

## ***Sonoma County Site Evaluation and Percolation Test Methods***

### **PURPOSE**

To provide uniform standards for review of site conditions, soil conditions and performance of percolation testing in Sonoma County as these relate to sewage disposal system applications.

### **AUTHORITY**

California Plumbing Code  
Basin Plan of Regional Water Quality Control Board

### **PROCEDURE**

The following guidelines shall be used by staff and industry when reviewing site and soil conditions and percolation tests:

#### **Section 1 - Preliminary Evaluation: Site Survey**

- A. Soil profile holes for the Preliminary Evaluation, (the Site Survey), shall be constructed prior to any soils percolation testing and/or groundwater determination tests. Site Surveys shall be performed prior to any soil percolation test. 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.

- B. 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 disposal systems.

A minimum of two soil profile holes shall be dug, one in the proposed leachfield area and one in the expansion area. The profile holes shall be dug to a depth of at least five feet below the proposed absorption surface (trench bottom or basal area of mound).

All profile holes excavated shall be evaluated for soil suitability by a Registered Civil Engineer, Registered Geologist, or Registered Environmental Health Specialist experienced in on-site sewage disposal systems (see Section 10). All profile holes used for the system design shall be subject to field review by Departmental staff.

More profile holes are required if the initial two profiles show dissimilar conditions.

Augered profile holes are an acceptable alternative only; (a) where use of a backhoe is impractical because of access, (b) when necessary to verify conditions expected on the basis of prior soils investigations, or (c) 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, three profile holes in the primary area and three in the expansion area are required (see Section 3A, for location of profile holes, the same as percolation test holes).

## **Section 2 - Description of Soils**

The following factors are to be observed and reported from ground surface to a depth corresponding to the requirements in Sections 1 and 3.

- A. Thickness and coloring of soil layers and apparent United States Department of Agriculture (USDA) classification.
- B. Depth to and type of bedrock, hardpan, or impermeable soil layer.
- C. Depth to observed ground water, saturated soil layers and areas of water infiltration.
- D. Depth to soil mottling.
- E. Other prominent soil features such as structure, stoniness, roots and pores, dampness, soil boundaries, etc.

## **Section 3 - Soil Percolation Tests:**

- A. Soil percolation tests, groundwater determination tests, etc., may occur after the Preliminary Site Survey and after the "Notification to Perform Soil Percolation form" has been filed with the Well and Septic Section.

Note: The Engineer/Environmental Health Specialist may choose to perform the percolation test at the same time as the previously scheduled Site Survey when authorized by the district Environmental Health Specialist.

- B. Soil percolation tests are for the purpose of evaluating soil suitability for sewage disposal and for sizing of possible sewage disposal systems. Private sewage disposal sites require a minimum of six or more holes spaced uniformly throughout the area chosen for the proposed leaching field and leaching field expansion area.

## **Section 4 - Location of Test Holes:**

- A. The location of test holes must take into consideration the minimum distances which will govern construction of standard private sewage disposal systems (see Section 4-B). Additional requirements, determined on an individual basis, may be required for

specially designed or non-standard on-site sewage disposal systems when permitted.

B. Minimum Horizontal Distances Required:

| <u>Horizontal minimum horizontal distance required from:</u> | <u>Septic Tank</u> | <u>Leaching Trenches (including future expansion area)</u> | <u>Non Standard Systems (h)</u> |
|--|--------------------|--|---------------------------------|
| Building or structures (a)                                   | 5 Ft               | 8 Ft   | 10 Ft (g)                       |
| Property line and easements                                  | 5 Ft               | 5 Ft   | 10 Ft (g)                       |
| Water supply wells   | 50 Ft              | 100 Ft   | 100 Ft                          |
| Perennially flowing streams (b)                              | 50 Ft              | 100 Ft   | 100 Ft                          |
| Drainage course of ephemeral stream (c)                      | 25 Ft              | 50 Ft  | 50 Ft                           |
| Ocean, lake or reservoir (d)                                 | 50 Ft              | 100 Ft   | 100 Ft                          |

