HIGHLY ERODIBLE LAND
INTRODUCTION

General
The erodibility index of each soil map unit in a field is used as the basis for identifying Highly Erodible Land (HEL) for Food Security Act compliance. Erodibility calculations are based on the "frozen" soil map units and factors for water and wind erosion as they existed in the Field Office Technical Guide on January 1, 1990. The erodibility index of a soil is determined by dividing the potential erodibility for each soil by the soil loss tolerance (T) value established for the soil. The T value represents the maximum annual rate of soil erosion that could take place without causing a decline in long-term productivity. A soil map unit with an erodibility index of 8 or more is a highly erodible soil map unit.

Water Erosion
Potential erodibility for sheet and rill erosion is calculated by multiplying the following factors of the Universal Soil Loss Equation (USLE):

1. Rainfall and runoff factor (R)
2. Susceptibility of the soil to water erosion (K)
3. Combined effects of slope length and steepness (LS)

The erodibility index for sheet and rill erosion is represented by the formula R*K*LS/T. For complex map units, the factors for the primary component are used.

- A soil map unit is highly erodible if the R*K*LS/T value using the minimum LS factor is equal to or greater than 8.
- A soil map unit is potentially highly erodible if the R*K*LS/T value using the minimum LS factor is less than 8 and the R*K*LS/T value using the maximum LS factor is equal to or greater than 8.
- A soil map unit is not highly erodible if the R*K*LS/T value using the maximum LS factor is less than 8.

Wind Erosion
Potential erodibility for wind erosion is calculated by multiplying the following factors of the Wind Erosion Equation (WEQ):

1. Climatic characterization of wind speed and surface soil moisture (C)
2. The susceptibility of the soil to wind erosion (I)

The erodibility index for wind erosion is represented by the formula C*I/T. For complex map units, the factors for the primary component are used.

- A soil map unit is highly erodible if the C*I/T value is equal to or greater than 8.
- A soil map unit is not highly erodible if the C*I/T value is less than 8.

Status of HEL Reports
The HEL reports in the Field Office Technical Guide show the applicable frozen factors (as of January 1, 1990) and HEL classifications for all map units in each county.

Key to 1990 Frozen Factors on the Highly Erodible Land Report
The USLE and WEQ factors in effect as of January 1, 1990 are used as a basis of determining erodibility.

- C = Climatic factor from Wind Erosion Equation (WEQ)
- R = Rainfall factor from Universal Soil Loss Equation (USLE)
- T = Soil loss tolerance
- I = Erodibility factor from Wind Erosion Equation (WEQ)
- K = Erodibility factor from Universal Soil Loss Equation (USLE)

Key to Highly Erodible Land Classification on the Highly Erodible Land Report

1 = HEL – The map unit is Highly Erodible Land for wind erosion, water erosion or both wind and water erosion. (The EI for wind erosion, water erosion, or both wind and water erosion is greater than or equal to 8.)

2 = PHEL** - The map unit is Potentially Highly Erodible Land for water erosion or factors for determining the EI were not assigned. (The EI for wind erosion is less than 8 and the EI for water erosion may be less than or greater than 8, based on slope and slope length.)

3 = NHEL – The map unit is Not Highly Erodible Land. (The EI for both wind and water erosion is less than 8.)

** Miscellaneous Soil Map Units without 1990 FOTG erosion factors (Such as “gravel pits”) are classified as PHEL.

Evaluating PHEL Map Units
District Conservationists are authorized to approve offsite determinations on PHEL map units as follows:

1. Document a minimum of 20 onsite conditions for a PHEL map unit. Documentation of findings must be maintained in applicable case files with summary information and reference of specific site findings maintained in correspondence file 180-12-5 labeled “PHEL Documentation”.
2. If at least 85% of any given PHEL map unit is either HEL or NHEL, the respective classification can be used for all offsite determinations for that map unit.
3. If less than 85% of any given PHEL map unit is not either HEL or NHEL, onsite determinations for that map unit must be completed when that map unit will affect the HEL determination for a field.
4. Slope and slope length to determine LS on PHEL map units are the only factors that can be determined on site. An exception is made for those miscellaneous area soil map units (such as “Gravel Pits”) that were not assigned K, T and/or I factors and were not assigned an HEL classification in 1990. In those cases, the HEL classification for both wind and water erosion is determined in the field.

