

## Map Unit Description (MN)

Cass County, Minnesota

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### 7A--Hubbard loamy sand, 0 to 3 percent slopes

#### Hubbard

*Extent:* 90 percent of the unit

*Landform(s):* flats on outwash plains

*Slope gradient:* 0 to 3 percent

*Parent material:* sandy outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 16 in	loamy sand	rapid	1.3 to 1.9 in	5.1 to 7.3
Bw1 -- 16 to 24 in	loamy sand	rapid	0.2 to 0.6 in	5.1 to 7.3
Bw2,C -- 24 to 60 in	sand	rapid	1.1 to 2.5 in	5.6 to 7.8

### 7B--Hubbard loamy sand, 3 to 8 percent slopes

#### Hubbard

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on outwash plains

*Slope gradient:* 3 to 8 percent

*Parent material:* sandy outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,Bw1 -- 0 to 19 in	loamy sand	rapid	1.5 to 2.3 in	5.1 to 7.3
Bw2 -- 19 to 45 in	sand	rapid	0.8 to 1.8 in	5.1 to 7.3
C -- 45 to 60 in	sand	rapid	0.4 to 1.0 in	5.6 to 7.8

### 48--Hiwood loamy fine sand

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### 48--Hiwood loamy fine sand

#### Hiwood

*Extent:* 90 percent of the unit

*Landform(s):* rises on outwash plains, rises on till-floored lake plains

*Slope gradient:* 0 to 2 percent

*Parent material:* sandy glacial outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* moderately well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 5 in	loamy fine sand	rapid	0.4 to 0.6 in	4.5 to 6.0
Bw -- 5 to 30 in	loamy fine sand	rapid	1.7 to 2.5 in	5.1 to 6.0
C -- 30 to 60 in	fine sand	rapid	1.5 to 2.4 in	5.6 to 7.8

### 82B--Redeye loamy sand, 1 to 6 percent slopes

#### Redeye

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on drumlins

*Slope gradient:* 1 to 6 percent

*Parent material:* sandy outwash over dense basal till

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 3s

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Ap -- 0 to 6 in	loamy sand	rapid	0.6 to 0.7 in	5.1 to 7.3
E -- 6 to 15 in	loamy fine sand	rapid	0.6 to 0.9 in	5.1 to 6.5
Bw -- 15 to 33 in	sand	rapid	1.3 to 1.8 in	5.6 to 6.5
2Bt -- 33 to 55 in	sandy loam	moderately slow	2.4 to 2.9 in	5.1 to 7.3
2Cd -- 55 to 60 in	sandy loam	slow	0.0 to 0.2 in	7.4 to 8.4

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### 82B--Redeye loamy sand, 1 to 6 percent slopes

### 82C--Redeye loamy sand, 6 to 12 percent slopes

#### Redeye

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on drumlins

*Slope gradient:* 6 to 12 percent

*Parent material:* sandy outwash over dense basal till

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 3e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 4 in	loamy sand	rapid	0.4 to 0.5 in	5.1 to 7.3
E -- 4 to 7 in	sand	rapid	0.2 to 0.3 in	5.1 to 6.5
Bw -- 7 to 31 in	sand	rapid	1.7 to 2.4 in	5.6 to 6.5
2Bt -- 31 to 48 in	sandy loam	moderately slow	1.9 to 2.2 in	5.1 to 7.3
2Cd -- 48 to 60 in	sandy loam	slow	0.0 to 0.5 in	7.4 to 8.4

### 119B--Pomroy loamy sand, 3 to 8 percent slopes

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### 119B--Pomroy loamy sand, 3 to 8 percent slopes

#### Pomroy

*Extent:* 85 percent of the unit

*Landform(s):* hillslopes on drumlins

*Slope gradient:* 3 to 8 percent

*Parent material:* sandy outwash over dense basal till

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 3s

*Hydric soil:* no

*Hydrologic group* C

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 4 in	loamy sand	rapid	0.4 to 0.5 in	5.1 to 6.5
Bw,E -- 4 to 24 in	fine sand	rapid	1.2 to 1.8 in	5.1 to 6.5
2Bt -- 24 to 31 in	sandy loam	moderately slow	0.0 to 0.6 in	5.1 to 6.5
2BC -- 31 to 42 in	sandy loam	slow	0.0 to 0.9 in	5.6 to 7.3
2Cd -- 42 to 60 in	sandy loam	moderately slow	0.0 to 0.7 in	5.6 to 7.3

### 119C--Pomroy loamy sand, 8 to 15 percent slopes

#### Pomroy

*Extent:* 85 percent of the unit

*Landform(s):* hillslopes on drumlins

*Slope gradient:* 8 to 15 percent

*Parent material:* sandy outwash over dense basal till

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* C

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 3 in	loamy sand	rapid	0.3 to 0.4 in	5.1 to 6.5
E,Bw -- 3 to 34 in	sand	rapid	1.8 to 2.8 in	5.1 to 6.5
2Bt,2BC -- 34 to 40 in	sandy loam	moderately slow	0.0 to 0.5 in	5.1 to 6.5
2Cd -- 40 to 60 in	sandy loam	moderately slow	0.0 to 0.8 in	5.6 to 7.3

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### 119C--Pomroy loamy sand, 8 to 15 percent slopes

### 126B--Graycalm loamy sand, 1 to 8 percent slopes

#### Graycalm

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on moraines, hillslopes on outwash plains

*Slope gradient:* 1 to 8 percent

*Parent material:* sandy outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG):* 2

