Iowa Technical Note No. 25 Iowa Phosphorus Index

Purpose

The purpose of Iowa phosphorus (P) index is to assess the risk of P delivery to surface waters. The index is a tool to help conservation planners, landowners/landusers and others to evaluate the current risk from P reaching surface water from a specific site, and to determine factors which dominate the risk due to P transport to surface waters. It will also assist landowners/landusers in making management decisions to reduce the risk.

Background

Phosphorus is an important nutrient needed for crop production and many fertilizers and organic sources can be used to supplement the supply of available P in soils. However, there are environmental concerns when excessive amounts of P (and other nutrients) from various sources reach surface waters. Phosphorus from soil, manure, fertilizer, and runoff, or subsurface flow that reaches surface water can produce eutrophication. Eutrophication is defined as an increase in the fertility status of natural waters that causes accelerated growth of algae or aquatic plants. In most fresh surface water systems (lakes, ponds, and streams), the excessive growth of algae or aquatic plants is directly related to levels of P. Large inputs of P to surface waters from nonpoint sources such as agricultural fields can elevate the P concentration in the water above critical levels for aquatic plant growth and thus enhance the development of eutrophication.

The challenge to producers and agriculturists is to develop a plan that efficiently utilizes all sources of nutrients and at the same time maintains or increases agricultural profitability and environmental quality.

The P index is an integrated approach to estimating the risk of P delivered to surface water from agricultural fields. This tool was developed to assess the potential for P moving from individual fields based on selected soil and field characteristics and on management practices. The P index is much more comprehensive than relying only on soil test P (STP) because it integrates many soil and field characteristics that influence potential P movement to surface waters. These characteristics include source factors such as soil test P, total soil P, rate, method, and timing of P application (fertilizer, manure, and other organic sources), and erosion. They also include transport factors such as sediment delivery, relative field location in the watershed, soil conservation practices, precipitation, runoff and tile flow/subsurface drainage. Use of the P index provides a means of identifying fields that have a low to moderate potential for P delivered to surface water, as well as fields that have very high risk of P loss and, therefore, require conservation practices and/or limits to manure or fertilizer P. The P index provides a relative rating as to the risk of P moving from individual fields, which can be used to prioritize fields for nutrient and soil management practices. Because of the integrated system, the P index is useful for understanding the processes causing a high P delivery to surface water and can help identify management practices to lower that risk. Ultimately, use of the P-index should reduce risks of P delivered to surface water, improve or maintain water quality, and provide producers options for improved P management.

Basic Concepts Underlying the Iowa Phosphorus Index

The current version of the P index is based on available research data and scientific judgment. Ongoing research designed to validate the various components of the index will produce results useful to modify the index. Current knowledge about the processes that are conducive to P delivered to surface waters has determined the main characteristics and underlying concepts of the Iowa P index. Some of the most important concepts can be summarized in the following four points.

The Iowa P index uses source and transport factors to approximate P loads to surface waters and to establish five risk classes. The source factors are arranged in a multiplicative manner within three components that represent the main transport mechanisms: 1) Erosion Component (sediment loss), 2) Runoff Component (water loss), and 3) Subsurface Drainage Component (water movement through tile and/or coarse subsoil/substrata). These components of the index yield relative risk of loss by approximating potential P delivered to surface water. The index sums the three components to get an overall estimate of P delivery to surface water, which will be placed into five risk classes (very low to very high). These classes are based on current knowledge concerning P loads to surface water from watersheds with varying degrees of eutrophication. The index units are approximated in lb/P/acre/yr for assumed long-term average conditions. The index is not intended to be used for prediction of actual P delivered to surface water from fields.

The index incorporates tools currently used by the Natural Resources Conservation Service (NRCS) to estimate the impact of landforms, soil map units, and management practices on soil and water loss from fields. These tools have been modified as needed to estimate these losses for the most representative area of individual agricultural fields. Appropriate use of the Index requires a recent measurement of soil test P using procedures suggested for crop production by Iowa State University.

The index considers loss of P dissolved in water runoff or subsurface drainage water that is readily available for algae growth. It also considers the proportion of the P in soil sediment (particulate P) delivered through erosion processes that likely will be released to the water over a period of time. Thus, the index will weigh particulate P losses very heavily when erosion risk is high and the impact of increased soil P associated with high soil P test levels.

The current version of the index does not differentiate between commonly used P sources, and gives similar weight to fertilizer, manure, and other organic sources. It is recognized that differences in water solubility of P may influence the short-term impact of P applications on P delivered to surface water through runoff or subsurface drainage, although not necessarily long-term losses through these processes or with eroded sediment. Ongoing research should provide information to modify future versions of the index as needed.

The Iowa Phosphorus Index

Only a brief explanation of the underlying equation and terms of the P index (PI) is provided here. More detailed background and explanations, including known improvements to be included in the future, are provided in the document “Mallarino, AP., B.M. Stewart, J.L. Baker, J.A. Downing, and J.E. Sawyer. 2005. Background and Basic Concepts of the Iowa P Index”.

The P Index is designed to be used on a field basis or Conservation Management Units (CMU). A CMU is a portion of a field, field, group of fields, or other land units of the same landuse and having similar treatment needs and management plans. When using the P Index on a field or CMU, use the flowing guidance for selection of the soil type for calculating soil loss: for NRCS planning purposes, use Iowa NRCS Planning Policy to determine the appropriate soil type for evaluation; for Iowa Department of Natural Resources planning, use Iowa Administrative Code, Chapter 65, to determine the appropriate soil type for evaluation.

Erosion Component + Runoff Component + Subsurface Drainage Component =P Index

Erosion Component (Potential P delivered to surface water with sediment):

Gross erosion x (Sediment trap factor or SDR) x Buffer factor x Enrichment factor x STP Erosion factor

Gross erosion is the sum of the estimated erosion from rill and interrill erosion and gully erosion for the field or CMU reported in tons/acre/year. . When manure or organic by-products are applied, the erosion component of the P-Index must be based on the annual soil loss rate for the year in which the manure is applied. Years in the cropping rotation not receiving manure or organic by-products may use a rotational average soil erosion rate. The Revised Universal Soil Loss Equation Version 2 (RUSLE2) or current erosion prediction tool used by NRCS will be used to determine rill and interrill erosion. Ephemeral gullies, and classical gully erosion are determined by the Gully Erosion procedures outlined in Section 1 of the FOTG. Gully erosion is prorated over the entire field or conservation management unit.

Sediment trap factor accounts for the sediment captured by certain conservation practices. **Table 1** lists the acceptable practices and factors. The factor applies to the area affected by the conservation practice. Fields should be subdivided by CMU to reflect different treatment units. If a factor for sediment trap efficiency is used, then the sediment delivery ratio defaults to 1.0.

Sediment delivery ratio (SDR) is derived from **Figure 1** and **Figure 2**. The SDR data is adapted from watersheds to individual fields by transforming area to linear distance from the center of the field to the nearest perennial, or intermittent channeled stream downslope, by major Iowa landform region (Figure 1). The output values from Figure 2 range from 0.03 to 1.0, with 1.0 for distances <60 feet.

Buffer factor refers to a vegetative buffer that meets NRCS standards for filter strips. Three classes, arranged by buffer width are listed in **Table 2** with the corresponding buffer factor.

Enrichment factor accounts for the increase in the proportion of fine soil particles in eroded sediment, which tend to have a higher concentration of P when certain land treatments are present. Five classes ranging from 1.1 to 1.3 according to cover or tillage utilized and presence or absence of a buffer strip are shown in **Table 3**.

Soil Test P (STP) Erosion factor represents the amount of particulate P in delivered sediment that likely will be released to the water over a long period of time. It is estimated as 70% of the total P concentration of the sediment, based on an average amount of total P (with low STP) in the surface 6- inch layer of soil and a recent measurement of STP. The average total P value is increased according to the recent STP value using a coefficient to transform STP to increased total P. The Bray P-1, Mehlich-3, Mehlich-3-ICP, or Olsen test methods can be used. The model reflects that about 30% of the total P is typically tightly bonded to soil particles and is not likely to become available for aquatic ecosystems. For a certain test value, the factors are the same for the Bray P-1 and Mehlich-3, higher for the Olsen since the Olsen test extracts less P, and lower for the Mehlich-3-ICP since it measures more P. The value for the STP Erosion factor can be found in **Table 4.**

Runoff Component (Potential P delivered to surface water in runoff):

Runoff factor x Precipitation x (STP Runoff factor + P Application factor)

Runoff factor uses the NRCS Runoff Curve Number (RCN) to convert precipitation to a fraction of water that runs off a field. It is estimated that 50% of the total rainfall will not produce runoff. The Runoff factor has been adjusted by 0.5 to account for this reduction. See **Figure 3** to determine the runoff from RCN.

Precipitation is the 30-year average annual precipitation for each county divided by the constant 4.415 to convert inches of rain to million lb of water/acre. Precipitation for each county can be selected from **Figure 4**.

STP Runoff factor consists of total dissolved P concentration in runoff estimated from STP (6-inch depth) results from the Bray P-1, Mehlich-3, Mehlich-3-ICP, or Olsen test methods. The STP runoff factor is taken from **Table 5**, with the appropriate factor determined by the soil test method used**.**

P application factor is an estimate of the additional impact of recent P applications on STP. The value of the factor is zero when there was no P application since the last time the soil was tested. The P application factor can be determined from **Table 6**.

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Subsurface Drainage Component (Potential P delivered to surface water with subsurface drainage):

Precipitation x Flow factor x STP Drainage factor

Precipitation is the 30-year average annual precipitation for each county divided by the constant 4.415 to convert inches of rain to million lb of water/acre. Precipitation for each county can be selected from **Figure 4**.

Flow factor is determined by presence or absence of subsurface/substrata flow. If tiles or coarse textured soils are known to be present, then the flow factor is 0.1, it is assumed that the flow is 10% of the precipitation. If it is unknown whether tile is present the evaluator can review **Table 7**. It contains a list of soil map units that have 5% or less slopes, 40% clay or coarser, and are poor or very poor in natural drainage. If one of the listed map units is present, predominate in the field, and the field is cropped the assumption is that some tile must be present. To determine if subsurface drainage is occurring from coarse-textured subsoil/substrata determine if the predominate soil is listed in **Table 8**. If yes for tile or coarse subsoil/substratum the flow factor is 0.1. If no the value is 0.0.

STP Drainage factor consists of two classes with a value of 0.1 or 0.2. The factor value is 0.1 if STP < 100 ppm Bray-1 or Mehlich-3, <118 ppm Mehlich-3-ICP or < 60 ppm Olsen P. The factor value is 0.2 if STP $\geq$ 100 ppm Bray-1 or Mehlich-3, $\geq$118 ppm Mehlich-3-ICP or $\geq$ 60 ppm Olsen P.

Procedure for making an assessment

Erosion Component

Gross Erosion	**X**	**Sediment Trap Factor or SDR**	**X**	**Buffer Factor**	**X**	**Enrichment Factor**	**X**	**STP Erosion Factor**	**=**	**Erosion Component**
Estimate gross erosion using the NRCS FOTG to calculate the sum of RUSLE2, Ephemeral, and Classic Gully in tons/acre/year.		Select landform from ***Figure 1***, determine distance to perennial or intermittent channeled stream and select factor from ***Figure 2***. If Conservation Practices are present that will affect sediment trap efficiency, select trap factor from ***Table 1*** instead of SDR factor.		Determine presence of buffer, buffer width and select buffer factor from ***Table 2.***		Determine tillage and presence of buffer and select from ***Table 3***. Buffer must be at least 20 ft in width.		Determine type of soil test method (Bray 1-P, Mehlich-3, Mehlich-3-ICPor Olsen) and Soil Test P in ppm and select factor from appropriate column in ***Table 4***.		**TOTAL**
	X		X		X		X		=	

Runoff Component

Runoff Factor	**X**	**Precipitation**	**X**	**(STP Runoff Factor**	**+**	**P Application Factor)**	**=**	**Runoff Component**
From ***Figure 3*** use the RCN to determine runoff factor.		Select county precipitation factor from ***Figure 4***.		Determine soil test method (Bray 1-P, Mehlich-3, Mehlich-3-ICP or Olsen) and STP in ppm and select factor from appropriate column in ***Table 5***.		Determine rate, method, and timing and select factor from ***Table 6***.		**TOTAL**
	X		**X**	(	**+**	)	**=**	

Subsurface Drainage Component

Flow Factor	X	Precipitation factor	X	STP Drainage Factor	=	Subsurface Drainage Component
If it is unknown whether tile is present the evaluator can review Table 7. It contains a list of soil map units that have 5% or less slopes, 40% clay or coarser, and are poor or very poor in natural drainage. If one of the listed map units is present, is predominant in the field and the field is cropped, the assumption is that some tile must be present. If yes enter 0.1. If no, enter 0.0		Select County Precipitation from ***Figure 4***.		Determine STP in ppm and the type of soil test. (Bray 1-P, Mehlich-3, Mehlich-3-ICP or Olsen)		
If it is unknown whether subsoil/substrata is coarse textured refer to ***Table 8***. To determine if subsurface drainage is occurring from coarse- textured subsoil/substrata determine if the predominant soil is listed in Table 8. If yes enter 0.1. If no, enter 0.0				Use a factor of 0.1 if the Mehlich-3-ICP is < 118 ppm or the Bray P-1 or Mehlich-3 is < 100 ppm or the Olson is < 60 ppm or a factor of 0.2 if the Mehlich-3-ICP is ≥ 118 ppm or the Bray P-1 or Mehlich-3 is ≥ 100 ppm or the Olsen P is ≥ 60.		**Total**
	X		**X**		**=**	

Erosion Component	+	Runoff Component	+	Subsurface Drainage Component	=	TOTAL PI
	+		+		=	

Risk Assessment:

Very Low	0-1
Low	>1-2
Medium	>2-5
High	>5-15
Very High	>15

INTERPRETATIONS OF SITE VULNERABILITY RATINGS FOR THE P INDEX

VERY LOW– 0-1 A field in which movement of P off site will be VERY LOW. If soil conservation and P management practices are maintained at current levels, impacts on surface water resources from P losses from the field will be small.

LOW – >1-2 A field in which movement of P off site will be LOW. Although the P delivery to surface water bodies is greater than from a field with a very low rating, current soil conservation and P management practices keep water quality impairment low.

MEDIUM – >2-5 A field in which movement of P off-site will be MEDIUM. Impacts on surface water resources will be higher than for the field with a low rating, and the P delivery potential may produce some water quality impairment. Careful consideration should be given to further soil conservation and P management practices that do not increase P delivery to surface water.

HIGH – >5-15 A field in which movement of P offsite will be HIGH. Water quality impairment will be large. Remedial action is required to reduce P movement to surface water bodies. New soil and water conservation and/or P management practices are necessary to reduce offsite P movement and water quality degradation.

VERY HIGH – >15 A field in which movement of P offsite will be VERY HIGH. Impacts on surface water resources are extreme. Remedial action is required to reduce P delivery to surface water. All necessary soil and water conservation practices plus a P management plan, which may require discontinuing P applications, must be put in place to reduce water quality impairment.

