

**State Data Table  
TOP20  
April 15, 2003**

The TOP20 table provides soils information and interpretations that many GIS users require on a regular basis. The TOP20 table is derived from the NRCS National Soils Information System (NASIS) database. Other sources of soils information include state reports such as "NRCS Ancillary Soil Interpretations for On-site Sewage Disposal in VT", March 2003 ([APPENDIX A.](#)) and "Farmland Classification Systems for Vermont Soils", April, 2003 ([APPENDIX B.](#)) and the NRCS Electronic Field Office Technical Guide (eFOTG).

The eFOTG - Section II is the primary scientific reference within NRCS for soil and site information. This information is now accessible to outside users over the worldwide web. It includes Adobe Acrobat files of reports for prime farmland, hydric soils and on-site septic ratings. This information is updated frequently. This information is for users who need the most current soils data in report format. Go to <http://www.vt.nrcs.usda.gov/> and click on the Technical Resources button. Scroll down to the Field Office Technical Guide button. That will take you to a "Connect to The Vermont eFOTG" link. Then go to Section IIa of the FOTG.

Official soil series descriptions are also available on the worldwide web at <http://ortho.ftw.nrcs.usda.gov/osd/osd.html>.

SSURGO NOTE: Recertified SSURGO attribute datasets will become available in the summer of 2003. These will be in the new "SSURGO-2" format. A Microsoft Access template will also be available for viewing the complete SSURGO-2 datasets.

The TOP20 table has one record for each MUID, creating a 1:1 relationship between the tabular and spatial data. \*NEW data in this version OF TOP20: "DATE", "ONSITE", "SITECLASS". These fields are in red below. Updated data include AGVAL, HYDRIC, HYDROGROUP, PRIME, WATERDEEP, WATERSHALLOW, WATERKIND.

Comments, questions and suggestions concerning the TOP20 Table should be sent to Martha Stuart, NRCS soil scientist (email: [martha.stuart@vt.usda.gov](mailto:martha.stuart@vt.usda.gov) or phone: 802-295-7942 ext 28).

### Field Names and Short Definitions

<u>Field</u>	<u>Length</u>	<u>Type</u>	<u>Short definition</u>
STSSAID	5	char	State abbreviation concatenated with the county FIPS code.
SSAID	3	char	County FIPS code.
MUID	7	char	Map unit symbol, concatenation of the county FIPS code with the soil map unit symbol (MUSYM).
MUSYM	4	char	Map unit symbol.
MUNAME	90	char	Map unit name.
MUKIND	1	char	Map unit type.
AGVAL	5	char	Vermont agricultural value group (1-11), footnote (b,c).
FLOOD	11	char	Flooding frequency of the map unit. "None" if none of the named components are subject to flooding.
FORSTGRP	1	char	Vermont forest land value groups (1-7).
FORSTVAL	3	int	Relative forest value of the map unit on a scale of 0 to 100, with 100 denoting the highest forest value.
FROSTACTION	11	char	Potential frost action of the dominant component in the map unit.
GRAVEL	11	char	Potential source for gravel, "probable" if at least one component is a potential source for gravel.
HELCLASS	35	char	Highly erodible land classification.

HYDRIC	1	char	Hydric soils present in the map unit, "Y" if at least one component is a hydric soil.
HYDROGROUP	11	char	Hydrologic soil group of the dominant component in the map unit.
<b>ONSITE</b>	<b>6</b>	<b>char</b>	<b>*2002 Septic system class number (I-V), footnote (a-h).</b>
PARENT	9	char	Major category of parent material of the named components.
PARENTSUB	15	char	More detailed breakdown of parent material category(s) of the named components.
PRIME	22	char	Prime farmland class, (PRIME, STATEWIDE, LOCAL, NOT prime or statewide, footnote (a,b,c).
ROCKSHALLOW	4	int	Shallow end of the range in depth to bedrock of all major components of the map unit, in inches.
ROCKDEEP	4	int	Deep end of the range in depth to bedrock of all major components of the map unit, in inches.
SAND	11	char	Potential source for sand, "probable" if <u>at least one component</u> is a potential source for sand.
<b>SITECLASS</b>	<b>11</b>	<b>char</b>	<b>*Vermont forest productivity class or "Site Class", (I, II, III, IV).</b>
SLOPELOW	4	int	Low end of the range in slope of the <u>dominant component</u> in the map unit, in percent.
SLOPEHIGH	4	int	Steeper end of the range in slope of the <u>dominant component</u> in the map unit, in percent.
WATERSHALLOW	4	float	Shallow end of range in depth to seasonal high water table of all <u>named components</u> in the map unit, in feet to 1 decimal place.
WATERDEEP	4	float	Deep end of range in depth to seasonal high water table of <u>all named components</u> in the map unit, in feet to 1 decimal place.
WATERKIND	11	char	Kind of seasonal high water table, (PERCH, APPAR, or NONE).
<b>DATE</b>	<b>11</b>	<b>char</b>	<b>*Date of download from NASIS. (mm-dd-yyyy).</b>

**Caution:** The MUID should always be used to relate tabular data from TOP20 to spatial data. The same MUSYM can be linked to different map units with differing tabular data in different counties.

## Data Record Identifiers

**STSSAID** - identifies the county. It is the combination of the state abbreviation plus the county FIPS code. For example, STSSAID "VT001" identifies Addison County.

**SSAID** - identifies the county. It is the county FIPS code. For example, SSAID "001" identifies Addison County.

**MUID** - is a unique map unit symbol that should be used when working with the data from more than one survey. It is a combination of the county FIPS code and a map unit symbol. For example, MUID "001AdA" identifies map unit AdA in Addison County. An older version of MUID is included at the end of the table as OLD\_MUID for those who may want to refer to it.

**MUSYM** - is a map unit symbol that should only be used when working with the data from 1 survey. An MUSYM may be used in more than one County. In each case it represents a different map unit, with different soil characteristics and interpretations. For example, MUSYM "AdA" identifies map unit AdA in Addison County and also map unit AdA in Chittenden County. In some counties, map units have numerical MUSYM s (e.g. 19B).

**MUNAME** - is the map unit name. For example, the MUNAME for map unit AdA in Addison County is "Adams loamy fine sand, 0 to 5 percent slopes".

**MUKIND** - identifies the type of map unit: consociation (C), complex (X), association (A), or undifferentiated unit (U). If the MUKIND is "C" for consociation, there is only one major soil or component in the map unit. Map units with a MUKIND that is **not** "C" have 2 or 3 components.

A **soil complex** consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. An **association** is similar to a complex.

An **undifferentiated group** is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in the mapped areas are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them.

## Data Columns

### AGVAL

- This information comes from the report titled "Farmland Classification Systems for Vermont Soils", dated April, 2003.
- See [APPENDIX B](#) for the first 16 pages of that report.
- These Ag Value Groups are unique to Vermont.

**Class 1** soils have few limitations that restrict their use.

**Class 2** soils have moderate limitations that reduce the choice of plants or require moderate conservation practices.

**Class 3** soils have severe limitations that reduce the choice of plants or require special conservation practices, or both.

**Class 4** soils have very severe limitations that reduce the choice of plants or require very careful management, or both.