*Wind erodibility index (WEI):* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group:* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,Bw -- 0 to 8 in	loamy sand	rapid	0.5 to 0.9 in	3.5 to 6.5
E -- 8 to 16 in	sand	rapid	0.4 to 0.8 in	3.5 to 7.3
E&Bt -- 16 to 52 in	sand	rapid	1.4 to 3.2 in	3.5 to 7.3
C -- 52 to 60 in	sand	rapid	0.3 to 0.5 in	3.5 to 8.4

### 126C--Graycalm loamy sand, 8 to 15 percent slopes

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### 126C--Graycalm loamy sand, 8 to 15 percent slopes

#### Graycalm

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on moraines, hillslopes on outwash plains

*Slope gradient:* 8 to 15 percent

*Parent material:* sandy outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 6s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 4 in	loamy sand	rapid	0.2 to 0.5 in	3.5 to 6.5
E,Bw -- 4 to 27 in	sand	rapid	1.1 to 2.3 in	3.5 to 7.3
E&Bt -- 27 to 50 in	sand	rapid	0.9 to 2.1 in	3.5 to 7.3
C -- 50 to 60 in	sand	rapid	0.4 to 0.6 in	3.5 to 8.4

### 139B--Huntersville loamy fine sand, 1 to 6 percent slopes

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### 139B--Huntersville loamy fine sand, 1 to 6 percent slopes

#### Huntersville

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on drumlins

*Slope gradient:* 1 to 6 percent

*Parent material:* sandy outwash over dense basal till

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* none

*Drainage class:* moderately well drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 3s

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Ap -- 0 to 7 in	loamy fine sand	rapid	0.7 to 0.9 in	6.1 to 7.3
E/B -- 7 to 12 in	loamy sand	rapid	0.2 to 0.5 in	6.1 to 7.3
Bw -- 12 to 24 in	cobbly loamy sand	moderately slow	1.3 to 1.6 in	6.1 to 7.3
2Bt,2Cd -- 24 to 60 in	sandy loam	slow	0.0 to 1.4 in	6.6 to 7.8

### 142--Nokay loam

#### Nokay

*Extent:* 90 percent of the unit

*Landform(s):* flats on interdrumlins, hillslopes on moraines

*Slope gradient:* 0 to 2 percent

*Parent material:* dense basal till

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat poorly drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 5

*Wind erodibility index (WEI)* 56

*Kw (surface layer):* .24

*Land capability class, nonirrigated:* 2w

*Hydric soil:* no

*Hydrologic group* C

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 5 in	loam	moderate	0.9 to 1.1 in	4.5 to 5.5
E -- 5 to 17 in	sandy loam	moderately rapid	1.4 to 2.2 in	4.5 to 5.5
Bt -- 17 to 32 in	sandy loam	moderate	1.8 to 2.8 in	5.1 to 6.5
BC -- 32 to 44 in	loamy coarse sand	slow	0.0 to 1.0 in	5.6 to 7.3
Cd -- 44 to 60 in	loamy coarse sand	impermeable	0.0 to 0.6 in	5.6 to 7.3

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### 142--Nokay loam

### 144B--Flak sandy loam, 3 to 8 percent slopes

#### Flak

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on drumlins, hillslopes on moraines

*Slope gradient:* 3 to 8 percent

*Parent material:* dense basal till

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .20

*Land capability class, nonirrigated:* 2e

*Hydric soil:* no

*Hydrologic group* C

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Ap -- 0 to 4 in	sandy loam	moderately rapid	0.5 to 0.7 in	4.5 to 6.5
E -- 4 to 16 in	sandy loam	moderately rapid	1.5 to 2.0 in	5.1 to 6.5
Bt -- 16 to 30 in	sandy loam	moderate	1.7 to 2.2 in	5.1 to 6.5
Cd -- 30 to 60 in	sandy loam	impermeable	0.0 to 1.2 in	5.6 to 7.3

### 144C--Flak sandy loam, 8 to 15 percent slopes

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### 144C--Flak sandy loam, 8 to 15 percent slopes

#### Flak

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on drumlins, hillslopes on moraines

*Slope gradient:* 8 to 15 percent

*Parent material:* dense basal till

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG):* 3

*Wind erodibility index (WEI):* 86

*Kw (surface layer):* .20

*Land capability class, nonirrigated:* 3e

*Hydric soil:* no

*Hydrologic group:* C

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Ap -- 0 to 6 in	sandy loam	moderately rapid	0.8 to 1.1 in	4.5 to 6.5
E -- 6 to 14 in	sandy loam	moderately rapid	1.0 to 1.3 in	5.1 to 6.5
Bt -- 14 to 26 in	sandy loam	moderate	1.4 to 1.9 in	5.1 to 6.5
BC -- 26 to 41 in	sandy loam	slow	0.0 to 0.9 in	5.1 to 7.3
Cd -- 41 to 60 in	sandy loam	impermeable	0.0 to 0.8 in	5.6 to 7.3

### 146B--Wabedo sandy loam, 1 to 6 percent slopes

#### Wabedo

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on drumlins, hillslopes on moraines

*Slope gradient:* 1 to 6 percent

*Parent material:* dense basal till

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* none

*Drainage class:* moderately well drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG):* 3

*Wind erodibility index (WEI):* 86

*Kw (surface layer):* .24

*Land capability class, nonirrigated:* 2e

*Hydric soil:* no

*Hydrologic group:* C

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Ap -- 0 to 5 in	sandy loam	moderately rapid	0.7 to 0.9 in	4.5 to 6.0
Bw -- 5 to 27 in	sandy loam	moderate	2.6 to 3.5 in	4.5 to 6.5
BC -- 27 to 47 in	sandy loam	slow	0.6 to 1.6 in	5.1 to 7.3
Cd -- 47 to 60 in	sandy loam	impermeable	0.0 to 0.5 in	5.1 to 7.3