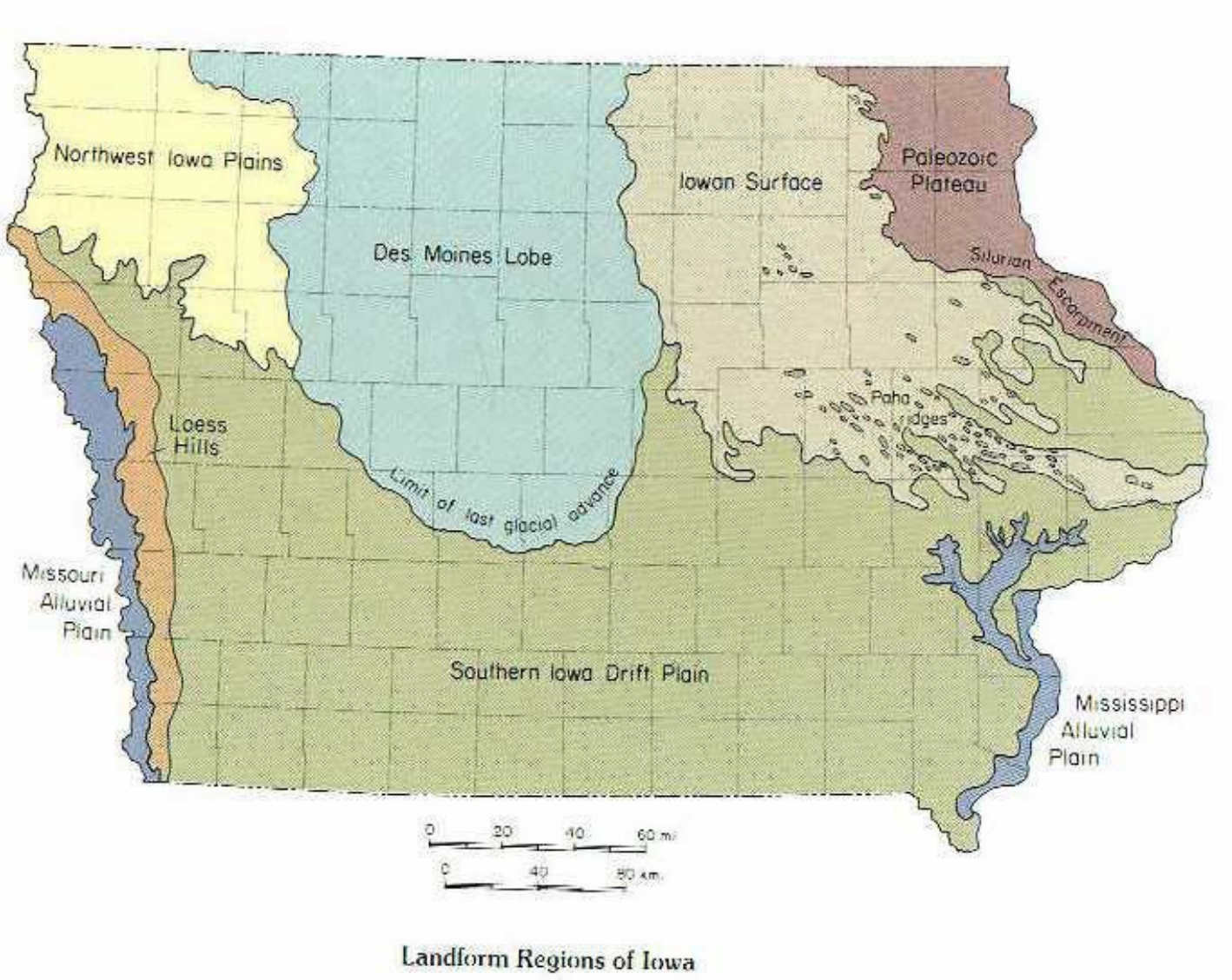
NOTE: See NRCS Nutrient Management Standard 590 for nutrient management recommendations.

PRECAUTIONS IN THE USE OF THE PHOSPHORUS INDEX

The P index is intended to be part of the NRCS nutrient management planning process that takes place between the land user and resource planner. It can be used to communicate the concepts, processes, and results that can be expected if various alternatives are implemented in the management of the natural resources at the site.

THE P INDEX IS NOT INTENDED TO BE AN EVALUATION SCALE FOR DETERMINING WHETHER LANDUSERS ARE COMPLYING WITH WATER QUALITY OR NUTRIENT MANAGEMENT STANDARDS ESTABLISHED BY LOCAL, STATE, OR FEDERAL AGENCIES. Use of this P index as a regulatory tool would be beyond the concept and philosophy of the working group that developed it. This P Index has been adapted to local conditions from appropriate regional and available in-state research. This version of the Index should be tested and modified periodically as new research data become available.

FIGURE 1. Iowa Land Form Regions



Landform Regions of Iowa

Figure 2, Sediment Delivery Ratio Factor

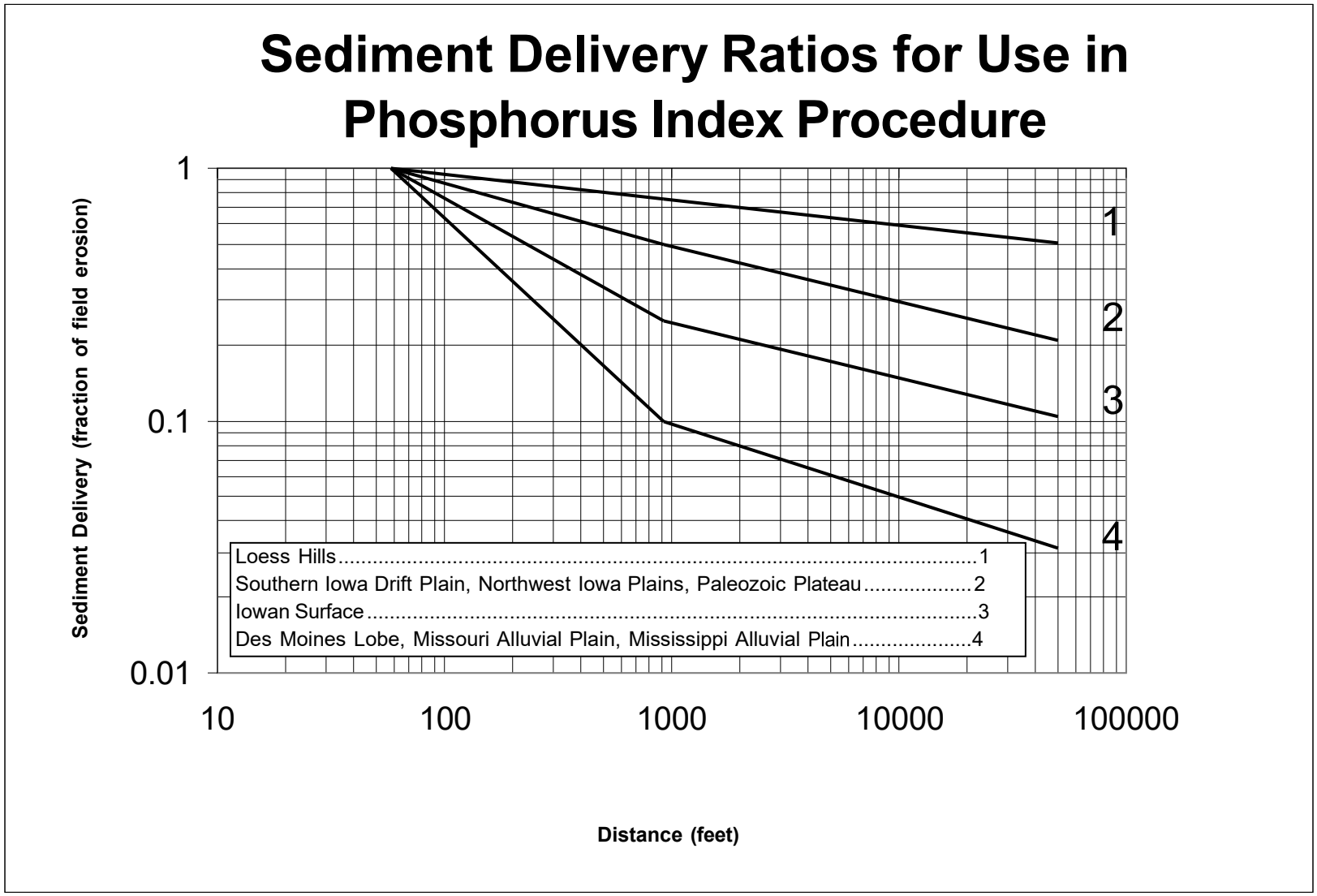


Figure 3, Surface Runoff Using Runoff Curve Numbers

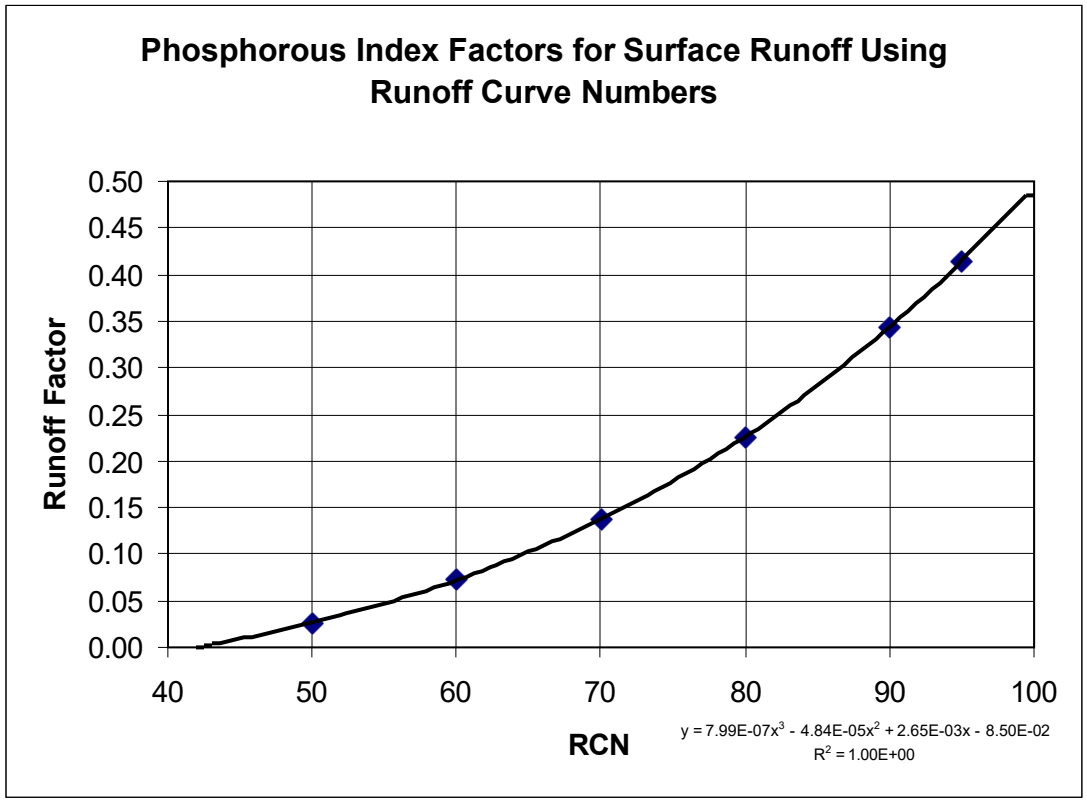


Figure 4, Precipitation 30 Year Average Annual (millions pounds/acre)

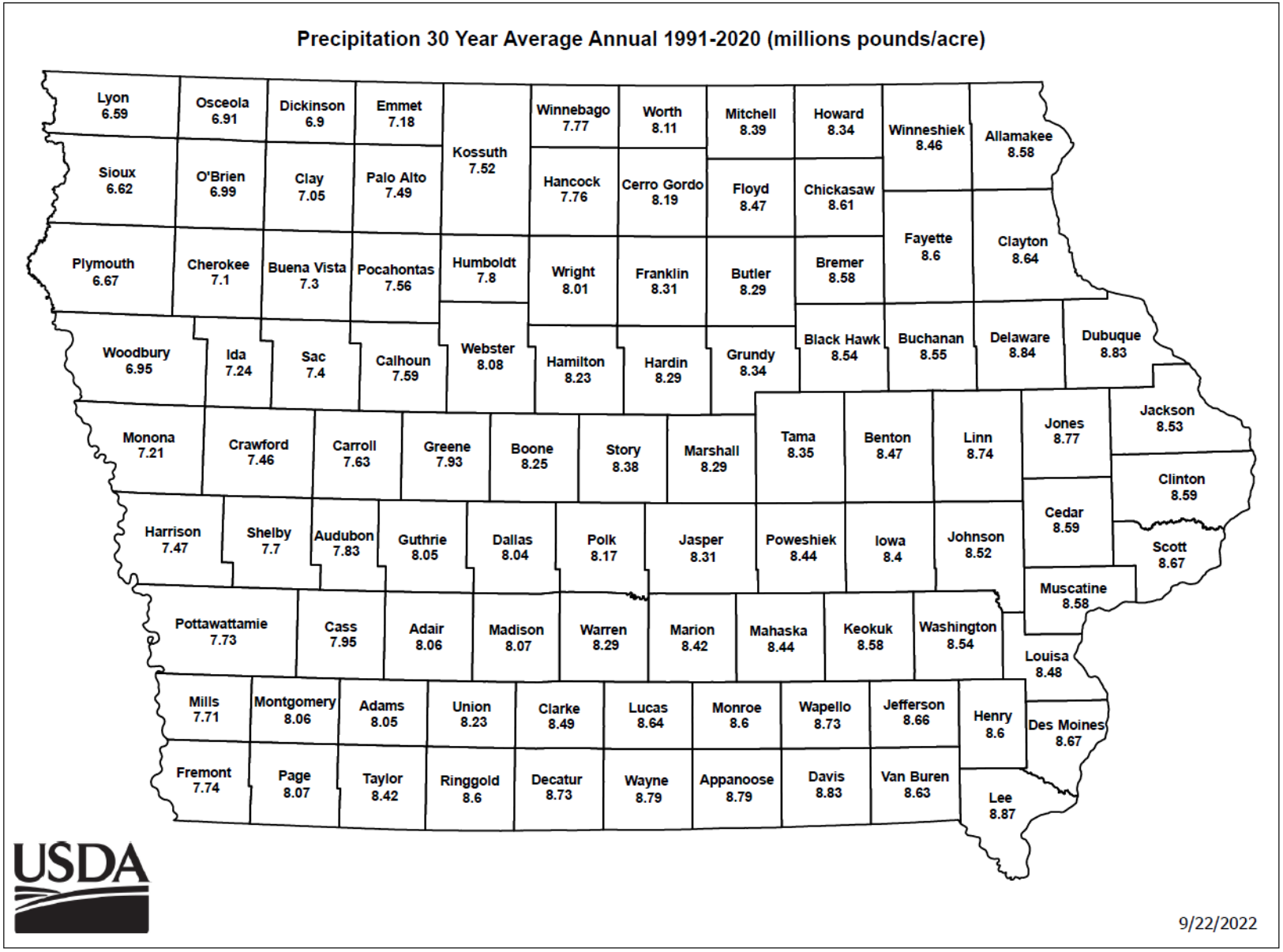


TABLE 1, Sediment Trap Factor

Conservation Practice	Trapping Factor
Level Terrace	0
Ponds Grade Stabilization Impoundment Tile Inlet Terrace	0.05
Water & Sediment Control Basin	0.2
Grade Stabilization Full Flow Graded Terrace Diversion	1

TABLE 2, Buffer Factor

Buffer Width	Factor
0-19 feet	1.0
20-75 feet	0.7
>75 feet	0.5

TABLE 3, Enrichment Factor

Management Treatment	Factor
Forage/Grass	1.3
With Buffer and No-Till	1.3
Without Buffer and No-Till	1.2
With Buffer and Tillage used	1.2
Without Buffer and Tillage used	1.1

Note: For buffers $\geq$ 20 feet in width.

