



Soil Erodibility Evaluation for General Permit 3-9020 Stormwater Runoff From Construction Activities

Introduction

Applicants for coverage under General Permit 3-9020 are required to fill out the Risk Evaluation in Appendix A of the permit to determine the appropriate risk category. This assessment gives weight to both the nature of the construction activity and the characteristics of the site that contribute to risk of erosion and sediment transport to waters of the state. One of the key site characteristics is the erodibility of the soil. This guidance document provides an overview of soil erodibility and directions on how to assess erodibility for completion of Appendix A.

Soil Erodibility

Soil erodibility (K) is the intrinsic susceptibility of a soil to erosion by runoff and raindrop impact. The soil erodibility factor was devised by the Natural Resources Conservation Service (NRCS) for use in estimating soil losses with the Universal Soil Loss Equation (USLE). K values for some soils types were experimentally derived using a standard evaluation procedure. These results are then extrapolated to other soil types based on their physical and chemical characteristics.

Values of K range from the lowest erodibility, 0.02, to the highest, 0.69. All other factors being equal, the higher the K value, the greater the susceptibility of the soil to rill and sheet erosion by rainfall. K values are dependent upon the soil texture, structure, permeability, and organic matter content. In general, soils with greater permeability, higher levels of organic matter and improved soil structure have a greater resistance to erosion and, therefore, a lower K value. The presence of silt, very fine sand, and clays with a high shrink-swell capacity tend to increase the K value, whereas sand, sandy loam and loam textured soils tend to be less erodible .

NRCS Soil Surveys

NRCS publishes evaluated or assigned soil Kw values in county soil surveys. These maps describe the location and properties of county soils and have traditionally been available in book form. NRCS no longer publishes new copies of soil surveys in hard copy, however most USDA service centers do have these for their local counties available for viewing (see sidebar). The University of Vermont has a complete set of historical soil surveys in the Government Documents and Maps section of the Bailey/Howe Library.

NRCS County Soil Survey Availability

Publish Hard Copies in Circulation

- Chittenden
- Franklin
- Lamoille
- Orange
- Rutland
- Windham
- Washington

Publish Hard Copies Out-of-print

- Addison
- Grande Isle

No Hard Copies

- Bennington
- Caledonia
- Orleans
- Windsor

On-going Mapping

- Essex

Washington, Addison, Bennington, and Grande Isle County Soil Surveys are available on CD from NRCS

In order to provide the most current and reliable data, NRCS has moved to digital soils data. While four counties have soil surveys available on CD-ROM, the full range of state data is available through the online NRCS Web Soil Survey.

NRCS Web Soil Survey

The NRCS [Web Soil Survey](#) portal is an interactive mapping application which allows the user to zoom in on their area of interest, draw the site boundary, and generate a report on the soils contained within this boundary. Data is available for all counties, except Essex County where NRCS is currently doing mapping. There are about 60,000 acres mapped in Essex County along the Connecticut River and in the towns of Canaan, Lunenburg, and Brighton as well as some scattered mapping in other areas of the county. This data is not yet available on the Web Soil Survey.

Soil erodibility values can be obtained in a few simple steps. The application menu is located on the left side (A in figure). The map and map tool bar are on the right side (B). Across the top are a series of tabs, Area of Interest (default start tab), Soil



Quick Navigation

Navigate By...

Address

State and County

State

County (optional)

Soil Survey Area

Latitude and Longitude

PLSS (Section, Township, Range)

Bureau of Land Management

Department of Defense

Forest Service

National Park Service

Hydrologic Unit

Area of Interest Interactive Map

View Extent

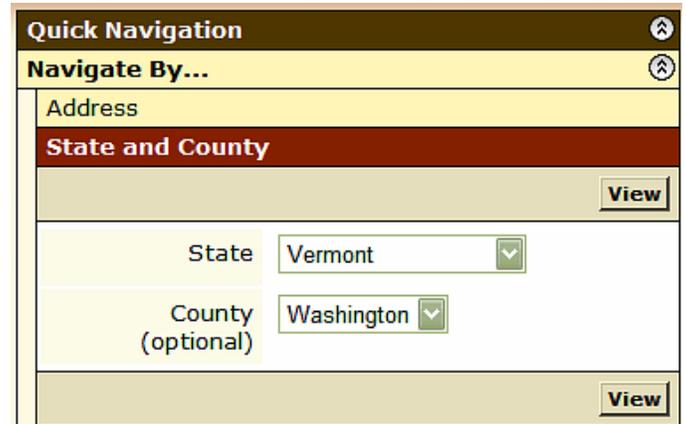
Scale

- A = Quick Navigation Menu
- B = Zoom and Pan Tools
- C = Soil Map Tab
- D = Soil Data Explorer Tab

Map (C) and Soils Explorer (D) . The procedure to obtain soil erodibility for a particular area is as follows.

