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# Farmland Classification Systems for Vermont Soils

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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 for Vermont. 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 Important Farmland evaluations and ACT 250 Primary Agricultural Soils (criteria 9B) and Forest and Agricultural Soils (criteria 9C) evaluations.

The Important Farmland 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. (Note: they are listed separately under each county's folder in the eFOTG.)

### **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, 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 to allow 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 Farmland 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 sugarbushes 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 Farmland 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:

- Excessive slope and erosion hazard,
- Excessive wetness or slow permeability,
- A flooding hazard,
- Shallow depth (less than 20 inches) to bedrock or to 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 farmland 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 Farmland 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 Farmland 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 Farmland 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 cropland.

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*, or *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 delineation. 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 delineations of a soil map unit can't be changed without an on-site 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 delineations 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 built-up areas. A delineation of a Prime, Statewide, or Local soil map unit, which has been converted to urban land 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 individual county soil survey legends that accompany this report. It is assumed that delineations of these map units are Prime, Statewide, or Local unless an on-site determination finds that the delineation should not be Important Farmland. A determination that the delineation is not Important Farmland doesn't require a change of the soil map unit symbol. See the FOOTNOTES section for more details.

Unique farmland is not tied to specific soil map units. A change in the land use of Unique farmland could require a change of the area affected to Statewide or Local if the soil map unit meets the criteria for one of those classes.

## **ACT 250 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."

Soil map units with an Important Farmland 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 is met is not made by NRCS.

The soil map units in Agricultural Value Group 12 have never been mapped and require an on-site 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 criteria for the determination of *reasonable potential* of the soil map units is included 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 four 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 sugarbushes 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 on-site 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* (on-site investigation is needed)

### **Chittenden County**

BUR *Burlington (Limit of Soil Survey)* (on-site investigation is needed)

MTFA *Military Test Firing Area* (on-site investigation is needed)

### **Essex County**

900 *Denied Access* (on-site 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 on-site determination to determine the 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 by 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 separate eFOTG county soils folders. 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 Group 11 and given a relative value of 0. These map units include the following types of soils:

1. soils with an extremely stony, very bouldery, or extremely bouldery surface,
2. very poorly drained organic soils,
3. very shallow soils(less than 10 inches to bedrock),

4. soils with slopes greater than 25 percent,
5. soils above 2500 feet elevation (soils in the cryic soil temperature regime), and
6. miscellaneous land types (beaches, escarpments, gravel pits, urban areas, 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 because they are in urban areas that were outside the scope of the soil survey 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 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 recommended to determine the feasibility of installing corrective measures and using these

soils for crop production. If it is determined that corrective measures can't be installed successfully, 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 not mapping urban areas that was in place at the time of the survey. An on-site investigation 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 only index numbers 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 on 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**

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**Table 1. Agricultural value groups of Vermont soils by Important Farmland Rating, acres, percentage of state land area, and Relative Value compiled in 1985.**

Agr. Value Group	Important Farmland Rating	Acres (1985)	Percentage of State	Relative Value
1	Prime	91,983	1.56	100
2	Statewide	10,919	0.18	97
3	Prime	289,654	4.88	84
4	Statewide	81,568	1.37	82
5	Statewide	115,386	1.94	69
6	Statewide	469,321	7.92	63
7	Statewide	284,026	4.80	57
8		436,916	7.37	52
9		302,716	5.11	43
10		1,496,360	25.25	22
11		<u>2,348,101</u>	<u>39.62</u>	0
	Totals	5,926,950	100.0	

The acreage figure used to generate this table is based on estimated acres mapped in 1985 for the original report.

**Table 2. Status of soil surveys in Vermont**

County	Published Soil Survey	Digital Soil Survey	Mapping Ongoing
Addison	yes(1)	yes	
Bennington	no(2)	yes	
Caledonia	no	no	yes
Chittenden	yes	no(3)	
Essex	no	no	yes
Franklin	yes	yes	
Grand Isle	yes(1)	no(3)	
Lamoille	yes	yes	
Orange	yes	yes	
Orleans	no(2)	no	
Rutland	yes	yes	
Washington	no(2)	yes	
Windham	yes	yes	
Windsor	no(2)	yes	

1. The published soil surveys of Addison and Grand Isle Counties are out of print.
2. The soil surveys of Bennington, Orleans, Washington, and Windsor Counties are currently in various stages of publication. Interim reports and information is available from local NRCS offices.
3. Digital soil surveys for Chittenden and Grand Isle Counties exist, but they were not prepared according to current standards and the quality is uncertain.