Table 4 STP Erosion Factor

STP from 6 to 7 inch sample depth		

(Includes 2,000/1,000,000 conversion factor)
(Includes 30% non-available P -- to aquatic organisms)
4/19/2004

Erosion Factor for Soil Test P

Bray-1 P Mehlich-3 STP	STP Erosion Factor	Olsen STP	STP Erosion Factor	Mehlich-3 ICP STP	STP Erosion Factor
ppm		ppm		ppm	
0	0.70	0	0.70	0	0.70
5	0.72	5	0.74	5	0.70
10	0.74	10	0.77	10	0.70
15	0.76	15	0.81	15	0.72
20	0.78	20	0.84	20	0.74
25	0.81	25	0.88	25	0.76
30	0.83	30	0.91	30	0.78
35	0.85	35	0.95	35	0.80
40	0.87	40	0.98	40	0.82
45	0.89	45	1.02	45	0.84
50	0.91	50	1.05	50	0.86
60	0.95	60	1.12	60	0.89
70	0.99	70	1.19	70	0.93
80	1.04	80	1.26	80	0.97
90	1.08	90	1.33	90	1.01
100	1.12	100	1.40	100	1.05
125	1.23	125	1.58	125	1.15
150	1.33	150	1.75	150	1.24
175	1.44	175	1.93	175	1.34
200	1.54	200	2.10	200	1.44
250	1.75	250	2.45	250	1.63
300	1.96	300	2.80	300	1.83
350	2.17	350	3.15	350	2.02
400	2.38	400	3.50	400	2.22
450	2.59	450	3.85	450	2.41
500	2.80	500	4.20	500	2.61
600	3.22	600	4.90	600	2.99
700	3.64	700	5.60	700	3.38
800	4.06	800	6.30	800	3.77
900	4.48	900	7.00	900	4.16

Table 5. STP Runoff Factor STP
from 6-7 inch sample depth
Includes 2,000/1,000,000 conversion factor

STP from 6 to 7 inch sample depth	

4/19/2004

Runoff Factor for Soil Test P

Bray-1 P Mehlich-3 STP	STP Runoff Factor	Olsen STP	STP Runoff Factor	Mehlich-3 ICP STP	STP Runoff Factor
ppm		ppm		ppm	
0	0.05	0	0.05	0	0.05
5	0.08	5	0.09	5	0.05
10	0.10	10	0.13	10	0.05
15	0.13	15	0.18	15	0.07
20	0.15	20	0.22	20	0.10
25	0.18	25	0.26	25	0.12
30	0.20	30	0.30	30	0.14
35	0.23	35	0.34	35	0.17
40	0.25	40	0.38	40	0.19
45	0.28	45	0.43	45	0.21
50	0.30	50	0.47	50	0.24
60	0.35	60	0.55	60	0.28
70	0.40	70	0.63	70	0.33
80	0.45	80	0.72	80	0.37
90	0.50	90	0.80	90	0.42
100	0.55	100	0.88	100	0.47
125	0.68	125	1.09	125	0.58
150	0.80	150	1.30	150	0.70
175	0.93	175	1.51	175	0.81
200	1.05	200	1.72	200	0.93
250	1.30	250	2.13	250	1.16
300	1.55	300	2.55	300	1.39
350	1.80	350	2.97	350	1.62
400	2.05	400	3.38	400	1.86
450	2.30	450	3.80	450	2.09
500	2.55	500	4.22	500	2.32
600	3.05	600	5.05	600	2.78
700	3.55	700	5.88	700	3.25
800	4.05	800	6.72	800	3.71
900	4.55	900	7.55	900	4.17

Table 6, P Application Factor

Runoff Factor for P Application Rate and Method of Application

P Application Rate	Incorporate or Inject Within 24 Hours	Incorporate Within One Week	Surface Application No Incorporation	Surface Application Frozen/Snow Covered, Saturated, or Floodplain
lb P_2O_5/acre				
0	0.00	0.00	0.00	0.00
10	0.00	0.00	0.01	0.01
20	0.00	0.01	0.01	0.02
30	0.01	0.01	0.02	0.02
40	0.01	0.01	0.02	0.03
50	0.01	0.02	0.03	0.04
60	0.01	0.02	0.03	0.05
70	0.02	0.02	0.04	0.06
80	0.02	0.03	0.04	0.07
90	0.02	0.03	0.05	0.07
100	0.02	0.03	0.05	0.08
120	0.03	0.04	0.07	0.10
140	0.03	0.05	0.08	0.11
160	0.03	0.05	0.09	0.13
180	0.04	0.06	0.10	0.15
200	0.04	0.07	0.11	0.16
220	0.05	0.07	0.12	0.18
240	0.05	0.08	0.13	0.20
260	0.06	0.09	0.14	0.21
280	0.06	0.09	0.15	0.23
300	0.07	0.10	0.16	0.25

Table 7, Soils listing for estimating presence of tile.

Soils Data of subsoil grouping by drainage class

It contains a list of sorted soil names (and a list of associated county numbers) where:

Slope Range High :	**Less than 5%**	and
Drainage Class :	**Poor, Poor-Very poor, or Very Poor**	and
Subsoil Groups :	**1 or 2 (Clay < 40%)**	

From the Iowa Soil Properties And Interpretations Database (ISPAID) 7.0 Manual:

21 Slope Range (%) High [SLOPERNGH]
The grade or slope of the surface of a soil. It is expressed in percentages of slope which equal the number of feet of fall per 100 feet of horizontal distance.

41 Subsoil Group (B Horizon only) [SUBSOILGRP]
[Subsoil group listed for complexes is the most limiting group of the soils identified in the map unit name] (i.e., Steinauer = 1 and Shelby = 2; Steinauer-Shelby complex = 2).]
1 = Subsoil texture about the same as surface soil texture, not more than 34% clay, subsoil favorable for crop growth.
2 = Subsoil moderately unfavorable for crop growth: slow permeability [35-40% clay content] or high plasticity.
3 = Subsoil very unfavorable for crop growth: silty clay and clay textures, very slow permeability [>40% clay content], or high plasticity.

58 Drainage Class (Natural) Code [DRNCLSCD]
Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. [The drainage class listed for complexes is the most limiting class of the soils identified in the map unit name (i.e., Ackmore = SP-P and Colo = P; Ackmore-Colo complex = P).]
Drainage class abbreviations and code numbers assigned follow.

E	= 10 = Excessive
E-SE	= 15 = Excessive-Somewhat excessive
SE	= 20 = Somewhat excessive
SE-W	= 25 = Somewhat excessive-Well
W	= 30 = Well
W-MW	= 35 = Well-Moderately well
MW	= 40 = Moderately well
MW-SP	= 45 = Moderately well-Somewhat poor
SP	= 50 = Somewhat poor
SP-P	= 55 = Somewhat poor-Poor
P	**= 60 = Poor**
P-VP	**= 65 = Poor-Very poor**
VP	**= 70 = Very poor**

Soil Data from SSURGO 2023

SOIL NAME	SLOPE RANGE	DRAINAGE CLASS	COUNTIES
Ackmore-Colo complex, 0 to 2 percent slopes	0-2%	P	79
Ackmore-Colo complex, 2 to 5 percent slopes	0-2%	P	48, 50, 64, 86
Ackmore-Colo-Judson complex, 0 to 5 percent slopes	0-5%	P	69, 78
Afton silty clay loam, 0 to 2 percent slopes, occasionally flooded	0-2%	P	11, 18, 47, 60, 71, 72, 81, 84
Afton silty clay loam, Sheldon creek formation, 0 to 2 percent slopes, occasionally flooded	0-2%	P	11, 18, 21, 60, 71, 72, 81
Albaton and Sarpy soils	0-2%	VP	43
Albaton silt loam, 0 to 2 percent slopes, occasionally flooded	0-2%	P	36, 43, 67
Albaton silt loam, 0 to 2 percent slopes, overwash, occasionally flooded	0-2%	P	78
Albaton silt loam, 0 to 2 percent slopes, rarely flooded	0-2%	P	67
Albaton silty clay loam, 0 to 2 percent slopes, occasionally flooded	0-2%	P	67
Albaton silty clay loam, 0 to 2 percent slopes, rarely flooded	0-2%	P	67
Albaton silty clay, 0 to 2 percent slopes, occasionally flooded	0-2%	P	36, 43, 65, 67, 78
Albaton silty clay, 0 to 2 percent slopes, rarely flooded	0-2%	P	67, 75, 97
Albaton silty clay, depressional, drained, 0 to 1 percent slopes, frequently flooded	0-1%	VP	67, 97
Albaton silty clay, depressional, undrained, 0 to 1 percent slopes, frequently flooded	0-1%	VP	67
Albaton-Urban land complex, 0 to 2 percent slopes, rarely flooded	0-2%	P	78
Algansee-Kalmarville complex, river valleys, 0 to 3 percent slopes, frequently flooded	0-1%	P	23
Ambraw clay loam, 0 to 2 percent slopes	0-2%	P	82
Ambraw loam, 0 to 2 percent slopes	0-2%	P	29, 58
Ambraw loam, rarely flooded, 0 to 2 percent slopes	0-2%	P	58, 70
Ambraw silty clay loam, 0 to 2 percent slopes	0-2%	P	23, 70
Ambraw-Perks-Lawson complex, frequently flooded, 0 to 2 percent slopes	0-2%	P	82
Ames silt loam, 0 to 1 percent slopes	0-1%	VP	8
Ansgar silt loam, 0 to 2 percent slopes	0-2%	P	16, 23, 35, 52, 53, 66
Appanoose silt loam, 0 to 2 percent slopes	0-2%	P	4, 26, 89, 93
Aquents loamy, reclaimed, 0 to 2 percent slopes	0-1%	VP	40
Aquents, loamy, rarely flooded	0-5%	VP	67
Aquents, loamy, reclaimed, 0 to 2 percent slopes	0-2%	VP	99
Aquents, ponded, occasionally flooded	0-5%	VP	67
Aquents, ponded, occasionally flooded	0-1%	VP	77
Aquents, ponded, occasionally flooded	0-2%	VP	89
Aquents, ponded, rarely flooded	0-3%	VP	67
Aquents-orthents complex	0-2%	P	67
Aquolls (marsh), ponded, 0 to 1 percent slopes	0-2%	VP	21, 46
Aquolls, 0 to 1 percent slopes, channeled, ponded	0-1%	VP	59
Aquolls, 0 to 2 percent slopes	0-1%	VP	70
Aquolls, ponded	0-2%	VP	18, 55
Aquolls, ponded	0-1%	VP	32
Aquolls, ponded, 0 to 1 percent slopes	0-1%	VP	2

SOIL NAME	SLOPE RANGE	DRAINAGE CLASS	COUNTIES
Aquolls, ponded, 0 to 2 percent slopes	0-2%	VP	49
Aquolls, ponded-Udorthents, loamy, complex		VP	59, 93, 94
Arispe-Clearfield silty clay loams, 5 to 9 percent slopes	5-9%	P	90
Ashgrove silt loam, 5 to 9 percent slopes, moderately eroded	5-9%	P	4, 56
Ashgrove silt loam, 9 to 14 percent slopes	9-14%	P	68
Ashgrove silt loam, 9 to 14 percent slopes, moderately eroded	9-14%	P	4, 56, 92
Ashgrove silty clay loam, 5 to 9 percent slopes, moderately eroded	5-9%	P	51, 54, 89
Ashgrove silty clay loam, 9 to 14 percent slopes	9-14%	P	89
Ashgrove silty clay loam, 9 to 14 percent slopes, moderately eroded	9-14%	P	26, 29, 44, 44, 51, 51, 54, 58, 89, 90
Ashgrove soils, 5 to 9 percent slopes, severely eroded	5-9%	P	56
Ashgrove soils, 9 to 14 percent slopes, severely eroded	9-14%	P	56
Beckwith silt loam, 0 to 2 percent slopes	0-2%	P	4, 26, 44, 51, 56, 68, 89, 90
Beckwith silt loam, terrace, 0 to 2 percent slopes	0-2%	P	26, 51, 56, 89
Belinda silt loam, 0 to 2 percent slopes	0-2%	P	4, 26, 29, 44, 51, 56, 63, 68, 89, 90
Belinda silt loam, terrace, 0 to 2 percent slopes	0-2%	P	4, 26, 27, 44, 51, 56, 68, 88, 89, 90
Belmann clay loam, 0 to 2 percent slopes	0-2%	P	21
Belmann clay loam, gypsum phase, 0 to 2 percent slopes	0-2%	P	21
Birds-Klum complex, 0 to 2 percent slopes, frequently flooded	0-2%	P	56
Birds-Orion Complex, channeled, O to 2 percent slopes, frequently flooded	0-2%	P	56
Biscay clay loam, 0 to 2 percent slopes	0-2%	P	8, 11, 13, 14, 21, 25, 30, 32, 37, 40, 41, 46, 55, 72, 74, 76, 77, 81, 85, 94, 99
Biscay clay loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes	0-2%	P	71
Biscay clay loam, deep, 0 to 2 percent slopes	0-2%	P	60
Biscay clay loam, depressional, 0 to 1 percent slopes	0-1%	VP	21, 41, 94
Biscay clay loam, loamy substratum, 0 to 2 percent slopes	0-2%	P	94
Biscay loam, 32 to 40 inches to sand and gravel, 0 to 2 percent	0-2%	P	84
Blencoe-Woodbury silty clays, 0 to 2 percent slopes, rarely flooded	0-2%	P	97
Blend silty clay	0-2%	P	36, 43
Blend silty clay, 0 to 2 percent slopes	0-2%	P	65
Blend silty clay, 0 to 2 percent slopes, rarely flooded	0-2%	P	67, 97
Blue Earth muck, ponded, 0 to 1 percent slopes	0-1%	VP	30, 72
Blue Earth mucky silt loam, 0 to 1 percent slopes	0-1%	VP	8, 11, 30, 32, 40, 41, 55, 74, 76, 81, 94, 95
Blue Earth mucky silt loam, 1 to 5 percent slopes	1-5%	VP	32
Blue Earth mucky silt loam, sandy substratum, 0 to 1 percent slopes	0-1%	VP	40
Boots muck, 0 to 1 percent slopes	0-1%	VP	95
Boots mucky peat, 0 to 1 percent slopes	0-1%	VP	98
Bremer silty clay loam, 0 to 2 percent slopes	0-2%	P	15, 27
Bremer silty clay loam, 0 to 2 percent slopes, occasionally flooded	0-2%	P	50, 61, 62, 65, 69, 86, 91

