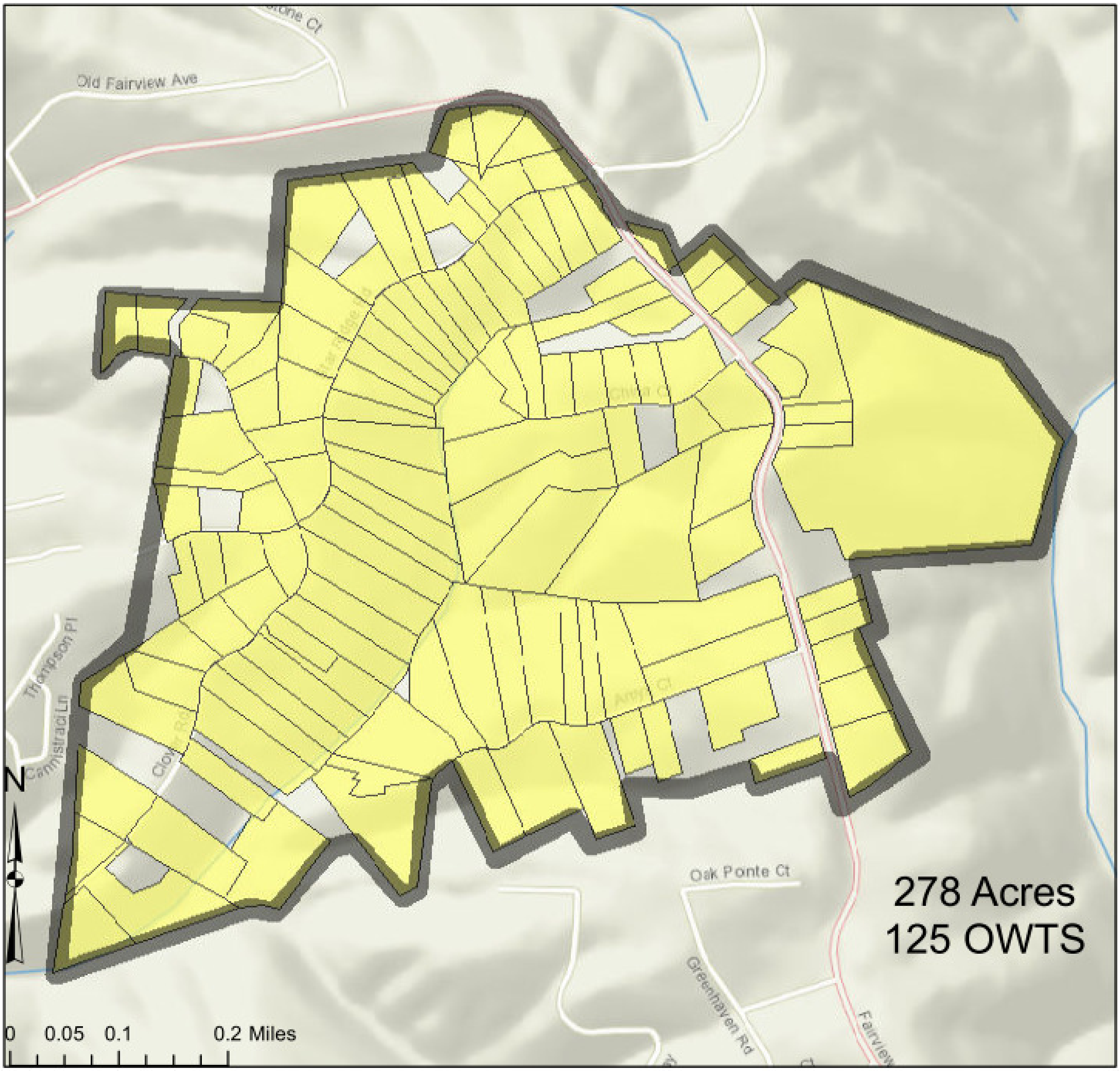


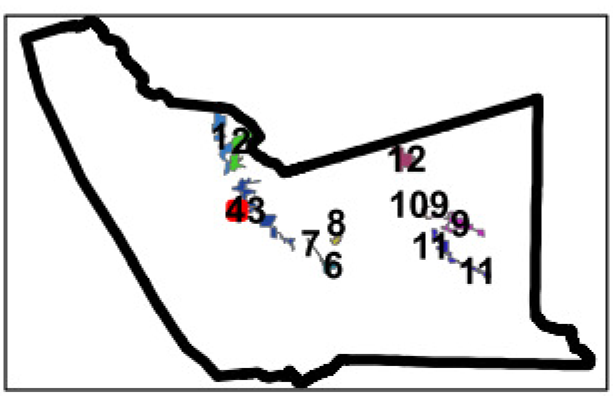
Legend

- Palomares Canyon
- Parcel Developed with OWTS
- County_Boundary

Palomares Canyon

Alameda County OWTS Focus Areas 4





Legend

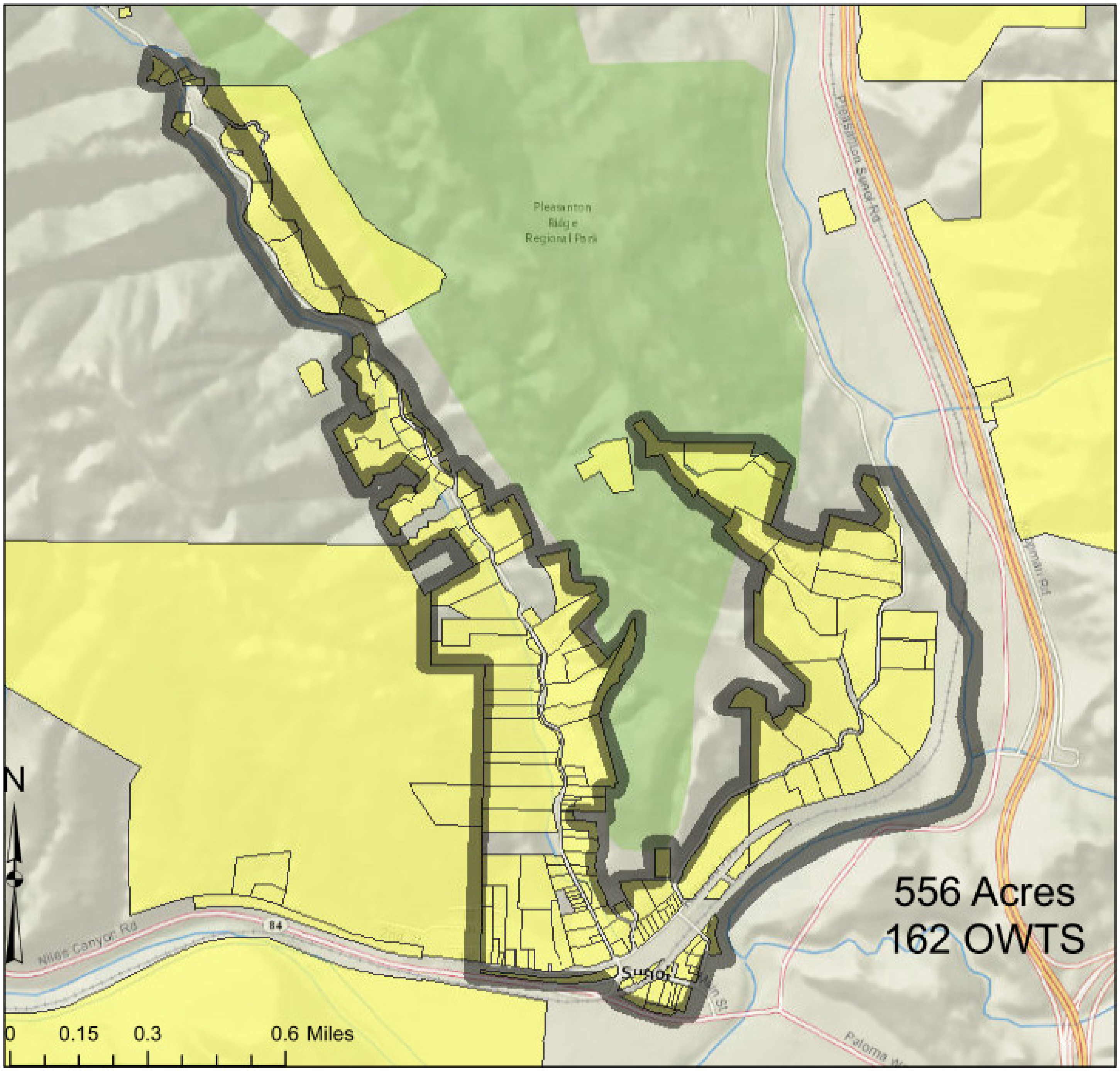
Fairview

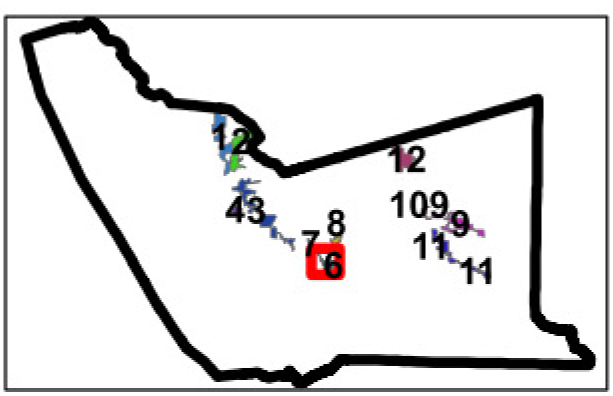
Parcel Developed with OWTS

County_Boundary

Fairview

Alameda County OWTS Focus Areas 6





Legend

Downtown Sunol

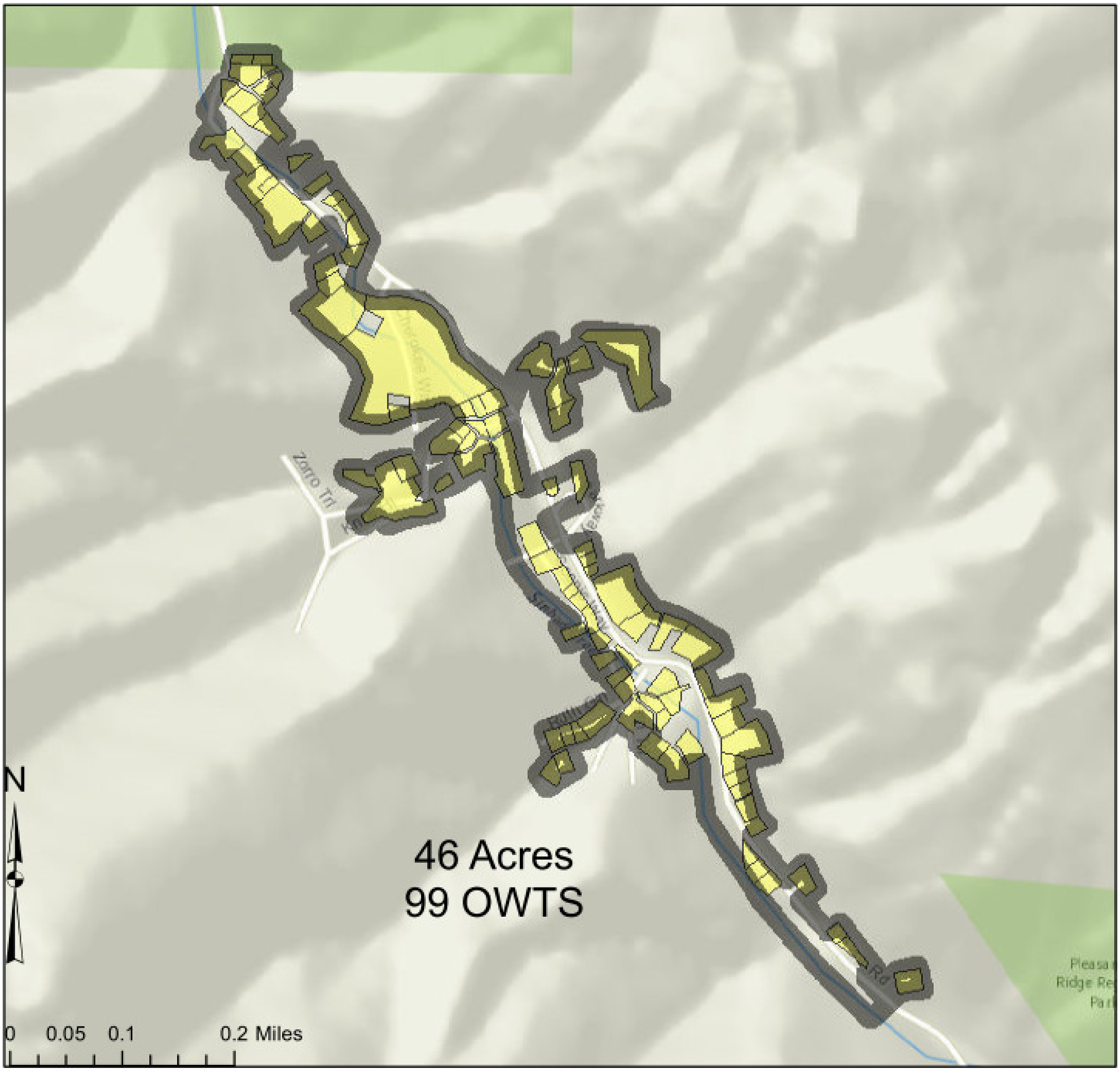
Parcel Developed with OWTS

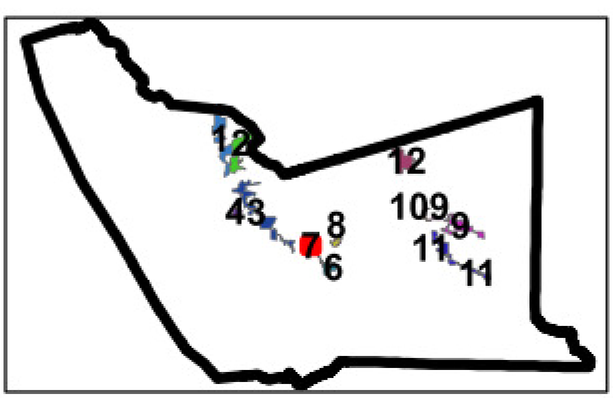
County_Boundary

Downtown Sunol

and Lower Kilkare Canyon

Alameda County OWTS Focus Areas 7





Legend

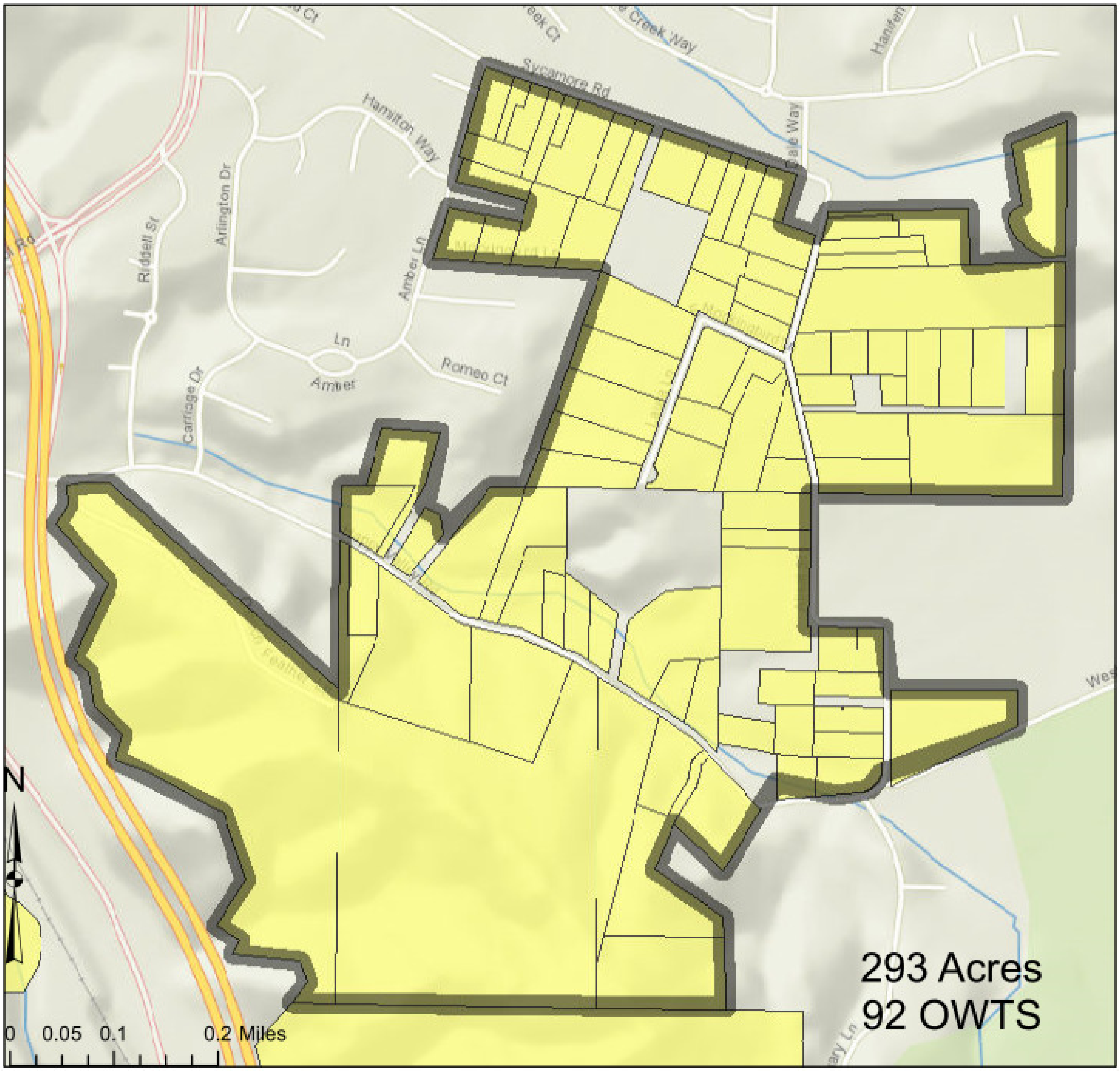
Kilkare Woods

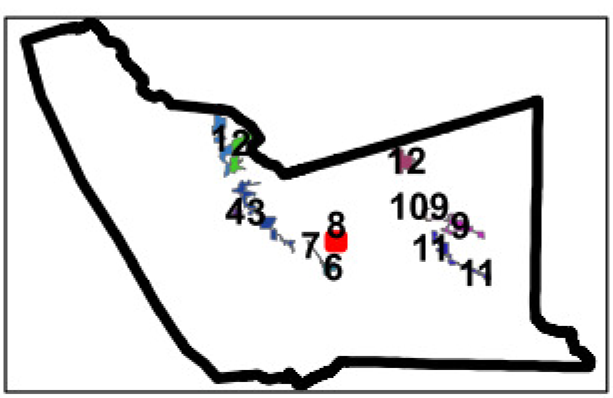
Parcel Developed with OWTS

County_Boundary

Kilkare Woods

Alameda County OWTS Focus Areas 8





Legend

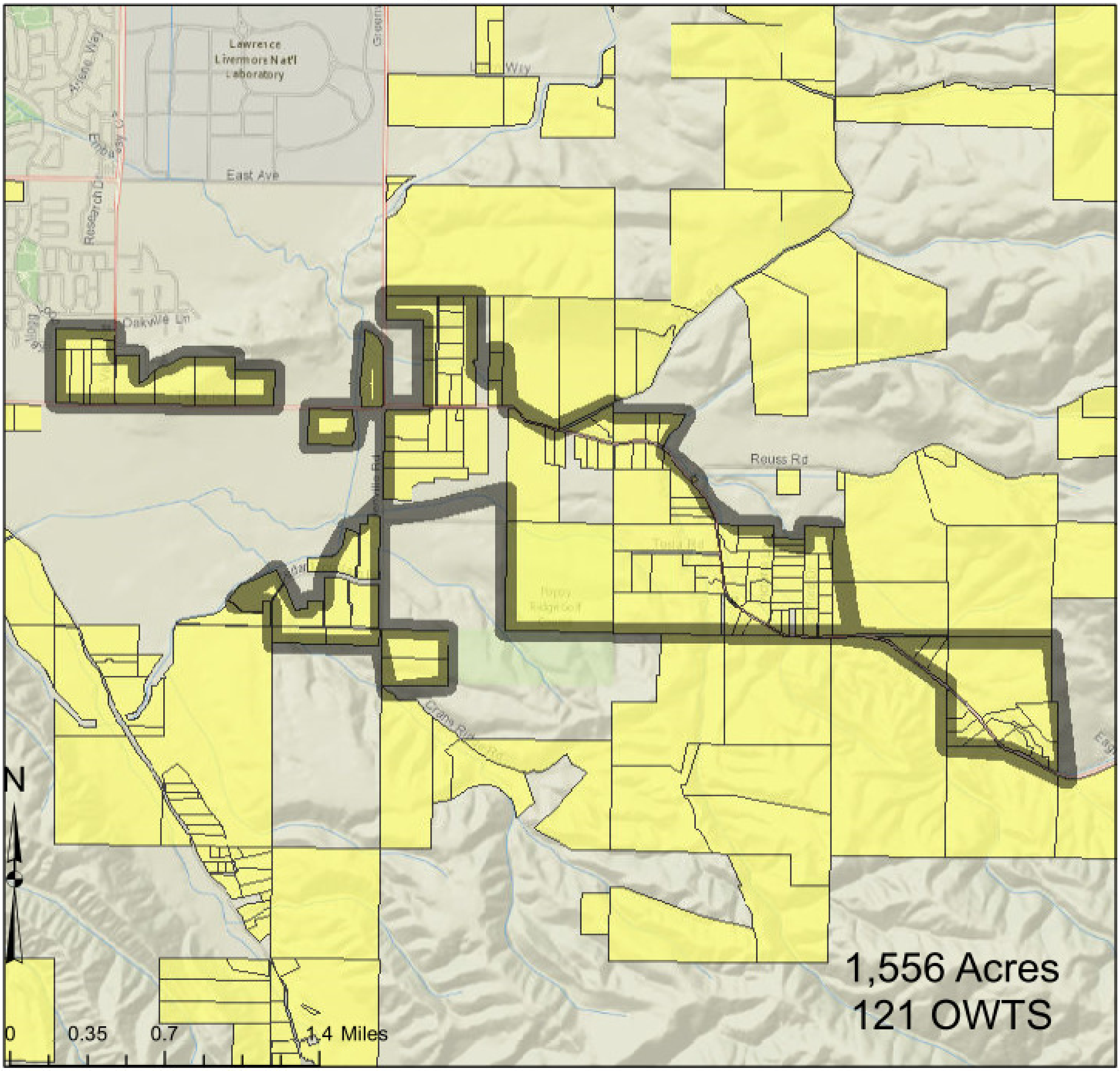
Happy Valley

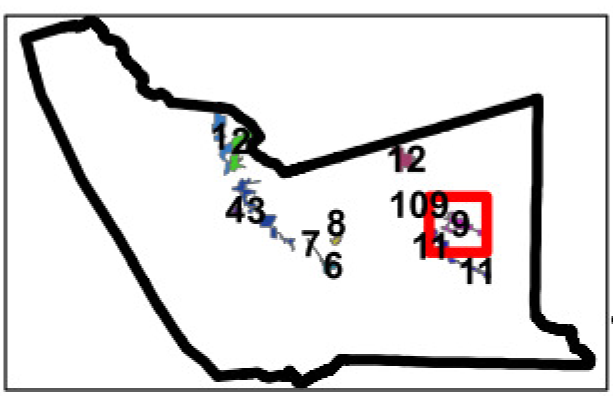
Parcel Developed with OWTS

County_Boundary

Happy Valley

Alameda County OWTS Focus Areas 9





Legend

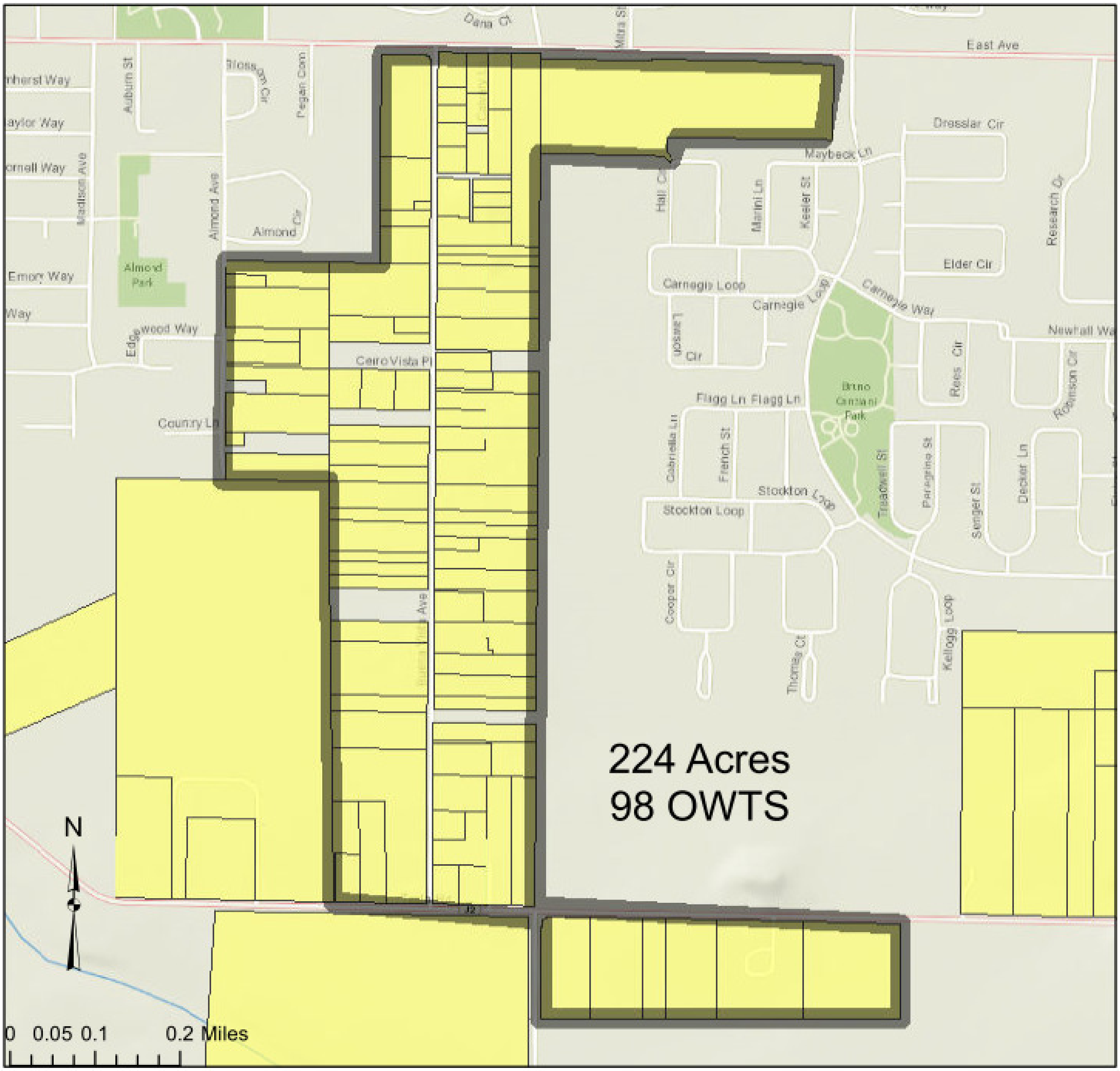
Tesla Ave. Greenville Rd.

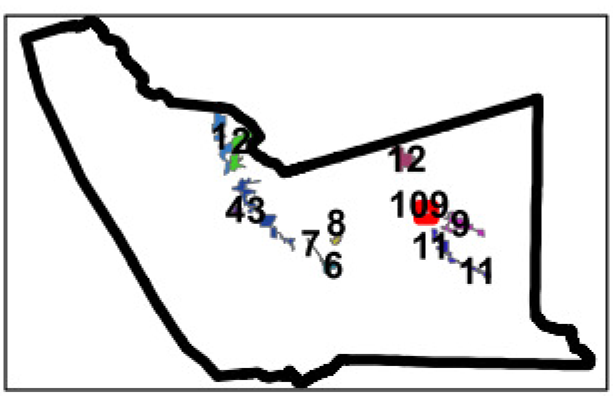
Parcel Developed with OWTS

County_Boundary

Tesla Ave. Greenville Rd.