**Class 5** soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

**Class 6** soils have severe limitations that make them generally unsuitable for crop production.

**Class 7** soils have very severe limitations that make them unsuitable for crop production.

**Class 8** soils and miscellaneous land areas have limitations that nearly preclude their use for crop production.

- The numerical rating of map units with more than one named component (complexes, associations and undifferentiated units) will depend on the proportion of the different components that comprise them.
- FOOTNOTE "d"- The soils in this soil map unit have a wetness limitation that may not be feasible to overcome. Areas of this soil map unit, where artificial drainage is not feasible should be placed in Agricultural Value Group 11.
- FOOTNOTE "e"- Bedrock outcrops cover more than 2 percent of the surface. Areas of this soil map unit should be placed in Agricultural Value Group 11, if bedrock outcrops are extensive enough to prohibit efficient farming.

## FLOOD

- This information can be used to determine if flooding may be a concern in the map unit.
- It was derived from the Flooding Frequency column in the comonth table in the SSURGO-2 dataset.
- The frequency of flooding is displayed as :
  - frequent** – greater than 50 times in 100 years
  - occasional** – 5 to 50 times in 100 years
  - rare**– 1 to 5 times in 100 years
  - none** – no reasonable chance of flooding (less than 1 time in 500 years)
  - not rated** – used for miscellaneous land types that cannot be rated
  - water** – water body or double line stream

## FORSTGRP and FORSTVAL

- This information is unique to Vermont.
- FORSTGRP refers to Vermont forest land value groups (1-7).
- FORSTVAL is the relative forest value of the map unit on a scale of 0 to 100, with 100 denoting the highest forest value.
- The group assignments and value ratings are based on “Soil Potential Study and Forest Land Value Groups for Vermont Soils”, revised, November 27, 2003. For a copy of this report, contact Steve Gourley, State Soil Scientist (email: [steve.gourley@vt.usda.gov](mailto:steve.gourley@vt.usda.gov) or 802-951-6796 x236).
- The numerical rating of map units with more than one named component (complexes, associations and undifferentiated units) will depend on the proportion of the different components that comprise them.
- FORSTGRP “1” - Map unit has a relative forest value of 100 on a scale of 0 to 100.
- FORSTGRP “2” - Map unit has a relative forest value of 83 on a scale of 0 to 100.
- FORSTGRP “3” - Map unit has a relative forest value of 74 on a scale of 0 to 100.
- FORSTGRP “4” - Map unit has a relative forest value of 63 on a scale of 0 to 100.
- FORSTGRP “5” - Map unit has a relative forest value of 51 on a scale of 0 to 100.
- FORSTGRP “6” - Map unit has a relative forest value of 31 on a scale of 0 to 100.
- FORSTGRP “7” - Map unit has a relative forest value of 0 on a scale of 0 to 100.

## FROSTACTION

- This information identifies the potential frost action of the dominant component in the map unit.
- The classes are “**low**”, “**moderate**”, “**high**”, and “**not rated**”. Musym of “W” will yield a value of “water”.
- This data resides in the Frost Action column of the SSURGO-2 dataset.

## GRAVEL

- This information can be used to determine if the map unit may be a potential source for gravel.
- If GRAVEL equals “**probable**” then at least one of the components in the map unit may be a potential source of gravel. Musym of “W” will yield a value of “water”.
- This information is not currently in the SSURGO-2 dataset.

## HELCLASS

- The purpose of this classification is to identify areas on which erosion control efforts should be concentrated.

- The definition is based on Erosion Indexes derived from certain variables of the Universal Soil Loss Equation. The indexes are the quotient of tons of soil loss by erosion predicted for bare ground divided by the sustainable soil loss (T factor). T factor resides in the "T" column of the component table in the SSURGO-2 datasets, and can also be viewed through the eFOTG in the statewide section.
- The classifications are:
  - Not highly erodible land**
  - Potentially highly erodible land**
  - Highly erodible land**
  - not rated
  - water
- This same information was previously available in the table titled helclass.dbf. The HEL classification now resides in the HEL Water column of the mapunit table of the SSURGO-2 dataset.

## HYDRIC

- This information can be used to determine if hydric soils are present in the map unit.
- This information comes from the Hydric Rating column of the component table of the SSURGO-2 dataset.
- If HYDRIC equals "Y" at least one of the named components in the map unit is a hydric soil.
- It also indicates that wetlands might be present. Vegetation and hydrology must also be considered when making a wetland determination.
- If HYDRIC equals "N" none of the named components in the map unit is a hydric soil.
- If HYDRIC equals "U" all of the named components are miscellaneous land types and the map unit is unranked. Musym of "W" will yield a value of "water".

## HYDROGROUP

- This information identifies the hydrologic soil group of the dominant component in the map unit.
- Hydrologic soil groups were revised in Vermont in 2003.
- The value in HYDROGROUP comes from the Hydrologic Group column in the component table of the SSURGO-2 dataset.
- The groups are:
  - Hydrologic Soil Group A** – Soils that are
    1. Well drained to excessively drained **and** moderately deep to very deep **and** sandy or sandy-skeletal, OR
    2. Well drained to excessively drained **and** moderately deep to very deep **and** loamy-skeletal with a sandy loam or fine sandy loam cap over a sandy or gravelly substratum.

### Hydrologic Soil Group B – Soils that are

1. Moderately well drained to somewhat poorly drained **and** moderately deep to very deep **and** sandy or sandy-skeletal or loamy-skeletal, OR
2. Well drained to moderately well drained **and** deep to very deep to bedrock **and** do not have a densic contact **and** have permeability of moderate or moderately rapid and are coarse-loamy or coarse-silty, OR
3. Well drained to moderately well drained **and** deep to very deep to bedrock **and** do not have a densic contact **and** have permeability of moderate or moderately rapid in the upper part **and** are coarse-loamy or coarse-silty over sandy or sandy-skeletal.

### Hydrologic Soil Group C – Soils that are

1. Poorly drained **and** very deep **and** sandy or sandy-skeletal, OR
2. Well drained or moderately well drained **and** have a fine or very fine particle size class substratum, OR

3. Well drained to poorly drained **and** moderately deep (or shallow to moderately deep) to a densic contact or to a layer with moderately slow to slow permeability, OR
4. Somewhat poorly drained to poorly drained **and** very deep **and** do not have a densic contact **and** are coarse-loamy, coarse-silty, or loamy-skeletal in at least the upper part, OR
5. Well drained to moderately well drained **and** moderately deep to bedrock **and** do not have a densic contact **and** are coarse-loamy, coarse-silty, or loamy-skeletal in at least the upper part.

**Hydrologic Soil Group D** – Soils that are

1. Very poorly drained, OR
2. Very shallow or shallow to bedrock, OR
3. In the fine or very fine particle size family class, OR
4. Somewhat poorly drained or poorly drained **and** have textures in the substratum that are in the fine or very fine particle size class, OR
5. Very shallow or shallow to a densic contact or to a layer with slow to very slow permeability.

Musym of “W” will yield a value of “water”.

**ONSITE**

- This information identifies the new onsite sewage disposal class and footnote of the map unit.
- Ratings are based on Vermont Environmental Protection Rules, August 16, 2002, based on 20% maximum slope – for lots created on or after June 14, 2002.
- It doesn’t replace onsite investigation.
- These are the five major classes. (For more detailed information, see Appendix A at the end of this document.)

Class I - WELL SUITED

Class II - MODERATELY SUITED

Class III - MARGINALLY SUITED

Class IV - NOT SUITED

Class V - NOT RATED

- The combination of class and footnote provides information on the major soil properties affecting the class assignment. A brief summary of the ratings groups follows. (For more detailed information on the individual classes, see Appendix A.)