SOIL NAME	SLOPE RANGE	DRAINAGE CLASS	COUNTIES
Bremer silty clay loam, 0 to 2 percent slopes, rarely flooded	0-2%	P	2, 9, 12, 15, 34, 38, 48, 52, 63, 64, 73, 77, 77, 78, 79, 92
Bremer silty clay loam, sandy substratum, 0 to 2 percent slopes, rarely flooded	0-2%	P	6, 70
Brownton silty clay loam, 0 to 2 percent slopes	0-2%	P	40, 41, 94, 99
Calamine loam, 1 to 3 percent slopes	1-3%	P	22
Calamine silty clay loam, 0 to 3 percent slopes	0-3%	P	34
Calamine silty clay loam, 1 to 3 percent slopes	1-3%	P	17, 33, 35
Calamine silty clay loam, 2 to 5 percent slopes	2-5%	P	94
Calamine silty clay loam, 5 to 14 percent slopes	5-14%	P	94
Calamine-Jacwin complex, 0 to 3 percent slopes	0-3%	P	96
Calamine-Urban land complex, 2 to 5 percent slopes	2-5%	P	94
Calamine-Urban land complex, 5 to 14 percent slopes	5-14%	P	94
Calco silty clay loam, 0 to 2 percent slopes	0-2%	P	12, 23, 34, 38, 60, 66, 84
Calco silty clay loam, 0 to 2 percent slopes, frequently flooded	0-2%	P	41
Calco silty clay loam, 0 to 2 percent slopes, occasionally flooded	0-2%	P	11, 15, 21, 60, 65, 71, 75, 81, 84, 97
Calco silty clay loam, 0 to 2 percent slopes, occasionaly flooded	0-2%	P	8, 13, 14, 17, 30, 32, 35, 37, 39, 42, 55, 74
Calcousta mucky silt loam, 0 to 1 percent slopes	0-1%	VP	32
Calcousta silty clay loam, 0 to 1 percent slopes	0-1%	VP	37, 40, 76, 99
Calcousta silty clay loam, depressional, 0 to 1 percent slopes	0-1%	VP	46, 77
Caneek silt loam, 0 to 2 percent slopes	0-2%	P	3, 22, 31, 33, 49, 70
Caneek silt loam, channeled, 0 to 2 percent slopes	0-2%	P	3, 22, 31, 49, 70
Canisteo clay loam, 0 to 2 percent slopes	0-2%	P	8, 11, 13, 17, 21, 30, 32, 35, 37, 40, 41, 42, 46, 55, 72, 74, 76, 81, 85, 94, 95, 98, 99
Canisteo clay loam, Bemis moraine, 0 to 2 percent slopes	0-2%	P	8, 13, 14, 17, 25, 35, 37, 39, 41, 42, 50, 64, 77, 81, 85
Canisteo silty clay loam, 0 to 2 percent slopes	0-2%	P	34, 66
Canisteo-Urban land complex, 0 to 2 percent slopes	0-2%	P	8, 77, 94
Cantril-Coppock-Nodaway complex, 2 to 9 percent slopes	2-5%	P	27
Carlow silt loam, overwash, 0 to 2 percent slopes	0-2%	P	80
Carlow silty clay, 0 to 2 percent slopes	0-2%	P	80
Carlow silty clay, 0 to 2 percent slopes, occasionally flooded	0-2%	P	4, 89
Chequest silt loam, 0 to 2 percent slopes, occasionally flooded, overwash	0-2%	P	48, 54
Chequest silt loam, 0 to 2 percent slopes, overwash	0-2%	P	59
Chequest silty clay loam, 0 to 2 percent slopes	0-2%	P	27, 51, 56
Chequest silty clay loam, 0 to 2 percent slopes, frequently flooded	0-2%	P	54
Chequest silty clay loam, 0 to 2 percent slopes, occasionally flooded	0-2%	P	4, 26, 48, 51, 54, 56, 59, 93
Chequest silty clay loam, 0 to 2 percent slopes, rarely flooded	0-2%	P	89
Clarinda silty clay loam eroded-severely eroded complex, 5 to 9 percent slopes	5-9%	P	15, 15
Clarinda silty clay loam eroded-severely eroded complex, 9 to 14 percent slopes	9-14%	P	15, 15
Clarinda silty clay loam, 5 to 9 percent slopes	5-9%	P	1, 4, 20, 27, 29, 44, 51, 54, 56, 59, 61, 62, 63, 68, 79, 80, 87, 88, 90, 91, 93

SOIL NAME	SLOPE RANGE	DRAINAGE CLASS	COUNTIES
Clarinda silty clay loam, 5 to 9 percent slopes moderately eroded	5-9%	P	79
Clarinda silty clay loam, 5 to 9 percent slopes, eroded	5-9%	P	1, 2, 15, 39, 61, 69, 87
Clarinda silty clay loam, 5 to 9 percent slopes, moderately eroded	5-9%	P	4, 20, 26, 27, 44, 50, 51, 54, 56, 59, 62, 63, 68, 69, 80, 88, 89, 90, 91, 92, 93
Clarinda silty clay loam, 5 to 9 percent slopes, severely eroded	5-9%	P	26, 59, 92
Clarinda silty clay loam, 9 to 14 percent slopes	9-14%	P	2, 80, 88
Clarinda silty clay loam, 9 to 14 percent slopes moderately eroded	9-14%	P	86
Clarinda silty clay loam, 9 to 14 percent slopes, moderately eroded	9-14%	P	4, 20, 27, 50, 59, 62, 64, 68, 79, 80, 92, 93
Clarinda silty clay loam, 9 to 14 percent slopes, severely eroded	9-14%	P	92
Clarinda silty clay loam, deep loess, 9 to 14 percent slopes, eroded	9-14%	P	5, 15, 69, 78, 83
Clarinda silty clay loam, dissected till plain, 9 to 14 percent slopes, eroded	9-14%	P	1, 2, 15, 39, 69, 87, 88, 91
Clarinda silty clay, 5 to 9 percent slopes, severely eroded	5-9%	P	20, 93
Clarinda silty clay, 9 to 14 percent slopes, severely eroded	9-14%	P	2, 15
Clarinda soils, 5 to 9 percent slopes, severely eroded	5-9%	P	4
Clearfield silty clay loam, 5 to 9 percent slopes	5-9%	P	62, 91
Clearfield silty clay loam, 5 to 9 percent slopes, moderately eroded	5-9%	P	62, 63, 91
Clearfield silty clay loam, 9 to 14 percent slopes, eroded	9-14%	P	39
Clearfield silty clay loam, dissected till plain, 5 to 9 percent slopes	5-9%	P	1, 20, 61, 80, 87, 88, 91
Clearfield silty clay loam, dissected till plain, 5 to 9 percent slopes, eroded	5-9%	P	1, 20, 61, 80, 87, 91
Clearfield-Arispe silty clay loams, 5 to 9 percent slopes	5-9%	P	63
Clearfield-Arispe silty clay loams, 5 to 9 percent slopes, moderately eroded	5-9%	P	63
Clyde clay loam, 0 to 3 percent slopes	0-3%	P	10, 19, 22, 28, 33, 82
Clyde loam, 0 to 2 percent slopes	0-2%	P	31
Clyde muck, 1 to 4 percent slopes	1-4%	P	45
Clyde silt loam, 0 to 3 percent slopes	0-3%	P	96
Clyde silty clay loam, 0 to 3 percent slopes	0-3%	P	6, 7, 9, 12, 17, 23, 34, 35, 38, 45, 53, 57, 66, 98
Clyde-Floyd complex, 1 to 4 percent slopes	0-3%	P	6, 7, 9, 10, 12, 17, 19, 22, 23, 28, 31, 33, 34, 35, 38, 45, 53, 57, 66, 96
Clyde-Floyd-Urban land complex, 0 to 5 percent slopes	0-3%	P	7, 57
Clyde-Urban land complex, 0 to 3 percent slopes	0-3%	P	7
Coland - Spillville complex, channeled, 0 to 2 percen slopes	0-2%	P	45
Coland clay loam, 0 to 2 percent slopes	0-2%	P	18, 29, 58
Coland clay loam, 0 to 2 percent slopes, frequently flooded	0-2%	P	8, 35, 37, 41, 55, 99
Coland clay loam, 0 to 2 percent slopes, occasionally flooded	0-2%	P	7, 8, 9, 12, 13, 14, 17, 19, 21, 25, 30, 32, 33, 34, 35, 37, 38, 40, 41, 42, 46, 50, 52, 55, 64, 66, 72, 76, 77, 81, 85, 94, 95, 96, 99
Coland clay loam, 2 to 4 percent slopes	2-4%	P	13

SOIL NAME	SLOPE RANGE	DRAINAGE CLASS	COUNTIES
Coland clay loam, 2 to 4 percent slopes	2-5%	P	81
Coland clay loam, 2 to 5 percent slopes	2-5%	P	50, 70, 76, 95
Coland clay loam, channeled, 0 to 2 percent slopes	0-2%	P	33
Coland clay loam, rarely flooded, 0 to 2 percent slopes	0-2%	P	70
Coland, occasionally flooded-Terril complex, 1 to 4 percent slopes	0-2%	P	12, 34
Coland, occasionally flooded-Terril complex, 2 to 5 percent slopes	1-3%	P	77
Coland, occasionally flooded-Terril-Urban land complex, 2 to 5 percent slopes	2-5%	P	77
Coland, occasionally flooded-Urban land complex, 0 to 2 percent slopes	0-2%	P	7, 77
Coland-Hanlon complex, 0 to 2 percent slopes	0-2%	P	17
Coland-Hanlon complex, channeled, 0 to 2 percent slopes	0-2%	P	17
Coland-Perks-Lawson complex, frequently flooded, 0 to 2 percent slopes	0-2%	P	58
Coland-Spillville complex, 0 to 2 percent slopes, occasionally flooded	0-2%	P	7, 9, 10, 12, 19, 28, 34, 45, 53, 98
Coland-Spillville complex, 0 to 5 percent slopes	0-2%	P	95
Coland-Spillville complex, 1 to 5 percent slopes	1-5%	P	37
Coland-Spillville complex, 1 to 5 percent slopes, occasionally flooded	1-3%	P	30
Coland-Spillville complex, 2 to 5 percent slopes	2-5%	P	8, 13, 32, 81
Coland-Spillville complex, 2 to 5 percent slopes	0-2%	P	14
Coland-Spillville complex, channeled, 0 to 2 percent slopes	0-2%	P	32, 37
Coland-Spillville complex, channeled, 2 to 5 percent slopes	2-5%	P	13, 76, 81
Coland-Spillville complex, channeled, 2 to 5 percent slopes	0-2%	P	37
Coland-Spillville-Hanlon complex, 0 to 2 percent slopes	0-2%	P	42
Coland-Spillville-Hanlon complex, channeled, 0 to 2 percent slopes	0-2%	P	42
Coland-Terril complex, 1 to 4 percent slopes	1-4%	P	17
Coland-Terril complex, 1 to 5 percent slopes	1-3%	P	35, 99
Coland-Terril complex, 1 to 5 percent slopes	0-2%	P	40
Coland-Terril complex, 1 to 5 percent slopes	1-2%	P	85
Coland-Terril complex, 1 to 5 percent slopes	1-5%	P	94
Coland-Terril complex, 2 to 5 percent slopes	0-2%	P	21, 46
Coland-Terril complex, 2 to 5 percent slopes	2-5%	P	25, 42, 64, 72
Coland-Turlin complex, 0 to 2 percent slopes	0-2%	P	34, 66
Coland-Turlin complex, channeled, 0 to 2 percent slopes	0-2%	P	66
Coland-Urban land complex, 0 to 2 % slopes, rarely flooded	0-2%	P	57
Colo loamy sand, overwash, 0 to 2 percent slopes	0-2%	P	58
Colo silt loam, 0 to 2 percent slopes, frequently flooded, overwash	0-2%	P	54
Colo silt loam, 0 to 2 percent slopes, occasionally flooded, overwash	0-2%	P	16, 23, 28, 44, 48, 50, 52, 54, 57, 62, 64, 77, 79, 86, 92
Colo silt loam, calcareous overwash, 0 to 2 percent slopes, occasionally flooded	0-2%	P	75
Colo silt loam, deep loess, 0 to 2 percent slopes, overwash, occasionally flooded	0-2%	P	1, 14, 24, 36, 39, 43, 47, 63, 65, 67, 69, 73, 78, 87

SOIL NAME	SLOPE RANGE	DRAINAGE CLASS	COUNTIES
Colo silt loam, dissected till plain, 0 to 2 percent slopes, channeled, frequently flooded	0-2%	P	39
Colo silt loam, dissected till plain, 2 to 5 percent slopes, overwash, occasionally flooded	2-5%	P	39, 87
Colo silt loam, heavy till, 0 to 2 percent slopes, occasionally flooded, overwash	0-2%	P	4, 90
Colo silt loam, overwash, 0 to 2 percent slopes	0-2%	P	68, 90
Colo silty clay loam, 0 to 2 percent slopes	0-2%	P	22, 32, 49, 55, 74
Colo silty clay loam, 0 to 2 percent slopes, frequently flooded	0-2%	P	54
Colo silty clay loam, 0 to 2 percent slopes, occasionally flooded	0-2%	P	6, 7, 12, 16, 23, 29, 35, 38, 42, 44, 48, 50, 52, 53, 54, 57, 58, 62, 64, 70, 79, 82, 86, 90, 92
Colo silty clay loam, 0 to 2 percent slopes, ponded, occasionally flooded	0-2%	P	6, 16, 29, 44, 48, 50, 52, 54, 58, 62, 63, 64, 70, 79, 82, 86, 90, 92
Colo silty clay loam, 0 to 2 percent slopes, rarely flooded	0-2%	P	70, 89
Colo silty clay loam, 2 to 4 percent slopes	2-4%	P	55, 74
Colo silty clay loam, 2 to 5 percent slopes	2-5%	P	68
Colo silty clay loam, 2 to 5 percent slopes, occasionally flooded	2-5%	P	29, 44, 54, 62, 64
Colo silty clay loam, channeled, 0 to 2 percent slopes	0-2%	P	32, 55, 95
Colo silty clay loam, channeled, 0 to 2 percent slopes, frequently flooded	0-2%	P	6, 38, 44, 64, 86
Colo silty clay loam, deep loess, 0 to 2 percent slopes, channeled, frequently flooded	0-2%	P	21
Colo silty clay loam, deep loess, 0 to 2 percent slopes, occasionally flooded	0-2%	P	1, 5, 11, 14, 18, 21, 24, 25, 36, 39, 43, 47, 60, 61, 63, 65, 67, 69, 71, 73, 75, 77, 78, 81, 84, 87, 88, 91
Colo silty clay loam, dissected till plain, 2 to 5 percent slopes, occasionally flooded	2-5%	P	39, 63, 87, 88, 91
Colo silty clay loam, heavy till, 0 to 2 percent slopes, occasionally flooded	0-2%	P	4, 20, 56, 68, 93
Colo silty clay loam, heavy till, 2 to 5 percent slopes, rarely flooded	2-5%	P	4, 20, 68, 93
Colo silty clay loam, loamy substratum	0-2%	P	45
Colo silty clay loam, rarely flooded, 0 to 2 percent slopes	0-2%	P	58
Colo, frequently flooded-Ely silty clay loams, gullied, 2 to 5 percent slopes	2-5%	P	61
Colo, occasionally flooded-Ely silty clay loams, deep loess, 2 to 5 percent slopes	2-5%	P	81
Colo, occasionally flooded-Ely silty clay loams, dissected till plain, 2 to 5 percent slopes	2-5%	P	1, 25, 61, 63, 88, 91
Colo, occasionally flooded-Urban land complex, 0 to 2 percent slopes	0-2%	P	7, 64
Colo, overwash-Ely complex, 2 to 5 percent slopes	2-5%	P	15
Colo, overwash-Lawson complex, channeled, 0 to 2 percent slopes, frequently flooded	0-2%	P	50
Colo, rarely flooded-Judson-Urban land complex, 2 to 5 percent slopes	2-5%	P	77
Colo-Ackmore complex, 0 to 5 percent slopes	0-5%	P	87
Colo-Alluvial land complex	0-2%	P	45
Colo-Alluvial land complex, channeled	0-2%	P	45
Colo-Ely complex, 0 to 5 percent slopes	0-2%	P	6, 7, 12, 16, 23, 28, 35, 38, 42, 48, 52, 53, 54, 57, 58, 62, 64, 68, 70, 79, 82, 86, 90, 92
Colo-Ely complex, 0 to 5 percent slopes	0-5%	P	49
Colo-Ely silty clay loams, 2 to 5 percent slopes	2-5%	P	63, 88, 91