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### 146B--Wabedo sandy loam, 1 to 6 percent slopes

### 147--Spooner very fine sandy loam

#### Spooner

*Extent:* 85 percent of the unit

*Landform(s):* flats on lake plains, swales on lake plains

*Slope gradient:* 0 to 2 percent

*Parent material:* silty glaciolacustrine deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* poorly drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG):* 3

*Wind erodibility index (WEI):* 86

*Kw (surface layer):* .37

*Land capability class, nonirrigated:* 3w

*Hydric soil:* yes

*Hydrologic group:* C/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Ap -- 0 to 6 in	very fine sandy loam	moderately rapid	1.2 to 1.3 in	5.6 to 7.8
E -- 6 to 14 in	very fine sandy loam	moderately rapid	1.4 to 1.6 in	5.6 to 7.8
Btg -- 14 to 22 in	silt loam	moderate	1.3 to 1.7 in	6.1 to 7.8
Cg -- 22 to 60 in	very fine sandy loam	moderate	6.4 to 8.3 in	7.4 to 8.4

### 158B--Zimmerman fine sand, 1 to 8 percent slopes

#### Zimmerman

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on outwash plains

*Slope gradient:* 1 to 8 percent

*Parent material:* sandy outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG):* 1

*Wind erodibility index (WEI):* 220

*Kw (surface layer):* .15

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group:* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 9 in	fine sand	rapid	0.6 to 0.8 in	5.1 to 6.5
E,E&Bt -- 9 to 60 in	fine sand	rapid	3.0 to 5.1 in	5.1 to 7.3

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### 158B--Zimmerman fine sand, 1 to 8 percent slopes

### 167B--Baudette silt loam, 1 to 6 percent slopes

#### Baudette

*Extent:* 90 percent of the unit

*Landform(s):* flats on lake plains, rises on lake plains

*Slope gradient:* 1 to 6 percent

*Parent material:* silty glaciolacustrine deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* moderately well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG):* 6

*Wind erodibility index (WEI):* 48

*Kw (surface layer):* .37

*Land capability class, nonirrigated:* 2e

*Hydric soil:* no

*Hydrologic group:* B

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 3 in	silt loam	moderate	0.6 to 0.7 in	5.6 to 7.3
E -- 3 to 10 in	silt loam	moderate	0.9 to 1.3 in	5.6 to 7.3
Bt,BC -- 10 to 32 in	silty clay loam	moderate	3.7 to 5.3 in	5.6 to 7.8
C -- 32 to 60 in	silt loam	moderate	4.8 to 6.1 in	7.4 to 8.4

### 202--Meehan loamy sand

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### 202--Meehan loamy sand

#### Meehan

*Extent:* 90 percent of the unit

*Landform(s):* flats on outwash plains

*Slope gradient:* 0 to 2 percent

*Parent material:* sandy outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat poorly drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4w

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Ap -- 0 to 7 in	loamy sand	moderately rapid	0.7 to 0.9 in	3.5 to 7.3
E,Bw -- 7 to 24 in	sand	rapid	1.0 to 1.9 in	3.5 to 6.5
C -- 24 to 60 in	sand	rapid	0.7 to 2.5 in	3.5 to 7.3

### 204B--Cushing loam, 2 to 8 percent slopes

#### Cushing

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 2 to 8 percent

*Parent material:* loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 5

*Wind erodibility index (WEI)* 56

*Kw (surface layer):* .32

*Land capability class, nonirrigated:* 2e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Ap -- 0 to 10 in	loam	moderate	1.6 to 2.4 in	5.1 to 7.8
E,B/E -- 10 to 20 in	loam	moderate	1.0 to 2.3 in	5.1 to 7.8
Bt -- 20 to 31 in	loam	moderate	1.1 to 2.1 in	5.1 to 7.8
C -- 31 to 60 in	sandy loam	moderately slow	2.6 to 5.5 in	5.1 to 8.4

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 204C--Cushing loam, 8 to 15 percent slopes

#### Cushing

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 8 to 15 percent

*Parent material:* loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 5

*Wind erodibility index (WEI)* 56

*Kw (surface layer):* .32

*Land capability class, nonirrigated:* 3e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 5 in	loam	moderate	0.8 to 1.2 in	5.1 to 7.8
E,B/E -- 5 to 24 in	sandy loam	moderate	1.9 to 4.2 in	5.1 to 7.8
Bt -- 24 to 49 in	clay loam	moderate	2.5 to 4.7 in	5.1 to 7.8
C -- 49 to 60 in	sandy clay loam	moderately slow	1.0 to 2.1 in	5.1 to 8.4

### 204E--Cushing loam, 15 to 30 percent slopes

#### Cushing

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 15 to 30 percent

*Parent material:* loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 5

*Wind erodibility index (WEI)* 56

*Kw (surface layer):* .32

*Land capability class, nonirrigated:* 6e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 3 in	loam	moderate	0.5 to 0.8 in	5.1 to 7.8
E,B/E -- 3 to 20 in	fine sandy loam	moderate	1.7 to 3.7 in	5.1 to 7.8
Bt -- 20 to 38 in	loam	moderate	1.8 to 3.4 in	5.1 to 7.8
C -- 38 to 60 in	fine sandy loam	moderately slow	2.0 to 4.2 in	5.1 to 8.4

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 204E--Cushing loam, 15 to 30 percent slopes

### 217--Nokasippi loamy fine sand

#### Nokasippi

*Extent:* 85 percent of the unit

*Landform(s):* drainageways on interdrumlins, drainageways on moraines

*Slope gradient:* 0 to 1 percent

*Parent material:* sandy outwash over dense basal till

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* frequent

*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG):* 2

*Wind erodibility index (WEI):* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 6w