Ia - WELL SUITED - Soil map units with rapid permeability

Ib - WELL SUITED - Soil map units with rapid permeability and limited slope

Ic - WELL SUITED - Soil map units with moderate permeability

Id - WELL SUITED - Soil map units with moderate permeability and limited slope

IIa - MODERATELY SUITED - Soil map units with slow permeability

IIb - MODERATELY SUITED - Soil map units with slow permeability and limited slope

IIc - MODERATELY SUITED - Soil map units with moderate depth to bedrock

IId - MODERATELY SUITED - Soil map units with moderate depth to bedrock and limited slope

IIe - MODERATELY SUITED - Soil map units with rapid permeability and steep slope

IIIf - MODERATELY SUITED - Soil map units with moderate permeability and steep slope

IIIg - MODERATELY SUITED - Soil map units with flooding limitation

IIHh - MODERATELY SUITED - Soil map units with moderate depth to seasonal high water table (SHWT)

IIIa - MARGINALLY SUITED - Soil map units with marginal depth to bedrock

IIIb - MARGINALLY SUITED - Soil map units with flooding limitation and moderate depth to SHWT

IIIc - MARGINALLY SUITED - Soil map units with marginal depth to SHWT and gentle slope

IIId - MARGINALLY SUITED - Soil map units with marginal depth to SHWT and moderate slope

IIIe - MARGINALLY SUITED - Soil map units with marginal depth to SHWT and limited slope

IIIf - MARGINALLY SUITED - Soil map units with SHWT and depth to bedrock limitation

IVa - NOT SUITED - Soil map units not suited due to excessive wetness

IVb - NOT SUITED - Soil map units not suited due to limited depth to bedrock and steep slope

IVc - NOT SUITED - Soil map units not suited due to very limited depth to bedrock on moderate slopes

IVd - NOT SUITED - Soil map units not suited due to slow permeability and steep slope

V - NOT RATED MAP UNITS

## PARENT

- This information comes from the official soil series descriptions.
- PARENT shows the broad category(s) of parent material of the named component(s) in the mapunit.
- The following codes (listed alphabetically) are used:
  - A alluvial
  - DT dense till
  - GF outwash
  - GL lacustrine
  - GT glacial till
  - M miscellaneous units
  - O organic deposits
  - W water

## PARENTSUB

- This information comes from the official soil series descriptions.
- PARENTSUB shows a more detailed parent material breakdown than PARENT.
- The following codes (listed alphabetically) are used:

ADT	dense till with carbonates at less than 40 inches
AGT	glacial till with carbonates at less than 40 inches
BAGT	glacial till with bedrock and carbonates at less than 40 inches
BCGT	cryic glacial till with bedrock at less than 40 inches
BEGT	glacial till with bedrock at less than 40 inches and high base saturation
BGT	glacial till with bedrock at less than 40 inches
BSGT	spodic glacial till with bedrock at less than 40 inches
CDT	cryic dense till
CGL	clayey lacustrine deposits
CO	cryic organic deposits
DT	dense till
EDT	dense till with high base saturation
EGT	glacial till with high base saturation
GF	outwash
GGF	gravelly outwash
GL	lacustrine
GT	glacial till
M	miscellaneous units
O	organic deposits
SDT	spodic dense till
SGF	sandy outwash
SGL	loamy or silty lacustrine deposits
SGT	spodic glacial till

W water

## PRIME

- This information comes from the report titled "Farmland Classification Systems for Vermont Soils", dated April, 2003.
- The classes are:
  - **Prime, Statewide, Local, NPSL.** (NPSL stands for "Not Prime or Statewide" and replaces "not rated".) Musym of "W" will yield a value of "water".
- See APPENDIX B for the first 16 pages of that report with detailed definitions of the ratings.
- The following footnotes are used:
  - FOOTNOTE "a" - If the upper slope class limit of the soil map unit is between 9 and 15 percent then the areas of the soil map unit that exceed 8 percent slope don't qualify as Prime, Statewide, or Local. If the upper slope class limit exceeds 15 percent then the areas of the soil map unit that exceed 15 percent slope don't qualify as Important Farmland.
  - FOOTNOTE "b" - The soils in this soil map unit have a wetness limitation that may be difficult and/or unfeasible to overcome. Areas of this soil map unit don't qualify as Prime, Statewide, or Local, if artificial drainage is not feasible.
  - FOOTNOTE "c" - Bedrock outcrops commonly cover more than 2 percent of the surface. Areas of this soil map unit will not qualify as Prime, Statewide, or Local, if bedrock outcrops are extensive enough to prohibit efficient farming.

## ROCKSHALLOW and ROCKDEEP

- This information identifies the range in the depth to bedrock (inches) of all of the named components in the map unit.
- It was derived from Top Depth-High Value and Top Depth-Low Value in the corestrictions table of the new SSURGO-2 dataset.
- The user can determine if bedrock is present in the map unit at or above a critical depth below the mineral soil surface by examining ROCKSHALLOW.
- The user can determine if bedrock is present in the map unit below a critical depth below the mineral soil surface by examining ROCKDEEP.
- If ROCKSHALLOW and ROCKDEEP equal "60" then the depth to bedrock for the map unit is greater than 60 inches.
- If ROCKSHALLOW is less than "60" and ROCKDEEP equals "60" then the depth to bedrock for the map unit ranges from ROCKSHALLOW to greater than 60 inches.
- If ROCKSHALLOW and ROCKDEEP equal "999" then the named components are miscellaneous land types and the map unit is unranked.

## SAND

- This information can be used to determine if the map unit may be a potential source for sand.
- If SAND equals "**probable**" then at least one of the components in the map unit may be a potential source of sand. Musym of "W" will yield a value of "water".
- It is not currently in the new SSURGO-2 dataset.

## SITECLASS

- Forest site class is based on the potential productivity of the soils for forestry, based on softwood productivity.
- They were developed for use in the administration of the Use Value Appraisal law in the State of Vermont.
- There are four classes:
  - **I** - potential productivity of more than 85 cubic feet per acre per year
  - **II** - potential productivity of 50 to 85 cubic feet per acre per year
  - **III** - potential productivity of 20 to 49 cubic feet per acre per year
  - **IV** - potential productivity of less than 20 cubic feet per acre per year
  - **not rated** – miscellaneous land types that are not assigned to a site class
  - **water** – water body or double line stream
- The productivity of forest land may also be determined by site index: **site class I** has the following site indices - spruce/fir-50 or more, white pine-70 or more, northern hardwood-60 or more, and oak/hardwood-60 or more; **site class II** has the following site indices - spruce/fir-40-49, white pine-60-69, northern hardwood-53-59, and oak/hardwood-53-59; **site class III** has the following site indices - spruce/fir-30-39, white pine-50-59, northern hardwood-45-52, and oak/hardwood-45-52; and **site class IV** has the following site indices - spruce/fir-less than 30, white pine-less than 50, northern hardwood-less than 45, and oak/hardwood-less than 45.

#### **SLOPELOW and SLOPEHIGH**

- This information identifies the range in %slope of the dominant component in the map unit and is identical to the slope range that appears in the map unit name.
- It was derived from Slope Gradient-Low Value and Slope Gradient-High Value the component table in the SSURGO-2 dataset.
- If SLOPELOW and SLOPEHIGH equal "999" then the named components are miscellaneous land types and the map unit is not assigned a slope range.

