

HIGHLY ERODIBLE LAND

General

The basis for identifying highly erodible land (HEL) is the erodibility index (EI) of a soil map unit. The "EI" of a soil is determined by dividing the potential erodibility for each soil by the soil loss tolerance (T) value established for the soil as of January 1, 1990. The "T" value represents the maximum annual rate of soil erosion that can take place without causing a decline in long-term productivity. A soil map unit with an "EI" of eight or more is a highly erodible soil map unit. Refer to the National Food Security Act Manual (NFSAM), (Third Edition, Amend. 2, Nov. 1996, Part 511) for further guidance.

For HEL determinations or redeterminations, the frozen HEL lists ("Soil Map Units and Component Highly Erodible Land Class") are provided in this section and the associated factors ("T," "K," etc.) For all other activities, planning, and programs use the Interpretive Groups, "Soils Legends Section, Section II, South Dakota Technical Guide (SDTG).

Water Erosion

Potential erodibility for sheet and rill erosion is estimated by multiplying the following factor values of the Universal Soil Loss Equation (USLE): (1) rainfall and runoff factor "R," (2) susceptibility of the soil to water erosion "K," and (3) combined effects of slope length and steepness "LS."

The "EI" for sheet and rill erosion is represented by the formula $EI = RKLS/T$. A soil map unit is highly erodible if the "LS" factor for the shortest length and minimum percent of slope is used and the $RKLS/T$ value equals or exceeds eight.

A soil map unit is potentially highly erodible if: (1) the $RKLS/T$ value using the minimum "LS" factor is less than eight and (2) the $RKLS/T$ value using the maximum "LS" factor is equal to or greater than eight.

Wind Erosion

Potential erodibility from wind erosion is estimated by multiplying the following factor values of the Wind Erosion Equation (WEQ). (1) Climatic characterization of windspeed and surface soil moisture "C" and (2) the susceptibility of the soil to wind erosion "I."

The "EI" for wind erosion is represented by the formula $EI = CI/T$. A soil map unit is highly erodible if the CI/T value equals or exceeds eight.

IDENTIFICATION OF HEL

I. DETERMINING "EI" FOR WATER EROSION

Several factors from the USLE are used to determine HEL due to the water erosion potential of the soil map unit. These soil map units are HEL when the $RKLS/T$ value for the map unit equals or exceeds eight. The equation is expressed as follows:

$$RKLS/T \geq 8$$

where

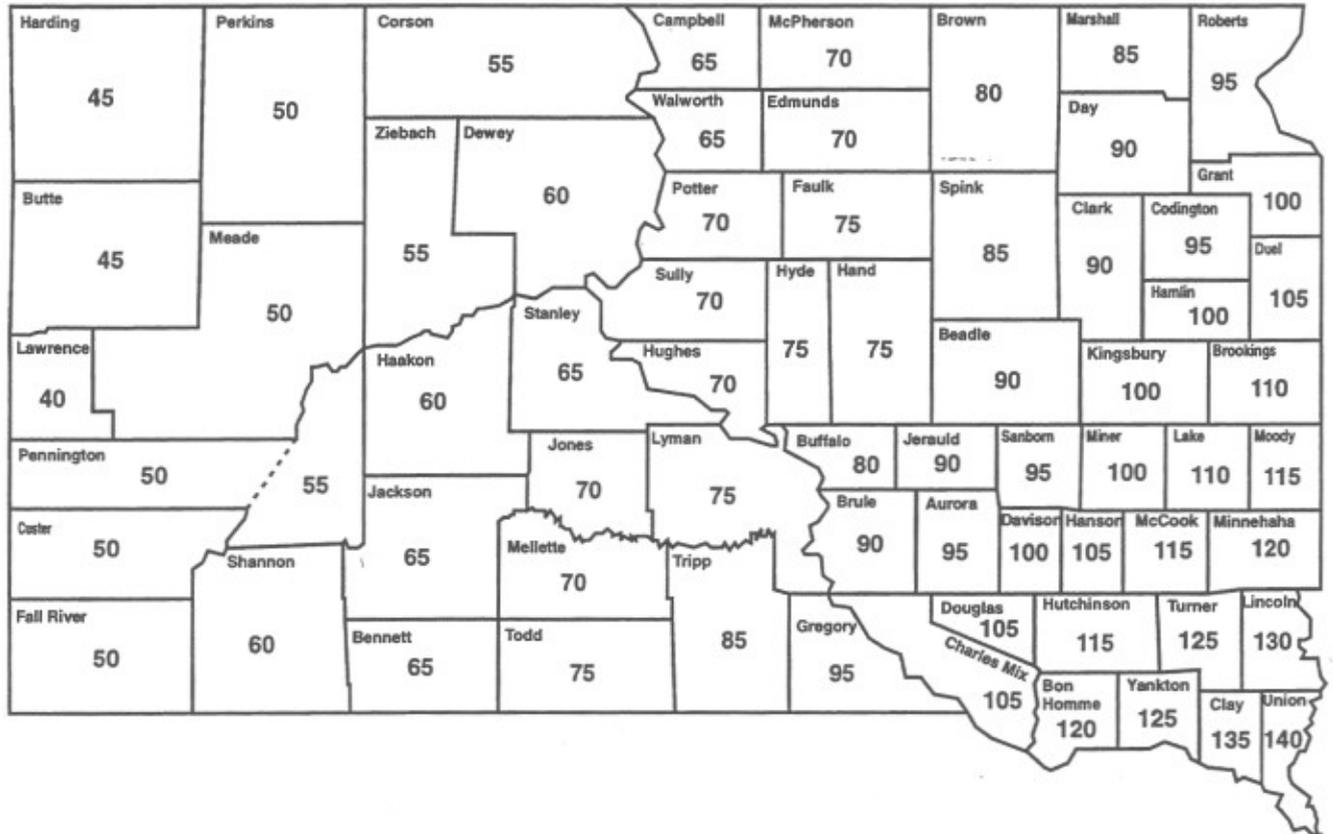
R = the rainfall factor. It is the number of "EI" units in a normal year's rain. The "EI" is a measure of the erosive force of specific rainfall.

