



## **COUNTY OF SONOMA**

# **ONSITE WASTEWATER TREATMENT SYSTEM REGULATIONS AND TECHNICAL STANDARDS**

## **(OWTS MANUAL)**

COUNTY OF SONOMA  
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## **Appendix A Experimental and Alternative OWTS**

# Section 1 General

## 1.1 Purpose

- A. The *OWTS Manual* amends in its entirety the *Regulations for Onsite Sewage Dispersal in Sonoma County (November 2002 et seq.)* and is intended to establish conformity with standards for the permit approval, installation, and operation of OWTS within the County. Modifications to County OWTS standards are necessary to update, add and/or replace outdated County regulations and to comply with the State Water Resources Control Board (SWRCB) *OWTS Policy*. These standards are adopted to address the potential creation of health hazards and nuisance conditions, to protect the quality of surface water and groundwater in Sonoma County, and to meet provisions of **Tier 2 Local Area Management Program (LAMP)** requirements of the *OWTS Policy*.

## 1.2 Authority

- A. This *OWTS Manual* provides the regulatory requirements, policy, procedural and technical details for implementation of the Porter Cologne Water Quality Control Act (California Water Code Section 13000 et seq.), the SWRQB *OWTS Policy*, and applicable sections of Sonoma County Code Chapters 7 and 24. The California Water Code 13282 authorizes counties to adopt and enforce regulations, conditions, restrictions, and limitations regarding the dispersal of waste. The SWRQB *OWTS Policy* authorizes the Regional Water Quality Control Board (RWQCB) to approve a LAMP for the implementation of the *OWTS Policy*. The Sonoma County Code Chapter 24-31.5 authorizes the Permit Authority Director to adopt and promulgate standards for OWTS.

## 1.3 Applicability

- A. These standards apply to OWTS, where there is a proposed or existing residence, a place of business or other building or place which people occupy, or where persons congregate, reside or are employed and where the maximum daily flow rate of wastewater produced is 10,000 gallons per day or less.
- B. Additionally, review and approval by the RWQCB is required for OWTS in cases where:
1. The maximum wastewater flow rate handled by the OWTS is more than 10,000 gallons per day;
  2. The OWTS is categorized as a community system;
  3. The OWTS receives high-strength wastewater, unless the waste stream is from a commercial food service building;
  4. The OWTS receives wastewater from a commercial food service building: (1) with a BOD higher than 900 milligrams per liter, or (2) that does not have a properly sized and functioning oil/grease interceptor;
  5. The RWQCB asserts jurisdiction.

## **Section 2 Sewer Connection Required**

A. Installation of a new or replacement OWTS where public sewer is available is prohibited, except as follows:

1. This provision does not apply to replacement OWTS where the connection fees and construction costs are greater than twice the total cost of the replacement OWTS and the local agency determines that the discharge from the OWTS will not affect groundwater or surface water to a degree that makes it unfit for drinking or other uses.

B. Sewer is available if:

1. The subject parcel is within a sanitation district boundary; and
2. A public sewer is 200 feet, or the distance specified by the respective sanitation district, or less from the proposed or existing structure; or
3. A lateral sewer connected to a public sewer is 200 feet, or the distance specified by the respective sanitation district, or less from the proposed or existing structure.



## Section 3 Definitions

**A-BLD** means a building permit issued without plans and without formal plan review, although in some cases supporting documents (such as a floor plan or manufacturer's listing documents) may be required. It is not intended that an "A-BLD" permit be issued for any change in occupancy.

**Absorption Area** means the area(s) of the OWTS dispersal system where wastewater is distributed subsurface for the purposes of final treatment and dispersal. Absorption area is also known as leach field, drainfield or dispersal area.

**Accessory Structure** means a residential structure not greater than 3,000 square feet in floor area, and not over two stories in height, the use of which is customarily accessory to and incidental to that of the dwelling(s) and which is located on the same lot.

**Addition** means an increase in living area square footage to the primary residential dwelling or commercial structure and/or any and all accessory structure(s) either through an expansion of the footprint of the dwelling(s) or structure(s), a second floor addition, a basement addition or the conversion of non-habitable space to habitable or living area use. For the purpose of this policy, a new residential accessory structure will be considered an "Addition" to the primary residential dwelling.

**Adjusting Valves** are a device(s) used in OWTS to distribute wastewater in a balanced or even flow.

**Administrative Authority.** See Permitting Authority.

**Advanced Treatment Unit** means an approved measure that utilizes special designs and/or additional technology to treat the effluent to a much higher level than a conventional system. An approved Advanced Treatment Measure shall reduce Biochemical Oxygen Demand (BOD) and Suspended Solids to less than 30 milligrams per liter and provide at least 50 percent total nitrogen removal, as verified by an approved independent testing laboratory.

**Advanced Treatment Unit.** See Pretreatment.

**Alternative OWTS** means an approved nonstandard OWTS that has demonstrated in the nonstandard Experimental phase to function in such a manner as to protect water quality and preclude health hazards and nuisance conditions, and is capable of producing an equal to or greater quality wastewater effluent and improved performance of and siting for effluent dispersal than a standard OWTS.

**Bedrock** means solid rock, which may have fractures, that lies beneath soils and other unconsolidated material. Bedrock may be exposed at the surface or have an overburden up to several hundred feet thick.

**Bedroom** means any living space in a dwelling unit or accessory structure which is 70 square feet or greater in size and which is located along an exterior wall, but not including the following: hall, bathroom, kitchen, living room (maximum of one per dwelling unit), family room (maximum of one per dwelling unit), laundry room, closet/dressing room, opening off of a bedroom. (Permit Sonoma Policy and Procedure Number 1-4-1, *Definition of Bedroom*).

**B-BLD** is a building permit for new additions, remodeling and/or new structures that requires construction plans and plan review. A “B-BLD” is any building permit that does not meet the definition of an “A-BLD” permit. (Section 6: OWTS Requirements for Approval of Building Permits)

**Best Available System.** See Class I Non-Conforming OWTS.

**Best Practical System.** See Class II Non-Conforming OWTS.

**Bulk Density** is the mass of dry soil per unit bulk volume, expressed in grams per cubic centimeter. The bulk volume is determined before drying to a constant weight at a temperature of 105 degrees.

**Cesspool** is an excavation in the ground receiving domestic 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 and are not authorized under this Policy. The term cesspool does not include pit-privies or out-houses which are not regulated under this Policy.

**Clay** means mineral soil particles less than 0.002 millimeters in diameter. It is classified in the USDA Soils Classification Triangle as a soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

**Clothes Washer Graywater System** is a graywater system utilizing only a single domestic clothes washing machine in a one or two family dwelling that does not include a cross-connected potable water connection or a pump and does not affect other building, plumbing, electrical, or mechanical components including structural features, egress, fire-life safety, sanitation, potable water supply piping, or accessibility.

**Coarse Fragments** is rock or mineral particles greater than 2.0 mm in diameter.

**Cobbles** are rock fragments 76 millimeters or larger using the USDA soils classification system.

**Code Compliant OWTS** means a system that is in conformance with this OWTS Manual. A Code Complaint OWTS can be new or existing.

**Commercial OWTS** is OWTS on a parcel of land that produces a peak daily sewage flow of 1,500 gallons per day or more of any wastewater strength or generates a wastewater of any quantity that meets the definition of a high strength wastewater. BOD concentrations up to 900 milligrams per liter are allowed at commercial food service buildings that are equipped with a properly sized and functioning oil/grease separator.

**Community System** is a decentralized OWTS that serves multiple structures, multiple wastewater discharge sources and/or multiple parcels of land under separate ownership.

**Complex Graywater System** is a residential graywater system that discharges over 250 gallons per day.

**Conditioned Space** is any area, room or space in a building being heated exceeding 10 BTUs per hour-ft<sup>2</sup> or cooled exceeding 5 Btu/hr.-ft<sup>2</sup> directly or indirectly by any equipment or passive design feature for the comfort of occupants or for other reasons such as preserving temperature-sensitive goods.

**Cumulative Effects** are the persistent and/or increasing effects of individual OWTS resulting from the density of such discharges in relation to the assimilative capacity of the ground environment. Examples include salt or nitrate additions to groundwater, nutrient enrichment of surface water, and hydraulic interference with groundwater and between adjacent systems.

**Cut Bank** is a man-made excavation of the natural terrain in excess of 3 feet. Cuts supported by retaining walls or similar structures shall be included within this definition, as shall steep natural ground surfaces where a sharp break in the ground slope is discernible.

**Dispersal System** means a leach field, seepage pit, mound, bottomless sand filter, subsurface drip, sand fill trench system for final wastewater treatment and subsurface discharge.

**Domestic Wastewater** means the type of wastewater normally discharged from, or similar to, that discharged from plumbing fixtures, appliances and other household dishwashing facilities and garbage disposals. Domestic wastewater may include wastewater from commercial buildings such as offices, retail stores and some restaurants. Domestic 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 an RV dump station. Typical domestic wastewater will have a 30-day average concentration of BOD less than 300 milligrams per liter or total suspended solids (TSS) less than of 300 milligrams per liter prior to the septic tank or other OWTS treatment component. Domestic wastewater does not include high strength wastewater or wastewater from industrial processes.

**Downslope Property Line** is a property line down-gradient from the proposed OWTS.

**Drainfield or Leach Field** is a system of rock-filled trenches or beds or infiltration chambers that distribute treated sewage effluent for absorption into the soil.

**Dual Drainfield** is an effluent dispersal system consisting of two complete primary drainfields connected by an accessible diversion valve and intended for alternating use on an annual or semiannual basis.

**Effective Drainfield Depth** is the depth of drain rock below the bottom of the drainfield pipe.

**Ephemeral Watercourse** is a stream or reach of a stream that flows briefly only in response to precipitation in the immediate locality and whose channel is at all times higher than the water table. Any water course that does not meet this definition is to be considered a perennial or intermittent stream for the purposes of the chapter.

**Existing Structure** is one that has been in recent and continuous service. Any structure not in use within the previous 5 consecutive years must meet the standards for a new on-site wastewater treatment system that would apply to a vacant lot. Proof of recent and continuous service means providing pertinent documentation that substantiates the use of the property during the period in question. These documents may include, but are not limited to receipts (for example PG&E, garbage, and water), business records, County or State licenses and permits, deeds, notarized affidavits and dated photographs. (Section 6: OWTS Requirements for Approval of Building Permits)

**Existing Exterior Walls** shall be measured at the exterior face of wall at the perimeter of the living area that is lawfully existing. (Section 6: OWTS Requirements for Approval of Building Permits)

**Expansion Area.** See Reserve Replacement Area.

**Experimental OWTS** means a nonstandard OWTS deemed conditionally acceptable by the Regional Water Quality Control Board (RWQCB), subject to increased performance monitoring and evaluation, prior to acceptance as an approved nonstandard Alternative OWTS.

**Field Clearance** is a site visit required when Permit Sonoma's file information is not sufficient to show that the proposed work will not adversely impact the OWTS. A field clearance is more often needed when an older OWTS predates Permit Sonoma's record keeping system. In addition, when there is a lack of information on file for the OWTS, a site visit is necessary to verify that an approved OWTS exists on the property.

**Findings Report** is an analysis of the OWTS which includes review of Permit Sonoma septic file information and a visual inspection of an existing OWTS and/or well for the purpose of providing potential buyers or interested parties with information regarding a particular septic system or well. A Findings Report may be prepared by Permit Sonoma staff, a Registered Civil Engineer (RCE) or Registered Environmental Health Specialist (REHS). (Section 6: OWTS Requirements for Approval of Building Permits)

**French Drain.** See Intercept Drain.

**Graywater** is untreated household wastewater that has not come into contact with toilet waste. Graywater includes used water from bathtubs, showers, bathroom wash basins, and water from clothes washing machines and laundry tubs. It does not include wastewater from kitchen sinks, dishwashers or laundry water from soiled diapers.

**Graywater System** is a system designed to collect graywater and transport it out of the structure for distribution in an irrigation or dispersal field. A graywater system may include tanks, valves, filters, pumps or other appurtenances along with piping and receiving landscape.

**Groundwater** is water located beneath the ground surface in soil pore spaces or in the fractures of lithologic formations. Groundwater may be present only seasonally (perched). A unit of rock or unconsolidated deposit is called an aquifer when it can yield a usable quantity of water.

**Hardpan** is an irreversibly hardened soil layer caused by the cementation of soil particles. The cementing agent may be silica, calcium carbonate, iron or organic matter.

**Health Officer** refers to the Sonoma County Health Officer or his/her designated representatives, for purposes of implementation of these standards; the Director of Permit Sonoma is the delegated representative.

**High Strength Wastewater** means wastewater having a 30-day average concentration of BOD greater than 300 milligrams per liter or TSS greater than 330 milligrams per liter or a fats, oils, and grease FOG concentration greater than 100 milligrams per liter prior to the septic tank or other OWTS treatment component. BOD concentrations above 900 milligrams per liter at a commercial food service building require permitting through the Regional Board.

**Holding Tank** is a watertight receptacle used to collect and store wastewater prior to it being removed from a property by means of vacuum pumping and hauling. The use of holding tanks is authorized for limited circumstances, including, but not limited to, for the abatement of health hazards or for certain public use facilities.

**Hydrometer Analysis** is a test used to determine the grain size distribution of soils passing the number 200 sieve.

**Impaired water bodies** are those surface water bodies or segments thereof that are identified on a list approved first by the State Water Board and then approved by US Environmental Protection Agency (EPA) pursuant to Section 303(d) of the Federal Clean Water Act.

**Impermeable Soil Layer** is any layer of soil having a percolation rate slower than 120 minutes per inch at the bottom of the proposed dispersal area or a Zone 4 Soil Texture according to Figure 7.4 which has a high shrink swell potential (Plasticity Index of greater than 20, ASTM D 4318-84).

**Incompatible Use** is any activity or land uses that would preclude or damage an area for future use as an effluent dispersal site, including the construction of buildings, roads, or other permanent structures and activities that may result in the permanent compaction or removal of existing soil.

**Interior Remodel** is improvement to the interior of the structure with no removal and/or replacement of the structure.

**Intermittent Stream** is a stream that ceases to flow occasionally or seasonally because of evaporation and leakage. See Perennial Stream.

**Intercept Drain** is a trench filled with drain rock that is designed to intercept and divert ambient groundwater with surface discharge via piping to another location. Intercept drains are typically used to dewater areas upslope of a leach field or a foundation and lower the water table. Intercept drains are also known as French drain or curtain drain.

**Land Encumbrance** means the land area that is eliminated from being utilized for septic dispersal areas. Examples of encumbrances are existing or proposed impervious surfaces such as structures, driveways, paved areas or other hard surfaces, as well as regulatory requirements or easements that eliminate land area for septic dispersal such as setbacks from creeks, rivers, riparian corridors, cut slopes, geological hazards, septic systems, wells, etc.

**Leach Field.** See Drainfield.

**Limiting Condition** is the portion of the soil profile that because of percolation characteristics most restricts the successful operation of a drainfield. A limiting condition would include but not be limited to impermeable soil, semi-permeable soil, expansive clay, fractured rock, consolidated rock, excessive rock content and perched or seasonal elevated groundwater conditions.

**Linear Loading Rate** is defined as the amount of effluent in gallons applied per day per linear foot of the system. The design linear loading rate is a function of the rate of effluent movement and the direction of movement away from the OWTS (horizontal, vertical or combination).

**Living Area** includes all areas of residential dwellings and residential accessory structures including bathrooms, kitchens, closets, utility rooms, hallways and any other area in a building that is designed for human use. New residential rooms above garages and/or other new residential accessory structures on the property will be considered living area. Areas such as unfinished attic space, unfinished basements, and garages are not considered living area. (Section 6: OWTS Requirements for Approval of Building Permits)

**Local Agency** means any subdivision of the state government that has responsibility for permitting the installation of and regulating OWTS within its jurisdiction boundaries (typically a county, city or special district).

**Maintenance** of a wastewater treatment system shall mean clearing of stoppages in pipes without removing, replacing, or rearranging the pipes or surrounding soils; repairing or replacing non-treatment components of a wastewater system; pumping liquid and solids from, or otherwise cleaning septic tanks and grease interceptors; cleaning sand filters; and cleaning pressure distribution system pumps and piping.

**Modification** is a remodel or addition of living area (potentially habitable or not) to an existing structure.

**Monitoring Wells** are installed to monitor groundwater. The construction of monitoring wells must meet California Well Standards and be installed under permit by the State of California or the designated enforcement agency. Monitoring wells are not to be confused with performance wells used to evaluate the efficacy of OWTS in the immediate area. See Performance Wells definition.

**Mottles** is a soil condition that results from oxidizing or reducing minerals due to soil moisture changes from saturated to unsaturated over time. Mottling is characterized by spots or blotches of different colors or shades of color (grays and reds) and size interspersed within the dominant color as described by the US Department of Agriculture soil classification system. The soil condition can be indicative of historic seasonal high groundwater level, but the lack of this condition may not demonstrate the absence of groundwater. Mottling in soils usually indicates poor aeration, periodic saturation, or poor drainage.

**New OWTS** means an OWTS permitted after the effective date of this Policy.

**Non-Conforming OWTS** means an OWTS that was in compliance with the septic laws, regulations or codes when constructed and has a septic tank and dispersal system.

**Nonstandard OWTS** means a type of OWTS that utilizes a method of wastewater treatment that may or may not include a conventional septic tank and/or method of wastewater dispersal other than a conventional drainfield for the purpose of producing an equal to or greater quality wastewater effluent and improved performance of and siting for effluent dispersal than a standard OWTS. There are two types of nonstandard systems. See Alternative OWTS and Experimental OWTS.

**Occupancy** is the classification of a structure as defined in the California Building Code (CBC), which is given based on the intended use and/or designed use of such structure. See CBC Chapter 3.

**Office Clearance** is a review of Permit Sonoma files and application documents in the office to determine that the proposed work will not impact the existing OWTS.

**Operating Permit** is a renewable and revocable permit to operate and maintain nonstandard experimental or alternative OWTS in compliance with specific operational or performance criteria stipulated by Permit Sonoma or the regulatory authority.

**Onsite Wastewater Treatment System(s) (OWTS)** means individual dispersal systems, community collection and dispersal systems, and alternative collection and dispersal systems that use subsurface dispersal. The short form of the term may be singular or plural. OWTS do not include “graywater” systems pursuant to the Health and Safety Code Section 17922.12.

**Package Treatment Plant** is a method of sewage treatment that includes flows greater than 1,500 gallons per day; wastewater used for Title 22 purposes and does not include process wastewater from agricultural sources, etc., unless there is a domestic component. A package treatment plant uses a process involving energy and mechanical, biological, chemical or physical treatment of the wastewater to reduce the BOD, suspended solids, Nitrogen, bacteria and other sewage constituents and which is of a degree of complexity that a certified wastewater treatment plant operator or approved OWTS Service Provider is required.

**Percolation Test** is a test conducted to determine the permeability or percolation quality of the soil in an area proposed for sewage dispersal.

**Perennial Stream** is any stretch of a stream that can be expected to flow continuously or seasonally (Intermittent). Perennial streams are generally fed in part by springs and appear on US Geological Survey maps as a solid blue line. A perennial stream may include an intermittent stream which is a USGS designated blue line dashed stream that ceases to flow occasionally or seasonally because of evaporation and leakage.

**Performance Wells** are installed in and around an OWTS to monitor the performance of the system. Performance wells are a component of the OWTS with the design and construction meeting County standards.

**Permitting Authority** is the state or local unit of government with the statutory or delegated authority to issue permits to build and operate OWTS.

**Pressure Dosing** is the uniform application of wastewater under pressure. Wastewater is applied under pressure uniformly on an intermittent basis in the dispersal field through the use of a sump and pump.

**Pretreatment** is a National Sanitation Foundation (NSF) 40 and/or NSF 245 (listed/certified) and County approved Advanced Treatment Unit that provides pretreatment of wastewater to reduce 5-day biochemical oxygen demand, total suspended solids, nitrogen, and/or the total and fecal coliform content to improve the wastewater quality prior to dispersal.

**Public Water System** is a water system regulated by the California Department of Public Health or a Local Primacy Agency pursuant to Chapter 2, Part 4, California Safe Drinking Water Act, Section 116275 (h) of the California Health and Safety Code.

**Public Water Well** is a groundwater well serving a public water system. A spring which is not subject to the California Surface Water Treatment Rule (SWTR), CCR, Title 22, Section 64650 through 64666 is a public well.



**Purge Valves** are used in OWTS utilizing pressurized wastewater distribution to aid in the cleaning of laterals. Purge valves are generally placed at the end of each lateral.

**Qualified Consultant** is a California Registered Civil Engineer (RCE) or a California Registered Environmental Health Specialist (REHS). Qualified Consultant also includes a registered soil scientist or a registered geologist but are limited to soil investigations or soil evaluations. A qualified consultant must have demonstrated experience in the design of on-site sewage dispersal systems.

**Reconstruction** means 100 percent construction of all elements of the structure, including, but not limited to, roof elements, load-bearing walls, non-bearing walls and foundations.

**Redoximorphic** means exhibiting characteristic features (soil mottles or soil mottling) caused by alternating reduction and oxidation of iron and manganese compounds.

**Regulatory Authority.** See Permitting Authority.

**Replacement OWTS** means an OWTS that has its treatment capacity expanded, or its dispersal system replaced or added onto, after the effective date of this Policy.

**Reserve Replacement Area** is an unencumbered portion of land that is reserved for the installation of a future OWTS, in the event of primary OWTS failure. The reserve replacement area must be suitable for an OWTS as demonstrated with acceptable percolation testing, groundwater conditions, and adequate depth to soil. Reserve Replacement area is sometimes referred to as expansion area.

**Residential** is any structure or room labeled "R-" occupancy as defined by the CBC.

**Rough-in** means to install the preliminary (rough) plumbing, electrical and/or mechanical building materials without making the final connections. (Section 6: OWTS Requirements for Approval of Building Permits)

**Sand** is individual rock or mineral fragments in soils having diameters ranging from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. It is classified in the USDA Soils Classification Triangle as a soil material that contains 85 percent or more sand and not more than 10 percent clay.

**Saturated Soil** is the condition of soil when all available pore space is occupied by water and the soil is unable to accept additional moisture. In very fine textured soils a free water surface may not be apparent. The extent of saturated soil conditions and anticipated level of high groundwater can be estimated by the extent of soil mottling, provided the soils contain the necessary iron compounds to exhibit mottling.

**Seepage Pit** is a pit filled with drain rock into which effluent from a septic tank is collected for gradual seepage into the ground. Seepage pits are typically substituted for a leach field at severely constrained sites serving existing dwellings.

**Septic Tank** is a water-tight covered receptacle designed and constructed to receive the discharge of sewage from a building sewer; separate solids from the liquid; digest organic matter; store digested solids through a period of detention and allow the clarified liquids to discharge for final subsurface dispersal.

**Service Provider** means a Registered Civil Engineer, Registered Environmental Health Specialist, or any person who is licensed as a "certified onsite wastewater system inspector" or other equivalent license by passing a state or nationally accredited onsite wastewater exam, capable of operating, monitoring and maintaining an OWTS (for example, NAWT and/or a proprietary unit certification).

**Setback** is the minimum horizontal distance from any point along the outside edge of a septic tank, or the edge of a dispersal area, to any point on the described site feature.

**Simple System** is a graywater system serving a one or two family dwelling with a discharge of 250 gallons per day or less. Simple Systems exceed a Clothes Washer Graywater System.

**Silt** is individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). It is classified in the USDA Soils Classification Triangle as a soil material that contains 80 percent or more silt and less than 12 percent clay.

**Site Evaluation** means soil profile evaluation, percolation test or groundwater table determination, either individually or collectively.

**Soil** consists of the natural organic and inorganic material near the earth's surface which is in contrast to the underlying rock material and has been formed over time by the interactions between climate, relief, parent materials, and living organisms.

**Soil Depth** is the combined thickness of adjacent soil layers which are suitable for effluent filtration. Soil depth is measured vertically to bedrock, hardpan, or an impermeable soil layer.

**Soil Horizon or Layer** is a layer of soil approximately parallel to the land surface and differing from adjacent (underlying or overlying) layers in some property or characteristic. Differences include, but are not limited to, color, texture, structure and porosity. Soil horizon is also known as soil zone.

**Soil Profile** is a vertical section of an excavation that displays the soil horizons.

**Soil Structure** refers to the formation of larger soil particles by the cementing together of individual sand, silt, and clay particles. Soil structure affects the pore size and rate at which water will move through soil. The structure of soil is generally described in the following terms: granular; platy; blocky; prismatic; massive; or columnar.

**Soil Survey** is a general term for the systematic examination of soils in the field and in the laboratory. This would include the soil description and classification, the mapping of kinds of soil, and the interpretation of soils for many uses such as suitability for growing various crops, grasses, and trees, for engineering uses, and predicting the soil behavior under different management systems.

**Soil Texture** is the relative proportions of sand, silt, and clay as defined by the classes of the USDA soil textural triangle. Textural classes may be modified when coarse fragments are present in sufficient number or when the bulk density is excessive.

**Standard OWTS** is a type of OWTS consisting of a septic tank for primary treatment of sewage, followed by a system of drainfield trenches for subsurface dispersal of effluent into the soil. A standard OWTS may utilize gravity flow or a pump system to convey effluent from the septic tank to the drainfield.

**Structure** is that which is built or constructed.

**Sump** is a tank that collects treated sewage for a period of time and then, periodically, discharges by means of a pump.

**Supplemental Treatment.** See Pretreatment.

**Tier 0 OWTS** means existing OWTS that are properly functioning and do not meet the conditions of failing systems or otherwise require corrective action (for example, to prevent groundwater impairment) as specifically described in Tier 4, and are not determined to be contributing to an impairment of surface waters as specifically described in Tier 3.

**Tier 1 OWTS** means a new or replacement OWTS that meets low risk siting and design requirements as specified in Tier 1, where there is not an approved Local Agency Management Program (LAMP) per Tier 2. Tier 1 is not applicable to this LAMP.

**Tier 2 OWTS** means a local agency OWTS management program that establishes minimum standards that differ from requirements specified in Tier 1, including the areas that do not meet those minimum standards but still achieve the OWTS Policy purpose.

**Tier 3 OWTS** means existing, new and replacement OWTS that are within 600 feet of impaired water bodies that are subject to a Total Maximum Daily Load (TMDL) or an Advance Protection Management Program (APMP) that is part of a LAMP approved by the RWQCB.

**Tier 4 OWTS** any OWTS that requires corrective action or is either presently failing or fails at any time while the OWTS Policy is in effect is automatically included in Tier 4. OWTS included in Tier 4 shall continue to meet applicable requirements of Tier 2 or 3 pending completion of corrective action.

**Topographic Map** is a map showing the topographic features of a land surface, commonly by means of contour lines. It is generally on a sufficiently large scale to show in detail selected man-made and natural features, including relief and physical and cultural features such as vegetation, roads, and drainage.

**Unfinished Structure** is any structure, or any part of a structure, with exposed studs, and no insulation or sheet rock covering the walls. Unfinished rooms in a primary dwelling and/or residential accessory structure shall have exterior access doors only with no direct access to the interior of a primary dwelling and/or residential accessory structure. (Section 6: OWTS Requirements for Approval of Building Permits)

**Unstable Landform** is an area that shows evidence of mass downslope movement such as debris flow, landslides, rockfalls, and hummocky hill slopes with undrained depressions upslope. Unstable landforms may exhibit slip surfaces roughly parallel to the hillside; landslide scars and curving debris ridges; fences, trees, and telephone poles which appear tilted; or tree trunks which bend uniformly as they enter the ground.

**Watercourse** is a definite open channel with bed and banks within which water flows either perennially or intermittently, including overflow channels contiguous to the main channel. A watercourse shall include both natural and man-made channels.

## **Section 4 Criteria for All OWTS**

### **4.1 Purpose of OWTS**

- A. New and replacement OWTS shall be located, designed, constructed, and operated in a manner to ensure that sewage effluent does not surface at any time, that is protective of public health, safety and the environment and that percolation of effluent into the soil will not adversely affect beneficial uses of the waters of the state of California.
- B. New and replacement OWTS and the repair of an OWTS shall comply with the requirements of this OWTS Manual.

### **4.2 Prohibitions**

- A. OWTS shared in common with other property owners are prohibited except with RWQCB and County authorization [for example, on-site management district or zone or septic tank effluent pumping (STEP) cluster OWTS].
- B. The use of holding tanks is prohibited. However, the use of holding tanks may be authorized for limited circumstances as follows:
  - 1. to abate an existing nuisance or health hazard; or
  - 2. the proposed use is within a sewer service area, sewers are under construction and completion is expected within two years and the sewerage agency assumes responsibility for maintenance of the tanks; or
  - 3. it is for use at a campground or similar temporary public facility where a permanent sewage dispersal system is not necessary or feasible and maintenance is performed by a public agency; or
  - 4. for a public service entity (for example, volunteer fire department) when it cannot otherwise install sanitary facilities in a building.
- C. The following are not authorized:
  - 1. Cesspools of any kind or size;
  - 2. OWTS receiving a projected flow over 10,000 gallons per day;
  - 3. OWTS that utilize any form of effluent disposal that discharges on or above the post installation ground surface such as sprinklers, exposed drip lines, free-surface wetlands, or a pond;
  - 4. OWTS on slopes greater than 30 percent without a slope stability report approved by a registered professional;
  - 5. Decreased leaching area for dispersal systems using a multiplier less than 0.70;

6. OWTS utilizing supplemental treatment without requirements for periodic monitoring or inspections;
7. OWTS dedicated to receiving significant amounts of wastes dumped from RV holding tanks;
8. Separation of the bottom of dispersal system to groundwater less than 2 feet;
9. Separation of the bottom of a seepage pit to groundwater less than 10 feet;
10. Installation of new or replacement OWTS where public sewer is available. Section 2.0 has additional details on this topic;
11. Public Water Wells. New or replacement OWTS with horizontal setbacks less than any of the following:
  - a. 150 feet from a public water well where the depth of the effluent dispersal system does not exceed 10 feet in depth;
  - b. 200 feet from a public water well where the depth of the effluent dispersal system exceeds 10 feet in depth;
  - c. Where the effluent dispersal system is within 600 feet of a public water well and exceeds 20 feet in depth, the horizontal setback required to achieve a two-year travel time for microbiological contaminants shall be evaluated. A qualified professional shall conduct this evaluation. However, in no case shall the setback be less than 200 feet.

**Table 4.1 – Minimum Horizontal Setbacks from Public Water Wells**

<b>Depth of Dispersal System</b>	<b>Horizontal Setback</b>
Less than or equal to 10 feet	150 feet
Greater than 10 feet	200 feet
Greater than 20 feet	200 foot minimum 2 year travel time within 600 feet

12. Public Water Systems. New or replacement OWTS with minimum horizontal setbacks less than any of the following:
  - a. Where the effluent dispersal system is within 1,200 feet from a public water system's surface water intake point, within the catchment of the drainage, and located such that it may impact water quality at the intake point such as upstream of the intake point for flowing water bodies, the dispersal system shall be no less than 400 feet from the high water mark of the reservoir, lake or flowing water body.

- b. Where the effluent dispersal system is located more than 1,200 feet but less than 2,500 feet from a public water system's surface water intake point, within the catchment area of the drainage, and located such that it may impact water quality at the intake point such as upstream of the intake point for flowing water bodies, the dispersal system shall be no less than 200 feet from the high water mark of the reservoir, lake or flowing water body.

**Table 4.2 – Minimum Horizontal Setbacks from Public Water Systems**

<b>Distance From Public Water Intake</b>	<b>Dispersal System Standard</b>
Less than 1,200 feet	Greater than or equal to 400 feet water source <sup>1</sup>
Equal to or greater than 1200 feet and less than 2,500 feet	Greater than or equal to 200 feet water source <sup>1</sup>

<sup>1</sup> water source is the high water mark of the reservoir, lake or flowing water body.

### **4.3 Mitigations to Prohibitions**

- A. To mitigate prohibition 4.2.C.4 (slopes over 30 percent), a slope stability report, completed by a registered civil engineer or registered geotechnical engineer, may be submitted to justify OWTS on slopes over 30 percent. The slope stability report shall be reviewed and approved by Permit Authority.
- B. To mitigate prohibition 4.2.C.6 (periodic monitoring), OWTS utilizing supplemental treatment components shall be enrolled in our Operational Permit Program, which requires monitoring and maintenance of the system.
- C. To mitigate prohibition 4.2.C.8 and 4.2.C.9 (vertical separation to groundwater), the owner shall file a Notice of Intent with the appropriate Regional Water Board for waste discharge requirements, waiver of waste discharge requirements or a conditional waiver of waste discharge requirements.
- D. To mitigate prohibition 4.2.C.11 and 4.2.C.12 (horizontal distances from water sources):
1. Replacement OWTS shall utilize supplemental treatment and other mitigation measures to meet the treatment standards in Table 4.3, unless the Permit Authority finds that there is no indication that the previous system is adversely affecting the public water source, and there is limited potential that the replacement system could impact the water source based on topography, soil depth, soil texture, and groundwater separation.
  2. New OWTS shall meet the horizontal separation to the greatest extent practicable and shall utilize supplemental treatment to achieve the Table 4.3 standards and any other mitigation measures prescribed by the Permit Authority.

**Table 4.3 – Treatment Standards for New OWTS Not in Conformance with Horizontal Separation Requirements**

Constituent	Standard
Total Suspended Solids	30 milligrams per liter as 30-day average
Fecal Coliform	200 Most Probable Number (MPN)
Soil Depth	Greater than 3 feet
Depth to Groundwater	Greater than 3 feet
Soil Cover over Dispersal System	12 inches

#### **4.4 OWTS Designer by System Type**

- A. The type of OWTS or OWTS components listed in Table 4.4 shall be designed by the corresponding designer.
1. A commercial/institutional, experimental, alternative, or a standard OWTS shall be designed by a qualified consultant.
  2. A replacement dispersal area or field shall be designed by a qualified consultant.
  3. A replacement septic tank may be designed by a qualified consultant or licensed contractor.
  4. A repair may be designed by a qualified consultant, licensed contractor or land owner.
  5. A repair or modification of an existing OWTS that was originally required to be designed by a Qualified Consultant shall be designed by a Qualified Consultant.
  6. Any parcel that was conditioned through the Project Review Advisory Committee or comparable land use body to have the OWTS designed by a Qualified Consultant that serves a parcel for which a Qualified Consultant design was a condition of a subdivision shall be designed by a Qualified Consultant.



**Table 4.4 – OWTS Designer by System Type**

Type of System	Designer
Commercial/Institutional Experimental OWTS Alternative OWTS Standard OWTS Replacement Dispersal Area/Field OWTS with Easements	Qualified Consultant
Replacement Septic Tank	Qualified Consultant Licensed contractor (A, C-42, C-36)
Repair	Qualified Consultant Licensed contractor (A, C-42, C-36), Homeowner/builder

## 4.5 Sizing Criteria Wastewater Flows

- A. Residential wastewater flows used for design of OWTS for single family residences, second units, guest houses and other detached buildings shall be based on the number of bedrooms multiplied by a factor of 150 gallons per day per bedroom for the first 5 bedrooms, plus 75 gallons per day for each additional bedroom, as indicated in Table 4.5.
- B. The design flows for a primary residence and detached accessory structures (second unit and/or guest house) shall be determined independently, regardless of whether the flows are treated separately or combined in a single OWTS.

**Table 4.5 - Wastewater Design Flows for Single Family Residences and Second Unit**

Number of Bedrooms	Design Flow (gallons perday)
1	150
2	300
3	450
4	600
5	750
greater than 5	+75 per bedroom

- C. Wastewater flows used for the design of OWTS for multiunit residences and non-residential projects shall be developed based on full consideration of projected activities, occupancy, and facilities. Table 11.1 provides guidelines for use in estimating design wastewater flows. Wastewater flows shall be determined by:
1. Table 11.1 for those listed facilities; or

2. Appropriate literature references (for example US/EPA) for the type of facility proposed; or
  3. Documented wastewater flow monitoring data for a comparable facility. Additionally, the Director of the Permit Authority may consider adjustment to the criteria listed in Table 11.1 for specific facilities based upon documented technical information to support the proposed design flow estimate.
- D. Reductions of wastewater design flows up to 20 percent shall be approved by the Permit Authority when each of the following is provided:
1. Low flow devices for toilets, showers and faucets are installed in the structure under permit;
  2. The septic tank shall be fitted with a corrosion-resistant effluent filter approved by the Permit Authority;
  3. The leachfield shall be either:
    - a. a dual leachfield with each half designed at 75 percent of the reduced design flow (either 50 percent or 150 percent additional reserve replacement area must be provided based upon the date the lot was created); or
    - b. a dispersal field using equal distribution. The dispersal field shall be sized based upon 100 percent of the reduced flow.

#### **4.6 Off-Site Easements**

- A. Methods to gain legal access to adjacent parcels to accommodate an OWTS include a:
1. Lot line adjustment;
  2. Parcel merger; or
  3. Legal easement.
- B. Easements shall be recorded with the County Recorder's office in a form acceptable to County Counsel and the Permit Authority, and shall include:
1. A Grant Deed conveying the easement from the record owners of the burdened parcel to the owners of the parcel to be developed;
  2. A full legal description of the easement area prepared by a Licensed Land Surveyor or a Registered Civil Engineer whose registration allows surveying;
  3. All appurtenant easements for access, pipelines, drainage, etc. shall be conveyed in the grant deed;
  4. Conditions, Covenants, and Restrictions recorded on the deed as follows:

- a. A statement that the easement shall bind and inure to the benefit of the respective heirs, personal representatives, successors, and assigns of the grantor and grantee and that all specifications of the easement shall pertain to and run with the land;
  - b. A statement that provision of the easement is a public health condition relative to approval of an OWTS permit and that alteration or elimination of the rights and duties without the express written consent of the County of Sonoma may constitute a violation of State and local laws;
  - c. The use of the area of the leachfield easement by the grantor shall be restricted from uses which are incompatible with proper leachfield operation. This shall include structures, vehicular parking, roadways, grading, drainage courses, wells, extensive landscaping, confined livestock or other uses which would disrupt the leachfield;
  - d. The easement shall include the right of the grantee to do all things reasonably necessary to inspect, maintain, repair and/or replace the leachfield;
5. The grant deed and/or legal description referenced in Section 4.6.B.1 and 4.6.B.2 shall be reviewed by the County Surveyor's office prior to permit issuance.
- C. Leachfield easements shall be separate and distinct from one another.
- D. An OWTS easement shall not encroach into an area needed for the grantor parcel's OWTS and/or reserve expansion area.
  1. The area necessary for the grantor parcel's OWTS and its reserve expansion area shall be based upon codes in effect at the time of the grantee parcel's OWTS easement application.
  2. The grantor parcel's OWTS does not need to be modified unless it is in a state of failure.
- E. Refer to Section 15 for OWTS easement requirements for new subdivisions of property.
- F. An easement grant from one property owner to another shall comply with the following:
  1. The grantor parcel and grantee parcel must abut each other.
  2. An unimproved lot will be considered as "abutting" if it is connected to another lot by an easement provided that the lots are in common ownership. (Sonoma County Code, Chapter 7)
  3. An "abutting lot" is also an improved lot connected to another lot by an easement. The lots need not be under common ownership so long as the lot owner has an easement over the abutting lot sufficient for an OWTS.

4. Lots separated by a public road or highway shall not be considered abutting except as provided in (F) above. A public road or highway will satisfy the connection between abutting lots.
  - a. An encroachment permit must be obtained from the permitting department.
- G. An easement grant when lots are in common ownership shall comply with the following:
  1. A deed of easement from the owner of each parcel burdened by the easement to the owner of the parcel upon which the building will be located:
    - a. locating the easement upon that parcel;
    - b. stating that the easement is a condition of County approval of the OWTS;
    - c. stating that it is the intent of the grantor and grantee that the easement will not merge with the underlying fee interest even if the easement and the fee come into the same ownership, and that the easement is intended to survive severance of the estates and to be included in conveyances to subsequent purchasers;
    - d. stating that the easement may not be quitclaimed or otherwise modified or destroyed without the written consent of the Director of the PRMD, which shall not be unreasonably withheld;
    - e. stating that the easement is appurtenant to the lot upon which the building is to be constructed.
  2. A Declaration of Covenants, Conditions and Restrictions upon each affected parcel which states that:
    - a. the benefits and burdens of the covenants and restrictions shall be binding upon the successive owners of each parcel;
    - b. the burdened parcels (described) shall not be used in any manner which may interfere with or adversely affect the safe operation of the OWTS for the structure of lot (\_\_\_);
    - c. the OWTS shall be located in the area described in the easement for sewage dispersal executed by \_\_\_ on (date) \_\_\_ and recorded as Document No. \_\_\_ of Official Records of Sonoma County, and which is incorporated by reference (or similar language);
    - d. the covenants contained in the declaration may be terminated or modified only with the written consent of the Director of the PRMD, which shall not be unreasonably withheld. This provision would be applicable when and if the Permit Authority approves some other type of sewage dispersal, and the easements and restrictive covenants are no longer needed.
  3. The affected lots shall be conveyed to a title company or some other "straw man" by a deed which incorporates the easements and the declaration of covenants, and then reconveyed back to the owner.

- a. The property owner shall supply the Permit Authority with a letter indicating his intentions to include the easements and covenants in future deeds of the affected parcels.
- 4. Another option is the use of a properly constructed "Owner Statement" that provides the following minimum specific items:
  - a. language that prohibits the "removal, alteration or rescinding of the Declaration of Restriction (\_\_\_\_) or easement(s) without the written consent of the Director of the PRMD";
  - b. for "Declarations of Restrictions" only, reference must be made within the Owner's Statement to a "Declaration of Restrictions" that must be recorded concurrently with the Map;
  - c. where easements are requested with the existing parcels, the Owner's Statement must also include the following:
    - i. a reference that specifies that the easement is "between adjacent parcels of same ownership" and that attached hereto as Exhibit \_\_\_\_ is a Grant Deed description of an easement;
    - ii. a reference in both the Owner's Statement and the easement that the "easement is one that is appurtenant";
    - iii. a reference on both the Owner's Statement and the easement that the "doctrine of merger shall not apply."

#### **4.7 OWTS Permit Applications**

- A. An application for an OWTS permit shall be submitted by the property owner, consultant, or contractor. The application package shall contain the following:
  - 1. Project description;
  - 2. Variance requests: code section(s) and mitigation measure(s);
  - 3. Filing fees;
  - 4. 4 copies of site plans, drawn to scale;
  - 5. Soil profile results;
  - 6. Soil percolation test results if required per Section 7;
  - 7. Groundwater table determination if required per Section 7;
  - 8. 4 copies of the OWTS design, drawn to a scale of 1 inch equals 20 feet.
  - 9. If a non-standard OWTS, include:
    - a. Operational Permit application;
    - b. Agreement-Permit Conditions, signed and notarized;
    - c. Easement Agreement signed and notarized;

- d. Items a through c. are not required for plan check only applications, but will be required for permit applications.
- B. Time Limit of Application. If no permit is issued within one year following the date of application, the application shall expire by limitation, and plans and other data submitted for review may thereafter be returned to the applicant or destroyed by the Permit Authority. If, after such expiration, the original plans are resubmitted within 180 days following such expiration, the plan review fee shall be 25 percent of that otherwise required. No application shall be renewed in this fashion more than once. In order to further renew action on an application after expiration, the applicant shall resubmit plans and pay a new plan review fee. The Permit Authority may extend this time period when such extension is warranted, including but not limited to:
  - 1. To correct an error by the department; or
  - 2. When a legal action prevents the project from being completed within the allowed year time frame; or
  - 3. In the interest of public health and safety.The Permit Authority's decision regarding the limitation period shall be final.
- C. OWTS applications shall be reviewed for zoning conformance pursuant to Permit Authority's Planning Policy 8-1-13, or current version.

#### **4.8 OWTS Plan Check Only Applications**

- A. An application for an OWTS Plan Check Only shall be submitted by the property owner, consultant, or contractor. The application package shall contain the following:
  - 1. A "Request for Service" form;
  - 2. Filing fees;
  - 3. 2 copies of site plans, drawn to scale;
  - 4. Soil profile results;
  - 5. Soil percolation test results if required per Section 7;
  - 6. Groundwater table determination if required per Section 7;
  - 7. 2 copies of the OWTS design, drawn to a minimum scale of 1 inch equals 20 feet.
- B. Time Limit of Plan Check Only Application. If no plan check approval is granted within one year following the date of application, the application shall expire by limitation, and plans and other data submitted for review may thereafter be returned to the applicant or destroyed by the Permit Authority. If, after such expiration, the original plans are resubmitted within 180 days following such expiration, the plan

review fee shall be 25 percent of that otherwise required. No application shall be renewed in this fashion more than once. In order to further renew action on an application after expiration, the applicant shall resubmit plans and pay a new plan review fee. The Permit Authority may extend this time period when such extension is warranted, including but not limited to:

1. To correct an error by the department; or
2. When a legal action prevents the project from being completed within the allowed year time frame; or
3. In the interest of public health and safety.

