

2008 SOIL SUITABILITY GROUPS FOR SOIL-BASED RESIDENTIAL WASTEWATER DISPOSAL SYSTEMS IN VERMONT

USDA Natural Resources Conservation Service
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The purpose of this report is to provide updated information on the suitability of the soils in Vermont for soil-based residential wastewater disposal systems, based on the 2007 Vermont Environmental Protection Rules (1). This report replaces the publication, "Ancillary Soil Interpretation Ratings for On-site Sewage Disposal in Vermont," published in January, 1997, by the Natural Resources Conservation Service (NRCS) (2). It updates the NRCS soil suitability ratings based on the 2002 Vermont Environmental Protection Rules (3).

NRCS has produced soil maps for every county in Vermont. (The soil mapping in Essex County is currently in progress.) Along with the soil maps, general information on the behavior of soil map units for various uses is provided by NRCS. In this report, the soil properties that affect soil-based wastewater disposal suitability and design have been compared to regulations set forth in the 2007 State of Vermont Environmental Protection Rules for wastewater systems. This review has led to a set of ancillary soil interpretations for soil-based residential wastewater disposal systems, with the soil map units in Vermont separated into five general suitability groups and then further separated into various subgroups.

Included in soil-based wastewater disposal systems are leachfields, also known as absorption beds or trenches and mound systems, in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. There must be unsaturated soil beneath the leachfield to filter the effluent effectively. Unsatisfactory performance, including surfacing of wastewater or it backing up into buildings and other structures or direct discharge of effluent into surface waters, can affect public health.

ASSUMPTIONS AND LIMITATIONS OF THIS REPORT

The ratings in this report are based on the installation of a new septic system for a new single-family home on a lot subdivided on or after June 14, 2002. Lots subdivided before June 14, 2002, have a 30% slope limitation, rather than the 20% slope limitation that these ratings are based on. The ratings do not necessarily apply to the siting of a replacement system for an existing residence. This report does not consider other site factors, such as wellhead and source protection areas, watershed classification, isolation distances and the size of the parcel, all of which can affect placement of wastewater disposal systems. The ratings are based on minimum site conditions set forth for prescriptive and enhanced prescriptive designs.

This report is intended for general planning purposes only and is not intended to replace or supersede an on-site soil investigation by a state-licensed designer or professional engineer. These ratings apply only to land within the State of Vermont.

SOIL RATINGS FOR SOIL-BASED RESIDENTIAL WASTEWATER DISPOSAL SYSTEMS

The five interpretive suitability groups and their subgroups are briefly described in this section. The rating symbols are based on the subgroup. A rating of **Ia** through **Id** indicates that soil properties and site features are well suited for soil-based wastewater disposal systems and good performance and low maintenance can be expected; a rating of **IIa** through **IIh** indicates that soil properties and site features are moderately suited for soil-based wastewater disposal systems and one or more soil properties or site features, such as the percent slope, make the soil less desirable than the soils rated well suited; a rating of **IIIa** through **IIIg** indicates that one or more soil properties or site features are marginally suited for soil-based wastewater disposal systems and overcoming those limitations requires special design, extra maintenance, or costly alteration; a rating of **IVa** through **IVd** indicates that the soil map unit is generally not suited for soil-based wastewater disposal systems. A rating of **V** indicates that the map unit is not rated.

I - Well Suited. This group is composed of coarse textured, sandy and gravelly glacial outwash soil map units with rapid to very rapid permeability in the substratum and well drained glacial till soil map units with a friable substratum with moderate permeability on slopes generally less than 20 percent. Some map units have slopes greater than 20 percent in some areas.

Ia - soil map units with rapid permeability and slopes less than 20 percent.

Ib - soil map units with rapid permeability and a slope range that includes some areas with slopes greater than 20 percent.

Ic - soil map units with moderate permeability and slopes less than 20 percent.

Id - soil map units with moderate permeability and a slope range that includes some areas with slopes greater than 20 percent.

II - Moderately Suited. This group is composed of several distinct types of soil map units: 1) map units of soils with moderately slow to very slow permeability, 2) map unit complexes with moderate depth to bedrock, with one or more soil underlain by bedrock within 40 inches, 3) map units of soil series listed in Group I, but with a slope range greater than 20 percent, and 4) map units of soils that have a seasonal high water table at moderate depths, generally at a depth of one-and-a-half feet or deeper.

IIa - soil map units with moderately slow to very slow permeability and slopes less than 20 percent.