SOIL NAME	SLOPE RANGE	DRAINAGE CLASS	COUNTIES
Colo-Ely-Urban land complex, 2 to 5 percent slopes	0-2%	P	7, 57, 64
Colo-Hanlon-Lawson complex, channeled, 0 to 2 percent slopes	0-2%	P	64
Colo-Judson silty clay loams, 0 to 5 percent slopes, occasionally flooded	0-5%	P	14, 18, 36, 39, 47, 65, 73, 77
Colo-Judson-Nodaway complex, 0 to 5 percent slopes	0-5%	P	87
Colo-Spillville complex, 0 to 2 percent slopes, occasionally flooded	0-2%	P	11, 84
Colo-Spillville complex, 2 to 5 percent slopes	2-5%	P	11, 39, 55, 74
Colo-Spillville complex, channeled, 0 to 2 percent slopes, frequently flooded	0-2%	P	11
Colo-Spillville complex, channeled, 2 to 5 percent slopes	2-5%	P	39
Colo-Urban land complex, 0 to 2 percent slopes	0-2%	P	82
Colo-Vesser complex, 2 to 5 percent slopes	2-5%	P	56, 56
Colo-Zook complex, 0 to 3 percent slopes	0-3%	P	54, 54
Colo-Zook complex, 0 to 5 percent slopes	0-3%	P	51, 51
Colo-Zook silty clay loams, 0 to 3 percent slopes	0-3%	P	92, 92
Coppock silt loam	0-2%	P	4
Coppock silt loam, 0 to 2 percent slopes	0-2%	P	29, 31, 44, 49, 51, 52, 56, 58, 92
Coppock silt loam, 0 to 2 percent slopes, occasionally flooded	0-2%	P	16, 26, 27, 44, 51, 54, 56, 89, 90
Coppock silt loam, 0 to 2 percent slopes, rarely flooded	0-2%	P	89
Coppock silt loam, 2 to 5 percent slopes	2-5%	P	16, 51, 58, 92
Coppock silt loam, 2 to 5 percent slopes, rarely flooded	2-5%	P	26, 27, 51, 54, 89
Coppock silt loam, sandy substratum, 0 to 2 percent slopes	0-2%	P	70
Cordova clay loam, 0 to 2 percent slopes	0-2%	P	94, 95
Cordova clay loam, Bemis moraine, 0 to 2 percent slopes	0-2%	P	37, 85
Corley silt loam	0-2%	VP	36
Corley silt loam, 0 to 1 percent slopes	0-1%	VP	65
Corley silt loam, 0 to 2 percent slopes	0-2%	P	78
Corley silt loam, benches, 0 to 2 percent slopes	0-2%	VP	69
Corley-Minden complex, terrace, 0 to 2 percent slopes	0-2%	P	15
Corvuso-Brownton complex, 0 to 2 percent slopes	0-2%	P	94, 94
Cosmos clay loam, 0 to 3 percent slopes, bouldery	0-3%	P	94
Darfur loam, 0 to 1 percent slopes	0-1%	P	95
Darfur loam, 0 to 2 percent slopes	0-2%	P	55
Darwin silty clay, bedrock substratum, 0 to 2 percent slopes	0-2%	VP	23
Darwin variant silty clay, 0 to 2 percent slopes	0-2%	P	23
Delft clay loam, 0 to 2 percent slopes	0-2%	P	32
Delft-Terril complex, 1 to 5 percent slopes	1-5%	P	30, 72
Delft-Terril complex, 2 to 5 percent slopes	2-3%	P	32
Denrock variant silt loam, 0 to 2 percent slopes	0-2%	P	56
Dockery-Quiver silt loams, 0 to 2 percent slopes, occasionally flooded	0-2%	P	1, 2, 5, 15, 20, 25, 39, 61, 63, 69, 73, 77, 80, 87, 88, 91
Dockery-Quiver silt loams, deep loess, 0 to 2 percent slopes, occasionally flooded	0-2%	P	5, 15, 24, 36, 39, 43, 47, 65, 67, 69, 73, 78, 83, 97
Dolbee silt loam, 0 to 2 percent slopes	0-2%	P	29

SOIL NAME	SLOPE RANGE	DRAINAGE CLASS	COUNTIES
Dolbee silt loam, sandy substratum, 0 to 2 percent slopes	0-2%	P	70
Dolbee silty clay loam, 0 to 2 percent slopes	0-2%	P	49
Dolbee silty clay loam, 2 to 5 percent slopes	2-5%	P	49
Donnan loam, gray subsoil variant	0-2%	P	57
Du Page-Calco complex, 0 to 2 percent slopes	0-1%	P	34
Du Page-Shellwood-Calco complex, channeled, 0 to 3 percent slopes	0-1%	P	17, 34, 66
Dundas silt loam, 0 to 2 percent slopes	0-2%	P	95
Dundas silt loam, Bemis moraine, 0 to 2 percent slopes	0-2%	P	8, 37, 94
Edina silt loam, 0 to 1 percent slopes	0-1%	P	4, 26, 27, 44, 56, 68, 80, 90
Edina silt loam, 0 to 2 percent slopes	0-2%	P	20, 89, 93
Edina silt loam, depressional, 0 to 1 percent slopes	0-1%	P	51, 59, 89
Elvers silt loam, 0 to 1 percent slopes	0-2%	VP	70
Elvers silt loam, 0 to 2 percent slopes	0-2%	P	23
Elvira silty clay loam, 0 to 2 percent slopes	0-2%	P	23, 52
Ely-Colo, overwash-Mt. Sterling complex, 0 to 2 percent slopes	0-2%	P	15, 15
Faxon silt loam, 0 to 2 percent slopes	0-2%	P	76
Faxon silty clay loam, 0 to 2 percent slopes	0-2%	P	17, 34
Faxon silty clay loam, 0 to 2 percent slopes, occasionally flooded	0-2%	P	98
Fens, aquolls, 5 to 14 percent slopes	5-14%	P	94
Fieldon loam, 0 to 2 percent slopes	0-2%	P	41, 55
Fluvaquents, 0 to 2 percent slopes	0-2%	P	84
Fluvaquents, 0 to 2 percent slopes, frequently flooded	0-2%	P	97
Fluvaquents, frequently flooded	0-2%	P	67
Fluvaquents, frequently flooded, 0 to 3 percent slopes	0-2%	P	29
Fluvaquents, loamy, 0 to 2 percent slopes, frequently flooded	0-2%	VP	94
Fluvaquents, nearly level	0-2%	VP	14
Fluvaquents, nearly level, occasionally flooded	0-2%	VP	14
Fluvaquents, ponded	0-2%	P	67
Fluvaquents, sandy and loamy	0-1%	VP	6
Fluvaquents-Coland complex, 0 to 3 percent slopes	0-3%	P	37
Fluvaquents-Coland complex, 0 to 3 percent slopes	0-1%	VP	37
Fluvaquents-Omadi complex, 0 to 2 percent slopes, occasionally flooded	0-2%	VP	18
Fluvents-Ambraw complex, 0 to 2 percent slopes	0-2%	P	23
Forney silty clay	0-1%	P	43
Forney silty clay, 0 to 2 percent slopes, rarely flooded	0-2%	P	67
Gara-Rinda complex, 9 to 14 percent slopes, moderately eroded	9-14%	P	29, 58
Garwin silty clay loam, 0 to 2 percent slopes	0-2%	P	3, 6, 12, 16, 23, 35, 38, 42, 49, 50, 52, 53, 57, 58, 64, 66, 70, 79, 82, 86
Garwin silty clay loam, sandy substratum, 0 to 2 percent slopes	0-2%	P	23
Garwin silty clay loam, terrace, 0 to 2 percent slopes	0-2%	P	16, 23, 70, 82
Garwin-Sperry complex, 0 to 2 percent slopes	0-2%	P	50
Garwin-Sperry complex, 0 to 2 percent slopes	0-1%	VP	50

SOIL NAME	SLOPE RANGE	DRAINAGE CLASS	COUNTIES
Gilford fine sandy loam, 0 to 2 percent slopes	0-2%	VP	58
Gillett Grove silty clay loam, 0 to 2 percent slopes	0-2%	P	21, 30
Gillett Grove silty clay loam, depressional, 0 to 1 percent slopes	0-1%	VP	21
Granby fine sandy loam, 0 to 2 percent slopes	0-2%	VP	23, 53
Gullied land-Ely-Colo, occasionally flooded, complex, 2 to 5 percent slopes	2-5%	P	91
Haig silt loam, 0 to 2 percent slopes	0-2%	P	20, 26, 29, 44, 51, 56, 59, 62, 63, 89, 90, 93
Haig silt loam, benches, 0 to 2 percent slopes	0-2%	P	44
Haig silty clay loam, 0 to 2 percent slopes	0-2%	P	4, 27, 44, 51, 56, 68, 80, 88, 89, 90
Hanska loam, 0 to 2 percent slopes	0-2%	P	55, 74, 76, 95
Hanska loam, 0 to 2 percent slopes	0-1%	P	64
Hanska loam, 1 to 4 percent slopes	1-4%	P	12
Harcot clay loam, 0 to 2 percent slopes	0-2%	P	41
Harcot loam, 0 to 2 percent slopes	0-2%	P	8, 17, 35, 42, 55
Harcot loam, 0 to 2 percent slopes, rarely flooded	0-2%	P	98
Harps clay loam, 0 to 2 percent slopes	0-2%	P	8, 11, 13, 17, 21, 30, 32, 35, 37, 40, 41, 42, 46, 55, 72, 74, 76, 81, 85, 94, 95, 98, 99
Harps clay loam, Bemis moraine, 0 to 2 percent slopes	0-2%	P	8, 13, 14, 17, 25, 35, 37, 39, 41, 42, 64, 77, 81, 85, 99
Harps-Okoboji complex, 0 to 2 percent slopes	0-2%	P	17, 32, 35, 40, 41, 42, 46, 85, 94, 98, 99
Harps-Okoboji complex, 0 to 2 percent slopes	0-1%	VP	17, 32, 35, 40, 41, 42, 46, 85, 94, 98, 99
Harps-Okoboji complex, Bemis moraine, 0 to 2 percent slopes	0-2%	P	17, 25, 35, 42, 77, 85
Harps-Okoboji complex, Bemis moraine, 0 to 2 percent slopes	0-1%	VP	17, 25, 35, 42, 77, 85
Harpster silt loam, 0 to 2 percent slopes	0-2%	P	55
Harpster silty clay loam, 0 to 2 percent slopes	0-2%	P	34, 35, 38, 41, 42, 64
Havana loam, 0 to 2 percent slopes	0-2%	P	19
Havelock clay loam, 0 to 2 percent slopes	0-2%	P	76
Havelock clay loam, 0 to 2 percent slopes, occasionally flooded	0-2%	P	21, 94
Havelock clay loam, channeled, 0 to 2 percent slopes	0-2%	P	76
Havelock loam, 0 to 2 percent slopes, occasionally flooded	0-2%	P	30, 72
Histosols, fens, 2 to 25 percent slopes	2-25%	VP	21
Histosols, fens, 5 to 14 percent slopes	5-14%	VP	30
Holly Springs silty clay loam, 0 to 2 percent slopes, rarely flooded	0-2%	P	97
Holly Springs silty clay loam, 0 to 2 percent slopes, rarely flooded, overwash	0-2%	P	97
Houghton muck, 0 to 1 percent slopes	0-1%	VP	17, 35, 41, 95, 98
Houghton muck, 1 to 4 percent slopes	1-4%	VP	12, 19, 45, 52
Houghton muck, ponded, 0 to 1 percent slopes	0-1%	VP	70
Humeston silt loam	0-2%	P	39
Humeston silt loam, 0 to 2 percent slopes	0-2%	P	1, 62, 69, 91
Humeston silt loam, 0 to 2 percent slopes	0-2%	VP	86
Humeston silt loam, 0 to 2 percent slopes, occasionally flooded	0-2%	P	2, 4, 20, 26, 27, 90

SOIL NAME	SLOPE RANGE	DRAINAGE CLASS	COUNTIES
Humeston silt loam, 0 to 2 percent slopes, overwash, occasionally flooded	0-2%	P	59, 80
Humeston silt loam, 2 to 5 percent slopes	2-5%	P	4
Humeston silt loam, 2 to 5 percent slopes, overwash, rarely flooded	2-5%	P	80
Humeston silt loam, overwash, 0 to 2 percent slopes	0-2%	P	80, 87
Humeston silty clay loam, 0 to 2 percent slopes	0-2%	P	87, 88, 92
Humeston silty clay loam, 0 to 2 percent slopes, occasionally flooded	0-2%	P	15, 59, 80, 93
Humeston silty clay loam, 2 to 5 percent slopes, rarely flooded	2-5%	P	80, 93
Humeston-Vesser-Colo complex, 2 to 5 percent slopes	2-5%	P	90, 90, 90
Jameston silty clay loam	0-2%	P	45
Jameston silty clay loam, 0 to 2 percent slopes	0-2%	P	19, 34, 66
Joliet-Faxon complex, 0 to 2 percent slopes	0-2%	P	94, 94
Judson-Ackmore-Colo, overwash complex, 1 to 5 percent slopes	1-3%	P	15, 24, 83
Judson-Colo-Ackmore complex, 2 to 5 percent slopes	2-5%	P	5
Kalona silty clay loam, 0 to 1 percent slopes	0-1%	P	29, 44, 51, 58, 90
Kalona silty clay loam, 0 to 2 percent slopes	0-2%	P	54, 92
Kalona silty clay loam, benches, 0 to 1 percent slopes	0-1%	P	44
Klossner muck, 0 to 1 percent slopes	0-1%	VP	8, 11, 17, 21, 32, 35, 40, 41, 42, 46, 55, 74, 77, 81, 85, 95, 98, 99
Klossner muck, 0 to 2 percent slopes, occasionally flooded, overwash	0-2%	VP	96
Klossner muck, 1 to 4 percent slopes	1-4%	VP	6, 7, 9, 10, 12, 16, 17, 19, 22, 23, 28, 33, 34, 38, 45, 53, 57, 66, 96, 98
Klossner muck, ponded, 0 to 1 percent slopes	0-1%	VP	70
Klum-Quiver complex, 0 to 2 percent slopes, frequently flooded	0-2%	VP	73
Knoke mucky silt loam, ponded, 0 to 1 percent slopes	0-1%	VP	13, 76
Knoke mucky silty clay loam, 0 to 1 percent slopes	0-1%	VP	13, 14, 21, 37, 40, 72, 76, 77, 99
Knoke mucky silty clay loam,ponded, 0 to 1 percent slopes	0-1%	VP	37
Knoke silty clay loam, 0 to 1 percent slopes	0-1%	VP	13, 37, 40, 72, 76, 77, 99
Kossuth silty clay loam, 0 to 2 percent slopes	0-2%	P	13, 40, 41, 55, 76, 85, 99
Lamoni-Clarinda-Shelby complex, 5 to 9 percent slopes, eroded	5-9%	P	2, 15
Lamoni-Clarinda-Shelby complex, 5 to 9 percent slopes, severely eroded	5-9%	P	2, 15
Lanyon silty clay loam, 0 to 1 percent slopes	0-1%	VP	11, 81
Lanyon silty clay loam, depressional, 0 to 1 percent slopes	0-1%	VP	94
Lawson-Nodaway-Colo Complex, 0 to 2 percent slopes, occasionally flooded	0-2%	P	50, 59, 93
Lawson-Nodaway-Colo complex, channeled, 0 to 2 percent slopes, frequently flooded	0-2%	P	59, 93
Lawson-Ossian complex, 0 to 4 percent slopes	0-4%	P	19, 96
Lawson-Quiver-Nodaway complex, 0 to 2 percent slopes, channeled, frequently flooded	0-2%	VP	59, 63, 90
Lawson-Quiver-Nodaway complex, 0 to 2 percent slopes, occasionally flooded	0-2%	P	59, 62, 63, 68, 90
Le Sueur-Reedslake-Cordova complex, 0 to 5 percent slopes	0-2%	P	17, 41, 95
Lemond loam, 0 to 2 percent slopes	0-2%	P	55