The Permit Authority's decision regarding the time limit period shall be final.

- C. Time Limit of Plan Check Only Approval. If no permit is applied for within one year following the date of plan check only approval, the plan check shall expire by limitation.

## **4.9 OWTS Permits Required**

- A. A valid permit is required to install, repair, replace, modify, destroy, or abandon any part of a new or existing OWTS except where specified in Section 4.9.F.
1. The Permit Authority may approve, conditionally approve or deny a permit to do any work on an OWTS. The Permit Authority may issue a permit only when all the requirements specified in this chapter for an OWTS are met. The permit may contain conditions that apply to the construction, operation and maintenance of the system. Only OWTS work authorized in the approved plans may be performed unless approved in writing by the Permit Authority. The permit conditions shall be binding upon the property owner and successive property owners for the life of the system.
- B. OWTS Permit. The following work requires an OWTS permit:
1. The installation, replacement, modification, destruction or abandonment of any part of a new or existing OWTS not authorized by a repair or replacement permit.
- C. Replacement Permit. The following work requires a replacement permit:
1. Replacement or repair of a septic tank;
  2. Replacement of a dispersal system.
- D. Repair Permit. The following work requires a repair permit:
1. The replacement or repair of a leach line or leach line segment within an existing leach line trench;

2. The replacement or repair of a dispersal chamber or chamber segment within an existing chamber trench;
  3. The replacement or repair of no more than 25 percent of the total linear footage of the existing dispersal system.
- E. Hardship Replacement Permit. Applicants may apply for a hardship replacement permit under the following circumstances:
1. Work would otherwise be considered a replacement permit;
  2. Financial constraints prevent compliance with replacement standards;
  3. A County Housing Rehabilitating Loan is not available;
  4. The landowner's household income is at or below 80 percent of the current Area Median Income (AMI) established by the U.S. Department of Housing and Urban Development;
  5. A hardship replacement permit application shall be submitted to the Permit Authority. Applications shall contain the contents as detailed in Section 4.8;
  6. Replacement septic tanks shall comply with the septic tank requirements of this OWTS Manual to the maximum extent feasible;
  7. Replacement dispersal systems shall comply with this OWTS Manual to the maximum extent feasible;
  8. Hardship replacement permits shall be forwarded to the appropriate Regional Water Board;
  9. Hardship replacement permits shall not be used to authorize building permits for the construction, re-construction, rebuilds, remodel, or work on a structure that would otherwise require an upgraded septic system.
- F. Permit Exemptions. The following work is permit exempt:
1. The repair or replacement of the following components or segments:
    - a. risers;
    - b. sanitary tees;
    - c. effluent filters;
    - d. diversion valves;
    - e. distribution box;
    - f. sewer line from house to septic tank;
    - g. sewer line from tank to distribution box and/or distribution box;
    - h. solid sewer lines connecting distribution boxes and/or distribution box(es).
- G. Time Limitation of Issued Permit. Every permit issued by the Permit Authority under the provisions of this section shall expire by limitation 3 years from the date of permit



issuance. The Permit Authority may limit a permit to a lesser time period when necessary to abate dangerous or substandard conditions. The Permit Authority may extend this time period when such extension is warranted, including but not limited to:

1. To correct an error by the department; or
2. When a legal action prevents the project from being completed within the 3-year time frame; or
3. In the interest of public health and safety.

The Permit Authority's decision regarding the time limit period shall be final.

H. Before any work can commence or recommence on any expired permit, or permit to legalize a violation, a new permit shall first be obtained. The new permit shall be obtained for all work necessary to finish the project including work already completed that has not been previously inspected and approved by the department.

1. Any new permits issued to recommence work started under an expired permit will be based on the codes in effect at the time the original expired permit was issued.
2. Any new permits issued to commence work under an expired permit will be based on the codes in effect at the time of the original expired permit, provided that no more than 6 years from date of original permit issuance have lapsed.
3. Any new permits issued to commence work under an expired permit where more than 6 years from date of original permit have lapsed, shall be governed by the codes in force at the time of the new permit application.
4. Any new permits issued to legalize a violation shall be governed by the codes in force at the time of the new permit application.

#### **4.10 OWTS Site and Design Plan Requirements**

A. The site plan shall be completely dimensioned and drawn to scale with a minimum of 1 inch equals 20 feet. The site plan shall include but not be limited to the following:

1. A vicinity map showing property boundaries and dimensions with north arrow, parcel number, street address (may be drawn on a smaller scale than 1 inch equals 20 feet);
2. A site plan with topographic information including contour lines and elevations (in feet) of the area in and around the proposed OWTS or percentage of slope when slope is not a critical factor in system design;
3. Location of any known pertinent (passing or failing) tests (for example soil profile pits, soil percolation tests, and groundwater determination tests, etc.);

4. Designated reserve replacement dispersal area;
5. Detail Page showing:
  - a. application rate, design capacity (number of bedrooms), projected daily sewage flow, wastewater application area (trench, bed length, or area), and all relevant calculations;
  - b. calculations for determining the sizing criteria, and the projected design of the OWTS, including pump sizing, pump curves, dose volume and frequency;
  - c. cross section of dispersal trenches and interceptor drain (if applicable);
  - d. spacing and sizing of the orifices and laterals;
  - e. proposed details and dimensions of the septic tank, treatment units, pump tanks, performance wells, valves, dispersal trenches or beds, alarm and control panels, and any other equipment specifications;
  - f. complete description of the wastewater treatment and dispersal processes;
  - g. construction notes;
  - h. construction details and specifications.
6. Location of any existing and/or proposed retaining walls, surface and subsurface drainage systems;
7. Location of any existing and/or proposed underground utilities, water supply lines and/or wells;
8. Location and dimensions of any existing and/or proposed improvements [for example, paved areas, all structures (including house location, accessory structures, outbuildings, swimming pools, large trees, solar arrays, etc.)];
9. Location of any existing and/or proposed easements, public right of ways, overhead utilities, building sewer line, and any other OWTS;
10. Location of the OWTS in relation to property lines, neighboring systems, neighboring wells, streams, springs, lakes, ponds, marsh areas, cut banks, and other features which may affect the performance of the system;
11. Any other site details that could potentially impact the function and/or design of the OWTS.

## **4.11 Permit Transfer**

- A. In the event of the transfer of an issued OWTS permit, prior to final construction approval, the following actions are required by Permit Authority staff:
1. If there is no change in the OWTS plans or building plans, it will be treated as an OWTS Office Clearance to use the old plans.
    - a. verify that contractor information, workers' compensation and signatures are correct;
    - b. update Easements and Supplemental Agreement for non-standard OWTS;
    - c. enter into permitting system and assess Office Clearance fee.
  2. If there is a change in building location, but no change in the OWTS plans and the change may affect the OWTS plan:
    - a. complete items 4.11.A.1.a and 4.11.A.1.b;
    - b. enter into permitting system and assess Field Clearance fee.
  3. If the OWTS design and building location remain the same, but there is a change in floor plans (which does not impact the OWTS):
    - a. review new building floor plan and complete items 4.11.A.1.
  4. If there are changes which significantly impact the approved OWTS plan:
    - a. complete items 4.11.A.1.a and 4.11.A.1.b;
    - b. applicant required to submit new OWTS plans. Assess Plan Review fee.
  5. If the property requires a Service Provider, the same Service Provider shall be retained or a contract needs to be transferred to a new certified Service Provider.

## **4.12 Construction Inspections**

- A. The system components and construction shall be inspected by Permit Authority staff for compliance with approved plans and this OWTS Manual. The following construction inspections are required and shall be scheduled with the Permit Authority. Permit Authority may waive attendance.
1. Pre-construction site inspection.
  2. Gravel placement, trenches or absorption bed should be level in previously approved proper location and placed on contour.
  3. Interim inspections, including squirt test, performed prior to covering any elements of the system; water tightness test of tank(s), if required.
  4. Final inspection of the completed system. (May require #189 electrical permit prior to final. Startup inspection for pretreatment unit includes Service Provider.)

- B. Construction inspections shall be scheduled for regular Permit Authority work days. The Permit Authority must be notified at least 24 hours in advance of desired inspection. No portion of the OWTS may be covered until it is inspected by the Permit Authority.
- C. Final approval of the OWTS permit shall be granted only after the Permit Authority has completed all necessary system inspections. Final approval of the permit for standard OWTS shall be granted only upon completion of the necessary inspections, the receipt of a signed and stamped letter from the Qualified Consultant certifying the installation of the system as designed, and for non-standard systems, in addition to the above, the #189 electrical inspection and Operational Permit fee paid and activated.

#### **4.13 General Provisions**

- A. Replacement Expansion Area:
  - 1. Parcels created prior to October 1971 require 100 percent replacement area;
  - 2. Parcels created in October 1971 or later require 200 percent replacement area;
  - 3. In a dual dispersal field system, a portion of the replacement area is constructed with the initial system.
- B. Incompatible uses including, but not limited to, driveways, tennis courts, parking lots, swimming pools, or structures over the replacement area shall be prohibited.
- C. No lot shall be improved in excess of its capability to properly absorb sewage effluent.
- D. No construction of OWTS shall occur during open wet weather groundwater periods or active rain storms, except when demonstrated by a qualified consultant that unsaturated soil conditions exist and compaction and smearing will not occur. Previously scheduled inspections are subject to cancelation by the Permit Authority if conditions are deemed unsuitable.
- E. OWTS shall be installed in accordance with the plans approved by the Permit Authority. Permit Authority staff must approve any changes to the approved plans prior to installation.
- F. OWTS shall be located so as to be accessible for maintenance and repairs. Septic tanks and sump tanks shall be located so as to allow vacuum pumping.
- G. The building sewer and distribution piping shall be constructed with materials in conformance to building sewer standards identified in the Uniform Plumbing Code. The sewer and distribution piping shall have approved watertight fittings with clean-outs provided in accordance with the Uniform Plumbing Code.

- H. All OWTS Permit applications located near a water body that is subject to a TMDL APMP may be subject to additional, more stringent, criteria than those systems located outside a designated APMP.
- I. Site evaluations are required for new or replacement OWTS per Section 7.
- J. Any structure not used within the last 5 years shall have an OWTS that meets current standards for a new OWTS system.
- K. Human remains and archeological sites.
- L. Any application that cannot meet the standards may apply for a variance pursuant to Section 17.
- M. A structural or building addition may not encumber any designated reserve replacement area. A revised designated reserve replacement area may be established if needed.
- N. An expansion of the existing footprint of an existing structure or new accessory structure is not allowed if a reserve replacement system cannot be adequately sized. A system where only a seepage pit reserve replacement area is available is not considered to be adequately sized.

## **Section 5 OWTS Abatements, Abandonments and Repairs of Failing Systems**

### **5.1 Abatements**

- A. Any OWTS that causes sewage to surface on the ground is deemed to have an adverse effect on groundwater and surface water and to be a public health hazard and a nuisance. Any OWTS septic tank failure, such as a baffle failure or tank structural integrity failure such that either wastewater is exfiltrating or groundwater is infiltrating is deemed to be failing (OWTS Policy Tier 4). Such a system is defined as a failing OWTS and shall be immediately corrected or abated.
- B. There are 2 classes of septic work to which Code Enforcement penalty fees may apply: construction without permit or Permit Authority required repair of a failing septic system.

Once the Permit Authority determines a system is failing, adequate notification to the property owner is required.

- 1. A Notice of Violation or Notice and Order is adequate notification. However, a written notice or letter produced by the Permit Authority and provided to the property owner may be considered adequate notification as determined by the Permit Authority supervisory or management staff.
  - 2. A reasonable period shall be given to allow the property owner to obtain a repair permit and complete repair work. Permit Authority shall treat failing septic systems in the same manner as sub-standard housing regarding the imposition of penalties.
    - a. If a repair permit is submitted within 30 days of sending a Notice of Violation or Notice and Order, only investigation fees apply.
    - b. If the owner delays response beyond 30 days, both investigation and penalties will apply.
      - i. The imposition of penalties may be extended if the applicant demonstrates a reasonable justification why a permit application could not be submitted within 30 days in accordance with Section 1-7.1(d) Sonoma County Code. Reasonable justifications include, but are not limited to, groundwater studies or delay to accommodate the schedule of a licensed professional.
- C. For residential properties, the owner shall be allowed to hire a licensed septic tank pumper to pump the failing system until a repair system is installed.
    - 1. The allowed time period shall be determined by the Permit Authority.
  - D. For commercial properties, the property owner or tenant may be allowed to pump the failing system at the discretion of the Permit Authority. Issues such as the availability of public restrooms hand washing facilities, and use as a food facility must be taken into consideration for commercial properties.

- E. Investigation and penalty fees for the abatement of failing OWTS and/or installation of an OWTS without permit that may apply are as follows:
1. For septic system replacement, repair or tank destruction permits where the property owner has voluntarily submitted a repair permit and no investigation has been conducted, the permit may be issued without investigation fee or penalty.
  2. For septic system replacement, repair or tank destruction permits where a Notice of Violation has been sent and the owner has submitted a septic repair permit within 30 days, penalties shall not be imposed.
  3. For septic system replacement, repair or tank destruction permits where the Permit Authority has received a complaint, a Notice of Violation has been sent and the owner has not submitted for a permit within 30 days, penalties shall be calculated.
  4. If the responsible party (owner or tenant) fails to correct the violation resulting in an administrative abatement hearing, any penalty as allowed under Section 1-7.1 of the Sonoma County Code may be imposed.
  5. For standard or non-standard OWTS constructed without permit, penalties shall be calculated.

## **5.2 Abandonments**

- A. Any abandonment of portions or the entire OWTS shall be conducted under an OWTS permit issued by the Permit Authority.
- B. In the event that a parcel is connected to public sewer, abandonment of the septic tank(s) is required.
- C. The following requirements shall be observed when a septic tank or sump (e.g. tank) is abandoned.
1. The tank shall be pumped of all contents by a licensed septic tank pumper.
  2. When abandoned in place:
    - a. The lid(s) shall be removed and disposed at a sanitary landfill or the tank lid may be broken into small pieces and placed into the tank with the gravel, rock or soils.
    - b. Several holes shall be made in the bottom of the tank.
    - c. The tank shall be filled with pea gravel, drain rock, compacted native soils or concrete slurry. Provision b does not apply if tank is filled with concrete.

3. When tank is removed:

- a. The tank and lid(s) shall be removed from the property and disposed at a sanitary landfill.

### **5.3 Repair of Failing Systems**

- A. This section is reserved for when the land owner self-discloses the failure and seeks to repair the system on their own volition, as opposed to Section 5.1 (where the Permit Authority receives a complaint or takes notice of the failing system independent of the owner).
- B. Depending on the amount and type of proposed work, the repair of a failing system could be permit exempt, require a repair permit or require a replacement permit. The type of required permit is detailed in Section 4.9.C, 4.9.D and 4.9.F.
- C. Applications to repair a failing system shall be given priority over other types of permit applications received by the Permit Authority.
- D. In addition to the application requirements of Section 4.9, the application to repair a failing system shall include the following:
  - 1. A statement the system is in failure.
  - 2. The system component in failure.
  - 3. The nature of the failure.
  - 4. The severity of the failure and/or the volume discharge of domestic waste to the surrounding environment.
  - 5. The location of any discharge of domestic waste.
- E. Upon receipt of such an application Permit Authority shall conduct a site visit within 48 hours to verify the extent of the failure and extent of waste discharge.
- F. Upon verification by Permit Authority of a failed or failing system, staff shall expedite the review and issuance of the repair permit.



## **Section 6 Requirements for Approval of Building Permits**

Sonoma County Code Section 7-5(b)(2) requires a Well and Septic Section clearance in relation to building structure improvement projects. Building permits shall be routed to the Well and Septic Section for review. Building permits that do not impose additional burdens upon existing OWTS will be provided a Well and Septic Section clearance. Building permits that do impose additional burdens upon existing systems will be evaluated in accordance with this section.

Burdens upon existing systems include new wastewater flows, increases in wastewater flow or strength to existing systems and potential impacts to system components including, but not limited to, septic tanks, dispersal systems and reserve replacement areas. Building permits shown to impose additional burdens upon existing systems and system components shall not be provided a Well and Septic Section clearance until the burden(s) have been mitigated.

### **6.1 Building Permit without a Plan Review**

A. Building permits without a plan review do not require a review by the Well and Septic Section. Following is a list of building permits that do not require a plan review.

1. Furnaces
2. Water Heater
3. Re-Roofs
4. Siding
5. HVAC
6. Electric Service
7. Electrical Repairs
8. Interior Wall Coverings
9. Dry Rot Repair less than 40 linear feet
10. Deck Repairs

### **6.2 Building Permit with a Plan Review**

- A. The Well and Septic Section shall review building permits requiring plan review. Any building permit not listed in Section 6.1 is required to have a plan review.
- B. The Well and Septic Section minimum review shall ensure the property is served by an existing non-conforming septic system consisting of a septic tank and dispersal system and not by a cesspool.

### **6.3 New Dwelling Unit on Undeveloped Land**

- A. A proposed dwelling unit on undeveloped land that has no existing dwelling unit(s) and no existing septic system typifies this category.
  - 1. A new code compliant septic system is required.
  - 2. A code compliant reserve replacement area is required, pursuant to Section 4.13.A.

### **6.4 New Dwelling Unit on Developed Land**

- A. New Dwelling Unit as a Reconstructed Dwelling. The reconstruction of an existing dwelling typifies this category.
  - 1. Either an existing code compliant septic system, pursuant to Section 6.9 is required; or
  - 2. A new code compliant septic system is required.
  - 3. A code compliant reserve replacement area is required, pursuant to Section 4.13.A.
- B. New Dwelling Unit as a Junior Dwelling Unit (JDU). An existing primary dwelling unit and the proposed construction of a new JDU typifies this category.
  - 1. Either an existing non-conforming septic system, pursuant to Section 6.10, is required; or
  - 2. An existing code compliant septic system, pursuant to Section 6.9, is required; or
  - 3. A new code compliant septic system is required.
- C. New Dwelling Unit as an Accessory Dwelling Unit (ADU). An existing primary dwelling unit and the proposed construction of a new ADU typifies this category. Construction of a new ADU could be a newly constructed structure or the conversion of an existing structure to a dwelling occupancy.

Applicant has the option to connect the ADU to the existing septic system serving the primary dwelling unit provided the existing septic system is code compliant and has capacity for the ADU waste flow or to construct a new code compliant septic system for the ADU.

- 1. The primary dwelling shall have an existing code compliant septic system, pursuant to section 6.9, which has sufficient capacity to treat and dispose the added wastewater flow associated with the proposed ADU; and
- 2. The ADU shall have a dedicated septic tank; or
- 3. The applicant shall provide a new code compliant system for the ADU.

4. A code compliant reserve replacement area is required for the primary dwelling unit, pursuant to section 4.13.A.
5. A code compliant reserve replacement area is required for the ADU, pursuant to section 4.13.A.

## **6.5 New Accessory Structure**

A. A proposed structure accessory to an existing dwelling unit on developed land typifies this category. Examples of structures accessory to dwelling units include, but are not limited to, garages, barns, storage buildings, workshops, pool houses, art studios, exercise rooms and swimming pools. This category has two sub-categories: those with plumbing and those without plumbing. This category is not a dwelling unit and does not contain a bedroom.

### **B. Accessory Structures with Plumbing**

1. An existing non-conforming septic system, pursuant to section 6, is required.
2. The applicant shall provide documentation that the proposed plumbing does not represent an increase in wastewater flow to the existing septic system.
3. A reserve replacement area shall be evaluated or required for the primary dwelling unit, pursuant to section 6.8 and section 4.13.A.

### **C. Accessory Structures without Plumbing**

1. An existing non-conforming septic system, pursuant to section 6.10, is required.
2. A reserve replacement area shall be evaluated or required for the primary dwelling unit, pursuant to section 6.8 and section 4.13.A.

## **6.6 Building Improvements Increasing Wastewater Flow or Strength**

- A. A proposed addition, interior improvement or tenant improvement to an existing structure that increases the occupancy loading (bedroom addition) and/or increases the wastewater flow or strength typifies this category.
1. An existing code compliant septic system, pursuant to section 6.9, and which has sufficient capacity to treat and dispose the increase in wastewater flow or strength is required; or,
  2. A new code compliant system for 100 percent of the wastewater flow is required.
  3. A code compliant reserve replacement area shall be required for the primary dwelling unit, pursuant to Sections 6.8 and 4.13.A.

## **6.7 Building Improvements without Increasing Wastewater Flow or Strength**

- A. A proposed addition, interior improvement or tenant improvement to an existing structure that does not increase the occupancy loading (bedroom addition) and/or does not increase the wastewater flow typifies this category.
  - 1. An existing non-conforming septic system, pursuant to Section 6.10, is required.
  - 2. A reserve replacement area shall be evaluated or required for the primary dwelling unit, pursuant to Sections 6.8 and 4.13.A.

## **6.8 Reserve Replacement Area**

- A. For Sections 6.3 and 6.4 a code complaint reserve replacement area is required. For Sections 6.5 through 6.8 reserve replacement areas shall be evaluated or required depending on the amount of land encumbrance and whether or not the proposed building permit increases the percent land encumbrance above 50 percent.
  - 1. The percent land encumbrance shall be determined. The percent land encumbrance is determined by dividing the encumbered land area by the total land area of the subject parcel
  - 2. When there is 50 percent or less land encumbrance, the proposed building permit project shall be evaluated to ensure it does not adversely affect the reserve replacement area.
  - 3. When there is greater than 50 percent land encumbrance, the reserve replacement area shall be required.
- B. Evaluation of the reserve replacement area consists of ensuring the proposed building does not physically encroach into, onto or adversely affect the reserve replacement area. A site map documenting the location of the proposed structure or structural improvements and the reserve replacement area should suffice.
- C. Requiring a reserve replacement area consists of site evaluation for soil type, percolation rate and depth of groundwater, pursuant to pertinent sections of this OWTS Manual, as well as a preliminary design of the replacement septic system including system type, sizing calculations, alignment within proposed reserve replacement area and abides by site constraints and setbacks.

## **6.9 Existing Code Compliant Septic System Documentation**

- A. Documentation of an existing code compliant septic system consists of 1 of the following:
  - 1. A finalized septic system permit with documentation the system meets current standards.
  - 2. A findings report is required when:
    - a. A finalized septic system permit when documentation is missing information or shows non-compliance with current standards; or
    - b. A septic permit does not exist.

## **6.10 Existing Non-Conforming Septic System Documentation**

- A. Documentation of an existing non-conforming septic system consists of 1 of the following:
  - 1. A county record clearly showing the septic tank and dispersal system; or,
  - 2. County Assessor record clearly showing the septic tank and dispersal system; or,
  - 3. A finalized septic system permit showing the septic tank and dispersal system; or,
  - 4. The type of Findings Report required by building project type follows:
    - a. New Dwelling Units on Developed Land
      - i. Reconstruction requires Code Compliant Findings Report
      - ii. New JDUs require Non-Conforming Findings Report
      - iii. New ADUs require Code Compliant Findings Report
    - b. New Accessory Structures (non-bedroom)
      - i. With plumbing require Non-Conforming Findings Report
      - ii. Without Plumbing require Location Only Findings Report
    - c. Building Improvements with
      - i. Increase in Flow or Strength requires Code Compliant Findings Report
      - ii. No increase in flow or strength requires a Non-Conforming Findings Report

## **6.11 Findings Report**

- A. Finding Reports shall be signed and stamped by a Qualified Consultant.
- B. Finding Reports shall include, but not be limited to, the following information:
  - 1. A site map including the parcel, assessor's parcel number, the located septic tank, the dispersal system, the replacement area, a north arrow, direction of slope, and scale or measurements to relevant features on the property.

2. The dispersal system shall be located if the structural improvement and/or associated construction activity has the potential to damage or adversely affect the primary and/or replacement dispersal system.
  3. Indicate the bedrooms/units/structures served by the system. Documentation of structure may be derived from building permits and/or assessor records.
  4. Evaluation of system performance including at least one of the following:
    - a. Uncovering distribution boxes to insure that the system is functioning adequately,
    - b. Hydraulic load test,
    - c. Pump test or
    - d. Evaluation of profile holes.
  5. Estimated age of system.
  6. Estimated sizing of system.
  7. Inspection of all tanks and recent pumper's report (within last 5 years); this should include presence or absence of baffle walls, inlet and outlet tees, effluent levels on the inlet and outlet sides of the tank, root intrusion and cracks in the tank.
  8. A completed monitoring form for nonstandard systems.
  9. Classification of system as either a code compliant system or as an existing non-conforming system.
  10. For code compliant septic systems the following shall be included, pursuant to pertinent sections of this OWTS Manual: the soil type, percolation rate and depth of groundwater, elevation of dispersal system and design calculations.
- C. Finding Reports shall be classified by the following types and shall include the numerated items which refer to section 6.11.B:
1. Findings Report – Location Only. A Findings Report – Location Only shall include items 1 and 2.
  2. Findings Report – Non-Conforming Septic System. A Findings Report – Non-Conforming Septic System shall include items 1 through 9.
  3. Findings Report – Code Compliant Septic System. A Findings Report – Code Compliant Septic System shall include items 1 through 10.

## **6.12 Hydraulic Load Test Guidelines**

### **A. Septic Tank Hydraulic Load Test**

The septic tank hydraulic load test, as described here, is conducted only for standard gravity-fed leach fields, and does not apply if the system utilizes a pump. A separate

pump test procedure is described below. The hydraulic load test is conducted after completion of a review of background data, an initial field performance and the septic tank inspection. The hydraulic load test is conducted by surcharging the septic tank with approximately 150 gallons of water over a 20 to 30 minute period; and then observing the rise in water in the tank and the subsequent draining process. Tracer dye may be used to assist in observing leach field failure.

A garden hose discharging into the outlet side of the tank can be used to surcharge the tank. The hose outlet should remain well above the water level of the tank to prevent cross-contamination. Before starting the test, the flow rate from the hose should be determined (for example, with a 5-gallon bucket and stop watch) to properly gauge the amount of surcharge water added to the tank. Alternately, a portable water meter can be installed between the house faucet and the hose to directly measure the water volume added.

## B. Test Procedures

The step-by-step procedures for the hydraulic load test are then as follows:

1. Measure the location of the static water line in the septic tank (at the outlet side) as an initial reference point.
2. Begin surcharging the tank with water to start the hydraulic load test.
3. Observe any rise in the liquid level at the outlet pipe and measure the water level at the end of filling. Typically, the liquid level will rise from 1/2 to 1 inch, at which point the liquid level should stabilize for the remainder of filling; and the return to the initial level in a matter of minutes after filling is stopped.
4. After the filling cycle is finished, the water level decline in the septic tank is observed until the initial level is reached; and the time to achieve this is recorded. If the initial level is not attained within 30 minutes, the test is terminated and the final water level is noted.

## C. System Rating

Based upon the water level readings during the test, a hydraulic performance rating shall be assigned to the system in accordance with the guidelines provided in F. below. It should be emphasized that these are guidelines only, and special circumstances may be cause for modifying the evaluation and rating of particular systems. A system receiving a "Failed" rating shall require appropriate upgrading.

## D. Pump Systems

The pump test is conducted by adding sufficient water to the basin to activate the pump "on" control and observing the performance of the system over at least one pumping cycle. The total amount of water added should be about 150 gallons, to approximate no edits hydraulic loading of the leach field as for gravity systems. Using a garden hose, 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.

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. While the pump is discharging, examine the piping system for any leaks. 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 done by a licensed and properly qualified contractor.

The pumping cycle (from “on” to “off”) levels should be timed and the results recorded on the inspection form. Typically, if the pump is sized and operating properly, pump operation lasts 1 to 5 minutes per dose. Pump cycles lasting longer than this may indicate leach field clogging and/or pump deficiencies. If this is observed, it should be noted and further investigation of the pump and leach field should be conducted to determine the specific cause.

If during filling of the basin, the pump does not activate when water reaches the high liquid level control (for example “on” float), discontinue the pump test. This indicates a pump failure, defective float switch or wiring problems and will require the repair service of a contractor familiar with these types of systems. The pump system failure should be noted, communicated immediately to the resident/owner and follow-up with a notice requiring prompt corrective action.

#### E. Final Leach Field Inspection

At the completion of the hydraulic load test, the drainfield area and downslope areas should be checked again for indications of surfacing effluent, wetness, or odor. If any of these conditions exist as a result of the hydraulic load test, this shall be considered conclusive evidence of system failure. If the field observations of wetness are not obviously the result of the hydraulic load test, further investigation may be necessary to determine if the drainfield is failing and the cause of the failure. Additional investigative work may include water quality sampling (for total and fecal coliform, ammonia and nitrate) or dye testing. The cause of seepage could be related to gopher holes, site drainage or erosion problems, excessive water use or simply the age of the dispersal system.

#### F. Clean Up

At the completion of the OWTS inspection and testing, all access lids shall be replaced and tools cleaned before leaving the site. All tools and equipment that come in contact with wastewater should be cleaned and disinfected with a 1 to 5 water to bleach solution: and all contaminated rinse water shall be disposed of in the septic tank.



The following guidelines shall be followed for Hydraulic Load Test ratings of septic tanks:

1. No noticeable rise in water level during filling-Excellent
2. Maximum water level rise of about 1 inch, with rapid decline to initial level within about 5 minutes after end of filling-Good
3. Maximum water level rise of about 2 inches, with decline to initial level within about 15 minutes after end of filling-Satisfactory
4. Maximum water level rise of about 3 inches, with decline to initial level within about 30 minutes after end of filling-Marginal
5. Water level rise of more than 3 inches, with decline not reaching initial level within 30 minutes after end of filling-Poor
6. Water level rise of more than 3 inches, with no noticeable decline within 30 minutes after end of filling.-Failed

## **Section 7 Site Evaluation Methods and Investigation Requirements**

### **7.1 Site Evaluations**

- A. Site evaluations are required for new or replacement OWTS.
- B. Site evaluations shall be conducted by Qualified Consultants experienced in OWTS. Qualified Consultants shall coordinate site evaluations with the Permit Authority.
- C. Site evaluations shall be conducted in accordance with regulations and Permit Authority policies.

### **7.2 General Site Criteria**

- A. General site criteria include, but are not limited to, the following:
  - 1. Land area available for primary dispersal area;
  - 2. Land area available for replacement area;
  - 3. Ground Slope;
  - 4. Soil Depth;
  - 5. Depth to Groundwater;
  - 6. Soil Percolation Rates (Tables 7.2a, 7.2b and 7.10);
  - 7. Setback Distances (Table 7.2c);
  - 8. Location of cut banks, fills, or evidence of past grading activities, natural bluffs, sharp changes in slope, soil landscape formations, rock outcrops, trees and unstable land forms within 50 feet of the dispersal and replacement areas;
  - 9. Location of wells, intercept drains, streams, springs and other bodies of water on the property in question and within 100 feet on adjacent properties;
  - 10. Other information may be necessary to evaluate the suitability of the proposed OWTS.
- B. Altered Terrain
  - 1. OWTS shall not be placed in areas that have been filled, excavated, ripped, plowed, altered, modified, or in areas of flooding, drainage problems, or geologic instability.

2. Such areas that have been excavated, ripped, plowed, altered, and/or modified may be acceptable if the soil is stable and soil evaluation indicates characteristics acceptable for installation of an OWTS such as approved structure, texture, consistency, pore space, percolation rate.

C. Potential Land Instability

1. If the Permit Authority determines the OWTS may cause a land instability concern, a soils report, prepared at the applicant's expense, by a California licensed engineering geologist, geotechnical engineer or registered geologist shall be required.

D. Setback Requirements

1. All new and replacement OWTS shall conform to the setback distances detailed in Table 7-2a below.

### **7.3 Soil Profile/Groundwater/Percolation Test Notification**

- A. The property owner or Qualified Consultant shall make the appointment with the Permit Authority and to schedule the preliminary soil profile evaluation, percolation test and/or groundwater determination. A Sonoma County Request for Service Form shall be filled out and the filing fee shall be submitted at this time. A copy of the Assessor's Parcel Map, one plot plan and a vicinity map shall be submitted with the Request for Service form and the parcel shall be clearly marked in the field.
- B. The Permit Authority shall be notified a minimum of 24 hours in advance to schedule (on a normal working day before 12:00 noon) profile hole preparation, any percolation testing, backhoe excavations, groundwater determination testing and/or other exploratory work that is being attempted.
- C. The Qualified Consultant is responsible to request the soil percolation test.

**Table 7.2a - Sewage Application/Soil Loading Rates  
(Gallons per Square Foot per Day)**

Column 1	Column 2
1-3 MPI = 1.200 gallons/square foot/day	47 MPI = 0.437 gallons/square foot/day
4 MPI = 1.143 gallons/square foot/day	48 MPI = 0.430 gallons/square foot/day
5 MPI = 1.086 gallons/square foot/day	49 MPI = 0.423 gallons/square foot/day
6 MPI = 1.029 gallons/square foot/day	50 MPI = 0.417 gallons/square foot/day
7 MPI = 0.971 gallons/square foot/day	51 MPI = 0.410 gallons/square foot/day
8 MPI = 0.914 gallons/square foot/day	52 MPI = 0.403 gallons/square foot/day
9 MPI = 0.857 gallons/square foot/day	53 MPI = 0.397 gallons/square foot/day
10 MPI = 0.800 gallons/square foot/day	54 MPI = 0.390 gallons/square foot/day
11 MPI = 0.786 gallons/square foot/day	55 MPI = 0.383 gallons/square foot/day
12 MPI = 0.771 gallons/square foot/day	56 MPI = 0.377 gallons/square foot/day
13 MPI = 0.757 gallons/square foot/day	57 MPI = 0.370 gallons/square foot/day
14 MPI = 0.743 gallons/square foot/day	58 MPI = 0.363 gallons/square foot/day
15 MPI = 0.729 gallons/square foot/day	59 MPI = 0.357 gallons/square foot/day
16 MPI = 0.714 gallons/square foot/day	60 MPI = 0.350 gallons/square foot/day
17 MPI = 0.700 gallons/square foot/day	61 MPI = 0.345 gallons/square foot/day
18 MPI = 0.686 gallons/square foot/day	62 MPI = 0.340 gallons/square foot/day
19 MPI = 0.671 gallons/square foot/day	63 MPI = 0.335 gallons/square foot/day
20 MPI = 0.657 gallons/square foot/day	64 MPI = 0.330 gallons/square foot/day
21 MPI = 0.643 gallons/square foot/day	65 MPI = 0.325 gallons/square foot/day
22 MPI = 0.629 gallons/square foot/day	66 MPI = 0.320 gallons/square foot/day
23 MPI = 0.614 gallons/square foot/day	67 MPI = 0.315 gallons/square foot/day
24 MPI = 0.600 gallons/square foot/day	68 MPI = 0.310 gallons/square foot/day
25 MPI = 0.593 gallons/square foot/day	69 MPI = 0.305 gallons/square foot/day
26 MPI = 0.587 gallons/square foot/day	70 MPI = 0.300 gallons/square foot/day
27 MPI = 0.580 gallons/square foot/day	71 MPI = 0.295 gallons/square foot/day
28 MPI = 0.573 gallons/square foot/day	72 MPI = 0.290 gallons/square foot/day
29 MPI = 0.567 gallons/square foot/day	73 MPI = 0.285 gallons/square foot/day
30 MPI = 0.560 gallons/square foot/day	74 MPI = 0.280 gallons/square foot/day
31 MPI = 0.553 gallons/square foot/day	75 MPI = 0.275 gallons/square foot/day
32 MPI = 0.545 gallons/square foot/day	76 MPI = 0.270 gallons/square foot/day
33 MPI = 0.538 gallons/square foot/day	77 MPI = 0.265 gallons/square foot/day
34 MPI = 0.531 gallons/square foot/day	78 MPI = 0.260 gallons/square foot/day
35 MPI = 0.523 gallons/square foot/day	79 MPI = 0.255 gallons/square foot/day
36 MPI = 0.516 gallons/square foot/day	80 MPI = 0.250 gallons/square foot/day
37 MPI = 0.509 gallons/square foot/day	81 MPI = 0.245 gallons/square foot/day
38 MPI = 0.501 gallons/square foot/day	82 MPI = 0.240 gallons/square foot/day
39 MPI = 0.494 gallons/square foot/day	83 MPI = 0.235 gallons/square foot/day
40 MPI = 0.487 gallons/square foot/day	84 MPI = 0.230 gallons/square foot/day
41 MPI = 0.479 gallons/square foot/day	85 MPI = 0.225 gallons/square foot/day
42 MPI = 0.472 gallons/square foot/day	86 MPI = 0.220 gallons/square foot/day
43 MPI = 0.465 gallons/square foot/day	87 MPI = 0.215 gallons/square foot/day
44 MPI = 0.457 gallons/square foot/day	88 MPI = 0.210 gallons/square foot/day
45 MPI = 0.450 gallons/square foot/day	89 MPI = 0.205 gallons/square foot/day
46 MPI = 0.443 gallons/square foot/day	90-120 MPI = 0.200 gallons/square foot/day

**Table 7.2b - Illustrative Table for Sizing Absorption Area**

<b>Texture</b>	<b>Structure Shape</b>	<b>Structure Grade</b>	<b>Hydraulic Loading (gallons/ square foot/day) STE<sup>1</sup></b>	<b>Hydraulic Loading (gallons/ square foot/day) STE<sup>1</sup></b>
Coarse sand, sand, loamy coarse sand	Single grain	Structureless	1.2	1.6
Fine sand, loamy fine sand	Single grain	Structureless	0.6	1.0
Sandy loam, loamy sand	Massive Platy	Structureless	.35	0.5
Sandy loam, loamy sand	Massive Platy	Weak	0.35	0.5
Sandy loam, loamy sand	Prismatic, blocky, granular	Weak	0.5	0.75
Sandy loam, loamy sand	Prismatic, blocky, granular	Moderate, strong	0.8	1.0
Loam, silt loam, sandy clay loam, fine sandy loam	Massive Platy	Structureless Weak		
Loam, silt loam, sandy clay loam, fine sandy loam	Prismatic, blocky, granular	Weak, moderate	0.5	0.75
Loam, silt loam, sandy clay loam, fine sandy loam	Prismatic, blocky, granular	Strong	0.8	1.0
Sandy clay, silty clay loam, clay loam	Massive Platy	Structureless Weak, moderate, strong		
Sandy clay, silty clay loam, clay loam	Prismatic, blocky granular	Weak, moderate	0.35	0.5
Sandy clay, silty clay loam, clay loam	Prismatic, blocky granular	Strong	0.6	0.75
Clay, silty clay	Massive Platy	Structureless Weak, moderate, strong		
Clay, silty clay	Prismatic, blocky, granular	Weak		
Clay, silty clay	Prismatic, blocky, granular	Moderate, strong	0.2	0.25

1: STE=septic tank effluent; PTE=pre-treated effluent

2: Higher hydraulic loading rates for pretreated effluent may only be used when pretreatment is not used for one foot of vertical separation credit.

**Table 7.2c - Setback Requirements**

Minimum horizontal distance required from:	Septic Tank (All Systems) (feet)	Dispersal Area (Standard) (feet)	Dispersal Area (Non Standard) (feet)
Building or structures (including driveways, parking areas and paved areas):			
Upgradient	5	8	10
Laterally	5	8	10
Downgradient	5	8	25
Property line and/or easements:			
Upgradient	5	5	10
Laterally	5	5	10
Downgradient	5	5	25
Water supply wells and springs	50 (Note 1)	100	100
Public water Supply Wells:			
Dispersal depth less than or equal to 10 feet	50 (Note 1)	150	150
Dispersal depth greater than 10 feet	50 (Note 1)	200	200
Public Water Supply Surface Intake:			
Less than 1200 feet to OWTS	50 (Note 1)	400	400
Less than 2500 feet to OWTS	50 (Note 1)	200	200
Perennially flowing streams (as measured from the edge of the waterbody's natural or levied bank)	50	100	100
Ephemeral streams (as measured from the edge of the watercourse) and ephemeral water bodies	25	50	50
Drainage ways greater than 18 inches in depth	25	50	50
Drainage ways less than or equal to 18 inches in depth	15	15	25
Intercept Drains – Perforated:			
Upgradient	15	15	15
Laterally	25	50	50
Downgradient	25	50	50
Non-Perforated / Solid Drain Pipes:			
Upgradient	5	10	10
Laterally	10	15	15
Downgradient	10	15	15
Ocean, lakes, ponds or reservoir (as measured from the high waterline)	50	100	100
Large trees	10	Considered on a case by case basis	Considered on a case by case basis
Dispersal field	5	—	—
Domestic water pipe*	5	5	5
Pressure Public Water Main*	5	10	10
Distribution box	5	4	—
Fill areas	—	15	15

**Table 7.2c - Setback Requirements (Continued)**

<b>Minimum horizontal distance required from:</b>	<b>Septic Tank (All Systems) (feet)</b>	<b>Dispersal Area (Standard) (feet)</b>	<b>Dispersal Area (Non Standard) (feet)</b>
Cut banks (manmade excavation of the natural terrain greater than 3 feet), natural bluffs, sharp changes in slope			
Soil or groundwater depth below dispersal area is greater than or equal to 5 feet	25	25	25
Soil or groundwater depth below dispersal area is less than 5 feet	25	50	50
Title 22 recycled water dispersal area	5	Per RWQCB requirements	Per RWQCB requirements
Swimming pools (downgradient)	5	8	25

Note 1: Septic tank and sump shall be watertight.

Note \*: Bottom of water pipe shall be greater than or equal to 12 inches above top of sewer/drain line. Water pipe placed on a solid shelf excavated at one side of the common trench with a minimum horizontal distance of greater than or equal to 12 inches (2007 CA Plumbing Code Table K-1)

- D. The Qualified Consultant may choose to perform the soil percolation test at the same time as the soil profile evaluation. Combining of these 2 steps must be authorized by the Permit Authority in advance of the work.
- E. All percolation tests, groundwater determination tests, and information obtained related to the percolation test procedures shall be submitted to the Permit Authority within 90 days of the completion of all on-site testing. This includes any test information data or results that may not prove acceptable for sewage dispersal design (extensions may be requested on a case by case basis).

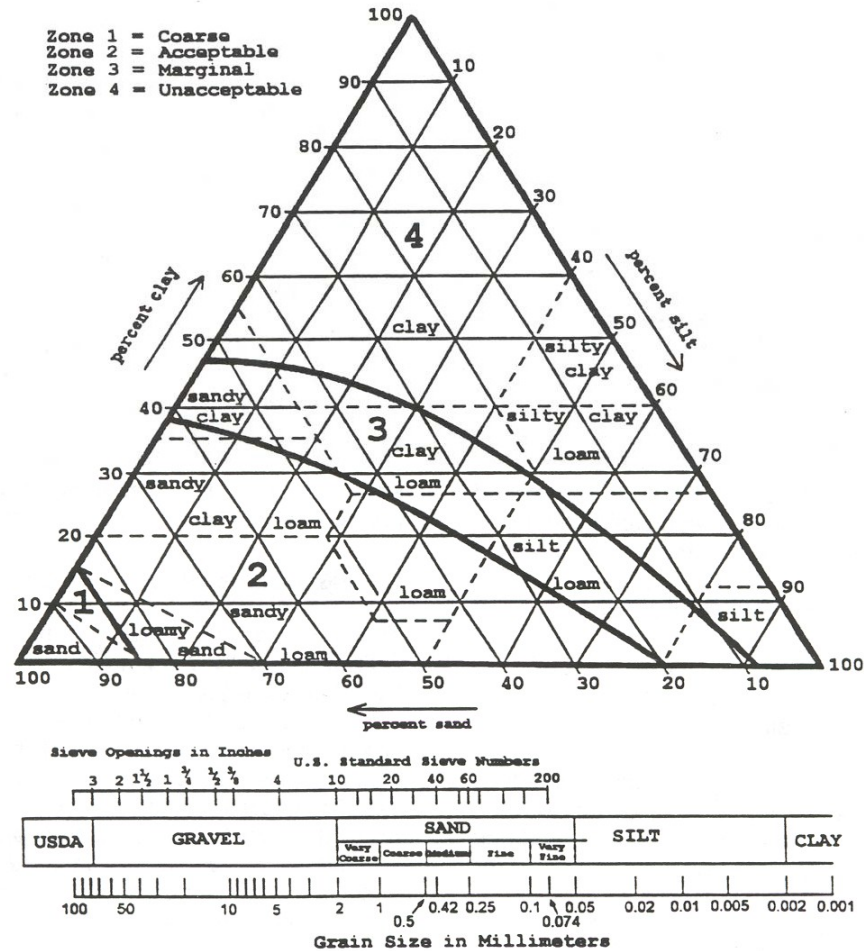
## **7.4 Soil Profile Evaluations**

- A. Soil profile holes for the Preliminary Site Survey Soil Profile Evaluation typically are constructed prior to any soils percolation testing and/or groundwater determination tests.
  - 1. Wet weather percolation testing and/or groundwater determination tests prior to soil profile evaluations are allowed; however, the tests are considered incomplete, pending approval of the soil profile investigation.
- B. Profile holes must be adequately covered to prevent entrance if left unattended and backfilled immediately after completion of test procedures. Note: Work is permissible on sites to locate potentially acceptable areas prior to the preliminary evaluation.
- C. Soil profiles holes are for the purpose of observing soil structures, texture, formations; the presence of seasonal groundwater; impervious rock formations, etc. Profiles are essential in the evaluation of any parcel for soil suitability for private sewage dispersal systems.