Making Slope and Slope Length Determinations in the Field
Slope and slope length measurements should be taken from at least three representative areas for each PHEL map unit. Document the location of the slope length and steepness measurements on an aerial photo of the field. Less than 3 measurements may be used for small areas where multiple measurements are not practical.

Percent slope can be determined in the field using a rod and transit, hand level or clinometer. The measurement of percent slope should be taken from within the PHEL map unit along the measured slope length.

Slope length is defined as the horizontal distance from the origin of overland flow to the point where either the slope gradient decreases enough that deposition begins or runoff becomes concentrated in a defined channel. To determine the slope length for a map unit identify the point on the slope where deposition begins (Figure 1) or where overland flow enters an area of concentrated flow, either a natural or constructed waterway (Figure 2). Walk upslope from the selected point, moving perpendicular to the contour, until the origin of overland flow is reached. **Note:** The formation of rills does not indicate an area of concentrated flow since RUSLE2 calculates both sheet and rill erosion for the slope.

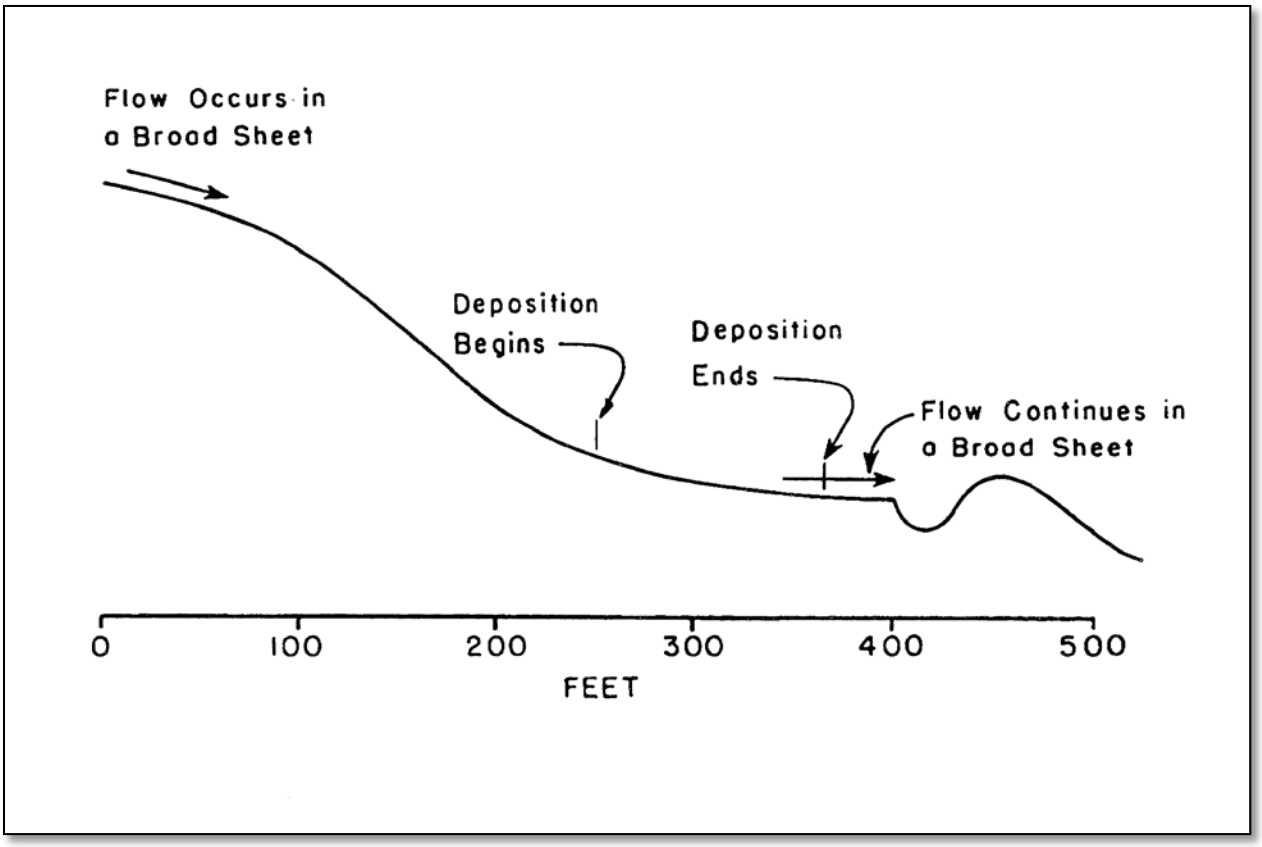


Figure 1: Illustration of slope length along a simple slope.