*Hydric soil:* yes

*Hydrologic group:* B/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 10 in	loamy fine sand	rapid	1.0 to 1.2 in	4.5 to 6.5
Bg1 -- 10 to 21 in	loamy sand	rapid	0.7 to 1.3 in	4.5 to 7.3
Bg2 -- 21 to 32 in	loamy sand	moderately rapid	1.2 to 2.0 in	4.5 to 7.3
2Bg3,2BC -- 32 to 41 in	sandy loam	slow	0.0 to 0.7 in	4.5 to 7.3
2Cd -- 41 to 60 in	sandy loam	impermeable	0.0 to 0.8 in	5.1 to 7.3

### 218--Watab loamy sand

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 218--Watab loamy sand

#### Watab

*Extent:* 85 percent of the unit

*Landform(s):* drainageways on interdrumlins, swales on moraines

*Slope gradient:* 0 to 2 percent

*Parent material:* sandy outwash over dense basal till

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* none

*Drainage class:* poorly drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 3w

*Hydric soil:* yes

*Hydrologic group* C

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 5 in	loamy sand	rapid	0.5 to 0.6 in	5.1 to 6.0
E -- 5 to 21 in	loamy sand	rapid	0.9 to 1.4 in	5.1 to 6.5
Bw -- 21 to 30 in	loamy sand	moderately rapid	0.7 to 1.1 in	5.1 to 6.5
2Bt,2BC -- 30 to 41 in	fine sandy loam	slow	0.3 to 0.9 in	5.6 to 7.3
2Cd -- 41 to 60 in	sandy loam	impermeable	0.0 to 0.8 in	5.6 to 7.3

### 240A--Warba very fine sandy loam, 1 to 3 percent slopes moderately wet

#### Warba, moderately wet

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 1 to 3 percent

*Parent material:* loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .37

*Land capability class, nonirrigated:* 2e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 14 in	very fine sandy loam	moderately rapid	2.6 to 3.3 in	5.1 to 6.5
E/B,B/E,Bt -- 14 to 40 in	loam	moderately slow	4.2 to 4.9 in	5.1 to 7.3
C -- 40 to 60 in	loam	moderate	3.1 to 3.7 in	6.6 to 8.4

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 240A--Warba very fine sandy loam, 1 to 3 percent slopes moderately wet

### 240B--Warba very fine sandy loam, 3 to 8 percent slopes

#### Warba

<i>Extent:</i> 90 percent of the unit	<i>Soil loss tolerance (T factor):</i> 5
<i>Landform(s):</i> hillslopes on moraines	<i>Wind erodibility group (WEG)</i> 3
<i>Slope gradient:</i> 3 to 8 percent	<i>Wind erodibility index (WEI)</i> 86
<i>Parent material:</i> loamy glacial till	<i>Kw (surface layer):</i> .37
<i>Restrictive feature(s):</i>	<i>Land capability class, nonirrigated:</i> 2e
<i>Flooding:</i> none	<i>Hydric soil:</i> no
<i>Ponding:</i> none	<i>Hydrologic group</i> B
<i>Drainage class:</i> well drained	<i>Potential frost action:</i> moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 11 in	very fine sandy loam	moderately rapid	2.0 to 2.5 in	5.1 to 6.5
E/B,B/E,Bt -- 11 to 37 in	clay loam	moderately slow	4.2 to 4.9 in	5.1 to 7.3
C -- 37 to 60 in	loam	moderate	3.7 to 4.3 in	6.6 to 8.4

### 240C--Warba very fine sandy loam, 8 to 15 percent slopes

#### Warba

<i>Extent:</i> 90 percent of the unit	<i>Soil loss tolerance (T factor):</i> 5
<i>Landform(s):</i> hillslopes on moraines	<i>Wind erodibility group (WEG)</i> 3
<i>Slope gradient:</i> 8 to 15 percent	<i>Wind erodibility index (WEI)</i> 86
<i>Parent material:</i> loamy glacial till	<i>Kw (surface layer):</i> .37
<i>Restrictive feature(s):</i>	<i>Land capability class, nonirrigated:</i> 3e
<i>Flooding:</i> none	<i>Hydric soil:</i> no
<i>Ponding:</i> none	<i>Hydrologic group</i> B
<i>Drainage class:</i> well drained	<i>Potential frost action:</i> moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 10 in	very fine sandy loam	moderately rapid	1.8 to 2.3 in	5.1 to 6.5
B/E,Bt -- 10 to 36 in	clay loam	moderately slow	4.2 to 4.9 in	5.1 to 7.3
C -- 36 to 60 in	clay loam	moderate	3.8 to 4.6 in	6.6 to 8.4

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 240C--Warba very fine sandy loam, 8 to 15 percent slopes

### 243--Stuntz very fine sandy loam

#### Stuntz

*Extent:* 90 percent of the unit

*Landform(s):* flats on moraines

*Slope gradient:* 0 to 2 percent

*Parent material:* loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat poorly drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG):* 3

*Wind erodibility index (WEI):* 86

*Kw (surface layer):* .37

*Land capability class, nonirrigated:* 2w

*Hydric soil:* no

*Hydrologic group:* C

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E,E/B -- 0 to 17 in	very fine sandy loam	moderately rapid	3.0 to 3.9 in	4.5 to 6.5
B/E,Btg -- 17 to 39 in	sandy clay loam	moderately slow	3.5 to 4.2 in	5.1 to 7.8
C -- 39 to 60 in	loam	moderately slow	3.3 to 4.0 in	6.6 to 8.4