#### **WATERSHALLOW and WATERDEEP**

- This information identifies the range in the depth (feet) to seasonal high water table of all of the named components in the map unit.
- It was derived from the Top Depth-High Value and Top Depth-Low Value in the cosoilmoist table.
- The user can determine if a water table may be present in some part of the map unit at or above a critical depth below the mineral soil surface.
- If WATERSHALLOW and WATERDEEP equal "6.00" then the depth to seasonal high water table for the map unit is greater than 6 feet.
- If WATERSHALLOW is a negative number, water is ponded on the surface (ie. "-1" indicates that the ponded water is 1 foot deep).
- If WATERSHALLOW is less than "6.00" and WATERDEEP equals "6.00" then the depth to the seasonal high water table for the map unit ranges from WATERSHALLOW to greater than 6 feet.
- If WATERSHALLOW and WATERDEEP equal "99.9" then the named components are miscellaneous land types and the map unit is unranked.

#### **WATERKIND**

- This information identifies the type of seasonal high water table: apparent or perched.
- It was derived by analyzing the depth to the bottom of the WATERDEEP element above.
- If WATERKIND equals "**PERCH**" the water table is perched.
- If WATERKIND equals "**APPAR**" the water table is apparent.
- If WATERKIND equals "**NONE**" there is no water table within 6 feet.

- If WATERKIND equals "**not rated**" the named components are miscellaneous land types and the map unit is unranked. Musym of "W" will yield a value of "water".

## APPENDIX A.

### 2003 ANCILLARY RATINGS FOR RESIDENTIAL ON-SITE WASTE DISPOSAL IN VERMONT

USDA Natural Resources Conservation Service  
Draft - March 2003

The purpose of this report is to provide information on the soils in Vermont in relation to their suitability for residential on-site waste disposal systems based on the 2002 Vermont Environmental Protection Rules (1).

The Natural Resources Conservation Service (NRCS) has primary responsibility for classifying and mapping the soils in Vermont. 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 on-site waste disposal suitability and design have been compared to regulations set forth by the recently-enacted 2002 State of Vermont Environmental Protection Rules. This study has resulted in a new set of ancillary soil interpretations for residential on-site waste disposal systems, with the soil map units in Vermont separated into five general suitability groups.

Included in on-site waste disposal systems are absorption fields or trenches in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Unsatisfactory performance, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health.

### ANCILLARY SEPTIC SYSTEM RATINGS

The five interpretive groups and their subgroups are briefly described in this section. A rating of **Ia** through **Id** indicates that soil properties and site features are well suited for on-site waste 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 on-site waste disposal systems and one or more soil properties or site features make the soil less desirable than the soils rated well suited; a rating of **IIIa** through **IIIh** indicates that one or more soil properties or site features are marginally suited for on-site waste disposal systems and overcoming those limitations require special design, extra maintenance, or costly alteration; a rating of **IVa** through **IVd** indicates that the soil map unit is not suited for on-site waste disposal systems. A rating of **V** indicates that the map unit is not rated.

For a more descriptive paragraph on each subgroup, see the following section on General Narratives for Subgroups.

**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 limited slope, having 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 limited slope, having 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 soils in Group I that are on slopes entirely greater than 20 percent, 4) map units with a flooding limitation, and 5) map units of soils that have a seasonal high water tables 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 limited slope, having 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 limited slope, having a slope range that includes some areas with slopes greater than 20 percent.
- IIE - soil map units with rapid permeability and steep slope, having a slope range greater than 20 percent.
- IIF - soil map units with moderate permeability and steep slope, having a slope range greater than 20 percent.
- IIg - soil map units with a flooding limitation.
- 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 any of these units may not be suited for on-site waste 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 limitation 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 limited slope, having 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.

**IV - Not Suited.** This group is composed of soil map units that are generally too wet, rocky, steep or otherwise unsuitable for use in on-site waste disposal systems.

- IVa - soil map units not suited due to excessive wetness.
- IVb - soil map units not suited due to limited depth to bedrock and steep slope, having a slope range greater than 20 percent.
- IVc - soil map units not suited due to very limited depth to bedrock on moderate slopes.
- IVd - soil map units not suited due to moderately slow to very slow permeability and steep slope, having a slope range 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, regraded 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 on-site waste disposal. Also included are areas mapped at a higher level of Soil Taxonomy than the 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 on-site waste disposal. 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.

**Ia.** This unit is well suited as a site for on-site sewage disposal, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2002 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 on-site sewage disposal, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2002 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 control plan shall be prepared for construction on sites over 20 percent.

**Ic.** This unit is well suited as a site for on-site sewage disposal, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2002 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 on-site sewage disposal, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2002 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 control plan shall be prepared for construction on sites over 20 percent.

**Iia.** This unit is moderately suited as a site for on-site sewage disposal, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2002 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 on-site sewage disposal, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2002 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 control plan shall be prepared for construction on sites over 20 percent.

**Iic.** This unit is moderately suited as a site for on-site sewage disposal, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2002 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.

**Iid.** This unit is moderately suited as a site for on-site sewage disposal, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2002 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. 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 control plan shall be prepared for construction on sites over 20 percent.

**Iie.** This unit is moderately suited as a site for on-site sewage disposal, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2002 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 control plan shall be prepared for construction on sites over 20 percent.

**Iif.** This unit is moderately suited as a site for on-site sewage disposal, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2002 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 control plan shall be prepared for construction on sites over 20 percent.

**IIg.** This unit is moderately suited as a site for on-site sewage disposal, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2002 Environmental Protection Rules. Flooding from surface waters is the primary concern. Locating the septic system on the highest part of the floodplain and with the maximum setback from surface waters is recommended.

**IIh.** This unit is moderately suited as a site for on-site sewage disposal, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2002 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 on-site sewage disposal, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2002 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.

**IIIb.** This unit is marginally suited as a site for on-site sewage disposal, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2002 Environmental Protection Rules. Flooding and the depth to the seasonal high water table are the major limitations. Locating the septic system on the highest part of the floodplain and with the maximum setback from surface waters is recommended. Mound system construction and other site modifications are often necessary. 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.

**IIIc.** This unit is marginally suited as a site for on-site sewage disposal, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2002 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.

**IIId.** This unit is marginally suited as a site for on-site sewage disposal, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2002 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 on-site sewage disposal, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2002 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 control plan shall be prepared for construction on sites over 20 percent.

**IIIf.** This unit is marginally suited as a site for on-site sewage disposal, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2002 Environmental Protection Rules. The depth to the seasonal high water table along with the restricted depth to bedrock in some areas are the major limitations. On-site investigations can help avoid areas with limited depth to bedrock. 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. 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.

**IVa.** This unit is generally not suited as a site for on-site sewage disposal, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2002 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. Locating the septic system in a more suitable unit is recommended.

**IVb.** This unit is generally not suited as a site for on-site sewage disposal, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2002 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. Locating the septic system in a more suitable unit is recommended.

**IVc.** This unit is generally not suited as a site for on-site sewage disposal, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2002 Environmental Protection Rules. The very shallow to shallow depth to bedrock is the limiting condition. Locating the septic system in a more suitable unit is recommended.

**IVd.** This unit is generally not suited as a site for on-site sewage disposal, based on a review by the Natural Resources Conservation Service of criteria set forth in the Vermont 2002 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. Locating the septic system in a more suitable unit is recommended.

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

#### **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, in a municipality that has planning and zoning bylaws. The ratings do not necessarily apply to the siting of a replacement system for an existing residence. Lots subdivided before June 14, 2002, have a 30% slope limitation, rather than the 20% slope limitation that these ratings are based on. This report does not consider other site factors, such as wellhead and source protection areas, isolation distances and the size of the parcel, that can affect placement of septic systems.

This report is intended for general planning purposes only and is not intended to replace or supercede an on-site soil investigation. These ratings apply only to land within the State of Vermont.