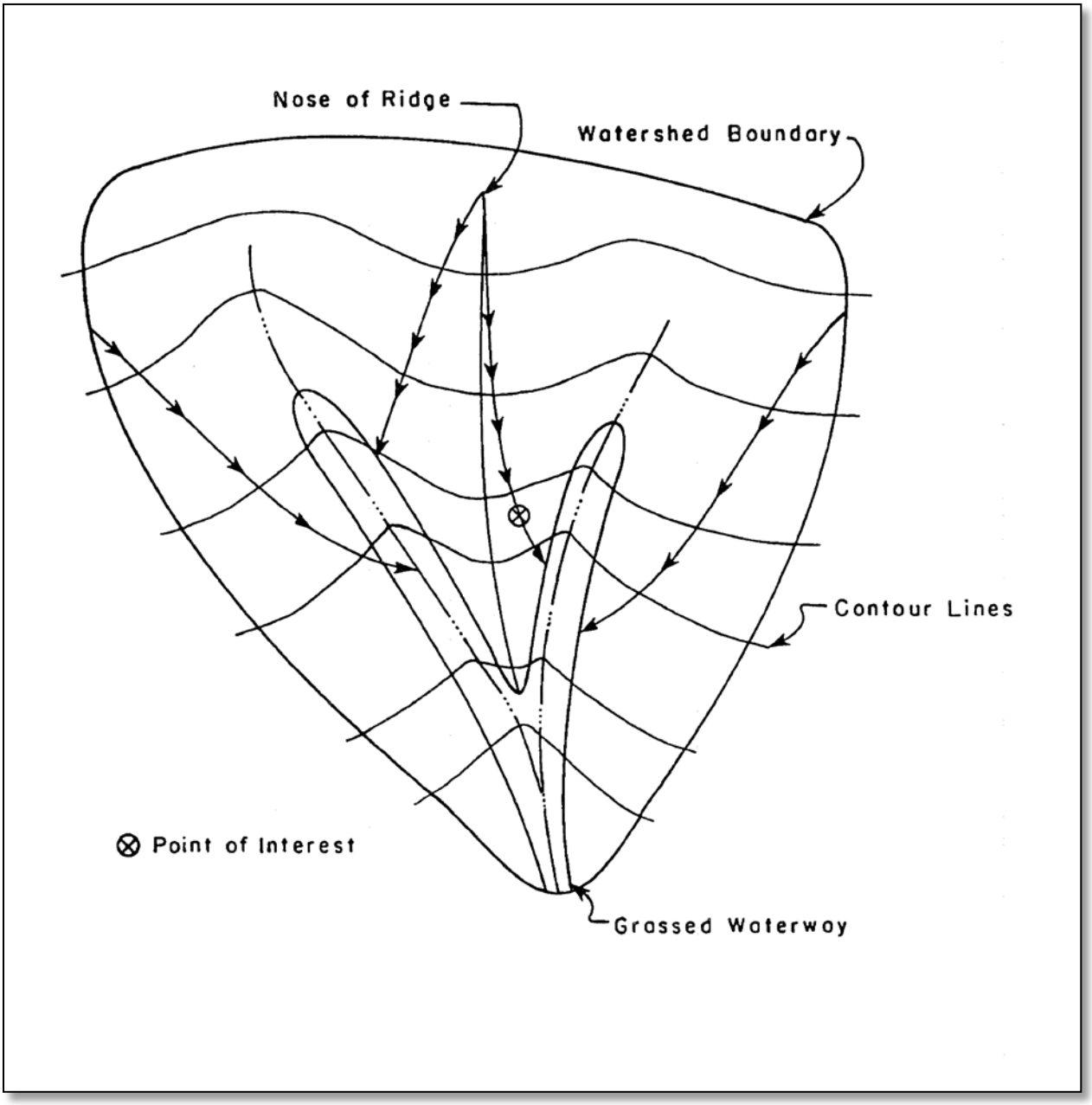


Figure 2: Illustration of the start and end points of slope lengths in a small watershed.