### 268B--Cromwell sandy loam, 1 to 8 percent slopes

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 268B--Cromwell sandy loam, 1 to 8 percent slopes

#### Cromwell

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on moraines, hillslopes on outwash plains

*Slope gradient:* 1 to 8 percent

*Parent material:* loamy mantled outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat excessively drained

*Soil loss tolerance (T factor):* 3

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .24

*Land capability class, nonirrigated:* 3e

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,Bw -- 0 to 17 in	sandy loam	moderate	2.7 to 3.0 in	4.5 to 6.0
2Bw,2BC,2C -- 17 to 60 in	sand	rapid	2.1 to 3.0 in	5.1 to 7.3

### 268C--Cromwell sandy loam, 8 to 15 percent slopes

#### Cromwell

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on moraines, hillslopes on outwash plains

*Slope gradient:* 8 to 15 percent

*Parent material:* loamy mantled outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat excessively drained

*Soil loss tolerance (T factor):* 3

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .24

*Land capability class, nonirrigated:* 4e

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,Bw -- 0 to 15 in	sandy loam	moderate	2.4 to 2.7 in	4.5 to 6.0
2Bw,2BC,2C -- 15 to 60 in	sand	rapid	2.2 to 3.1 in	5.1 to 7.3

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 292--Alstad fine sandy loam

#### Alstad

*Extent:* 90 percent of the unit

*Landform(s):* flats on moraines

*Slope gradient:* 0 to 2 percent

*Parent material:* loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat poorly drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .24

*Land capability class, nonirrigated:* 2w

*Hydric soil:* no

*Hydrologic group* C

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 5 in	fine sandy loam	moderate	0.6 to 0.9 in	4.5 to 7.8
E -- 5 to 15 in	fine sandy loam	moderate	0.9 to 2.2 in	4.5 to 7.8
B/E -- 15 to 20 in	sandy loam	moderate	0.5 to 0.9 in	4.5 to 7.8
Bt -- 20 to 31 in	sandy loam	moderate	1.0 to 2.0 in	4.5 to 7.8
BC,C -- 31 to 60 in	sandy loam	moderate	2.6 to 5.2 in	7.4 to 8.4

### 453B--DeMontreville loamy sand, 2 to 8 percent slopes

#### DeMontreville

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 2 to 8 percent

*Parent material:* sandy outwash over loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 3s

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 4 in	loamy sand	rapid	0.4 to 0.5 in	5.1 to 7.3
Bw -- 4 to 25 in	loamy sand	rapid	1.3 to 1.9 in	5.1 to 7.3
2B/E,2Bt -- 25 to 47 in	sandy loam	moderately slow	1.7 to 3.0 in	5.6 to 6.5
2C -- 47 to 60 in	sandy loam	moderately slow	0.8 to 1.3 in	5.6 to 7.3

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 453B--DeMontreville loamy sand, 2 to 8 percent slopes

### 453C--DeMontreville loamy sand, 8 to 15 percent slopes

#### DeMontreville

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 8 to 15 percent

*Parent material:* sandy outwash over loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 2 in	loamy sand	rapid	0.2 to 0.2 in	5.1 to 7.3
Bw -- 2 to 33 in	sand	rapid	1.9 to 2.8 in	5.1 to 7.3
2B/E,2Bt -- 33 to 40 in	loamy sand	moderately slow	0.6 to 1.0 in	5.6 to 6.5
2C -- 40 to 60 in	sandy loam	moderately slow	1.2 to 2.0 in	5.6 to 7.3

### 453E--DeMontreville loamy sand, 15 to 40 percent slopes

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 453E--DeMontreville loamy sand, 15 to 40 percent slopes

#### DeMontreville

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 15 to 40 percent

*Parent material:* sandy outwash over loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 7e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 2 in	loamy sand	rapid	0.2 to 0.2 in	5.1 to 7.3
Bw -- 2 to 36 in	loamy sand	rapid	2.0 to 3.0 in	5.1 to 7.3
2B/E,2Bt -- 36 to 45 in	sandy loam	moderately slow	0.7 to 1.3 in	5.6 to 6.5
2C -- 45 to 60 in	sandy loam	moderately slow	0.9 to 1.5 in	5.6 to 7.3

### 454B--Mahtomedi loamy sand, 1 to 8 percent slopes

#### Mahtomedi

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on moraines, hillslopes on outwash plains

*Slope gradient:* 1 to 8 percent

*Parent material:* sandy and gravelly outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .15

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 2 in	loamy sand	rapid	0.2 to 0.2 in	5.1 to 6.5
E -- 2 to 6 in	loamy sand	rapid	0.2 to 0.3 in	5.1 to 6.5
Bw -- 6 to 20 in	coarse sand	rapid	0.7 to 1.0 in	5.1 to 6.5
C -- 20 to 60 in	coarse sand	rapid	1.6 to 3.6 in	5.1 to 7.4

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 454B--Mahtomedi loamy sand, 1 to 8 percent slopes

### 454C--Mahtomedi loamy sand, 8 to 15 percent slopes

#### Mahtomedi

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on moraines, hillslopes on outwash plains

*Slope gradient:* 8 to 15 percent

*Parent material:* sandy and gravelly outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG):* 2

*Wind erodibility index (WEI):* 134

*Kw (surface layer):* .15

*Land capability class, nonirrigated:* 6s

*Hydric soil:* no

*Hydrologic group:* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 2 in	loamy sand	rapid	0.2 to 0.2 in	5.1 to 6.5
E -- 2 to 6 in	gravelly loamy sand	rapid	0.2 to 0.3 in	5.1 to 6.5
Bw -- 6 to 22 in	sand	rapid	0.8 to 1.1 in	5.1 to 6.5
C -- 22 to 60 in	gravelly sand	rapid	1.5 to 3.4 in	5.1 to 7.4