- D. A minimum of 2 soil profile holes will be excavated with a backhoe. 1 profile hole shall be excavated in the primary effluent dispersal area and 1 in the reserve replacement area shall be required to demonstrate the suitability of soil conditions. Additional soil profile holes may be required to demonstrate suitable soil conditions for both the primary dispersal area and the reserve replacement area if the initial two profiles show dissimilar conditions.
- E. The profile holes shall be dug to a depth of at least 3 feet below the proposed absorption surface (trench bottom or 2 feet below the basal area of a mound).
1. Soil depth is measured vertically to the point where bedrock, hardpan, impermeable soils, rock content greater than 50 percent, or saturated soils are encountered.
  2. For soils having less than 15 percent silt and clay, a minimum depth to groundwater below the leaching trench shall be 5 feet.
  3. For soils having greater than 15 percent silt and clay, the minimum soil depth and depth to groundwater below the leaching trench shall be 3 feet.
    - a. Lesser soil depths may be granted only as a variance or for Non-Standard Alternative OWTS.
- F. Augured profile holes are an acceptable alternative only (1) where use of a backhoe is impractical because of access, (2) when necessary to verify conditions expected on the basis of prior soils investigations, or (3) when done with geologic investigations (the extracted soils shall be arranged for evaluation so that corresponding depths can be determined). Where this method is employed, 3 profile holes in the primary area and 3 in the expansion area are required, (the same as percolation test hole requirements).
- G. The classification of soils into zones as shown in the USDA Soils Classification Triangle will be the primary reference on acceptability of soils for OWTS. (see Figure 7.4)
- H. The following factors are to be observed and reported from ground surface to a depth corresponding to the groundwater determination and soil percolation test requirements:
1. Thickness and coloring of soil layers, structure and texture using the United States Department of Agriculture (USDA) classification;
  2. Depth to and type of bedrock, hardpan, or impermeable soil layer;
  3. Depth to observed ground water, saturated soil layers and areas of water infiltration;
  4. Depth to soil mottling;
  5. Other prominent soil features such as structure, stoniness, roots and pores, dampness, soil boundaries, etc.



**Figure 7.4 Soil Percolation Suitability Chart for OWTS**



**Instructions:**

1. Plot texture on triangle based on percent sand, silt, and clay as determined by hydrometer analysis.
2. Adjust for coarse fragments by moving the plotted point in the 100 percent sand direction an additional 2 percent for each 10 percent (by volume) of fragments greater than 2 millimeters in diameter.
3. Adjust for compactness of soil by moving the plotted point in the 100 percent clay direction an additional 15 percent for soils having a bulk-density greater than 1.7 grams per cubic centimeter.

**Note:** For soils falling in sand, loamy sand, or sandy loam classification, bulk density analysis will generally not affect suitability, and analysis is not necessary.

## **7.5 Groundwater Table Determination**

### **A. General Provisions**

Groundwater table determinations are required for lands having slopes of 0 to 5 percent in a basin area. Groundwater determinations on lands greater than 5 percent slope may be required if high seasonal groundwater is suspected.

### **B. Groundwater Table Determination Methods**

Groundwater table determination can be made by one of following methods:

1. Direct observations via backhoe pits or auger holes;
2. Direct observation via existing water wells or monitoring wells;
3. Indirect observation via soil mottling; or
4. Compilation of approved readings or observations from any of the first three methods from adjacent or neighboring parcels and/or projects.
5. Other alternate methods as approved by the Permit Authority.

### **C. Direct Groundwater Table Determination Calendar**

1. Direct groundwater table determinations shall be conducted between January 1 and March 1, after having received 50 percent of the average seasonal rainfall for each defined geographic area, as listed in Table 7.5 and depicted in Map 7.5, and within 10 days of receipt of 0.8 inch or more of rainfall within a 48-hour period as reported by the officially recognized reporting stations, as published in the Press Democrat.
2. Time extensions for direct groundwater table determinations may be authorized by the Permit Authority based on extended periods of rainfall before January 1 and/or after March 1.

### **D. Direct Groundwater Table Observation Construction Methods**

1. Backhoe excavated profile holes shall remain open a minimum of 24 hours, adequately supervised or barricaded until observed by the Permit Authority.
2. An alternative to leaving the holes open for 24 hours, is to insert a perforated pipe in the hole and place native backfill around the pipe (the backfill may not be compacted).

3. Another acceptable alternative is to hand dig or bore a hole to at least 36 inches below the proposed percolation test depth, insert a perforated pipe, and fill the annular space with gravel covered with 2 feet of native soil. This hole may then be used to monitor groundwater levels 24 or more hours later. Note: Additional holes at lesser depths to augment the data or prove multiple water table depths are encouraged, as is recordation of water levels throughout the wet-weather period.
4. Groundwater holes shall be protected to prevent sheet flow runoff, rainfall or other sources of non-groundwater from entering the observation hole.
5. The minimum depth to the anticipated highest level of groundwater that occurs over an extended period of time below the bottom of the leaching trench shall be determined according to soil texture and percolation rate. Where groundwater is determined to be non-usable, (for example cannot reasonably be expected to be used for withdrawal and beneficial use due to quantity and/or quality, a minimum depth to groundwater of 3 feet below the leaching trench bottom may be permitted without need for a variance, if soils contain greater than 15 percent silt and clay as demonstrated by hydrometer analysis, or soils having a percolation rate slower than 5 minutes per inch. This depth may be waived to no less than 2 feet if variance is justified or for an approved Non-Standard System.

#### E. Direct Groundwater Table Determination

1. The observation hole shall remain in place and undisturbed for a minimum of 24 hours to allow infiltration of groundwater.
2. Qualified Consultant shall measure and record the depth to groundwater from the undisturbed or pre-existing ground surface.
3. All observation holes shall be labeled and labelling shall be consistent with associated maps and/or submittals to the Permit Authority.

#### F. Indirect Groundwater Table Determination Method

1. Soil mottling observations may be utilized as an alternative to direct wet weather groundwater table determinations in the following circumstances:
  - a. Replacement dispersal systems.
  - b. Soil characteristics, primarily the presence of iron and/or manganese, that lend themselves to redoximorphic processes.
  - c. Soil sampling shall be required if soil mottling is not observable to both the Qualified Consultant and Permit Authority staff.
  - d. Existing, legally established parcels.
2. Soil mottling observations shall not be utilized for properties with failed or canceled groundwater determinations on file.
3. A soil profile evaluation of sufficient means to determine the observable depth of

soil mottling is required for this procedure.

4. Soil mottling shall be observed by the Qualified Consultant and Permit Authority. The field procedure will be similar to a Pre-Perc where the Qualified Consultant shall schedule a time to meet onsite with the Permit Authority and shall coordinate the excavation and backfilling of soil profile pits.

#### G. Compilation Method

The compilation method may be used provided the following criteria are met:

1. Soil profile readings or observations are within 500 feet of the proposed OWTS; and,
2. Area conditions lend themselves towards using off-site data or data not directly associated with the proposed OWTS. Area conditions include, but are not limited to, topography, slope, geology, geography, cut banks, natural bluffs, rock outcrops, landslides, springs, streams, roads; and,
3. Soil profile readings or observations were made by both a Qualified Consultant and the Permit Authority within the past 3 years; and,
4. Soil profile readings or observations have been submitted and approved by the Permit Authority.

#### H. Conflicts Between Methods

Where a conflict in the above methods exists, the Permit Authority shall decide the appropriate method. Considerations shall include soil characteristics, rainfall and/or drought conditions, historical records and written reports.

- I. Table 7.5, below, presents 50 percent of the average annual rainfall by Wet Weather Zone

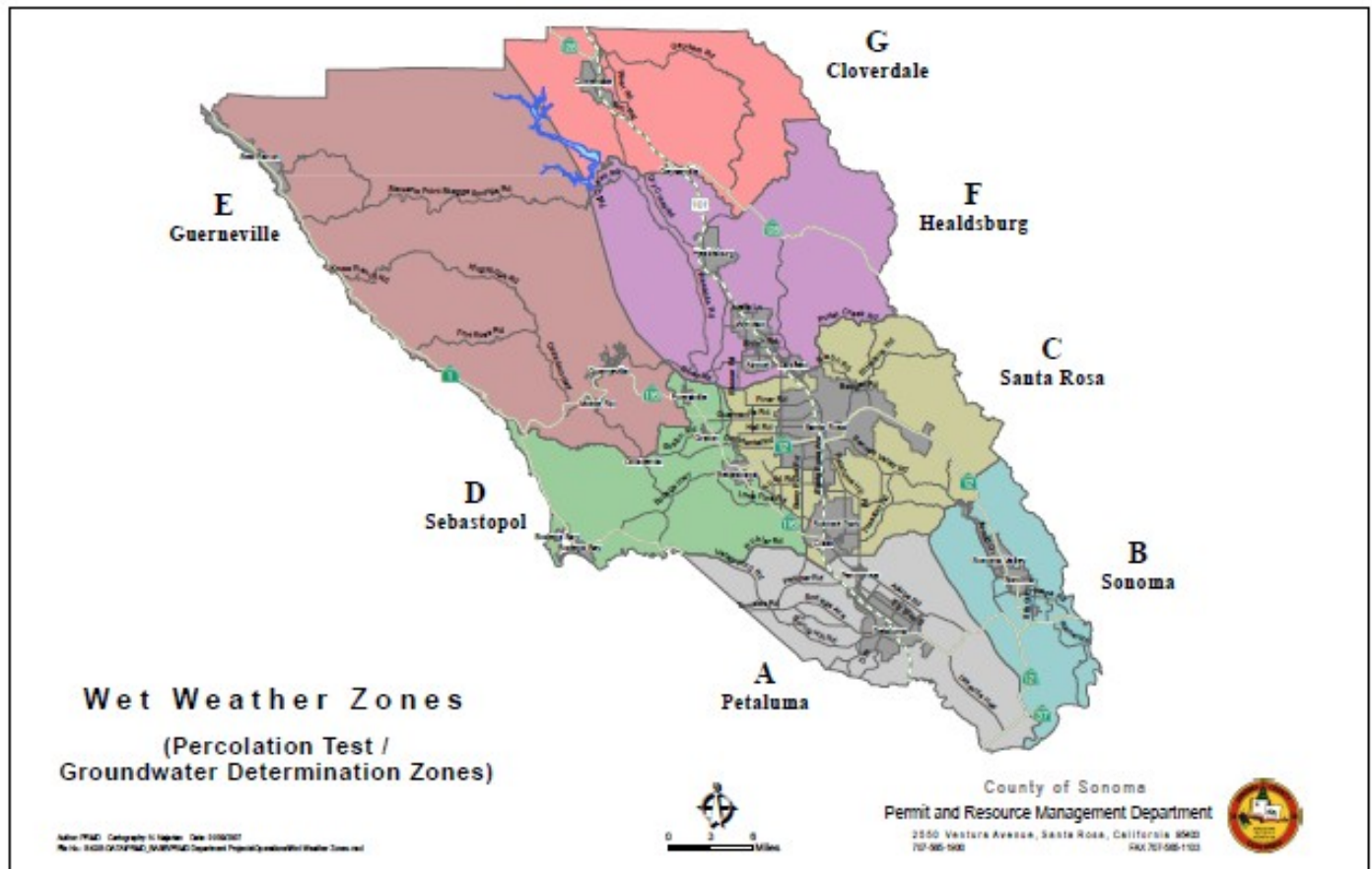
**Table 7.5**

**50 Percent of Average Annual Rainfall by Zone**

<b>Wet Weather Zone</b>	<b>50 Percent of Annual Rainfall</b>
Petaluma (Area A)	12.5 inches
Sonoma (Area B)	15 inches
Santa Rosa (Area C)	15 inches
Sebastopol (Area D)	17.5 inches
Guerneville (Area E)	25 inches
Healdsburg (Area F)	20 inches
Cloverdale (Area G)	20 inches

J. Map 7.5, below, shows the Wet Weather / Groundwater Determination Zones.

## Map 7.5 Wet Weather/Groundwater Determination Zones



## 7.6 Percolation Test Suitability

- A. Site suitability for effluent dispersal for an undeveloped parcel shall be determined by a percolation test. Site suitability for effluent dispersal for a developed parcel shall be determined by a percolation test or soil analysis.
- B. Private sewage dispersal sites require a minimum of 6 or more holes spaced uniformly throughout the area chosen for the proposed leaching field and leaching field expansion area.
- C. The location of test holes must take into consideration the minimum distances which will govern construction of an OWTS.
- D. Additional requirements, determined on an individual basis, may be required for specially designed or non-standard on-site sewage dispersal systems when permitted.

## 7.7 Percolation Test Hole Construction

A. Percolation test hole construction requirements are as follows:

1. Dig or bore holes 4, 6, or 8 inches in diameter, to the vertical depth of the proposed trench and at least 12 inches below any proposed effluent pipe (refer to Tables 7.8a and b and Figures 7.8a and b).
2. After holes are dug, remove all loose material possible after carefully scraping the bottom and sides to remove any smeared soil surfaces. Add clean pea-gravel (maximum of 1 inch) to stabilize the hole, insert a perforated pipe (3 or 4 inch diameter) and place pea-gravel around exterior of pipe at least 12 inches, or up to ground surface. At the bottom of any backhoe excavations used, a secondary 6 or 8-inch diameter hole is to be bored to the depth of the proposed trench in *undisturbed* soil, providing that the depth shall not be less than 12 inches. Do not back fill soil around pipe in backhoe holes. Measure and record the length of the pipe on the report form.

**Table 7.8a**

### Percolation Test Hole Depth Requirements (Standard OWTS)

Standard OWTS Slope at Hole	Standard OWTS Depth of Holes
Standard 0 to 12.5 percent <sup>1</sup>	30 inches (Minimum)
Standard 12.5 to 30 percent <sup>1</sup>	36 inches (Minimum)
Filled Land (0 to 20 percent)	24 inches
Shallow Sloping (12.5 to 30 percent)	36 inches

<sup>1</sup> Deeper percolation testing may be required if there is dissimilar soil types below the bottom of the trench.

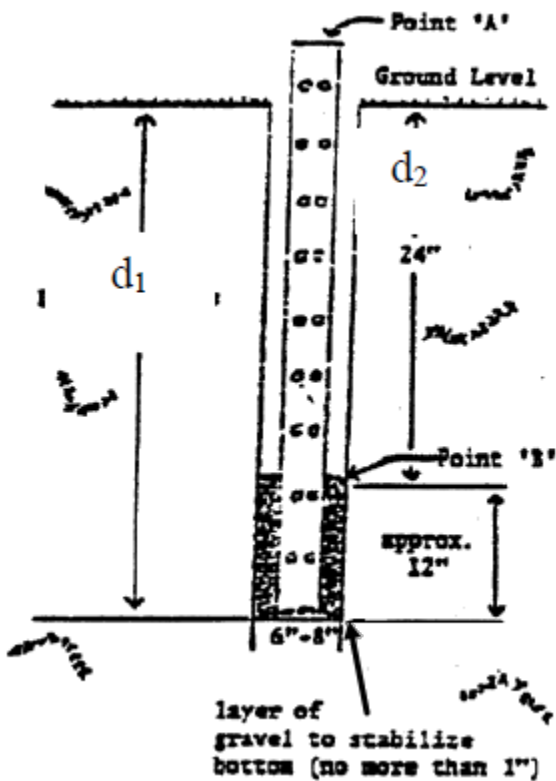
**Table 7.8b**

**Percolation Test Hole Depth Requirements (Non-Standard OWTS)**

<b>Non-Standard OWTS Slope at Hole</b>	<b>Non-Standard OWTS Depth of Holes</b>
Mound (0 to 20 percent)	24 inches (Minimum)
STPD (0 to 20 percent)	24 inches (Minimum)
STPD (20 to 25 percent)	30 inches (Minimum)
STPD (25 to 30 percent)	36 inches (Minimum)
STPD (up to 30 percent)	60 inches (Maximum)
At-Grade	12, 24, and 36 inches
Drip Dispersal	6 to 12 inches and 24 inches below pipe depth
Shallow In Ground	10 to 14 inches and 24 inches below pipe depth
Gravel-less Pressurized Dispersal Channel (GPDC)	10 to 14 inches and 24 inches below pipe depth

## Figure 7.8a Percolation Test Hole Requirements

### Example A of Typical Percolation Test Hole on 12 % Slope



#### Materials needed to conduct a percolation test:

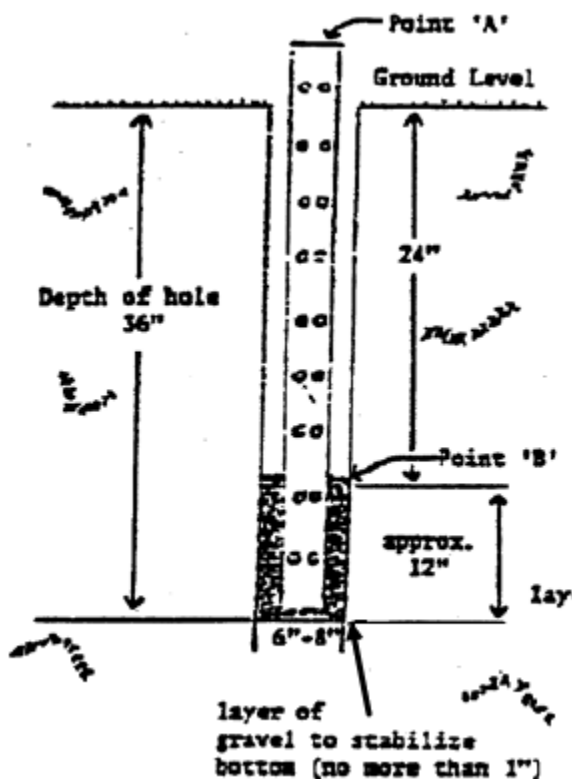
1. 3 or 4 inch diameter perforated pipe.
2. Fine gravel (pea).
3. Metal tape measure.
4. 6 inch or 8 inch soil auger.
5. Water supply.

#### Measurements:

1. Record length of pipe and depth of hole.
2. Record presoak remaining to the nearest one eighth inch.
3. Record measurements from Point "A" to Point "B" (from top of pipe to top of water).
4. Adjust water level to 12 inches above gravel at bottom of hole.

Note: The depth of the percolation hole will vary according to slopes on site, and whether the system proposed is a standard, innovative or alternative system.

### Example B of Typical Percolation Test Hole on 12 % Slope



#### Materials needed to conduct a percolation test:

1. 3 or 4 inch diameter perforated pipe.
2. Fine gravel (pea).
3. Metal tape measure.
4. 6 inch or 8 inch soil auger.
5. Water supply.

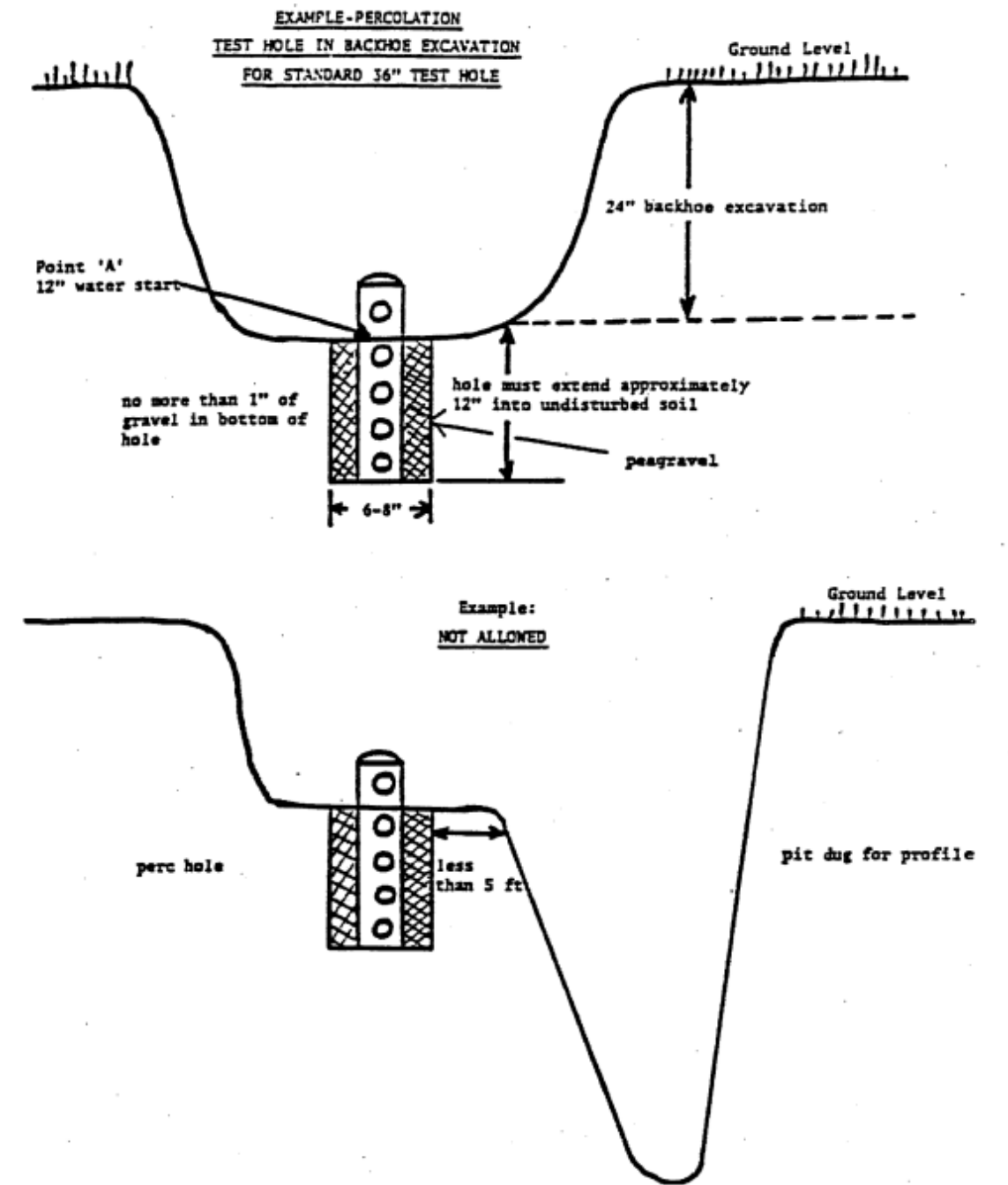
#### Measurements:

1. Record length of pipe and depth of hole.
2. Record presoak remaining to the nearest 1/8 inch (from top of pipe to top of water).
3. Record measurements from Point "A" to Point "B" (from top of pipe to top of water).
4. Adjust water level to twelve inches above gravel at bottom of hole.

Note: The depth of the percolation hole will vary according to slopes on site, and whether the system proposed is a standard, innovative, or alternative system.



Figure 7.8b Percolation Test Hole



## **7.8 Percolation Test Procedures**

- A. Presoak on the day prior to conducting the tests, fill the holes completely with clear water to which no substances have been added and refill at least 4 times. An alternate procedure is a continuous 12-hour presoaking employing a reservoir and continuous head device. Presoaking for wet-weather tests is not necessary if the tests are performed during the 10-day period in which wet-weather groundwater determinations are allowed.
- B. Percolation Rate Measurements Percolation-rate measurements shall be made on the day following the presoaking of test holes.
  - 1. When water remains from presoaking, record the inches of water remaining on the report form and adjust the water level to 12 inches over the gravel base. Measurements are then taken from a fixed point at the top of the pipe to the top of the water and like measurements taken each hour for 6 hours. Record measurements accurately, vertically, and to the nearest 1/8 inch.
  - 2. When no water remains from presoaking, gently add clear water to the hole to a depth of 12 inches over the gravel base. Measure the drop in the water level from a fixed point at the top of the pipe to the top of the water each hour for 6 hours. Additional water may be added to 12 inches above the gravel when the hole is empty, or after any reading that indicates the water is less than 2 inches above the gravel. Record the new water elevation and continue measurements for duration of initial 6-hour test. Record measurements to the nearest 1/8 inch.
  - 3. When hole is dry before the first 60 minutes upon start of test measurements, add clear water to 12 inches over the gravel base and take measurements every 10 minutes for 2 hours. The 12 inches of water is to be replaced at any time the hole is empty or the water depth is less than 2 inches.

## **7.9 Percolation Rate Interpretation**

- A. An average stabilized percolation rate of at least 1 inch per hour is required for the installation of a standard OWTS. Stabilized rates slower than 1 inch per hour or less than 1 minute per inch may be considered for inclusion within the Experimental or Alternative Non-Standard OWTS Program (Sections 12 and 13). Refer to Table 7.2a.
- B. The drop in the water level that occurs between the 5th and 6th measurements on 6-hour tests is considered to be the stabilized percolation rate. The drop in water level that occurs between the 11th and 12th measurements is considered to be the stabilized rate for the 2-hour test. The readings during prior periods provide information for modification of the interpretation of the average stabilized percolation rate. Prior readings will be evaluated where refilling of test holes has occurred in the last 2 hours of the test or when rates show significant inconsistency during the course of the tests.

- C. Average percolation rates less than 5 minutes per inch will require that a soil texture analysis (hydrometer method) be performed to determine the necessary clearance from proposed trench bottom to elevated seasonal water table, unless well logs demonstrate the distance to water table to be 40 feet or greater. If soil texture analysis is performed, required clearance to water table shall be as specified in Section 7.5.
- D. An average percolation rate of less than 1 minute per inch is not suitable for the installation of an OWTS with the exception of a pretreatment and disinfection to a drip system.

**Table 7.10**  
**Percolation Rate Conversion Chart**

Inches per Hour	Rate Minutes per Inch	Inches per Hour (Continued)	Rate Minutes per Inch (Continued)
1/8	480	2 3/4	22
1/4	240	3	20
3/8	160	3 1/4	18
1/2	120	3 1/2	17
5/8	96	3 3/4	16
3/4	80	4	15
7/8	69	5	12
1	60	6	10
1 1/8	53	7	9
1 1/4	48	8	8
1 3/8	44	9	7
1 1/2	40	10	6
1 5/8	37	12	5
1 3/4	34	15	4
1 7/8	32	20	3
2	30	39	2
2 1/4	27	60	1
2 1/2	24		

## **7.10 Wet Weather Percolation Tests**

- A. If a soil is determined to be within Zones 3 and 4 of the soils suitability chart, “wet weather” percolation testing is automatically required, unless Plasticity Index is less than 20 (ASTM D 4318-84). (See Figure 7.4 soil suitability chart.)
- B. Wet weather soils percolation tests are percolation tests conducted between January 1 and March 1 after having received 50 percent of actual seasonal rainfall for each defined geographic area. (See Section 7.5, Table 7.5 and, Map 7.5.)
- C. Extensions beyond the time limits of the above criteria may be made by the Engineering Program Manager of the Permit Authority based on an evaluation of rainfall and groundwater monitoring and within the parameters of this section. Extensions beyond April 30 are not allowed.
- D. Presoaking for wet weather tests is not necessary if the tests are performed during the 10-day period in which wet weather groundwater determinations are allowed.

## **7.11 Percolation Test Submittal of Results**

- A. Percolation test information shall be submitted within 90 days to the Permit Authority on the County form provided for all tests conducted including preliminary tests, failing holes and exploratory holes which were not tested.
- B. All percolation test records submitted for approval of a site must be complete and shall include a written evaluation attesting to the validity of all tests by a Registered Civil Engineer, Registered Geologist, Soil Scientist or Registered Environmental Health Specialist experienced in on-site sewage dispersal systems. Records and evaluations submitted are to include at a minimum:
  - 1. Data on all excavations, including failing holes and exploration holes within a 100-foot radius of the proposed septic area which were not tested.
  - 2. Size of land area available for primary dispersal system and required replacement area, including a scaled plot plan showing the location of test holes dimensioned to property lines and delineating the area for the dispersal fields as calculated from the established percolation rate.
  - 3. Accurate ground slope in the primary and expansion dispersal field, and areas within 50 feet.
  - 4. Location of cut banks, natural bluffs and sharp changes in slope within 50 feet of the primary and expansion field.
  - 5. Location of wells, springs, intercept drains, streams and other bodies of water on the property and within 150 feet of primary and expansion areas.

6. Location of existing houses, structures, rock outcrops and large trees in the area of the test.
7. Depth to groundwater when required, per Section 7.5.
8. Special area standards.
9. The person verifying the validity of the tests must describe the soils encountered in the profile holes as outlined in Section 7.4, as well as attest to the fact that required presoak was performed, that the test was set up in accordance with County standards, that he/she personally observed the site and a portion of the tests, and that it is a true and accurate indication of the suitability of the site for on-site sewage dispersal as measured by the standards of the Permitting Authority and the County of Sonoma.

## **7.12 Cumulative Impact Studies**

- A. Cumulative Impact Studies may be required for those projects that propose a potential groundwater mounding and or nitrate loading condition that has potential to effect groundwater and/or surface waters.
- B. The study may be required for subdivisions, commercial, multifamily and individual proposed OWTS.
- C. The study shall be conducted by a qualified professional.
- D. The study shall include both the detailed methodology used and the principles of groundwater hydraulics.
- E. Groundwater Mounding Study shall be done to determine the highest extent the water table will rise during wet weather season.
- F. Nitrate Loading Study shall include the annual chemical-water mass balance.

## **Section 8 Criteria for OWTS Components**

### **8.1 Septic Tank Requirements**

- A. These requirements shall apply to all septic tanks in new OWTS and replacement systems.
1. Septic tanks shall be International Association of Plumbing and Mechanical Officials (IAPMO) approved. Septic tanks shall be sealed with an approved sealant so it is watertight. Wood septic tanks and metal septic tanks are prohibited.
  2. Septic tanks shall have at least 2 two compartments separated by a baffle or equivalent arrangement. The inlet compartment shall have a capacity of not less than 2/3 the total volume.
  3. An inlet tee and outlet tee is required.
  4. Each compartment of the septic tank shall have access provided by a manhole having not less than 24 inches in minimum dimensions with a close fitting manhole cover equipped with a durable handle to facilitate removal.
  5. A clean-out to finished grade shall be provided between the structure and the septic tank.
  6. Each compartment shall be provided with a riser extended from each manhole cover to the surface of the ground so as to facilitate inspection and maintenance of the septic tank. The riser shall be of equal size or larger than the manhole cover and shall be constructed of durable material. All joints shall be properly sealed with a sealant and/or an interlocking mechanism approved by the Permit Authority.
  7. A corrosion-resistant, NSF rated effluent filter approved by the Permit Authority, capable of screening solids in excess of 3/16 of an inch in diameter, shall be provided in the outlet tee.
  8. All connections from building to septic tank must conform to construction standards per the approved County Code requirements.

### **8.2 Septic Tank Sizing**

- A. The minimum liquid capacity of any septic tank installed shall be 750 gallons. Septic tanks intended to serve single family dwellings shall be sized on the number of bedrooms in the dwelling. The septic tank size for commercial OWTS shall be based on the peak daily sewage flow formula of  $V$  (net volume in gallons equals  $1,125$  plus  $0.75Q$  (daily wastewater flow in gallons)).
- B. Minimum required septic tank sizing is shown in Table 8.2.

**Table 8.2**  
**Septic Tank Capacity**

<b>Bedrooms</b>	<b>Tank Capacity (gallons) Pre-Cast Tank</b>
1-2	750
3	1000
4	1200
5-6	1500
Additional Bedrooms	250 per bedroom

### **8.3 Sump & Pump System**

- A. A pump system can be a supplement to an OWTS. A pump in a standard system is utilized to enable the installation of a dispersal field up-slope of the structure to be served. The effluent at the higher elevation is distributed to the dispersal field by gravity flow.
- B. A pump system is a major feature in an alternative OWTS that allows intermittent balanced dosing or pressurizing of effluent in the dispersal system. Any sump and pump must be designed, inspected and hydraulically tested for proper operation by the designer and Permit Authority staff prior to final approval of the installation.

### **8.4 Sump & Pump Requirements**

- A. Sewage effluent sump and pump general requirements area as follows:
  - 1. Specifications for the sump and pump, including the pump performance curve, must be submitted with the design for the OWTS.
  - 2. Design information shall include the following:
    - a. Relative elevations of the pump and dispersal field pipe;
    - b. Total dynamic head loss through the effluent piping and valves;
    - c. Pump run times; and
    - d. Design flow rate (gallons per minute).
  - 3. All sump pump systems and distribution systems must be inspected and hydraulically tested for proper operation by the designer and Permit Authority staff prior to final approval of the installation and occupancy of the structure.
- B. Required features of the sump are as follows:
  - 1. The minimum working capacity of all sumps is 300 gallons, including:

- a. The design dose volume.
  - b. A minimum 200 gallon additional storage capacity between the high water alarm and inlet.
  - c. The minimum working capacity of sumps for non-standard OWTS is 500 gallons or 3 times the designed dose, whichever is greater.
  - d. Alternative configurations may be approved for systems utilizing pretreatment and repairs if justified by the designer.
2. Concrete tanks shall be a monolithic casting or joints sealed with appropriate sealants.
    - a. Concrete tanks shall be made of sulfate-resisting cement, Specification C 150, Type II or highly sulfate-resisting cement, Specification C 150, Type V or coated with an asphalt emulsion or equivalent on the inside.
    - b. The coated interior shall be allowed to dry for at least 24 hours.
    - c. Asphalt emulsion or tar shall not be used as joint sealants.
  3. Sump tanks shall be constructed of solid durable materials, which are not subject to excessive corrosion and degradation in the presence of domestic sewage and shall be watertight.
    - a. They shall meet the IAPMO construction standards for septic tanks of the said material (glass-fiber-reinforced polyester, polyethylene, synthetic fiber reinforced).
    - b. Wood and/or metal tanks are not allowed.
  4. All sumps shall have a riser that extends to at least 2 inches above the finished grade.
    - a. Risers shall be sealed watertight to the sump chamber with materials suited for the specific application.
    - b. Wood risers are not allowed.
    - c. Risers and lids in traffic areas shall be traffic rated and may be flush with the ground elevation.
  5. All pipes and/or electrical conduits entering the sump tank or riser shall be sealed to make the passage gas and water tight.
    - a. If the pipes and/or electrical conduits enter a synthetic tank or plastic riser, rubber grommets shall be used
    - b. Non-shrink grouts should be used with concrete tanks or risers.
  6. Sumps on downhill runs shall be placed within 30 feet of the leach field, unless greater distances are allowed. When practical, sumps shall be located at a lower elevation than the leach field.
    - a. The sump tank location must be accessible for a septic tank pumper to pump the tank.
  7. A pre-screening device or filter capable of screening solids in minimum 3/16 inches size shall be installed in the septic tank or sump chamber to assist in preventing suspended solids from reaching the pump.



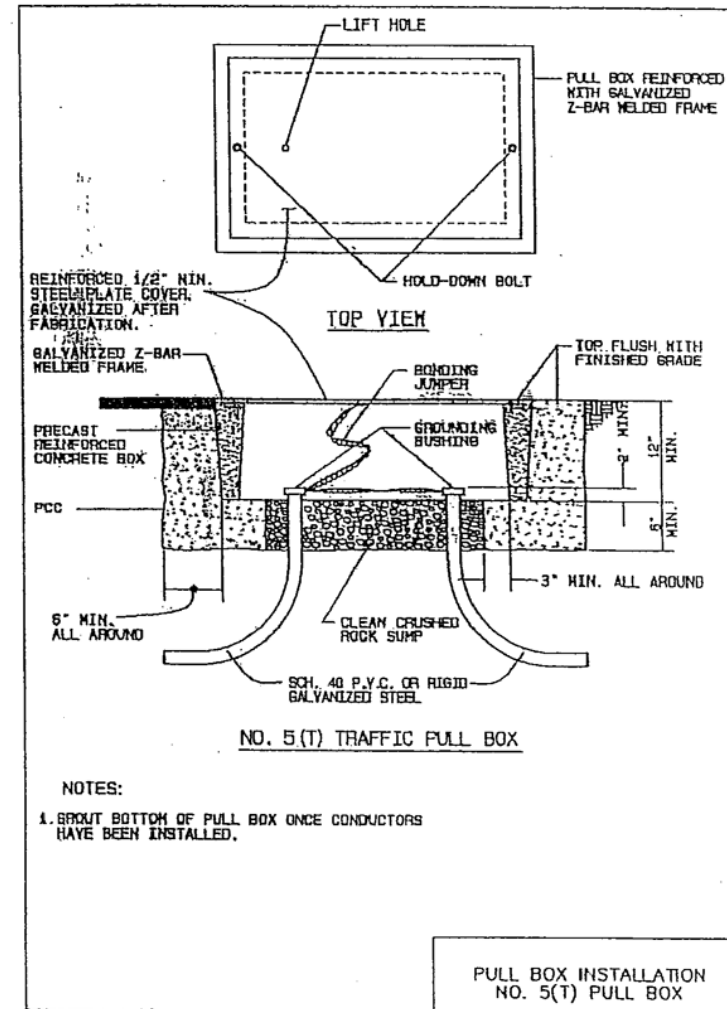
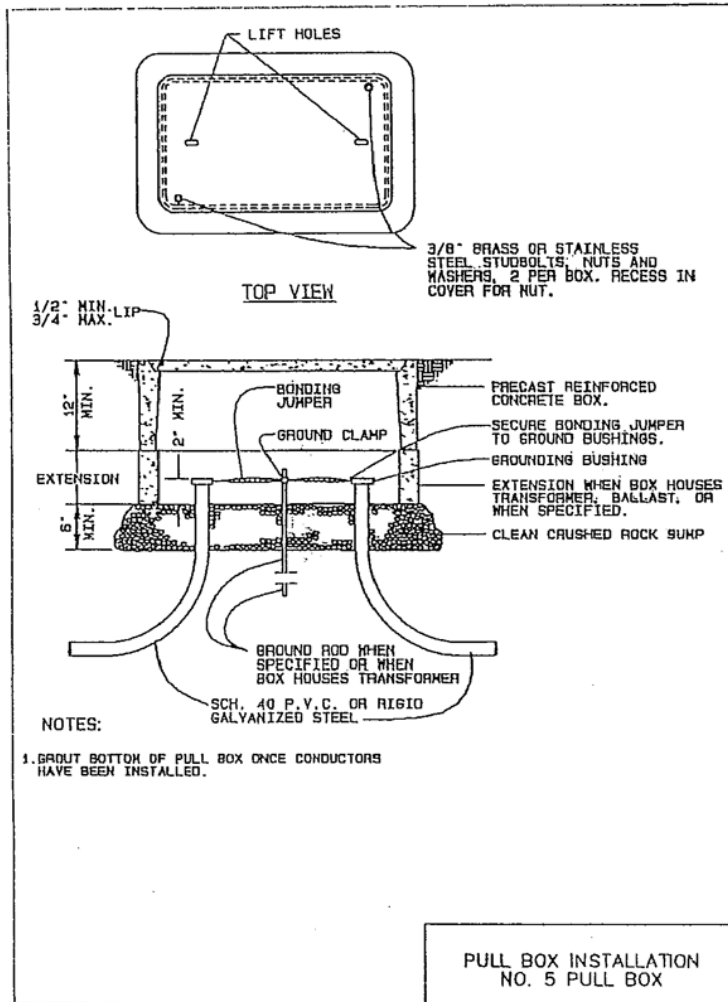


D. Required electrical features are as follows

1. All materials, connections, and specifications shall meet the California Electric Code.
  - a. In all cases in which a sump with a pump is used for an OWTS, the contractor/owner shall obtain an electrical permit from Permit Authority or City Building Department having jurisdiction.
  - b. The Permit Authority shall be responsible for inspection and approval of all electrical code requirements.
  - c. Disconnecting means (control panel or disconnecting switch) shall be located in sight from the pump location per the County adopted electrical code.
2. The alarm shall be equipped with:
  - a. A loud (87 decibels at a 10-foot minimum horizontal distance from the alarm location) audio alarm operated by a float switch or switches to indicate an "alarm" situation.
  - b. A minimum sized 7/8-inch diameter red light shall be mounted on the face of the panel, which shall glow as long as the "alarm" condition exists.
  - c. A momentary "alarm test/alarm silence" switch to test the alarm light and horn to simulate an "alarm" condition and to silence the audio alarm horn.
3. An approved listed model or type of float switch shall be used to activate each pump. The alarm/control panel shall be equipped with a motor contactor for the pump and a pump hand/off/automatic switch to manually run the pump bypassing the control panel automatic mode and to test the alarm.
4. Power supply to each circuit breaker in the control panel shall be from a separate dedicated circuit with circuit protection, of equivalent or higher amperage rating, at the power supply panel.
  - a. The alarm/control panel shall be equipped internally with separate circuit protection for the control and pump circuitry.
    - i. Multiplex (more than 1 pump) systems shall have separate power supply circuits.
    - ii. Separate circuits are required for controls and each pump.
    - iii. Joint circuits may be acceptable for existing sump/pump systems that were installed prior to this requirement if fused pursuant to the current Electrical Code.
  - b. Pump protection shall be provided by a thermal magnetic circuit breaker for overload protection.
    - i. If the pump is single-phase, the motor windings shall have internal thermal overload protection.
    - ii. If the pump is 3-phase, the circuit protection in the alarm/control box shall be equipped with an adjustable thermal overload protection.

5. Below grade electrical splices shall be placed in a Sonoma County approved pull box installation or a Sonoma County approved external splice box with waterproof splice connectors.
  - a. Traffic-rated pull boxes shall be used in traffic and adjacent areas. See Figure 8.4b.
6. Electrical non-metallic splice boxes may be placed within the sump chamber for existing sump/pump systems that were installed prior to this requirement. They shall be gas-tight boxes with waterproof splice connectors.
7. The pump power lead and the float switch control wires may run in a common conduit. High voltage and low voltage conductors shall be run in separate conduits.
  - a. All cords going into the sump shall be individually sealed with non-metallic gas tight fittings in either the riser, junction box or alarm/control panel as appropriate.
  - b. Metallic gas tight fittings are not allowed.
  - c. All exposed PVC conduit shall be Schedule 80.
8. The control panel and its contents shall be UL listed.
  - a. The control panel shall be placed in an easily accessible location.
  - b. A non-resettable dose counter shall be installed in control boxes utilized for non-standard OWTS.
  - c. If a dose counter is not provided, a non-resettable flow meter shall be provided on the outgoing line to the dispersal field. Additionally, systems with flush modes shall be equipped with a flow meter on the return line. The flow meter shall read in gallons per minute and total gallons.
  - d. The control panel shall be equipped so settings can be adjusted manually on-site.
  - e. Control boxes that must be opened to view the dose counter shall be equipped with a clear plastic or Pyrex safety shield inside the control box.
  - f. The control box shall be labeled "Caution-Electrical Hazard."
  - g. The dose settings (time or gallons), calculated dose volume and float settings shall be posted on the inside of the panel.

Figure 8.4b Sump and Pump Requirements



9. All exterior mounted alarm and controller enclosure shall be NEMA Type 4. If the alarm/controller is mounted more than 75 feet from any residence or commercial structure served by the system, a separate audible/visible alarm shall be provided at the primary structure connected to the OWTS.

- a. The enclosure for the remote and audio/visual alarm shall be NEMA Type 1 if mounted indoors.

E. Required features of sewage piping are as follows:

1. The effluent line entering the sump shall be minimum of 3 inch diameter, ABS Sch 40 or PVC Sch 40, and shall be sealed with a coupling integrally cast into the tank, a properly fit neoprene grommet or with non-shrink grout as appropriate.
  - a. The effluent line shall be turned down with a sanitary tee fitting and drop that extend to within 4 inches of the tank floor.
2. Minimum 1 inch PVC Schedule 40 from pump to dispersal field is required with:
  - a. A 1/8-inch diameter anti-siphon and air vent hole located between the pump and check valve angled down and away from the floats;
  - b. PVC check valve;
  - c. PVC gate or ball valve and union(s).
3. Brass type fittings, valves, and piping are prohibited in sump chambers.
4. High points in the transmission line after the sump may require an "air relief valve" depending on the design situation.

## **8.5 Alternating Leach Fields**

- A. Alternating leach fields are required for OWTS of greater than 500 lineal feet of leach line.
- B. An approved diversion valve, or dosing tank with pump(s), is required for alternating leach fields.
- C. Each primary field shall be equal to 75 percent of the primary leach field lineal requirement.
- D. For installations of from 500 to 1,000 lineal feet of leach line, the dosing requirement may be satisfied by any one of the following approaches:
  1. Dosing tank with a pump which discharges the tank once every 3 to 4 hours.
  2. Alternating leach fields with an approved diversion valve.