IIb - soil map units with moderately slow to very slow permeability and a slope range that includes some areas with slopes greater than 20 percent.

IIc - soil map units with moderate depth to bedrock, within 40 inches in some areas, and slopes less than 20 percent.

IId - soil map units with moderate depth to bedrock, within 40 inches in some areas, and a slope range that includes some areas with slopes greater than 20 percent.

IIe - soil map units with rapid permeability and steep slopes, having a slope range greater than 20 percent.

IIf - soil map units with moderate permeability and steep slopes, having a slope range greater than 20 percent.

IIg - soil map units previously assigned to this subgroup have been re-assigned to IIIg in this revision.

IIh - soil map units with moderate depth to a seasonal high water table, generally at a depth of one-and-a-half feet or deeper, and slopes less than 20 percent.

III - Marginally Suited. This group is composed of soil map units that have a greater degree of limitations than Group II. They may require more intensive on-site investigations to locate suitable areas or they may require more sophisticated designs to overcome the limitations. Soil map units with a shallow seasonal high water table may require seasonal on-site monitoring of the water table to determine if the site is suitable. Some areas of these soil map units may not be suited for soil-based wastewater disposal systems.

IIIa - soil map units with marginal depth to bedrock, within 10 inches in some areas. Some map units are limited by a slope range that includes some areas with slopes greater than 20 percent.

IIIb - soil map units with a flooding hazard and a moderate depth to a seasonal high water table.

IIIc - soil map units with marginal depth to a seasonal high water table, generally at a depth of one foot or less, and slopes less than or equal to 8 percent.

IIId - soil map units with marginal depth to a seasonal high water table, generally at a depth of one foot or less, and slopes between 8 percent and less than or equal to 20 percent.

IIIe - soil map units with a seasonal high water table at a depth generally between zero and two feet and a slope range that includes some areas with slopes greater than 20 percent.

IIIf - soil map units with a seasonal high water and limited depth to bedrock. Areas of these map units may be limited by either the depth to the seasonal high water table or the depth to bedrock. Some map units are limited by a slope range that includes some areas with slopes greater than 20 percent.

IIIg - soil map units with a flooding hazard.

IV - Generally Not Suited. This group is composed of soil map units that are typically too wet, rocky, steep or otherwise generally not suited for use in soil-based wastewater disposal systems.

IVa - soil map units generally not suited due to excessive wetness.

IVb - soil map units generally not suited due to limited depth to bedrock and steep slopes, having a slope range entirely greater than 20 percent.

IVc - soil map units generally not suited due to very limited depth to bedrock on moderate slopes.

IVd - soil map units generally not suited due to moderately slow to very slow permeability and steep slopes, having a slope range entirely greater than 20 percent. Some map units have a seasonal high water table.

V - Not Rated. This group is composed of miscellaneous map units that been filled, excavated, re-graded or otherwise disturbed by human activities. They have a wide range of soil properties and require on-site investigations to determine their suitability for most uses, including soil-based wastewater disposal systems. Also included are areas mapped at a higher level of Soil Taxonomy than the soil series level. These areas also have a wide range of soil properties and require on-site investigations to determine their suitability for most uses, including soil-based wastewater disposal systems. Finally, also included are areas mapped as Water.

GENERAL NARRATIVES FOR SUBGROUPS

These narrative paragraphs are intended for use by consultants, planners, and others, in any report based on these ancillary ratings. The term "unit" refers to a soil map unit or a grouping of soil map units that are singularly or collectively assigned to each subgroup. The first sentence is a statement of suitability. The second sentence is a statement of limitations. The remaining text provides more information and discusses how limitations may be addressed and overcome.

Ia. This unit is well suited as a site for soil-based residential wastewater disposal systems, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2007 Environmental Protection Rules. The rapid permeability in the substratum is a concern. Backfilling absorption trenches with at least one foot of finer textured material or other site modifications may be necessary to slow the percolation rate enough to allow for thorough filtering of effluent.

Ib. This unit is well suited as a site for soil-based residential wastewater disposal systems, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2007 Environmental Protection Rules. The rapid permeability in the substratum and slopes greater than 20 percent in some areas are concerns. Backfilling absorption trenches with at least one foot of finer textured material or other site modifications may be necessary to slow the percolation rate enough to allow for thorough filtering of effluent. There may be less-sloping areas within the unit that are suitable for siting a septic system, or, if feasible, cut and fill site modifications may produce an acceptable area within the unit. An erosion prevention and sediment control plan is required by the State for construction on sites over 20 percent slope.