### 454E--Mahtomedi loamy sand, 15 to 40 percent slopes

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 454E--Mahtomedi loamy sand, 15 to 40 percent slopes

#### Mahtomedi

*Extent:* 90 percent of the unit

*Landform(s):* ridges on moraines, hillslopes on outwash plains

*Slope gradient:* 15 to 40 percent

*Parent material:* sandy and gravelly outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .15

*Land capability class, nonirrigated:* 7s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 1 in	loamy sand	rapid	0.1 to 0.1 in	5.1 to 6.5
E -- 1 to 9 in	loamy sand	rapid	0.5 to 0.7 in	5.1 to 6.5
Bw -- 9 to 14 in	sand	rapid	0.3 to 0.4 in	5.1 to 6.5
C -- 14 to 60 in	gravelly sand	rapid	1.8 to 4.1 in	5.1 to 7.4

### 458A--Menahga loamy sand, 0 to 3 percent slopes

#### Menahga

*Extent:* 90 percent of the unit

*Landform(s):* flats on outwash plains

*Slope gradient:* 0 to 3 percent

*Parent material:* sandy outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 3 in	loamy sand	rapid	0.3 to 0.4 in	4.5 to 6.5
Bw -- 3 to 25 in	coarse sand	rapid	1.1 to 1.5 in	4.5 to 6.5
C -- 25 to 60 in	coarse sand	rapid	1.7 to 2.4 in	5.6 to 7.8

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 458A--Menahga loamy sand, 0 to 3 percent slopes

### 458B--Menahga loamy sand, 3 to 8 percent slopes

#### Menahga

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on outwash plains

*Slope gradient:* 3 to 8 percent

*Parent material:* sandy outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 3 in	loamy sand	rapid	0.3 to 0.4 in	4.5 to 6.5
Bw -- 3 to 20 in	sand	rapid	0.8 to 1.2 in	4.5 to 6.5
C -- 20 to 60 in	sand	rapid	2.0 to 2.8 in	5.6 to 7.8

### 458C--Menahga loamy sand, 8 to 15 percent slopes

#### Menahga

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on outwash plains

*Slope gradient:* 8 to 15 percent

*Parent material:* sandy outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 3 in	loamy sand	rapid	0.3 to 0.4 in	4.5 to 6.5
Bw -- 3 to 27 in	loamy sand	rapid	1.2 to 1.7 in	4.5 to 6.5
C -- 27 to 60 in	sand	rapid	1.7 to 2.3 in	5.6 to 7.8

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 458C--Menahga loamy sand, 8 to 15 percent slopes

### 458E--Menahga loamy sand, 15 to 40 percent slopes

#### Menahga

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on outwash plains, ridges on outwash plains

*Slope gradient:* 15 to 40 percent

*Parent material:* sandy outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG):* 2

*Wind erodibility index (WEI):* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 7s

*Hydric soil:* no

*Hydrologic group:* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 5 in	loamy sand	rapid	0.5 to 0.6 in	4.5 to 6.5
E -- 5 to 22 in	sand	rapid	0.8 to 1.2 in	4.5 to 6.5
C -- 22 to 60 in	sand	rapid	1.9 to 2.6 in	5.6 to 7.8

### 540--Seelyeville muck

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 540--Seelyeville muck

#### Seelyeville

*Extent:* 85 percent of the unit

*Landform(s):* depressions on moraines, depressions on outwash plains

*Slope gradient:* 0 to 1 percent

*Parent material:* herbaceous organic material

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* frequent

*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 3

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .02

*Land capability class, nonirrigated:* 6w

*Hydric soil:* yes

*Hydrologic group* A/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Oa1 -- 0 to 20 in	muck	moderately rapid	7.0 to 9.0 in	
Oa2,Oa3 -- 20 to 60 in	muck	moderately rapid	13.9 to 17.9 in	

### 541--Rifle mucky peat

#### Rifle

*Extent:* 85 percent of the unit

*Landform(s):* depressions on moraines, depressions on outwash plains, depressions on till-floored lake plains

*Slope gradient:* 0 to 2 percent

*Parent material:* herbaceous organic material

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* frequent

*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 3

*Wind erodibility group (WEG)* 5

*Wind erodibility index (WEI)* 56

*Kw (surface layer):* .02

*Land capability class, nonirrigated:* 6w

*Hydric soil:* yes

*Hydrologic group* A/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Oe1 -- 0 to 11 in	mucky peat	rapid	5.3 to 6.4 in	
Oe2,Oe3,Oe4 - 11 to 60 in	mucky peat	rapid	23.4 to 28.3 in	

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 543--Markey muck

#### Markey

*Extent:* 85 percent of the unit

*Landform(s):* depressions on moraines, depressions on outwash plains, depressions on till-floored lake plains

*Slope gradient:* 0 to 2 percent

*Parent material:* herbaceous organic material over outwash

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* frequent

*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 2

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .02

*Land capability class, nonirrigated:* 6w

*Hydric soil:* yes

*Hydrologic group* A/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Oa -- 0 to 30 in	muck	moderately rapid	10.5 to 13.5 in	
Cg -- 30 to 60 in	sand	rapid	0.9 to 2.4 in	

### 544--Cathro muck

#### Cathro

*Extent:* 85 percent of the unit

*Landform(s):* depressions on moraines, depressions on till-floored lake plains

*Slope gradient:* 0 to 2 percent

*Parent material:* herbaceous organic material

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* frequent

*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 2

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .02

*Land capability class, nonirrigated:* 6w

*Hydric soil:* yes

*Hydrologic group* A/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Oa1,Oa2 -- 0 to 40 in	muck	moderately rapid	18.1 to 22.1 in	
Cg -- 40 to 60 in	loam	moderate	2.2 to 3.7 in	