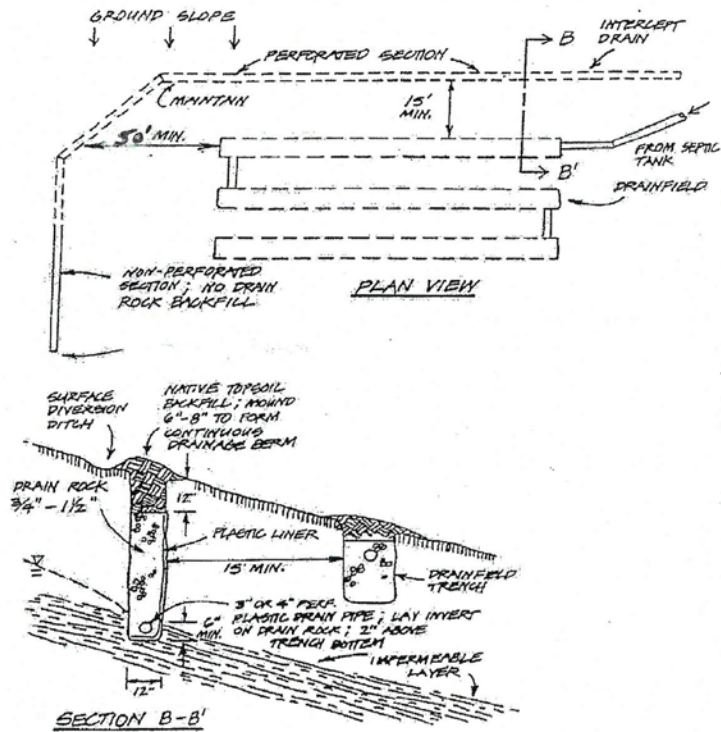
3. 2 or more septic tank / leach field systems, with neither system exceeding 500 lineal feet of leach line.
- E. For installations of greater than 1,000 lineal feet of leach line, the dosing requirement may be satisfied by any of the following approaches:
1. Dosing tank with 2 pumps dosing alternately and each serving  $\frac{1}{2}$  of the leach field.
  2. 3 or more septic tank/leach field systems, with no system exceeding 500 lineal feet.

## **8.6 Intercept Drains**

- A. The design of the intercept drain is dependent on the size of the contributing drainage area, the amount of water that must be removed, the soil's hydraulic properties, and the available slope of the site. The use of intercept drains to lower the level of perched groundwater in the immediate dispersal field area shall be acceptable only under the following conditions:
1. The design plan shall be signed and stamped by a Qualified Consultant.
  2. Natural ground slope is greater than 5 percent.
  3. Site investigations indicate groundwater to be perched on bedrock, hardpan, or an impermeable soil layer.
  4. The intercept drain extends from ground surface into bedrock, hardpan, or impermeable soil layer. See Figure 8.6.
  5. A trench minimum width of 1 foot.
  6. The upslope side of the trench shall be lined with a geotextile filter fabric.
  7. The down slope side of the trench shall be lined with 10 to 12 millimeter polyethylene sheeting.
  8. The drain rock shall be  $\frac{3}{4}$  to 2-inch diameter in size and washed, contain less than 1 percent fines (sand, very fine silt, and clay) and extend from trench bottom to within 6 to 12 inches of grade and backfilled to grade with native soil.
  9. The collection pipe shall consist of 4-inch diameter perforated drain pipe, oriented with holes down and installed on top of the drain rock, approximately 2 to 4 inches above trench bottom.
  10. The outlet pipe shall consist of a minimum 4-inch solid (non-perforated) drain pipe at the point of discharge with placement of rip rap and be maintained free and clear.

11. The trench and pipe shall be sloped for gravity flow at a minimum 1 percent gradient throughout the trench and extending to the outlet point.
  12. Cleanouts to grade are required
    - a. At the upslope end of the drain;
    - b. At bends of 45 degrees or greater;
    - c. At least every 100 feet along the length of the drain.
- B. The perforated section of an intercept drain shall not be located less than 15 feet upgradient nor 25 feet laterally or 25 feet downgradient of a septic tank. The perforated section of an intercept drain shall not be located less than 15 feet upgradient nor 50 feet laterally or 50 feet downgradient of a dispersal area or non-standard system.
- C. The non-perforated or solid section of a drain pipe shall not be located less than 5 feet upgradient nor 10 feet laterally or 10 feet downgradient of a septic tank. The non-perforated section or solid section of drain pipe shall not be located less than 10 feet upgradient nor 15 feet laterally or 15 feet downgradient of a dispersal area or non-standard system.
- D. Where all of the above conditions cannot be met, actual performance of the intercept drain shall be demonstrated prior to approval for an OWTS permit.
- E. Interceptor drains are required and shall be installed according to Section 18A.b and c (West Petaluma Variance Prohibition Special Standards Area).

**Figure 8.6 Interceptor Drain**





## **8.7 Stream and Driveway Crossings**

- A. All pipe used within the watercourse setbacks or under a driveway must be PVC Schedule 40 or other approved material.
- B. All effluent transmission pipes used for stream crossings must be pressure tested at the time of installation and prior to final inspection. Pressure testing shall be conducted in accordance with the most current version of the Sonoma County Water System Standards, Section 8, Inspection and Testing (including record drawings).
  - 1. Buried pipe must have a minimum of 4 feet of cover over the portion of the pipe under the center line of the stream.
    - a. This may be reduced to 1 foot if the portion of the pipe under the stream banks is encased (sleeved) in ABS Schedule 40, PVC, cast iron, or concrete pipe extending a minimum of 25 feet beyond the high water elevation mark on both sides of the stream.
  - 2. Pipe must be encased (sleeved) with cast iron or well casing whenever it is exposed or above the stream.
    - a. Pipe must be 1 foot above the 100 year flood elevation.
    - b. Pipe must be either covered with fill over a culvert or hung by approved hangers every 4 feet from an appropriate supporting structure as specified in the California Plumbing Code.
- C. All effluent transmission pipes used for driveway crossings must have a minimum of 1 foot of native cover over the pipe and encased (sleeved) with ABS Schedule 40, PVC, cast iron, or concrete pipe extending a minimum of 5 feet beyond the driveway edges.

## Section 9 Criteria for Standard OWTS

### 9.1 Standard OWTS

- A. A standard OWTS consists of an approved septic tank and standard dispersal trenches. A standard OWTS may include a pump system to enable the installation of a dispersal field up- slope of the structure to be served.
- B. Standard OWTS may be allowed in areas with a soil percolation rate of 60 minutes per inch or less. Soil percolation rates of 61 to 120 minutes per inch require installation of a non-standard OWTS.
- C. The minimum soil depth below the leaching trench shall be 3 feet for a Standard OWTS.
- D. Standard OWTS may not be installed on slopes exceeding 30 percent.
- E. Sizing of standard OWTS shall be based on Table 7.2a Sewage Application/Soil Loading Rates (gallons per square foot per day) at 150 gallons per bedroom. Lineal footage sizing requirement is based on the consideration of sidewall area only. Credit is not given for trench bottom area. Note: 20 percent reduction allowed with installation of low flow fixtures.
- F. The required lineal feet of standard leach line is determined by the Design Flow Rate divided by the Soil Loading Rate (Table 7.2a) divided by the trench lineal area available (sidewall infiltration only, bottom area is not included). For example a 2 bedroom house at 150 gallons per day per bedroom equals 300 gallons per day. A percolation rate of 30 minutes per inch equals 0.56 gallons per square foot per day. 12 inches of gravel below the pipe times 2 equals 2 square feet per linear foot. Thus 300 divided by 0.56 divided by 2 equals 268 linear feet required. See Table 9.1 for example linear feet of leach line based on assumed effluent quality, flow rate, hydraulic loading rate and absorption area.

**Table 9.1 - Illustrative Table for Linear Footage of Leach Line  
per Number of Bedrooms for a Standard Septic System**

Texture	Structure Shape	Structure Grade	Hydraulic Loading (gallons/square foot/day)	Leach Line Length (feet) 1 Bedroom	Leach Line Length (feet) 2 Bedroom	Leach Line Length (feet) 3 Bedroom	Leach Line Length (feet) 4 Bedroom
Coarse sand, sand, loamy coarse sand	Single grain	Structureless	1.2	63	125	188	250
Fine sand, loamy fine sand	Single grain	Structureless	0.6	125	250	375	500
Sandy loam, loamy sand	Massive Platy	Structureless	0.35	214	429	643	857

**Table 9.1 - Illustrative Table for Linear Footage of Leach Line  
per Number of Bedrooms for a Standard Septic System (Continued)**

<b>Texture</b>	<b>Structure Shape</b>	<b>Structure Grade</b>	<b>Hydraulic Loading (gallons/square foot/day)</b>	<b>Leach Line Length (feet) 1 Bedroom</b>	<b>Leach Line Length (feet) 2 Bedroom</b>	<b>Leach Line Length (feet) 3 Bedroom</b>	<b>Leach Line Length (feet) 4 Bedroom</b>
Sandy loam, loamy sand	Massive Platy	Weak	0.35	214	429	643	857
Sandy loam, loamy sand	Prismatic, blocky, granular	Weak	0.5	150	300	450	600
Sandy loam, loamy sand	Prismatic, blocky, granular	Moderate, strong	0.8	94	188	281	375
Loam, silt loam, sandy clay loam, fine sandy loam	Massive Platy	Structureless Weak					
Loam, silt loam, sandy clay loam, fine sandy loam	Prismatic, blocky, granular	Weak, moderate	0.5	150	300	450	600
Loam, silt loam, sandy clay loam, fine sandy loam	Prismatic, blocky, granular	Strong	0.8	94	188	281	375
Sandy clay, silty clay loam, clay loam	Massive Platy	Structureless Weak, moderate strong					
Sandy clay, silty clay loam, clay loam	Prismatic, blocky, granular	Weak, moderate	0.35	214	429	643	875
Sandy clay, silty clay loam,	Prismatic, blocky,	Strong	0.6	125	250	375	500
Clay, silty clay	Massive Platy	Structureless Weak, moderate, strong					
Clay, silty clay	Prismatic, blocky, granular	Weak					
Clay, silty clay	Prismatic, blocky, granular	Moderate, strong	0.2	375	750	1125	1500

Assumptions:

Hydraulic Loading Rate assumes Septic Tank Effluent

Flow Rate per Bedroom = 150 gallons per day per bedroom

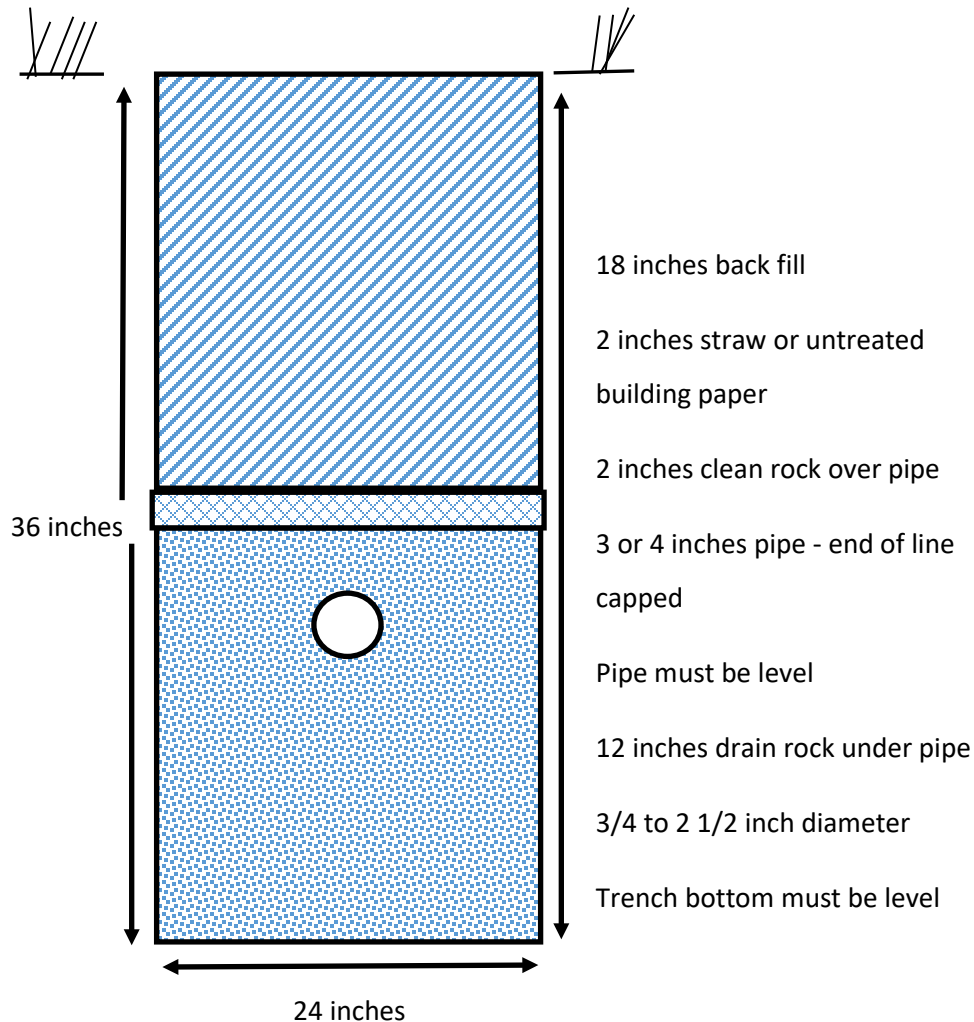
Absorption Area per Length = 2 square feet / linear foot

Trench Length = no. Bedrooms times Bedroom Flow Rate / (Hydraulic Loading times Absorption Area per Length)

## 9.2 Standard Dispersal Trench

- A. Dispersal trenches shall be installed on contour. Dispersal trenches shall be placed a minimum of 8 feet on center on slopes up to 30 percent.
- B. The depth of the dispersal trenches, dependent on the slope, percolation depth, or type of standard OWTS is found in Table 7.8a.
- C. The dispersal trenches shall be constructed in maximum lengths of 100 feet and at widths between 18 and 24 inches. The bottom of the dispersal trench shall be level to within a tolerance of 3 inches in 100 feet.
- D. Dispersal trenches shall contain double-washed rock filter material of 3/4 to 2 ½ inches in diameter, perforated sewage distribution pipe, geotextile filter fabric, and back-filled with a minimum of 12 inches of soil.
- E. The Permit Authority may permit gravel-less trench construction. The design, manufacturing and materials shall be durable and approved by the Permit Authority (See Section 9.4).
- F. A concrete or plastic distribution box shall precede each dispersal trench for the receipt and distribution of wastewater into the trenches. There shall be a minimum distance of 4 feet between the distribution box and the dispersal trench.
- G. Distribution boxes shall be placed for serial distribution of wastewater on sloping ground.
- H. Distribution boxes shall be placed for equal distribution of wastewater on flat terrain.
- I. The distribution box shall be placed in native soils at the appropriate depth. A minimum of 12 inches of backfill shall be placed above the distribution box or extended to grade with a riser. The distribution box shall not be placed in over-excavated soils.
- J. Metal detection markings, a 2 foot by ½ inch galvanized pipe or rebar shall be installed flush and vertical at each distribution box and in a vertical position against the trench wall at the end of the leach line, and also in the middle of lines that are longer than 50 feet. The pipe or rebar shall not be placed at a depth greater than 24 inches.
- K. Construction and paving over leaching systems and replacement areas is prohibited.
- L. Refer to Figure 9.2 Standard dispersal trench detail.

**Figure 9.2 Standard Leach Line Trench**



### **9.3 Seepage Pits**

A. Seepage Pits may be allowed under the following conditions:

1. Separation of the bottom of seepage pits to groundwater shall not be less than 10 feet.
2. Seepage pits shall be no deeper than 6 feet.
3. Seepage pits can only be installed if a satisfactory dispersal trench installation cannot be installed.
4. It is recommended that seepage pits be at least the same size (gallonge capacity) as the septic tank size that would be required based upon the number of bedrooms in the dwelling.
5. All seepage pits shall be completely filled with drain rock. No redwood seepage boxes will be permitted.

### **9.3 General System Installation Requirements**

- A. OWTS shall be installed in accordance with the plans approved by the Permit Authority. Permit Authority staff must approve any changes in the installation plan prior to installation.
- B. OWTS shall be located so as to be accessible for maintenance and repairs. Septic tanks and sump tanks shall be located so as to allow vacuum pumping.
- C. The building sewer and distribution piping shall be constructed with materials in conformance to building sewer standards identified in the Uniform Plumbing Code. The sewer and distribution piping shall have approved watertight fittings with clean-outs provided in accordance with the Uniform Plumbing Code. Piping shall be ABS or PVC Schedule 40 or better.
- D. Dosing siphons are prohibited.
- E. Leaching area side-walls should be left with rough surfaces prior to backfill.
- F. Construction of OWTS shall be avoided during the rainy season. Dispersal trenches are to be back-filled as soon after final construction inspection as possible. Trenches that have remained uncovered during any substantial rain may require abandonment or entire retrenching.

### **9.4 Gravel-less Drain Field Systems**

- A. Gravel-less drain field systems replace conventional rock and pipe standard OWTS drain fields.
- B. Gravel-less chambers are typically made of recycled plastic and must be pre-approved by the Permit Authority.
  - 1. Chambers are usually installed in an 18 or 24-inch wide trench.
  - 2. The chambers are interlocking arches that form a continuous drainage area with louvers to allow dispersal of the effluent into the soil.
  - 3. Sizing of the OWTS dispersal field is based on the height of the louvers sidewall infiltration area only. No credit is given for the trench bottom area. For example, if the chambers have louvers to a height of 9.5 inches, an infiltrative area of 1.6 square feet per linear foot is available.
    - a. Any other configuration must be reviewed on a case by case basis.
- C. Cylindrical bundles typically consist of a geosynthetic aggregate held in place with a high density polyethylene netting, with or without a 4-inch polyethylene pipe, and must be pre-approved by the Permit Authority.
  - 1. Bundles are usually installed in an 18 or 24-inch wide trench.

2. The bundles, also referred to as cylinders, are typically 12 or 18 inches in diameter.
  3. Sizing of the OWTS dispersal field is based on the sidewall area beneath the invert, the number and the configuration of the bundles placed in the trench. No credit is given for the trench bottom area. For example, a bundle with a diameter of 12 inches containing the pipe, installed in a square configuration with 3 additional bundles without pipe, installed in a 24-inch trench, provide an infiltrative area of 3.0 square feet per linear foot.
    - a. Any other configuration must be reviewed on a case by case basis.
- D. Where soil and site conditions allow, approved chamber and cylindrical bundle systems may be installed in lieu of conventional gravel trench at depths up to 60 inches, as measured from the base of the trench to ground surface.
- E. Minimum 12 inches of soil cover is required over the cylindrical bundle(s) or chambers.
- F. Trench spacing, prevention of soil infiltration from cover soil, and all other requirements are the same as for gravel trenches.
- G. The chamber and cylindrical bundle systems are not to be installed in locations that would be subject to vehicular traffic, such as driveways or parking areas.

## **9.5 Filled Land Systems**

- A. Filled Land OWTS are systems where imported soil is imported and compacted to a minimum depth of 12 inches over native soil for the dispersal trench area of the system.
1. The system must be designed by a qualified consultant.
  2. Filled Land proposals for subdivisions which have received tentative map approval based on the prior filled land septic system policy dated January 1, 2009 shall not be deemed acceptable for processing of the septic requirements for the subdivision.
  3. All the test holes in the area proposed for the Filled Land system and the reserve replacement area and within a 20-foot radius of the proposed perimeter of the leachfield shall be evaluated per standard system percolation test criteria. See Table 9.5 for allowable trench depth into native soil.

**Table 9.5 - Filled Land OWTS Trench and Fill Requirements**

<b>Trench Depth Into Native</b>	<b>Gravel Depth Below Pipe</b>	<b>Fill Material Needed</b>
12	9	15
15	12	15
18	12	12
18	15	15
21	18	15
21	12	9
24	21	15
24	18	12
24	12	6
27	24	15
27	18	9
27	12	6
30	24	12
30	18	6
30	12	No Fill. Standard System.

4. A full description of the complete installation including quality, kind and grade of all materials, equipment, construction workmanship and methods of assembly and installation shall be provided.
5. Proof of soil below the bottom of the trench is the same as for standard systems and can be demonstrated by percolation testing, soil morphology, and texture analysis. At a minimum, 3 feet of continuous acceptable soil is required below the proposed trench bottom. A variance for an alternative system (for example incorporation of an approved pretreatment unit) may justify reduction of the setback to 2 feet below trench bottom.
6. Filled Land Systems are limited to areas not exceeding 25 percent slope.
7. All dispersal trenches shall be a minimum of 12 inches in depth into native soil.
8. Gravel depth above pipe is to be 2 to 3 inches.
9. Gravel depth below pipe is to be not less than 12 inches unless an administrative variance is approved. See Table 9.5 for permissible gravel depth below pipe.
10. Trench width of 18 to 24 inches



11. Increased trench depth and gravel depth is permissible with a subsequent reduction of fill soil. A minimum of 6 inches of fill for any trench depth is required. A minimum of 15 inches of soil is always required above the pipe. See Table.9.5 for fill material requirements.
12. Use of gravel-less drain field systems, as described in Section 9.4, are permitted.
13. The absorptive quality of imported soil for the leachfield cover shall be equal to or better than the native soil meeting percolation test requirements. Sand, gravel, rock or compost does not qualify as acceptable cover material for filled land systems.
14. Cover material for filled land systems shall be constructed in not more than 8 inch layers to approximately the same relative compaction as the upper soil horizon native to the site. Certified results of the soil density test may be required to be submitted to the Well and Septic Section by the Registered Civil Engineer or Environmental Health Specialist.
  - a. The fill is to be of uniform depth extending to a distance at least 15 feet from the center of any trench in all directions except the up slope distance may be reduced to 5 feet with additional fill to maintain a 5 to 1 taper for a total of 10 feet from the center of the up slope dispersal trench on slopes above 5 percent.
  - b. The down and side slope toes of the fill should be tapered at a 5 to1 ratio beginning 15 feet from any leachfield or proposed leachfield expansion area to provide a total of 20 feet from the center of any trench.
15. Reserve replacement areas must be demonstrated as per other standard systems. A 100 percent reserve replacement area for pre October 1971 parcels and 200 percent for post October 1971 parcels is required. Fill material is not required to be placed on the reserve placement area prior to permitting of the replacement system.
16. Site specifications for fill shall indicate that vegetation is to be removed and surface prepared to permit good mixing of the native soil and fill material added.
  - a. Areas with closely-spaced trees in excess of 24 inches in diameter are generally not suitable for filled-land systems.
  - b. Rototilling to prepare the site for fill is prohibited. A single pass 6 inch rip of the surface soil to ensure a good mixing of the native soil and the fill material is required.
  - c. Wheeled tractors are to be minimized in the dispersal area at this time to avoid soil compaction.
17. Specifications on Filled Land proposals require the fill to be completed before any leaching trenches are constructed.
18. Construction of any dispersal field should be avoided during the rainy season. Lines are to be back-filled as soon after final construction inspection as possible. Lines which have remained uncovered during any substantial rain

may require abandonment or entire retrenching. The fill area shall be seeded or sodded with appropriate vegetation after construction of the dispersal field is complete. Appropriate erosion control measures shall also be in place.

## **9.6 Shallow Sloping OWTS**

- A. The determination of site suitability for a “shallow sloping OWTS,” a standard OWTS that may be installed where depth of permeable soil is inadequate to provide for 15 feet to breakout from the leach pipe to the surface of a slope in areas with slopes from 12½ to 30 percent, may be considered provided the following conditions are met:
1. The system must be designed by a qualified consultant.
  2. If 1 or more soil profiles performed on the site at the depths required for 15 foot-to-breakout prove unsatisfactory and are supported by soils profiles, then additional tests to justify a “shallow sloping system” may be considered.
  3. 8 or more percolation test holes (in no instance less than 36 inches in depth) are required:
    - a. at least 6 in the primary/replacement area,
    - b. 1 hole 25 feet downslope and
    - c. 1 hole 50 feet downslope of the lowest leach line in the primary/replacement area to show the permeable top soil is continuous (for example adequate distance and depth of soil exists to provide filtration and treatment of effluent).
  4. Percolation rates of 1 to 60 minutes per inch are required.
    - a. Percolation rates of faster than 5 minutes per inch may require additional evidence that breakout of effluent to the surface or contamination of beneficial waters will not occur.
  5. The percolation test report must evaluate slope stability. Proposed leachfield areas which are identified on geologic maps of Sonoma County as unstable or questionable must be surveyed by a Registered Geologist. Any mitigations recommended by the geologist are to be incorporated into the system design.
  6. Any proposed leachfield area with outcroppings of bedrock or impermeable soil horizons is not acceptable for a “shallow sloping system.”
- B. The design criteria for a “shallow sloping OWTS” includes the following:
1. Any “shallow sloping OWTS” proposed under these criteria shall be designed by a Qualified Consultant.
  2. Dispersal fields are to be set back a minimum of 50 feet from any bank, natural or manmade, unless otherwise specified by Table 7.2b or where more stringent requirements may apply.

3. Leachfields and reserve replacement areas shall be placed so as to utilize as much of the upper contours of the site as possible. Serial distribution is required unless an approved parallel distribution system is developed.
4. Trenches must be at least 18 inches wide and a minimum of 36 inches deep. Construct dispersal trenches with 12 inches of gravel under the pipe, 2 inches of gravel over the pipe, and 18 inches of earth backfill. If there is more than 36 inches of soil as shown by percolation tests and more than 12 inches of gravel can be used, credit for use of additional trench sidewall may be granted. Non-residential designs will be based on Permit Authority, EPA, or other approved design criteria.
5. Space trenches at least 10 feet on center (8 feet solid earth between trench walls).
6. Amount of leaching trench required for each primary field will be determined from the number of bedrooms and approved percolation rate.
  - a. Construct two primary leachfields divided by an approved diversion valve which can be alternated on at least a yearly basis.
  - b. Each primary field shall be equal to 100 percent of the pre-determined lineal requirement.
7. All dispersal fields are to be provided with an intercept drain unless no significant watershed exists above the system.
  - a. Exceptions must be justified by satisfactory wet-weather ground water determinations.
  - b. Intercept drains shall be installed according Section 8.6.
  - c. Drainage diversions shall not influence neighboring properties.
  - d. All surface drainage shall be diverted away from the leachfield area.
  - e. All perforated portion of intercept drains must be a minimum of 25 feet from any property line unless a variance is justified.

C. The following additional requirements apply to “shallow sloping OWTS”

1. Construction of the dispersal field should be during the dry portion of the typical Sonoma County year. The rainy season should be avoided. Lines are to be back-filled as soon after final construction inspection as possible. Lines which have remained uncovered during any substantial rain may require abandonment or entire retrenching.
2. Benching is not permitted during construction of the dispersal field.
3. The area of the leachfield should be stabilized by sodding or seeding with native grasses to control erosion.
4. No animals may be contained, housed, or pastured over the dispersal field. The soil in the dispersal field area shall not be disturbed by cultivation or tilling.

5. If any lot is to be created utilizing a “shallow sloping system” design, appropriate deed restrictions shall be recorded prior to validation of the land division.

## **9.7 Standard Shallow Trench Pressure Distribution (STPD) OWTS**

- A. If desired by the property owner, a STPD OWTS may be permitted as a Standard OWTS, rather than a Non-Standard OWTS, under the following conditions
  1. The percolation rate is 60 minutes per inch or less at proposed trench bottom and otherwise meets the Section 7 Site Evaluation and Investigation Requirements.
  2. Gravel size of  $\frac{3}{4}$  to  $2\frac{1}{2}$  inches is allowed.
  3. Except for the percolation test rate of 60 minutes per inch or faster and gravel size, the proposed OWTS otherwise meets all other Section 13.3 STPD site, design and construction criteria.
  4. A STPD that meets the above referenced requirements shall not be subject to the reporting requirements of Section 13.

## **Section 10 Criteria for Water Reuse**

### **10.1 Graywater**

- A. The construction, alteration, and repair of graywater systems are subject to the provisions of the 2013 California Plumbing Code (CPC), Chapter 16 Alternate Water Sources for Nonpotable Applications, Section 16.02.
  - 1. A Clothes Washer System is subject to the requirements of the 2013 CPC Section 16.02.1.1.
    - a. The repair, alteration, relocation, installation or construction of a clothes washer graywater system is exempt from a permit unless it is demonstrated that the system does not meet the requirements of the 2013 CPC Section 16.02.
  - 2. A Simple System is subject to the requirements of the 2013 CPC, Section 16.02.1.2.
    - a. An application for a permit, accompanied by fees as specified in the current fee resolution, is required for a Simple System.
  - 3. A Complex System is subject to the requirements of the 2013 CPC Section 16.02.1.3.
    - a. An application for a permit, accompanied by fees as specified in the current fee resolution, is required for a Complex System.

## **Section 11 Criteria for Commercial, Industrial, and Institutional OWTS**

### **11.1 Commercial, Industrial, and Institutional OWTS**

- A. All commercial OWTS shall be designed by a Qualified Consultant.
- B. A typical commercial OWTS would service businesses such as, but not limited to food facilities, schools, care homes, childcare facilities, dog kennels, veterinary offices, wineries and wine-tasting rooms. Refer to Table 11.1.
- C. All commercial OWTS, including, pre-1971 created parcels shall provide 200 percent reserve replacement area. Dual dispersal fields consisting of a primary field and a secondary field (75 percent of design flow) with a diversion valve to alternate the field use are recommended but not required.
- D. Commercial OWTS that exceed the 1,500 gallons per day flow criteria of this section are subject to the requirements of Section 14, or Section 11.5.
- E. For commercial uses, the minimum size of the septic tank must be based on the formula  $V$  (net volume in gallons) equals  $1,125$  plus  $0.75Q$  (daily wastewater flow in gallons)
- F. Pretreatment is required when high strength commercial wastewater is proposed. Pretreatment components and/or pretreatment system shall reduce wastewater strength to levels below the defined levels for high strength wastewater.
- G. Any OWTS that receives high strength wastewater from a commercial food service building requires a properly sized and functioning oil/grease interceptor.

**Table 11.1**  
**Multiunit and Non-Residential Design**  
**Flow Rates**

TYPE OF OCCUPANCY	GALLONS PER DAY
Airports	5 per passenger
Campgrounds:	
Campgrounds with central comfort station	35 per person
Campgrounds with flush toilet, no showers	25 per person
Day Camps (no meals)	15 per person
Luxury Camp, private bath	100 per person
Summer and seasonal	50 per person
Churches (sanctuary)	5 per seat
With kitchen wastes	7 per seat
Country Club	125 per person
Factories	35 per person per shift
Hospitals	250 per bed space
Kitchen waste only	25 per bed
Laundry waste only	40 per bed
Hotels/Motels with private bathroom (no kitchen waste)	60 per two-person room
Hotels/Motels without private bathroom (no kitchen waste)	50 per two-person room
Hotel/Motel with private bath and kitchen	75 gallons per person
Institutions other than hospitals	125 per bed space
Movie Theaters	5 per seat
Offices	20 per employee
Picnic parks with toilets and showers	10 per person
Picnic parks with toilet waste only	5 per person
Resort camps with limited plumbing	50 gallons per person
Restaurants:	
Kitchen waste (multi-use utensils)	5 per meal served
Kitchen waste (disposable utensils)	3 per meal served
And add the following for type of facility present:	
Conventional sit down	10 per person
Short Order	8 per person
Bar and Cocktail	3 per person
School (non-boarding)	20 per student
With gym and showers add	5 per student
With cafeteria using disposable utensils	3 per meal served
Self-service laundries	50 gallons per waste
Service station	10 gallons per vehicle served
Retail stores	20 per employee
For public restrooms add	1 per 10 square feet
Swimming pools and bathhouses	10 per person
Tourist camps or mobile home parks with individual bath units	100 per person
Tourist camps or trailer parks with central bathhouse	75 per person
Work or construction camps (semi-permanent)	50 per person
Wine tasting facility (no meals served)	3 per person
Employee	15 per employee

## 11.2 Winery OWTS

- A. The peak daily flows from wineries shall be determined by either the tons of grapes processed or cases of wine produced annually. The following shall be used in the determination of peak daily flows:

1 case of wine equals 2.4 gallons

1 ton of grapes equals 160 gallons

Peak wastewater flow equals 1.5 gallons for each gallon of wine

Production

Length of crush season varies by winery production –see formulas below

The following formulas are used to calculate winery wastewater flows:

WINERY SIZE	FORMULA
Up to 20,000 gallons per year	$\frac{\text{Annual production (gal)}}{\text{day harvest period}} \times 1.5 \times 30$
20,000-50,000 gallons per year	$\frac{\text{Annual production (gal)}}{\text{day harvest period}} \times 1.5 \times 45$
50,000 gallons per year and above	$\frac{\text{Annual production (gal)}}{\text{day harvest period}} \times 1.5 \times 60$

- B. Winery process wastewater and domestic sewage shall have separate tanks.
1. Domestic and process wastewater may share a common leach field.
- C. Mounds are prohibited for winery wastewater dispersal systems unless supplemental treatment is provided to reduce BOD to less than 300 milligrams per liter
- D. A minimum 3-day hydraulic retention time for peak winery process wastewater flow is required.
- E. Pretreatment must be provided to treat the winery process wastewater to domestic wastewater levels (less than 300 BOD and TSS) for discharge to an approved OWTS.
- F. Coverage under waste discharge requirements or waiver therefore, from the appropriate Regional Water Board, shall be required prior to issuing a septic permit.



## 11.3 Special/Cultural Events

- A. The intent of this standard is to provide sizing criteria for onsite dispersal systems that are commensurate with the number and size of special events approved under the facility's permit. Generally, this standard requires larger dispersal systems as the number and size of permitted events increases.
- B. For purposes of implementation of Special Events granted in Use Permits and the use of Portable Toilets. The following definitions apply:
1. "Event" means any special event authorized under a Use Permit or an "Occasional Cultural Event" as defined in the zoning ordinance and as interpreted by the Board of Zoning Adjustments. "Event" includes industry-wide events.
  2. "Visitors per day" means the peak number of visitors estimated for the entire busiest single day of 1 event, and not the combined number of visitors of both days of a week-end event, and not just the maximum number of visitors at 1 time during the busiest day.

**Table 11.3 - Special Events and OWTS Sizing Criteria**

<b>Number of special events approved per year.</b>	<b>Percent increase in the design and capacity of the facility's wastewater treatment system due to special event wastewater flows.*</b>
0 to 4	The additional special event wastewater flow may be accommodated by portable toilets. No increase in the facility wastewater system required.
5 to 10	The design and capacity of the facilities wastewater treatment system must be increased by 25 percent of the fifth largest single special event flow.
11 to 25	The design and capacity of the facilities wastewater treatment system must be increased by 50 percent of the fifth largest single special event flow.
26 or more	The design and capacity of the facilities wastewater treatment system must be increased by 100 percent of the fifth largest single special event flow.

- C. The wastewater system consultant shall justify the sizing of the OWTS for Special Events based upon the specific circumstances of the site and the proposed event.
  - 1. Special Events without food service shall size the on-site wastewater dispersal system as large as needed, but in no case at less than 2 ½ gallons per visitor per day.
  - 2. Special events with food service shall size the on-site wastewater dispersal system as large as needed, but in no case at less than 5 gallons per visitor per day.
- D. Sizing of the OWTS for Special Event wastewater flows shall comply with the following requirements when mitigation is provided by an adequate number of portable toilets as specified in Permit Sonoma Policy and Procedure 9-2-31 *Sizing of Onsite Wastewater Dispersal Systems for Special Events Authorized by Use Permits and the Use of Portable Toilets* Table 11.3. The Special Event Wastewater Flow is the additional sewage flow expected from the largest single special event that is in excess of the normal wastewater flow from the facility.

## **11.4 Flow Equalization**

- A. 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. Installed following the septic tank, it allows peak surges in wastewater flow (for example from a weekend event) to be temporarily stored and metered into the treatment system and/or dispersal field at a relatively even (“average”) rate over an extended number of days (for example during the subsequent week). This generally aids OWTS performance.
- B. Where flow equalization is proposed to be incorporated in an OWTS the following apply:
  - 1. The septic tank capacity shall be sized based on the peak daily flow for the facility;
  - 2. The design flow used for sizing supplemental treatment unit(s) and/or the dispersal field may be based on the equalized (“average”) flow rate rather than the peak daily flow rate for the facility;
  - 3. Engineering calculations and specifications must be submitted substantiating the proposed design and operation of the flow equalization system; and
  - 4. An operating permit (per Section 14) will be required.
- C. Flow equalization may be used for non-residential and mixed use facilities that experience significant, regular and predictable fluctuations in wastewater flows. Examples of applicable facilities include, but are not limited to:

1. Churches
2. Schools
3. Special/Cultural event venues

## **11.5 Package Treatment Plants**

- A. Package Treatment Plants include systems that use wastewater in a manner subject to Title 22 wastewater reclamation standards and/or any treatment unit other than a septic tank which processes more than 10,000 gallons of wastewater per day. It does not include systems which process wastewater originating solely from agricultural uses, retail food facilities or storm water if these systems do not include any domestic wastewater component.
  1. Package treatment plants cannot serve multiple uses on separate parcels under separate ownership unless the Board of Supervisors approves specific findings for multiple ownership of sewage dispersal systems.
- B. The application request for a package treatment plant must be prepared by a Registered Civil Engineer with documented experience in the design of sewage treatment plants and must include the following:
  1. A full description of the proposed collection and treatment method and process components.
  2. A full description of the proposed method for wastewater dispersal.
  3. Environmental review for California Environmental Quality Act (CEQA) compliance.
- C. The typical conditions of approval for a Package Treatment Plant include the following:
  1. An independent engineering consultant acceptable to the Permit Authority shall perform peer review of the plans at the applicant's expense.
  2. A permit to construct the collection system shall be obtained from the Permit Authority prior to the start of any construction of the collection system.
  3. All applicable county permits shall be obtained for the treatment and dispersal facilities including grading, electrical, and plumbing permits.
  4. Prior to obtaining building permits for any portion of the project, Waste Discharge Requirements shall be obtained from the appropriate Regional Water Quality Control Board.
  5. The long term managerial and financial needs of the package treatment plant shall be fully documented.

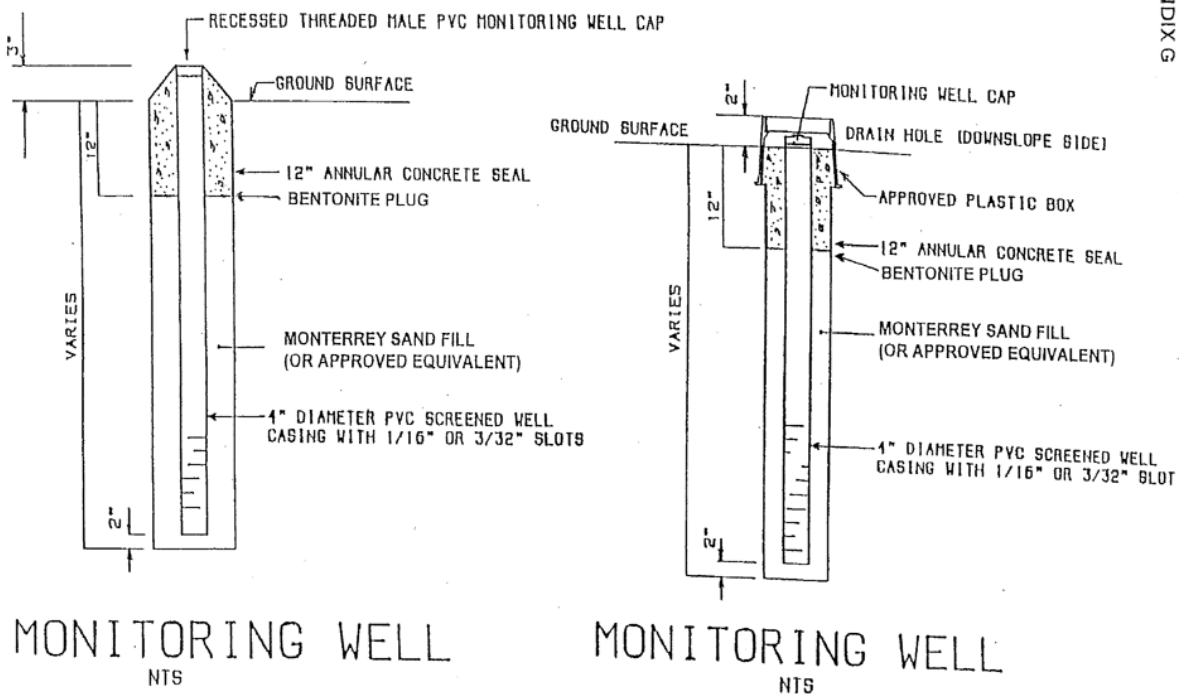
- a. Prior to the issuance of building permits, deed restrictions shall be recorded specifying the conditions under which the package treatment plant was approved.
- 6. The package treatment plant shall be operated under a valid Sonoma County Operational Permit in accordance with an approved monitoring plan.
- 7. Use of the facility shall cease if either the Waste Discharge Requirements or the County Operational Permit is revoked.
- D. For additional information and specific requirements refer to Permit Sonoma Policy and Procedure 1-4-3 *Package Treatment Plant Policy and Procedure*.

## **11.6 Performance Wells**

- A. All commercial systems and nonstandard OWTS must be designed with a series of performance wells to monitor the performance of the system. In limited circumstances, performance wells may be required for standard OWTS that may present a threat to public health and/or the environment. Sampling of effluent in the wells may be required to evaluate the treatment of the system and ensure that groundwater degradation does not occur.
- B. The construction of the performance wells shall be constructed with 3 or 4 inch approved casing and screened with 1/16 or 3/32 inch slots, and a minimum 12 inch annular concrete seal. Monterey sand or equivalent shall be placed from the bottom of the well to the depth of the annular seal. The exception to the Monterey sand fill is for wells in the gravel bed of at-grade or mound systems. These wells shall be filled from the bottom of the well to the depth of the annular seal with pea gravel.
- C. All performance wells are designed to monitor the performance of the system by sampling groundwater to ensure degradation does not occur. Performance wells are strategically placed up-gradient, within, laterally, and down-gradient of the OWTS.
  - 1. If damage is noted during monitoring or the performance well cannot be located, the well shall be replaced by a qualified contractor in the area shown on the original design.
- D. The performance wells shall be either augured or post holed or drilled by hand after the OWTS is completed. The construction of the performance wells shall be as mandated by the Permit Authority staff. The soil shall be scarified to remove compaction or smeared soil that may seal the performance well. A backhoe shall not be utilized to excavate for a performance well.
- E. Performance well heads shall be protected and encased within plastic, concrete, or an approved type box to provide easy access.
  - 1. The performance well caps/lids shall be maintained for easy removal/access during monitoring and need to prevent surface water from entering the well.

- F. The depth of the annular seal for the performance wells within the gravel bed shall not exceed beyond the depth of the gravel bed of the OWTS.
- G. A concrete annular seal of a minimum 12 inches from the surface of native grade is required for all performance wells, between the earthen side-wall and the solid portion of the performance well pipe.
- H. Refer to Sections 11, 12, 13 and Figure 11.6 for additional performance well information and specific requirements.

**Figure 11.6 Performance Well Detail**



APPENDIX G

## 11.7 Grease Interceptors

- A. Grease interceptors are required when greater than 50 milligrams per liter of grease is introduced into a commercial OWTS.
1. Plans and specifications for grease interceptors shall be submitted to the Permit Authority for approval. Permit Authority staff shall review the grease interceptor design in accordance with minimum design and construction criteria established by Sonoma County.
  2. Waste from floor drains, floor sinks, dishwashers, pot sinks, and mop sinks shall be plumbed separately into the grease interceptor.
  3. Effluent from grease interceptors shall be disposed of in a septic tank and not directly discharged to the dispersal field.
  4. Grease interceptors shall be located, installed and constructed so that the temperature of the sewage will be reduced to permit congealing or separation of grease, and easy access for cleaning.
  5. Commercial facilities generating up to 200 gallons per day of wastewater from the fixtures noted in Section 11.7.A.2 above, shall install a 810 gallon capacity minimum size grease interceptor or an interior pressure Uniform Plumbing Code (UPC) rated grease interceptor on the kitchen drain.
  6. Commercial facilities generating 200 gallons per day or more from the fixtures noted in 11.7 A.2 above, shall install a grease interceptor sized in accordance with the Permit Authority requirements. The grease interceptor shall be a minimum size of 810 gallons capacity.
  7. Each grease interceptor shall be so installed and connected that it shall be easily accessible for inspection, cleaning, and removal of the intercepted grease. Grease interceptors shall be located outside.