#### **REFERENCES**

1. Environmental Protection Rules, Chapter 1, Wastewater System and Potable Water Supply Rules, Wastewater Management Division, Department of Environmental Conservation, Agency of Natural Resources, State of Vermont, Waterbury, VT, August 16, 2002.



**APPENDIX B.**

Farmland Classification Systems for Vermont Soils, April 2003

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## INTRODUCTION

This report contains information on Agricultural Value Groups, Important Farmland ratings, Primary Agricultural Soils and Forest and Secondary Agricultural Soils. The information in this report updates and replaces information that has been previously available from a number of sources.

There have been significant changes since the last issue of "Agricultural Value Groups for Vermont Soils" in November 2002. This report now describes several farmland classification systems in use in Vermont. It provides information that can be used in making Import Farmland evaluations and ACT 250 Primary Agricultural Soils (criteria 9B) and Forest and Agricultural Soils (criteria 9C) evaluations.

The Important Farmlands ratings have been updated for all soil map units used in Vermont as of the date of publication. The soil mapping is still ongoing in several counties in the Northeast Kingdom, see table 2. The information for those ongoing surveys is subject to change at a later date.

Agricultural Value Group 12 has been added for those areas that have never been mapped in soil surveys that have been published and/or digitized.

## IMPORTANT FARMLANDS

Important Farmland ratings help to identify soil map units that represent the best land for producing food, feed, fiber, forage, and oilseed crops. Important Farmland inventories identify soil map units that are Prime Farmland, Unique Farmland, Additional Farmland of Statewide Importance, and Additional Farmland of Local Importance. Important Farmland ratings are listed in the county soil survey legends in this report.

### **Prime Farmland (Prime)**

The national definition of Prime Farmland was modified to include information that applies to soils in Vermont. The national definition can be found in the Code of Federal Regulations (7CFR657).

Soil map units are Prime Farmland if they have the best combination of physical and chemical characteristics for producing food, feed fiber, forage, and oilseed crops and are also available for these uses. The present land use may be cropland, pasture, forestland, or other land uses, but not urban and built-up or water. Location, tract size, and accessibility to markets and support industries are not considered when making a Prime Farmland determination.

Prime Farmland has the soil quality, growing season, and moisture supply needed to economically produce sustained high yields of crops when treated and managed according to acceptable farming methods. These soils have an adequate and dependable water supply from precipitation, a favorable temperature and growing season, acceptable acidity or alkalinity, and few or no surface stones or boulders. They are permeable to water and air, are not excessively erodible or saturated with water for a long period of time, and don't flood frequently or are protected from flooding.

To qualify as a Prime Farmland soil map unit, the dominant soils must meet all of the following conditions:

- Soil temperature and growing season are favorable.
- Soil moisture is adequate to sustain commonly grown crops throughout the growing season in 7 or more years out of 10.
- Water moves readily through the soil and root-restricting layers are absent within 20 inches of the surface.
- Less than 10 percent of the surface layer consists of rock fragments larger than 3 inches in diameter.
- The soils are neither too acid nor too alkaline for, or the soils respond readily to additions of lime.
- The soils are not frequently flooded (less often than once in 2 years) and have no water table, or the water table can be maintained at a sufficient depth during the growing season for the growth of commonly grown crops.
- Slope is favorable (generally less than 8 percent) and the soils are not subject to serious erosion.
- The soils are typically deep (greater than 40 inches to bedrock), but include moderately deep soils (20 to 40 inches) with adequate available water capacity.

### **Unique Farmland (Unique)**

There is currently no Unique Farmlands identified in Vermont.

Unique Farmland is land other than Prime Farmland that is used for the production of specific high value food and fiber crops. It has the special combination of soil quality, location, growing season, and moisture supply needed to economically produce sustained high quality and/or high yields of a specific crop when treated and managed according to acceptable farming methods.

Specific characteristics of unique farmland are:

- It is used for high value food or fiber.
- Has a moisture supply that is adequate for the specific crop. The supply is from stored moisture, precipitation, or a developed irrigation system.
- Combines favorable factors of soil quality, growing season, temperature, humidity, air drainage, elevation, aspect, or other conditions, such as nearness to market, that favor the growth of a specific food or fiber crop.

Many crops that could fall under the definition of Unique Farmland are currently grown on Prime or Statewide soil map units. Other crops such as maple sugar bushes are commonly grown on soil map units in Agricultural Value Groups 8, 9, and 10, on land that is not Important Farmland.

For more information about the status of Unique Farmlands in Vermont, see the contacts listed below.

### **Additional Farmland of Statewide Importance (Statewide)**

This is land, in addition to Prime and Unique Farmland, that is of Statewide importance for the production of food, feed, fiber, forage, and oilseed crops. In Vermont, criteria for defining and delineating Statewide Important Farmland was determined by the appropriate state agencies, working with the Natural Resources Conservation Service.

The dominant soils, in these soil map units, have limitations resulting from one or more of the following:

- Excess slope and erosion hazard,
- Excess wetness or slow permeability,
- A flooding hazard,
- Shallow depth (less than 20 inches) to bedrock or other layers that limit the rooting zone and available water capacity,
- Moderately low to very low available water capacity.

### **Additional Farmland of Local Importance (Local)**

In some areas, there is a need to identify additional farmlands for the production of food, feed, fiber, forage, and oilseed crops that has not been identified by the other categories in the Important Farmland system. These lands can be identified as Additional Farmland of Local Importance by the appropriate local agencies. In places, Additional Farmlands of Local Importance may include tracts of land that have been designated for agriculture by local ordinance.

In Vermont, a few soil map units in certain counties have been identified as Additional Farmland of Local Importance. The local Natural Resources Conservation Districts made these designations, with assistance from local NRCS personnel and concurrence by the State Conservationist.

The following soil map units are considered Additional Farmlands of Local Importance.

Addison County

Adams Loamy Fine Sand, 5 To 12 Percent Slopes

Colton Gravelly Sandy Loam, 5 To 12 Percent Slopes

Raynham Silt Loam, 6 To 12 Percent Slopes

Franklin County

Missisquoi Loamy Sand, 8 To 15 Percent Slopes

Rutland County

Adams Loamy Fine Sand, 8 To 15 Percent Slopes

Hinckley Gravelly Loamy Fine Sand, 8 To 15 Percent Slopes

Windsor Loamy Sand, 8 To 15 Percent Slopes

Soil map units in Agricultural Value Groups 8, 9, and 10 could potentially be Additional Farmlands of Local Importance. Soil map units in Agricultural Value Groups 11 and 12 have little value as crop land or require onsite determinations to determine if they have any value as crop land.

The soil map units in Agricultural Value Groups 8 have limitations for crop production that can be overcome. Many areas of these soil map units are currently being used for hay or pasture. Those soil map units that have been designated in Vermont as Local are all from Agricultural Value Group 8.

The soil map units in Agricultural Value Groups 9 and 10 have limitations for crop production that are difficult to very difficult to overcome. Limiting factors can include but are not limited to slope, wetness, surface stones, and bedrock outcrops. For many soil map units on less than 15 percent slope, that are somewhat excessively drained to moderately well drained, the major limiting factor that needs to be overcome is surface stones that cover 0.1 to 3.0 percent of the surface.

For many soil map units on less than 15 percent slope that are somewhat poorly drained to very poorly drained the major limiting factors that need to be overcome are surface stones that cover 0.1 to 3.0 percent of the surface and wetness. However, many of these areas may have never been cleared of surface stones because the wetness limitation was too difficult to overcome.