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 549--Greenwood peat

#### Greenwood

*Extent:* 85 percent of the unit

*Landform(s):* depressions on moraines, depressions on outwash plains, depressions on till-floored lake plains

*Slope gradient:* 0 to 2 percent

*Parent material:* herbaceous organic material

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* frequent

*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 3

*Wind erodibility group (WEG)* 7

*Wind erodibility index (WEI)* 38

*Kw (surface layer):* .02

*Land capability class, nonirrigated:* 7w

*Hydric soil:* yes

*Hydrologic group* A/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Oi -- 0 to 8 in	peat	very rapid	4.3 to 5.1 in	
Oe1,Oe2 -- 8 to 60 in	mucky peat	rapid	23.4 to 28.6 in	

### 564--Friendship loamy sand

#### Friendship

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on moraines, flats on outwash plains

*Slope gradient:* 0 to 3 percent

*Parent material:* sandy outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* moderately well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 4 in	loamy sand	rapid	0.3 to 0.5 in	4.5 to 7.3
Bw1 -- 4 to 9 in	sand	rapid	0.3 to 0.6 in	4.5 to 6.5
Bw2,BC -- 9 to 37 in	sand	rapid	1.4 to 2.2 in	4.5 to 7.3
C -- 37 to 60 in	sand	rapid	0.9 to 1.6 in	5.1 to 7.8

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 564--Friendship loamy sand

### 620B--Cutaway loamy sand, 1 to 10 percent slopes

#### Cutaway

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 1 to 10 percent

*Parent material:* sandy outwash over loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 3s

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 2 in	loamy sand	rapid	0.2 to 0.2 in	5.1 to 6.5
Bw -- 2 to 27 in	sand	rapid	1.5 to 2.7 in	5.1 to 6.5
2E/B,2Bt,2BC - 27 to 42 in	loam	moderate	1.8 to 2.9 in	5.1 to 7.8
-				
2C -- 42 to 60 in	sandy loam	moderate	2.1 to 3.4 in	6.1 to 8.4

### 620D--Cutaway loamy sand, 10 to 25 percent slopes

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 620D--Cutaway loamy sand, 10 to 25 percent slopes

#### Cutaway

<i>Extent:</i> 90 percent of the unit	<i>Soil loss tolerance (T factor):</i> 5
<i>Landform(s):</i> hillslopes on moraines	<i>Wind erodibility group (WEG)</i> 2
<i>Slope gradient:</i> 10 to 25 percent	<i>Wind erodibility index (WEI)</i> 134
<i>Parent material:</i> sandy outwash over loamy glacial till	<i>Kw (surface layer):</i> .17
<i>Restrictive feature(s):</i>	<i>Land capability class, nonirrigated:</i> 4e
<i>Flooding:</i> none	<i>Hydric soil:</i> no
<i>Ponding:</i> none	<i>Hydrologic group</i> B
<i>Drainage class:</i> well drained	<i>Potential frost action:</i> low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 3 in	loamy sand	rapid	0.3 to 0.4 in	5.1 to 6.5
Bw -- 3 to 31 in	loamy sand	rapid	1.7 to 3.1 in	5.1 to 6.5
2E/B.2Bt,2BC - -	loam	moderate	1.4 to 2.2 in	5.1 to 7.8
2C -- 43 to 60 in	sandy loam	moderate	2.0 to 3.2 in	6.1 to 8.4

### 625--Sandwich loamy sand

#### Sandwich

<i>Extent:</i> 85 percent of the unit	<i>Soil loss tolerance (T factor):</i> 4
<i>Landform(s):</i> drainageways on moraines, swales on moraines	<i>Wind erodibility group (WEG)</i> 2
<i>Slope gradient:</i> 0 to 2 percent	<i>Wind erodibility index (WEI)</i> 134
<i>Parent material:</i> sandy outwash over loamy glacial till	<i>Kw (surface layer):</i> .17
<i>Restrictive feature(s):</i>	<i>Land capability class, nonirrigated:</i> 3w
<i>Flooding:</i> none	<i>Hydric soil:</i> yes
<i>Ponding:</i> none	<i>Hydrologic group</i> B
<i>Drainage class:</i> poorly drained	<i>Potential frost action:</i> moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 5 in	loamy sand	rapid	0.4 to 0.5 in	5.1 to 6.5
E,Bw -- 5 to 28 in	loamy sand	rapid	1.4 to 2.1 in	5.1 to 6.5
2B/E,2Btg -- 28 to 43 in	clay loam	moderately slow	1.5 to 2.4 in	5.6 to 7.3
2Cg -- 43 to 60 in	loam	moderately slow	0.3 to 1.7 in	6.6 to 8.4

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 625--Sandwich loamy sand

### 665B--Menahga loamy sand, moraine, 3 to 8 percent slopes

#### Menahga, moraine

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 3 to 8 percent

*Parent material:* sandy outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 3 in	loamy sand	rapid	0.3 to 0.4 in	4.5 to 6.5
Bw -- 3 to 30 in	loamy sand	rapid	1.9 to 2.4 in	4.5 to 6.5
C -- 30 to 60 in	coarse sand	rapid	1.5 to 2.1 in	5.6 to 6.5