SOIL NAME	SLOPE RANGE	DRAINAGE CLASS	COUNTIES
Letri clay loam, 0 to 2 percent slopes	0-2%	P	21
Letri silty clay loam, 0 to 1 percent slopes	0-2%	P	30
Letri silty clay loam, 0 to 2 percent slopes	0-2%	P	72
Letri silty clay loam, 1 to 4 percent slopes	0-2%	P	81
Letri silty clay loam, calcareous, 0 to 2 percent slopes	0-2%	P	72
Luton silt loam, 0 to 2 percent slopes, rarely flooded, overwash	0-2%	P	67
Luton silt loam, overwash	0-2%	P	36, 43
Luton silt loam, overwash, 0 to 2 percent slopes	0-2%	P	65
Luton silt loam, overwash, 0 to 2 percent slopes	0-2%	VP	78
Luton silty clay	0-2%	P	36, 43
Luton silty clay loam	0-2%	P	36
Luton silty clay loam, 0 to 1 percent slopes, rarely flooded	0-2%	P	67
Luton silty clay loam, 0 to 2 percent slopes, rarely flooded	0-2%	P	97
Luton silty clay, 0 to 1 percent slopes	0-1%	P	75
Luton silty clay, 0 to 2 percent slopes	0-2%	P	65
Luton silty clay, 0 to 2 percent slopes	0-2%	VP	78
Luton silty clay, 0 to 2 percent slopes, rarely flooded	0-2%	P	67, 97
Luton silty clay, thin surface	0-2%	P	43
Madelia silty clay loam, 0 to 2 percent slopes	0-2%	P	30, 98
Marcus silty clay loam, 0 to 2 percent slopes	0-2%	P	11, 18, 47, 60, 71, 72, 81, 84
Marna silty clay loam, 0 to 2 percent slopes	0-2%	P	8, 37, 94
Marsh	0-1%	VP	4, 39, 56, 74, 81
Marsh, deep loess	0-1%	VP	36, 39
Marshan clay loam, 0 to 2 percent slopes, rarely flooded	0-2%	P	7, 9, 10, 12, 17, 19, 23, 28, 31, 33, 34, 35, 38, 42, 45, 52, 53, 56, 57, 58, 66, 70, 82, 98
Marshan clay loam, depressional	0-2%	VP	45
Marshan loam, 0 to 2 percent slopes, rarely flooded	0-2%	P	96
Marshan silty clay loam, depressional, 0 to 1 percent slopes	0-1%	VP	28
Marshan-Urban land complex, 0 to 2 percent slopes	0-2%	P	7
Maxcreek silty clay loam, 0 to 2 percent slopes	0-2%	P	98
Maxfield silt loam, 0 to 2 percent slopes	0-2%	P	7, 9, 10, 12, 17, 34, 35, 66, 98
Maxfield silty clay loam, 0 to 2 percent slopes	0-2%	P	6, 7, 12, 16, 23, 35, 38, 42, 52, 53, 57, 82
Maxfield-Urban land complex, 0 to 2 percent slopes	0-2%	P	7
Maxmore silty clay loam, 0 to 2 percent slopes	0-2%	P	7, 9, 16
Mayer loam, 0 to 2 percent slopes	0-2%	P	37, 41, 46, 55, 60, 74, 95
Mayer loam, sandy loam subsoil, 0 to 2 percent slopes	0-2%	P	74
Medo muck, depressional, 0 to 1 percent slopes	0-1%	VP	41
Millington loam, 0 to 2 percent slopes	0-2%	P	37
Millington loam, 0 to 2 percent slopes, occasionally flooded	0-2%	P	11
Millington loam, channeled, 0 to 2 percent slopes	0-2%	P	13
Millington silt loam, channeled, 0 to 2 percent slopes	0-2%	P	32
Minnetonka silty clay loam, 0 to 2 percent slopes	0-2%	P	17, 94, 95
Minnetonka silty clay loam, 1 to 3 percent slopes	1-3%	P	98

SOIL NAME	SLOPE RANGE	DRAINAGE CLASS	COUNTIES
Moville-Holly Springs, overwash complex, 0 to 2 percent slopes, rarely flooded	0-2%	P	97
Mt. Sterling silt loam, 0 to 2 percent slopes, occasionally flooded	0-2%	P	89
Mt. Sterling silty clay loam, 0 to 2 percent slopes, occasionally flooded	0-2%	P	93
Mt. Sterling-Zook, overwash, complex, 0 to 2 percent slopes, occasionally flooded	0-2%	P	2, 2
Muskego soils, 0 to 1 percent slopes	0-1%	VP	32, 32, 41, 41, 95, 95
Mystic variant silty clay loam, 5 to 9 percent slopes, moderately eroded	5-9%	P	20
Napa silty clay loam, 0 to 2 percent sloeps, rarely flooded	0-2%	P	67
Napa-Luton-Tieville silty clays, 0 to 2 percent slopes, rarely flooded	0-2%	P	97, 97, 97
Napier-Kennebec-Colo complex, 0 to 5 percent slopes	0-2%	P	24, 67, 97
Napier-Nodaway-Colo complex, 2 to 5 percent slopes	2-5%	P	43
Niota silt loam, 0 to 2 percent slopes	0-2%	P	82
Niota silt loam, 2 to 5 percent slopes	2-5%	P	82
Niota silty clay loam, 0 to 2 percent slopes	0-2%	P	56
Niota silty clay loam, 2 to 5 percent slopes	2-5%	P	56
Niota silty clay loam, 7 to 14 percent slopes, moderately eroded	7-14%	P	56
Niota variant silty clay loam, 0 to 3 percent slopes	0-3%	P	29
Niota variant silty clay loam, 7 to 14 percent slopes	7-14%	P	29
Nira-Clearfield complex, 5 to 9 percent slopes	5-9%	P	2
Nishna silt loam, overwash	0-2%	P	36
Nishna silty clay	0-2%	P	36
Nishna silty clay loam, 0 to 2 percent slopes	0-2%	P	65, 78, 81
Nishna silty clay loam, 0 to 2 percent slopes, occasionally flooded	0-2%	P	67
Nodaway occasionally flooded-Coppock-Cantril rarely flooded complex, 2 to 5 percent slopes	2-5%	P	54
Nodaway-Ackmore-Vesser complex, 0 to 2 percent slopes, occasionally flooded	0-2%	P	54
Nodaway-Coppock complex, 0 to 2 percent slopes	0-2%	P	51
Nodaway-Coppock complex, 0 to 2 percent slopes, occasionally flooded	0-2%	P	89
Nodaway-Coppock-Cantril complex, 2 to 5 percent slopes	2-5%	P	51, 89
Nodaway-Vesser silt loams, 2 to 5 percent slopes	2-5%	P	62, 63, 88
Nodaway-Vesser-Ackmore complex, 0 to 2 percent slopes	0-2%	P	51
Nodaway-Vesser-Mt. Sterling complex, 0 to 2 percent slopes, occasionally flooded	0-2%	P	89, 89
Okaw silt loam, 0 to 2 percent slopes	0-2%	P	29, 51, 92
Okaw silt loam, 0 to 2 percent slopes, rarely flooded	0-2%	P	89
Okaw silt loam, 0 to 3 percent slopes	0-3%	P	56
Okaw silt loam, 2 to 5 percent slopes	2-5%	P	29, 44
Okaw silt loam, heavy till, 0 to 2 percent slopes, rarely flooded	0-2%	P	26, 44, 68
Okoboji mucky silt loam, 0 to 1 percent slope	0-1%	VP	13
Okoboji mucky silt loam, 0 to 1 percent slopes	0-1%	VP	8, 14, 25, 32, 35, 37, 41, 42, 55, 72, 74, 85, 95
Okoboji mucky silty clay loam, 0 to 1 percent slopes	0-1%	VP	21, 40, 76, 99

SOIL NAME	SLOPE RANGE	DRAINAGE CLASS	COUNTIES
Okoboji mucky silty clay loam, depressional, 0 to 1 percent slopes	0-1%	VP	46, 77, 94
Okoboji silty clay loam, 0 to 1 percent slopes	0-1%	VP	8, 11, 13, 14, 17, 21, 25, 30, 32, 35, 37, 39, 40, 41, 42, 46, 55, 64, 72, 74, 76, 77, 81, 85, 94, 95, 98, 99
Okoboji silty clay loam, benches, 0 to 1 percent slopes	0-1%	VP	74
Olmitz-Colo, occasionally flooded, complex, 0 to 5 percent slopes	0-2%	P	39
Olmitz-Colo-Vesser complex, 2 to 5 percent slopes	0-2%	P	68, 68
Olmitz-Ely-Zook complex, 2 to 5 percent slopes	2-5%	P	2, 15
Olmitz-Vesser-Colo complex, 2 to 5 percent slopes	2-5%	P	4, 4
Olmitz-Vesser-Zook complex, 0 to 5 percent slopes	0-2%	P	26, 89
Olmitz-Vesser-Zook complex, 0 to 5 percent slopes	1-3%	P	26, 89
Olmitz-Zook-Colo complex, 0 to 5 percent slopes	0-2%	P	20
Olmitz-Zook-Colo complex, 0 to 5 percent slopes	2-5%	P	20
Olmitz-Zook-Humeston complex, 0 to 5 percent slopes	2-5%	P	80
Olmitz-Zook-Humeston complex, 0 to 5 percent slopes	0-2%	P	80
Olmitz-Zook-Vesser complex, 0 to 5 percent slopes	0-2%	P	27, 51, 54
Olmitz-Zook-Vesser complex, 0 to 5 percent slopes	2-5%	P	27, 51, 54
Onawa silt loam, 0 to 2 percent slopes, rarely flooded	0-2%	P	67
Onawa silty clay, 0 to 2 percent slopes, rarely flooded	0-2%	P	67
Onawa-Albaton complex, 0 to 2 percent slopes, rarely flooded	0-2%	P	97
Ossian silt loam, 0 to 2 percent slopes	0-2%	P	22, 28, 33, 53, 62
Ossian silt loam, 0 to 3 percent slopes, occasionally flooded	0-3%	P	96
Otter silt loam, 0 to 2 percent slopes	0-2%	P	3, 22, 49
Otter silt loam, overwash, 0 to 2 percent slopes	0-2%	P	22, 31
Otter-Huntsville silt loams, 2 to 5 percent slopes	0-2%	P	33
Otter-Worthen complex, 1 to 4 percent slopes	0-2%	P	3
Otter-Worthen complex, 1 to 4 percent slopes	1-4%	P	96
Otter-Worthen silt loams, 1 to 4 percent slopes	1-2%	P	22
Otter-Worthen silt loams, 2 to 5 percent slopes	0-2%	P	31
Owego silty clay, 0 to 2 percent slopes, occasionally flooded	0-2%	P	67
Owego silty clay, 0 to 2 percent slopes, rarely flooded	0-2%	P	67, 97
Palms muck, ponded, 0 to 1 percent slopes	0-1%	VP	8, 40, 41, 77, 99
Percival-Albaton complex, 0 to 2 percent slopes, occasionally flooded	0-2%	P	97
Psammaquents, 0 to 2 percent slopes, frequently flooded	0-2%	VP	16, 56, 63
Psammaquents, frequently flooded	0-2%	VP	7
Psammaquents, frequently flooded	0-1%	VP	77, 78
Quiver-Colo silty clay loams, 0 to 2 percent slopes, frequently flooded	0-2%	VP	36, 39, 61, 63, 91
Quiver-Colo silty clay loams, 0 to 2 percent slopes, frequently flooded	0-2%	P	36, 39, 61, 63, 91
Quiver-Colo silty clay loams, 0 to 2 percent slopes, occasionally flooded	0-2%	P	39, 61, 63, 91
Quiver-Colo silty clay loams, 0 to 2 percent slopes, occasionally flooded	0-2%	VP	39, 61, 63, 91
Quiver-Zook-Klum complex, 0 to 2 percent slopes, frequently flooded	0-2%	VP	48

SOIL NAME	SLOPE RANGE	DRAINAGE CLASS	COUNTIES
Quiver-Zook-Klum complex, 0 to 2 percent slopes, frequently flooded	0-2%	P	48
Racoon silt loam, 0 to 2 percent slopes	0-2%	P	56
Racoon silt loam, 0 to 2 percent slopes, occasionally flooded	0-2%	P	89
Racoon silt loam, 0 to 2 percent slopes, rarely flooded	0-2%	P	89
Revere loam, 0 to 2 percent slopes	0-2%	P	72
Rinda silt loam, 5 to 9 percent slopes	5-9%	P	56
Rinda silt loam, 5 to 9 percent slopes, moderately eroded	5-9%	P	29
Rinda silt loam, 9 to 14 percent slopes, moderately eroded	9-14%	P	29, 56
Rinda silty clay loam, 5 to 9 percent slopes, moderately eroded	5-9%	P	26, 27, 44, 51, 54, 58, 59, 68, 89, 90, 92, 93
Rinda silty clay loam, 5 to 9 percent slopes, severely eroded	5-9%	P	26
Rinda silty clay loam, 9 to 14 percent slopes, moderately erode	9-14%	P	58
Rinda silty clay loam, 9 to 14 percent slopes, moderately eroded	9-14%	P	27, 44, 59, 68, 90, 92, 93
Riverwash, 1 to 3 percent slopes	1-3%	P	36, 43, 63
Rocksan silty clay loam, 0 to 2 percent slopes	0-2%	P	34
Rodney silty clay, 0 to 2 percent slopes, occasionally flooded	0-2%	P	67
Rodney silty clay, 0 to 2 percent slopes, rarely flooded	0-2%	P	67
Rolfe silt loam, 0 to 1 percent slopes	0-1%	VP	11, 13, 17, 21, 30, 41, 46, 55, 72, 74, 76, 81, 85, 94, 98
Rubio silt loam, 0 to 2 percent slopes	0-2%	P	29, 51, 54, 58, 62, 92
Rushmore silty clay loam, 0 to 2 percent slopes	0-2%	P	21
Rushville silt loam, 0 to 2 percent slopes	0-2%	VP	56
Rushville silt loam, terrace, 0 to 2 percent slopes	0-2%	VP	44, 56
Sawmill silty clay loam, shallow loess, 0 to 2 percent slopes, occasionally flooded	0-2%	P	7, 23, 35, 38, 42, 53
Sawmill silty clay loam, shallow loess, 1 to 4 percent slopes, occasionally flooded	1-4%	P	28, 86
Sawmill, occasionally flooded-Urban land complex, 0 to 2 percent slopes	0-2%	P	7
Shandep clay loam, 0 to 1 percent slopes	0-1%	VP	12, 17, 19
Shandep clay loam, 0 to 1 percent slopes, occasionally flooded	0-1%	VP	98
Shandep clay loam, 0 to 2 percent slopes, ponded, occasionally flooded	0-1%	VP	6, 7, 9, 10, 12, 16, 17, 19, 23, 28, 33, 34, 35, 38, 42, 45, 53, 57, 66, 82, 98
Shandep loam, 0 to 1 percent slopes	0-1%	VP	35, 53
Shandep loam, ponded, 0 to 1 percent slopes, occasionally flooded	0-1%	VP	9
Sigglekov-Fluvaquents, channeled-Aquents, ponded, complex, 0 to 2 percent slopes, frequently flooded	0-1%	VP	7, 9
Sigglekov-Fluvaquents, channeled-Aquents, ponded, complex, 0 to 2 percent slopes, frequently flooded	0-2%	VP	7, 9
Solomon clay	0-2%	P	36
Solomon silty clay	0-2%	P	43
Sperry silt loam	0-1%	VP	61
Sperry silt loam, 0 to 1 percent slopes	0-1%	VP	58, 60, 91
Sperry silt loam, 0 to 2 percent slopes	0-2%	VP	88
Sperry silt loam, depressional, 0 to 1 percent slopes	0-1%	VP	6, 16, 29, 38, 42, 44, 48, 50, 51, 52, 54, 62, 64, 70, 79, 86, 90, 92