### **Important Farmland Determinations**

An Important Farmland classification of Prime, Statewide, Local is assigned to soil map units based on the characteristics of the dominant soils in the soil map unit. Determinations of unique are based on the specific crop and are not directly related to the soil map unit.

In most cases, Important Farmland determinations are made on a soil map unit basis. They are never made for individual components of a soil map unit. For example, if the area in question is a delineation of a Prime soil map unit the whole area is considered Prime regardless of any map unit inclusions within the delineation.

The Important Farmland designation of individual delineation's of a soil map unit can't be changed without an onsite investigation and a change in the official copy of the soil map where the area is located. This would only occur after an evaluation of a representative sample of all delineation's of the specific soil map unit within the soil survey area.

There are exceptions. Prime, Statewide, and Local soil map units can't be urban or buildup. A delineation of a Prime, Statewide, or Local soil map unit, which has been converted to urban or build up, should no longer be considered Important Farmland. The delineation should be changed to an appropriate soil map unit on the official copy of the soil map.

Delineations of some soil map units that are Prime, Statewide, or Local have a wetness, bedrock, or slope limitation. These soil map units are footnoted in the soil surveys legends at the end of this report. It is assumed that delineations of these map units are Prime, Statewide, or Local unless an onsite determines that the delineation should not be Important Farmland. A determination that the delineation is not Important Farmland doesn't require that change is made in the soil map unit symbol. See the FOOTNOTES section for more details.

Unique farmlands are not tied to a specific soil map unit. A change in the land use of unique farmlands could require a change of the area effected to Statewide or Local if the soil map unit met the defining criteria for those classes.

## **PRIMARY AGRICULTURAL SOILS, AND FOREST AND SECONDARY AGRICULTURAL SOILS**

Primary Agricultural Soils, and Forest and Secondary Agricultural Soils are defined in Vermont's Land Use and Development Law, Act 250. The information in this section is intended as guidance for completing criteria 9B and 9C on ACT 250 applications.

### **Criteria 9B - Primary Agricultural Soils**

The definition of Primary Agricultural Soils can be found in ACT 250, Vermont's Land Use Development Law, section, 601 (15).

"Primary agricultural soils" means soils which have a potential for growing food and forage crops, are sufficiently well drained to allow sowing and harvesting with mechanized equipment, are well supplied with plant nutrients or highly responsive to the use of fertilizer, and have few limitations for crop production or limitations which may be easily overcome. In order to qualify as primary agricultural soils, the average slope of the land containing such soils does not exceed 15 percent, and such land is of a size capable of supporting or contributing to an economic agricultural operation. If a tract of land includes other than primary agricultural soils, only the primary agricultural soils shall be affected by criteria relating specifically to such soils."

Important Farmland soil map units with a rating of Prime or Statewide meet the criteria contained in the definition of Primary Agricultural Soils, subject to a determination of whether such land is of a size capable of supporting or contributing to an economic agricultural operation. Determination of whether the size criteria are met is not made by NRCS.

The soil map units in Agricultural Value Group 12 have never been mapped and require an onsite investigation to determine the presence of *Primary Agricultural Soils*.

Criteria 9C - Forest and Secondary Agricultural Soils

The definition of Forest and Secondary Agricultural Soils can be found in ACT 250, Vermont's Land Use and Development Law, section 601 (8).

"“Forestry and secondary agricultural soils” means soils which are not primary agricultural soils but which have reasonable potential for commercial forestry or commercial agriculture, and which have not yet been developed. In order to qualify as forest or secondary agricultural soils, the land containing such soils shall be characterized by location, natural conditions and ownership patterns capable of supporting or contributing to present or potential commercial forestry or agriculture. If a tract of land includes other than forest or secondary agricultural soil only the forest or secondary agricultural soil shall be affected by criteria relating specifically to such soils.”

**Reasonable Potential for Commercial Agriculture or Commercial Forestry**

*Reasonable potential for commercial forestry or commercial agriculture* is not defined in ACT 250. Because it is not defined, no determination of *reasonable potential* of the soil map units is possible in this document.

The definition of forestry and secondary agricultural soils states that “*In order to qualify as forest or secondary agricultural soils, the land containing such soils shall be characterized by location, natural conditions, and ownership patterns capable of supporting or contributing to present or potential commercial forestry or agriculture.*” *Location and ownership patterns* are site-specific and are not related to soil map units. However, *natural conditions* can include soil map unit information related to potential productivity for commercial forestry and commercial agriculture.

Determination of whether *location* or *ownership patterns* criteria are met is not made by NRCS.

**Potential Productivity – Commercial Agriculture and Commercial Forestry**

Soil map units were ranked for their potential for producing and harvesting timber in Forest Value Groups of Vermont (USDA-SCS, Winooski, VT, February, 1991).

Soil map units with the following conditions were deemed to have very limited commercial forestry potential:

- organic soils,
- soils above 2,500 feet elevation (soils in the cryic soil temperature regime),
- miscellaneous land types,
- very poorly drained soils, and
- soils exceeding 60 percent slope.

The remaining soil map units are considered to have some commercial potential for producing and harvesting timber.

Soil map units were ranked for their agricultural potential productivity in Agricultural Value Groups for Vermont (USDA-SCS, Winooski, VT, 1985) and are updated in this report.

Soil map units with the following conditions were considered to have very limited commercial agricultural potential:

- soils with an extremely stony, very bouldery, or extremely bouldery surface,
- organic soils,
- very shallow soils (soils less than 10 inches to bedrock),
- soils on slopes greater than 25 percent,
- soils above 2,500 feet elevation (soils in the cryic soil temperature regime), and
- miscellaneous land types.

The remaining soil map units are considered to have some commercial potential for crop production.

Because *reasonable potential* is not defined, no further subdivision of the soil map units based on their potential for either commercial agriculture or commercial forestry is possible in this document. However, it is possible to make a determination on which soil map units have *very limited potential* for **both** commercial forestry and commercial agriculture, which includes cultivated crops commonly grown in Vermont and hay and pasture. These soil map units are in Agricultural Value Group 11 and Forest Value Group 7, see table 3.

Many more soil map units are in Agricultural Value Group 11, than Forest Value Group 7. The amount of acres that are in Agricultural Value Group 11 is approximately 4 times the amount of acres in Forest Value Group 7. Not every soil map unit in Agricultural Value Group 11 is in Forest Value Group 7 and not every soil map unit in Forest Value Group 7 is in Agricultural Value Group 11.

No determination is made regarding whether the soil map units listed in table 3 have *reasonable potential* for other specialized forest uses, such as sugar bushes or Christmas trees, or for crops not commonly grown in Vermont.

Soil map units that do not have an Important Farmland rating of Prime or Statewide and do not have a very limited potential for **both** commercial forestry and commercial agriculture, as defined in this report, meet the intent of *natural conditions* defined in *Forest or Secondary Agricultural Soils*, except for the soil map units in Agricultural Value Group 12. The soil map units in Agricultural Value Group 12 have never been mapped and require an onsite investigation to determine *Forest and Secondary Agricultural Soils*.