**Table 3. Soil map units that have very limited potential for both commercial forestry and commercial agriculture.**

**Addison County**

Co	Cobbly Alluvial Land
Fw	Fresh Water Marsh
GP	Gravel Pits
MP	Mines and Pits
Mv	Muck and Peat
Qu	Quarry
Rk	Rock Land
RL	Rubble Land
W	Water

**Bennington County**

9	Pits-Dumps complex
10D	Glebe-Stratton-Londonderry complex, 15 to 25 percent slopes, very rocky
10E	Glebe-Stratton-Londonderry complex, 25 to 60 percent slopes, very rocky
23A	Adrian and Saco soils, 0 to 2 percent slopes
24A	Carlisle mucky peat, 0 to 2 percent slopes
27B	Udipsamments and Udorthents, gently sloping
28A	Udifluvents, loamy-skeletal
913E	Glebe-Stratton association, very hilly, very rocky
W	Water

**Caledonia County**

27A	Bucksport muck, 0 to 2 percent slopes
50A	Wonsqueak and Pondicherry mucks, 0 to 2 percent slopes
81D	Ricker-Londonderry-Stratton complex, 15 to 35 percent slopes, very rocky
81E	Ricker-Londonderry-Stratton complex, 35 to 60 percent slopes, very rocky
82F	Ricker-Londonderry-Rock Outcrop complex, 60 to 90 percent slopes, very rocky
83D	Stratton-Glebe complex, 15 to 35 percent slopes, very rocky
100	Pits, sand and Pits, gravel
102	Pits, quarry-Dumps, mine complex
103	Udorthents loamy
104B	Urban Land-Adams-Nicholville complex, 0 to 8 percent slopes
104C	Urban Land-Adams-Nicholville complex, 8 to 15 percent slopes
104D	Urban Land-Adams-Nicholville complex, 15 to 25 percent slopes
104E	Urban Land-Adams-Nicholville complex, 25 to 60 percent slopes
105F	Lyman-Rock Outcrop complex, 60 to 90 percent slopes
380F	Rock Outcrop, 60 to 120 percent slopes
900	Denied Access (onsite investigation is needed)
W	Water

### Table 3. Continued

#### Chittenden County

An	Alluvial Land
Bo	Blown-Out Land
Br	Borrow Pits
BUR	Burlington (Limit of Soil Survey) (onsite investigation is needed)
Du	Dumps
Fu	Fill Land
Fw	Fresh Water Marsh
MTFA	Military Test Firing Area (onsite investigation is needed)
Mp	Muck and Peat
Qd	Quarries
Rk	Rock Land
W	Water

#### Essex County

27A	Bucksport muck, 0 to 2 percent slopes
50A	Wonsqueak and Pondicherry mucks, 0 to 2 percent slopes
81D	Ricker-Londonderry-Stratton complex, 15 to 35 percent slopes, very rocky
81E	Ricker-Londonderry-Stratton complex, 35 to 60 percent slopes, very rocky
82F	Ricker-Londonderry-Rock Outcrop complex, 60 to 90 percent slopes, very rocky
83D	Stratton-Glebe complex, 15 to 35 percent slopes, very rocky
100	Pits, sand and Pits, gravel
102	Pits, quarry-Dumps, mine complex
103	Udorthents loamy
104B	Urban Land-Adams-Nicholville complex, 0 to 8 percent slopes
104C	Urban Land-Adams-Nicholville complex, 8 to 15 percent slopes
104D	Urban Land-Adams-Nicholville complex, 15 to 25 percent slopes
104E	Urban Land-Adams-Nicholville complex, 25 to 60 percent slopes
105F	Lyman-Rock Outcrop complex, 60 to 90 percent slopes
380F	Rock Outcrop, 60 to 120 percent slopes
900	Denied Access (onsite investigation is needed)
W	Water

#### Franklin County

Ce	Carlisle muck
Ma	Marsh
RoE	Rock Outcrop-Woodstock complex, 20 to 60 percent slopes
Tm	Terric Medisaprists
W	Water
Wa	Wallkill silt loam

### Table 3. Continued

#### Grand Isle County

BaA	Balch peat
Bb	Beach and Dune sand
CaA	Carlisle muck
FaA	Fresh Water Marsh
Gr	Pits, sand and Pits, gravel
Qu	Pits, quarry
W	Water

#### Lamoille County

Bx	Borohemists, deep
By	Borohemists, moderately deep over loamy substratum
FrB	Fragiaquepts and Haplaquepts, 0 to 8 percent slopes
Hs	Histic Fluvaquepts, frequently flooded
LoE	Londonderry-Stratton complex, 25 to 60 percent slopes
RkE	Ricker peat, very rocky, 15 to 80 percent slopes
StC	Stratton-Londonderry complex, 8 to 25 percent slopes
Ud	Udfluvents, frequently flooded
W	Water