SOIL NAME	SLOPE RANGE	DRAINAGE CLASS	COUNTIES
Sperry silt loam, terrace, 0 to 1 percent slopes	0-1%	VP	44
Sperry silty clay loam, 0 to 1 percent slopes	0-1%	VP	18, 71
Spicer silty clay loam, 0 to 2 percent slopes	0-2%	P	11, 30, 41, 55, 60, 71, 72, 84
Spicer silty clay loam, MLRA 107, 0 to 2 percent slopes	0-2%	P	30
Spillville, occasionally flooded-Coland, occasionally flooded-Urban land complex, 0 to 2 percent slopes	0-2%	P	7
Spillville-Coland complex, 0 to 2 percent slopes	0-2%	P	12, 38
Spillville-Coland complex, 0 to 2 percent slopes, frequently flooded	0-2%	P	10, 12, 19, 35, 38
Spillville-Coland complex, 0 to 2 percent slopes, occasionally flooded	0-2%	P	21
Spillville-Coland complex, 1 to 5 percent slopes	1-2%	P	18
Spillville-Coland complex, channeled 0 to 2 percent slopes	0-2%	P	28
Spillville-Coland complex, channeled, 0 to 2 percent slopes	0-2%	P	25, 40, 77, 85, 99
Spillville-Coland complex, channeled, 0 to 2 percent slopes, frequently flooded	0-2%	P	21, 46, 50
Spillville-Coland-Shandep complex, 0 to 2 percent slopes, frequently flooded	0-2%	P	7, 9, 33
Spillville-Coland-Shandep complex, 0 to 2 percent slopes, frequently flooded	0-1%	VP	7, 9, 33
Spillville-Colo complex, channeled	0-2%	P	45
Spillville-Hanlon-Coland complex, channeled, 0 to 3 percent slopes	0-3%	P	34, 66
Steinauer-Steinauer variant clay loams, 20 to 50 percent slopes	20-50%	P	18
Taintor silt loam, 0 to 2 percent slopes	0-2%	P	68
Taintor silt loam, benches, 0 to 2 percent slopes	0-2%	P	68
Taintor silty clay loam, 0 to 2 percent slopes	0-2%	P	29, 44, 48, 50, 51, 52, 54, 58, 62, 63, 79, 90, 92
Taintor silty clay loam, terrace, 0 to 2 percent slopes	0-2%	P	44, 54, 62, 90
Talcot clay loam, 0 to 2 percent slopes	0-2%	P	94
Talcot clay loam, 0 to 2 percent slopes, rarely flooded	0-2%	VP	98
Talcot clay loam, 24 to 32 inches to sand and gravel, 0 to 2 percent slopes	0-2%	P	17
Talcot clay loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes	0-2%	P	8, 13, 17, 21, 32, 34, 55, 76, 81, 85, 99
Talcot clay loam, 32 to 40 inches to sand and gravel, 0 to 2 percent slopes	0-2%	VP	35
Talcot clay loam, deep, 0 to 2 percent slopes	0-2%	P	11, 74
Talcot clay loam, loamy substratum, 0 to 2 percent slopes	0-2%	P	94
Talcot clay loam, moderately deep, 0 to 2 percent slopes	0-2%	P	11
Talcot silty clay loam, 0 to 2 percent slopes	0-2%	VP	30, 72
Talcot silty clay loam, 32 to 40 inches to sand and gravel, 0 t 2 percent slopes	0-2%	P	14, 40
Talcot-Biscay complex, 0 to 2 percent slopes	0-2%	P	30, 72
Talcot-Biscay complex, 0 to 2 percent slopes	0-2%	VP	30, 72
Terril-Coland, occasionally flooded complex, 2 to 9 percent slopes	2-5%	P	18
Terril-Colo, frequently flooded complex, 2 to 10 percent slopes	2-5%	P	71
Thorp silt loam, 0 to 1 percent slopes	0-1%	P	12
Thorp silt loam, 0 to 2 percent slopes	0-2%	VP	23, 38

SOIL NAME	SLOPE RANGE	DRAINAGE CLASS	COUNTIES
Tieville silty clay, 0 to 2 percent slopes, rarely flooded	0-2%	P	67, 97
Tilfer loam, 0 to 2 percent slopes	0-2%	P	42
Tilfer silty clay loam, 0 to 2 percent slopes	0-2%	P	17
Tilfer silty clay loam, 0 to 2 percent slopes, occasionally flooded	0-2%	P	98
Titus silty clay loam, 0 to 2 percent slopes	0-2%	P	29, 58
Titus silty clay loam, rarely flooded, 0 to 2 percent slopes	0-2%	P	58
Toolesboro loam, 0 to 2 percent slopes	0-2%	P	58
Toolesboro sandy loam, 0 to 2 percent slopes	0-2%	P	70
Traer silt loam, 0 to 2 percent slopes	0-2%	P	58, 70, 86
Tripoli clay loam, 0 to 2 percent slopes	0-2%	P	6, 7, 9, 10, 12, 17, 19, 33, 34, 35, 45, 57, 66
Tripoli-Urban land complex, 0 to 2 percent slopes	0-2%	P	7
Turlin-Coland complex, 0 to 3 percent slopes, occasionally flooded	0-3%	P	96
Tuskeego silt loam, 0 to 1 percent slopes	0-1%	P	50
Tuskeego silt loam, 0 to 2 percent slopes	0-2%	P	44, 51, 52, 58, 62, 63, 79, 90, 92
Tuskeego silt loam, 0 to 2 percent slopes, occasionally flooded	0-2%	P	54
Tuskeego silt loam, 0 to 2 percent slopes, rarely flooded	0-2%	P	4, 26, 27, 44, 48, 56, 59, 63, 89, 90
Tuskeego silt loam, 1 to 3 percent slopes	1-3%	P	29
Tuskeego silt loam, 2 to 5 percent slopes	2-5%	P	4
Tuskeego silt loam, sandy substratum, 0 to 2 percent slopes	0-2%	P	58, 70
Udifluvents-Fluvaquents complex, 0 to 2 percent slopes, flaggy, frequently flooded	0-2%	VP	61
Udolpho loam, 0 to 2 percen slopes	0-2%	P	23
Udolpho loam, 0 to 2 percent slopes	0-2%	P	6, 52, 52
Udolpho loam, 0 to 2 percent slopes, rarely flooded	0-2%	P	19
Udolpho loam, 32 to 40 inches to sand, 0 to 2 percent slopes	0-2%	P	70
Uturin silt loam, 0 to 2 percent slopes, occasionally flooded	0-2%	P	67
Vesser silt loam overwash, 0 to 2 percent slopes	0-2%	P	26
Vesser silt loam overwash, 2 to 5 percent slopes	2-5%	P	26
Vesser silt loam, 0 to 2 percent slopes	0-2%	P	6, 23, 29, 44, 51, 56, 62, 64, 68, 79, 90
Vesser silt loam, 0 to 2 percent slopes, frequently flooded	0-2%	P	54
Vesser silt loam, 0 to 2 percent slopes, occasionally flooded	0-2%	P	4, 20, 26, 27, 48, 54, 56, 59, 63, 68, 88, 89, 93
Vesser silt loam, 0 to 2 percent slopes, occasionally flooded, overwash	0-2%	P	89
Vesser silt loam, 0 to 2 percent slopes, overwash	0-2%	P	59
Vesser silt loam, 0 to 2 percent slopes, overwash, occasionally flooded	0-2%	P	39, 87
Vesser silt loam, 0 to 2 percent slopes, rarely flooded	0-2%	P	89
Vesser silt loam, 2 to 5 percent slopes	2-5%	P	51, 62, 70
Vesser silt loam, 2 to 5 percent slopes, occasionally flooded	2-5%	P	20, 61, 91
Vesser silt loam, 2 to 5 percent slopes, overwash	2-5%	P	59
Vesser silt loam, 2 to 5 percent slopes, overwash, occasionally flooded	2-5%	P	87

SOIL NAME	SLOPE RANGE	DRAINAGE CLASS	COUNTIES
Vesser silt loam, 2 to 5 percent slopes, rarely flooded	2-5%	P	4, 20, 26, 27, 51, 54, 59, 87, 89, 93
Vesser silt loam, dissected till plain, 0 to 2 percent slopes, occasionally flooded	0-2%	P	1, 39, 61, 63, 87, 88, 91
Vesser-Colo complex, 2 to 5 percent slopes	2-5%	P	44, 44
Vesser-Nodaway silt loams, 2 to 5 percent slopes	2-5%	P	1
Wabash silt loam, 0 to 2 percent slopes, overwash, occasionally flooded	0-2%	VP	80
Wabash silt loam, overwash, 0 to 1 percent slopes	0-1%	VP	73, 87
Wabash silt loam, overwash, 0 to 2 percent slopes	0-1%	VP	80
Wabash silty clay	0-2%	VP	61
Wabash silty clay loam	0-2%	VP	61
Wabash silty clay loam, 0 to 1 percent slopes	0-1%	VP	5, 73, 87
Wabash silty clay loam, 0 to 2 percent slopes	0-1%	VP	63
Wabash silty clay loam, 0 to 2 percent slopes	0-2%	VP	88, 91
Wabash silty clay loam, occasionally ponded, 0 to 2 percent slopes, occasionally flooded	0-2%	VP	2
Wabash silty clay, 0 to 1 percent slopes	0-1%	VP	27
Wabash silty clay, 0 to 1 percent slopes	0-2%	VP	87
Wabash silty clay, 0 to 2 percent slopes	0-2%	VP	29, 50, 74, 91
Wabash silty clay, 0 to 2 percent slopes	0-1%	VP	73, 80
Wabash silty clay, 0 to 2 percent slopes, occasionally flooded	0-2%	VP	4, 56, 59, 80, 89, 93
Wabash silty clay, 0 to 2 percent slopes, occasionally flooded	0-2%	P	48
Wabash silty clay, frequently ponded, 0 to 2 percent slopes, occasionally flooded	0-2%	VP	2
Wacousta mucky silt loam, 0 to 1 percent slopes	0-1%	VP	11
Wacousta mucky silt loam, depressional, 0 to 1 percent slopes	0-1%	VP	94
Wacousta mucky silty clay loam, depressional, 0 to 1 percent slopes	0-1%	VP	46
Wacousta silt loam, 0 to 1 percent slopes	0-1%	VP	35, 42
Wacousta silty clay loam, 0 to 1 percent slopes	0-1%	VP	13, 37, 40, 41, 55, 74, 76, 81, 85, 99
Wacousta silty clay loam, depressional, 0 to 1 percent slopes	0-1%	VP	21, 46, 94
Wacousta silty clay loam, stratified substratum, 0 to 1 percent slopes	0-1%	VP	41
Wacousta variant silty clay loam, 0 to 1 percent slopes	0-1%	VP	13
Waldorf silty clay loam, 0 to 2 percent slopes	0-2%	P	11, 21, 30, 32, 41, 55, 72, 74, 81, 95
Walford silt loam, 0 to 1 percent slopes	0-1%	P	23
Walford silt loam, 0 to 2 percent slopes	0-2%	P	16, 52, 57, 58, 70, 82
Walford silt loam, benches, 0 to 1 percent slopes	0-1%	P	23
Walford silt loam, benches, 0 to 2 percent slopes	0-2%	P	49
Walford silt loam, terrace, 0 to 2 percent slopes	0-2%	P	6, 16, 48, 52, 57
Walford-Atterberry silt loams, 1 to 3 percent slopes	0-2%	P	52
Walford-Urban land complex, 0 to 2 percent slopes	0-2%	P	70
Webster clay loam, 0 to 2 percent slopes	0-2%	P	8, 11, 13, 14, 17, 21, 30, 32, 35, 37, 40, 41, 42, 46, 55, 72, 74, 76, 81, 85, 94, 95, 98, 99
Webster clay loam, Bemis moraine, 0 to 2 percent slopes	0-2%	P	8, 13, 14, 17, 25, 35, 37, 39, 41, 42, 50, 64, 77, 81, 85, 99
Webster-Nicollet complex, 0 to 3 percent slopes	0-2%	P	17, 35, 42, 98