Alameda County OWTS Focus Areas 10



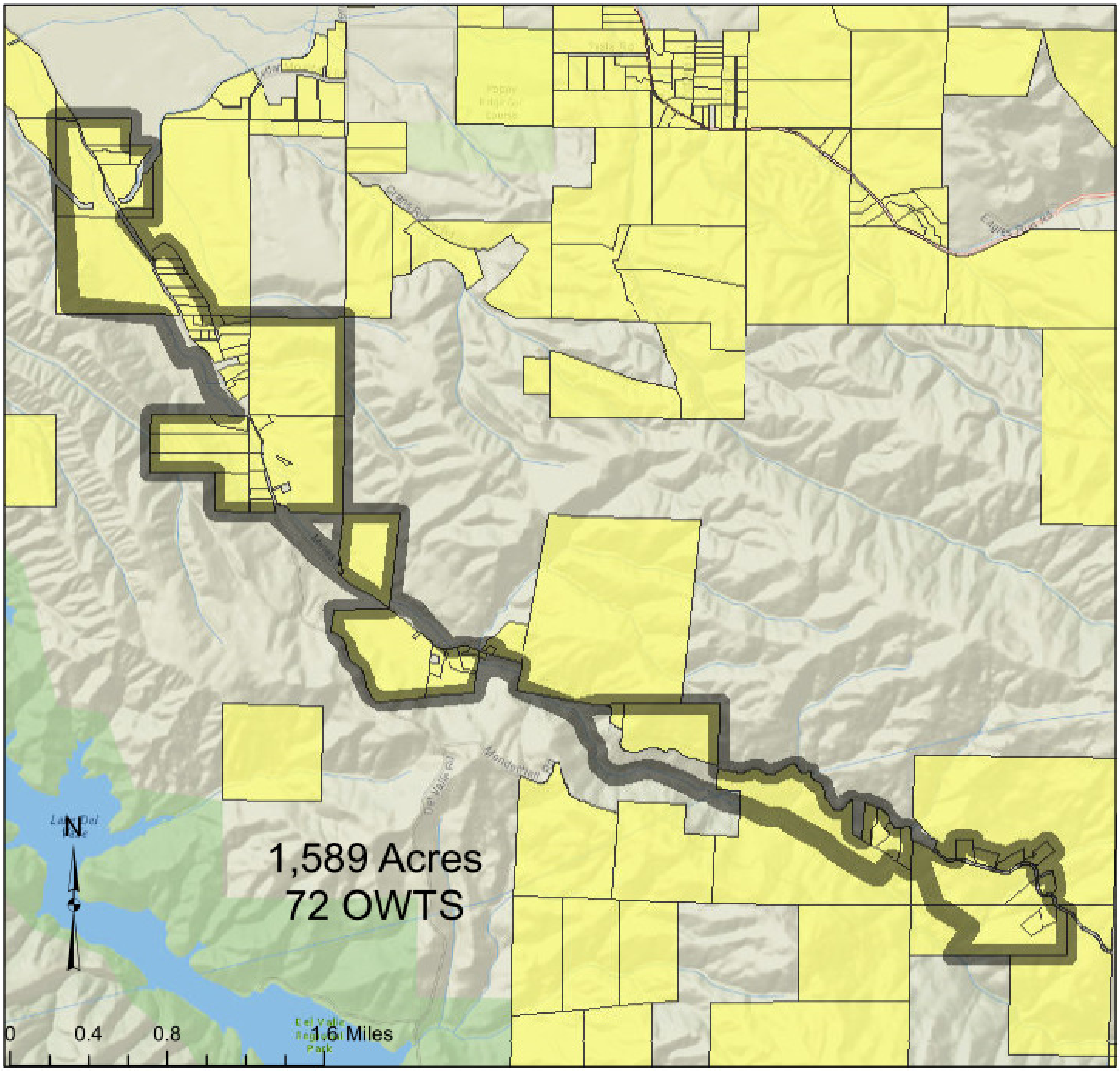


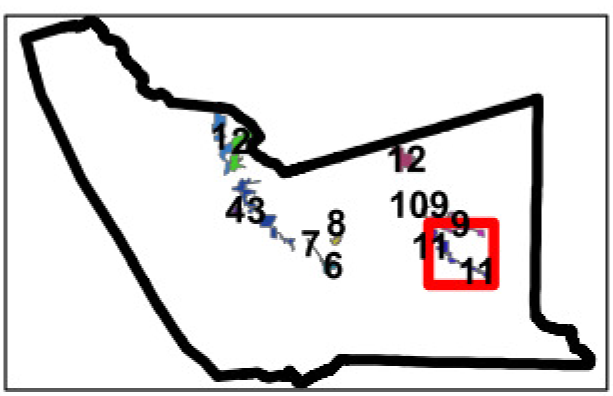
Legend

- Buena Vista Avenue
- Parcel Developed with OWTS
- County_Boundary

Buena Vista Avenue

Alameda County OWTS Focus Areas 11





Legend

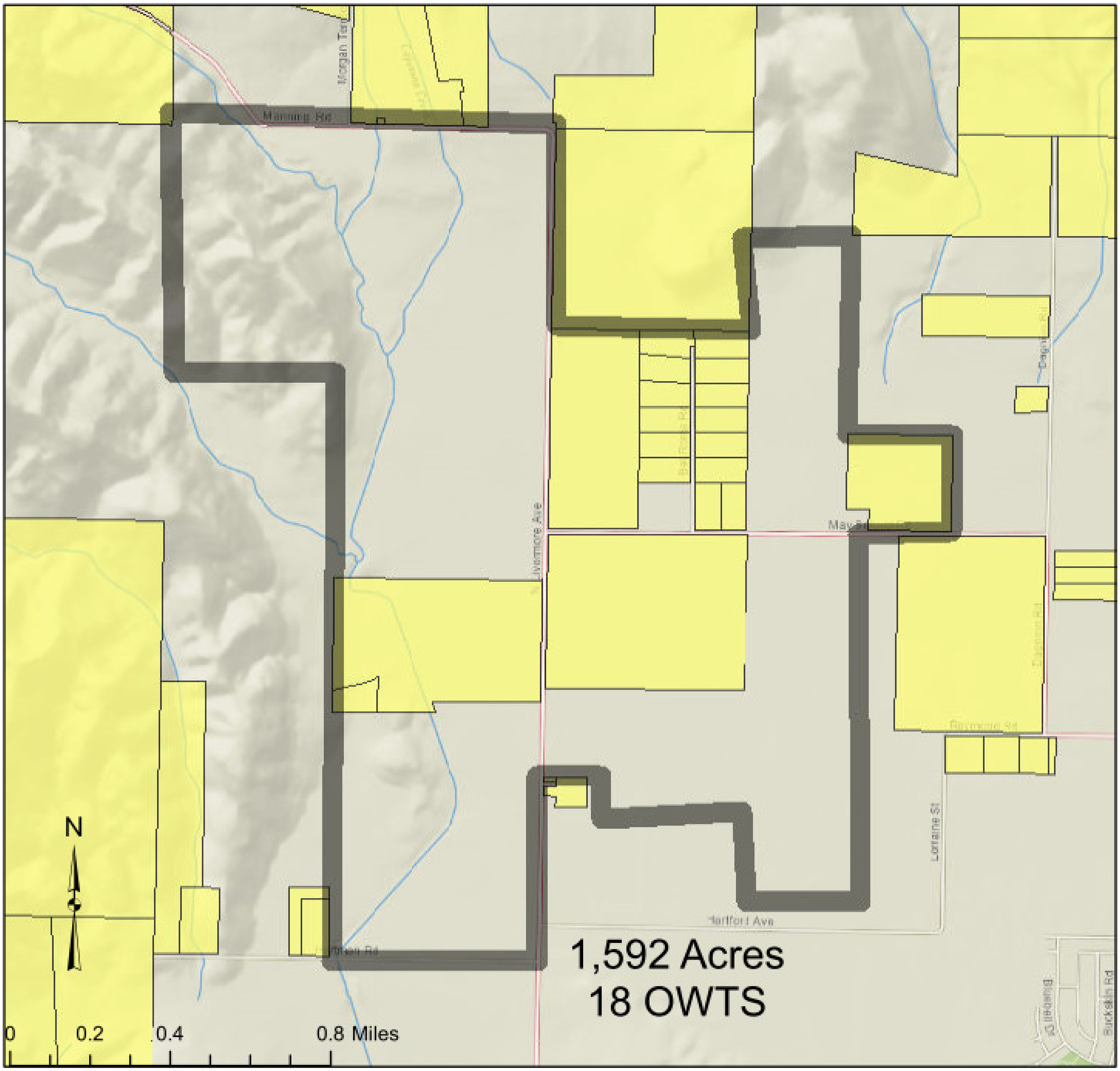
Mines Road

Parcel Developed with OWTS

County_Boundary

Mines Road

Alameda County OWTS Focus Areas 12



May School

Appendix C

Supplemental OWTS Data and Mapping
DEH File Records for Oakland Hills

Table C-2. OWTS Discharges and Loading Estimates, City of Oakland/Oakland Hills Focus Area

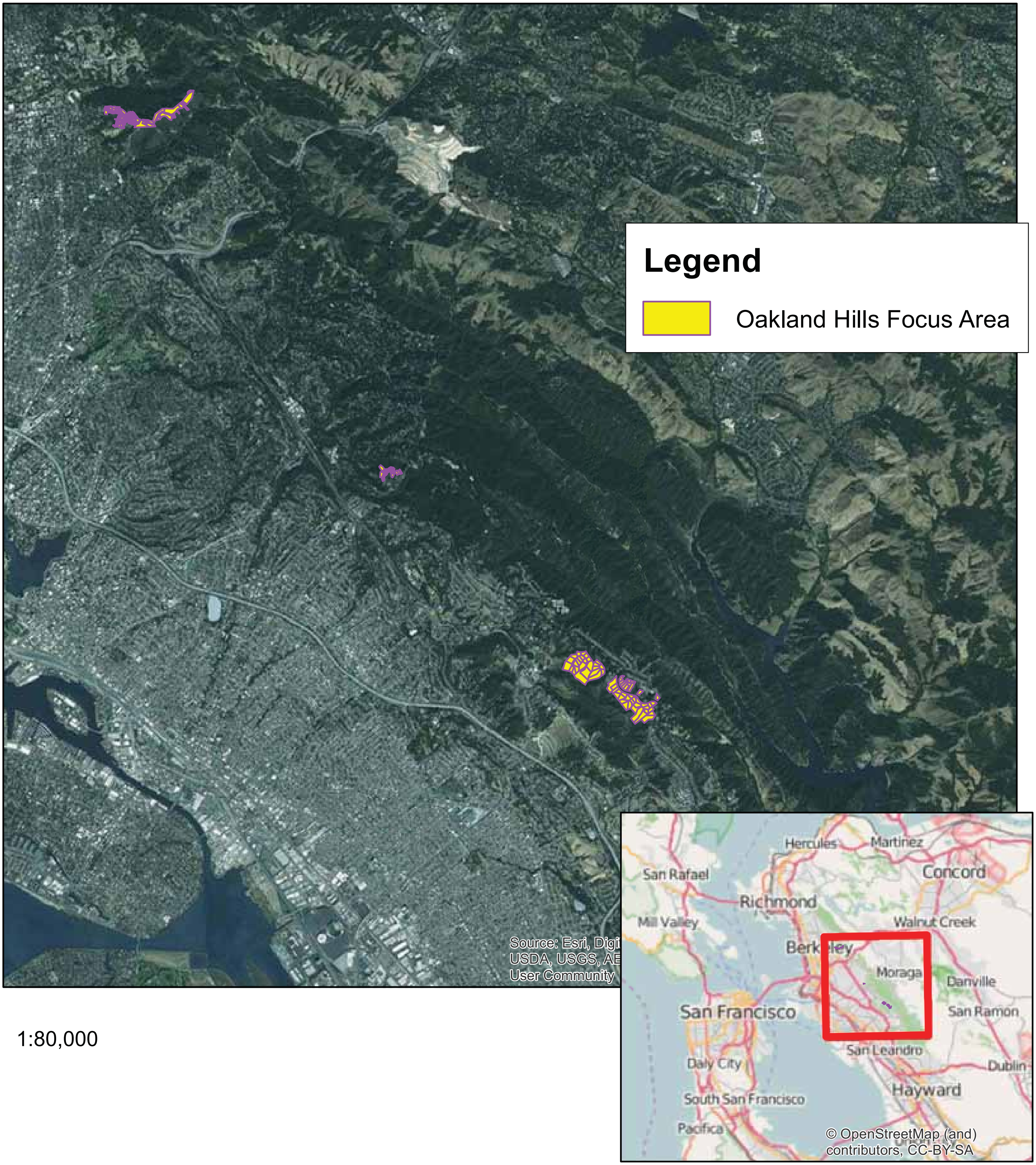
Street Name	Gross Acreage of Focus Area (ac)	Number of Known Parcels with OWTS	Median Parcel Size (ac)	Area-wide OWTS Density (ac/OWTS)	Estimated Daily OWTS Discharge* (gpd)	Estimated OWTS Discharge		Estimated Annual Nitrogen Loading**	
						Daily Discharge per Acre (gpd/ac)	Annual Total (Mgal/yr)	Total Loading (lbs/yr)	Per Acre (lbs/ac-yr)
1. Barmied Pl	0.12	2	2.53	0.06	300	2,531	0.11	64	539
2. Castle Dr / Castle Ln[1]	6	15	0.40	0.43	2,250	351	0.82	479	75
3. Cathy Ln	16	7	1.66	2.25	1,050	67	0.38	224	14
4. Colbourn Pl	13	7	1.14	1.80	1,050	83	0.38	224	18
5. Cornwall Ct	2	6	0.25	0.27	900	555	0.33	192	118
6. Denton Pl	16	9	1.38	1.74	1,350	86	0.49	288	18
7. Graham Pl	4	3	1.63	1.41	450	106	0.16	96	23
8. Lexford Pl	8	6	1.41	1.37	900	109	0.33	192	23
9. Skyline Blvd[1]	25	20	1.12	1.27	3,000	118	1.10	639	25
10. Weaver Pl	23	10	1.10	2.31	1,500	65	0.55	320	14
Total		**85**			**12,750**	**4,072**	**4.65**	**2,717**	

[1] Represents a subset of parcels on these streets known to be on OWTS. All other streets listed in table are assumed to be 100% on OWTS.

[2] Based on 150 gpd/OWTS

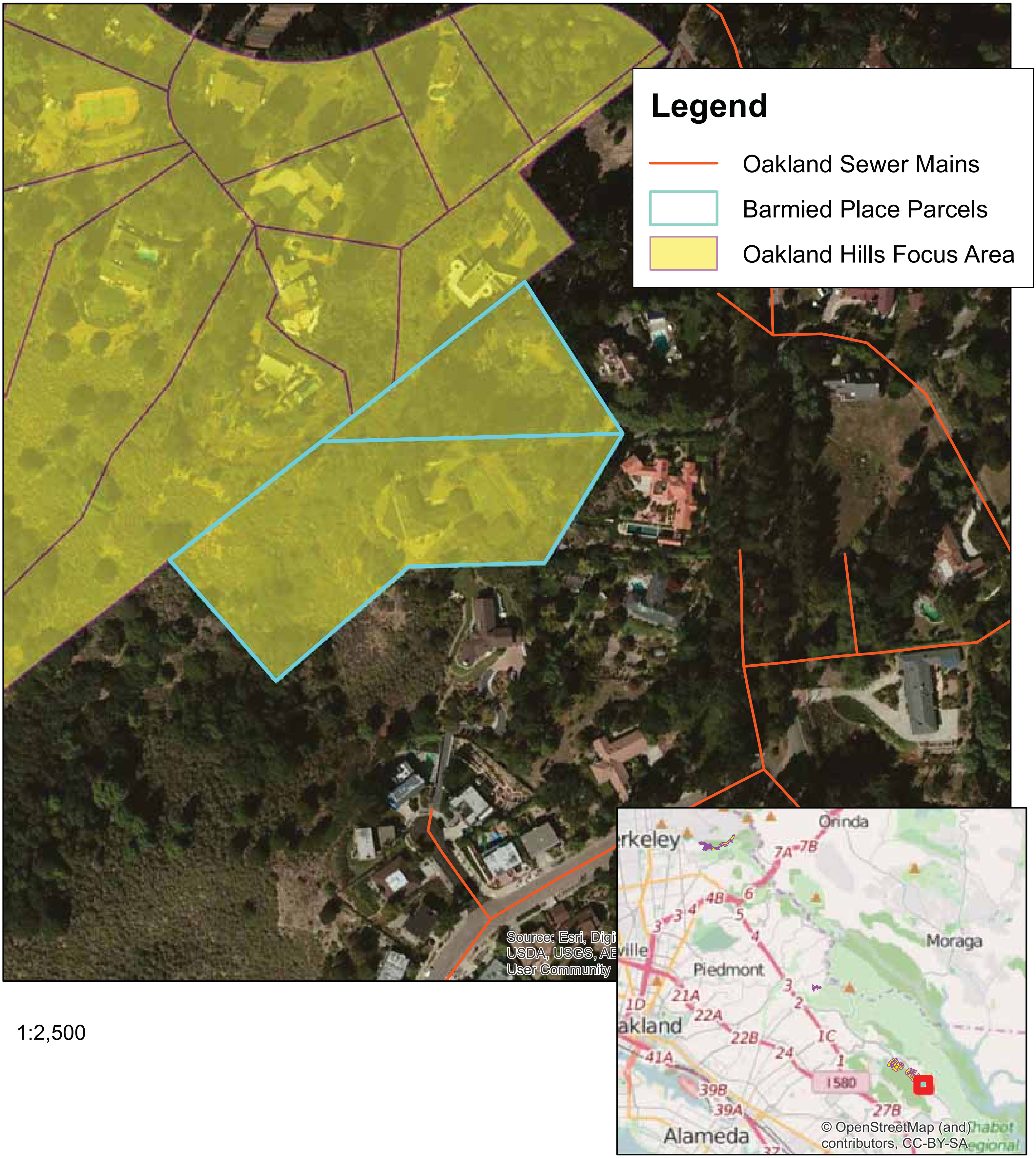
[3] Based on 70 mg-N/L total nitrogen concentration