The measurement of slope length should not be restricted to the boundaries of the PHEL map unit but should represent the sheet and rill erosion flow path that affects the PHEL map unit. When making this determination the slope length may also extend outside of the field boundary providing there are no changes in management or land use along the slope length and there are no physical boundaries, such as a fence line, that would interrupt the flow path.

Slope length can be altered by vegetative or structural practices such as terraces or contour buffer strips. When those practices occur along a slope the spacing and width of the practices should be included in the RUSLE2 calculation.

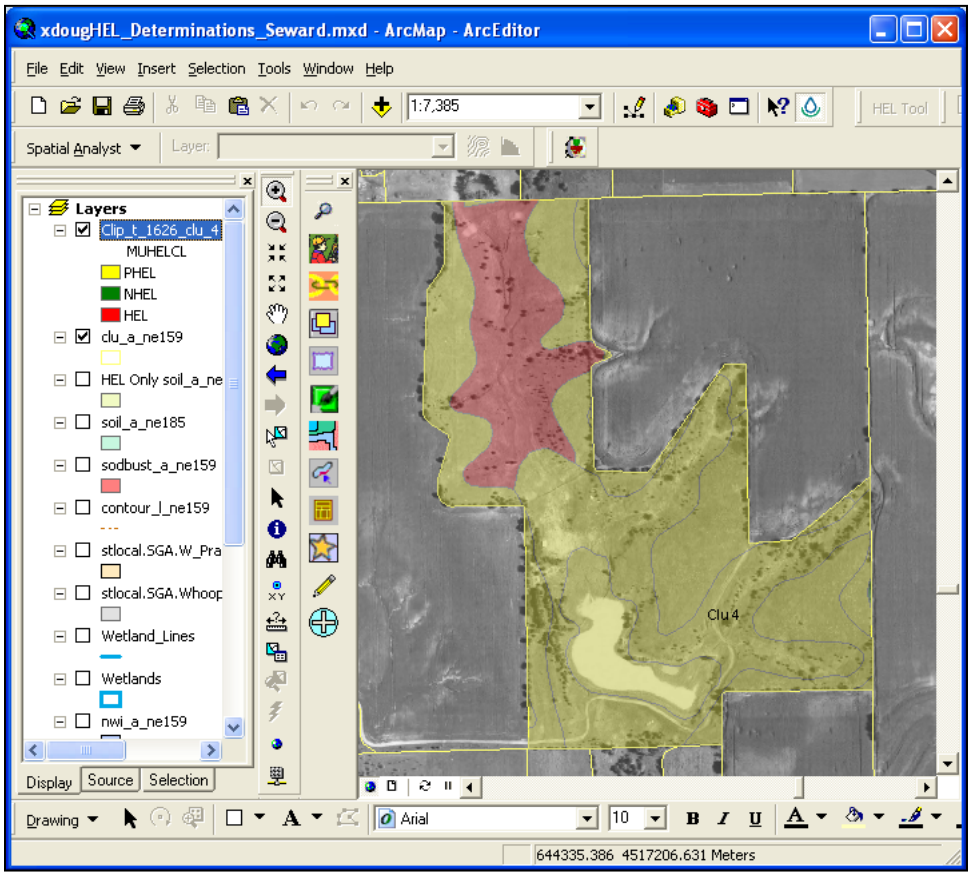
Making HEL Determinations for Fields with PHEL Map Units

In completing preliminary HEL determinations do not make a field visit to complete field slope and/or slope length measurements. **Only PHEL map units may be examined in the field if necessary to measure the percent slope and slope length to determine if they are highly erodible or not highly erodible.** Otherwise, the HEL determination and any reconsideration or appeal is completed offsite. GIS tools for use in making HEL determinations can be found on the Nebraska SharePoint site:
https://nrcs.sc.egov.usda.gov/central/ne/soils/GIS/Tools/Forms/AllItems.aspx

Mechanical alterations to the landscape, such as land leveling or other land shaping, are not considered in determining HEL. If a PHEL map unit has been altered prior to making an HEL determination, use previously documented slope measurements (if available) for that map unit to make the determination. If previous documentation is not available slope measurements from a comparable site or the use of contour maps and/or LIDAR data is acceptable.

Example HEL Determination using the ArcGIS HEL Tool

The HEL Tool clips the soils for the field and generates a report showing the extent and HEL classification of each map unit in the field and makes a preliminary HEL determination based on that information.