## **Section 12 Non-Standard Experimental and Alternative OWTS Approval Process**

### **12.1 General**

- A. There are two basic types of non-standard OWTS: Experimental and Alternative. Non-standard OWTS are used to overcome one or more adverse site or soil condition such as high groundwater, slowly permeable soils, or other limiting condition or where increased wastewater treatment is needed. Unlike conventional OWTS, non-standard OWTS vary in design and concept depending on the site and soil conditions. Experimental and Alternative OWTS are also subject to the Section 14 requirements.
- B. The Permit Authority monitors the operation and maintenance of all non-standard systems. Inspection frequency is dependent upon the level of monitoring compliance by the system owner/operator.
- C. Because of evolving technology and problems that may be discovered through the monitoring program, the regulations for non-standard OWTS may change. Property owners are cautioned that regulations for non-standard OWTS may change by action of the RWQCB or the Permit Authority. Therefore, despite previously performed and accepted work by Permit Authority, any proposal for a non-standard OWTS must meet the regulations in effect at the time that the Permit Authority approves the OWTS permit application.
- D. When a non-standard OWTS is proposed in order to increase the sewage discharge of an existing use, the existing system must be brought into compliance with all current regulatory requirements.

### **12.2 Experimental OWTS Criteria**

- A. An Experimental OWTS shall meet National Science Foundation (NSF) criteria and shall be NSF certified.
- B. An Experimental OWTS shall be capable of reliably performing settling or solids separation, nutrient and pathogen reduction comparable to a standard system consisting of a two-compartment septic tank with subsurface treatment of 3 feet of acceptable soil.
- C. Experimental OWTS are not authorized for the following:
  - 1. Greater than 33 percent expansion of use for existing residential and commercial systems
  - 2. Flow rates of 600 gallons per day or more for new single family homes
  - 3. Flow rates of 1,000 gallons per day or more for new commercial establishments.

4. Subdivision of land.
5. Properties within a sewer hookup area, septic tank ban area, or County identified Variance Prohibition Areas, except as a repair.

### **12.3 Experimental OWTS Process**

- A. A person or company shall make an application requesting a specific design be entered into the Experimental OWTS Program.
- B. The application contents shall include:
  1. Name and address of applicant
  2. Trade name and model number, if applicable.
  3. NSF Certification
  4. Technology description
  5. Number of units currently in operation
  6. Location of units currently in operation
  7. Effluent sampling results
  8. Estimated cost of units, installation, operation and maintenance
  9. Discussion of specific operational requirements and/or operational training needed to successfully operate the proposed unit
  10. Operation and maintenance manual
  11. The appropriate filing fee
- C. The Liquid Waste Specialist will review each application and present any promising non-standard Experimental OWTS to the Regional Water Quality Control Board (RWQCB) for technical review and approval. If both Permit Authority and the RWQCB staff approve the non-standard Experimental OWTS, design parameters, site and soil characteristics, a site specific monitoring program will be established. These provisions will be added to Section 13 of this manual.
- D. Once approved, installation of a maximum of 10 systems per year shall be allowed for new construction within each Regional Board jurisdiction with similar site and soil conditions.
- E. Intensive monitoring (2 or more inspections per year) performed for at least 2 normal winters is required.



- F. The Permit Authority may consider whether an additional period of monitoring or an additional number of systems shall be installed prior to Alternative non-standard OWTS status consideration.

## **12.4 Alternative OWTS Criteria**

- A. An Alternative OWTS shall meet the following requirements:
  - 1. The standards for a non-standard Experimental OWTS.
  - 2. Enrollment in the Sonoma County Experimental Program or comparable municipality or jurisdiction.
  - 3. 50 installed units that are or have been in operation for at least 2 years.
  - 4. Supporting monitoring data demonstrating compliance and/or successful wastewater treatment for the 50 units.

## **12.5 Alternative OWTS Approval Process**

- A. A person or company shall make an application requesting a specific design be entered into the Alternative OWTS Program.
- B. The application contents shall include:
  - 1. The contents listed in Section 12.3.B.
- C. The Liquid Waste Specialist may request the RWQCB's permission to proceed to Alternative non-standard OWTS status if the intensive monitoring indicates satisfactory results.
- D. The Liquid Waste Specialist will review each application and present any promising non-standard Alternative OWTS to the RWQCB for technical review and approval. If both Permit Authority and the RWQCB staff approve the non-standard Alternative OWTS, design parameters, site and soil characteristics, a site specific monitoring program will be established. These provisions will be added to Section 13 of this manual.

## **12.6 Approved Experimental and Alternative OWTS**

- A. Appendix A contains a list of these approved systems as well as systems under review. Appendix A will be updated annually.

# **Section 13 Non-Standard Experimental and Alternative OWTS Standards**

## **EXPERIMENTAL OWTS STANDARDS**

### **13.1 Bottomless Sand Filter OWTS (Geographical Waiver)**

- A. A bottomless sand filter is a special case of an above grade gravel and sand-lined drain field. The process requires intermittent application of wastewater that allows an unsaturated downward flow through a filter media of an ASTM C-33 sand. The purpose of the sand filter is to pretreat the effluent and improve wastewater quality. The use of bottomless sand filters are adequate to allow substantial repairs and renovations to existing residences, provided there is no increase in the volume of sewage discharged.
- B. The site criteria for bottomless sand filter OWTS includes the following:
  - 1. The sand filter will serve an existing structure located on the 100 year flood plain; and
  - 2. The sand filter will be located at least 100 feet from the summertime banks of the waterway; and
  - 3. The sand filter will be located on deep, well drained soils without elevated winter time water table levels and will meet all other setback requirements.
  - 4. Under these conditions, a reduction or elimination of replacement area may be permissible.
- C. The design criteria for bottomless sand filter OWTS includes the following:
  - 1. The design of bottomless sand filters is based on the April, 1999 Washington State Department of Health publication "Sand Lined Trench Systems."
  - 2. A support structure shall:
    - a. Be designed and built so that the top of the liner is at least 6 inches above natural grade.
    - b. On sloping sites a surface water diversion must be excavated upslope of the sand filter at the top of the sand filter backfill material.
    - c. The containment vessel must be designed by a qualified engineer and have a support foundation to prevent vertical and horizontal movement of the vessel.
  - 3. The bottomless sand filter must be installed into a minimum of 6 inches of native undisturbed soils and consist of the following components:

- a. 24 inches of ASTM C-33 sand filter media, as determined by ASTM D-136 and C-177;
  - b. A distribution bed consisting of 6 to 12 inches of gravel bed with pipe;
  - c. An approved geo-textile followed by 6 to 12 inches of earth backfill.
4. Effluent distribution from the sump to the sand filter shall be:
- a. Pressure transport. Manifold, lateral piping and fittings must be at minimum Schedule 40 PVC.
  - b. Pressure transport piping shall be solvent welded. All joints in the manifold piping, lateral piping, and fittings must be solvent welded and watertight.
  - c. A gate valve and check valve must be placed on the pressure transport pipe, in or near the sump tank, as appropriate.
  - d. Pressure lateral distribution piping and fittings must be a minimum of 1 inch in diameter.
  - e. Pressure manifold and transport piping must be a minimum of 2 inches in diameter.
  - f. Hydraulic orifice discharge shall be a minimum of 60 inches for upward discharge. Orifices shall have a protective shield.
  - g. Orifices must have a minimum 1/8-inch diameter and be placed a maximum distance of 30 inches apart.
  - h. Ends of the lateral distribution piping must be connected with a blow off riser for cleaning and inspecting. The riser shall extend to the ground surface and have a threaded cap.
  - i. The distribution lateral shall have 6 or 12 inches of gravel beneath the pipe (residential and commercial respectively), 2 inches of gravel above the pipe and be covered with an approved geo-textile filter prior to placement of 6 to 12 inches of soil cover.
  - j. The sand filter maximum dosage is 90 gallons per cycle. Electronic timed meters are preferred over float (on demand) type controls.
  - k. The minimum setback requirements for bottomless sand filters are the same as those required for septic tanks.
- D. The construction criteria for bottomless sand filter OWTS includes the following:
- 1. Wooden containment vessels shall be constructed of pressure treated or redwood heart grade materials.
  - 2. The sides of the above ground containment vessels shall be lined with a minimum thickness 30 millimeters PVC membrane liner.
  - 3. The liner must extend up the sides of the support structure with enough excess to allow the liner to be firmly anchored.
  - 4. All seams shall be factory heated or solvent welded.
  - 5. A factory fabricated boot where the pressure line passes through the liner is required. The boot must extend into the box. All fittings must extend into the liner and be watertight.

6. Use of a non-woven needle punched synthetic geo-textile fabric in a thickness appropriate to protect the liner is required.
  7. Both the filter media surface and the sand-original soil interface must be level.
- E. The performance well criteria for bottomless sand filter OWTS includes the following:
1. 1 or more performance wells shall be installed 10 feet upslope of the sand filter to a depth of 24 inches below grade.
  2. 1 or more performance wells shall be installed 10 feet down slope of the sand filter to a depth of 24 inches below grade.
  3. If the hydraulic gradient cannot be determined on flat sites, performance wells will be required on each side of the sand filter. 1 well shall be installed 25 feet upslope and 1 well installed 25 feet down slope of the sand filter. The depths of the wells shall be a minimum of 24 inches below grade.
  4. On sloping sites, 1 or more performance wells shall be installed 25 feet down slope of the sand filter to a depth of 24 inches below grade.
  5. 1 or more performance wells shall be installed in the sand filter to a depth of the upper gravel and sand interface.
  6. 1 or more performance wells shall be installed in the sand filter to a depth of the lower sand and gravel interface. See Figure 11.6.

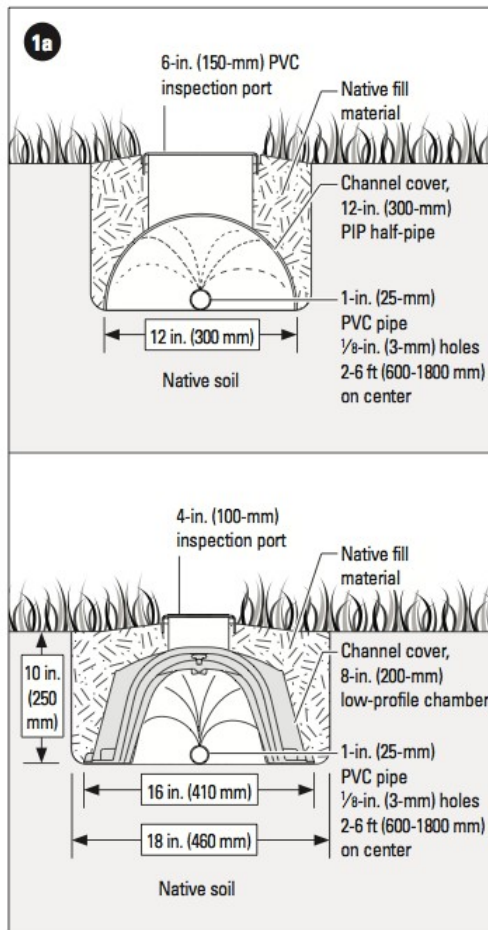
### **13.2 Gravel-less Pressurized Dispersal Channel (GPDC)**

- A. Gravel-less Pressurized Dispersal Channel (GPDCs) are designed for subsurface dispersal of high-quality effluent after secondary treatment. There are 2 typical configurations. 1 consists of perforated laterals laid in a 12-inch wide infiltration channel, covered with sections of plastic half-pipe and shallowly buried in native soil. The other uses an 18-inch infiltration channel and sections of 8-inch low-profile HDPE chamber material.
- B. The site criteria for Gravel-less Pressurized Dispersal Channel OWTS includes the following:
1. Depth to a limiting condition and permeable soils (1 to 120 minutes per inch) below the dispersal line shall be a minimum of 24 inches.
  2. The soil above the PVC line proposed depth shall be permeable (1 to 120 minutes per inch). This excludes massive or platy structured soils. Soils subject to flooding, excessive irrigation, farming practices, grading, ripping or roto-tilling are also not acceptable. The quality of acceptable soils above the line shall be equal to those below the line.

3. A minimum of 24 inches of permeable soil below dispersal depth shall extend a horizontal distance of no less than 25 feet down gradient from the edge of the last proposed line, including expansion areas.
4. GPDC sites shall not exceed 30 percent slope without an approved waiver and a geotechnical study required for slope stability and suitability.
5. GPDC sites shall not exceed 25 percent slope when fill is placed over the dispersal system.

C. The design criteria for GPDC OWTS includes the following:

1. Separation between laterals shall be a minimum of 3 feet.
2. GPDC installations space orifice holes 24 inches minimum to 72 inches maximum on center.
3. A GPDC System is typically installed 10 inches into native soil. A minimum native soil depth of 6 inches may be allowed with disinfection. The minimum soil cover over the orifice shield is 2 inches. The maximum soil cover allowed is 18 inches. (see Illustration 1a).



*Cross sections of typical half-pipe and low-profile SPDS installations showing dimensions and materials*

4. The designer shall also determine the number of zones, the number of doses, the quantity of the dose, the head losses, spacing of lines, spacing of orifices, diameter of the pipe (typically 1 inch PVC), and pump size.

5. The length of each dispersal line shall not exceed 75 feet to ensure equal distribution to each orifice. If multiple zones are designed, dosing must be automatically alternated between each zone.

6. All GPDC Systems require an approved packed bed media filter supplemental treatment unit for treating septic effluent. The level of supplemental treatment must comply with NSF Standard 40 or to the satisfaction of the administrative authority.

7. Designer shall employ measures to prevent uneven distribution of the dispersal field due to drain down following a pump cycle. Per California Plumbing Code, spring check valves are not allowed for wastewater applications.

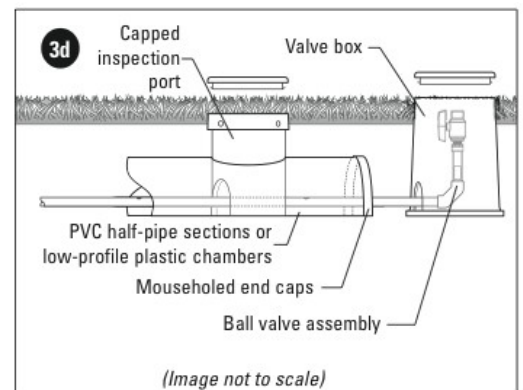
8. Provide 2 feet of solid pipe between the manifold and the first orifice.

9. At the end of each lateral, install a sweep ell (or two 45 degree elbows) and a ball valve with a threaded plug.
10. All system components shall be appropriately sized for the system dosing flow rates, and shall meet specifications of the manufacturer. All transport piping, supply and return manifolds and fittings must be Schedule 40 PVC or Schedule 80 PVC if threaded fittings are utilized. All filters must be sized to operate at a flow rate greater than or equal to the maximum design discharge rate of the system.
11. All GPDC System designs shall demonstrate that sufficient suitable area exists to construct 200 percent reserve area. Because GPDC Systems are experimental, in cases of split system designs, the GPDC System shall be installed as the primary system, and the other type of dispersal system shall be the 200 percent expansion system.
12. Totalizing flow meters (in gallons) are required on the supply line. Flow meters must be installed in a readily accessible location for reading and servicing.
13. A controller capable of timed dosing is required.
14. Disinfection of the treated wastewater shall be incorporated in cases of well-drained soils (less than 1 minute per inch or faster) or where dispersal systems only have a minimum of 6 inches of native soil cover above the shield (see Illustration 3d). If 6 inches of approved fill is added above the 6 inches of native soil cover, disinfection will not be required.

15. For aerobic treatment unit (ATU) systems that function with external blowers, a cutoff switch or interlock that disables the pump must be built into the control panel so the blower may not be disconnected.

D. Construction criteria for GPDC OWTS includes the following:

1. Construct trenches with special attention to proper elevation and contour.
  - a. Shallow trenches can be dug (by hand or with a trenching machine).
  - b. Trenches shall not be installed when the soils are wet or excessively damp state.
  - c. Sidewall of trenches shall be scarified to remove all smears.
  - d. Install perforated piping, placing orifices upwards for the hydraulic test.
  - e. Trenches can be straight, or they can be curved to fit terrain and complement vegetation, but they must be set on level grade.



- f. Lay the half-pipe (or low-profile chamber) sections over the laterals, overlapping the section ends by a few inches. For covering curving laterals, half-pipe section ends can be cut at an angle and overlapped to match the curve of the lateral. Install 1 inspection port halfway along each lateral (see Illustration 1a).
2. Valves must be readily accessible for service and/or inspection. All valve boxes must be protected from gopher soil movement. A detail of the valve box must be included on the plans. Specify concrete, hardware wire or similar bottom.
3. Perform hydraulic test after the distribution system has been completed.
  - a. Size of orifice shall be 1/8 to 3/16 of an inch.
  - b. Pump must be adequate to deliver the required orifice discharge range of 24 (3/16 hole) and 60 inches (1/8 hole) for upward discharge to the lateral.
  - c. Distribution to all laterals shall be balanced.
  - d. This test shall be inspected by the designer/consultant and Permit Authority Registered Environmental Health Specialist.
- E. Establish the finished grade of the GPDC OWTS by track rolling and grooming by hand. Backfill the excavation with caution. Do not compact the soil around the half-pipe or chamber.
- F. Fill material may only be placed above native soil for soil cover, and shall not be used to meet required soil depth minimums. The system designer shall describe the type of fill to be placed in terms of texture and structure, the depth and method of ripping before placement. No part of the GPDC dispersal field may be located where the site slope exceeds 25 percent when fill is used.
  1. A ground cover (turf, fruit trees or other appropriate landscaping) must be planted over the dispersal field after installation to provide additional treatment, prevent erosion and increase wastewater reuse through plant evapotranspiration.
  2. Native material is acceptable if there are no large or sharp rocks that may damage the pipe walls. If native material is not usable, backfill with sand or pea gravel, or use an imported material that is approved by your local regulator.
  3. Install performance wells and complete all details as shown on the plans.
  4. After the #189 septic electrical inspection has been completed by the Building Inspector, a startup inspection must be scheduled with the system designer, installer, or service provider and the Permit Authority.
  5. Prior to OWTS final approval, acceptable erosion control must be completed.

- G. The performance wells criteria for GPDC OWTS includes the following. A minimum of 5 performance wells shall be installed within and around the system to a depth of 24 inches below proposed trench bottom. (See Figure 11.6)
1. 2 performance wells shall be installed between trenches in the middle of the leach field.
  2. 2 performance wells shall be installed 25 feet down slope of the lowest trench line.
  3. 1 performance well shall be installed at 10 feet upslope of the highest trench line.
  4. Additional performance wells may be required for systems longer than 75 feet.
  5. The Permit Authority may require that performance well locations be changed in special situations.
  6. Performance wells shall be properly installed to provide easy access.

## **ALTERNATIVE OWTS STANDARDS**

### **13.3 Mound OWTS**

- A. Mound OWTS are based upon the Small Scale Waste Management Project, University of Wisconsin at Madison, *Wisconsin Mound Soil Absorption System Siting, Design and Construction Manual*, by James C. Converse and E. Jerry Tyler, January 2000. Mound systems are designed to overcome restrictive conditions for soil permeability and depth to groundwater below the bottom of the system. Designers shall use the same methodology and nomenclature as the most recent *Wisconsin Mound Soil Absorption System Siting, Design and Construction Manual*.
- B. The site criteria for Mound OWTS includes the following:
1. Percolation rate of 1 to 120 minutes per inch
    - a. Percolation rate requirements apply to the first 24 inches of soil as measured from native grade. See Section 7.
    - b. Presoak remaining in 24 inch deep percolation test holes may indicate lack of soil depth.
    - c. Rates faster than 1 minute per inch are not acceptable.
  2. Minimum elevated groundwater level is 24 inches from native grade.
  3. Minimum depth of suitable permeable soil is 24 inches from native grade.
    - a. The rock content (as retained on the #10 Sieve) shall not exceed 50 percent by volume within the first 24 inches of soil from native grade.
    - b. The minimum depth to fractured rock, impermeable soils, such as hardpans and claypans, and consolidated bedrock is 24 inches.



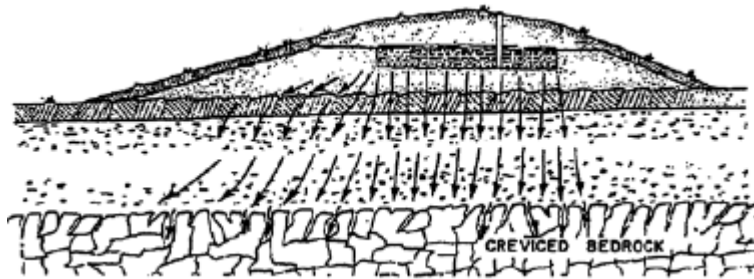
- c. The addition of an approved pretreatment unit does not mitigate 1 foot of the required minimum 24 inches of suitable soil beneath the mound. 2 feet of acceptable native soil from native ground is required.
  - 4. The minimum depth of permeable soil (24 inches) shall extend a minimal horizontal distance of at least 25 feet down gradient from the edge of the sand perimeter.
  - 5. Mound systems are allowable on slopes up to 20 percent.
  - 6. Placement of mound OWTS into areas that require the removal of large trees, boulders, or rock outcroppings is not recommended.
- C. The design criteria for mound OWTS (see Figures 13.3a and 13.3b) includes the following:
- 1. Wastes with a high biological oxygen demand are not suitable for mound systems without approved pretreatment sufficient to lower the waste strength to the level of that septic tank effluent as specified in Section 13.9.
  - 2. Distribution (Gravel) Bed
    - a. Sand Fill Loading Rate
      - i. 1.0 gallon per square foot per day for residential type systems
      - ii. 0.8 gallons per square foot per day for all commercial type systems
      - iii. Reduced loading rates for high strength waste may be required.
  - 3. Linear Loading Rate
    - a. Designers shall estimate the linear loading rate for all proposed mound OWTS and shall design the width dimensions of the gravel bed accordingly, so that the distribution bed is long and narrow and on the contour.
    - b. When the depth to a limiting condition, for example, impermeable soil layer or rock is only 24 inches, the linear loading rate shall not exceed 4 gallons per lineal foot per day.
    - c. If it can be demonstrated that the wastewater flow will be vertical, as well as horizontal, a higher loading rate may be proposed.
    - d. Refer to Table 13.3a and Figure 13.3a for the Linear Loading Rates based on Limiting Conditions.

**Table 13.3a - Linear Loading Rates (LLR) Based on Limiting Conditions**

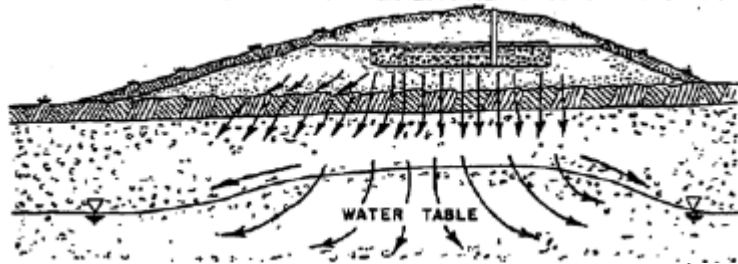
Nature of Limiting Condition	LLR Range (gpd/linear foot)
Solid Bedrock	3-4
Impermeable Soil Layer	3-4
Semi-Permeable Soil Layer	5-6
Fractured Compacted Till	5-6
Seasonal High Water Table	6-8
Crevised or Fractured bedrock	8-10
Sand and/or Gravel Layer	8-10

**Figure 13.3a Linear Loading Rate**

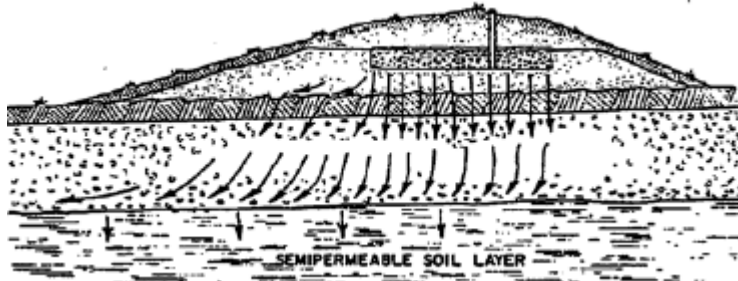
Mound system overlaying a permeable soil lens over crevised bedrock. Estimated linear loading rate equals 8 to 10 gallons per day per linear foot.



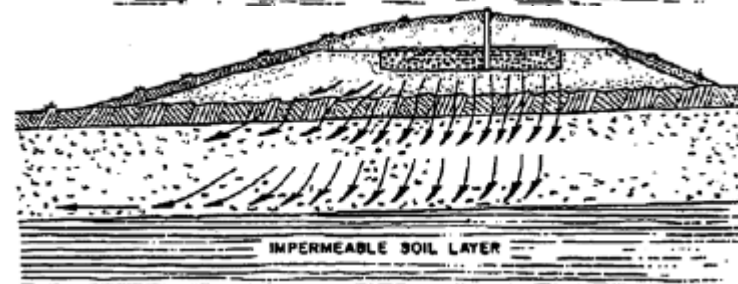
Mound System overlaying a deep permeable soil lens over a fluctuating water table. Estimated linear Loading rate equals 6 to 8 gallons per day per linear foot.



Mound System overlaying a shallow permeable soil lens over a semi-permeable soil layer. Estimated Linear Loading Rate equals 5 to 6 gallons per day per linear foot.



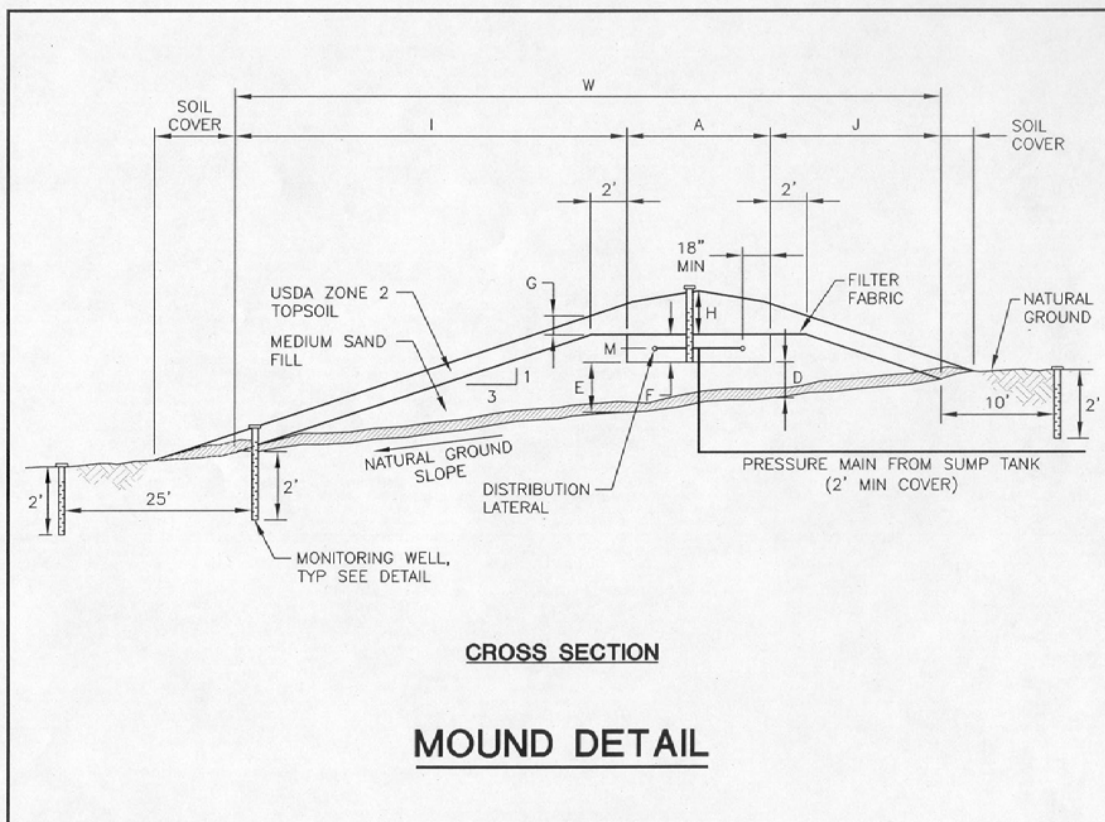
Mound System overlaying a shallow permeable soil lens over an impermeable soil layer. Estimated linear loading rate equals 3 to 4 gallons per day per linear foot.



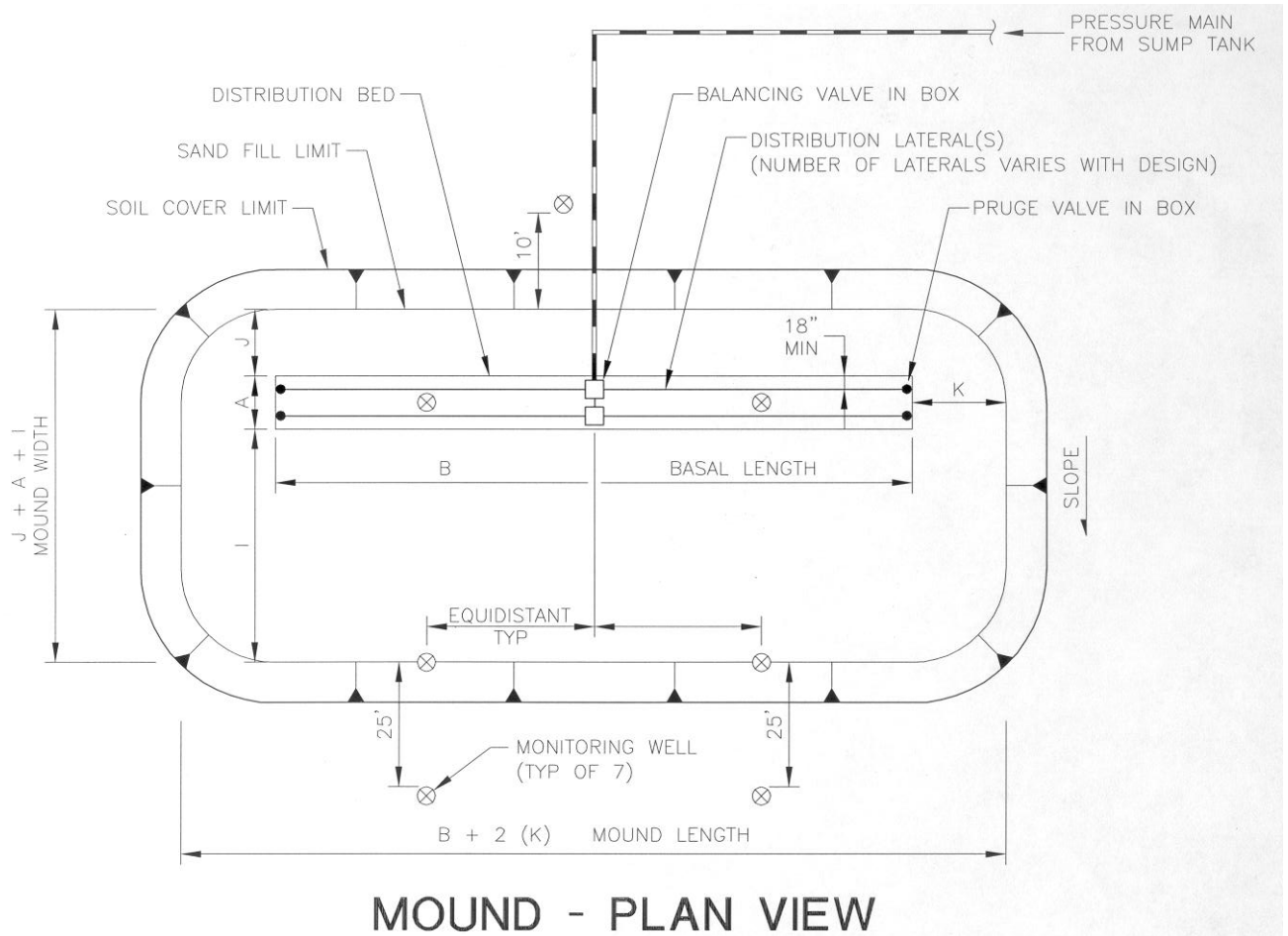
#### 4. Infiltration Area (Dispersal Bed)

- a. Sizing calculations for all mound dimensions shall be provided with all proposals. Refer to Figures 13.3a and 13.3b. The size of the infiltration area (the bottom infiltrative surface area of the bed) is determined by applying the following formula
  - i. Infiltrative Surface Area (square feet) equals Daily Design Flow (gallons per day) divided by Sand Fill Loading Rate

**Figure 13.3b Mound Cross Section**



**Figure 13.3c Mound Plan View**



- b. Dispersal Bed Width—The dispersal bed width (A) is determined by the Linear Loading Rate of certain soil type and depth. Linear Loading Rates are shown in Table 13.3a and Figure 13.3a. Maximum bed width shall be 10 feet.
  - i. Dispersal Bed Width (A) equals Linear Loading Rate divided by Sand Fill Loading Rate
- c. Dispersal Bed Length— The length of the infiltration area (the infiltrative surface area of the dispersal bed) is determined by applying the following formula
- d. Dispersal Bed length (B) equals Required Infiltrative Surface Area divided by Dispersal Bed Width (A)
- e. Dispersal Bed Depth (F)—A minimum of 6 inches of aggregate for residential and 9 inches for commercial systems is placed beneath the distribution pipe and 2 inches of aggregate is placed above the pipe.

- i. Dispersal Bed Grade—The bottom of the dispersal bed must be level.
- ii. Filter Media Depth—The depth of filter media shall be at least 12 inches under all parts of the dispersal bed.
- iii. The depth of filter media below the dispersal bed varies with ground slope according to the following formulas
- iv. Filter media depth below upslope edge of dispersal bed (D) equals 1 foot.
- v. Filter media depth below downslope edge of dispersal bed (E) equals 1 foot plus [percentage natural slope as a decimal times the width of dispersal bed (A)]
- e. Filter Media Length and Width—The length and width of the filter media are dependent upon the length and width of the dispersal bed, filter media depth and side slopes of the filter media.
- f. Side slopes must be no steeper than 3 to 1 (for example 3 feet of run to every 1 foot of rise).
- g. The filter media length consists of the end slopes (K) and the dispersal bed length (B).
- h. The filter media width consists of the upslope width (J), the dispersal bed width (A), and the downslope width (I). On sloping sites, the downslope width (I) will be greater than on a level site if a 3 to 1 side slope is maintained. Table 13.3b gives the slope correction factor (multiplier) for slopes from 0 up to 20 percent with a 3 to 1 side slope.
- i. The sand fill shall be level and extend a minimum of 24 inches horizontally beyond the dispersal bed on all sides, and then uniformly slope as determined by the mound dimensions. On slopes greater than 2 percent, the 24 inch dimension may be reduced to 12 inches on the uphill side of the distribution bed.
- j. Slope Width and Length of the Mound System
  - i. For sloping sites the downslope width (I) and upslope width (J) are a function of the depth of the sand fill below the respective downhill or uphill side of the dispersal bed, the desired side slope, 3 to 1, and the slope correction factor. See Table 13.3b.
  - ii. For level sites and end slope length (K), no slope correction factor is used.
  - iii. Upslope width (J) equals (D plus F) times 3 (slope correction factor)
  - iv. Downslope width (I) equals (E plus F) times 3 (slope correction factor)
  - v. End slope length (K) equals {(D plus E) divided by 2 plus F} times 3.

**Table 13.3b - Mound Slope Correction Factors**

Slope %	Downslope (I) Correction Factor	Upslope (J) Correction Factor
0	1	1
2	1.06	.94
4	1.14	.89
6	1.22	.86
8	1.32	.80
10	1.44	.77
12	1.57	.73
14	1.72	.71
16	1.92	.68
18	2.17	.65
20	2.50	.62

- k. Basal Area Calculation—The amount of sand basal area required is dependent upon the permeability of the original soil.
  - i. For level sites the total basal area [length of filter media (L) times width of filter media (W) beneath the filter media is available for effluent absorption into the soil.
  - ii. For sloping sites, the only available basal area is the area beneath the dispersal bed (A times B) and the area immediately downslope from the dispersal bed [bed length (B) times downslope width (I)]. It includes the area enclosed by [B times (A plus I)]. The upslope and end slopes will transmit very little of the effluent on sloping sites, and are therefore disregarded.
  - iii. The available basal area must equal or exceed the required basal area
    - (aa) Basal area required equals Daily flow divided by Soil Infiltration rate
    - (bb) Basal area available equals B times (A plus I plus J) on level sites or B times (A plus I) on a sloping site.

## 5. Configuration

- a. Only single distribution beds are acceptable. Dual beds are not allowed.
- b. The maximum width of any gravel bed is 10 feet.
- c. The depth of the gravel bed shall be 6 inches below the pipe for residential systems and 9 inches for commercial systems and include 2 inches of gravel cover over the pipe.

6. Aggregate

- a. 3/8 inch double washed pea gravel size to 2.0 inch double washed drain rock
- b. The percentage of fines (less than .035 millimeters) of washed gravel shall not exceed 1 percent by weight

7. Natural Contour

- a. The distribution bed shall explicitly follow the natural contour of the ground
- b. The bed must be installed within a tolerance of 0.25 feet (3 inches) vertically per 100 feet horizontally.
- c. Distribution beds shall be angled or curved to meet this requirement.
- d. The distribution bed shall not be placed in a concave landscape position.

8. Reserve Expansion Area

- a. On parcels created before October 1971, a 100 percent reserve area is required.
- b. For commercial systems and parcels created after October 1971, a 200 percent reserve area is required.

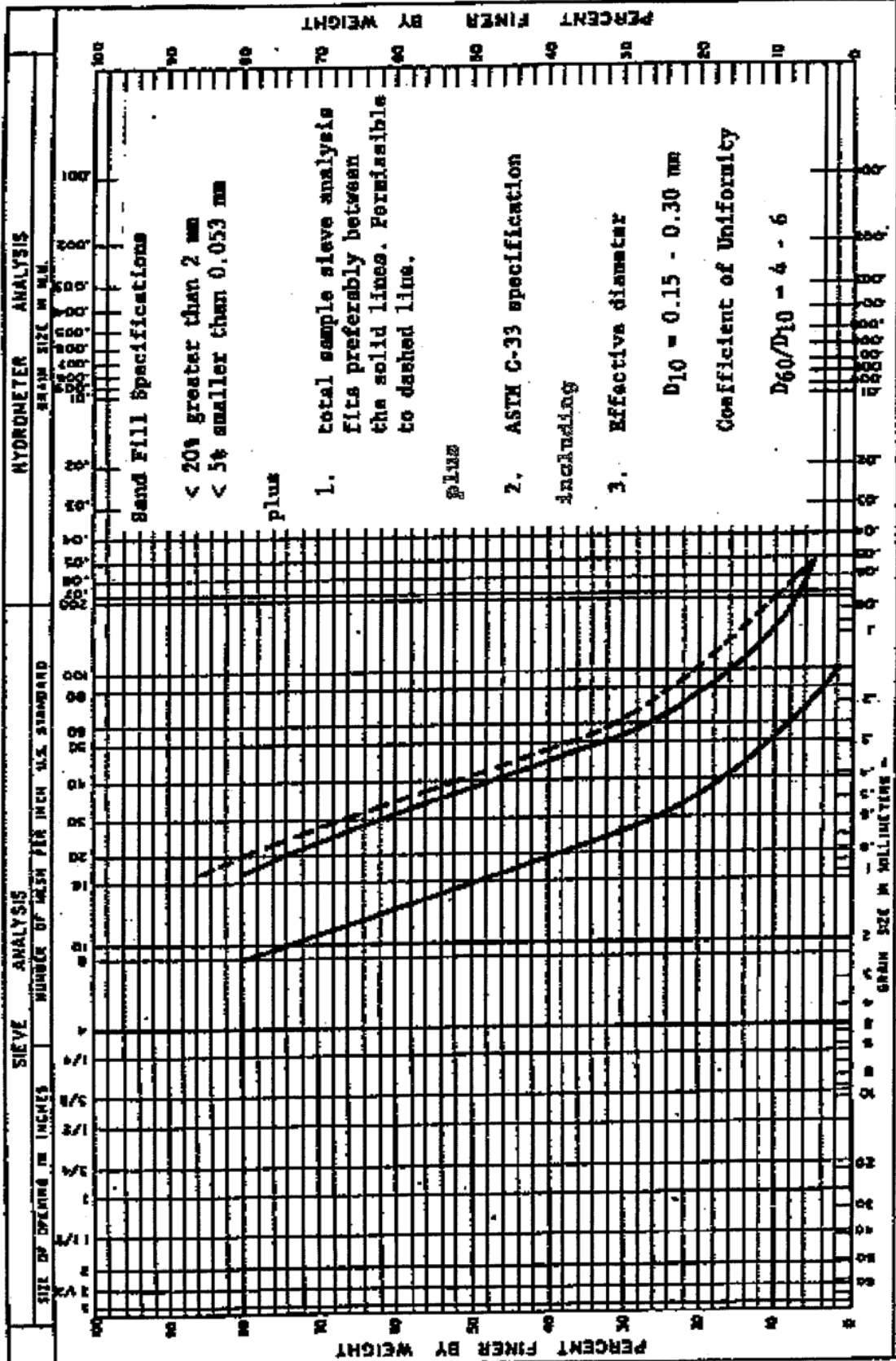
9. Sand Fill (Basal) Area

- a. The sand-fill (basal) area, shall, at a minimum, provide adequate basal (absorption area). The sand area size is based upon the average percolation rate and the sewage application rate chart. See Table 7.2a.
- b. Sand fill media shall conform to the ASTM C-33 sand with less than 5 percent fines less than 0.53 millimeter sand specification to Wisconsin mound criteria (see Table 13.3c and Figure 13.3d).

**Table 13.3c - Mound Sand Specification**

<b>Sieve Size Number</b>	<b>Percent</b>
3/8	100
4	95-100
8	80-100
16	50-85
30	25-60
50	10-30
100	2-10
200	0-5

Figure 13.3d Mound Sand Criteria



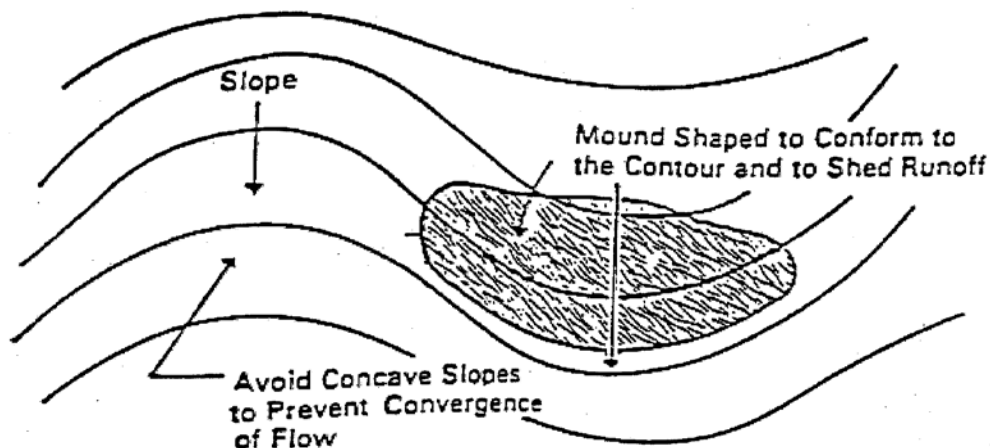


- c. For ground slopes greater than 1 percent, the area uphill from the edge of the gravel distribution bed shall not be included in the calculations for the required basal area.
- d. Areas beyond the distal end of the gravel bed shall not be included in the calculations for the required basal area for systems exceeding 1 percent slope.

#### 10. Configuration

- a. The toe of the sand fill shall follow contour, and shall not deviate more than 0.25 feet (3 inches) in elevation per 100 foot run.

**Figure 13.3e Contour Conformance**



- b. The sand fill configuration shall extend a minimum of 24 inches level from the edge of the distribution bed on all sides, then uniformly slope as determined by the mound dimensions. On the slopes greater than 2 percent, the 24 inch dimension may be reduced to 12 inches (minimum) on the uphill side of the distribution bed only.

#### 11. Soil Cover

- a. A minimum of 6 inches in depth after settling over the gravel bed portion of the mound and over the remainder of the sand portion.
- b. Mounded to a height of 12 inches after settling at the midsection of the gravel bed.
- c. The distal ends and uphill sides soil cover width requirements are 4 feet
- d. Downslope soil cover shall conform to Table 13.3d.
- e. The quality of the soil structure and texture (USDA Classification) shall be at least equal to that of the topsoil existing on the site.