Fig. C-2. Focus Area: Oakland Hills
Pockets of Known OWTS



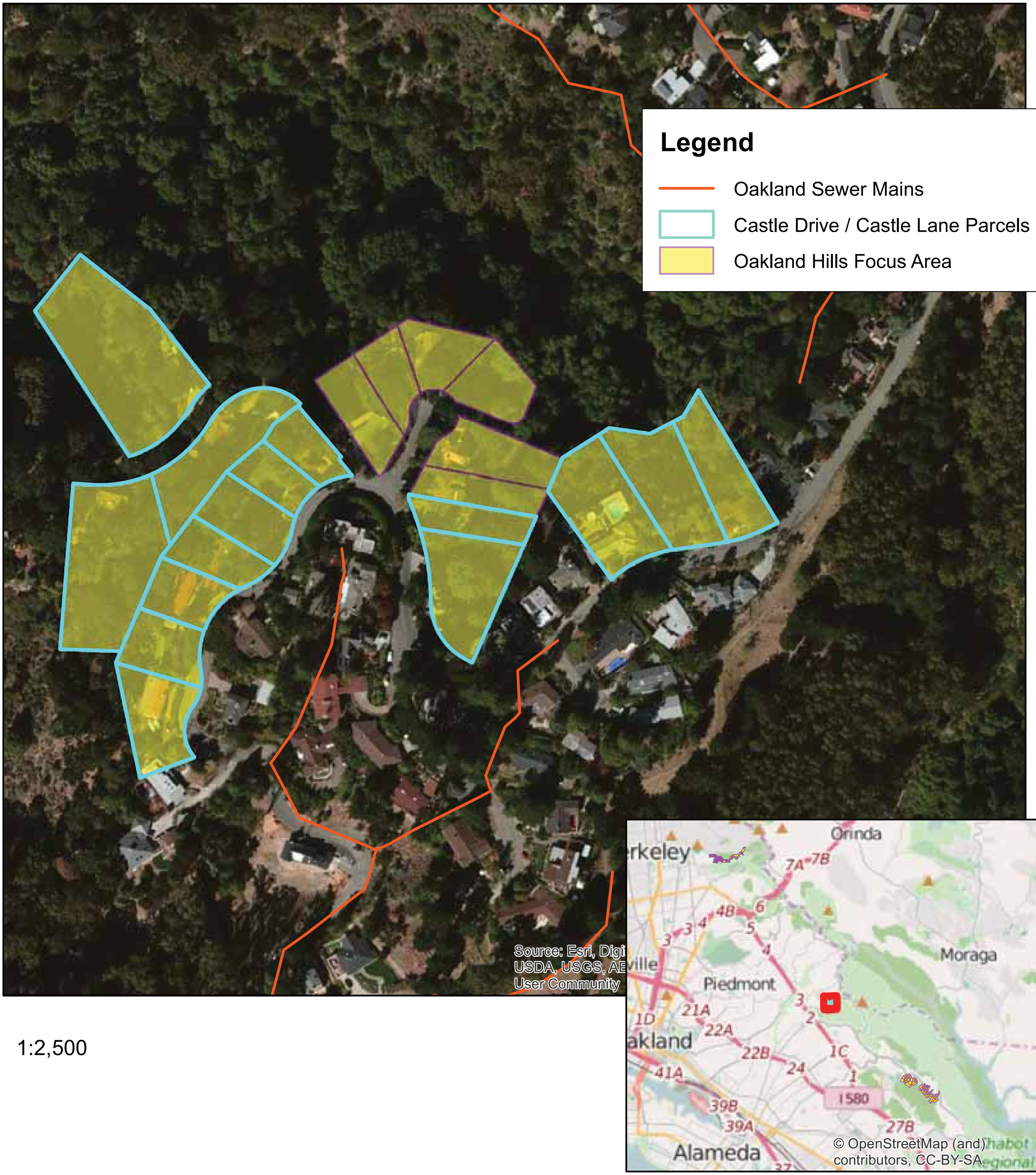
1:80,000

Fig. C-2.1. Focus Area: Oakland - Barmied Place Pockets of Known OWTS



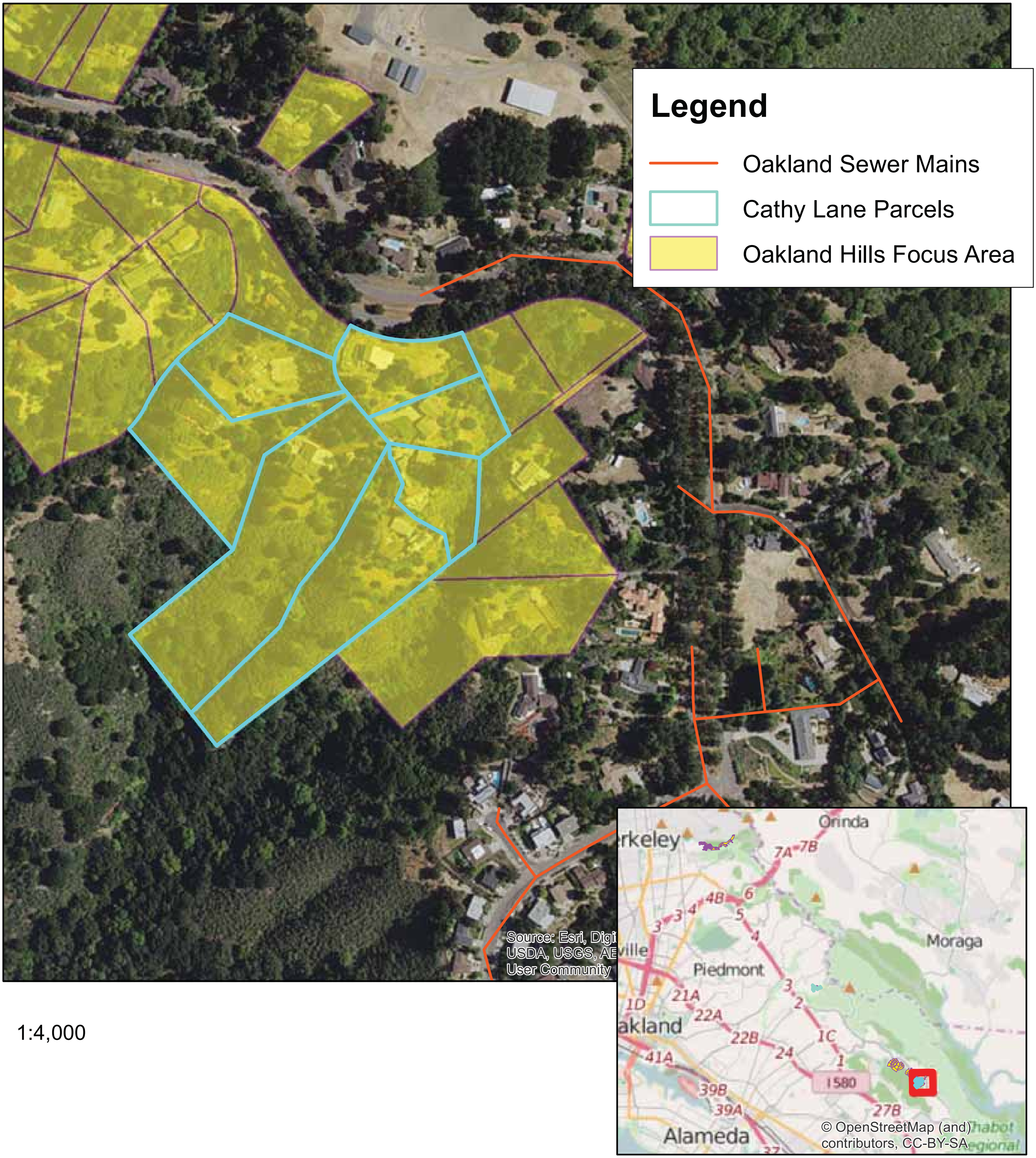
1:2,500

Fig. C-2.2. Focus Area: Oakland - Castle Lane / Castle Drive Pockets of Known OWTS



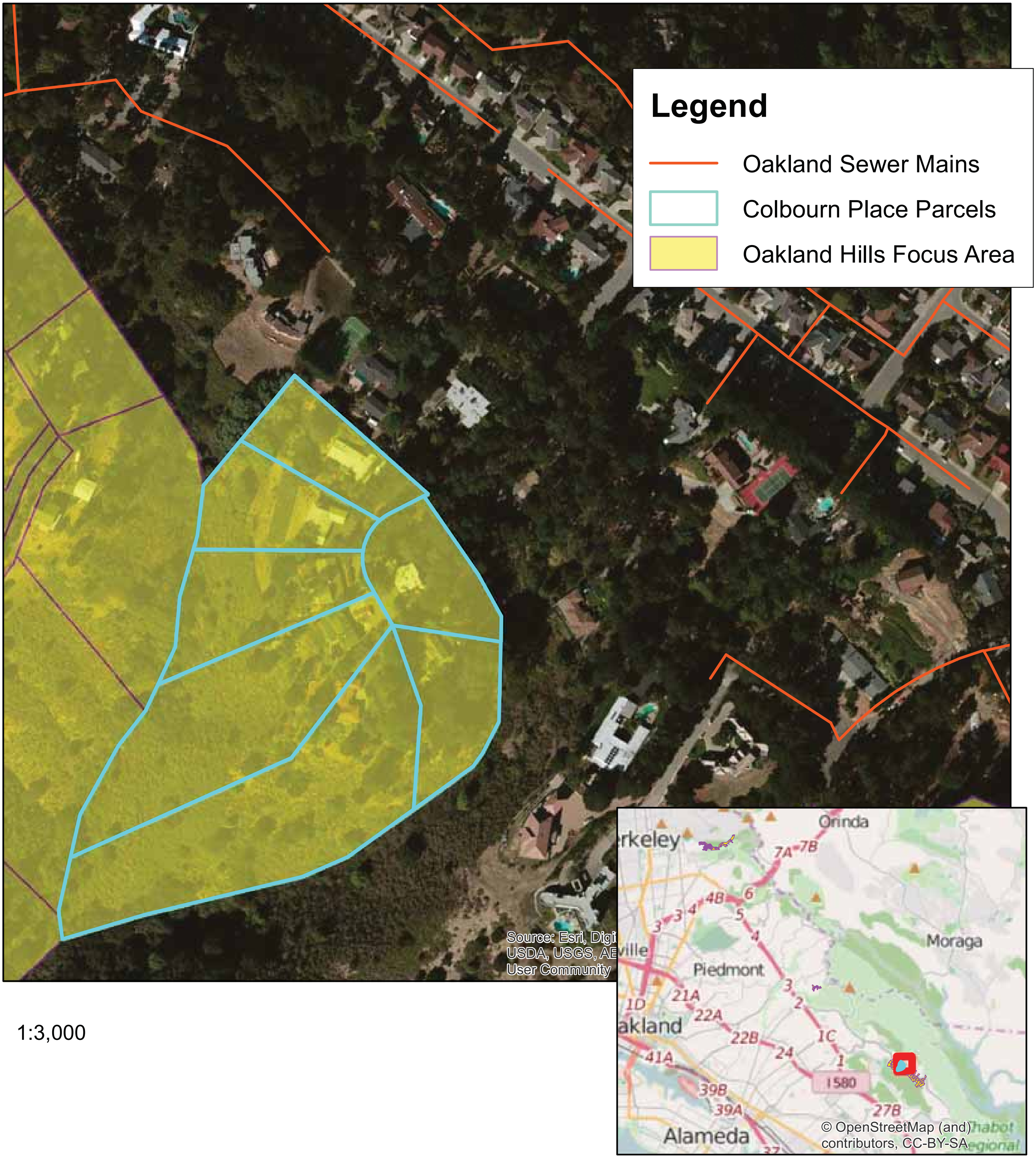
1:2,500

Fig. C-2.3. Focus Area: Oakland - Cathy Lane Pockets of Known OWTS



1:4,000

Fig. C-2.4. Focus Area: Oakland - Colbourn Place Pockets of Known OWTS



1:3,000

Fig. C-2.5. Focus Area: Oakland - Cornwall Court Pockets of Known OWTS

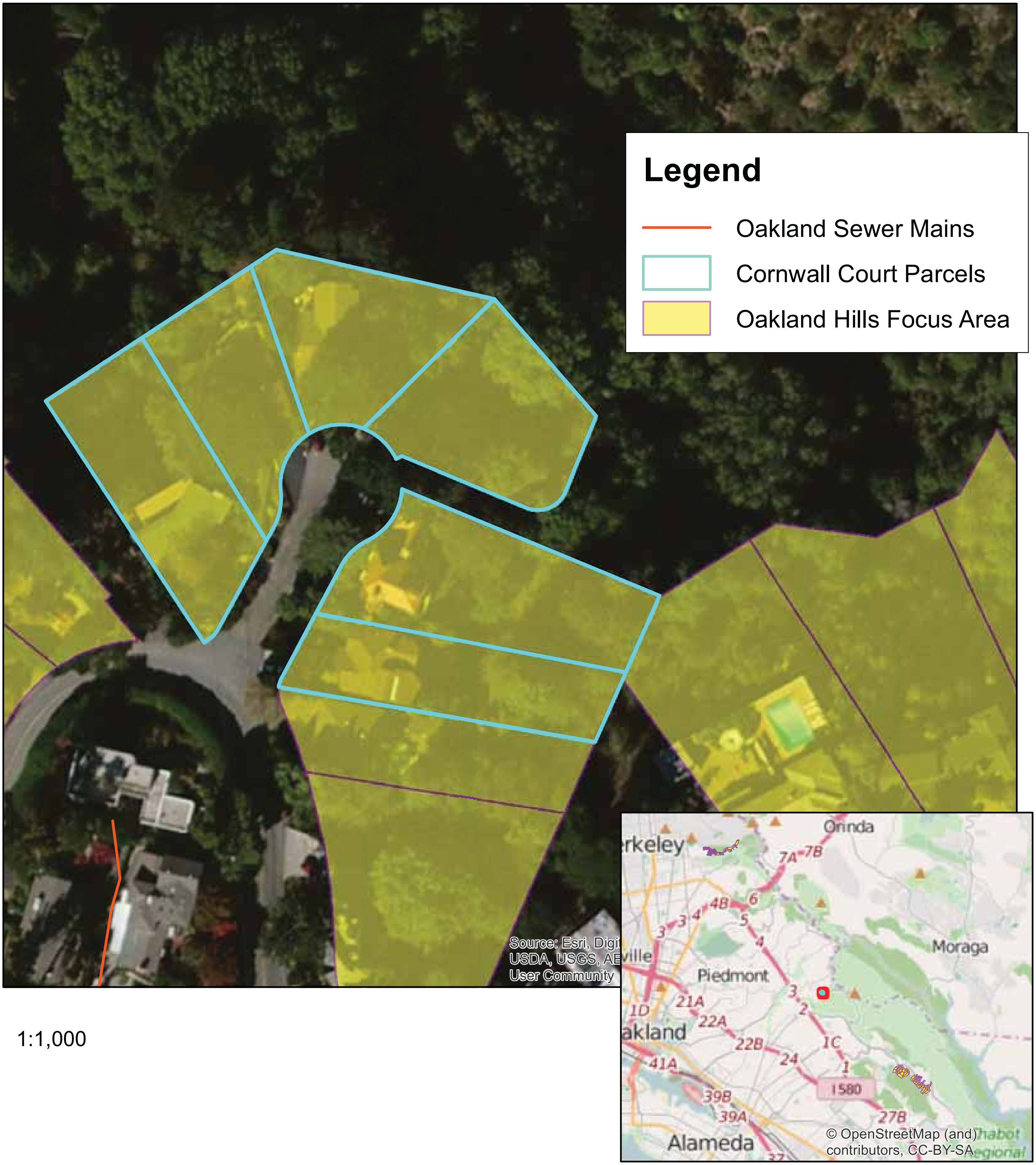
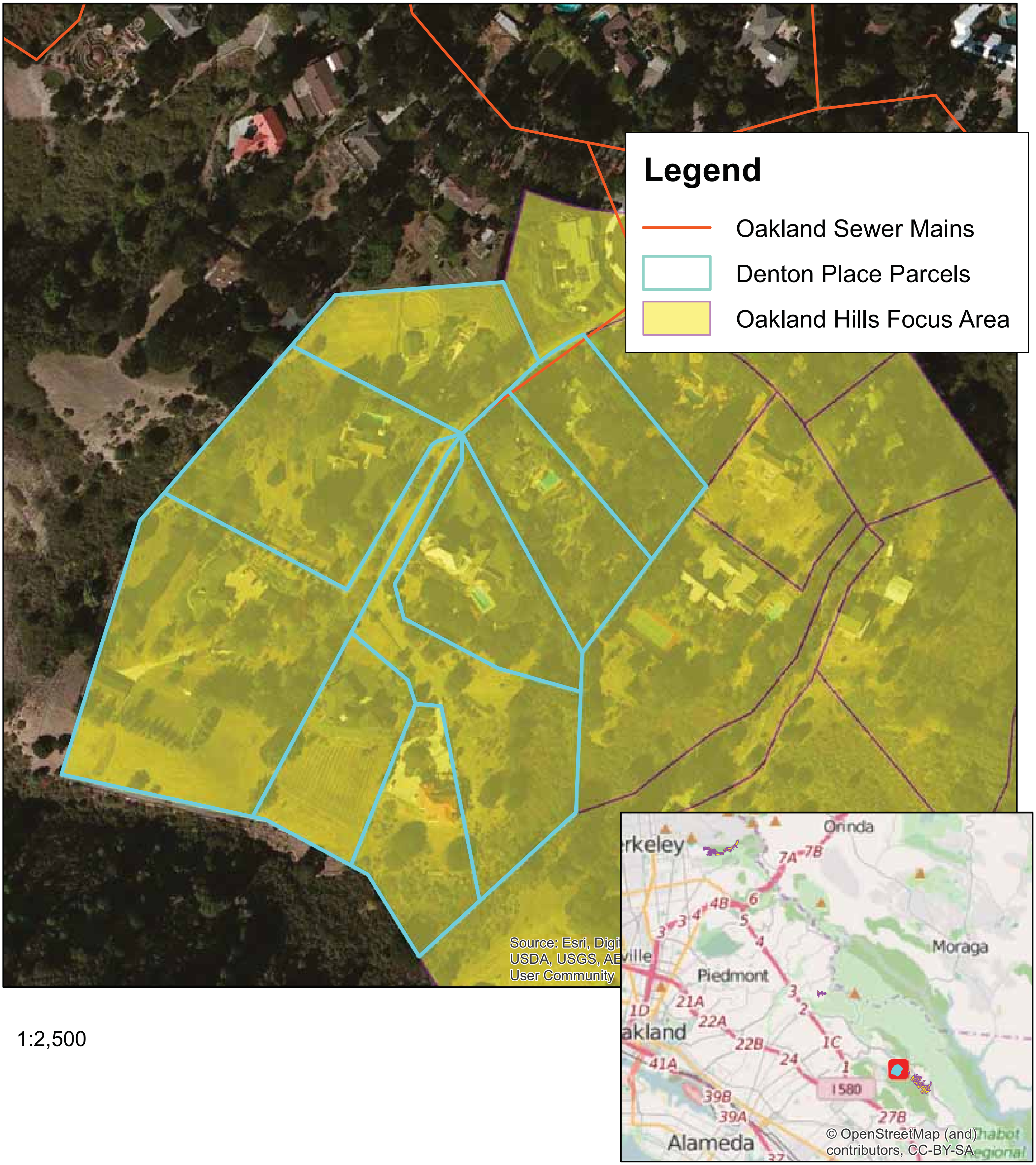
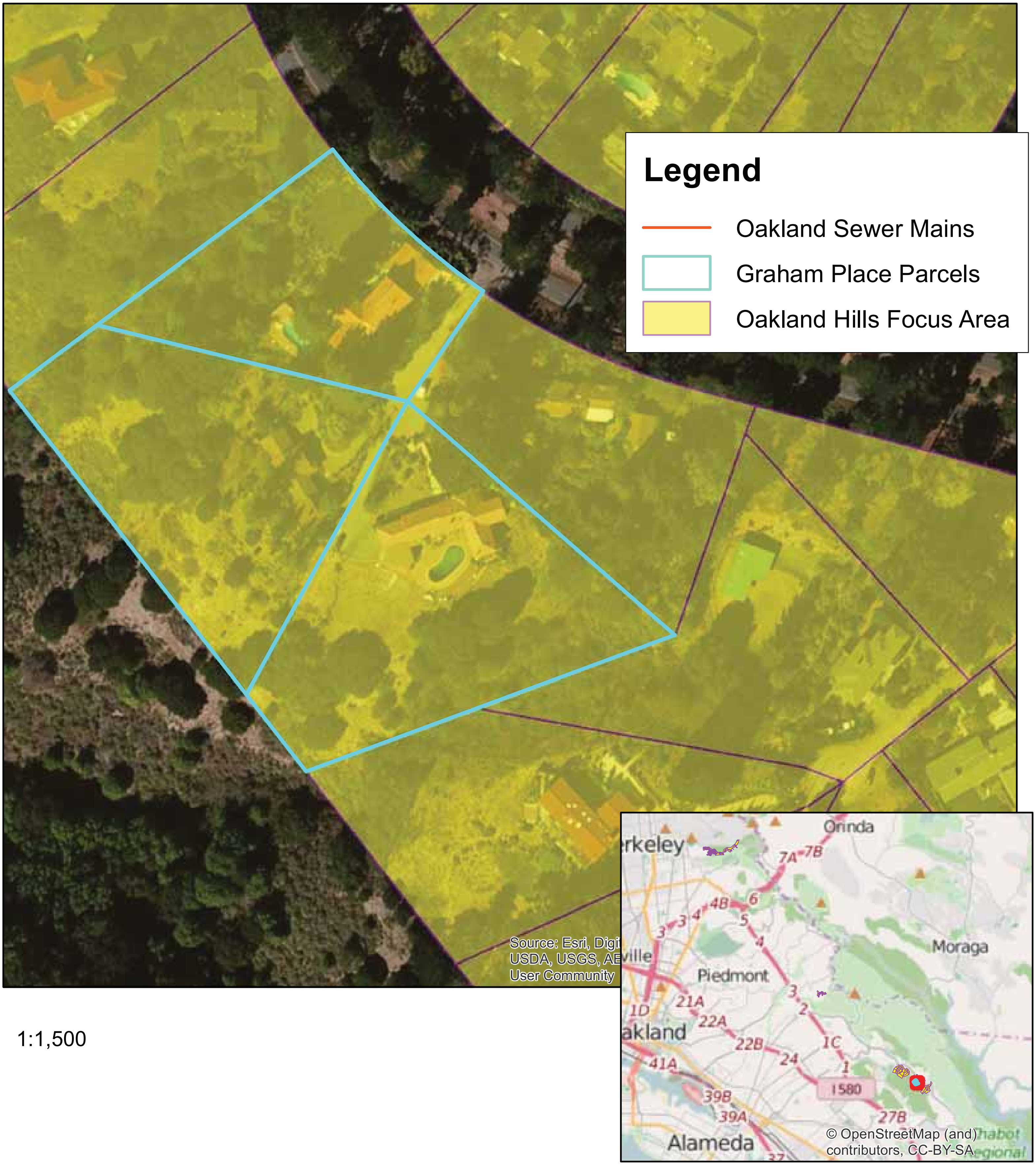