Map view of HEL Tool clip showing PHEL map units in yellow and HEL map units in red.

Clip_t_1626_clu_4.txt - Notepad

File Edit Format View Help

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Soil Data From Theme:  Clip_t_1626_clu_4.shp

Farmnbr     Tractnbr    Clunbr      Muhelcl     Musym       Acres
6108        1626        4           2           By          23.8
6108        1626        4           3           HsA          0.0
6108        1626        4           2           HtB2         2.0
6108        1626        4           2           HtB2         0.1
6108        1626        4           2           HtC2         6.2
6108        1626        4           2           HtC2         5.6
6108        1626        4           2           HtC3        14.1
6108        1626        4           1           HtD3        12.3
6108        1626        4           2           W            0.1
6108        1626        4           2           W            6.3
-------------------------------------------------------------------
Sum                                                         70.5

HEL = 12.3 Ac for 17.4468%
PHEL = 58.2 Ac for 82.5532%
(HEL + PHEL) = 70.5 Ac for 100.0000%
NHEL = 0.0 Ac for 0.0000%
Area is *** PHEL (HEL + PHEL) ***


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Other Data Layer Analysis:

nwi_a_ne159: **DATA PRESENT**
stlocal.SGA.Whooping_Crane_092211: **DATA PRESENT**
soilmu_a_hydric_soil_indicators_ne159: **DATA PRESENT**
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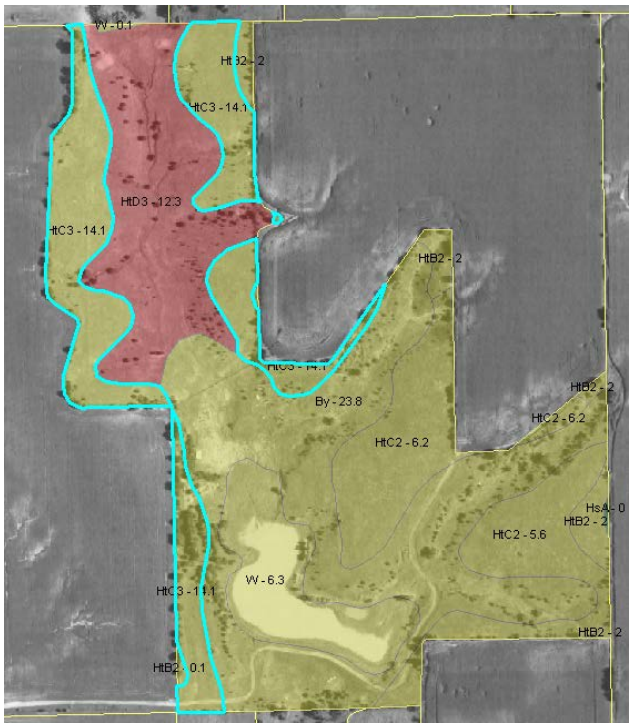
HEL Tool report for the field.

Note the HEL determination for the field is PHEL so the PHEL map units need to be evaluated. However, not all of the PHEL map units need to be evaluated. Start with the PHEL map unit with the greatest extent and work back. For preliminary HEL determinations the in-office procedure outlined in Appendix 4 of the guidance document for the HEL tool can be used. Select the polygon for analysis from the attribute table generated when the soils were clipped.

ND3CM	AREASYMBOL	SPATIALVER	MUSYM	MUKEY	NEWACRES	MUHELCL
0	NE159	2	HtB2	1674054	2	2
0	NE159	2	HtB2	1674054	0.1	2
0	NE159	2	HsA	1674051	0	3
0	NE159	2	HtC3	1674057	14.1	2
0	NE159	2	HtD3	1674058	12.3	1
0	NE159	2	W	1674086	0.1	2
0	NE159	2	By	1674033	23.8	2
0	NE159	2	HtC2	1674056	6.2	2
0	NE159	2	HtC2	1674056	5.6	2
0	NE159	2	W	1674086	6.3	2

Show: All Selected Records (1 out of 10 Selected) Options

Attribute table for the field with the PHEL map unit of greatest extent selected.



Map with the largest PHEL map unit selected.

Note that while the map unit is recognized as ONE polygon on the attribute table it looks like 4 or 5 separate polygons on the map. For field evaluations select two or three of the larger areas to evaluate for slope and slope length.