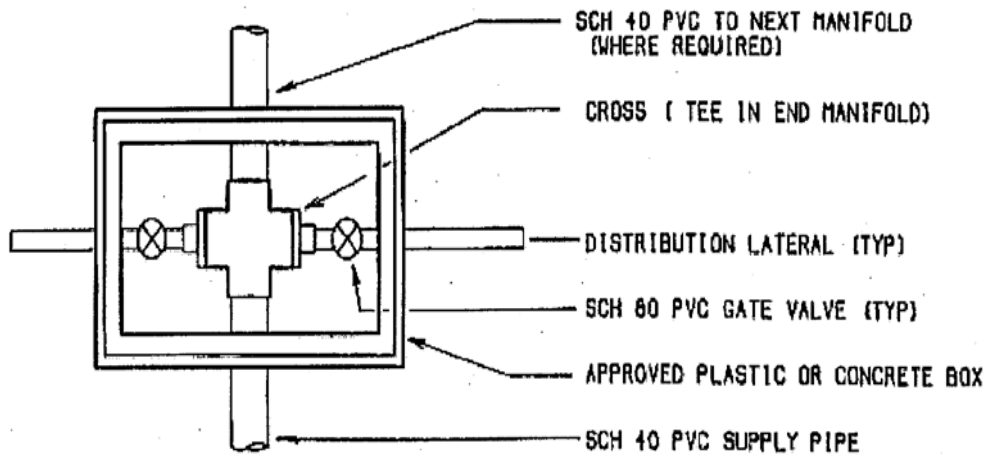
**Table 13.3d - Mound Downhill Soil Cover Requirements**

<b>Slope Percentage</b>	<b>Cover (lineal feet beyond gravel)</b>
0-2	1
2-4	1.06
4-6	1.14
6-8	1.22
8-12	1.32
12-16	1.44
greater than 16	1.57

**12. Distribution System**

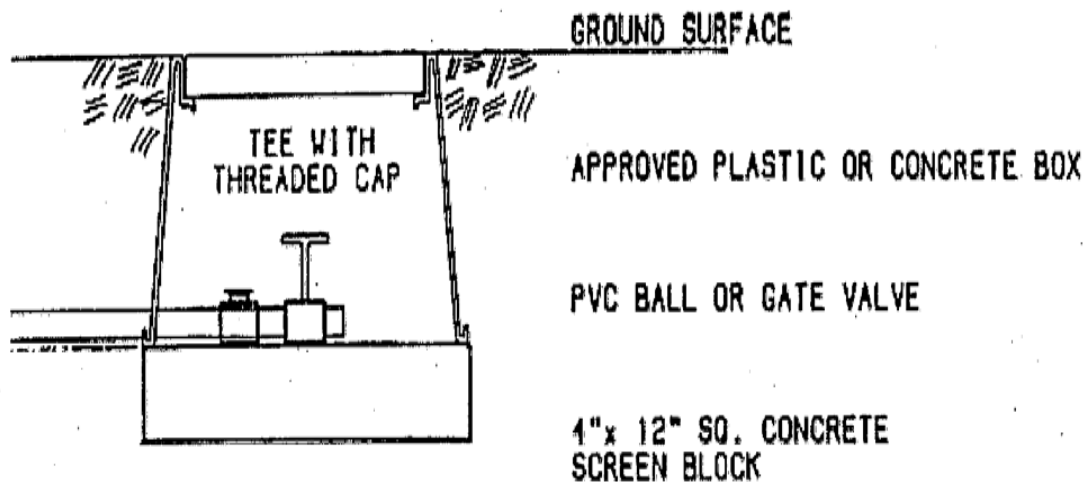
- a. Designers shall calculate the total dynamic head loss of the entire distribution systems.
  - i. Vertical differences
  - ii. Length of entire piping system
  - iii. Loss of all valves, tees, elbows, and appurtenances
  - iv. Head Loss shall be referenced as feet of elevation
  - v. Hydraulic orifice discharge shall be a minimum of 60 inches for upward discharge. Orifices shall have a protective shield.
  - vi. Orifice spacing shall be a maximum of 36 inches on center. (Closer spacing is preferred.)
  - vii. Size of orifice shall be 1/8 to 3/16 of an inch.
- b. System distribution manifolds shall have a balancing valve at the beginning of each perforated pressurized line and a purge valve at the end.
  - i. All valves shall be protected and encased within plastic, concrete or other approved type box to provide easy access and maintenance. Metallic valves are prohibited.
  - ii. Box size shall be 10 inches across or larger, round or square, and must allow enough room for maintenance and/or to install stand pipes onto the ends of the purge valves
  - iii. Balancing valves shall be PVC Schedule 80 (or higher) gate valves.
  - iv. Purge valves shall be PVC Schedule 80 gate or ball type valves.
  - v. Valve boxes shall be placed on screen blocks or equivalent and shall be designed, installed, and maintained so as to prevent soil and rodent intrusion into the box. See Figures 13.3f and g.

Figure 13.3f Balancing Valve



PLAN VIEW  
BALANCING VALVE DETAIL

Figure 13.3g Purge Valve



PURGE VALVE DETAIL

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- c. Spacing of pressurized lines shall be based on gravel bed width.
  - i. A Gravel bed width of 3 to 4 feet allows 1 pressurized line
  - ii. A Gravel bed width of 4 to 6 feet allows 2 pressurized lines
  - iii. A Gravel bed width of 6 to 8 feet allows 3 or 4 pressurized lines
  - iv. A Gravel bed width of 8 to 10 feet allows 4 or 5 pressurized lines
- d. Distribution piping shall be Schedule 40 PVC or greater of at least 3/4 inch diameter.
- e. Maximum length of pressurized lines shall be 75 feet.
- f. Maximum distance between perforations shall be 36 inches.
- g. Perforations shall be directed upward and must be protected with a shield.

### 13. Sump and Pump

- a. Refer to Sections 8.3 and 8.4 for required sump and pump features.
  - i. Automatic dosing siphons are not allowed in mound sewage dispersal systems.

### D. The construction criteria for Mounds includes the following:

1. These specifications must be included in the system plans submitted with the Permit Authority. The use of wheel type vehicles is prohibited,
  - a. For the purpose of ripping
  - b. When driving on any areas that have been ripped
  - c. When driving on the sand fill
  - d. When placing or moving the soil cover
  - e. At any time that soil conditions are wet, moist, or saturated.
2. Placement of the pressurized transmission line from the sump tank to the mound manifold shall be a minimum of 24 inches below the surface of the ground.
3. Site preparation of soil surface to a depth of 8 to 12 inches.
  - a. Mow excessive vegetation.
  - b. Remove trees.
  - c. Cut and grind stumps to a depth of 12 inches.
4. Perform initial ripping parallel to the contours of the ground within the limits of the sand base; rippers set 8 to 10 inches apart.
5. After all the sand has been placed and prior to mound soil cover placement, rip the native soil that will interface with the mound soil.

6. Prohibit all traffic on any ripped surfaces until the full depth of fill or cover material has been placed.
  7. Uniformly place and compress the sand fill by track rolling a neat line to the grade determined by the mound dimensions. A tolerance of no more than 0.25 feet (3 inches) vertically, to 100 feet horizontally is allowed. Add additional sand as the sand fill area is compressed.
  8. Construct gravel bed with special attention to proper elevation
    - a. Temporary form boards are required for placement of the distribution bed gravel.
    - b. Form boards shall be fully enveloped by the sand bed and shall be removed prior to cover placement.
  9. Perform hydraulic test after the distribution has been completed.
    - a. Hydraulic orifice discharge shall be a minimum of 60 inches for upward discharge.
    - b. Orifices shall have a protective shield.
    - c. Distribution to all laterals shall be equal.
    - d. This test shall be inspected by the consultant and the Permit Authority.
  10. Condition soil cover material with sufficient moisture to permit track rolling to a firm cohesive surface.
  11. Establish the finished grade of the mound by track rolling and grooming by hand.
  12. Complete proper drainage work and erosion control measures before final inspection.
  13. Install monitoring wells and details as shown on the plans.
  14. Prior to septic system final approval, acceptable erosion control must be completed.
- E. The performance wells criteria for mounds includes the following:
1. A minimum of 7 performance wells shall be installed within and around the mound system. Well screen is required for the perforated sections of the performance wells. See Figure 11.6.

- a. 2 performance wells extending to the bottom of the gravel bed shall be installed within the distribution gravel bed in proportionate locations.
- b. 2 performance wells shall be installed at the down slope and toe of the mound at proportionate locations from centerline at a depth of 24 inches.
- c. 2 performance wells shall be installed at a depth of 24 inches, 25 feet down slope of the sand toe mound at proportionate locations from the centerline.
- d. 1 performance well shall be installed at a depth of 24 inches, 10 feet upslope of the edge of the upslope sand bed at mound centerline for sloping sites and 25 feet upslope of for level terrain.
- e. Performance wells shall be protected and encased within plastic, concrete or an approved equivalent to provide easy access.
- f. All performance wells shall have concrete seals for the upper 12 inches

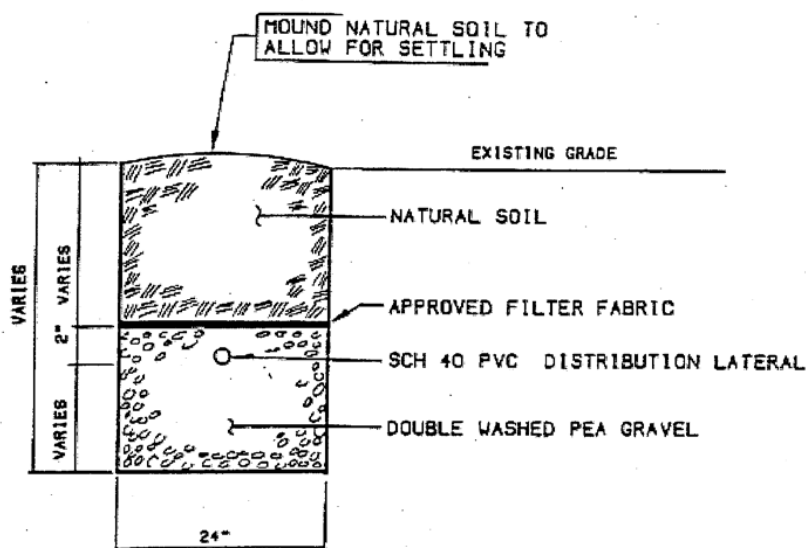
### **13.4 Shallow Trench Pressure Distribution (STPD) OWTS**

- A. Pressure distribution systems are designed for sites that typically have shallow top soils over slowly permeable or fractured subsoils on slopes up to 30 percent.
- B. The site criteria for STPD OWTS includes the following:
  - 1. Percolation rate of 1 to 120 minutes per inch for STPD systems on slopes up to 30 percent.
  - 2. Rates faster than 1 minutes per inch are not acceptable.
  - 3. Percolation depth measured from native grade
    - a. 24 inches minimum on slopes up to 20 percent.
    - b. 30 inches minimum on slopes from 20 to 25 percent.
    - c. 36 inches minimum on slopes from 25 to 30 percent.
    - d. 60 inches maximum on slopes up to 30 percent.
  - 4. Systems shall have a minimum depth of 24 inches of suitable soil beneath proposed trench bottom as established by:
    - a. Visual field observations and soil texturing to identify a limiting condition
    - b. The rock content (as retained on the #10 sieve) shall not exceed 50 percent by volume within the first 24 inches of soil below trench bottom
    - c. Soil hydro and bulk density tests (Zone 1 or Zone 2 soils)
    - d. Plasticity Index tests as measured by ASTM D-4318-84 Atterburg Series, with results of less than 20 for Zone 3 or 4 soils
    - e. Soil percolation testing with rates of 120 minutes per inch or better
  - 5. Systems shall have a minimum depth of 24 inches below trench bottom to groundwater, fractured rock, consolidated rock, bed rock, or impermeable soils.
  - 6. The addition of an approved pretreatment unit to a STPD does not mitigate 1 foot of the required minimum 24 inches of suitable soil beneath proposed trench bottom. 2 feet of acceptable native soil beneath the proposed trench bottom is required.
  - 7. A minimum of 24 inches below trench bottom of permeable soil shall extend a horizontal distance of no less than 25 feet down gradient from the edge of the last proposed trench.
  - 8. To maximize evapotranspiration, pressure distribution systems may not be installed below non-permeable type soils such as high shrink well clays, highly compacted soils, highly cemented soils, and/or massive or platy soil structures.

C. The design criteria for STPD OWTS includes the following:

1. The minimum trench spacing shall be 6 feet, center to center, on slopes less than 20 percent.
    - a. Greater trench spacing is recommended on steeper slopes.
  2. Distribution trenches shall follow the natural contour of the ground; trench bottoms shall be level.
    - a. The maximum deviation along the downhill side of the trench shall not vary more than 0.25 feet (3 inches) vertically per a 100 foot run. Distribution trenches shall be angled or curved to meet this requirement. The distribution field should not be placed on concave land forms.
  3. Approved distribution trench design. See Figure 13.4.
- a. Distribution piping shall be Schedule 40 PVC or greater of at least 3/4 inch diameter.
  - b. Approved aggregate below the pipe
    - i. Percolation rate of 5 to 120 minutes per inch 3/8 to 3/4 inch double washed gravel with less than 1 percent fines passing the 200 sieve.
    - ii. Percolation rate faster than 5 minutes per inch - Pretreatment required before dispersal field.
  - c. 2 inches of aggregate is required over the perforated sections of the pressurized line.
  - d. Minimum requirement of backfill is 12 inches over the pipe.
  - e. Maximum trench depth shall be 60 inches.

**Figure 13.4 STPD Trench Detail**



Note: The allowable width of STPD dispersal trench 18 to – 24 inches

**TRENCH DETAIL**

NTS



4. Absorption Area. Shall be calculated as the sidewall beneath the distribution pipe. The bottom area of the trench is not included as absorption area for sizing purposes.
  - a. The maximum sidewall area allowed for any system design is 3 square feet per lineal foot of trench.
  - b. Center trench spacing shall be increased by 1 foot for every 6 inch increase in gravel depth.
5. Soil Cover. The quality of the back fill shall be consistent in structure and texture as the topsoil already existing on the site. A minimum depth of 12 inches is required.
  - a. Soil structure and texture above the trench is extremely important to maximize evapotranspiration.
  - b. Trenches shall not be installed below non-permeable types of soils (high shrink-swell clays, soils with massive structure, or highly compacted soils).
6. Designers shall calculate the total dynamic head loss of the entire distribution System, taking into account
  - a. Vertical differences.
  - b. Length of entire piping system.
  - c. Loss of all valves, tees, elbows, and appurtenances.
  - d. Head loss shall be referenced as feet of elevation
  - e. Hydraulic orifice discharge shall be a minimum of 60 inches for upward discharge. Orifices shall have a protective shield.
  - f. The recommended orifice spacing is 24 inches on center; however the maximum spacing is 36 inches. The first and last orifice shall be located 1/2 orifice space from the ends of the distribution lines.
7. Balancing Valves and Purge Valves. System shall have a balancing valve at the beginning of each perforated pressurized line and a purge valve at the end. See Figures 13.3f and g.
  - a. All valves shall be encased in plastic or concrete boxes. Metallic valves are prohibited.
    - i. All balancing valves shall be PVC Schedule 80 (or equivalent) gate valves.
    - ii. All purge valves shall be ball or gate PVC Schedule 80.
  - b. All boxes shall allow enough room for maintenance and adequate room to install stand pipes onto the end of the purge valves.
8. There shall be a minimum of 3 foot separation from the transmission line to the beginning of the aggregate portion of the trench or gravel bed.

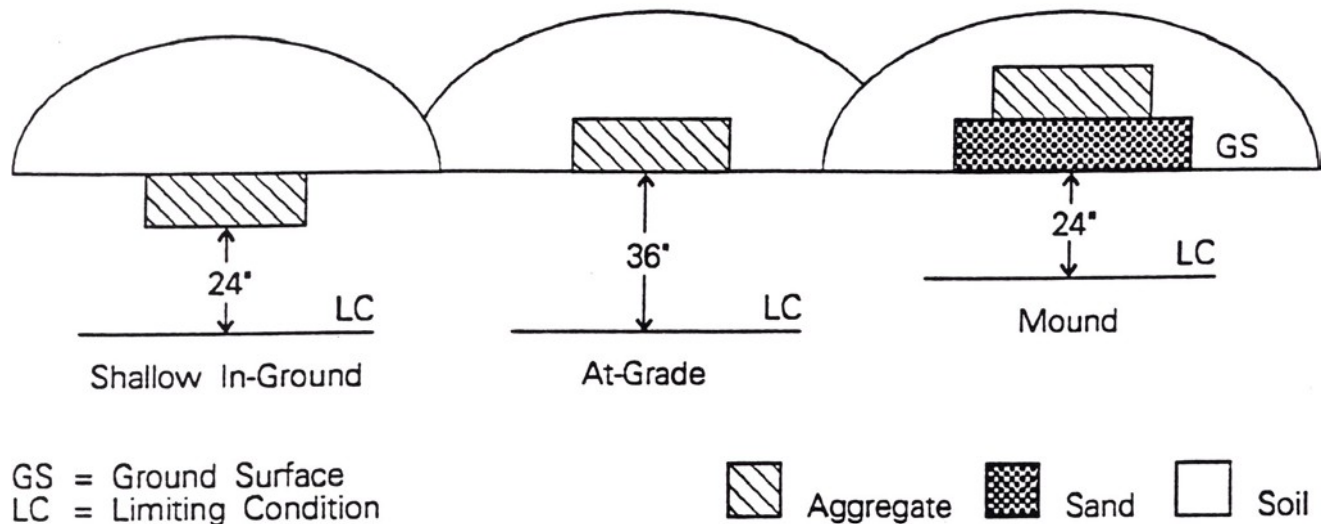
9. The cross section of the transmission line and the beginning of the gravel portion of the trench shall be stepped so as to prevent seepage of effluent from trench to trench.
  10. Maximum length of run for a perforated pressurized line shall be 75 lineal feet.
  11. In the distribution network, orifices shall be placed in upward position using an orifice shield.
  12. The sump and pump installation shall be as specified in Sections 8.3 and 8.4
  13. Dosing siphons are prohibited in all pressure distribution type systems.
- D. The following construction criteria for STPD OWTS and specifications must be included with the system plans submitted with the permit application
1. Placement of the pressurized transmission line from the sump tank to the first manifold must be a minimum of 24 inches below the surface of the ground.
  2. Construct trench beds with special attention to proper elevation and strict attention to contour.
    - a. Trenches shall not be installed when the soils are wet or excessively damp state.
    - b. Sidewall of trenches shall be scarified to remove all smears.
    - c. Place aggregate into the trench.
    - d. Install perforated piping, placing orifices upwards for the hydraulic test. Benching is strictly prohibited for the installation shallow trench pressure distribution systems regardless of the slope.
  3. Perform hydraulic test after the distribution system has been completed.
    - a. Pump must be adequate to deliver the required orifice discharge minimum of 60 inches for upward discharge to the lateral.
    - b. Distribution to all laterals shall be balanced.
    - c. This test shall be inspected by the designer/consultant and the Permit Authority.
  4. Establish the finished grade of the STPD system by track rolling and grooming by hand. Complete required drainage work and erosion control measures before final inspection.
  5. Install performance wells and complete all details as shown on the plans.
  6. Prior to septic system final approval, acceptable erosion control must be completed.

- E. The performance wells criteria for STPD OWTS includes the following. A minimum of 6 performance wells shall be installed within and around the system to a depth of 24 inches below proposed trench bottom. See Figure 11.6.
1. 1 or more performance wells shall be installed between trenches in the middle of the leach field.
  2. 1 or more performance wells shall be installed 10 feet down slope of the lowest trench line.
  3. 2 performance wells shall be installed 25 feet down slope of the lowest trench line.
  4. 1 or more performance well shall be installed at 10 feet upslope of the highest trench line.
  5. Additional performance wells may be required for systems longer than 75 feet.
  6. Permit Authority may require that performance well locations be changed in special situations.
  7. Performance wells shall be properly installed to provide easy access.
  8. Performance wells shall be a minimum of 24 inches below trench bottom.

### **13.5 At-Grade OWTS**

- A. The Wisconsin At-Grade soil absorption system accepts septic tank effluent and treats and disperses it in an environmentally acceptable manner. At-grade systems are designed to allow for reduced soil permeability and/or depth to groundwater conditions below the bottom of the system. It serves the same function as in-ground soil absorption trenches and mound systems. The at-grade component contains pressure distribution laterals installed on top of a gravel distribution media, which is installed directly on top of a plowed native soil. The system is then covered with a loam or a similar soil. Figure 13.5a is for illustration purposes only. Note that the diagram for the Shallow In-Ground would require the addition of an approved pretreatment unit to meet the 3 feet of soil below trench bottom requirement.

**Figure 13.5a SIG (requires pretreatment), At-Grade, Mound Soil Below Trench Bottom Requirements**



- B. The minimum site criteria for At-grade OWTS. Permeable soil is required to a depth of 36 inches. Percolation testing done at 24 or 36 inches must meet the following criteria:
1. Percolation testing may also be required at 12 inches if this is the worst soil horizon encountered.
  2. 1 to 120 minutes per inch for at-grade systems on slopes up to 25 percent. Note: A sand filter or other approved pretreatment unit is required when percolation rates are faster than 5 minutes per inch or slower than 90 minutes per inch.
    - a. Rates faster than 1 minute per inch are not acceptable.
  3. Separation from native grade to elevated groundwater is 36 inches, but may be reduced to 24 inches with the use of a sand filter or other acceptable pretreatment unit.
  4. Minimum separation is 36 inches from fractured rock, rock exceeding 50 percent by volume, or bedrock as measured from native grade.
  5. Placement of the at-grade system in areas that require the removal of large trees, boulders, or rock outcroppings is not permitted.

- a. Designers shall estimate the LLR for all proposed At-Grade systems and shall design the width dimensions and gravel dimensions accordingly, so that the distribution bed is long and narrow and on contour (Refer to Figure 13.5b).
- b. When the depth to a limiting condition (for example impermeable soil layer or rock is only 36 inches (or 24 inches with pretreatment) the LLR shall not exceed 4 gallons per linear foot per day (refer to Table 13.5a and Figure 13.5d).
- c. If it can be demonstrated that the wastewater flow will be vertical as well as horizontal, a higher LLR may be proposed.

## 2. Soil Loading Rate

- a. The soil loading rate is to be based on the most restrictive soil horizon in contact with the distribution area. Use the percolation rate of the most restrictive soil horizon(s) and apply the corresponding Sewage Application Rate (SAR) from Table 7.2a.

## 3. Configuration (Refer to Figure 13.5b)

- a. The length of the gravel bed (B) shall be greater than or equal to the design wastewater flow plus the LLR.
- b. The basal area shall be greater than or equal to the design wastewater flow divided by the SAR.
- c. The effective width of the gravel bed (A) shall be greater than or equal to the design wastewater flow plus basal area length (B). In no instance shall the width of the distribution bed below and downslope of the lateral exceed 15 feet.
- d. Absorption bed depth
  - i. There shall be a minimum of 6 inches of gravel below the distribution pile for residential systems with 2 inches of gravel cover over the pipe.
  - ii. There shall be a minimum of 9 inches of gravel below the distribution pile for commercial systems with 3 inches of gravel cover over the pipe.
- e. Only single distribution beds are acceptable. Dual beds are not allowed.
- f. The gravel bed shall extend at least 2 feet above the uppermost distribution pipe lateral.

## 4. Aggregate

- a. 3/8 inch double washed pea gravel size to 2 inch double washed drain rock
- b. The percentage of fines of washed gravel shall not exceed 1 percent by weight.

## 5. Natural Contour

- a. The distribution bed shall explicitly follow the natural contour of the ground. The bed must be installed within a tolerance of 0.25 feet (3 inches) vertically per 100 feet horizontally.
- b. Distribution beds shall be angled or curved to meet this requirement.
- c. The distribution bed shall not be placed in a concave landscape position. See Figure 13.5b.

## 6. Soil Cover

- a. A geo-textile synthetic fabric (Mirafi 140 N or equivalent) is to be placed over the aggregate bed.
- b. 12 inches of soil covering after settling is to be placed over all aggregate. Additional depth of topsoil must be placed during the time of construction to assure that the minimum depth is achieved following natural settling of the soil.
- c. Soil cover shall extend a minimum of 5 feet uphill and on both sides of the gravel bed. Downslope soil cover shall conform to Table 13.5a.

**Table 13.5a - At-grade Downhill Soil Cover Requirements**

SLOPE PERCENTAGE	COVER (lineal feet beyond gravel)
0 to 2	4
2 to 4	6
4 to 6	8
6 to 8	10
8 to 12	12
12 to 16	16
Greater than 16	20

## 7. Distribution System

- a. Total Dynamic Head Loss. Designers shall calculate the total dynamic head loss of the entire distribution system.
  - i. Vertical differences
  - ii. Length of entire piping system
  - iii. Loss of all valves, tees, elbows and appurtenances
  - iv. Head loss shall be referenced in feet of elevation
  - v. Distribution piping shall be Schedule 40 PVC or greater of at least 3/4 inch diameter
  - vi. Hydraulic orifice discharge shall be a minimum of 60 inches for upward discharge. Orifices shall have a protective shield.
  - vii. Orifice spacing shall be a maximum of 36 inches on center (Closer spacing is preferred)/
  - viii. Size of orifices shall be 1/8 to 3/16 of an inch

- b. Balancing Valves and Purge Valves. System distribution manifolds shall have a balancing valve at the beginning of each pressurized line and a purge valve at the end.
  - i. All valves shall be protected and encased within plastic, concrete or other approved type box to provide easy access and maintenance. Metallic valves are prohibited.
  - ii. Box size shall be 10 inches across or larger, round or square, and must allow room for maintenance and/or to install stand pipes onto the ends of the purge valves.
  - iii. Balancing and purge valves shall be PVC Schedule 80 gate or ball type valves.
- c. Perforated Pressurized Lines.
  - i. 1 or 2 pressurized lines may be used in the At-Grade bed with the goal being to provide maximum distribution of wastewater along the length of the At-Grade. Where 2 lines are used, the distance between the lines shall be 24 inches.
  - ii. The maximum length of pressurized lines shall be 75 feet.
  - iii. The maximum distance between perforations shall be 36 inches. Where 2 pressurized lines are used the holes shall be staggered between the 2 lines.
  - iv. Hydraulic orifice discharge shall be a minimum of 60 inches for upward discharge. Orifices shall have a protective shield
- 8. Sump and Pump. Refer to Sections 8.3 and 8.4 for required sump and pump features. Note Automatic dosing siphons are NOT allowed in at-grade sewage dispersal systems.
- 9. Sizing formulas for at-grade systems. Sizing calculations for all at-grade dimensions shall be provided with all proposals.



D. The construction criteria for at-grade OWTS includes the following

1. The use of wheel type vehicles is prohibited.
  - a. For the purpose of ripping
  - b. When driving on any areas that have been ripped.
  - c. When placing or moving the soil cover.
  - d. At any time that the soil conditions are wet, moist, or saturated.
2. Placement of the pressurized transmission line from the sump tank to the at-grade manifold shall be a minimum of 24 inches below the surface of the ground.
3. Site preparation of soil surface to a depth of 8 to 12 inches.
  - a. Mow excessive vegetation
    - i. Remove trees
    - ii. Cut and grind stumps to a depth of 12 inches.
    - iii. Perform initial ripping parallel to the contours of the ground and only within the limits of the gravel base; rippers set 8 to 10 inches apart. The interface of the native soil and the at-grade soil shall be ripped after the gravel has been placed and just prior to placement of the at-grade soil cover.
    - iv. Prohibit all traffic on any ripped surfaces until the full depth of gravel bed or cover material has been placed.
4. Gravel Bed
  - a. Temporary form boards are required to hold aggregate in place to construct the gravel bed.
  - b. The temporary form boards shall be removed prior to placement of the soil cover.
  - c. Place performance wells as specified in Section 13.4E
  - d. Place aggregate in the designated tilled area to the appropriate depth as specified in D.2 above.
  - e. Work from the upslope side and avoid compaction along the downslope side.
5. Construct distribution network prior to cover placement
6. Perform hydraulic test after the distribution has been completed.
  - a. Pump must be adequate to provide hydraulic orifice discharge of a minimum of 60 inches upward discharge. Orifices shall have a protective shield.
  - b. Distribution to all laterals shall be equal.
  - c. This test shall be inspected by the consultant and the Permit Authority.

7. Place soil cover

- a. Place 2 inches (residential) or 3 inches (commercial) aggregate over the distribution network.
- b. Place geo-textile fabric over the aggregate. Extend only to the edge of the aggregate.
- c. Condition soil cover with sufficient moisture to permit track rolling to a firm cohesive surface.
- d. Rip area to be covered with cover soil.
- e. Place soil against the form boards by track rolling only. Remove the form boards.
- f. Place soil over entire gravel bed by track rolling and grooming by hand. Complete proper drainage work and erosion control measures before final inspection. Seed and mulch.

8. Establish the final grade of the at-grade by track rolling and grooming by hand.

9. Install performance wells and details as shown on the plans.

E. The performance well criteria for at-grade OWTS include the following

1. A minimum of 5 performance wells shall be installed within and around the system.
  - a. 1 performance well shall be installed 10 feet upslope of the upslope gravel bed at the system centerline for sloping sites. The well depth shall be 36 inches below original grade. If the system was designed for 24 inches of soil and utilizing a pretreatment unit, the well depths shall be 24 inches below original grade.
  - b. 2 performance wells shall be installed 25 feet down slope of the gravel toe at-grade at proportionate locations from the centerline. The well depths shall be 36 inches below original grade. If the system was designed for 24 inches of soil and utilizing a pretreatment unit, the well depths shall be 24 inches below original grade.
  - c. If the hydraulic gradient cannot be determined on flat sites, 2 performance wells will be required on each side of the system installed 25 feet from the gravel toe at proportionate locations from centerline. The well depths shall be 36 inches below original grade or 24 inches below original grade if a pretreatment unit was utilized.
  - d. 2 performance wells shall be installed at the down slope toe of the gravel bed at proportionate locations from centerline at a depth of 24 inches. The depth of these performance wells shall extend to the gravel soil interface. The slotted/screen casing of the well shall extend through the entire depth of the gravel and the gravel (instead of sand) shall be placed in the annulus between the casing and the borehole. For long systems, at least 1 performance well shall be installed in each 75 feet of lateral. See Figure 11.6.

## 13.6 Shallow In Ground (SIG) OWTS

- A. Shallow In-Ground Systems (SIG) utilize shallow depth trenches and pressure distribution methods of disbursement of effluent.
1. SIG systems are designed with the acceptable fill material as soil cover.
  2. The fill or soil cover is placed in a manner similar to the Permit Authority requirements for Filled Land systems.
  3. SIG systems are designed for sites that typically have shallow top-soils over slowly permeable or fractured subsoils on slopes up to 25 percent.
- B. The site criteria for SIG OWTS includes the following
1. Percolation rate of 1 to 120 minutes per inch for systems on slopes up to 25 percent.
  2. Percolation rates faster than 1 minute per inch are unacceptable.
  3. Percolation tests shall be at trench depth and at 2 and 3 feet below the trench depth, if necessary after soil profile review.
  4. Visual field observations and soil texturing to identify any limiting conditions.
    - a. Systems shall have a minimum depth of 36 inches of suitable soil beneath trench bottom and 36 inches from trench bottom to groundwater. These may be reduced to 24 inches if an approved pretreatment is used.
    - b. The rock content (as retained in the #10 Sieve) shall not exceed 50 percent by volume within the first 24 inches of soil below trench bottom.
    - c. Soils hydrometer and bulk density tests (Zone 1 or Zone 2 soils).
    - d. Plasticity Index test results less than 20 for Zone 3 or 4 soils (ASTM D-4318-84 Atterburg Series).
  5. System sizing shall be based upon soil morphology and average percolation rate, if that results in larger system. Refer to Sonoma County Percolation Test and Sizing Chart for non-standard systems recommended sizing.
  6. Systems shall have a minimum separation of 36 inches to groundwater, fractured or impermeable soils beneath trench bottom and 48 inches to bedrock as measured beneath proposed trench bottom. Note that minimum separation may be reduced to 24 inches below trench bottom if acceptable pretreatment is used.
  7. To maximize evapotranspiration pressure distribution systems as the SIG may not be installed below non-permeable soils such as high shrink-swell clays, highly compacted soils, and/or soils with massive or platy structures.
  8. See Sections 12.1 and 12.2 and Table 7.2c for restrictions on use and other required setbacks.

9. Soil cover of 12 inches minimum is required.

C. The design criteria for SIG OWTS includes the following:

1. See Section 13.3C

a. Refer also to the following standards.

- i. Permit Authority regulations for Filled Land Systems.
- ii. Permit Authority Mound Construction Regulations.

2. Trench Spacing

- a. Minimum of 8 feet on center for 0 to 12 ½ percent slope.
- b. Minimum of 10 feet on center for 12 ½ to 20 percent slope.

3. Sand filter or other approved Pre-treatment units are required on sites with percolation rates faster than 5 or slower than 90 minutes per inch.

4. A dual system with an approved diversion valve shall be designed and installed for SIG systems.

D. The construction criteria for SIG OWTS includes the following

1. See Section 13.3D

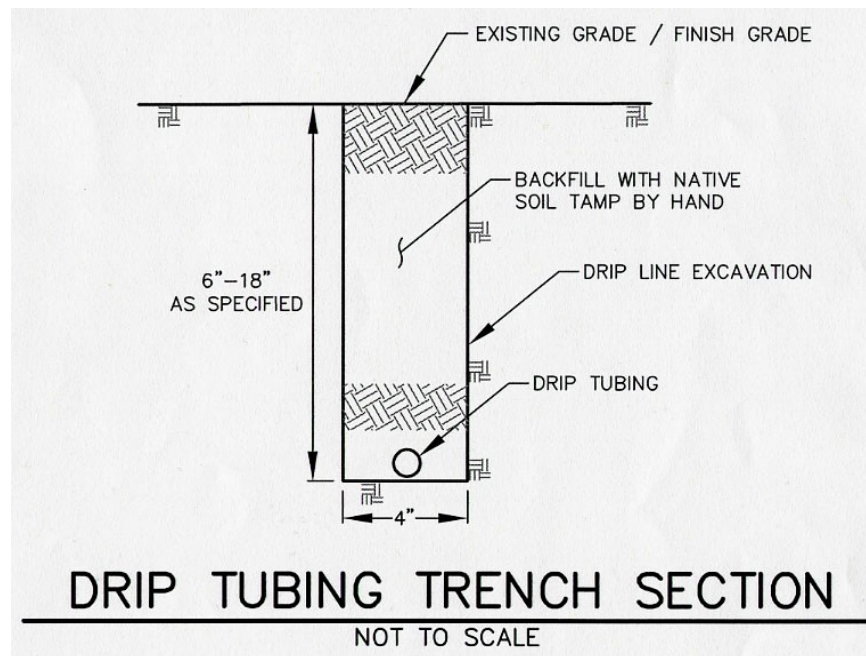
E. The performance well criteria for SIG OWTS includes the following

1. See Section 13.3E

## 13.7 Subsurface Drip Dispersal OWTS

- A. A subsurface drip dispersal OWTS is a pressurized wastewater distribution system that delivers small, precise doses of effluent to shallow subsurface dispersal/reuse fields. The distribution piping is small diameter flexible polyethylene tubing (dripline) with small in-line emitters that discharge effluent at slow controlled rates. A typical subsurface drip dispersal system installation includes a septic tank, supplemental treatment, a dosing chamber, pump(s), control panel, timed dosing and supply and return flow monitoring, particulate filter, filter backwashing and drip line flushing, driplines, and monitoring wells. A supplemental treatment system that reduces effluent strength to the Section 13.9 Pretreatment Units quality standards is required.
- B. The site criteria for subsurface drip dispersal OWTS includes the following:
1. Depth to a limiting condition and permeable soils (1 to 120 minutes per inch) below the drip line bottom shall be a minimum of 24 inches.
  2. The soil above the drip line proposed depth shall be permeable (1 to 120 minutes per inch). This excludes massive or platy structured soils. Soils subject to flooding, excessive irrigation, farming practices, grading, ripping or roto-tilling are also not acceptable. The quality of acceptable soils above the dripline shall be equal to those below the dripline.
  3. A minimum of 24 inches of permeable soil below emitter depth shall extend a horizontal distance of no less than 25 feet down gradient from the edge of the last proposed drip line, including expansion areas.
  4. Subsurface drip irrigation system sites shall not exceed 30 percent slope without an approved variance and a geotechnical study required for slope stability and suitability.
  5. Subsurface drip irrigation system sites shall not exceed 20 percent slope when fill is placed over the drip system without an approved variance and a geotechnical study required for slope stability and suitability.
- C. The design criteria for subsurface drip dispersal OWTS includes the following:
1. Separation between emitter line laterals shall be a minimum of 2 feet.
  2. Dripline installations generally have emitters spaced 24 inches apart maximum and 12 inches minimum.
  3. A standard drip system is typically installed 12 inches into native soil. A minimum native soil depth of 6 inches may be allowed with disinfection. The maximum soil cover allowed is 18 inches. (See Figure 13.8a).

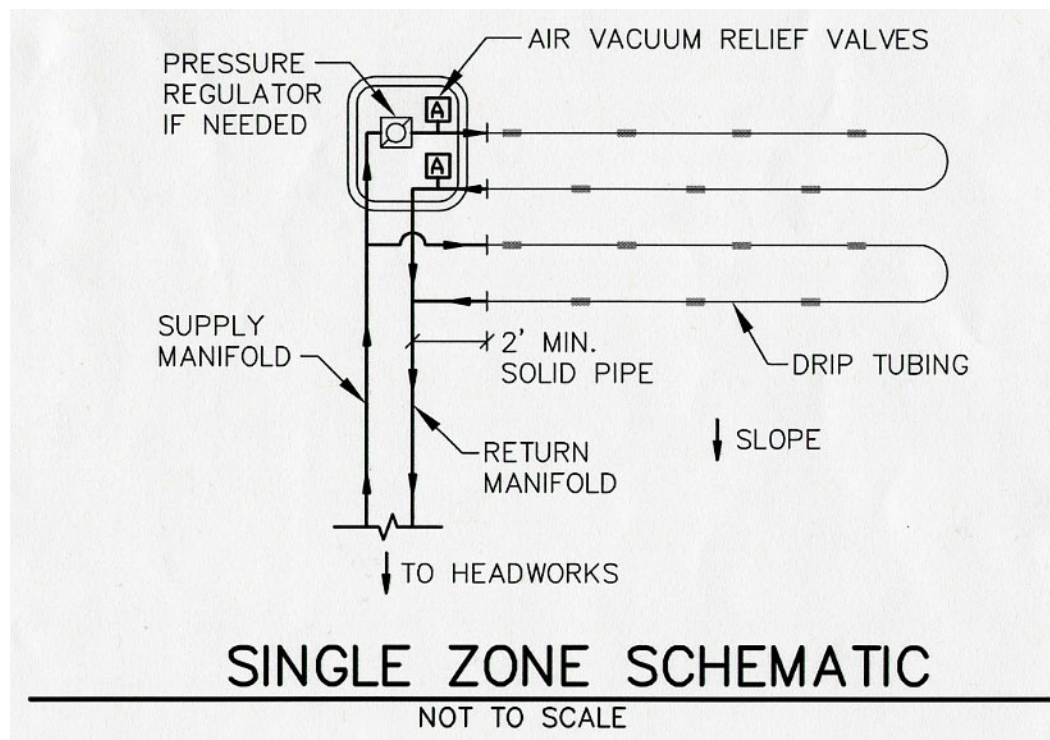
**Figure 13.8a Drip Trench Cross-Section**



4. Soil application rates generally assume each emitter will wet an area of 4 square feet. However, this assumption is not valid in all soil types because the size of the wetted volume depends on soil characteristics and dosing cycles. Sizing of the subsurface drip dispersal system shall be based on both soil morphology and the percolation rate at the most restrictive horizon (See Table 7.2a for percolation rates). Designers shall clearly demonstrate the minimal square footage required as determined by the soil morphology and percolation rate. Percolation tests may be waived for developed parcels in some circumstances.
5. The designer shall also determine the number of zones, the number of doses, the quantity of the dose, the head losses, spacing of drip lines, spacing of drip emitters, diameter of the drip tubing (typically 0.55 inches), pump size, location of air relief valves and the "frequency of flushes."
6. Distribution zones shall be designed to be consistent with dripline manufacturer requirements. The length of each distribution line shall not exceed manufacturer's specifications to insure equal distribution to each emitter. If multiple zones are designed, dosing must be automatically alternated between each zone.

7. All subsurface drip dispersal systems require an approved supplemental treatment unit for treating septic effluent and mechanical filtration with Vortex/Spin Filters or Disk Filters. The level of supplemental treatment must comply with NSF Standard 40 or to the satisfaction of the administrative authority, Section 13.9 or as specified by the manufacturer, whichever results in most improved effluent quality. Different subsurface drip dispersal products may require different levels of supplemental treatment.
8. Drip systems are “closed loop” networks with control valves and supply/return manifolds to allow for periodic line flushing (See Figure 13.8b). Required flushing velocity shall be a minimum of 1 foot per second.

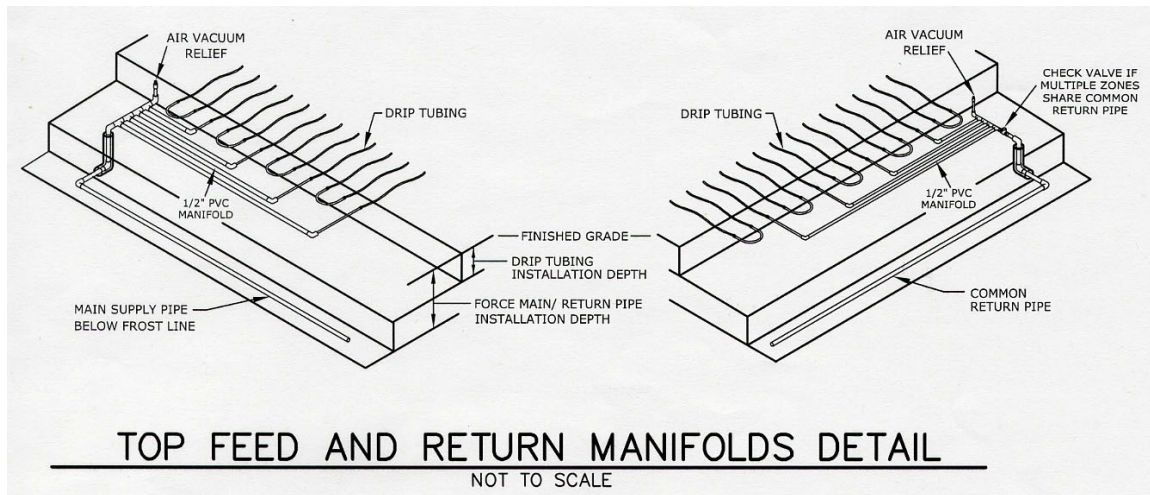
**Figure 13.8b Single Zone Schematic**



9. Designer shall employ measures to prevent uneven distribution of the dispersal field due to drain down following a pump cycle. Per California Plumbing Code (CPC), spring check valves are not allowed for wastewater applications. (See Figure 13.8c for example of a top feed manifold.)