| <u>Horizontal minimum horizontal distance required from:</u> | <u>Septic Tank</u> | <u>Leaching Trenches (including future expansion area)</u> | <u>Non Standard Systems</u> |
|--|--------------------|--|-----------------------------|
| <u>Large trees</u>   | 10 Ft              | ***  | ***                         |
| Disposal field   | 5 Ft               | 6 Ft   | -----                       |
| Domestic water pipe  | 5 Ft               | 5 Ft   | 5 Ft                        |
| Distribution box   | 5 Ft               | 4 Ft   | -----                       |
| Fill areas   | -----              | 15 Ft  | 15 Ft                       |
| Cut banks (e); natural bluff, sharp changes in slope (f)     | 25 Ft              | 25 Ft  | 50 Ft                       |
| Swimming pools   | 5 Ft               | 8 Ft   | 25 Ft                       |

\*\*\* Areas with trees are considered on a case by case basis

- a. Including driveways, parking areas, and paved areas.
- b. As measured from the line which defines the limit of a ten-year frequency flood.
- c. As measured from the edge of the watercourse.
- d. As measured from the high waterline.
- e. A manmade excavation of the natural terrain in excess of 3 feet.
- f. Where soil depth or depth to groundwater below the leaching trench is less than five feet, a minimum of setback of 50 feet is required.

- g. If structure or property line is downhill from the system, then the setback is 25 feet.
- h. Experimental systems may have increased setbacks

**Section 5 - Type of Test Holes Required:**

- A. Dig or bore holes, six or eight inches in diameter, to the vertical depth of the proposed trench but no less than 24 inches below the ground level and at least 12 inches below any proposed effluent pipe (refer to chart below and examples A, B and C, at the end of this document).
- B. On sloping ground, the depth of test holes shall equal or exceed the following (see notes for alternative and innovative type sewage disposal systems):

| <b>STANDARD SYSTEMS:</b> |                                    | <b>NON-STANDARD SYSTEMS:</b> |                       |
|--------------------------|------------------------------------|------------------------------|-----------------------|
| <b>Slope at Hole</b>     | <b>Depth of Holes</b>              | <b>Slope at Hole</b>         | <b>Depth of Holes</b> |
| 0-8%                     | 30 Inches                          | 0-6% (Slow Perc Mound)       | 24 Inches             |
| 9-10%                    | 33 Inches                          | 0-12% (Fast Perc Mound)      | 24 Inches             |
| 11-12.5%                 | 36 Inches                          |                              |                       |
| 13-14%                   | 40 Inches                          | 0-20% (Press. Dist. Sys.)    | 24 Inches             |
| 15%                      | 43 Inches                          | 20%-30-% (Press. Dist. Sys)  | 36 Inches             |
| 20%                      | 52 Inches                          |                              |                       |
| 25%                      | 62 Inches                          |                              |                       |
| 30%                      | 72 Inches                          |                              |                       |
| 0-20%                    | 24 Inches (Fill Land System)       |                              |                       |
| 12.5-30%                 | 36 Inches (Shallow Sloping System) |                              |                       |

- C. Slopes greater than 30% are unacceptable for any type of sewage disposal system. Parcels may not be graded or altered in any manner to accommodate this requirement.
- D. The proposed depth of percolation test holes must take into consideration whether subsequent grading and removal of topsoil would require deeper testing. The proposed depth of percolation test holes must take into consideration whether more than 12 inches of trench sidewall will be used in the system. If reduction in trench length is proposed, then tests must be conducted at various depths to substantiate increased sidewall percolation (evaluation shall be made on a case by case basis).
- E. Percolation testing of soil strata at deeper depths may be necessary to establish sub-soil permeability.

Note: 1. Stability of slopes and travel of sewage are to be considered in the location of percolation test holes.

2. Percolation test holes should not be located in close proximity to the root zone of large trees.
3. See Appendix C for examples.