#### Orange County

Bp	Borrow Pits
Cm	Pits, Copper Mine-Dumps, Mine complex
Gp	Gravel Pits
Ml	Udorthents
Mu	Muck
Ro	Rock Outcrop
Qu	Pits, Quarry-Dumps, Mine complex
SLF	Dumps, Sanitary Landfill
W	Water

#### Orleans County

25	Pits, gravel and Pits, sand
70A	Bucksport muck, 0 to 2 percent slopes, ponded
83A	Wonsqueak muck, 0 to 2 percent slopes
84A	Bucksport muck, 0 to 2 percent slopes
104B	Urban Land-Adams-Nicholville complex, 0 to 8 percent slopes
104C	Urban Land-Adams-Nicholville complex, 8 to 15 percent slopes
104D	Urban Land-Adams-Nicholville complex, 15 to 25 percent slopes
210F	Ricker-Londonderry-Stratton complex, 35 to 70 percent slopes, very rocky
211F	Ricker-Londonderry-Rock Outcrop complex, 35 to 70 percent slopes
260F	Udorthents, 35 to 90 percent slopes, very rubbly
W	Water

**Table 3. Continued**

**Rutland County**

9	Pits-Dumps complex
23	Adrian muck
24	Pinnebog muck
28	Udfluvents and Fluvaquents, nearly level
29	Histosols and Aaquents, ponded
86	Linwood muck
95	Udorthents loamy
96	Udipsamments, nearly level
132C	Glebe-Stratton complex, 8 to 25 percent slopes, very stony
132E	Glebe-Stratton complex, 25 to 60 percent slopes, very stony
134F	Stratton-Londonderry-Ricker complex, 15 to 80 percent slopes, very rocky
213E	Glebe-Stratton association, very hilly, very rocky
W	Water

**Washington County**

9A	Rifle muck, 0 to 2 percent slopes
68D	Stratton-Glebe complex, 15 to 35 percent slopes, very rocky
68E	Stratton-Glebe complex, 35 to 60 percent slopes, very rocky
69D	Sisk-Glebe complex, 15 to 35 percent slopes, very bouldery
69E	Sisk-Glebe complex, 35 to 60 percent slopes, very bouldery
79A	Markey and Wonsqueak mucks, 0 to 2 percent slopes
82A	Peacham muck, 0 to 5 percent slopes, extremely bouldery
85E	Ricker-Londonderry-Stratton complex, 35 to 70 percent slopes, very rocky
86F	Ricker-Londonderry-Rock Outcrop complex, 35 to 70 percent slopes
100	Pits, sand and Pits, gravel
102	Pits, quarry-Dumps, mine complex
103	Udorthents, loamy
104	Urban Land-Udipsamments complex, occasionally flooded
172F	Taconic-Hubbardton-Rock Outcrop complex, 60 to 80 percent slopes
W	Water

**Windham County**

12C	Stratton-Glebe complex, 8 to 15 percent slopes, very rocky
12D	Stratton-Glebe complex, 15 to 25 percent slopes, very rocky
12E	Stratton-Glebe complex, 25 to 50 percent slopes, very rocky
41D	Londonderry-Stratton silt loams, 8 to 25 percent slopes, very rocky
41E	Londonderry-Stratton silt loams, 25 to 70 percent slopes, very rocky
47	Lupton mucky peat
62	Markey muck
64	Udfluvents, loamy
W	Water

### Table 3. Continued

#### Windsor County

3	Pits, quarry-Dumps, mine complex
28	Udorthents and Udipsamments
32B	Urban Land-Windsor-Agawam complex, 0 to 8 percent slopes
47	Pondicherry and Wonsqueak mucks, ponded
48	Pits, sand and Pits, gravel
56	Bucksport muck, ponded
60D	Glebe-Stratton complex, 15 to 35 percent slopes, very stony
60F	Glebe-Stratton complex, 35 to 70 percent slopes, very stony
61D	Ricker-Londonderry-Stratton complex, 15 to 35 percent slopes, very rocky
61F	Ricker-Londonderry-Stratton complex, 35 to 70 percent slopes, very rocky
75B	Urban Land-Colton-Croghan complex, 0 to 8 percent slopes
82	Udifluvents, sandy-skeletal
213F	Stratton-Ricker-Glebe complex, 15 to 70 percent slopes, very rocky
W	Water