

Policy 4211.04

**LINEAR LOADING RATE  
IN SHALLOW SOIL ON >20% SLOPE**

**Intent and Benefit**

It is the intent of this policy to develop adequate guidance to DEH staff facilitating consistent reliable decisions that allow for soil depth <3 feet below the absorption surface on slopes >20% while mitigating slope instability issues. DEH desires to take advantage of new technological advances that make possible the use of shallow soils on steep slopes. It is the intent of DEH to assure slope stability and avoid soil instability where sewage systems are permitted in shallow soils on slopes >20%. It is a benefit to the orderly development of Mendocino County when DEH can responsibly facilitate development in shallow soils on slopes >20%.

**Background**

This policy has been developed in response to the increased number of Site Evaluation Reports that are submitted with sites that exceed 20% slope and where soil depth is a constraint. Currently, the WQCB Basin Plan limits installation of sewage systems where soil depth is <3 feet below the absorption surface. DEH has a long-standing Waiver Guideline policy approved by the WQCB that addresses the conditions/mitigations required for granting a waiver of the soil depth criteria to no less than 2 feet below the absorption surface. However the Waiver Guidelines do not address the issue of linear loading or contour loading. This policy addresses the linear loading rate concern for all system types on sites where soil depth is <3 feet below the absorption surface on slopes >20%.

**Statement of Problem**

The construction and use of sewage systems on sloping sites where soil depth is <3 feet below the absorption surface can cause slope instability and even soil liquefaction resulting in costly damage and potential health hazards. Previous Wisconsin Sand Mound System technology restricted the use of sites with shallow soil to  $\leq 12\%$ . DEH wishes to take advantage of new technologies that can utilize slopes up to 25% and in some cases exceeding 30%. These new technologies are often employed where soil depth may also be a constraint. Soil depth is of special concern on steeper sloping sites. This policy addresses the potential for soil destabilization including liquefaction caused by on-site sewage systems on sloping sites with shallow soils by prescribing a design linear loading rate consistent with published guidelines.

**Implementation**

This policy is consistent with the US EPA Onsite Wastewater Treatment Systems Manual Section 4.4.6 “*Geometry, orientation, and configuration of the infiltration surface*”.

Long narrow trenches on the slope contour are highly recommended and the reader is cautioned against exceeding the maximum contour loading though no quantitative data are presented.

For purposes of this policy the most recent Wisconsin At-Grade Design Manual shall be used as a source of quantitative data for Linear Load Rate (LLR). LLR shall mean the sum of the hydraulic loadings to one or more lines per each unit of contour length. Design Principles are discussed on pages 5 through 7 of the Manual and represented on Figure 3, a copy of which is attached to this policy. The Basin Plan criteria as shown below shall be used to provide definition for the 4 different soil profile conditions of Figure 3 of the At Grade Design Manual.

Criteria for granting approval for soil depth <3 feet on slopes >20%:

A. Trench Systems:

1. Pressure distribution shall be required and;
2. Linear loading rates consistent with the At-Grade Design Manual and;
3. Cross sectional details specifying how the trenches are to be constructed.

B. Drip Emitter Systems:

1. Pressure Compensating emitters shall be required and;
2. Linear loading rates consistent with the At-Grade Design Manual and;
3. Cross sectional details specifying on-center spacing of drip laterals.

C. Linear Loading Rates from the At-Grade Design Manual (Fig. 3. ) shall be defined consistent with the Basin Plan as follows:

1. Impermeable Soil Layer = >120 MPI and LLR = 4 gpd/lf
2. Semi-permeable Soil Layer = >60 and <120 MPI and LLR = 6 gpd/lf
3. Water Table = >5 and <60 MPI and LLR = 8 gpd/lf
4. Creviced Bedrock = >1 and <5 MPI and LLR = 10gpd/lf

Sites that can not meet these criteria may be considered if a Slope Stability Study is completed by a qualified geo-technical engineer to the satisfaction of DEH.

**Effective Date: 1/1/2005**

**Revised Date:**

**Director's Initials:** \_\_\_\_\_