### **Section 6 - Preparation of Test Holes**

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 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". Do not back fill soil around pipe in backhoe holes. Measure and record the length of the pipe on the report form.

### **Section 7 - Presoaking of Test Holes**

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 four (4) times. A preferred 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.

### **Section 8- Percolation-Rate Measurements**

Percolation-rate measurements shall be made on the day following the presoaking of test holes.

- A. 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 six hours. Record measurements accurately, vertically, and to the nearest 1/8 inch.
- B. 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 six 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 six-hour test. Record measurements to the nearest 1/8 inch.
- C. 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 ten minutes for two

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 as stated in B above.

### **Section 9 - Percolation Rate**

The drop in the water level that occurs between the fifth and sixth measurements on six-hour tests is generally considered to be the stabilized percolation rate. The drop in water level that occurs between the eleventh and twelfth measurements is generally considered to be the stabilized rate for the two-hour test. The readings during prior periods provide information for modification of the interpretation of the stabilized percolation rate. Prior readings will be evaluated where refilling of test holes has occurred in the last two hours of the test or when rates show significant inconsistency during the course of the tests. 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 12-C.

### **Section 10 - Percolation Test Information**

Percolation test information shall be promptly submitted (within 90 days) to the Permit Resource Management Department, Well and Septic Section on the County form provided for all tests and preliminary tests conducted, including failing holes and exploratory holes which were not tested (see Section 14-E). If the test holes slow to less than one inch per hour, and an alternative or innovative system is proposed, continue the test for a total of six hours to determine the stabilized rates for future evaluation. 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 or Registered Environmental Health Specialist experienced in on-site sewage disposal systems.

Records and evaluations submitted are to include at a minimum:

- A. Data on all excavations, including failing holes and exploration holes within a 100 foot radius of the proposed septic area which were not tested
- B. Size of land area available for primary disposal system and required expansion area, including a scaled plot plan showing the location of test holes dimensioned to property lines and delineating the area for the fields as calculated from the established percolation rate.
- C. Accurate ground slope in the primary and expansion disposal field, and areas within 50 feet.
- D. Location of cut banks, natural bluffs and sharp changes in slope within 50 feet of the primary and expansion field.

- E. Location of wells, springs, intercept drains, streams and other bodies of water on the property and within 150 feet of primary and expansion areas.
- F. Location of existing houses, structures, rock outcrops and large trees in the area of the test.
- G. Depth to groundwater when required, per Section 12-C
- H. Special area standards.
- I. The person verifying the validity of the tests must describe the soils encountered in the profile holes as outlined in Sections 1 & 2, 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 disposal as measured by the standards of Sonoma County Permit and Resource Management Department.

### **Section 11 - Interpretation of Percolation Rate Measurements**

A stabilized percolation rate of at least one inch per hour is required for the installation of a standard private sewage disposal system. Stabilized rates slower than one inch per hour may be considered for inclusion within the Non-Standard Systems Program on a case-by-case basis.

Note (1) See Appendix A for sizing of standard leach lines for subsurface sewage disposal system.

Note (2) See Appendix B for percolation rate conversion chart.

Satisfactory percolation rates do not justify extension of sewage disposal fields to a depth where inadequately treated effluent may adversely affect beneficial uses of an underground water stratum. The slope percentages, height of winter water table (both perched and true groundwater), stability of soils, and proximity to water ways and streams are all considered in evaluation of the site for sewage disposal purposes.

The following standards must be met prior to site approval:

A. Ground slope

Natural ground slope in all areas to be used for effluent disposal shall not be greater than 30%. Where there is demonstrably less than three feet of soil below the trench bottom, ground slope may not exceed 20% unless for a non-standard system, shallow sloping system or granted as a waiver. "Soil depth" is measured vertically to the point where bedrock, hardpan, demonstrable impermeable soils or saturated soils are encountered.

B. Soil Depth

Soil depth where slopes are less than 20%, minimum soil depth immediately below the bottom of the leaching trench for standard systems shall be no less than three feet.