SOIL NAME	SLOPE RANGE	DRAINAGE CLASS	COUNTIES
Webster-Nicollet complex, Bemis moraine, 0 to 3 percent slopes	0-2%	P	17, 35, 42
Webster-Urban land complex, 0 to 2 percent slopes	0-2%	P	77, 94
Winterset silty clay loam, 0 to 2 percent slopes	0-2%	P	1, 2, 20, 61, 63, 63, 73, 80, 87, 88, 91, 91
Woodbury silty clay	0-2%	P	36, 43
Woodbury silty clay, 0 to 2 percent slopes	0-2%	P	65
Woodbury silty clay, 0 to 2 percent slopes, rarely flooded	0-2%	P	67, 97
Worthen-Otter silt loams, 0 to 5 percent slopes	0-2%	P	49
Zook silt loam, 0 to 2 percent slopes, occasionally flooded, overwash	0-2%	P	1, 2, 15, 20, 24, 36, 39, 48, 54, 63, 65, 67, 69, 73, 78, 80, 83
Zook silt loam, heavy till, 0 to 2 percent slopes, occasionally flooded, overwash	0-2%	P	20, 26, 27, 59, 63, 68, 80
Zook silt loam, overwash, 0 to 2 percent slopes	0-2%	P	62
Zook silty clay	0-2%	P	36
Zook silty clay loam, 0 to 2 percent slopes	0-2%	P	23, 29, 68, 82, 90
Zook silty clay loam, 0 to 2 percent slopes, frequently flooded	0-2%	P	54
Zook silty clay loam, 0 to 2 percent slopes, frequently flooded, flood pool	0-2%	VP	63, 91
Zook silty clay loam, 0 to 2 percent slopes, occasionally flooded	0-2%	P	1, 2, 5, 6, 14, 15, 18, 20, 21, 24, 36, 38, 39, 46, 47, 48, 50, 51, 52, 54, 55, 58, 60, 61, 62, 63, 64, 65, 67, 69, 70, 73, 77, 78, 79, 80, 81, 83, 84, 85, 86, 91, 92, 97
Zook silty clay loam, 0 to 2 percent slopes, rarely flooded	0-2%	P	89
Zook silty clay loam, 2 to 5 percent slopes	2-5%	P	61, 62, 80
Zook silty clay loam, depressional, 0 to 1 percent slopes	0-1%	VP	62
Zook silty clay loam, heavy till, 0 to 2 percent slopes, occasionally flooded	0-2%	P	4, 20, 26, 27, 51, 59, 63, 68, 80, 89, 90, 91, 93
Zook silty clay loam, heavy till, 2 to 5 percent slopes, rarely flooded	2-5%	P	4, 59, 80, 93
Zook silty clay, 0 to 2 percent slopes	0-2%	P	58, 69, 81
Zook silty clay, sandy substratum, 0 to 2 percent slopes	0-2%	P	82
Zook-Colo silty clay loams, 0 to 5 percent slopes, occasionally flooded	0-2%	P	20
Zook-Colo silty clay loams, 0 to 5 percent slopes, occasionally flooded	2-5%	P	20
Zook-Colo-Ely silty clay loams, 2 to 5 percent slopes	0-2%	P	1, 1
Zook-Ely complex, 2 to 5 percent slopes	2-5%	P	2
Zook-Ely silty clay loams, 0 to 5 percent slopes	0-2%	P	80
Zook-Ely-Gullied land complex, 2 to 5 percent slopes	2-5%	P	2, 15
Zook-Mt. Sterling complex, 0 to 2 percent slopes, occasionally flooded	0-2%	P	2, 2, 15, 15
Zook-Olmitz-Vesser complex, 0 to 5 percent slopes	0-5%	P	59, 59, 93, 93
Zwingle silt loam, 0 to 2 percent slopes	0-2%	P	22, 23, 49
Zwingle silt loam, 1 to 9 percent slopes	1-9%	P	3
Zwingle silt loam, 2 to 5 percent slopes	2-5%	P	23
Zwingle silt loam, 2 to 7 percent slopes	2-7%	P	31
Zwingle silt loam, 2 to 9 percent slopes	2-9%	P	22, 70
Zwingle variant silty clay, 0 to 2 percent slopes	0-2%	P	23, 49

Table 8, Soils listing for estimating subsurface drainage

(Soils with moderately rapid, rapid, and very rapid permeable subsoils/substrata)

It contains a list of sorted soil names (and a list of associated county numbers) where:
Permeability : 00 through 35, 58, 72, 75 (Proxy for Coarse Texture Subsoil/Substrate)
It includes all slopes.

From the Iowa Soil Properties And Interpretations Database (ISPAID) 7.0 Manual:

21 Slope Range (%) High [SLOPERNGH]
The incline of the surface of a soil. It is expressed in percentages of slope which equal the number of feet of fall per 100 feet of horizontal distance.

56 Permeability Code [PERMCODE]
The quality of the soil that enables water to move through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. If the clayey material or the residuum overlying bedrock is 1 to 5 inches thick and continuous, the permeability is slower than the overlying material. A slash indicates that two materials with different permeabilities occur; i.e., MR/S means moderately rapid over slow. [Permeability listed for complexes is the most limiting class of the soils identified in the map unit name (i.e., Marshall = moderate and Dickman = moderately rapid over rapid; Marshall-Dickman complex = moderately rapid over rapid).]

Permeability class abbreviations and code numbers assigned are:

VR	**= 00**	**= Very rapid [>20.0 in/hr]**
R/VR	**= 05**	**= Rapid/Very rapid**
R	**= 10**	**= Rapid [6.0-20.0 in/hr]**
MR/VR	**= 15**	**= Moderately rapid/Very rapid**
MR/R	**= 20**	**= Moderately rapid/Rapid**
M/VR	**= 25**	**= Moderate/Very rapid**
MR	**= 30**	**= Moderately rapid [2.0-6.0 in/hr]**
M/R	**= 35**	**= Moderate/Rapid**
R/M	= 40	= Rapid/Moderate
MR/M	= 45	= Moderately rapid/Moderate
M	= 50	= Moderate [0.6-2.0 in/hr]
MS	= 55	= Moderately slow [0.2-0.6 in/hr]
MS/M	= 56	= Moderately slow/Moderate
MR/MS	= 57	= Moderately rapid/Moderately slow
MS/R	**= 58**	**= Moderately slow/Rapid**
R/S	= 60	= Rapid/Slow
MR/S	= 65	= Moderately rapid/Slow
M/S	= 70	= Moderate/Slow
S/R	**= 72**	**= Slow/Rapid**
VS/R	**= 75**	**= Very slow/Rapid**
S	= 80	= Slow [0.06-0.20 in/hr]
M/VS	= 85	= Moderate/Very slow
VS	= 90	= Very slow [<0.06 in/hr]

SOIL NAME	PERMEABILITY	COUNTIES
Adrian ponded	MR	41
Alluvial land channeled, frequently flooded	R	61,91
Alluvial land frequently flooded	R	2,15,36,39,56,61,73,81,91
Alluvial land occasionally flooded	R	60
Ankeny	MR	15,45,53,70,77,85,96
Ankeny occasionally flooded	MR	22
Ankeny rarely flooded	MR	94
Aquents frequently flooded, ponded	MR	54,92
Aquents loamy	MR	99
Aquents loamy, rarely flooded, ponded	MR	67
Aquents occas flooded, ponded	MR	67
Aquents occasionally flooded, ponded	MR	77,89
Aquents rarely flooded, occasionally ponded	MR	67
Aquents rarely flooded, ponded	MR	67
Aquolls (marsh), ponded	MR	21
Aquolls occasionally flooded, ponded	MR	58
Aquolls ponded	MR	10,12,18,23,32,46,49,53,55,72,82,86
Aquolls-Histosols Complex ponded	MR	17
Bertram	MR	23
Billett	MR	7,19,49,53,96,94
Billett moderately eroded	MR	49
Bolan variant	MR	84
Bolan variant moderately eroded	MR	84
Boots ponded	MR	95,98
Brady	MR	23,53
Brady rarely flooded	MR	16
Buckney	MR	94
Buckney channeled, frequently flooded	MR	8
Buckney occasionally flooded	MR	8
Buckney rarely flooded	MR	36,65,94
Buckney-Spillville Complex rarely flooded	MR	94
Burkhardt	MR	6,9,12,19,23,28,31,33,34,45,52,57,66,96
Burkhardt moderately eroded	MR	23,33,57
Burkhardt-Bassett-Chelsea Complex	MR	7
Burkhardt-Saude Complex	MR	10,28
Carr occasionally flooded	MR	36,43
Chelsea	R	3,6,7,9,10,12,16,19,22,23,28,31,33,34,49,50,52,53,56,57,58,62,63,64,70,82,86,96,48
Chelsea bench	R	56
Chelsea moderately eroded	R	62,63,91
Chelsea-Clinton Complex moderately eroded	R	62
Chelsea-Fayette Complex	R	50,51,54,70
Chelsea-Fayette-Tell Complex	R	48
Chelsea-Fayette-Tell Complex moderately eroded	R	48
Chelsea-Ladoga Complex	R	79
Chelsea-Ladoga Complex moderately eroded	R	79
Chelsea-Lamont Complex	R	86
Chelsea-Lamont Complex moderately eroded	R	86
Chelsea-Lamont-Fayette Complex	R	6,16,23,44,52,53,57,58,82
Chelsea-Lamont-Fayette Complex moderately eroded	R	52,57
Chelsea-Lilah Complex	R	22
Dickinson	MR	6,7,9,10,11,12,16,17,19,21,23,25,28,29,31,33,34,35,38,40,42,44,45,46,49,50,52,53,56,57,58,64,66,69,70,77,80,82,85,86,88,92,95,96,98,99,48
Dickinson bench	MR	9

SOIL NAME	PERMEABILITY	COUNTIES
Dickinson gravelly substratum	MR	9
Dickinson lacustrine substratum	MR	21
Dickinson loamy substratum	MR	57
Dickinson moderately eroded	MR	1,49,64
Dickinson moderately eroded, lacustrine substratum	MR	21
Dickinson till substratum	MR	33
Dickinson-Ostrander Complex	MR	9,45,66
Dickinson-Racine Complex	MR	45
Dickinson-Sharpsburg Complex	MR	1
Dickinson-Sharpsburg Complex moderately eroded	MR	1,39
Dickinson-Sparta-Tama Complex	MR	57,64
Dickinson-Sparta-Tama Complex moderately eroded	MR	64
Dickinson-Tama Complex	MR	16
Dickman	MR	8,14,18,32,37,41,55,60,72,74,75,84,95
Dickman moderately eroded	MR	14,37,41,47,55,60,72,84
Dickman-Bolan Complex	MR	30
Dickman-Marshall Complex	MR	5
Elrick rarely flooded	MR	58,70
Estherville	MR	11,13,14,18,21,30,32,37,41,55,60,71,74,76,84,85,94
Estherville loamy substratum	MR	94
Estherville moderately eroded	MR	11,13,14,18,30,32,37,41,55,74,76,84
Estherville-Hawick Complex	MR	21,94
Estherville-Salida Complex	MR	60,76
Finchford	R	6,7,10,23,28,49,53
Finchford rarely flooded	R	23
Flaggy alluvial land frequenyly flooded	R	61
Flagler	MR	6,7,10,12,17,19,22,23,28,31,33,34,35,42,50,53,57,62,66,81,82,85,98
Flagler moderately eroded	MR	19,42,57,81
Flagler rarely flooded	MR	52
Flagler variant	MR	74
Fluvaquents channeled, frequently flooded	R	14
Fluvaquents frequently flooded	MR	6
Fluvaquents frequently flooded	R	94
Fruitfield	VR	58,70
Fruitfield rarely flooded	VR	70
Gilford rarely flooded, ponded	MR	58
Granby	MR	53
Granby ponded	MR	23
Hagener	MR	9
Hagener bench	MR	9
Hagener moderately eroded	MR	2,15
Hanlon channeled, frequently flooded	MR	40,99
Hanlon frequently flooded	MR	25,33
Hanlon occasionally flooded	MR	6,8,16,17,34,40,42,46,64,66,85,99,94
Hanlon-Radford Complex frequently flooded	MR	70
Hanlon-Spillville Complex channeled, frequently flooded	MR	25,85
Hanska	MR	12,55,76,95
Hanska 24 to 32 inches to sand and gravel	MR	74
Hanska rarely flooded	MR	64
Hawick	MR	94
Hawick	R	3,18,21,24,47,97
Hesch	MR	39
Hoopeston	MR	12,17,19,29,44,52,70,90,98
Hoopeston rarely flooded	MR	56,58,89

SOIL NAME PERMEABILITY COUNTIES

Hoopeston variant	MR	72
Houghton	MR	12,19
Houghton ponded	MR	17,35,41,52,70,95,98
Klum frequently flooded	MR	29,44,58
Klum occasionally flooded	MR	27,51,77,89
Klum rarely flooded	MR	89
Klum-Nodaway Complex frequently flooded	MR	58
Klum-Perks-Nodaway Complex channeled, frequently flooded	MR	44
Klum-Perks-Nodaway Complex frequently flooded	MR	44
Lamont	MR	6,9,10,12,16,22,23,28,31,33,34,44,45,52,53,57,58,66,86
Lamont bench	MR	9
Lamont moderately eroded	MR	49
Lamont-Renova Complex	MR	66
Landes occasionally flooded	MR	56,62,90
Landes-Alluvial land Complex frequently flooded	MR	63
Landes-Perks Complex frequently flooded	MR	90
Landes-Perks-Nodaway Complex frequently flooded	MR	90
Lemond	MR	55
Lilah	MR	7,10,19,22,28,34,45,66
Lilah moderately eroded	MR	19,38
Lilah-Dickinson Complex	MR	96
Marlean	MR	31
May City	MR	21
May City moderately eroded	MR	21
Mixed alluvial land channeled, frequently flooded	MR	98
Palms	MR	10,22,28,34
Palms occasionally flooded, ponded	MR	70
Palms ponded	MR	35,40,41,42,77,85,95,98,99
Peaty muck deep	MR	9
Perks frequently flooded	MR	53
Perks occasionally flooded	MR	52,58,70,82,92
Perks occasionally flooded	R	51,58,70,82,89
Perks rarely flooded	MR	58
Perks rarely flooded	R	89
Perks-Chaseburg Complex frequently flooded	MR	53
Perks-Nodaway Complex frequently flooded	MR	82,92
Perks-Spillville Complex frequently flooded	MR	52
Psammaquents frequently flooded, ponded	R	77,78
Reedscreek occasionally flooded	MR	89
Ridgeport	MR	8,14,25,32,41,46,55,95
Ridgeport moderately eroded	MR	8,46,55
Riverwash frequently flooded	R	43
Riverwash very frequently flooded	R	36,62,63
Rock outcrop-Nordness Complex	R	23
Roine	MR	21
Roine moderately eroded	MR	21
Salida	MR	8,11,17,30,32,35,42,60,71,74,81,95,98
Salida moderately eroded	MR	32,39,41,55
Salida-Storden Complex	MR	14
Salida-Storden Complex moderately eroded	MR	37
Sarpy	R	67
Sarpy occasionally flooded	MR	43,65
Sarpy occasionally flooded	R	36,43,65,67,78,97
Sarpy rarely flooded	R	36,43,67,78,97
Sarpy-Albaton Complex frequently flooded	R	43
Sarpy-Morconick Complex occasionally flooded	R	97
Saude	MR	45
Schley variant variant	MR	10

SOIL NAME	PERMEABILITY	COUNTIES
Shellwood occasionally flooded	MR	34
Sigglekov-Fluvaquents-Aquents Complex frequently flooded	MR	7
Sparta	MR	3,6,7,10,12,16,17,21,22,23,28,29, 31,33,34,35,38,42,44,45,49,50,51, 52,53,56,57,58,62,64,68,70,73,76, 77,79,81,82,85,90,92,96,98,48
Sparta loamy substratum	MR	57
Sparta moderately eroded	MR	50
Sparta thick surface	MR	52,56
Sparta-Otley Complex moderately eroded	MR	62
Sunburg moderately eroded	MR	41
Sunburg-Salida Complex moderately eroded	MR	41
Ticonic rarely flooded	R	97
Toolesboro rarely flooded	MR	70
Udifluvents occasionally flooded	MR	94
Udifluvents-Spillville Complex channeled, frequently flooded	MR	96
Volney frequently flooded	MR	22
Volney occasionally flooded	MR	3,96
Volney rarely flooded	MR	96
Volney-Dorchester Complex frequently flooded	MR	49
Watseka	R	10,52,58,70,74,76
Waubonsie occasionally flooded	MR	36
Zenor	MR	8,21,25,32,35,40,42,46,77,85,99
Zenor moderately eroded	MR	8,21,25,32,40,42,46,77,85,99
Zenor-Storden Complex moderately eroded	MR	8,25,40,46,77,99