Ic. This unit is well suited as a site for soil-based residential wastewater disposal systems, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2007 Environmental Protection Rules. With moderate permeability and slopes less than 20 percent, there are few limitations.

Id. This unit is well suited as a site for soil-based residential wastewater disposal systems, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2007 Environmental Protection Rules. Slopes greater than 20 percent in some areas are a concern. There may be less-sloping areas within the unit that are suitable for siting a septic system, or, if feasible, cut and fill site modifications may produce an acceptable area within the unit. An erosion prevention and sediment control plan is required by the State for construction on sites over 20 percent slope.

IIa. This unit is moderately suited as a site for soil-based residential wastewater disposal systems, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2007 Environmental Protection Rules. The slow permeability in the substratum is the primary concern. Mound system construction and other site modifications may be necessary.

IIb. This unit is moderately suited as a site for soil-based residential wastewater disposal systems, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2007 Environmental Protection Rules. The slow permeability in the substratum and slopes greater than 20 percent in some areas are the primary concerns. Mound system construction and other site modifications may be necessary. There may be less-sloping areas within the unit that are suitable for siting a septic system, or, if feasible, cut and fill site modifications may produce an acceptable area within the unit. An erosion prevention and sediment control plan is required by the State for construction on sites over 20 percent slope.

IIc. This unit is moderately suited as a site for soil-based residential wastewater disposal systems, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2007 Environmental Protection Rules. The depth to bedrock in some areas is the primary concern. A significant percentage of this map unit has sufficient soil depth over bedrock to accept a range of designs. On-site investigations can help avoid areas with limited depth to bedrock. Additional fill material may be needed in some areas in order to meet the separation distance requirement between the bottom of the leachfield and bedrock.

IIId. This unit is moderately suited as a site for soil-based residential wastewater disposal systems, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2007 Environmental Protection Rules. The depth to bedrock and slopes greater than 20 percent in some areas are the primary concerns. A significant percentage of this map unit has sufficient soil depth over bedrock to accept a range of designs. On-site investigations can help avoid areas with limited depth to bedrock. Additional fill material may be needed in some areas in order to meet the separation distance requirement between the bottom of the leachfield and bedrock. There may be less-sloping areas within the unit that are suitable for siting a septic system, or, if feasible, cut and fill site modifications may produce an acceptable area within the unit. An erosion prevention and sediment control plan is required by the State for construction on sites over 20 percent slope.

IIe. This unit is moderately suited as a site for soil-based residential wastewater disposal systems, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2007 Environmental Protection Rules. The rapid permeability in the substratum and slopes greater than 20 percent are the primary concerns. Backfilling absorption trenches and beds with at least one foot of finer textured material, or other site modifications, may be necessary to slow the percolation rate enough to allow for thorough filtering of effluent. Cut and fill site modifications may produce an acceptable area within the unit. An erosion prevention and sediment control plan is required by the State for construction on sites over 20 percent slope.

IIIf. This unit is moderately suited as a site for soil-based residential wastewater disposal systems, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2007 Environmental Protection Rules. Slopes greater than 20 percent are the primary concern. Cut and fill site modifications may produce an acceptable area within the unit. An erosion prevention and sediment control plan is required by the State for construction on sites over 20 percent slope.

IIg. (Deleted - see narrative for IIIg.)

IIIf. This unit is moderately suited as a site for soil-based residential wastewater disposal systems, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2007 Environmental Protection Rules. The depth to the seasonal high water table is the primary concern. Mound system construction and other site modifications are often necessary. On sloping sites, curtain drains can help lower the water table to an acceptable level. In some cases, a detailed, site-specific analysis with groundwater level monitoring and determination of induced groundwater mounding may be required to establish the suitability of this unit.

IIIa. This unit is marginally suited as a site for soil-based residential wastewater disposal systems, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2007 Environmental Protection Rules. The depth to bedrock is the major limitation. On-site investigations are needed to locate areas with sufficient soil depth. A significant percentage of the soils in this unit are less than 18 inches to bedrock and are not suitable as a site. However, there may be deeper areas that are suitable. Additional fill material may be needed in some areas in order to meet the separation distance requirement between the bottom of the leachfield and bedrock.