Fig. C-2.6. Focus Area: Oakland - Denton Place Pockets of Known OWTS



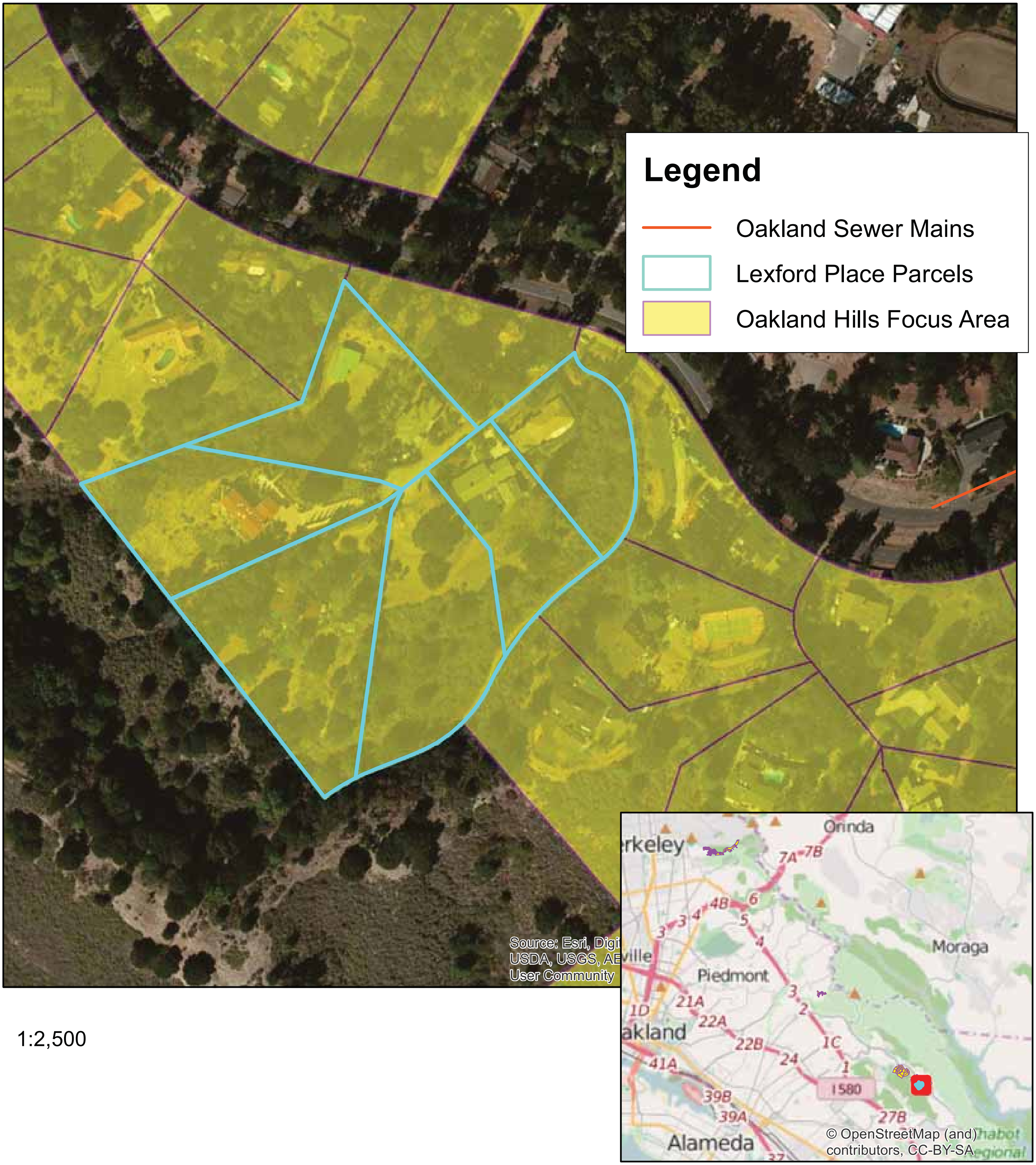
1:2,500

Fig. C-2.7. Focus Area: Oakland - Graham Place
Pockets of Known OWTS



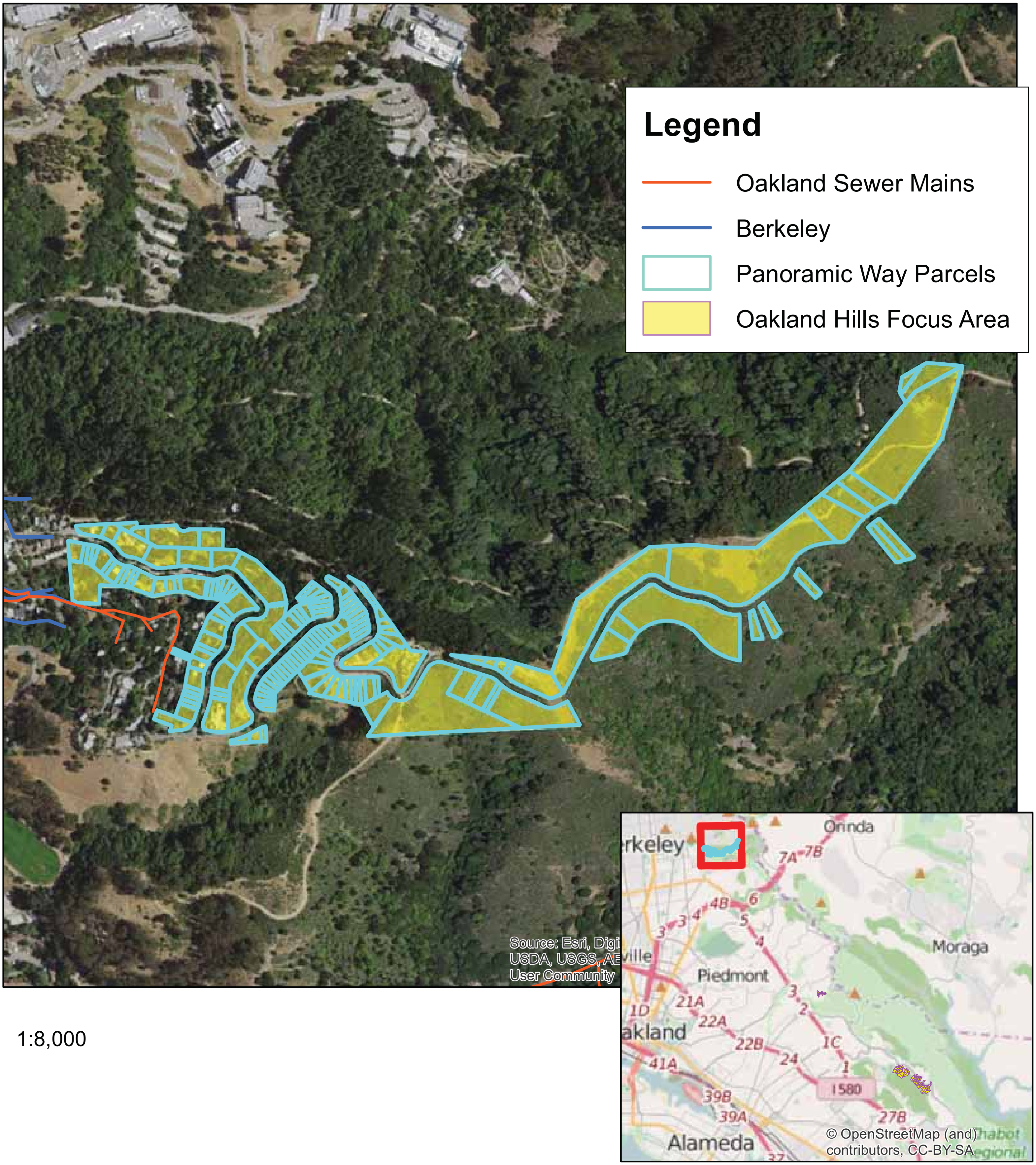
1:1,500

Fig. C-2.8. Focus Area: Oakland - Lexford Place Pockets of Known OWTS



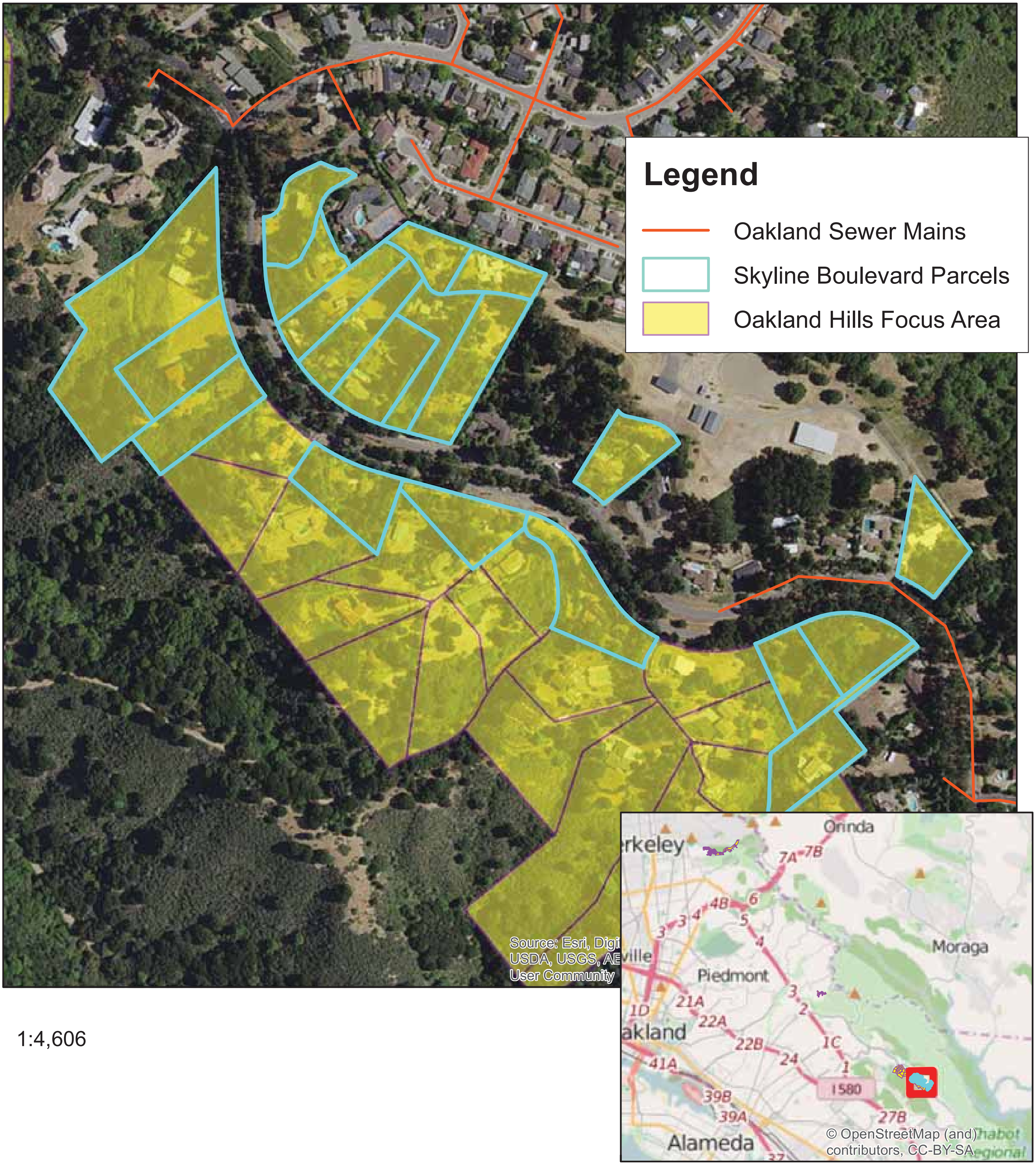
1:2,500

Fig. C-2.9. Focus Area: Oakland - Panoramic Way Pockets of Known OWTS



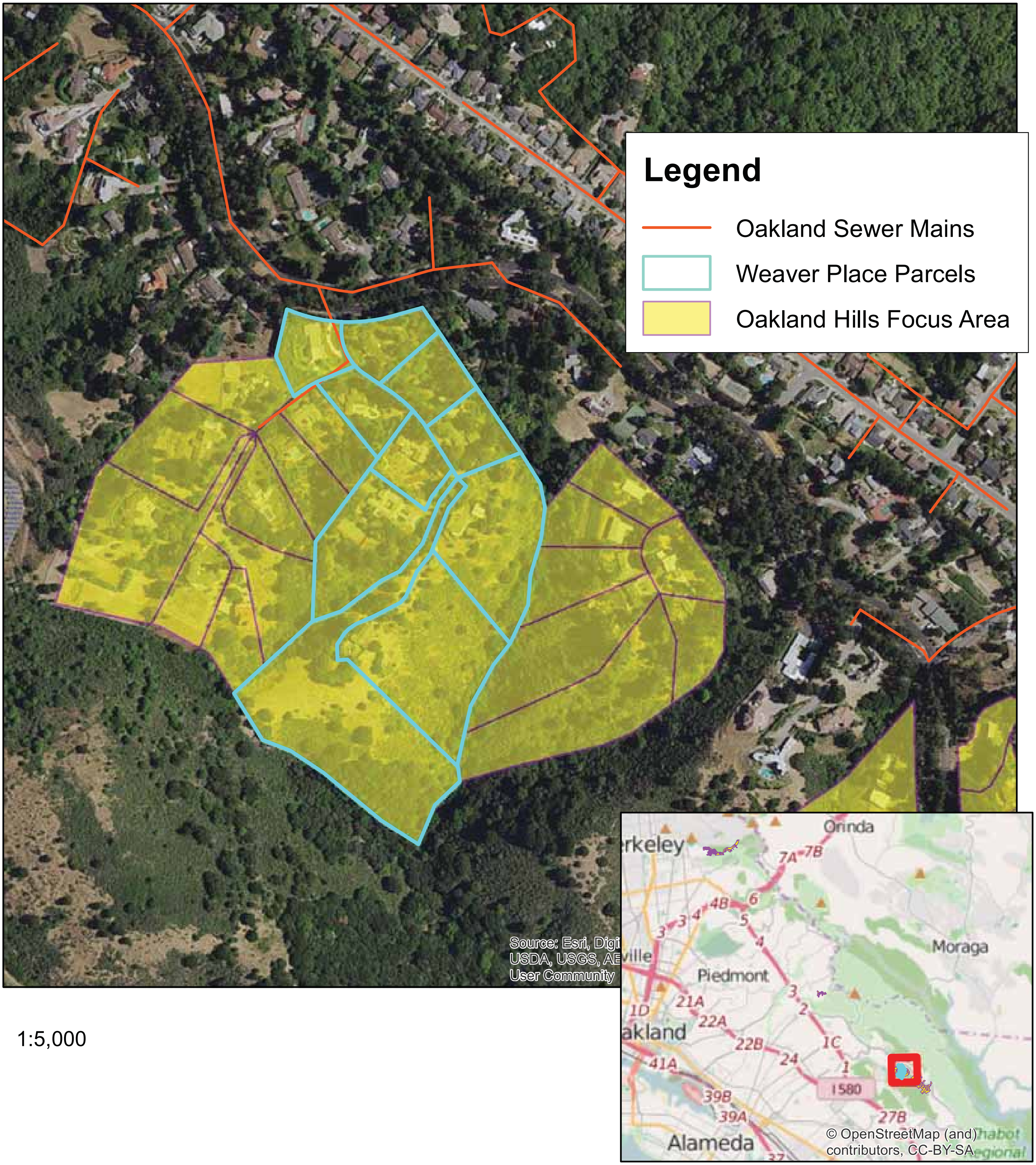
1:8,000

Fig. C-2.10. Focus Area: Oakland - Skyline Boulevard Pockets of Known OWTS



1:4,606

Fig. C-2.11. Focus Area: Oakland - Weaver Place
Pockets of Known OWTS



1:5,000

Appendix D

Section 6 of the Zone 7 Water Agency Nutrient Management Plan For Livermore Valley Groundwater Basin July 2015

6 Plan Implementation

6.1 Investigate Boundaries of Areas of Concern

Zone 7 intends to obtain additional information regarding the extent of high nitrate concentrations near Areas of Concern that have significant data gaps, proposed development with OWTS, and/or increasing nitrate concentrations. To this end, Zone 7 plans on pursuing the following options to further investigate the extent of nitrate concentrations:

- Zone 7 will work with well owners to sample existing shallow wells for nitrate. This process could include public outreach to homeowners to identify domestic wells with ideal characteristics (e.g., location, screened intervals, well depth) for further delineating the extent of nitrate concentrations in Areas of Concern. These wells could then be sampled and analyzed by Zone 7 at no cost to the well owner.

- Zone 7 will assess the data available, identify data gaps, and prepare maps showing preferred locations for future monitoring wells potentially to be installed by developers for each Area of Concern. It is anticipated that the studies will be conducted in the following priority: Greenville, Buena Vista, Mines Road, May School, Happy Valley, Staples Ranch, Jack London, Constitution, Charlotte Way, and Bernal.

- Zone 7 will work with Alameda County planning and health agencies to encourage or require hydrogeologic studies as part of new commercial developments. These studies could include installing new monitoring wells in locations identified on the preferred well location maps, sampling of existing wells, or drilling direct-push type borings.

- Zone 7 may require that new wells and borings near Areas of Concern include the running of electronic logs (elogs) and/or collecting and analyzing groundwater samples. The results of these elogs and groundwater samples can be used to better understand the geology and assess the extent of contamination in the Areas of Concern.

- The data results and work products generated from the tasks above (e.g., preferred well location maps, well sampling results) will be presented in the GWMP Annual Reports or as a separate report, as appropriate, based on the size and extent of the study and/or timing of its completion.

6.2 Implementation Measures to Minimize Nitrogen Loading

6.2.1 Introduction

Nitrate concentrations are expected to remain well below 20% of the assimilative capacity limit for all four groundwater areas in the Livermore Valley Groundwater Basin; however there are local Areas of

Concern where nitrate concentrations are above the Basin Objective (BO, 45 mg/L as NO_3). The main sources of nitrogen loading throughout the groundwater basin include fertilizer application, recycled water irrigation, livestock facilities, and onsite wastewater treatment systems. The implementation measures presented below are designed to minimize loading from these main sources, particularly in the Areas of Concern shown on *Figure 2-15* and described in *Section 2.4*. Many of these implementation measures include continuing with existing Best Management Practices (BMPs) that are monitored and administered by other agencies.

6.2.2 Fertilizer BMPs

Fertilizer application should be adjusted to the needs of the plants/crops to which it is being applied and take into account the nutrients already present in soil and irrigation water to avoid over-fertilization. The implementation plan promotes the continued use of the following fertilizer BMPs by agriculturists, park districts, school districts and other landscape and turf managers and practitioners.

- Targeted application of fertilizer and soil amendments – limit the application of salts and nutrients to the area at the point of the irrigation drip emitter, rather than broadcast across a large area.

- Adjust fertilizer amounts to account for nutrients already present in irrigation water and soil. Nutrient levels can be assessed by testing soil and water.

- Apply irrigation at agronomic rates to prevent nutrients in fertilizer from leaching into the groundwater.

- Effective vineyard management includes regular soil and petiole testing to help understand what, and volume of, nutrients that need to be added to the soil to produce the desired grape production and flavor. When the soil and petiole testing includes nitrogen as a test parameter, the results can be used to ensure that the amount of additional nitrogen applied is limited to that amount needed by the vines.

6.2.3 Recycled Water Irrigation BMPs

The use of recycled water for irrigation is controlled by water recycling criteria in Title 22 of the California Code of Regulations, and by discharge requirements established by the Regional Water Board. In addition to adhering to these regulations related to recycled water, the implementation plan recommends the continued use of the following BMPs by those who irrigate with recycled water:

- Reduce application of fertilizer to account for nitrogen in the recycled water.

- Irrigate during evening and early morning hours to reduce evaporation and human exposure.

- An effective irrigation system should be used that applies recycled water at agronomic rates. Infiltration of recycled water past the active root zone should be limited to only what is needed to remove salts from the root zone.

6.2.4 Livestock Manure Management

Livestock and Equestrian Facilities are another source of nitrates due to concentrated amounts of manure where animals are kept. Equestrian Facilities include horse boarding, training, and breeding facilities. The NMP endorses the County's requirement for concentrated and confined livestock facilities to implement design measures and BMPs for livestock manure management, such as:

- Manure management – remove manure regularly. If manure can't be removed daily then it should be covered and stockpiled on an impervious surface. Surface water should be prevented from reaching the storage area.

- Building and site design – should keep animal areas, such as paddocks and corrals, as dry as possible during the rainy season.

- Wash rack design – should not allow water to flow into storm drains, creeks, or recharge areas. Wash racks should be connected to the sanitary sewer or lined evaporation ponds, if possible.

- Facility and BMP inspections are performed by Alameda County Public Works as part of their Clean Water Program.

Additional guidance for manure management can be found in existing documents such as *Horse Manure Management – A Guide for Bay Area Horse Keepers (Buchanan et al., 2003)*. The existing City and County proposed development review and referral process is another opportunity to educate facility managers and architects on the design and operation considerations for limiting nutrient impacts to surface waters and groundwater.

6.2.5 Onsite Wastewater Treatment and Disposal

Limitations for the expansion of municipal sewer coverage in the Livermore-Amador Valley associated with the establishment of urban growth boundaries have resulted in the continued reliance of OWTS for development in the unincorporated areas. In particular, the continued growth of winery-related commercial development in or near the south Livermore high nitrate areas is a concern for maintaining or improving groundwater quality. OWTS that may have been allowed in the past may not be appropriate in the future as conditions and circumstances surrounding particular locations change or become known.

As provided for in the Water Board Basin Plan, ACEH has committed to developing a Local Agency Management Program (LAMP) for Water Board approval that will address their management of OWTS in unincorporated Alameda County. A LAMP is a management program that allows local agencies to establish minimum standards that are different from those specified in the State OWTS Policy, but are necessary to protect water quality and public health. Requirements for different minimum lot size for new development using OWTS and the addition of nitrogen-removing treatment equipment on OWTS for certain conditions are examples of special provisions that ACEH will likely include in its LAMP.