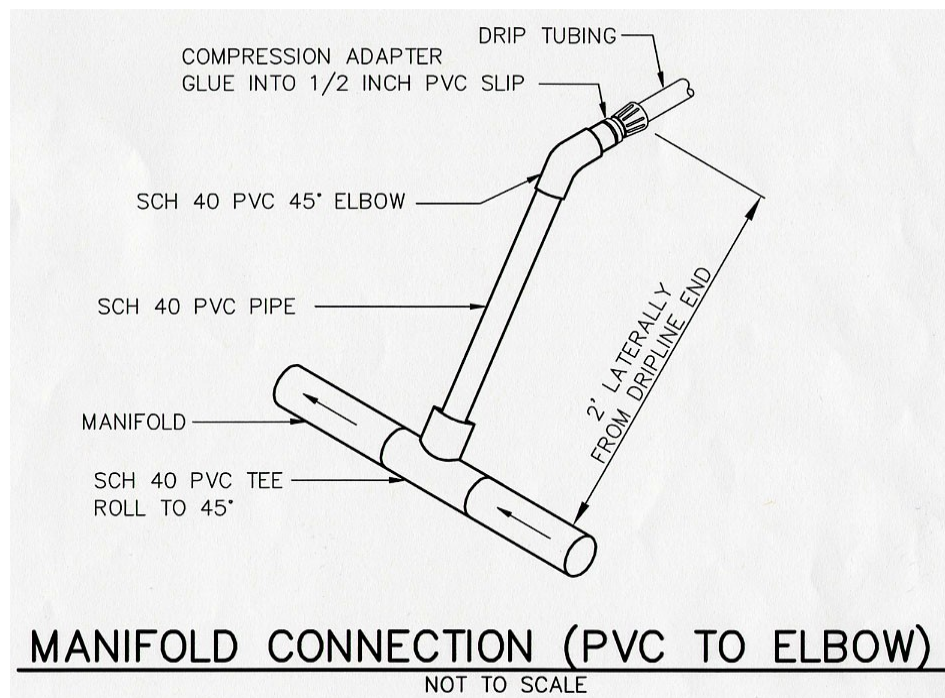


**Figure 13.8c Top Feed Manifold**



10. Provide 2 feet of solid tubing/pipe between the manifold and the drip tubing (See Figure 13.8d).

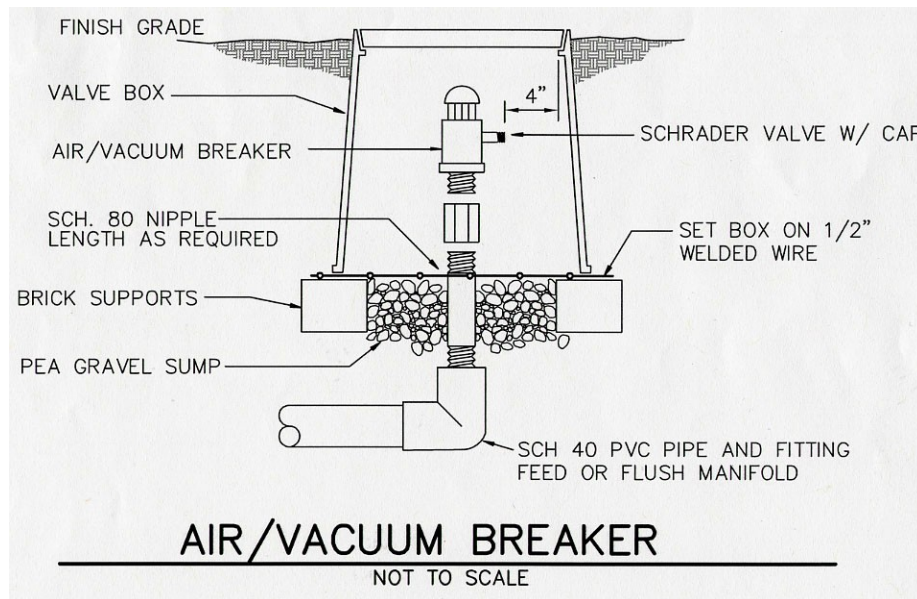
**Figure 13.8d Manifold Connection**





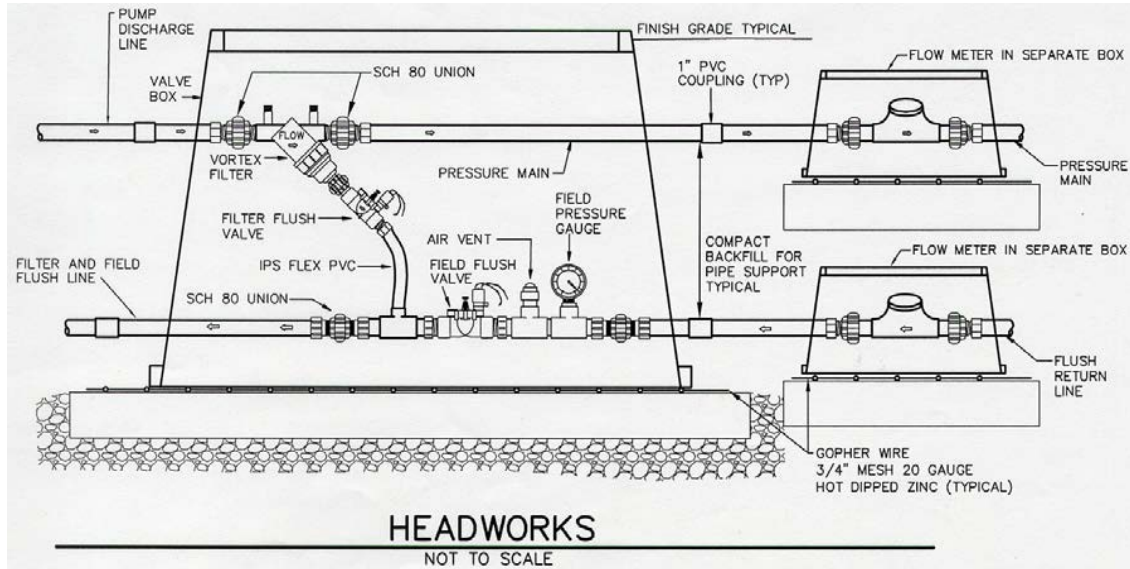
11. Air/vacuum release helps prevent soil particles from being sucked into emitters and is required on all drip systems. Air/vacuum release valves must be installed at the high point of each distribution sector of the supply and return manifold. The air relief valves shall be equipped with Schrader valves in order to check pressure. These valves must be located in valve boxes with adequate room to attach a pressure gauge (See Figure 13.8e).

**Figure 13.8e Air Relief with Schrader Valve**



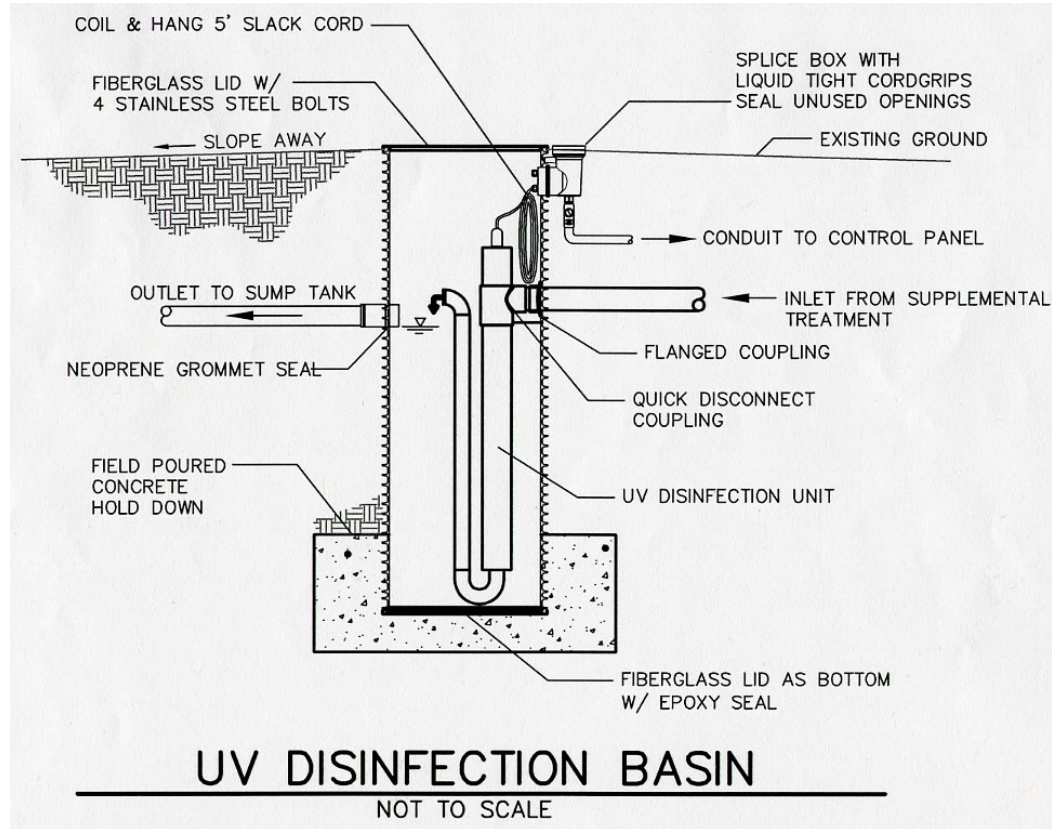
12. All system components (filters, control valves, air-vacuum relief valves, pressure regulators and controllers) shall be appropriately sized for the system dosing and flushing flow rates, and shall meet specifications of the drip line manufacturer (See Figure 13.8f for example of headworks). All transport piping, supply and return manifolds and fittings must be Schedule 40 PVC or Schedule 80 PVC if threaded fittings are utilized. All filters must be sized to operate at a flow rate greater than or equal to the maximum design discharge rate of the system including the field flush cycle.

**Figure 13.8f Headworks**



13. Filter backwash and line flushing debris must be returned to the septic tank or into the sump chamber.
14. Totalizing flow meters (in gallons) are required on the supply and return distribution lines. Flow meters must be installed in a readily accessible location for reading and servicing.
15. A controller capable of timed dosing and automatic line/filter flushing is required.
16. Disinfection of the treated wastewater shall be incorporated in cases of well-drained soils (less than 1 minute per inch or faster) or where drip dispersal systems only have a minimum of 6 inches of native soil cover above the drip line (see Figure 13.8g). If 6 inches of approved fill is added above the 6 inches of native soil cover, disinfection will not be required.
17. For aerobic treatment unit (ATU) systems that function with external blowers, a cutoff switch or interlock that disables the pump must be built into the control panel so the blower may not be disconnected.

**Figure 13.8g Disinfection Unit**



D. The construction criteria for subsurface drip dispersal OWTS includes the following

1. Dripline can be trenched (by hand or with a trenching machine) into narrow, shallow trenches or plowed directly into the soil (with a vibratory plow or other insertion tool) and backfilled without gravel or geotextile.
2. To the extent possible, systems should be designed for the dripline lateral to follow the contour. However, whenever drip lines cannot follow the contour, distribution network driplines with Pressure Compensating (PC) emitters shall be installed in grid patterns to accommodate irregularly shaped sites or landscape irrigation applications.
3. Valves must be readily accessible for service and/or inspection. All valve boxes must be protected from gopher soil movement. A detail of the valve box must be included on the plans. Specify concrete, hardware wire or similar bottom.
4. A ground cover (turf, fruit trees or other appropriate landscaping) must be planted over the drip field after installation to provide additional treatment, prevent erosion and increase wastewater reuse through plant evapotranspiration.

5. Fill material may only be placed above native soil for soil cover, and shall not be used to meet required soil depth minimums. The system designer shall describe the type of fill to be placed in terms of texture and structure, the depth and method of ripping before placement. No part of the subsurface drip dispersal field may be located where the site slope exceeds 20 percent when fill is used.
  6. Owners should avoid activities that might damage the drip tubing or compact the soil.
  7. After the #189 septic electrical inspection has been completed by the Building Inspector, a startup inspection must be scheduled with the system designer, installer, service provider and the Permit Authority.
- E. The performance well criteria for subsurface drip dispersal OWTS includes the following:
1. A minimum of 4 performance wells shall be installed around the drip dispersal field.
    - a. 1 performance well shall be located 10 feet upslope of the system to a minimum depth of 24 inches below the drip line depths.
    - b. 1 or more performance wells shall be located 10 feet down slope of the system to a minimum depth of 24 inches below the drip line depths.
    - c. 2 performance wells shall be located 25 feet down slope of the system to a minimum depth of 24 inches below the drip line depths. See Figure 11.6.

### **13.8 Pretreatment Units**

- A. Pretreatment units may be used in conjunction with standard or nonstandard systems where the site and soil conditions are not adequate. Standard systems with a pretreatment unit are considered to be a standard system unless the pretreatment unit is required in which case it will be considered an alternative nonstandard system.
- B. In cases where a pretreatment system is used, Permit Authority and the RWQCB may allow a reduction in the minimum depth of soil below trench bottom to 2 feet. However, in all instances, at least 2 of the required 3 feet of soil beneath trench bottom must be acceptable native soil.
- C. Recirculating sand filters are also an approved pretreatment unit. Sand filtration may be defined as the intermittent application of wastewater to a bed of granular material that has an under drain to collect and discharge the final effluent. The purpose of sand filters is to pretreat the effluent and improve wastewater quality.
1. The design of sand filters in Sonoma County is based on the "Guidelines for the Use of Sand Filters" (Technical Review Committee, August 2, 1989. Washington State Department of Health, Olympia, Washington). Under the Permit Authority waiver standards, designers may propose to the liquid waste specialist, the use of sand filters to justify increasing soil application rate.

## **Experimental Pretreatment Units**

- A. The following pretreatment units shall be installed pursuant to the manufacturers specifications:
1. Aqua Filter
  2. Pura System SBR (aeration system) Models PS1-4 through PS1-8; PS1-9 through PS1-14
  3. EZ-treat (Recirculating Synthetic filter)
  4. Aqua Klear (Air diffuser)

## **Alternative Pretreatment Units**

- D. The following alternative pretreatment units shall be installed pursuant to the manufacturers specifications:
1. Peat Moss Systems
  2. Recirculating Sand Filter
  3. Single Pass Sand Filter
  4. Advantex Units (filter fabric)
  5. Clearstream
  6. Bio-Microbics Fast
  7. Hoot Aerobic
  8. Microseptic Enviroserver
  9. Multiflo
  10. Norweco Singulair
  11. Norweco Biokinetic Singulair
  12. Nayadic
  13. Peat filter
  14. Southern Aerobic
  15. Whitewater Aerobic

## **Section 14 Non Standard and/or Commercial OWTS Operational Permit and Monitoring**

- A. All non-standard OWTS and commercial OWTS that meet applicable criteria of Sections 11 (Commercial), 12 (Experimental) or 13 (Alternative) OWTS criteria require the issuance and possession of valid Operational Permits pursuant to Sonoma County Code Sections 24-33 and 34.
  - 1. Applications to construct non-standard OWTS must be accompanied by applications and fees for operational permits.
  - 2. Operational permits are transferable subject to an ownership transfer fee.
  - 3. An Operational Permit Easement Deed and Agreement is needed for the Easement property serving the residence or business.
  - 4. A separate Easement Agreement to an Operational Permit OWTS Easement Agreement is required whenever a portion of the non-standard OWTS is located on a different parcel.
    - a. If a property changes ownership within 60 days of the issuance of the original Operational Permit, the permit may be transferred without additional fees. The anniversary date shall remain as per permit originally issued.
- B. A recorded easement agreement is required for all OWTS subject to this Section. The purpose of easement agreements is to allow Permit Sonoma staff and associates, and/or the RWQCB onto the properties to monitor and test the non-standard OWTS.
  - 1. Primary and reserve test areas for non-standard OWTS are required to have the standard easement agreement recorded against the parcel before issuance of the sewage dispersal permit.
  - 2. Easement agreements may not be removed from the title of the property unless authorized in writing by the Permit Authority.
- C. Monitoring forms will be provided by Permit Authority staff to the property owner two times per year for recording information regarding OWTS operation.
  - 1. Property owners shall complete the monitoring reports and submit them to the Permit Authority within 30 days of receipt.
  - 2. Failure to perform the self-monitoring program is cause for suspension of the Operational Permit.
  - 3. Failure to provide access to the system area when requests for access have been communicated to the property owner is cause for revocation.

- D. All Experimental or Alternative Non-Standard OWTS that include an approved Pretreatment Unit, permitted on or after the effective date of this OWTS manual are subject to inspection, maintenance and monitoring by an approved Service Provider for the life of the system. An approved Service Provider means a Registered Civil Engineer, Registered Environmental Health Specialist, or any person who is licensed as a certified on-site wastewater system inspector or other equivalent license by passing a state or nationally accredited test.
1. All Non-Standard OWTS permitted prior to the effective date of this OWTS manual will have the option of being permitted with an approved Service Provider, or remain as they are currently permitted.
  2. A copy of a signed contract with the approved Service Provider, if applicable, a completed maintenance and monitoring inspection report shall be submitted to the Permit Authority with any application for a change of ownership.
  3. Once a Service Provider is hired or upon change of ownership, the non-standard OWTS with a pretreatment unit will be required to have a Service Provider for the remaining life of the system.
  4. All non-standard systems with TCOM/VCOM panels must have a qualified Service Provider for the life of the system.
- E. All non-standard OWTS must be designed with a series of performance wells to sample for potential subsurface groundwater degradation. Performance wells are strategically placed up gradient, laterally, down gradient and within most non-standard OWTS.
- F. The Permit Authority may occasionally sample performance wells for total coliform bacteria, fecal coliform bacteria, and nitrates as indicators of the degree of sewage treatment and function of non- standard OWTS. The following are limits of maximum contaminant levels to analyze degree and function of nonstandard sewage dispersal systems.

- G. Any non-standard OWTS that causes sewage to surface or discharge at ground level or any tank exfiltrating wastewater or infiltrating groundwater is deemed to have an adverse effect on surface water and is considered a public health hazard. It is defined as a failing OWTS. Such a system shall be immediately corrected or abated.
1. Sample results greater than 240,000 of the most probable number (MPN)) total coliform bacteria and/or a fecal coliform count greater than 2.2 MPN exceeds the maximum contaminant levels and is deemed to have an adverse effect on subsurface water.
    - a. Such level of contamination as sampled from any purged performance well located 25 feet or greater down gradient from the dispersal field indicates a failing system.
    - b. Failing systems shall be corrected or abated.
  2. Sample results exceeding 3,000 MPN but less than 240,000 MPN total coliform and/or less than 2.2 MPN fecal coliform, do not exceed the maximum contaminant levels (MCLs). However, these results define a non-standard OWTS as operating marginally.
    - a. The contaminant levels are results of samples that have been taken from any purged monitoring well located 25 feet down gradient from the dispersal field.
    - b. For the purpose of the Annual Monitoring Report, OWTS that show ponding of effluent within 12 inches of trench bottom (but do not exceed MCLs mentioned above) are defined as operating marginally.
- H. The RWQCB requires the Permit Authority to monitor the operation and maintenance of all non-standard OWTS.
1. Inspection frequency is generally based upon a frequency of 1 inspection per year.
    - a. The Permit Authority shall submit results of the monitoring inspections to the RWQCB in the form of an annual report for each calendar year.
    - b. The Permit Authority shall notify the RWQCB in writing whenever the monitoring program is inadequately staffed.



## **Section 15 Vesting Certificates**

### **15.1 General**

- A. The issuance of vesting certificates for approved OWTS plans and/or installed OWTS are intended to protect property owners from any potential future changes in OWTS regulations, during the effective term of the vesting certificate. Pursuant to Sonoma County Code Chapters 24 through 56 and 57 and 7-12 (Appendix C), the design and/or installed system must be in conformance with current codes and standards in effect at the time of vesting certificate approval, including proof of water in water scarce and marginal water areas (second dwelling units only).

### **15.2 Limitations**

- A. Vesting certificates for approved OWTS designs are valid for 3 years from the date the vesting certificate is signed. Upon submission of a complete OWTS permit application within the 3 years, an OWTS permit shall be issued in accordance with the approved plans. Prior to permit issuance, a site visit shall be made to determine that no changes have occurred which may cause revocation of the vesting certificate.
- B. Vesting certificates for installed OWTS are valid for 2 years from the date the vesting certificate is signed.
- C. Upon proper application for a Well & Septic Clearance for the residence within that time period, the clearance will be approved, provided the proposed dwelling does not exceed the design capacity of the OWTS and does not conflict with required setbacks to any feature of the OWTS.

### **15.3 Restrictions**

- A. Experimental systems and/or those systems subject to Waste Discharge Requirements (WDRs) from the RWQCB are not eligible for vesting certification. Vesting certificates for OWTS subject to WDRs may be eligible if WDRs are waived by the RWQCB.

## **15.4 Revocation**

### **A. Vesting Certificates can be revoked in the following cases**

1. It is found to have been based upon false or erroneous data; or
2. Excavation, grading, or compaction of soils has occurred which would render the approved leach field area or expansion area unsuitable for a septic system;  
or
3. The RWQCB adopts a prohibition against waste discharges; or
4. Further information shows that the proposed installation would create a gross public health hazard.

### **B. Alteration of Ambient Conditions**

1. Construction of wells, waterways, cut banks, or roads have occurred that would affect the area's use for the leach field or reserve expansion area.
- 2 .The County cannot deny a permit for a well within 100 feet of a vested area unless the septic system has actually been installed or a septic system permit issued.

## **Section 16 Subdivisions and Lot Line Adjustment Requirements**

- A. No approval of an application for a minor subdivision or lot line adjustment which necessitates use of sewage easements shall be granted. Each proposed lot must be demonstrated to have a site suitable for installation and expansion of an OWTS contained entirely within the proposed property lines of the lot.
- B. Sewage easements for major subdivisions may be considered under the following circumstances
  - 1. A homeowner's association or other entity of dischargers empowered to conduct a program of regular sewage system monitoring, maintenance, and repair is created.
  - 2. Easements are contained only within common lands of the subdivision.
  - 3. Common areas are owned and controlled by the entity.
  - 4. The easement for each lot is entirely separate and distinct from the easement for any other lot.
  - 5. Easements shall not be used as a basis to allow lot sizes smaller than those specified in the County Subdivision Ordinance for lots with OWTS.
  - 6. New applications for construction or repair of an OWTS shall be in accordance with these requirements.
  - 7. The Project Review Specialist - Health shall be responsible for implementing regulations relative to subdivisions and lot line adjustments.

## Section 17 Variance Requirements

- A. Requests for variances of State and/or County regulations may be granted only when the Director of the Permit Authority, or his/her designee, determines that the requested variance is consistent with the minimum standards for public health and water quality protection. Any variance request must provide a corresponding mitigation measure(s) or justification to assure that public health and water quality protection at least equal to that established by the rules, is provided.
- B. Variances shall be considered only if no other reasonable alternative exists on the property.
- C. The Permit Authority shall review the variance request(s) for a site development, evaluating the proposed variance mitigation measure(s) for consistency with the public health/water quality protection intent of the OWTS standards.
- D. Variances cannot be approved for the prohibitions listed in Section 4.2.C unless there is a corresponding mitigation measure listed in Section 4.3.
- E. Variance Justification. The variance justification shall include the following:
  - 1. The special circumstances affecting the property that make the strict application of the standards impractical;
  - 2. The standard proposed to be varied;
  - 3. The proposed substitute measure and when it would apply;
  - 4. How the mitigation measure achieves the same intent or goal as the standard being varied;
  - 5. The soil type, according to the USDA Sonoma County Soil Survey;
  - 6. Soil profile logs;
  - 7. Depth to groundwater;
  - 8. Preliminary OWTS design.
- F. Typical variance items and acceptable mitigation measures approved are shown in Table 17.
- G. Variance requests for undeveloped parcels and upgrades to existing OWTS that would result in a potential increase in flow are prohibited in areas identified in Section 18.

**Table 17 - Minimum Requirements for Variance Requests**

	<b>Variance Request</b>	<b>Minimum Mitigation Measures*</b>
1	Soil Depth less than 3 feet below trench bottom	<ul style="list-style-type: none"> <li>• Use of pretreatment</li> <li>• UV disinfection</li> <li>• Use of Nonstandard system types</li> </ul>
2	Less than 15 percent fines	<ul style="list-style-type: none"> <li>• Applicable for developed parcels only</li> <li>• Nonstandard system types</li> <li>• Pretreatment</li> <li>• UV if depth of groundwater is less than 5 feet below trench bottom</li> <li>• Depth of groundwater 2 foot minimum</li> <li>• Percolation rate of greater than 1 MPI</li> </ul>
3	Soils with greater than 50 percent gravels	<ul style="list-style-type: none"> <li>• Applicable for developed parcels only</li> <li>• Must have a percolation rate of 1 to 5 minutes per inch</li> <li>• Use of pretreatment</li> <li>• UV (may be required)</li> <li>• Standard systems with pretreatment</li> <li>• Nonstandard system types</li> </ul>
4	Perc rate less than 1 minute per inch	<ul style="list-style-type: none"> <li>• Applicable for developed parcels only</li> <li>• Nonstandard system with pretreatment and UV</li> </ul>
5	Slopes greater than 30 percent (Section 4.2.C.4)	<ul style="list-style-type: none"> <li>• Subsurface drip dispersal or shallow trench pressure distribution OWTS only</li> <li>• Drip/leach lines installed by hand</li> <li>• Geotechnical Report prepared by a registered professional which addresses slope stability, unstable land forms and the potential for effluent breakout/surfacing.</li> <li>• No benching</li> <li>• Trees with diameters greater than 6 inches, not to be removed</li> <li>• Minimum 36 inch soil depth below drip/leach lines or no evidence of saturation</li> </ul>
6	100 foot setback from leachfield to perennial or intermittent watercourse	<ul style="list-style-type: none"> <li>• For developed parcels with no increase in flow, reduction to no less than 50 feet (setback will be the greatest possible and no closer than existing OWTS) with Department approved pretreatment unit</li> <li>• For developed parcels with a proposed increase in flow, reduction to no less than 50 feet (setback will be the greatest possible and no closer than existing OWTS) with Department approved pretreatment unit and disinfection unit</li> </ul>
7	50 foot setback from leach field to ephemeral watercourse or drainage ways greater than 18 inches in depth	<ul style="list-style-type: none"> <li>• For developed parcels, reduction to no less than 25 feet (setback will be the greatest possible) with Department approved pretreatment unit</li> <li>• For undeveloped parcels, reduction to no less than 40 feet (setback will be the greatest possible) with Department approved pretreatment unit</li> <li>• Or, existing piped watercourse to be encased in a watertight pipe with watertight joints</li> <li>• Or, adequate protective site specific conditions existing, such as physical settings with low hydrogeologic susceptibility from contaminant infiltration (for example evidence of confining layer(s), or watercourse upgradient</li> </ul>

**Table 17 - Minimum Requirements for Variance Requests (Continued)**

	Variance Request	Minimum Mitigation Measures*
8	50 foot setback from septic tank or sump to perennial stream, ocean, lake or reservoir Or 25 foot setback from septic tank to ephemeral watercourse or drainage greater than 18 inches in depth	<ul style="list-style-type: none"> <li>Waterproof surface barrier applied to concrete tank consistent with Manual of Concrete Practice ACI 515.1R</li> <li>Flexible rubber boots or compression seals meeting ASTM C 117 used for inlet and outlet connections to provide flexibility in case of tank settlement while still maintaining watertight seal</li> <li>An approved double wall fiberglass tank may be used in lieu of a concrete tank</li> <li>Tank leakage test</li> </ul>
9	100 foot setback from well to leach field	<ul style="list-style-type: none"> <li>Reduction of setback to 50 feet for existing wells on same parcel</li> <li>New leach field shall be no closer to the well than the leachfield that is being replaced (50 feet is a minimum, the setback will be the greatest possible)</li> <li>Provide an approved nonstandard OWTS or an approved pretreatment unit on a standard OWTS</li> </ul>
10	Installation of OWTS in areas considered Altered Terrain	<ul style="list-style-type: none"> <li>Evaluation of soil structure, soil texture, pore space and percolation rate of dispersal area per Section 7.</li> <li>Groundwater determination per Section 7.</li> </ul>
11	Property line setback reductions	<ul style="list-style-type: none"> <li>Consultant and property owner clearly state in writing and on the approved OWTS plan that the location of the OWTS is clearly on his/her property</li> <li>If there is a disagreement and the location is not clear, a survey of the property line is required</li> <li>For nonstandard dispersal system downslope 25 feet reduced to 10 feet on slopes no greater than 12.5 percent. Must modify the placement of the downslope monitoring well to edge of surveyed property line</li> </ul>
12	Structure setbacks	<ul style="list-style-type: none"> <li>A reduction to a setback to a non-structural cement slab, path, patio, or pool deck can be approved provided the setback reduction will not interfere with the performance of the OWTS</li> <li>Structural engineer certification that the tank or dispersal field will not impact the integrity of the structure's foundation or cause pollution of the structure (e.g. pool, spa, pond) and that the access to the tank and dispersal field will not be impeded</li> </ul>
13	Installation of a nonstandard OWTS in permeable soil below an impermeable soil lens	<ul style="list-style-type: none"> <li>Provide an approved pretreatment unit</li> </ul>
14	Prohibition 4.2.C.6, Periodic Monitoring	<ul style="list-style-type: none"> <li>Enrolled in the Operational Permit Program</li> </ul>

**Table 17 - Minimum Requirements for Variance Requests (Continued)**

	<b>Variance Request</b>	<b>Minimum Mitigation Measures*</b>
15	Prohibition 4.2.C.8-9 Vertical Separation to Groundwater	<ul style="list-style-type: none"> <li>• Apply to the appropriate Regional Water Board for a set of waste discharge requirements, waiver of waste discharge requirements or a conditional waiver of waste water discharge requirements</li> </ul>
16	Prohibition 4.2.C.11-12 Horizontal Separation from Public Water Sources	<ul style="list-style-type: none"> <li>• Utilize supplemental treatment to achieve treatment standards listed in Table 4-3</li> </ul>

\*: The listed minimum mitigation measures may be cumulative or individual depending on the proposal and site constraints.

## **Section 18 Variance Prohibition and Special Standards Areas**

A. There are several areas in Sonoma County that are subject to variance prohibitions and/or special standard requirements. These areas include the following:

1. Camp Meeker
  - a. Variance requests for new construction of structures on vacant lots and construction on existing structures that would result in an increase of flow prohibited.
  - b. All applications approved by Permit Authority are subject to a condition that the structures involved will be connected to a community system when it becomes available.
2. Canon Manor Subdivision
  - a. Permits/clearances for new construction of structures on vacant lots and/or construction on existing structures on OWTS that would result in an increase of flow prohibited.
3. Coastal Subdivisions of Carmet, Rancho del Paradiso, Salmon Creek, Sereno del Mar and the Community of Jenner
  - a. Variance requests for new construction of structures on vacant lots and construction on existing structures that would result in an increase of flow prohibited.
4. Happy Acres Subdivision
  - a. Lots of less than 30,000 square feet are unbuildable unless connected to the Happy Acres Water System.
  - b. All standard OWTS with intercept drains shall be designed by a Qualified Consultant.
  - c. If wet weather percolation testing required, no variances allowed.
5. Larkfield-Wikiup Area
  - a. Septic system prohibition area Mayfield Drive, Ascot Drive, Fairly Drive, Eton Court, and Devon Court.
6. Monte Rio
  - a. Variance requests for new construction of structures on vacant lots and construction on existing structures that would result in an increase of flow prohibited.



7. Penngrove/South Cotati

- a. Variance requests of wet weather percolation requirements prohibited.

8. West Petaluma Area

- a. All lots subject to 7.5 and 7.11 wet weather percolation testing and groundwater determination requirements.
- b. An interceptor drain shall be provided on all lots that have not had wet weather groundwater determinations (for example, lots with a slope of greater than 5 percent).
- c. Lack of a confining layer in which to bed an interceptor drain will result in the need for wet weather groundwater determinations.
- d. Areas which exhibit spring activity or potential wintertime seepage shall be subject to wet weather groundwater determinations.

9. Russian River Meadows Subdivision Units 1 and 2 (also known as Rein's Beach)

- a. Wet weather testing may be conducted when observed water levels ranges from 0 to 12 inches below ground surface in the groundwater monitoring wells located on Assessor's Parcel Number 096-211-017 (22800 Conifer).
- b. Except for the above noted provision, variance requests for new construction of structures on vacant lots and construction on existing structures that would result in an increase of flow prohibited.

10. South Wright Area

- a. Variance requests for new construction of structures on vacant lots and construction on existing structures that would result in an increase of flow prohibited.
- b. No permits and/or clearances for property improvement, land division or change in use in the "septic tank ban area" shall be granted unless connection to sewer is included in the proposed application.

11. Thomas Larkin Woods Subdivision Unit 1

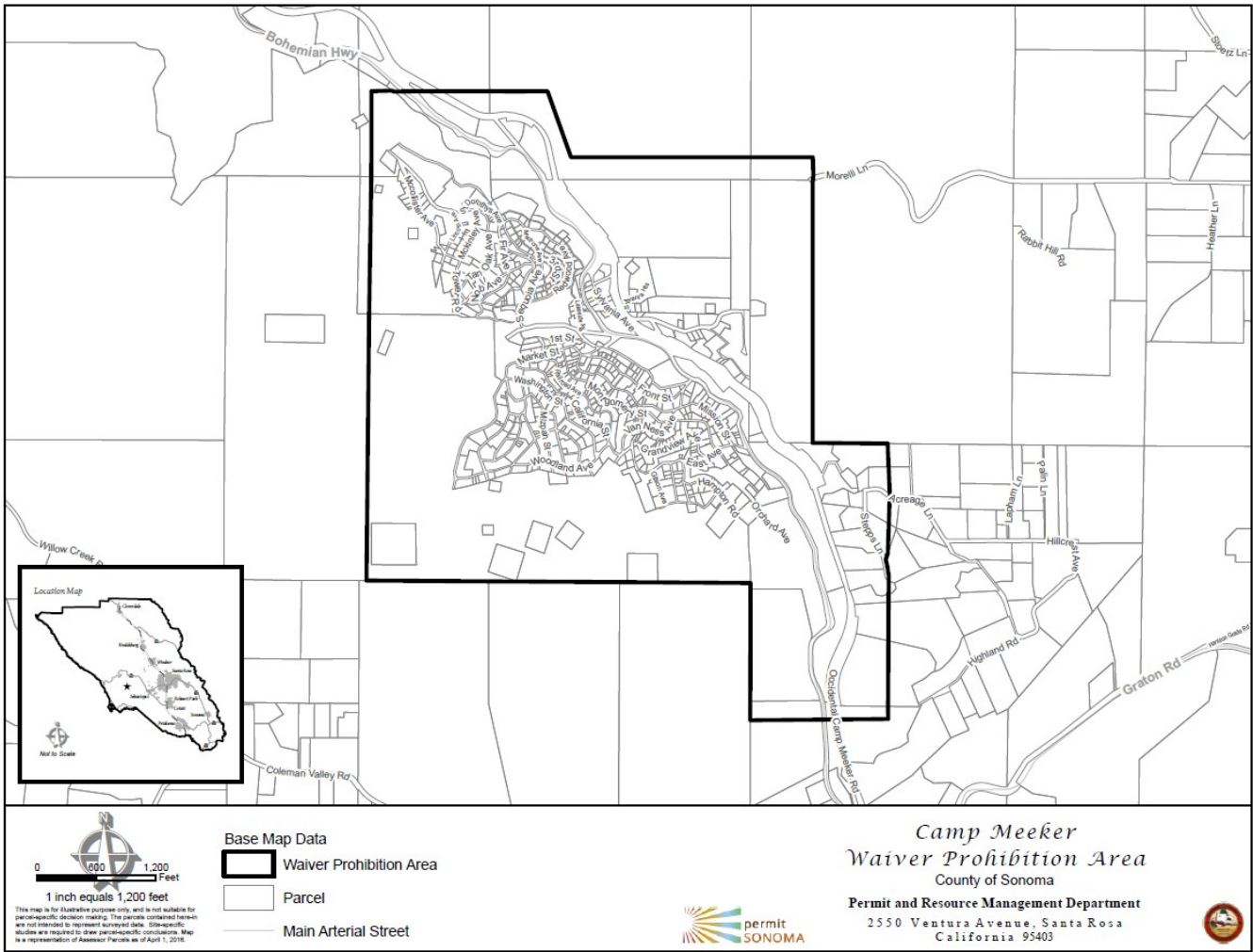
- a. Variance requests for new construction of structures on vacant lots and construction on existing structures that would result in an increase of flow prohibited.

12. Westvue Meadows Subdivision

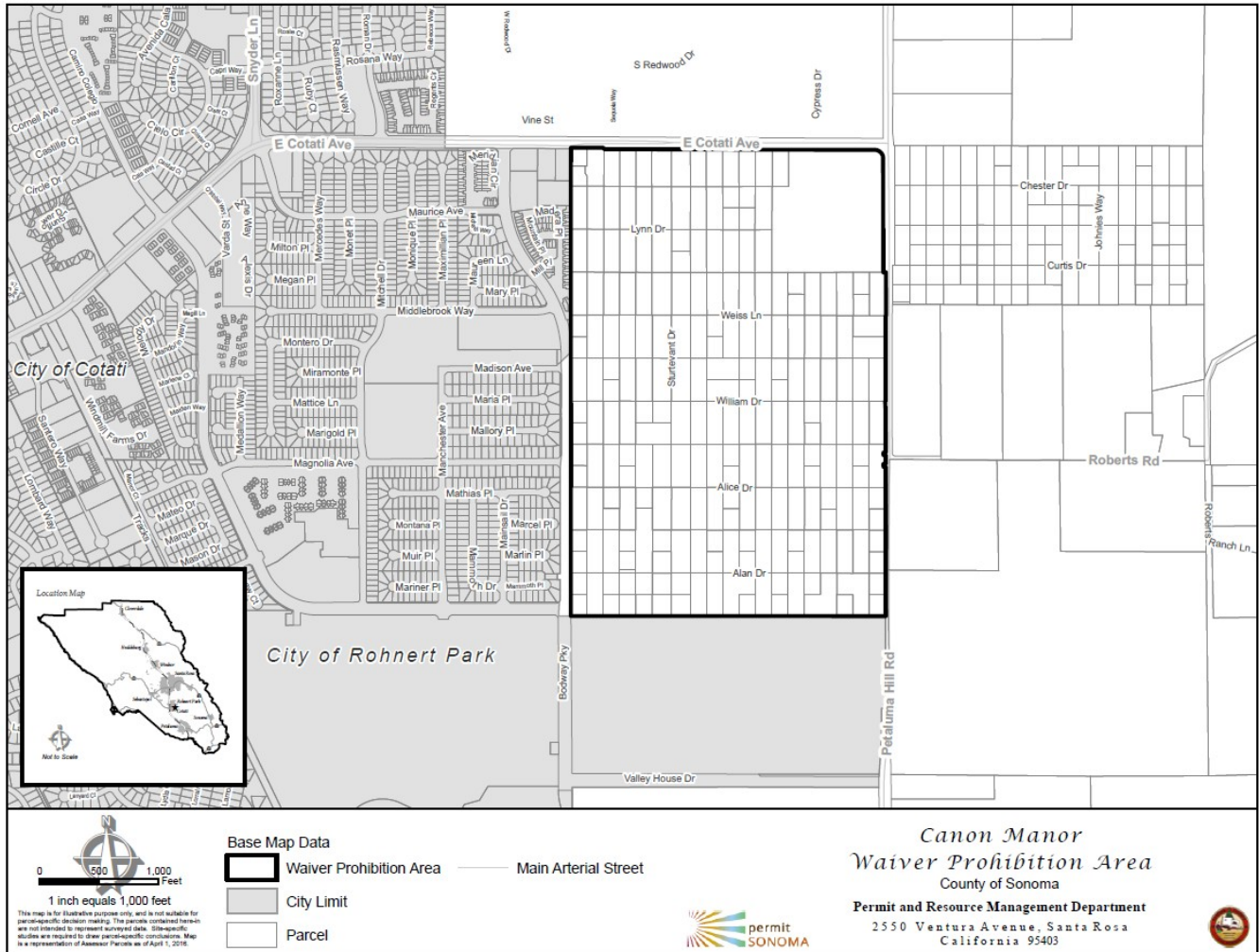
- a. Compliance with depth to groundwater requirements (without variance), required on all lots, regardless of slope.

- B. Sonoma Creek is subject to the approved 2010 Pathogen TMDL Implementation Plan.
- C. RWQCB Impaired Water Bodies for Pathogens subject to Tier 3 Impaired Areas
  - 1. TMDL Completion Date 2016
    - a. Mainstem Russian River from Fife Creek to Dutch Bill Creek, Green Valley Creek watershed, Russian River at Healdsburg Memorial Beach and unnamed tributary at Fitch Mountain, mainstem Laguna de Santa Rosa, mainstem Santa Rosa Creek. (See LAMP Part 1, Appendix C and Part 3 Advanced Protection Management Plan).
  - 2. TMDL Completion Date 2017
    - a. Petaluma River, Petaluma River (tidal portion).
- D. Refer to Maps 18.1-13 for areas subject to this Section.