IIIb. This unit is marginally suited as a site for soil-based residential wastewater disposal systems, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2007 Environmental Protection Rules. The hazard of flooding and the depth to the seasonal high water table are the major limitations. This unit is on floodplains and typically includes land in the floodway and the special flood hazard area. Consult flood hazard maps prepared by the Federal Emergency Management Agency (FEMA) in local town offices for more information. Wastewater systems must be located, designed and constructed in a manner that avoids impairment to the system and contamination from the system due to flooding. A detailed, site-specific analysis with groundwater level monitoring and determination of induced groundwater mounding may be required to establish the suitability of this unit. Mound system construction and other site modifications are often necessary.

IIIc. This unit is marginally suited as a site for soil-based residential wastewater disposal systems, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2007 Environmental Protection Rules. The depth to the seasonal high water table in association with the minimal slope is the major limitation. A detailed, site-specific analysis is generally required. On-site groundwater level monitoring and determination of induced groundwater mounding is often necessary to establish the suitability of this unit. Curtain drains may help lower the water table to an acceptable level, however, the minimal slope may prevent their use in many areas.

III d. This unit is marginally suited as a site for soil-based residential wastewater disposal systems, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2007 Environmental Protection Rules. The depth to the seasonal high water table is the major limitation. A detailed, site-specific analysis is generally required. On-site groundwater level monitoring and determination of induced groundwater mounding is often necessary to establish the suitability of this unit. Curtain drains may help lower the water table to an acceptable level.

IIIe. This unit is marginally suited as a site for soil-based residential wastewater disposal systems, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2007 Environmental Protection Rules. The depth to the seasonal high water table and slopes greater than 20 percent in some areas are the major limitations. A detailed, site-specific analysis is generally required. On-site groundwater level monitoring and determination of induced groundwater mounding is often necessary to establish the suitability of this unit. Curtain drains may help lower the water table to an acceptable level. There may be less-sloping areas within the unit that are suitable for siting a septic system, or, if feasible, cut and fill site modifications may produce an acceptable area within the unit. An erosion prevention and sediment control plan is required by the State for construction on sites over 20 percent slope.

III f. This unit is marginally suited as a site for soil-based residential wastewater disposal systems, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2007 Environmental Protection Rules. The depth to the seasonal high water table and the restricted depth to bedrock in some areas are the major limitations. On-site investigations can help avoid areas with limited depth to bedrock. Additional fill material may be needed in some areas in order to meet the separation distance requirement between the bottom of the leachfield and bedrock. A detailed, site-specific analysis with groundwater level monitoring and determination of induced groundwater mounding may be required to establish the suitability of this unit. Mound system construction and other site modifications are often necessary. On sloping sites, curtain drains can help lower the water table to an acceptable level.

III g. This unit is marginally suited as a site for soil-based residential wastewater disposal systems, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2007 Environmental Protection Rules. The hazard of flooding is the major limitation. This unit is on floodplains and typically includes land in the floodway and the special flood hazard area. Consult flood hazard maps prepared by the Federal Emergency Management Agency (FEMA) in local town offices for more information. Wastewater systems must be located, designed and constructed in a manner that avoids impairment to the system and contamination from the system due to flooding.

IV a. This unit is generally not suited as a site for soil-based residential wastewater disposal systems, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2007 Environmental Protection Rules. Excessive soil wetness in association with the minimal slope is the limiting condition. Prolonged periods of saturation at or near the soil surface do not allow for the proper functioning of septic systems.

IV b. This unit is generally not suited as a site for soil-based residential wastewater disposal systems, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2007 Environmental Protection Rules. Steep slopes in association with the depth to bedrock is the limiting condition. Cut and fill site modifications that reduce the slope gradient are difficult to achieve due to the depth to bedrock.

IV c. This unit is generally not suited as a site for soil-based residential wastewater disposal systems, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2007 Environmental Protection Rules. The very shallow to shallow depth to bedrock is the limiting condition.

IVd. This unit is generally not suited as a site for soil-based residential wastewater disposal systems, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2007 Environmental Protection Rules. Steep slopes in association with the slowly permeable substratum is the limiting condition. Cut and fill site modifications that reduce the slope gradient are not generally effective due to the slowly permeable substratum.

V. This unit is not rated as a site for soil-based residential wastewater disposal systems. Due to the variable nature of the soils, on-site investigations are needed to determine their suitability.

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REFERENCES

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2. USDA, NRCS. January, 1997. Ancillary Soil Interpretation Ratings for On-site Sewage Disposal in Vermont. Winooski, VT. 64 pgs.
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