"R" values for each county are shown on the state map, Figure 1, page 2, or in - Soil Map Units and Component Highly Erodible Land Class, Section II, Cropland Interpretations, of the SDTG.

K = the soil-erodibility factor. It is the erosion rate per unit of "EI" for a specific soil in cultivated continuous fallow on a 9 percent slope, 72.6 feet long. "K" values are listed for each soil by county in - Soil Map Units and Component Highly Erodible Land Class, Section II, Cropland Interpretations, of the SDTG.

Figure 1. USLE ANNUAL RAINFALL FACTOR "R" MAP

Annual Rainfall Factor "R" USLE



L = the slope length factor. It is the ratio of soil loss from the field slope length to that from a 72.6-foot length on the same soil type and gradient. Slope length is the distance from the point of origin of overland flow to: (1) the point where the slope decreases to the extent that deposition begins or (2) the point where runoff enters a defined channel such as ephemeral gully or a natural watercourse.

S = the slope-gradient factor. It is the ratio of soil loss from the field gradient to that from a nine percent slope.

In field application of the equation, values for slope length "L" and slope gradient "S"

are combined in the single topographic factor "LS." When slope length and gradient have been determined, the "LS" value can be determined using Table A in this section, page 4.

T = soil loss tolerance. It is the average annual erosion rate that can occur with little or no long-term degradation of the soil resource on the field. When the computed soil erosion rate is less than the "T" value, control of sheet and rill erosion is assumed to be adequate. "T" values are listed for each soil by county in - Soil Map Units and Component Highly-Erodible Land Class, Section II, Cropland Interpretations, of the SDTG.

TABLE A
SLOPE-EFFECT FACTORS "LS"

Length of Slope (L)	Percent of Slope													
	1.0	2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	18.0	20.0	24.0
20	.08	.12	.18	.21	.24	.30	.44	.61	.81	1.0	1.3	1.5	1.8	2.5
40	.10	.15	.22	.28	.34	.43	.63	.87	1.1	1.5	1.8	2.2	2.6	3.5
60	.11	.17	.25	.33	.41	.52	.77	1.1	1.4	1.8	2.2	2.7	3.2	4.3
80	.12	.19	.27	.37	.48	.60	.89	1.2	1.6	2.1	2.5	3.1	3.6	4.9
100	.13	.20	.29	.40	.54	.67	.99	1.4	1.8	2.3	2.8	3.4	4.1	5.5
110	.13	.21	.30	.42	.56	.71	1.0	1.4	1.9	2.4	3.0	3.6	4.3	5.8
120	.14	.21	.30	.43	.59	.74	1.1	1.5	2.0	2.5	3.1	3.8	4.5	6.0
130	.14	.22	.31	.44	.61	.77	1.1	1.6	2.1	2.6	3.2	3.9	4.7	6.3
140	.14	.22	.32	.46	.63	.80	1.2	1.6	2.1	2.7	3.4	4.1	4.8	6.5
150	.15	.23	.32	.47	.66	.82	1.2	1.7	2.2	2.8	3.5	4.2	5.0	6.7
160	.15	.23	.33	.48	.68	.85	1.3	1.7	2.3	2.9	3.6	4.3	5.2	7.0
180	.15	.24	.34	.51	.72	.90	1.3	1.8	2.4	3.1	3.8	4.6	5.5	7.4
200	.16	.25	.35	.53	.76	.95	1.4	1.9	2.6	3.2	4.0	4.9	5.8	7.8
300	.18	.28	.40	.62	.93	1.2	1.7	2.4	3.0	4.0	4.9	5.9	7.1	9.5
400	.20	.30	.44	.70	1.1	1.3	2.0	2.7	3.5	4.6	5.7	6.9	8.2	11.0

II. DETERMINING "EI" FOR WIND EROSION

Two factors from the WEQ are used to determine HEL due to the wind erosion potential of the soil map unit. These soil map units are HEL when the CI/T value for the map unit equals or exceeds eight. The equation is expressed as follows:

$$CI/T \geq 8$$

where

C = climatic factor. It characterizes climatic erosivity, specifically wind speed and surface soil moisture. The factor for any given locality is expressed as a percentage of the "C" factor for Garden City, Kansas, which has a value of 100. Values for "C" in South Dakota range from 20 to 60 and are expressed as a decimal for use in the "EI" calculation

(i.e., .20 - .60). The "C" values for each county are shown on the state map, Figure 2, page 6, or in - Soil Map Units and Component Highly Erodible Land Class, Section II, Cropland Interpretations, of the SDTG.