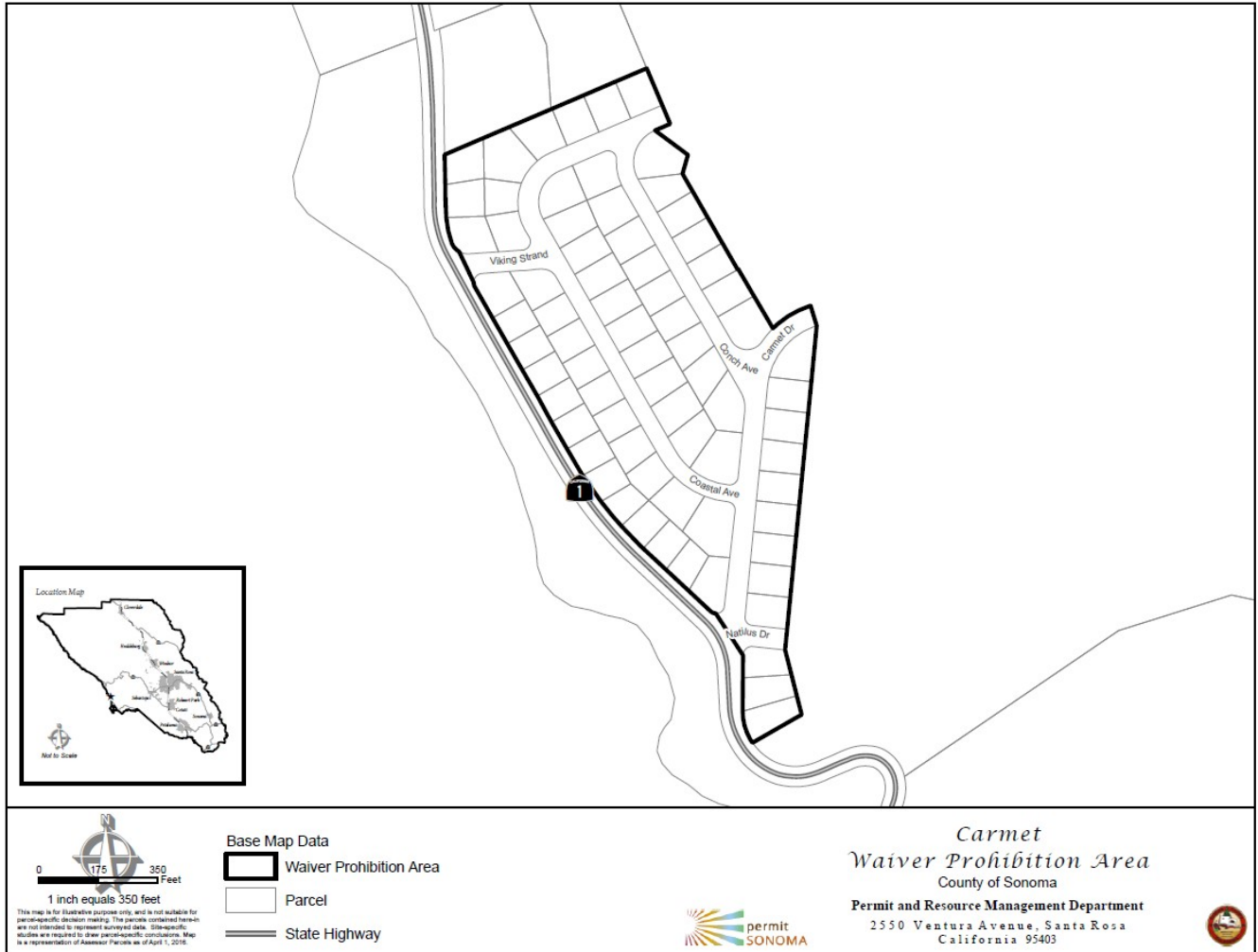
# Map 18.1 Camp Meeker



# Map 18.2 Canon Manor



# Map 18.3a Carmet



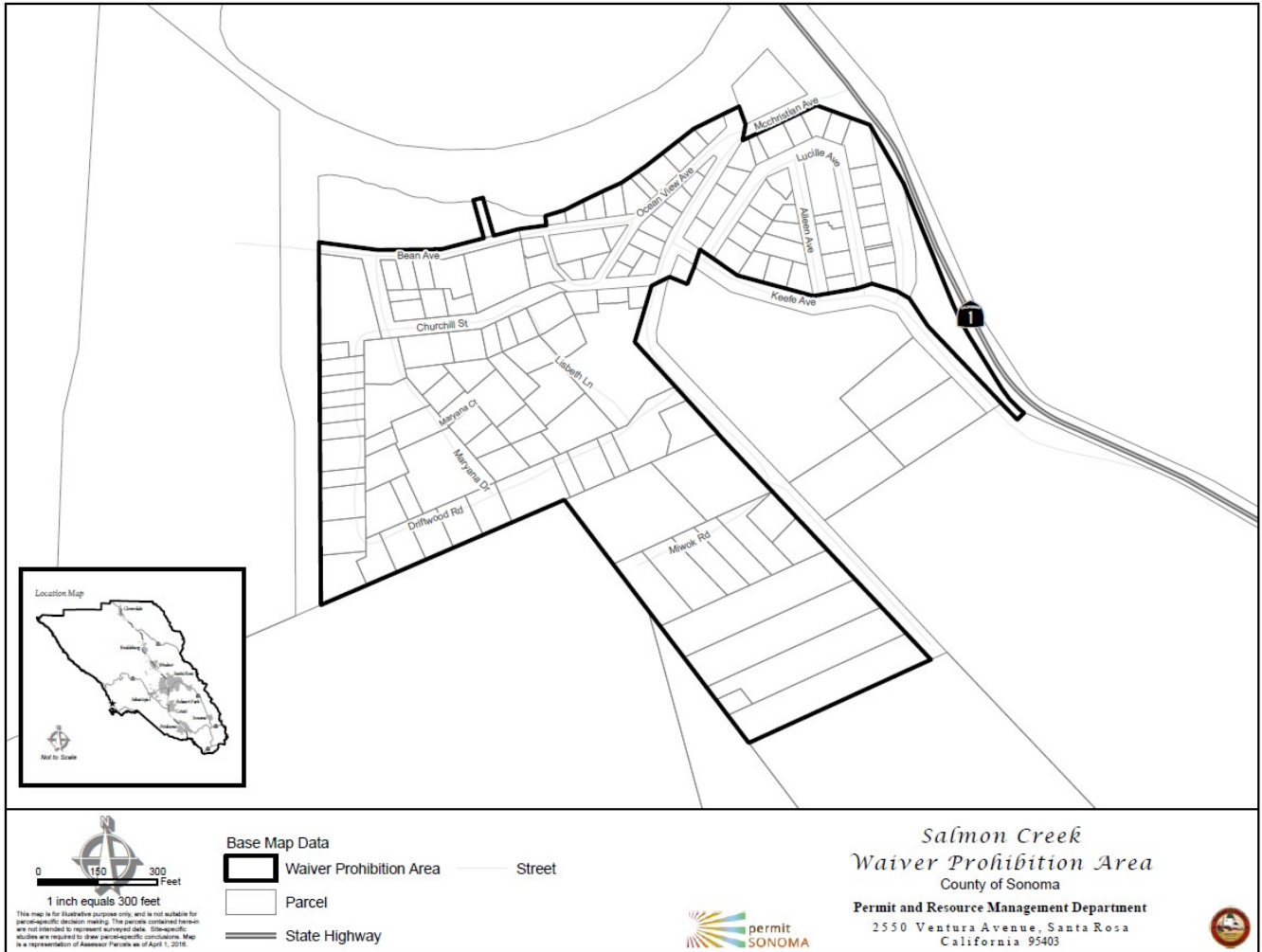
Author: PRMD GIS Date: April 14, 2016

## Map 18.3b Rancho del Paradiso



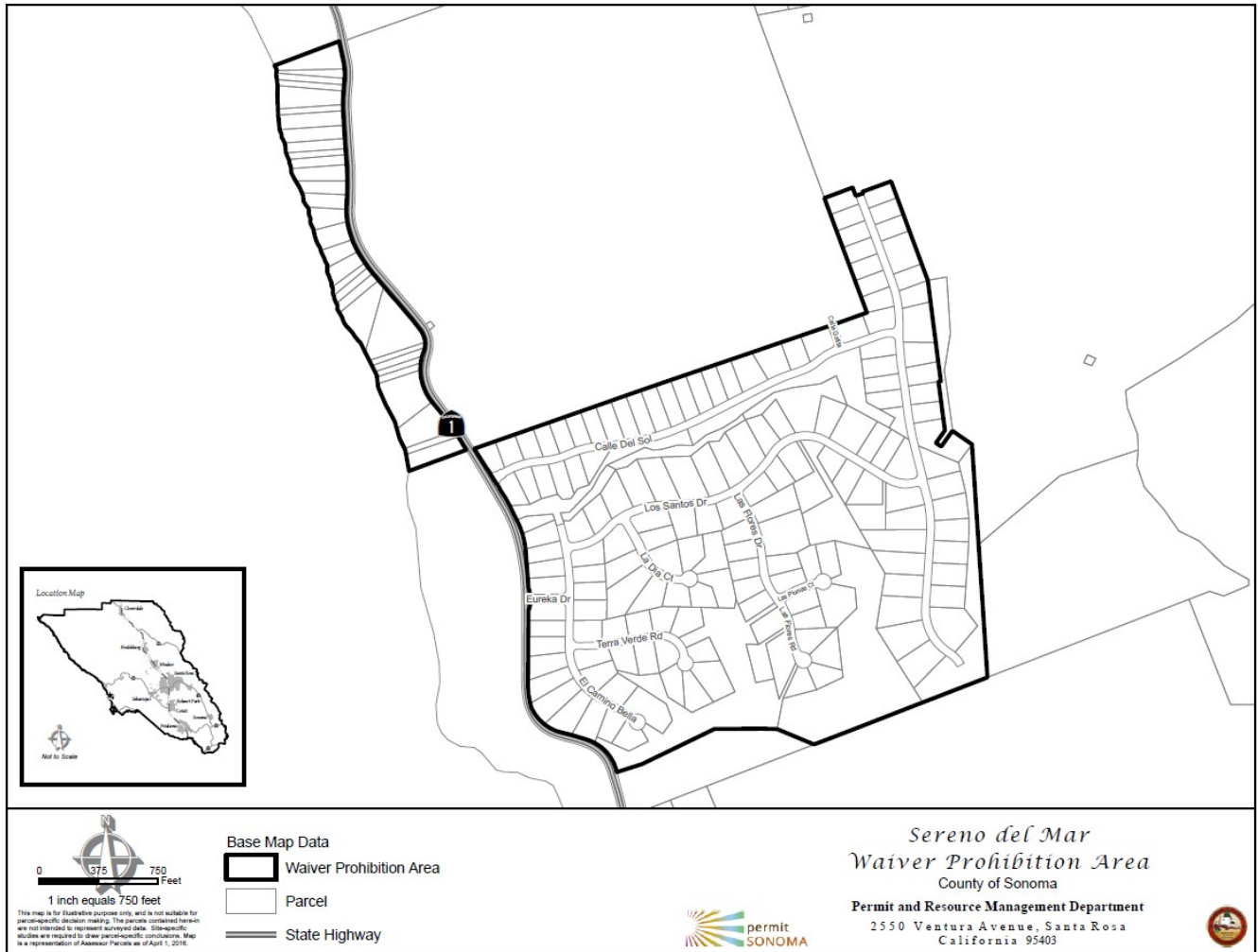
Author: PRMD GIS Date: April 14, 2016

# Map 18.3c Salmon Creek



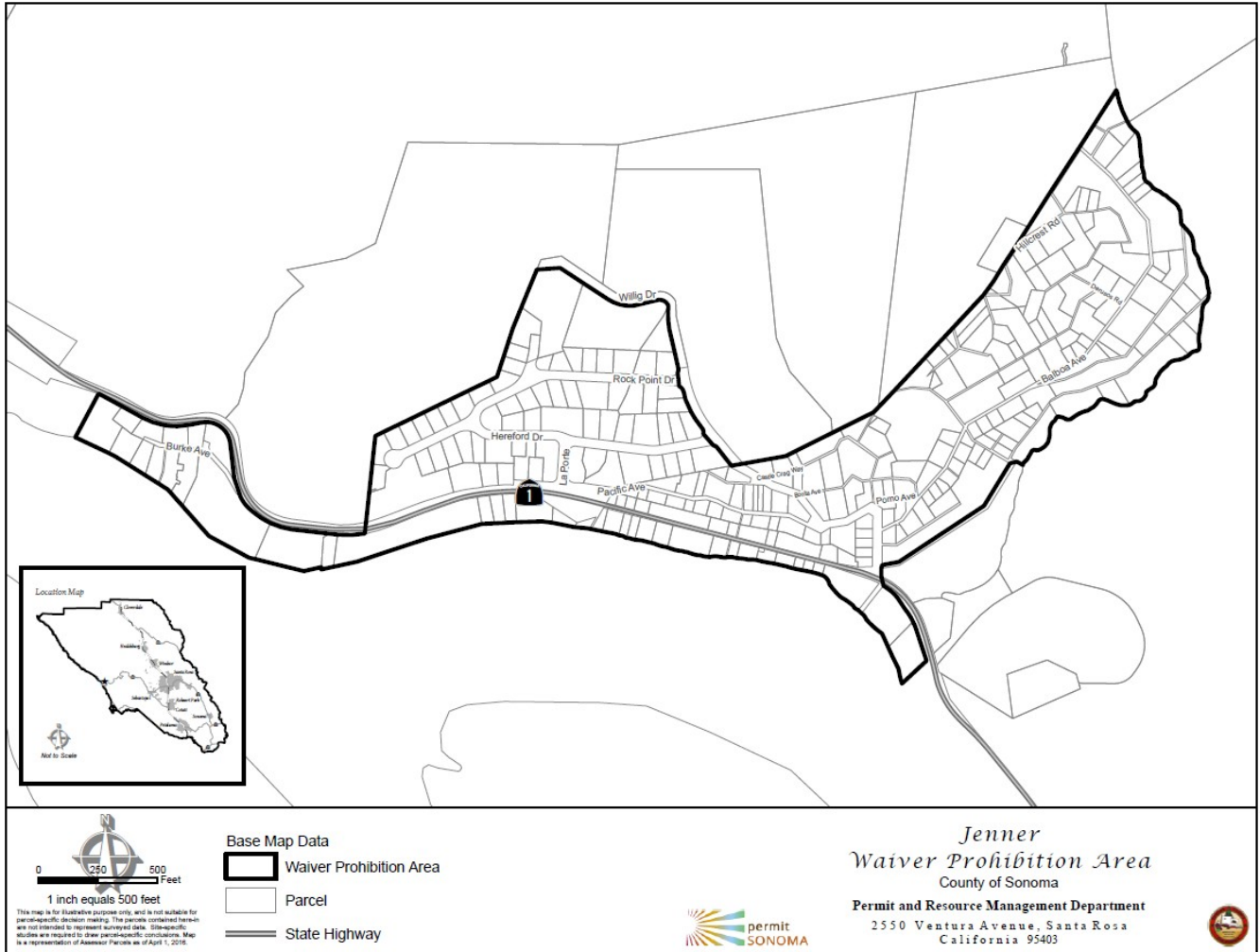


## Map 18.3d Sereno del Mar/Gleason's Beach





# Map 18.3e Jenner



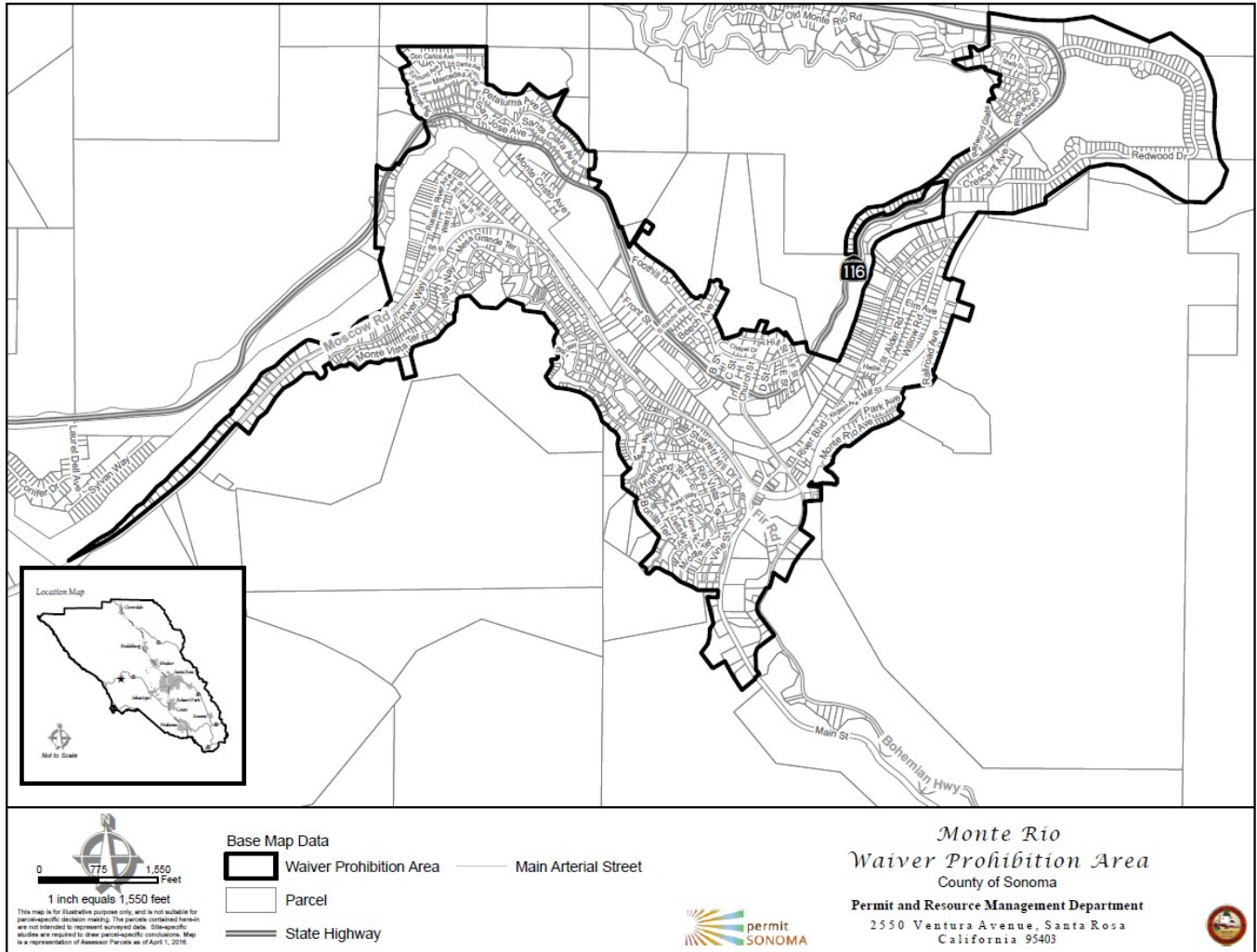
Author: PRMD GIS Date: April 14, 2016

## Map 18.4 Happy Acres



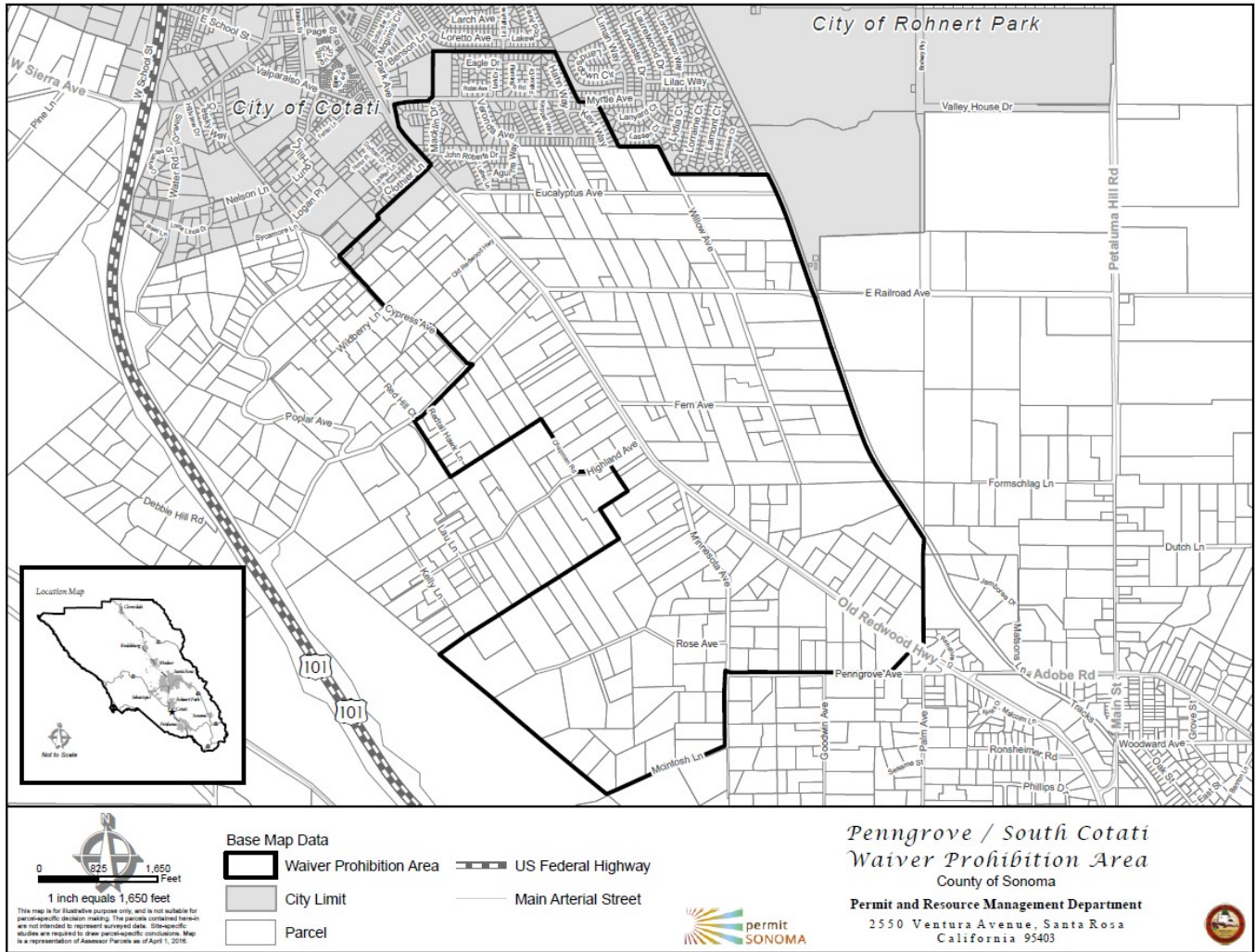
Author: PRMD GIS Date: April 14, 2016

## Map 18.5 Monte Rio



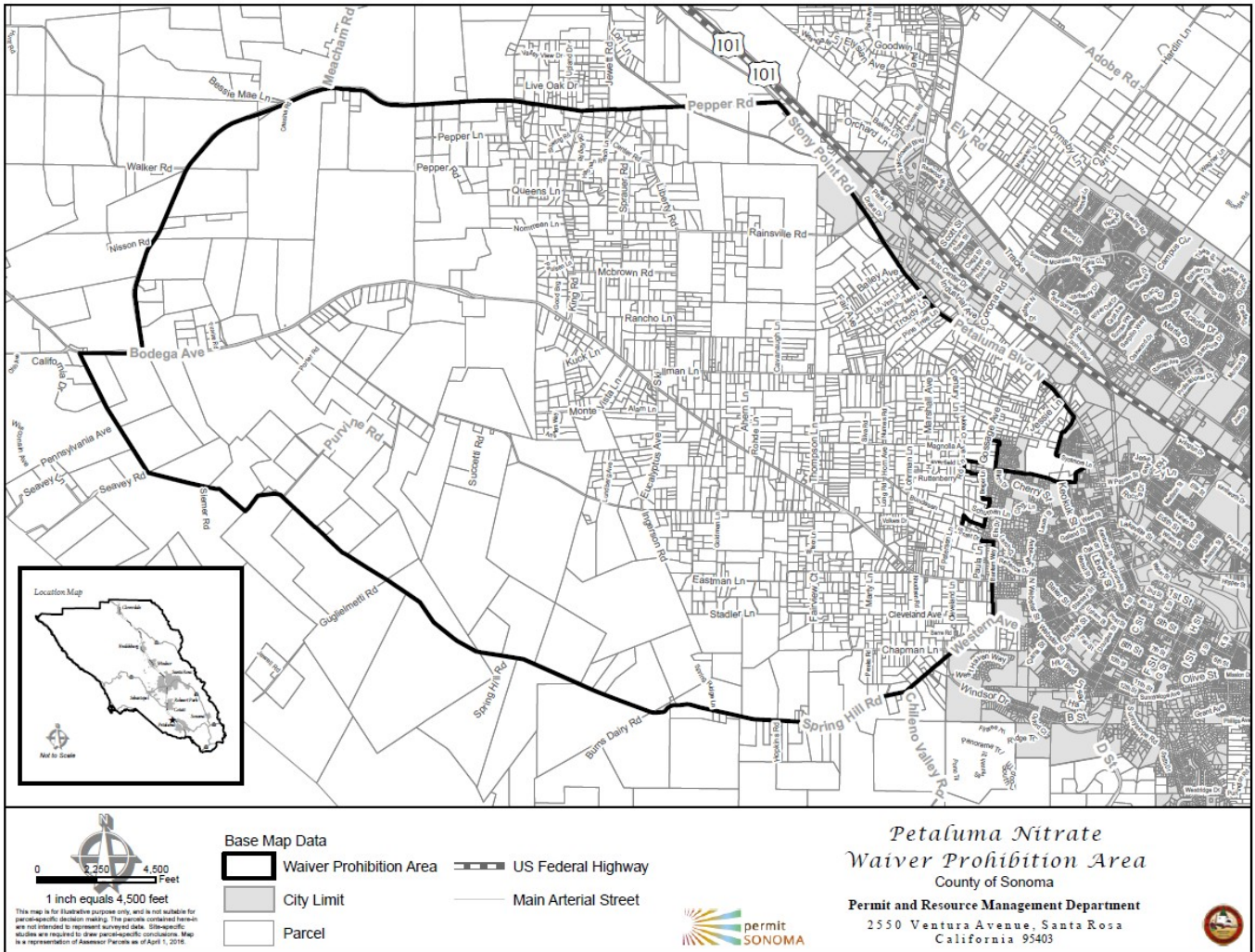
Author: PRMD GIS Date: April 14, 2016

### Map 18.6 Penngrove/South Cotati



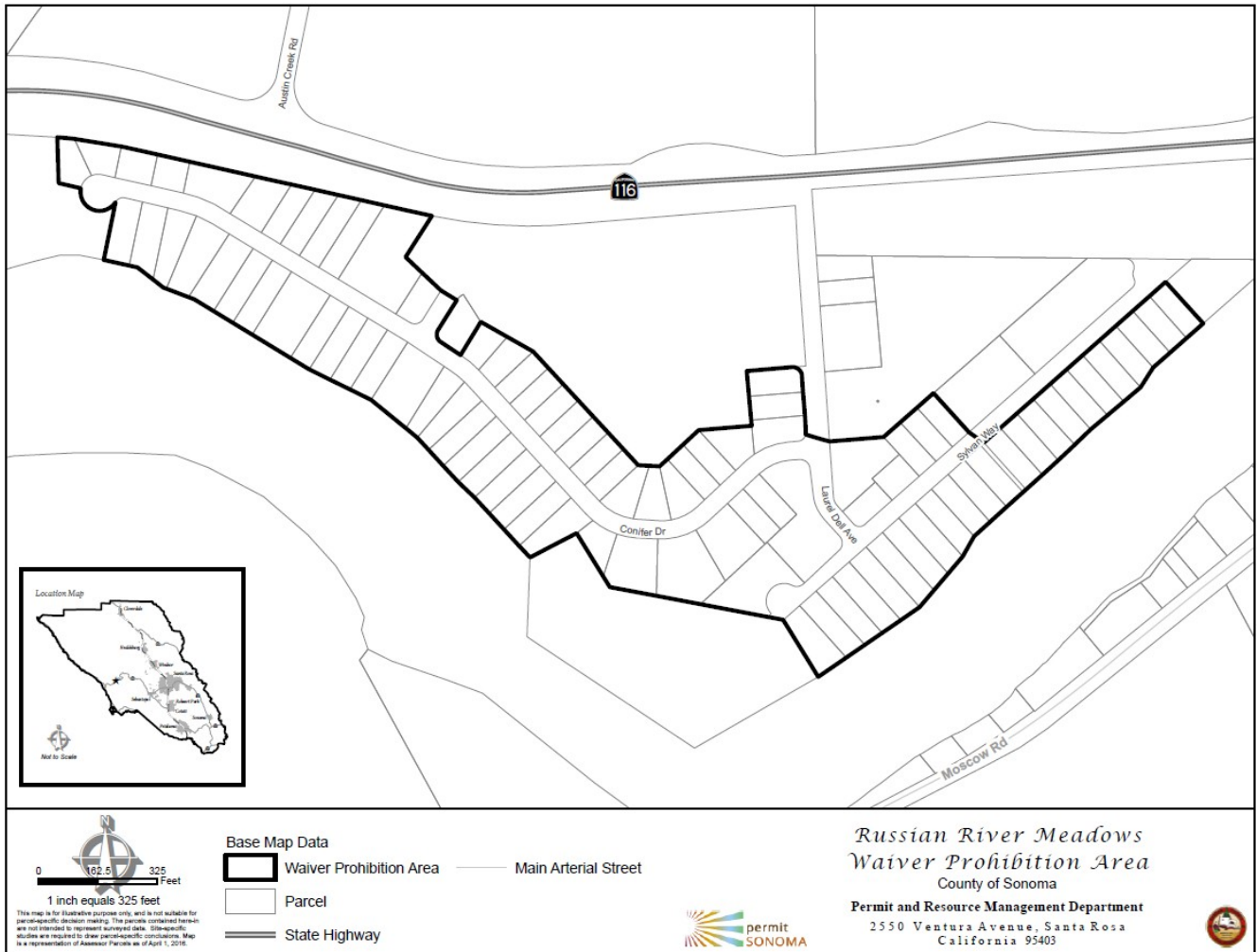


# Map 18.7 West Petaluma



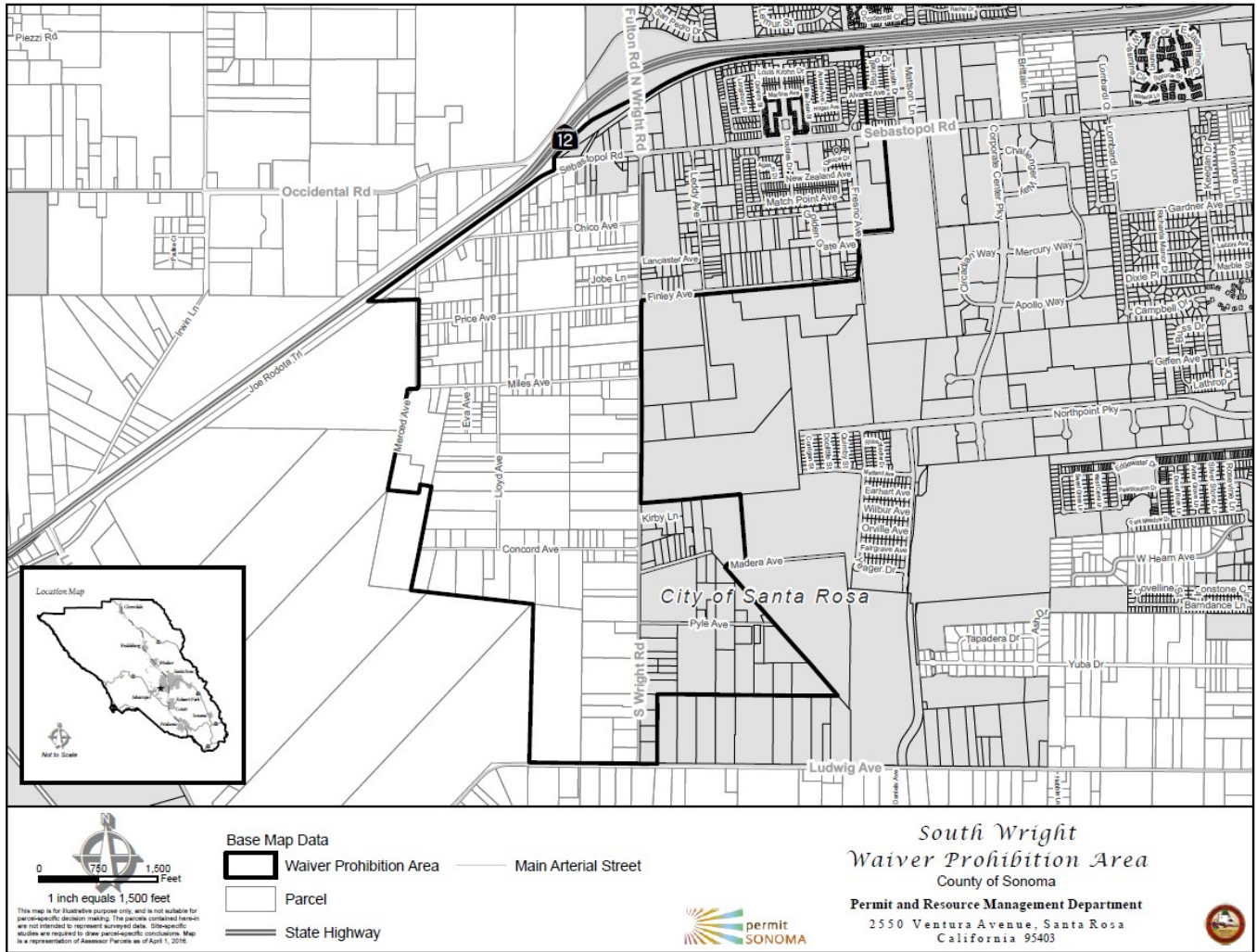
Author: PRMD GIS Date: April 14, 2016

## Map 18.8 Russian River Meadows

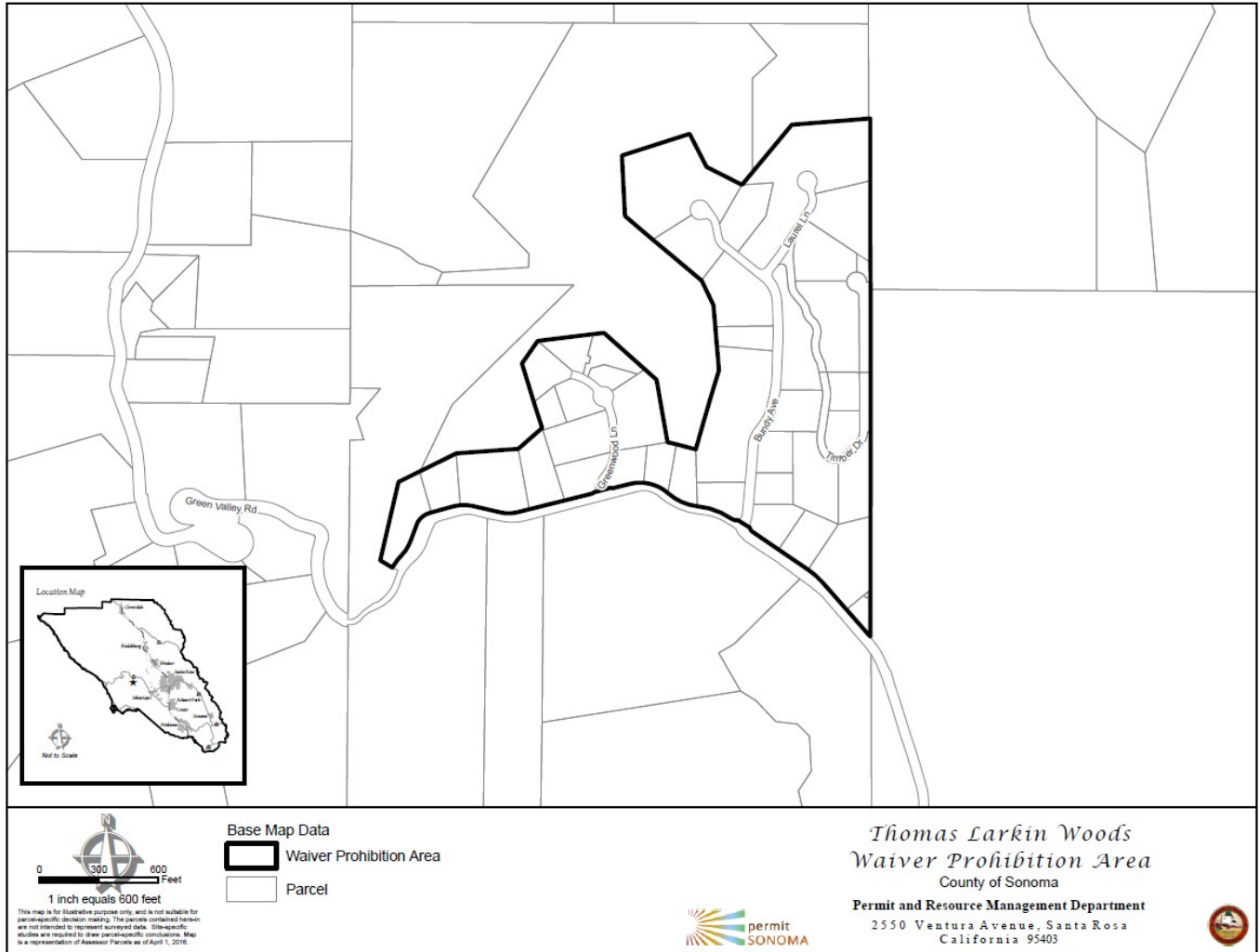


Author: PRMD GIS Date: April 14, 2016

# Map 18.9 South Wright Road

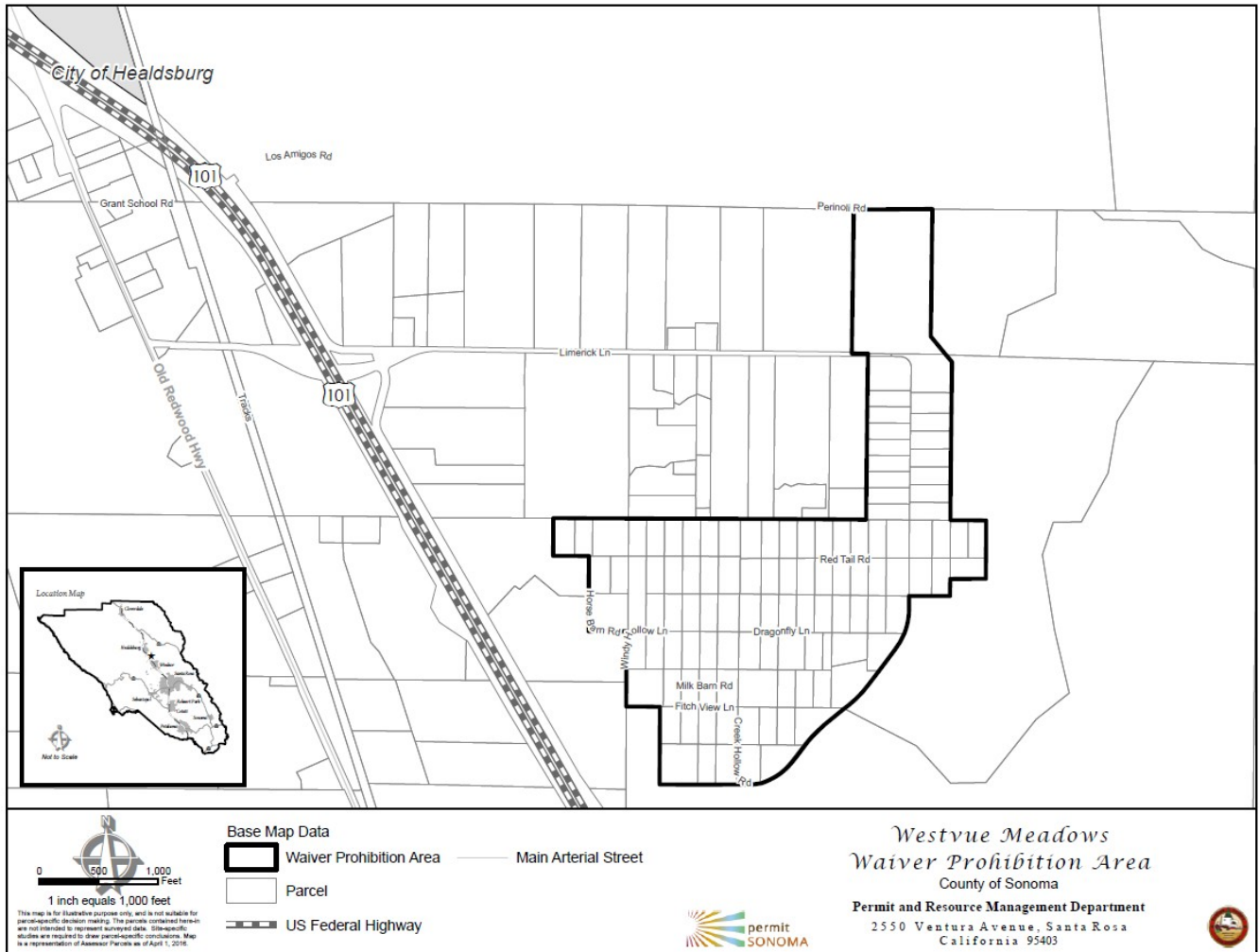


## Map 18.10 Thomas Larkin Woods



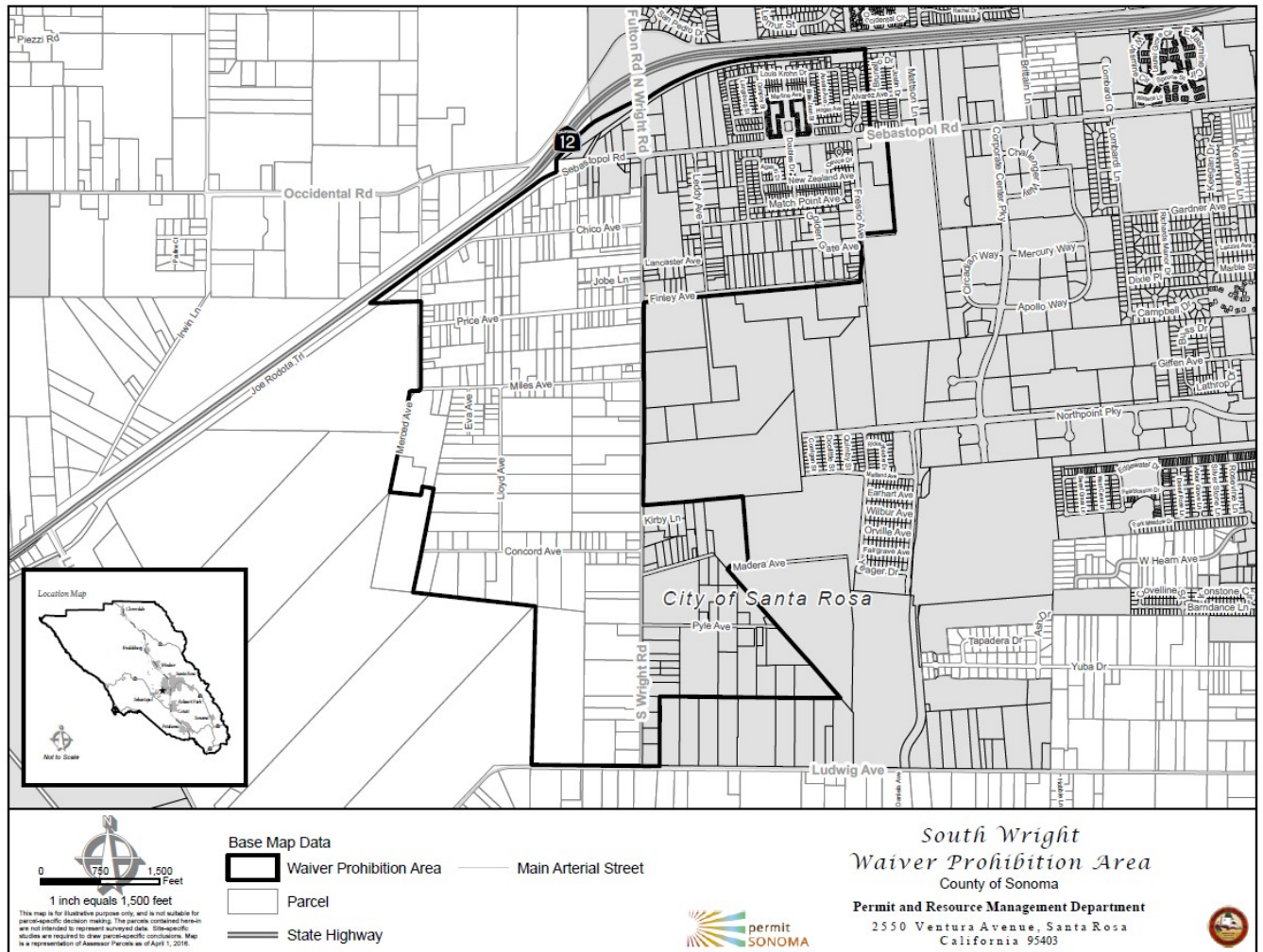


# Map 18.11 Westvue Meadows



Author: PRMD GIS Date: April 14, 2016

## Map 18.12 South Wright Septic Ban Area



## **Section 19 Dispute Resolution**

- A. In those instances when the findings and/or documents submitted by an Applicant are not approved by the Permit Authority and differences cannot be resolved at the staff level, applicant may appeal the staff's decision to the Division Supervisor. Appeal of the Supervisor's decision shall be made to the Division Manager.
- B. Pursuant to BOS Resolution 97-1098, if a resolution cannot be accomplished at the administrative level, the Applicant may have staff's decision reviewed by a Dispute Resolution Panel (DRP). The Applicant shall prepare and submit appropriate documents, including the Dispute Resolution processing fee, to the Permit authority Director. The Director will set a date for the review within 5 days of the request.
- C. The DRP shall be appointed by the Land Use Advisory Panel (LUAP) and consist of 6 persons familiar with County policies and regulations 1 RCE, 1 REHS, 1 licensed real estate individual, 1 Class A General Engineering or C-42 Sanitation System licensed contractor, 1 C-57 water well licensed contractor and 1 citizen at large. A quorum of 4 panel members is necessary to convene a meeting and to vote on a recommendation.
- D. The DRP is to review the materials submitted, offer an impartial analysis, and recommend approval or denial of the Applicant's appeal. The DRP does not have the authority to modify or alter adopted standards. The Permit Authority Director will review the DRP's recommendation before making a determination. The Director's decision is final. The Director shall notify the Applicant and DRP members of his/her decision and the basis for the decision, within 10 working days of the hearing.

## **Section 20 Tier 3 Treatment, Monitoring, Inspection and Sampling for Supplement Treatment Units**

This section addresses the treatment, monitoring, inspection and sampling requirements for supplemental treatment units subject to the OWTs Policy, Section 10, that are located outside of the geographical area defined by either a TMDL implementation plan or an Advanced Protection Management Program.

- A. Supplemental treatment units for pathogens shall be capable of producing effluent that meets the following effluent quality parameters:
  - 1. Less than or equal to 30 milligrams per liter total suspended solids as a 30-day average.
  - 2. Less than or equal to 200 MPN per 100 milliliters for fecal coliform bacteria.
- B. Supplemental treatment units for nitrogen shall be capable of producing effluent that reduces the nitrogen levels 50 percent or more when comparing the 30-day average influent nitrogen levels to the 30-day average effluent nitrogen levels.
- C. Supplemental treatment units shall be monitored in accordance with the operation and maintenance manual for the treatment unit.
- D. Supplemental treatment components shall be equipped with a visual or audible alarm as well as a telemetric alarm that alerts the owner and service provider in the event of a system malfunction. Where telemetry is not possible, the owner or owner's agent shall inspect the system at least monthly while the system is in use.
- E. Disinfection systems shall be inspected quarterly by a service provider for proper operation while the system is in use unless a telemetric monitoring system is capable of continuously assessing the operation of the disinfection system.
- F. Sampling and analytical testing of disinfected effluent shall be conducted quarterly. The analytical testing shall be performed by a laboratory certified by the California Department of Public Health. The analytical test shall have a minimum detection level of 2.2 MPN. The effluent shall be tested for fecal coliform bacteria and total suspended solids. The location of the effluent sampling point shall be documented with geographic coordinates.

## EXPERIMENTAL AND ALTERNATIVE OWTS

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### OWTS SYSTEMS

#### A. Approved Experimental OWTS

1. Bottomless Sand Filters
2. Gravel less Pressurized Dispersal Channel (GPDC)

#### B. Approved Alternative OWTS

1. Wisconsin Mound System
  - a. An above ground system built with a gravel bed and sand area
  - b. Pressure distribution
  - c. Sites with shallow soils
2. At Grade System
  - a. An above ground system built with gravel
  - b. Pressure distribution
  - c. Sites with shallow soils
3. Drip System
  - a. Shallow subsurface dispersal
  - b. Time dosing, pressure distribution and flexible tubing
  - c. Sites with shallow soils; steep slopes (greater than 30 percent variance)
4. Shallow Trench Pressure Distribution (STPD)
  - a. Pressurized trench system for sites with shallow top soils over slowly permeable or fractured rock
  - b. On slopes up to 30 percent
5. Shallow in Ground (SIG)
  - a. Utilize shallow depth trenches and pressure distribution
  - b. Minimum if 24 inches of soil below the trench bottom

## EXPERIMENTAL AND ALTERNATIVE OWTS

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The following units have been evaluated by Permit Sonoma and approved for installation according to the manufacturer's specifications.

### PRETREATMENT UNITS

#### Experimental

1. Aqua Filter
2. Pura System SBR (aeration system), Models PS1-4 through PS1-8 and PS1-9 through PS-14
3. EZ-treat (Recirculating Synthetic Filter)
4. Aqua Klear (Air diffuser)

#### Alternative

1. Peat Moss Systems
2. Recirculating Sand Filter
3. Single Pass Sand Filter
4. Advantex Units (filter fabric)
5. Clearstream
6. Bio-Microbics Fast
7. Hoot Aerobic
8. Microseptic Enviroserver
9. Multiflo
10. Norweco Singulair
11. Norweco Biokinetic Singulair
12. Nayadic
13. Peat filter
14. Southern Aerobic
15. Whitewater Aerobic