**Section 12 - Requirements for “Wet-Weather” Soil Percolation and Ground Water Determination Tests**

In general, lands with slopes of 0 to 5% in a basin area require site inspection by the district Environmental Health Specialist and “wet-weather “ ground water table determinations (generally done between January 1 and March 1\* after having received 15 inches\*\* of seasonal rainfall and within 10 days of receipt of 0.8 inch or more of rainfall within a 48 hour period). Additionally, soils having a shrink-swell potential (tendency to crack) require “wet-weather” percolation tests (See soil suitability chart of the Water Quality Control Board’s Basin Plan”).

A. Wet-Weather soils percolation tests are percolation tests conducted (generally) between January 1 and March 1\* after having received 15 inches of actual seasonal rainfall.

Note: 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).

\* Extensions beyond the time limits of the above criteria may be made by the Operations Manager of PRMD based on rainfall and groundwater monitoring and within the parameters of the North Coast Regional Water Quality Control Board Basin Plan.

\*\* As reported by the officially recognized reporting stations as published in the Press Democrat.

Lands having slopes of 0 to 5% with seasonal water tables less than five feet from the ground surface are not suitable for standard leachfields, unless a waiver is approved, but may be acceptable for installation of a non-standard sewage disposal system. (Non-standard or alternative systems are explained in other documents.) Depth to water table requirements are more stringent in “waiver prohibition” areas as established by the Regional Water Quality Control Board.

Lands having slopes of more than 5% and not more than 30% will frequently require interceptor drains to intercept and divert surface and sub-surface flows of storm water away from the leachfield. Demonstration that surface and sub-surface facilities function as designed may be a requirement.

B. Groundwater Determination Tests

1. When wet-weather groundwater determinations are required, backhoe excavated profile holes shall remain open a minimum of 24 hours, adequately supervised or barricaded until observed by the staff Environmental Health Specialist.

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 60 inches below the proposed percolation test depth, insert a perforated pipe, and fill the annular space with gravel covered with two 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.

C. Depth to Groundwater

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 as indicated in the Basin Plan.

Where groundwater is determined to be non-usable, e.g. cannot reasonably be expected to be used for withdrawal and beneficial use due to quantity and/or quality, a minimum depth to groundwater of three feet below the leaching trench bottom may be permitted without need for a waiver, if soils contain greater than 15% silt and clay as demonstrated by hydrometer analysis, or soils have a percolation rate slower than 5 mpi. This depth may be waived to no less than two feet if waiver is justified or for an Alternative or Non-Standard System.