I = soil erodibility index. It is the potential annual wind erosion for a given soil under a given set of field conditions. This factor is expressed as the average annual soil loss in tons per acre per year from a field area that is isolated, unsheltered, wide, bare, smooth, level, loose, and noncrusted, and at a location where the climatic factor is 100. The "I" factor values are listed in Table B, Section II, Cropland Interpretations, of the SDTG.

T = the soil loss tolerance. The "T" values are listed for each soil by county in Soil Map Units and Component Highly Erodible Land Class, Section II, Cropland Interpretations, of the SDTG.

Figure 2. "C" FACTOR MAP

"C" Climatic Factors

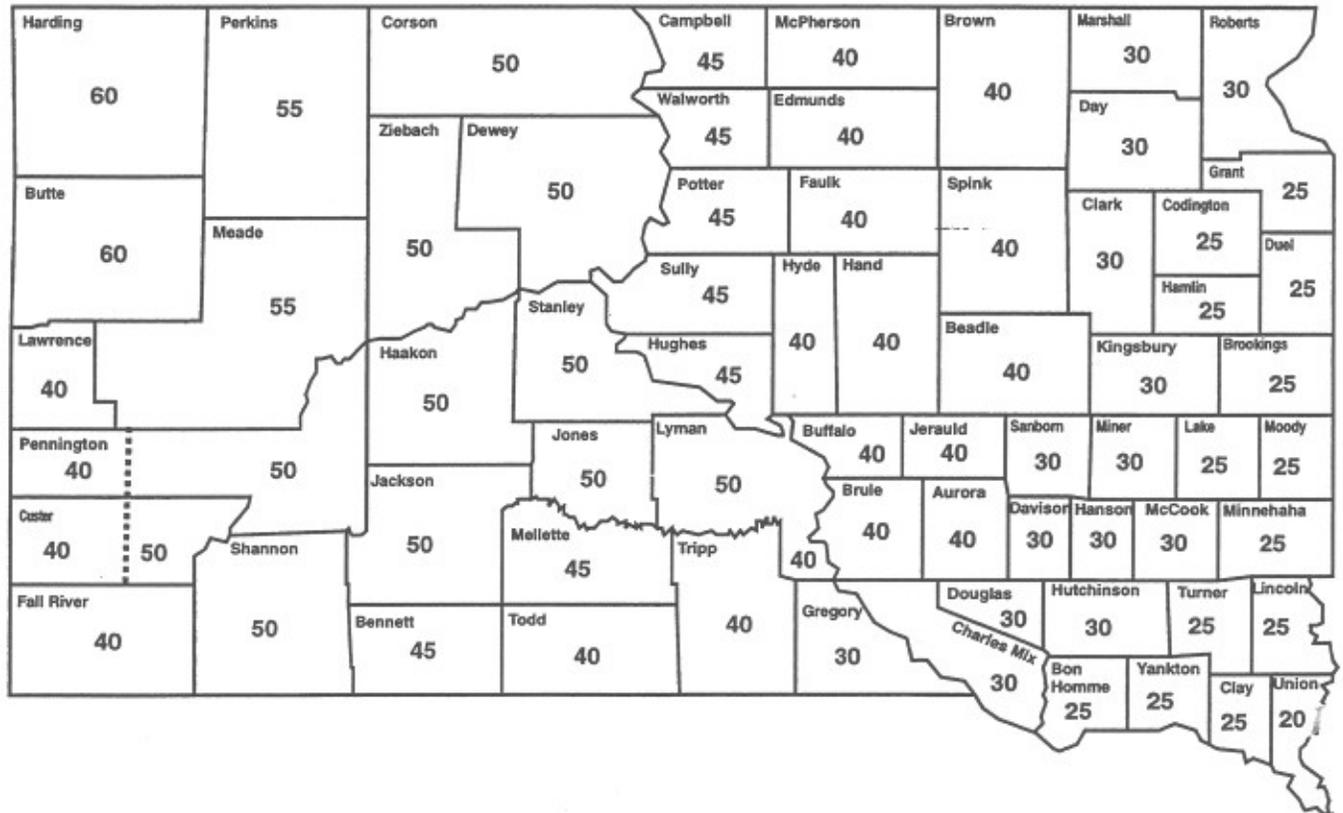


TABLE B

Each respective field office Table B will be filed behind this page.