6.2.5.1 Winery Process Wastewater

There are currently over 50 wineries located over the Livermore Valley Groundwater Basin, however, many of them do not produce or bottle wine onsite. The ones that do produce or bottle wine, also produce a wastewater stream during the wine production and bottling operations. This winery process water, which contains nutrients, is often disposed of in evaporation ponds, on the surface as irrigation or dust control water, or in the subsurface using OWTS and leachfields. Regardless of which of these disposal methods is used, the Water Board has authority to regulate the discharge; thus a Report of Waste Discharge is required to be submitted to the Water Board for the discharge of wastewater to the surface or subsurface. The Water Board will then approve the discharge by issuing Waste Discharge Requirements, waive the need of a WDR, or deny approval of the discharge.

- To assist applicants with their ROWD preparation and the Water Board with their evaluation of ROWDs and WDR decisions, Zone 7 and ACEH will continue to provide relevant information on groundwater occurrence, use, quality and vulnerability to the Water Board and applicants.

- The preparation of a guidance document on the proper treatment and disposal of wastewater and organic wastes generated from the wine making and wine bottling processes would be beneficial for the development of plans that are effective at minimizing nutrient loading to the groundwater basin.

6.2.5.2 General OWTS Program

One of the purposes of the Alameda County Onsite Wastewater and Individual/Small Water Systems Ordinance and Regulations is to prevent environmental degradation of surface water and groundwater from onsite disposal of private sewage to the greatest extent possible. Included in the regulations are special provisions for the Upper Alameda Creek Watershed, above Niles; namely:

a. a minimum parcel size requirement of 5 acres for new single-family OWTS; and
b. a maximum discharge of 320 gallons per day per 5 acres for commercial OWTS.

Continued application of the general provisions of the County OWTS Ordinance and Regulation and these special provisions are expected to minimize the groundwater nitrate impact from OWTS use in the majority of the unincorporated areas of the Livermore Valley Groundwater Basin except in the Areas of Concern. Additionally, the following measures are planned:

- Zone 7 and ACEH will continue working together to ensure that both agencies are aware of groundwater issues in the Livermore Valley Groundwater Basin and that any OWTS approvals are consistent with the adopted NMP goals and objectives.

- Zone 7 and ACEH will continue to collaborate on the decisions surrounding approval of new OWTS for commercial facilities' domestic wastewater disposal on a case-by-case basis and to evaluate the potential risks and make proper decisions as additional information becomes available.

- Zone 7 and ACEH will continue to collaborate on assessing the potential risks and impact(s) associated with granting OWTS regulation variances and on developing any special requirements necessary to ensure groundwater quality protection.

- Zone 7 and ACEH will collaborate to determine the applicable time periods of any new OWTS permits, and continued compliance monitoring and renewal requirements to ensure long-term successful performance.

6.2.5.3 OWTS Management in Areas of Concern

Zone 7 has identified ten Areas of Concern with elevated nitrate concentrations in groundwater. Current and past onsite wastewater disposal practices are thought to be an important contributor to the high nitrate concentrations found in these areas. As such, ongoing and future wastewater disposal projects in the Areas of Concern should be managed with a bias towards reduction of the current loading. It is also important to increase the understanding of the extent of the nitrate impacts in many of these areas and to monitor the concentration trends as projects add and subtract wastewater loading in these areas. Towards these goals the following measures are expected to be performed:

- Zone 7 will coordinate further characterization and monitoring of the local nitrate plumes by working with ACEH, the Water Board and various property owners and consultants on the development of plans for the construction and operation of additional monitoring wells.

- Zone 7 will continue its effort to inform ACEH and Alameda CDA of the nitrate issues in the Livermore Valley Groundwater Basin and to collaborate on development plans, permit reviews, and CEQA analyses for projects involving onsite wastewater disposal in Areas of Concern to assure approvals are consistent with adopted NMP goals and objectives.

- Local Agency Formation Commission (LAFCO), developers and County and City planning agencies are expected to continue to work together to create opportunities for discontinuing onsite disposal of nutrient-rich wastewater within the Areas of Concern, such as connecting dwellings and businesses to municipal or community sewage treatment works when feasible.

- ACEH, Zone 7, and the Water Board will work together on the development, approval, and implementation of the LAMP to identify the special need areas, contributing local groundwater and geologic expertise, and providing ongoing regional groundwater monitoring.

In five of the ten Areas of Concern, OWTS are the predominant method of wastewater disposal, but unlike the other Areas of Concern, there are no current plans for extending the municipal sewer service to these five areas. The five areas are:

- Happy Valley (*Figure 6-2*)
- May School (*Figure 6-3*)
- Buena Vista (*Figure 6-4*)
- Greenville (*Figure 6-4*)
- Mines Road (*Figure 6-5*)

Accordingly, special OWTS permit requirements have been developed for new OWTS applications received for these five Areas of Concern. These five special OWTS permit requirement areas are shown in
Figure 6-1 to *Figure 6-5*, and the recommended permit requirements are summarized below and presented in a table in *Figure 6-6*. These requirements are intended to minimize the impact to existing homeowners and future development while still being protective of the environment and groundwater quality.

These special permit provisions are designed to limit or reduce the amount of nitrogen loading from OWTS in the five Areas of Concern over time by requiring parcels planned for new or replacement OWTS to meet a lower nitrogen loading standard than what exists for parcels located outside of the Special OWTS Permit Areas. These proposed requirements do not apply to existing, properly-working and properly-sized OWTS.

As is the case for properties outside Special OWTS Permit Areas, the requirements are based on the total size of the property parcel (see graph on *Figure 6-7*), and assume that the nitrogen loading from one Rural Residential Equivalent (RRE), i.e., a typical, single-family home served by a conventional OWTS is 34 lbs N/year. For new or remodel development on parcels of less than seven acres in the special OWTS permit requirement areas, the project must achieve a total nitrogen loading from all OWTS on the property of less than 0.7 RRE (23.8 lbs N/year) per parcel. This is the equivalent to the loading from two advanced single-family OWTS, each capable of 65% nitrogen reduction. For example, in order to add an additional single-family dwelling with a new OWTS to a parcel that already has an existing single-family dwelling with a conventional OWTS, the project must include installation of pre-treatment equipment, capable of removing 65% of the nitrogen content from the wastewater stream, on both OWTS (new and existing systems). As a consequence, the net result would be an onsite loading reduction from a pre-project total of one RRE to a post- project total of 0.7 RRE. (0.35 + 0.35 RRE).

For parcels equal to or greater than 7 acres, the total nitrogen loading from all OWTS must not exceed 0.5 RRE per 5 acres (3.4 lbs N/parcel acre/year). For example, the total nitrogen loading limit for a ten acre parcel is calculated as follows:

$$10\ acres \text{ x} \frac{0.5\ RRE}{5\ acres} = 1\ RRE = 34\ lbsN/yr$$

Alternatively, if the property owner performs a hydrogeologic study demonstrating that the proposed project will not cause nitrate concentrations to rise, then the total nitrogen loading limit is 1 RRE/5 acres (6.8 lbs N/parcel acre). The study must show that total on-site recharge does not exceed 36 mg/L (80% of the MCL) or the maximum concentration at the site, whichever is lower. The 80% MCL limit is based on Zone 7 Water Quality Policy and provides a standard buffer for not exceeding the MCL. This alternative is intended to encourage additional hydrogeologic studies that can further define the boundaries and nitrate concentrations of Areas of Concern.