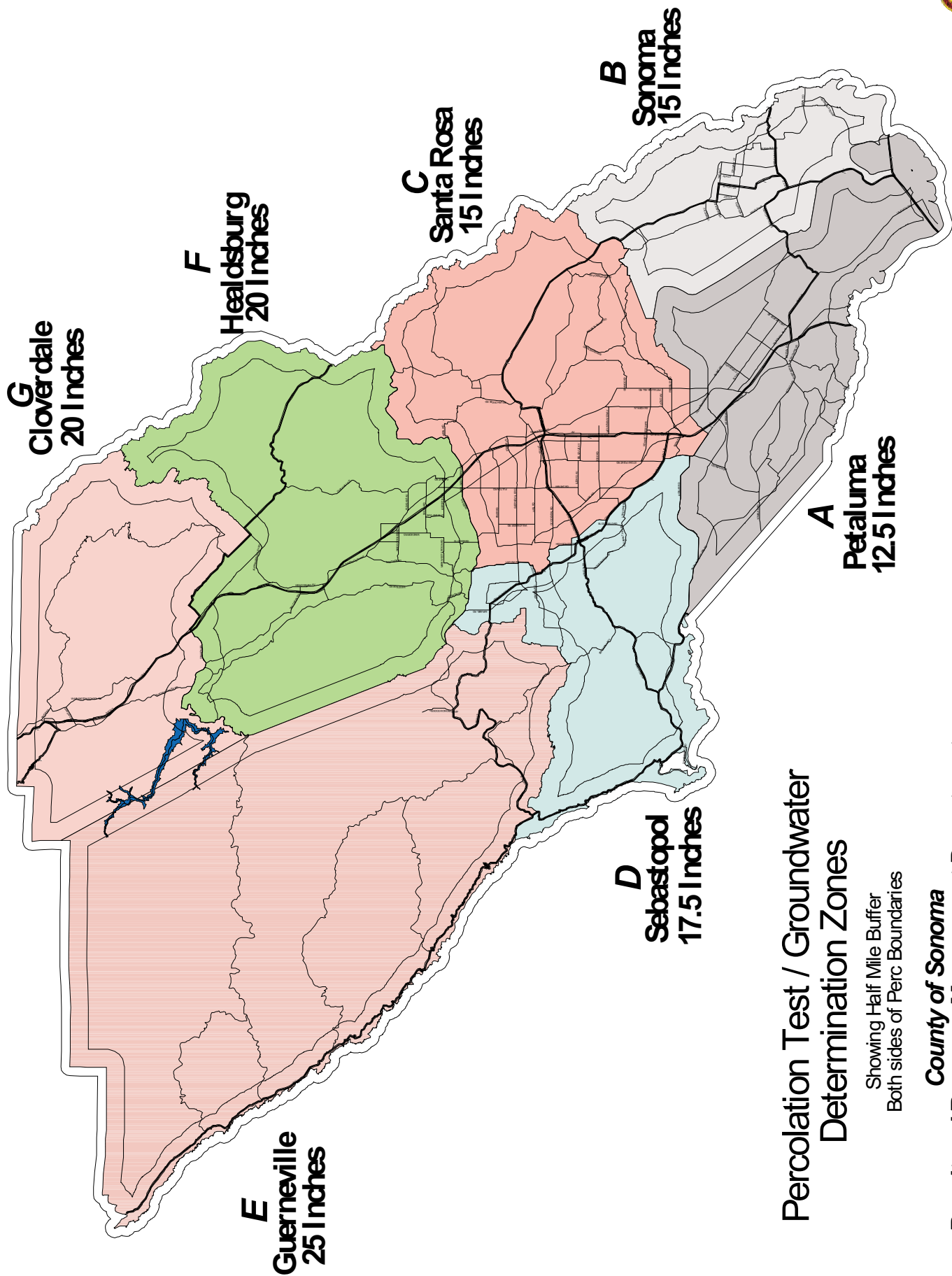
**Section 13 - Modification of Section 12 to Incorporate Winter Time Percolation Test/groundwater Determination Zones**

- A. Rainfall determinations will be based upon the rainfall amounts published by the Press Democrat for Petaluma, Sonoma, Santa Rosa, Sebastopol, Guerneville, Healdsburg, and Cloverdale.
- B.. The wet weather testing season will be in effect between January 1 and March 1\* after having received 50% of the average rainfall for each defined geographic area. For purposes of this instruction, 50% of the average rainfall is defined as:

|             |          |             |
|-------------|----------|-------------|
| 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   |

\* Extensions beyond the time limits of the above criteria may be made by the Operations Manager of PRMD based on rainfall and groundwater monitoring and within the parameters of the North Coast Regional Water Quality Control Board Basin Plan.

- C. The geographical areas associated with each weather station shall be as shown on the attached map. In order to allow flexibility of interpretation, a property which is located within 2500 feet of a dividing line between areas can be considered to be in either of the areas.
- D. Depth to groundwater determinations can be conducted within ten (10) calendar days following a rainfall of 0.8 inches in a 48 hour period. The amount of rainfall will be determined for each geographical area. Depth to groundwater observations within each area shall be made in accordance with the rainfall determination for that area.
- E. Rainfall readings shall be maintained on a daily basis by the Liquid Waste Specialist and/or the Well and Septic Section Supervisor.