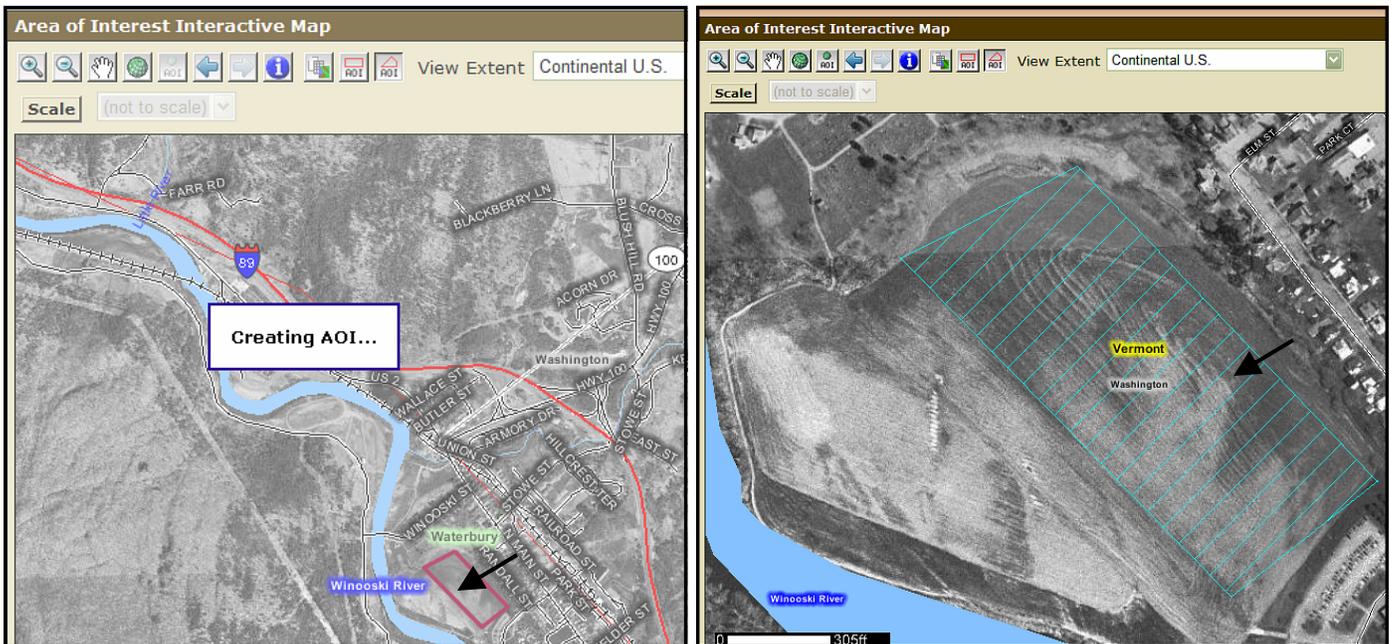
1. Select County

From the Quick Navigation Menu (Au, select ' Navigate By ', ' State and County ' and click ' View '. The map will zoom in to the selected county. Using the magnification and pan tools in the Map Toolbar (B) , zoom into the general location of the project. 



2. Define Area of Interest

From the Map Toolbar (B) click on an ' Area of Interest ' (AOI) Tool  .