Because wastewater generated by commercial operations can result in higher loading rates than residential flows, the permitting of OWTS for new commercial projects within the special permit requirement areas require a higher level of scrutiny. At a minimum, projects must include a nitrogen-removing system, but also must demonstrate by analysis that the project will result in an improved nitrate condition beneath the site and not cause the offsite condition to worsen. Many of the commercial use OWTS will fall under the Water Board's jurisdiction and thus be subject to their Report of Waste Discharge (ROWD) requirements.

These same permit criteria are anticipated to be incorporated into the County's LAMP and used by the Water Board while developing Waste Discharge Requirements (WDR) for commercial projects within their purview if they prove to be effective at improving or halting groundwater quality degradation in these Areas of Concern. The following are measures specific to the special permit requirement areas:

- Until ACEH's LAMP has been finalized and approved by the Water Board, ACEH should incorporate and implement an interim permit approval policy such as the one recommended in *Figure 6-6*.

- Zone 7 will continue to refine the special permit area boundaries as more groundwater quality data becomes available in the future.

- Zone 7 and ACEH will continue to support the Water Board in its WDR decisions and specific requirements.

- Zone 7 will work with ACEH to assess the effectiveness of the County's OWTS moratorium in Happy Valley and whether this regulation should be continued in the County's LAMP.