The following soil map units are Agricultural Value Group 12 and Forest Value Group 7:

Caledonia County

900 Denied Access (onsite investigation is needed)

Chittenden County

BUR Burlington (Limit of Soil Survey) (onsite investigation is needed)

MTFA Military Test Firing Area (onsite investigation is needed)

Essex County

900 Denied Access (onsite investigation is needed)

Summary

1. This report can provide assistance in determining whether soils meet Criteria 9B and provide the *natural conditions capable of supporting or contributing to present or potential commercial forestry or agriculture* as defined in Criteria 9C.
2. Soil map units with a Important Farmland rating of Prime or Statewide will meet the definition of Criteria 9B, Primary Agricultural Soils, subject to a determination of whether such land is of a size capable of supporting or contributing to an economic agricultural operation. NRCS personnel do not make this determination.
3. Soil map units listed in Agricultural Value Group 11 and Forest Value Group 7 have very limited potential for **both** commercial forestry and commercial agriculture. Soil map units in Agricultural Value Group 12 require an onsite determination to determine their potential for commercial forestry or commercial agriculture.
4. No determination has been made regarding whether the soil map units listed in this report have reasonable potential for other specialized forest uses or for crops not commonly grown in Vermont.
5. Soil map units that do not have an Important Farmland rating of Prime or Statewide and do not have a very limited potential for **both** commercial forestry and commercial agriculture, as defined in this report, meet the intent of *natural conditions* defined in Criteria 9C, *Forest or Secondary Agricultural Soils*. No other determinations required for Criteria 9C, are made NRCS personnel.

## **AGRICULTURAL VALUE GROUPS**

In October, 1985, the Natural Resources Conservation Service published "Agricultural Value Groups for Vermont Soils." This publication was revised in March 1995, August 1999, and November 2002.

During the late 1980's, a number of county Agricultural Value Group studies were completed. These reports ranked the potential of soil map units within a specific county for crop production. The information in these reports can only be used within the specified county.

### **This report replaces all previous editions of statewide and county reports.**

Agricultural value groups are a land classification system that can be used to compare the "relative value" for crop production of one soil map unit to another. They can be a useful tool in administering national, state, and local land use programs and regulations.

This report contains Agricultural Value Group rankings for all soil map units in Vermont as of March 2003. The soil map units are listed by county soil survey legend in this report. Because soil survey mapping is still ongoing in some soil surveys, this report will continue to be updated on a regular basis. See Table 2 for the status of county soil surveys in Vermont.

### **Preparation of Agricultural Value Groups**

The Agricultural Value Groups were derived by integrating three land classification systems: land capability classification, Important Farmland classification, and soil potential ratings. Other factors were also considered, including slope, parent material, and general knowledge of the use and management of specific soils. Soil map unit acreage was used to help derive the relative value of each group.

### **Relative Values**

The relative value assigned to each Agricultural Value Group is a weighted average for the group and was derived using the soil potential indices (SPI's) (see Soil Potential Study) and the acreage of each soil map unit, see table 1. Acres represent the estimated acreage of each soil map unit.

#### **Soil map units with a relative value of 0**

Over 300 different soil map units were considered to have a very limited potential for crop production and were assigned to Agricultural Value Groups 11 and given a relative value of 0. These soil map units include:

1. extremely stony, very bouldery, or extremely bouldery soil surface,
2. organic soils,

3. very shallow soils(less than 10 inches to bedrock),
4. soils with slopes greater than 25 percent,
5. soils above 2,500 feet elevation (soils in the cryic soil temperature regime), and
6. miscellaneous land types (beaches, escarpments, marshes, etc.).

#### Soil map units with no relative value assigned

Some soil map units within a digitized or published soil survey have never been mapped because of restricted access or the policy on mapping urban areas that was in place at the time. These soil map units are assigned to Agricultural Value Group 12 and not assigned a relative value.

The following soil map units are in Agricultural Value Group 12:

#### Caledonia County

900 - Denied Access

#### Chittenden County

BUR - Burlington (Limit of Soil Survey)  
MTFA - Military Test Firing Area

#### Essex County

900 - Denied Access

### **Results**

In 1985, all soils were rated and placed into one of eleven Agricultural Value Groups. Relative values for each group were developed on a scale of 0 to 100, with 100 representing the highest agricultural value.

In 1999, Agricultural Value Groups were assigned to each soil map unit in Vermont. Soil map units that consisted of a phase of one major soil (for example, Berkshire fine sandy loam, 0 to 3 percent slopes) were assigned the relative value of that soil phase based on the 1985 report. Soil map units that consisted of phases of 2 or more major soils (for example, Tunbridge-Lyman complex, 3 to 8 percent slopes) were assigned one relative value based on the relative values and extent of each soil phase in the 1985 report. The results for Agricultural Value Groups are listed by county soil survey legend. Relative values are listed in table 1.

As of March 2003, the soil surveys in Caledonia, Essex and Orleans counties are ongoing and the soil survey legends are subject to change. When using the information from these soil surveys, one should verify that the information is up-to-date with the contacts listed in this report.

### **Interpretation and Use**

Soil map units were placed in their respective Agricultural Value Groups assuming that it was feasible to apply the corrective measures needed to overcome the soil limitations identified in the soil potential study. Soil map units associated with bedrock or wetness are identified by footnotes, defined in the section Footnotes, and are listed on the soil survey legends. Users of this report are encouraged to consider the footnotes and the need for on-site investigations.

### Agricultural Value Groups Descriptions

Agricultural Value Groups consist of soil map units that have similar characteristics, limitations, management requirements, and potential for crop production. Soil map units in Group 1 have the most potential for crop production and soil map units in Groups 11 and 12 have the least potential for crop production. The description and makeup of the Agricultural Value Groups are as follows:

- 1 – These soil map units have an Important Farmland rating of Prime. Most of the soil map units are in Land Capability Class 1 or 2. Their relative value is 100.
- 2 – These soil map units have an Important Farmland rating of Statewide. Most of the soil map units are in Land Capability Class 2. Their relative value is 97.
- 3 – These soil map units have an Important Farmland rating of Prime. Most of the soil map units are in Land Capability Class 2 or 3. Their relative value is 84.
- 4 – These soil map units have an Important Farmland rating of Statewide. Most of the soil map units are in Land Capability Class 2, 3, or 4. Their relative value is 82.
- 5- These soil map units have an Important Farmland rating of Statewide. Most of the soil map units are in Land Capability Class 3. Their relative value is 69.
- 6- These soil map units have an Important Farmland rating of Statewide. Most of the soil map units are in Land Capability Class 2, 3, or 4. Their relative value is 63.
- 7- These soil map units have an Important Farmland rating of Statewide. Most of the soil map units are in Land Capability Class 3. Their relative value is 57.
- 8- These soil map units have limitations for crop production that can be overcome. Most of the soil map units are in Land Capability Class 4 or 6. Low crop yields, low available water capacity, and erosion hazard tend to be the major limitations. This group includes a few soil map units that have an Important Farmland rating of Local. Their relative value is 52.
- 9- These soil map units have limitations that are difficult to overcome and they are usually considered to be unsuitable for crop production. Limiting factors can include but are not limited to slope, wetness, surface stones, and bedrock outcrops. On-site investigations are strongly recommended to determine the feasibility of installing corrective measures and using these soils for crop production. If the user determines, that corrective measures can't be installed then the area in question should be placed in Agricultural Value Group 11.

Normally, the cost of overcoming corrective measures and laws governing the installation of corrective measures should not be considered when making this determination. In some situations, if laws prevent the installation of corrective measures, the area in question should be placed in Agricultural Value Group 11. Most of the soil map units are in Land Capability Class 5, 6, or 7. Their relative value is 43.