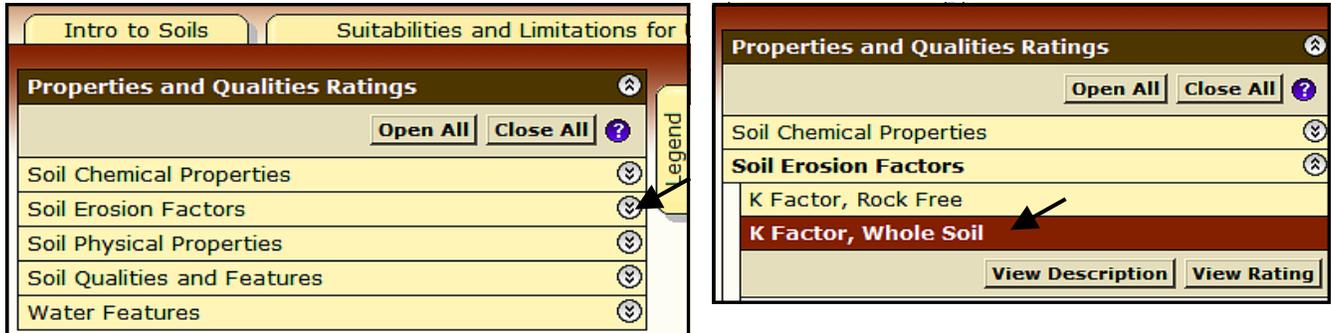
Using the tool, outline the boundary of the project. When completed, the application will show a hatched polygon of covering the selected area.

3. Generate Soils Data Summary

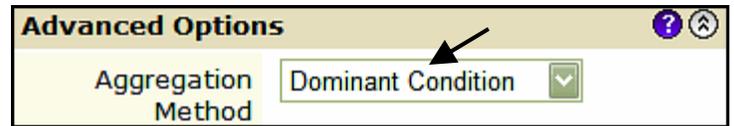
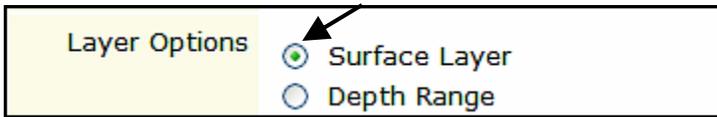
Click on the ' Soils Data Explorer ' tab. A second tab bar will appear below the original one. Click on the ' Soil Properties and Qualities ' tab.



The left menu (A) will change to show a range of available soils properties. Select the 'Soil Erosion Factors' option from the menu. A sub-menu will appear. Make sure 'K Factor, Whole Soil' is highlighted in red.



In the lower part of the left menu are a series of options. Select 'Surface Layer' and 'Dominant Condition'.



4. Obtain Area and K values of Site Soils

Click the 'View Rating' button. On the right side, under the map of the soils, a table will be produced showing the area of all of the soils in the Area of Interest and the Kw value. Kw, the whole-soil erodibility, is a modified K value that accounts for the presence of rock fragments in the soil. **Use these values when completing Appendix A of General Permit 3-9020.**

Do not use tabulated K values for USLE or RUSLE.

A print out may be obtained by clicking on the Printable Version button at the top right of the screen. Applicants are encouraged to include this print-out in their application.





K Factor, Whole Soil— Summary by Map Unit — Washington County, Vermont

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
21A	Sunday fine sand, 0 to 3 percent slopes	.15	19.4	54.0%
43B	Salmon very fine sandy loam, 3 to 8 percent slopes	.49	0.4	1.0%
59A	Waitsfield silt loam, 0 to 3 percent slopes	.32	11.3	31.5%
60A	Weider very fine sandy loam, 0 to 3 percent slopes	.32	4.8	13.5%
Totals for Area of Interest (AOI)			35.8	100.0%

Example Output from the NRCS Web Soil Survey

Determining K Where No Data is Available

In situations where there is no available soil survey data, or where the site soils differ from the data in the soil survey (e.g. an old fill area), three options are available for completing Appendix A.

1. A conservative assumption that all soils within the project boundary have a Kw value of 0.37 or greater is made
2. Soil series identification by a soil scientist, where the series has a known K value. Documentation of this assessment should be included with the application.
3. An estimate of the K value of site soils can be made using the Soil Erodibility Nomograph from Agricultural Handbook 537. This method is based on the soil properties that influence erodibility (soil texture, structure, organic matter, and porosity). Proper analysis of these soil characteristics should be performed. With the results of these analyses, a K value may be derived from the nomograph (see following page). Include analysis documentation with the application.

For the completion of Appendix A, estimates of K should be made for all of the major soil types within the project boundary.