Figure 6-1: Special OWTS Permit Areas

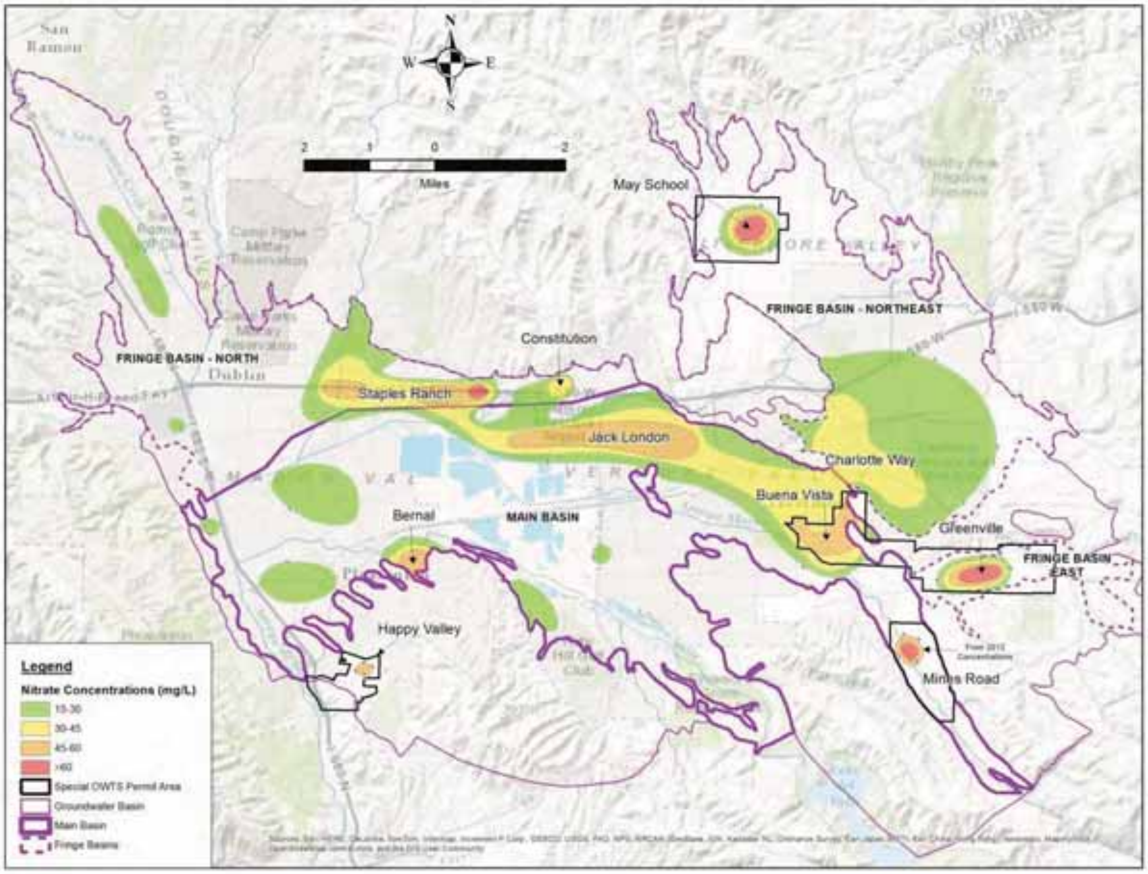


Figure 6-2: Happy Valley Area of Concern

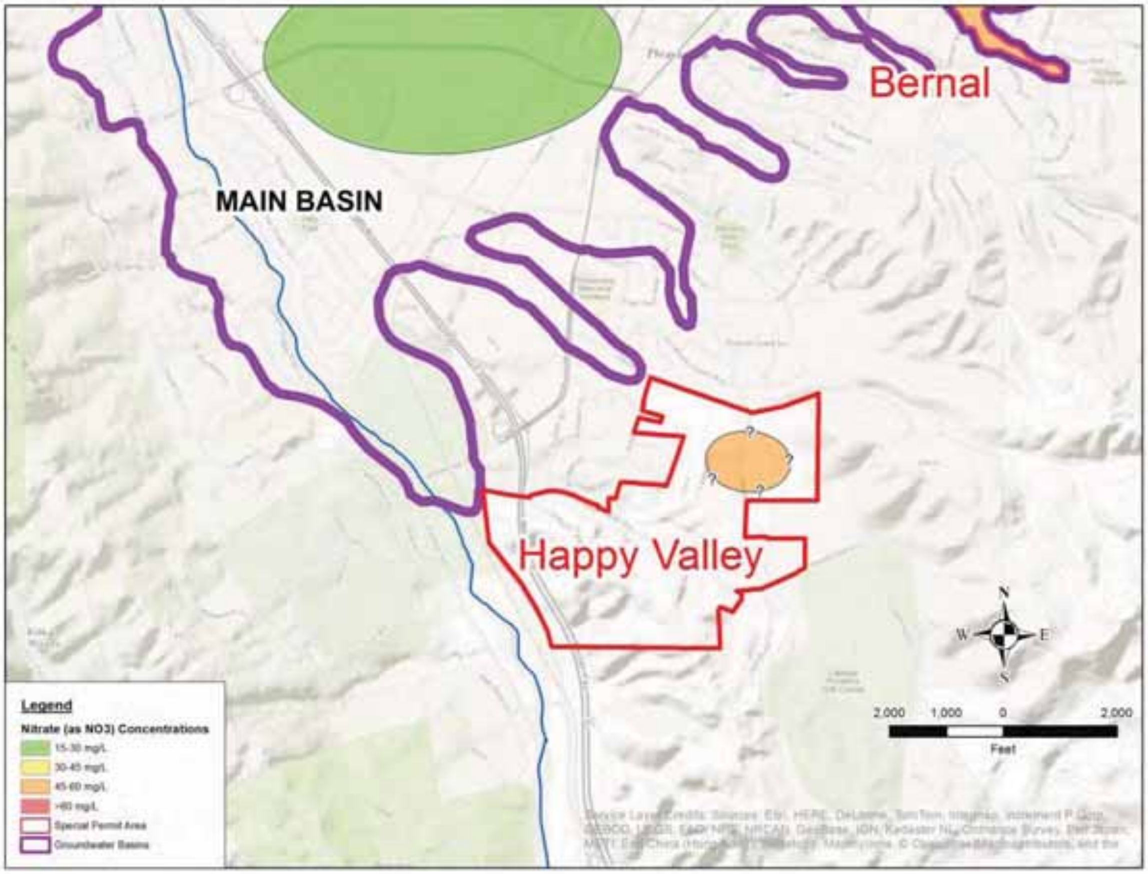


Figure 6-3: May School Area of Concern

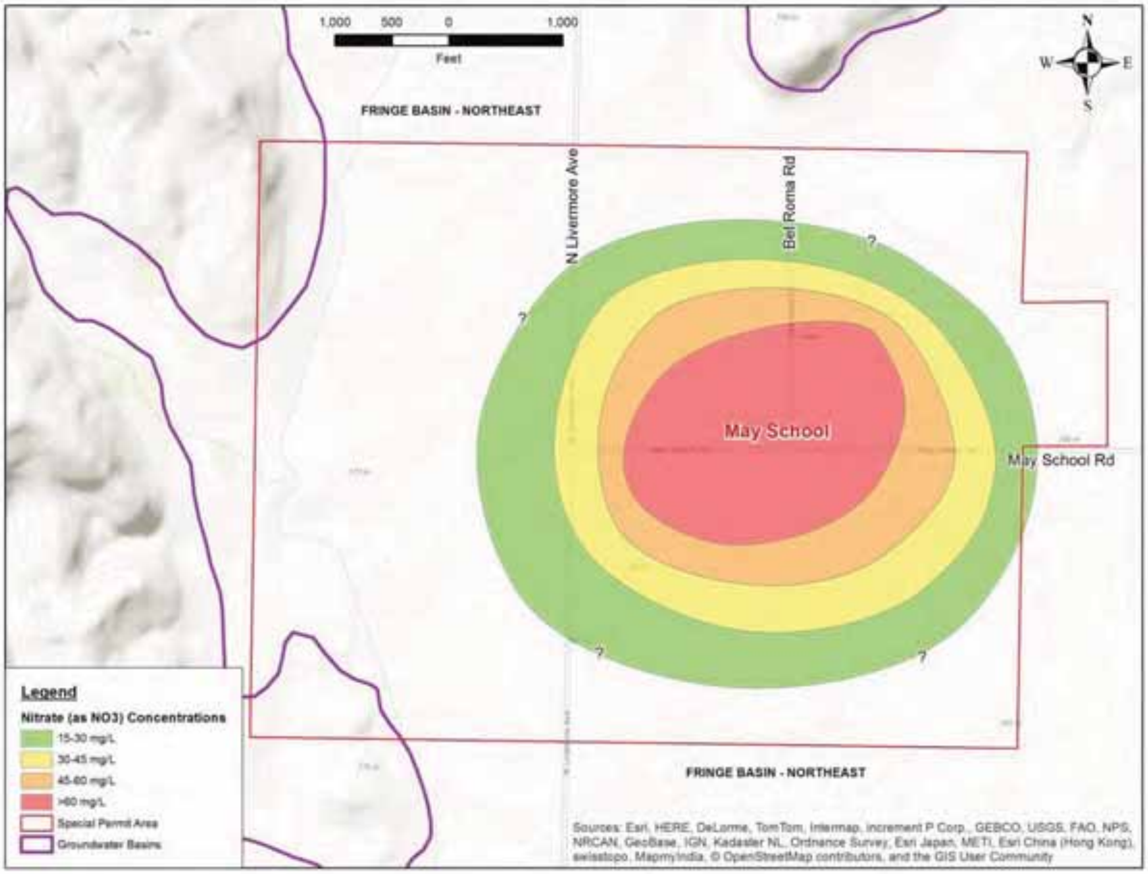


Figure 6-4: Buena Vista/Greenville Areas of Concern

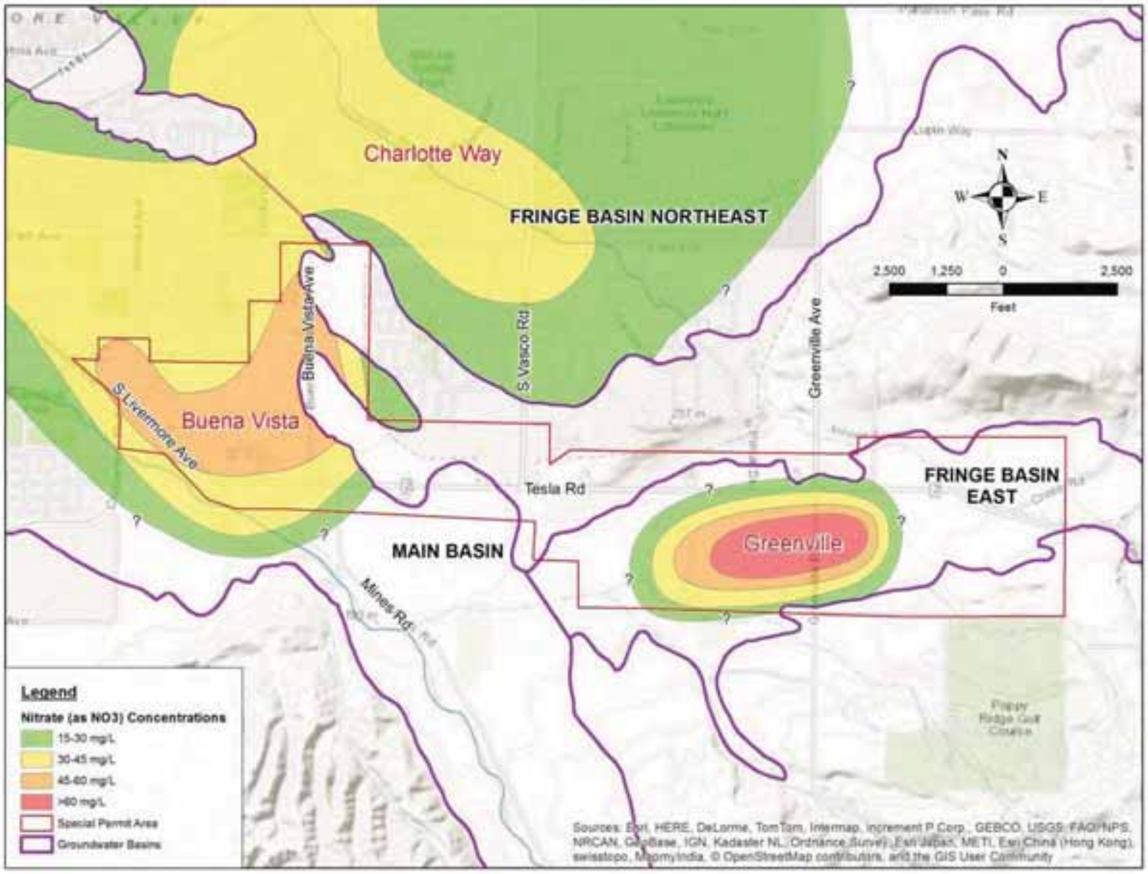


Figure 6-5: Mines Road Area of Concern

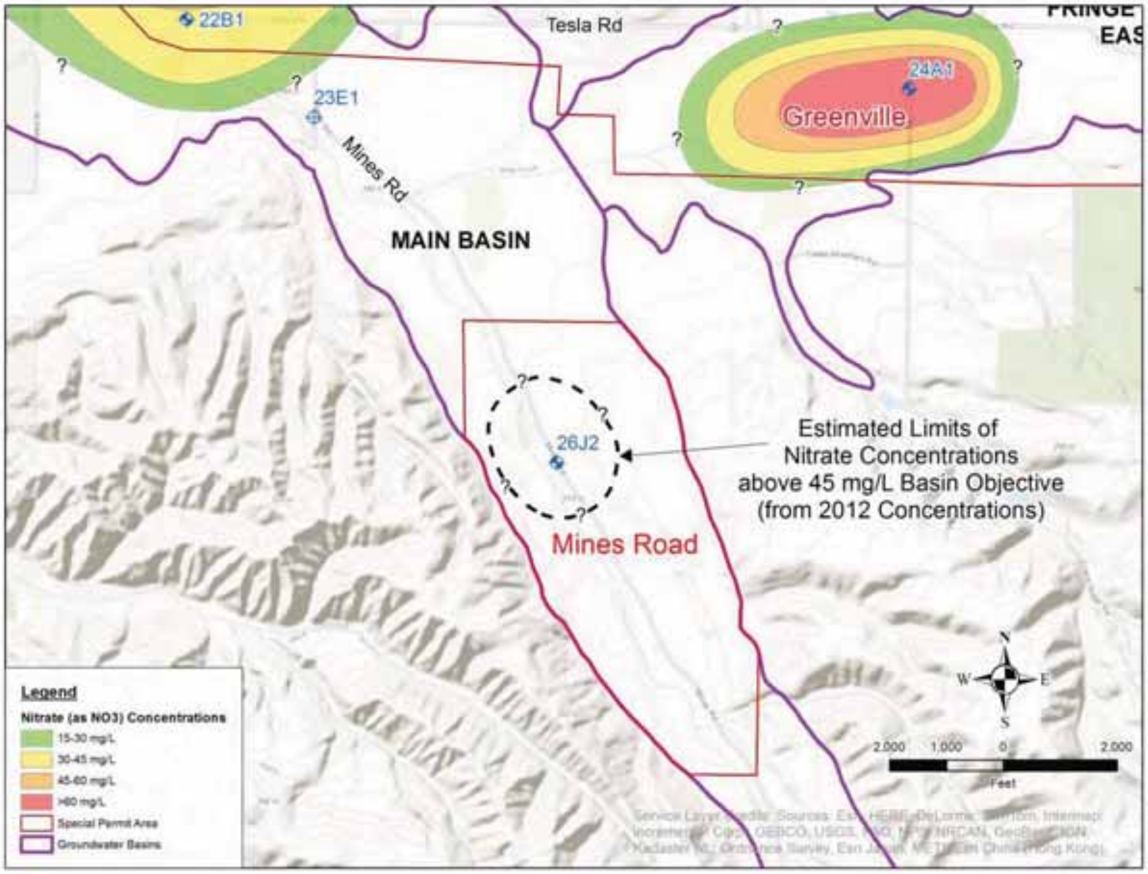


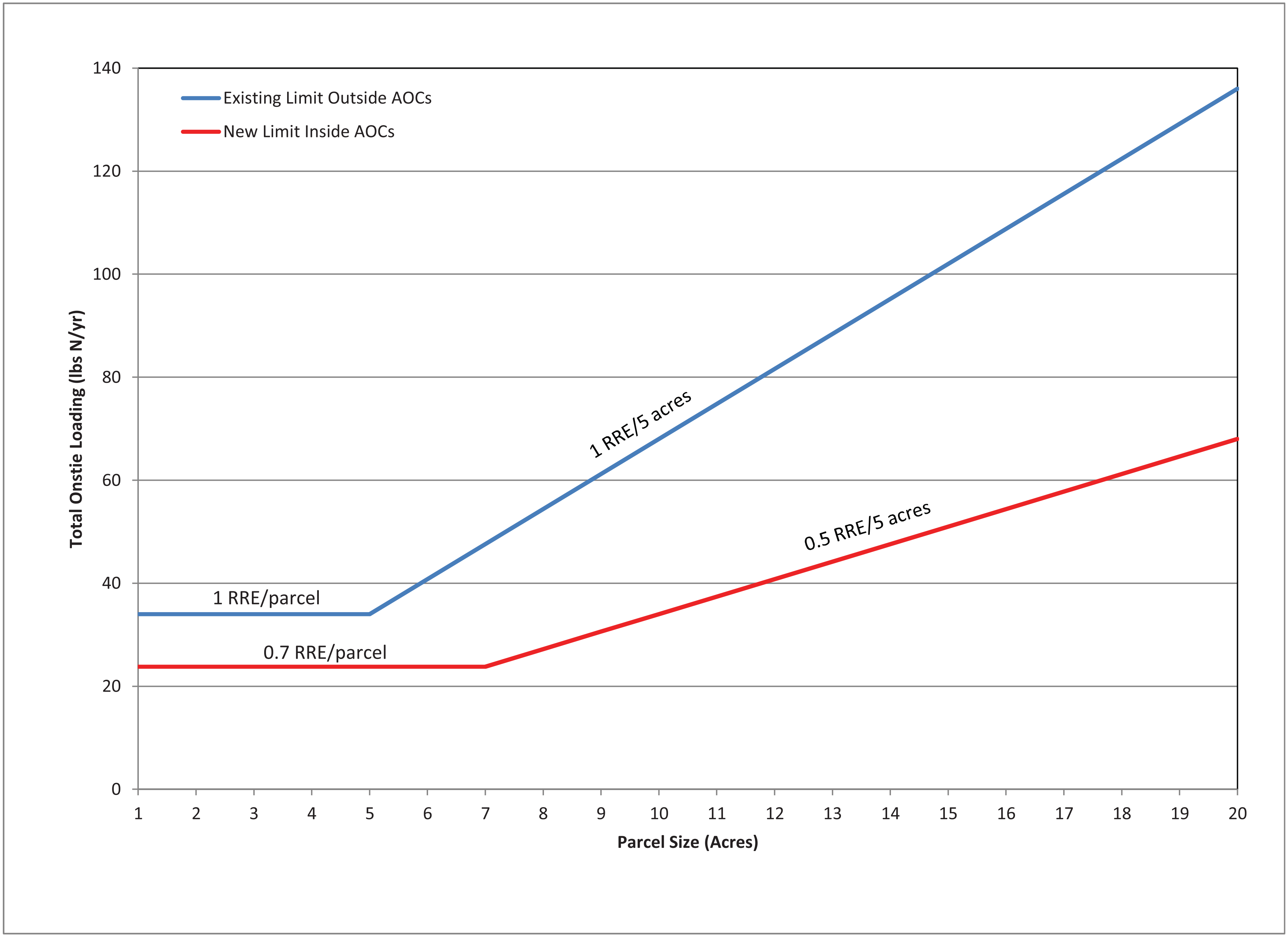
FIGURE 6-6
PROPOSED OWTS PERMIT REQUIREMENTS
FOR SPECIAL OWTS REQUIREMENT AREAS
NUTRIENT MANAGEMENT PLAN

OWTS Scenario	Parcel Size	New Requirement	Max Nitrogen Loading Rate[2]
New, upgraded, or replacement OWTS required by County OWTS Ordinance[1]	*≤ 7 acres*	*Must install/upgrade/replace with code-compliant nitrogen-reducing system(s).*	*23.8 lbs/year Per Parcel*
	> 7 acres	*Total nitrogen loading on the parcel must not exceed the Maximum Nitrogen Loading Rate. Commercial uses must also install/upgrade/replace with code-compliant nitrogen-reducing system(s).*	*3.4 lbs/year Per Parcel Acre*
		OR	
		Prepare hydrogeologic study that assesses current groundwater nitrate conditions beneath the site and demonstrates that nitrate concentration of total onsite recharge[3] *does not exceed 36 mg/L (80% of MCL) or the maximum concentration at the site, whichever is lower.*	*6.8 lbs/year Per Parcel Acre*

1 Does not apply to existing, properly-working and properly-sized OWTS.
2 Loading rates calculated based on 1 RRE = 34 lbs/yr.
3 Assume that 18% of rainfall naturally recharges to groundwater unless study demonstrates otherwise.

ACEH = Alameda County of Environmental Health
OWTS = Onsite Wastewater Treatment System
RRE = Rural Residential Equivalence
MCL = Maximum Conaminant Level (NO_3 = 45 mg/L)

FIGURE 6-7
Graphs of OWTS Limits



6.3 Implementation Measures to Enhance Nitrate Attenuation

6.3.1 Low Impact Development BMPs

Low Impact Development (LID) BMPs promote the use of small-scale, natural drainage features to slow, clean, capture, and infiltrate rainfall in an effort to replenish local aquifers, reduce pollution, and increase the reuse of water. This NMP encourages development approval agencies to require LID BMPs such as those listed below to help dilute and attenuate nitrate concentrations in groundwater:

- Bioretention cells and swales,
- Permeable pavement blocks, and
- Soil amendments to improve soil permeability

6.4 Basin Monitoring Programs

6.4.1 Introduction

Zone 7 currently monitors the following as part of its GWMP:

- groundwater (levels and quality),
- climatological (precipitation and evaporation),
- surface water (streamflow and quality),
- mining area (mining activities and water export volumes),
- land use (area),
- groundwater production (volume and quality),
- land surface subsidence (inelastic and elastic), and
- wastewater/recycled water (use and quality).

The monitoring programs focus on the Main Basin where groundwater is pumped for municipal uses, but monitoring stations are located throughout the groundwater basin to assess conditions in the fringe and upland basins. The programs are designed to assess the sustainability and quality of the groundwater basin, and the results are used in water resources management planning and decision making. Complete descriptions of the monitoring programs are provided in Zone 7's GWMP and SMP. The components of the programs that address nutrient monitoring are outlined below. These programs are evaluated annually and revised as necessary as part of Zone 7's Annual Reports for the GWMP.

Zone 7's existing monitoring programs already address nutrient monitoring, and no changes are proposed at this time. Zone 7 will identify data gaps and suggested locations and depths for new monitoring wells and/or soil borings for expedited groundwater sampling in the Areas of Concern. Zone 7 will provide this information to property owners, developers, and regulatory agencies to assist in developing efficient strategies for fully characterizing nitrate concentrations and nitrogen loading for projects inside Areas of Concern. Zone 7 will also work with ACEH to develop OWTS monitoring plans that may require the installation and monitoring of additional regional monitoring wells, up-gradient and down-gradient of high nitrate concentration areas, by the owners and developers.

State policy does not require monitoring for Constituents of Emerging Concern (CECs) for basins where recycled water use is limited to irrigation projects. Since the recycled water use in the Valley is currently limited to irrigation projects, Zone 7 does not monitor for CECs at this time; however, Zone 7 will continue to review the regulations and Valley conditions to assess whether future CEC monitoring is appropriate.

6.4.2 Nutrient Specific Monitoring Programs

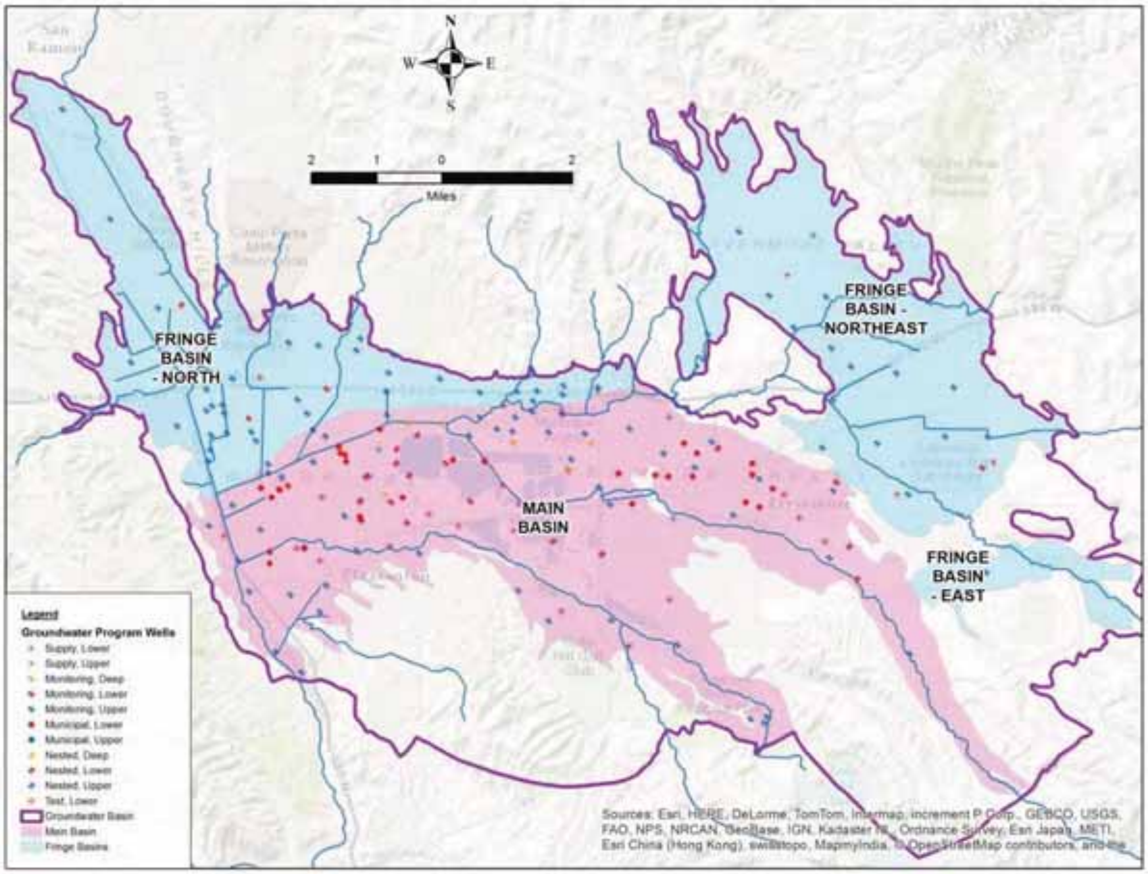