**Percolation Test / Groundwater  
Determination Zones**

Showing Half Mile Buffer  
Both sides of Perc Boundaries

**County of Sonoma**  
**Permit and Resource Management Department**

2550 Ventura Avenue Santa Rosa, California 95403 (707) 565-1900



**Section 14- Percolation Tests - Notification - Submittal of Results:**

A. An appointment shall be made with the district Environmental Health Specialist for the purpose of scheduling the preliminary site survey. The property owner, Civil Engineer, Registered Environmental Health Specialist, or Registered Geologist shall make the appointment with the district Environmental Health Specialist (see Section 1). The Sonoma County Request for Service Form shall be filled out and the Site Survey fee shall be submitted at this time.

Note: A copy of the Assessors 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. If the preliminary site review is acceptable, the Civil Engineer, Registered Environmental Health Specialist, Registered Geologist or his designated representative, shall submit the 'Notification to Perform a Soil Percolation' form to the Sonoma County Permit and Resource Management Department (appendix D) and render the Percolation Test Evaluation fee.

Note: 1. Official testing may occur only after proper notification.

2. Soils percolation tests shall be conducted within 120 days of the Notification to the Permit and Resource Management Department (unless extended by written approval of the district Environmental Health Specialist).

C. The Well and Septic Section shall be notified a minimum of 24 hours in advance (on a normal working day before 12:00 noon) of profile hole preparation, any percolation testing, backhoe excavations, ground water determination testing and/or other exploratory work that is being attempted.

D. Official percolation rate measurements may not be performed on weekends or legal county holidays, or outside of normal working hours and shall be performed between the hours of 8:00 a.m. and 5:00 p.m.

E. All percolation tests, groundwater determination tests, and information obtained related to the percolation test procedures shall be submitted to the Well and Septic Section 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 disposal design (extensions may be requested on a case by case basis).

Note: Any information not submitted in the designated time frame to the Well and Septic Section for review may (on a case by case basis) be rejected.

**Section 15 - Procedures and Requirements for Subdivisions:**

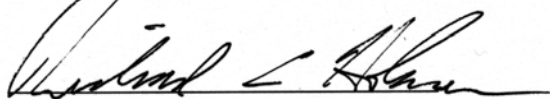
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Percolation test submittals for new subdivisions (2 or more parcels) shall meet the following requirements. (Testing of lots in existing subdivisions are exempt from these additional requirements.)

- A. All soil exploration holes, groundwater determination holes and percolation test holes shall be clearly identified in the field as to hole number and lot number. Staking, flagging or other easily identifiable methods are acceptable.
- B. Percolation test information shall be submitted in a separate format for each proposed lot. The lot by lot information may be bound into an overall septic system site assessment for the entire subdivision. The lot by lot information shall include percolation tests for that lot using the same numbering as in the field. Site plans for the proposed sewage disposal areas shall show information specified in Section 10, A through I, including descriptions of the soil profile and groundwater holes and results of hydrometer tests (if required).
- C. If the proposed site development will create road cuts, driveway cuts, grading, structures downhill of the leachfield sites or drainage improvements, these must be noted on the site plans.
- D. The area tested shall be marked by placing a 6 foot minimum steel fence post at least 4 feet into the ground at the 2 (or more) profile holes on each percolation test site. The locations of fence posts shall be located with distances from at least two prominent, permanent, and readily identifiable property features. Areas tested for sewage disposal shall be delineated on the final map or parcel map. These areas shall be accurately tied to the fence posts marking the profile hole/leachfield area.
- E. The individual certifying the test shall indicate the boundaries of the acceptable leachfield site and shall certify that each lot has sufficient area to accommodate a leachfield for a 3 bedroom home plus 200% reserve expansion area.
- F. An overall map of the subdivision shall be submitted with the submittal of the percolation tests. This map shall clearly indicate areas tested, proposed building site, proposed individual or mutual lot configuration and proposed roads.

**Approved by:**

Date Posted: 9/27/02



Richard L. Holmer,  
Operations Manager

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