10- These soil map units have limitations are very difficult to overcome and they are usually considered to be unsuitable for crop production. Limiting factors can include but are not limited to slope, wetness, surface stones, and bedrock outcrops. They can be used as cropland only after intensive and expensive installation of various corrective measures. On-site investigations are strongly recommended to determine feasibility of installing corrective measures and using these soils for crop production. . If the user determines, that corrective measures can't be installed then the area in question should be placed in Agricultural Value Group 11. Normally, the cost of overcoming corrective measures and laws governing the installation of corrective measures should not be considered when making this determination. In some situations, if laws prevent the installation of corrective measures, the area in question should be placed in Agricultural Value Group 11. Most of the soil map units are in Land Capability Class 5, 6, or 7. Their relative value is 22.

11- These soil map units are considered to have very limited potential for crop production. Most of the soil map units are in Land Capability Class 7 or 8. Only in rare situations, and usually after great expense, are these soil map units converted for crop production. Their relative value is 0.

12- These soil map units are areas within a digitized or published soil survey that have never been mapped because of restricted access or the policy on mapping urban areas that was in place at the time. An onsite should be conducted to determine if areas of these soil map units should be assigned to a different Agricultural Value Group. No relative value is assigned.

### Possible Uses

Agricultural Value Groups and relative values may be useful in many state and local programs, including:

- design and implementation of Agricultural Land Evaluation and Site Assessment (LESA) systems;
- implementation of Public Law 97-98, the Farmland Protection Policy Act (FPPA);
- rating of agricultural soils for appraisal under Vermont's Use Value Program of Agricultural and Forest Land;
- rating of agricultural soils for appraisal under Town Tax Stabilization Programs;
- assessment of agricultural soils by land trusts, landowners, bankers, realtors; and
- broad resource planning by state agencies and town and regional planning commissions.

Note that the relative values are index numbers only and do not represent dollar net returns for a given agricultural use. Determinations of the absolute profitability of agricultural production on a given soil map unit is not possible from these relative values. However, relative values may be used to compare the relative profitability of farming various soil map units.

The user must consider the appropriate footnotes. With the exception of broad planning activities, on-site investigations are recommended when using this report, because of the following needs:

- To assess wetness, surface stones and boulders, and bedrock limitations.
- To assess the steepness of soils on slopes ranging from 15 percent to at least 25 percent. The steeper areas may be unsuitable for crop production.
- To assess landscape pattern limitations. Some areas with good potential may be non-farmable because of irregular slope patterns and the presence of small streams and drainage ways. Landscape patterns can result in small inefficient tract sizes, hamper the operation of farm equipment, and make a site unproductive without additional and expensive land shaping activities.

## **DEFINITIONS**

### **Land Capability Classification System**

The Land Capability Classification system shows the suitability of soils for most agricultural uses. Soils are grouped according to their limitations for agricultural crops, the risk of damage when they are used, and the way they respond to management. The grouping does not consider major, and generally expensive, landforming activities that would change slope, depth, or other characteristics of the soils, nor does it consider major land reclamation projects.

Soils are grouped at three levels: capability class, subclass, and unit. Classes and subclasses have been used in this study. Capability classes are designated by Roman numerals I through VIII in older soil survey reports, and by Arabic numerals 1 through 8 in newer soil survey reports. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

- Class 1 soils have few limitations that restrict their use.
- Class 2 soils have moderate limitations that reduce the choice of plants or require moderate conservation practices.
- Class 3 soils have severe limitations that reduce the choice of plants or require special conservation practices, or both.

- Class 4 soils have very severe limitations that reduce the choice of plants or require very careful management, or both.
- Class 5 soils are not likely to erode but have other limitations, impractical to remove, that limit their use.
- Class 6 soils have severe limitations that make them generally unsuitable for crop production.
- Class 7 soils have very severe limitations that make them unsuitable for crop production.
- Class 8 soils and miscellaneous land areas have limitations that nearly preclude their use for crop production.

Capability subclasses indicate the major kinds of limitations within each capability class. Within most capability classes there can be up to four subclasses. Adding a small letter e, w, s, or c, to the class numeral indicates the subclass. An example is 2e.

- The letter **e** represents a risk of erosion,
- **w** means that water in or on the soil will interfere with plant growth or crop production,
- **s** represents a shallow, droughty, or surface stoniness limitation, and
- **c** represents a climate limitation that is very cold or very dry.

### **Soil Potential Study**

A soil potential study conducted by NRCS formed the numerical basis for developing the Agricultural Value Groups and their relative values. Soil potential ratings are expressed by a soil potential index (SPI), which is a numerical rating of a soil's relative potential for crop production.

The soil potential ratings are based on the integration of numerous data derived from literature and the knowledge of technical specialists. Some of this data was estimated based on the knowledge and judgment of the technical specialists. Crop yields on specific soils are examples of such estimates. The estimates and ratings are subject to change when more precise data becomes available.

Monetary benefits and costs associated with crop yields and soil corrective measures may change due to inflation and/or technology changes. Such changes may affect the soil potential ratings and thereby warrant an update of this report.

The SPI is used to rank soils from very high potential to very low potential and is derived from indices of soil performance, cost of corrective measures, and costs of continuing limitations. The SPI indicates a soil's agricultural profitability potential relative to other soils in the study area. The SPI is expressed by the equation:

$SPI = P - CM - CL$ , where:

P = performance index (P is determined by a soil's estimated corn silage yield/acre converted to dollars)

CM = index of costs of corrective measures needed to overcome or minimize the effects of soil limitations (CM is expressed in dollars/acre/year)

CL = index of costs resulting from continuing limitations (CL is expressed as maintenance costs of reduced yields converted to dollars)

## DIGITAL INFORMATION

The information in this report will be available as part of the next TOP20 attribute data table update. TOP20 is available through the Vermont Center for Geographic Information.

## FOOTNOTES

Listed below are the footnotes for the county Agricultural Value Groups and Important Farmland rankings in the county soil survey legends.

a - If the upper slope class limit of the soil map unit is between 9 and 15 percent then the areas of the soil map unit that exceed 8 percent slope don't qualify as Prime, Statewide, or Local. If the upper slope class limit exceeds 15 percent then the areas of the soil map unit that exceed 15 percent slope don't qualify as Important Farmland.

b - The soils in this soil map unit have a wetness limitation that may be difficult and/or unfeasible to overcome. Areas of this soil map unit don't qualify as Prime, Statewide, or Local, if artificial drainage is not feasible. Feasible means it is possible to install artificial drainage. No consideration is given to the cost of overcoming the drainage limitation or any law governing the installation of artificial drainage, when making an Important Farmland determination.

c - Bedrock outcrops commonly cover more than 2 percent of the surface. Areas of this soil map unit will not qualify as Prime, Statewide, or Local, if bedrock outcrops are extensive enough to prohibit efficient farming.

d- The soils in this soil map unit have a wetness limitation that may not be feasible to overcome. Agricultural Value Group assignments are based on the assumption that installing artificial drainage is feasible. Feasible means it is possible to install artificial drainage. Areas of this soil map unit, where artificial drainage is not feasible should be placed in Agricultural Value Group 11. Normally, the cost of installing artificial drainage and laws governing the installation of artificial drainage should not be considered when making this determination. In some situations, if laws prevent the installation of corrective measures, the area in question should be placed in Agricultural Value Group 11. This footnote is assigned to Agricultural Value Groups 1 through 8.

e - Bedrock outcrops cover more than 2 percent of the surface. Areas of this soil map unit should be placed in Agricultural Value Group 11, if bedrock outcrops are extensive enough to prohibit efficient farming. This footnote is assigned to Agricultural Value Groups 1 through 8.

## **CONTACT INFORMATION**

If you have questions about Important Farmlands, Primary Agricultural Soils, Forest and Secondary Agricultural Soils, or Agricultural Value Groups contact:

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