Climatological Monitoring – Zone 7's network of seven rainfall stations, two pan evaporation stations, and one California Irrigation Management Information System (CIMIS) station provide daily rainfall and evaporation data for basin recharge calculations. This information is used to calculate the volume of recharge, evaporation, and nitrogen loading from rainfall.

Surface Water Monitoring – This program focuses on the four main gaining and losing streams that impact the groundwater basin (i.e., Arroyo Valle, Arroyo Mocho, Arroyo Las Positas, and Arroyo De La Laguna), and the diversions and accretions that affect the flows into or from each of them. Zone 7 measures the inflow and outflow from the streams to quantify the volume of water recharging or discharging from the groundwater basin's aquifers. Zone 7 also samples and analyzes water from the streams to provide a record of water quality for the basin's recharge and discharge waters from which the groundwater basin's annual nitrate loading is calculated.

Zone 7's Water Level Monitoring – Zone 7 measures groundwater levels in over 230 monitoring and production wells (see *Figure 6-8* below and *Figure A-7*) twice per year during seasonal extremes (i.e., spring highs and fall lows) for storage tracking. Water level measurements are also measured monthly in some wells to monitor subsidence, adjust recharge operations, and identify when semi-annual water level measurements should be scheduled.

Zone 7's Water Quality Sampling –Zone 7 samples groundwater at least annually from all accessible groundwater wells in the program. Samples are analyzed by Zone 7's laboratory for metals and general minerals (including Nitrate as NO_3 and Phosphate as PO_4).

Figure 6-8: Map of Program Wells



Land Use Monitoring – Zone 7 maps and quantifies Valley land use (see *Figure 3-7* for the 2013 land use map) for areal recharge calculations (e.g., rainfall recharge, applied water recharge, and unmetered groundwater pumping for agriculture) and salt/nutrient loading (e.g., from irrigation, horse boarding facilities, and properties with OWTS). The program identifies changes in land use with an emphasis on changes in impervious areas and the volume and quality of irrigation water that could impact the volume or quality of water recharging the Main Basin. Land use data are derived from aerial photography, permit applications, field observations, and City and County planning documents.

Wastewater and Recycled Water Monitoring - Zone 7 compiles and reviews data on the volume and quality of wastewater collected and recycled water used within the watershed from the Livermore Water Reclamation Plant (LWRP), DSRSD Water Reclamation plant, and the Veterans Hospital sewage treatment plant. Zone 7 also reviews new OWTS applications located within the Valley for compliance with Zone 7's Wastewater Management Plan. Zone 7 must approve all onsite disposal systems for new commercial developments or any residential OWTS that will potentially exceed the loading allowed for the site.

6.5 Implementation Schedule

- The investigation of the Areas of Concern is ongoing. Zone 7 is currently soliciting permission to sample existing wells from homeowners near the Areas of Concern. Zone 7 is also currently working with several commercial developers to perform hydrogeologic studies in the Greenville special permit area.

- The Implementation Measure BMPs for Fertilizers, Irrigation, Livestock Manure Management, and Low Impact Development are already in place throughout the Valley.

- Zone 7 will assess the available data, identify data gaps, and prepare preferred well location maps for each of the Areas of Concern as identified in *Section 6.1*. These monitoring wells will potentially be installed by the developers. These will be prepared with the following schedule:

Figure 6-9: Proposed Schedule for Areas of Concern

Area of Concern	Calendar Year of Completion
Greenville	2016
Buena Vista	2016
Mines Road	2016
May School	2017
Happy Valley	2017
Staples Ranch	2018
Jack London	2018
Constitution	2018
Charlotte Way	2018
Bernal	2018

The results of the data and work products generated from the tasks above (e.g., preferred well location maps, well sampling results) will be presented in the GWMP Annual Reports or as a separate report, as appropriate, based on the size and extent of the study and/or timing of its completion.

- Zone 7's groundwater monitoring programs are also already in place, the results of which are presented in Zone 7's Annual Reports for the GWMP. New monitoring wells constructed as part of new developments (*Section 6.1.5.3*) will be added to the existing programs.

- The NMP recommends that the special OWTS permit requirements discussed in *Section 6.2.5.3* and described in *Figure 6.6* be incorporated into the LAMP, which ACEH anticipates completing a draft in 2016, and finalizing it by 2018.