Online Resources

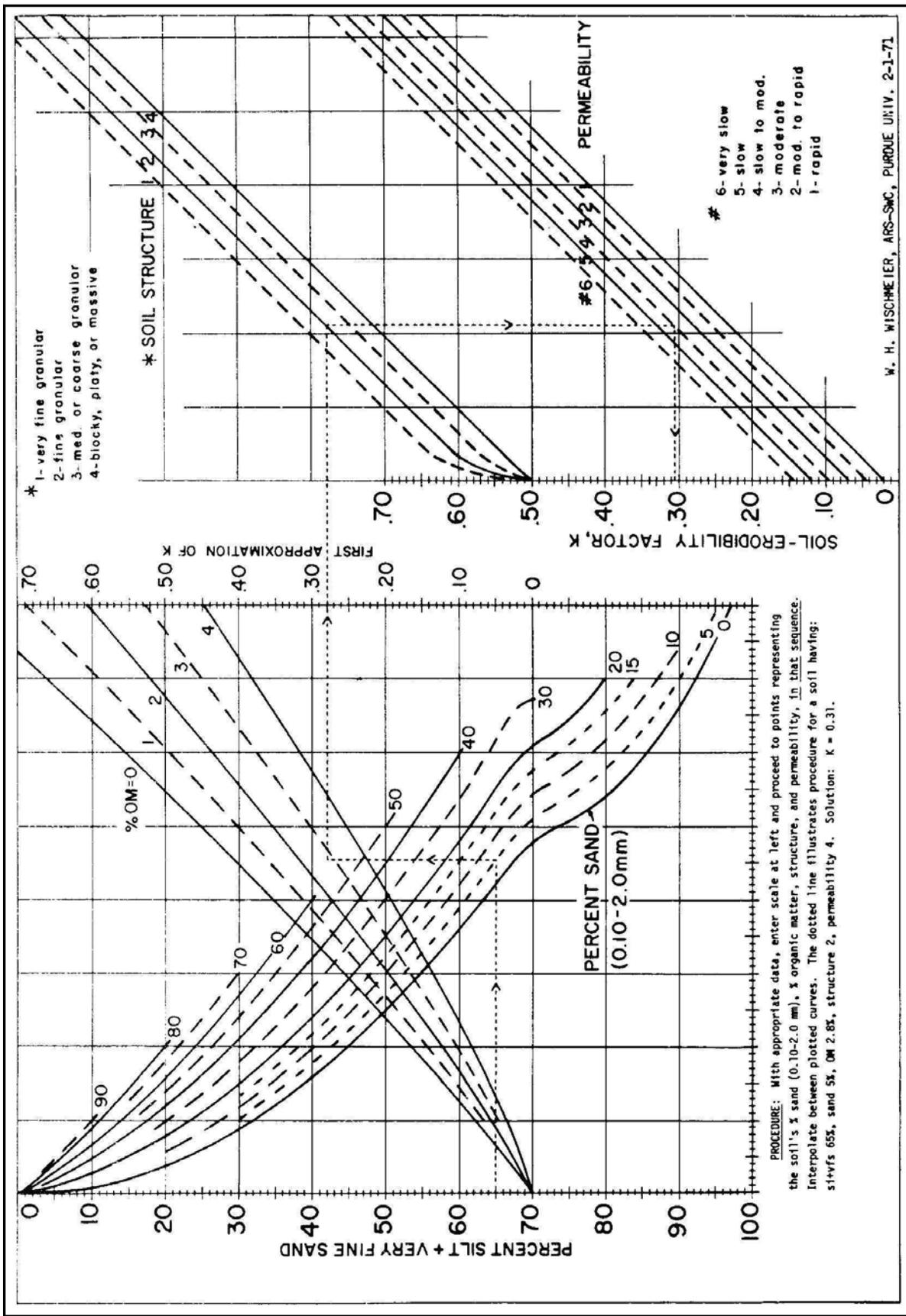
- **NRCS Web Soil Survey:**
<http://websoilsurvey.nrcs.usda.gov/app>
- **NRCS Vermont Soil Fact Sheets:**
<ftp://ftp-fc.sc.egov.usda.gov/VT/Soils/Soil%20Fact%20Sheets/>
- **History of Vermont Soil Surveys:**
http://www.vt.nrcs.usda.gov/soils/so_publications.html

For More Information

Please visit the Stormwater Section website at:

www.vtwaterquality.org/stormwater.htm





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Soil Erodibility Nomograph