### 665C--Menahga loamy sand, moraine, 8 to 15 percent slopes

#### Menahga, moraine

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 8 to 15 percent

*Parent material:* sandy outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 5 in	loamy sand	rapid	0.5 to 0.6 in	4.5 to 6.5
Bw -- 5 to 25 in	sand	rapid	1.4 to 1.8 in	4.5 to 6.5
C -- 25 to 60 in	sand	rapid	1.7 to 2.4 in	5.6 to 6.5

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 665C--Menahga loamy sand, moraine, 8 to 15 percent slopes

### 665E--Menahga loamy sand, moraine, 15 to 40 percent slopes

#### Menahga, moraine

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on moraines, ridges on moraines

*Slope gradient:* 15 to 40 percent

*Parent material:* sandy outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 7s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 3 in	loamy sand	rapid	0.3 to 0.4 in	4.5 to 6.5
Bw -- 3 to 20 in	sand	rapid	1.2 to 1.5 in	4.5 to 6.5
C -- 20 to 60 in	sand	rapid	2.0 to 2.8 in	5.6 to 6.5

### 679B--Menahga loamy sand, loamy substratum, 2 to 8 percent slopes

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 679B--Menahga loamy sand, loamy substratum, 2 to 8 percent slopes

#### Menahga, loamy substratum

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on moraines, hillslopes on outwash plains

*Slope gradient:* 2 to 8 percent

*Parent material:* sandy outwash deposits over loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

*Representative soil profile:*

		<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A --	0 to 3 in	loamy sand	rapid	0.3 to 0.4 in	5.1 to 7.3
E --	3 to 9 in	loamy sand	rapid	0.4 to 0.6 in	5.1 to 6.5
Bw --	9 to 54 in	sand	rapid	3.1 to 4.5 in	5.1 to 6.5
2C --	54 to 60 in	sandy loam	moderate	0.5 to 0.8 in	5.1 to 7.8

### 679C--Menahga loamy sand, loamy substratum, 8 to 15 percent slopes

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 679C--Menahga loamy sand, loamy substratum, 8 to 15 percent slopes

#### Menahga, loamy substratum

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on moraines, hillslopes on outwash plains

*Slope gradient:* 8 to 15 percent

*Parent material:* sandy outwash deposits over loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 3 in	loamy sand	rapid	0.3 to 0.4 in	5.1 to 7.3
E,Bw1 -- 3 to 27 in	loamy sand	rapid	1.7 to 2.4 in	5.1 to 6.5
Bw2 -- 27 to 35 in	sand	rapid	0.6 to 0.8 in	5.1 to 6.5
2C -- 35 to 60 in	sandy loam	moderate	2.2 to 3.5 in	5.1 to 7.8

### 684--Bergkeller sandy loam, moderately wet

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 684--Bergkeller sandy loam, moderately wet

#### Bergkeller, moderately wet

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 0 to 1 percent

*Parent material:* loamy glacial till over sandy and gravelly outwash

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* moderately well drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .20

*Land capability class, nonirrigated:* 2s

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 5 in	sandy loam	moderately rapid	0.8 to 0.9 in	4.5 to 6.0
Bw -- 5 to 20 in	sandy loam	moderately rapid	1.3 to 1.9 in	4.5 to 6.0
2Bt -- 20 to 33 in	sandy loam	moderate	1.3 to 2.0 in	5.1 to 6.0
3BC,3C -- 33 to 60 in	gravelly coarse sand	rapid	1.4 to 1.9 in	5.6 to 7.3

### 701--Runeberg mucky loam, depressional

#### Runeberg, depressional

*Extent:* 85 percent of the unit

*Landform(s):* drainageways on interdrumlins, depressions on moraines

*Slope gradient:* 0 to 2 percent

*Parent material:* loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* frequent

*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 5

*Wind erodibility index (WEI)* 56

*Kw (surface layer):* .24

*Land capability class, nonirrigated:* 6w

*Hydric soil:* yes

*Hydrologic group* C/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A1 -- 0 to 3 in	mucky loam	moderate	0.6 to 0.8 in	6.1 to 7.3
A2,A3,Bg -- 3 to 26 in	loam	moderately slow	2.7 to 4.1 in	6.1 to 7.3
Cg -- 26 to 60 in	sandy loam	moderately slow	2.0 to 4.4 in	7.4 to 8.4

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 701--Runeberg mucky loam, depressional

### 703--Paddock loam

#### Paddock

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on drumlins

*Slope gradient:* 0 to 2 percent

*Parent material:* loamy dense basal till

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat poorly drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 5

*Wind erodibility index (WEI)* 56

*Kw (surface layer):* .24

*Land capability class, nonirrigated:* 2w

*Hydric soil:* no

*Hydrologic group* C/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 7 in	loam	moderate	1.4 to 1.6 in	5.6 to 7.3
E, BE -- 7 to 20 in	sandy loam	moderate	1.6 to 2.1 in	5.6 to 6.5
Bt, BC -- 20 to 45 in	sandy loam	moderately slow	3.0 to 4.0 in	6.6 to 7.3
Cd -- 45 to 60 in	sandy loam	impermeable	0.0 to 0.6 in	6.6 to 8.4

### 720B--Blowers sandy loam, 1 to 5 percent slopes

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 720B--Blowers sandy loam, 1 to 5 percent slopes

#### Blowers

*Extent:* 85 percent of the unit

*Landform(s):* hillslopes on drumlins

*Slope gradient:* 1 to 5 percent

*Parent material:* loamy dense basal till

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* none

*Drainage class:* moderately well drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 2e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Ap,E -- 0 to 10 in	sandy loam	moderate	1.3 to 1.8 in	5.1 to 7.3
E/B,B/E -- 10 to 23 in	sandy loam	moderate	1.6 to 1.9 in	5.1 to 6.5
Bt -- 23 to 35 in	sandy loam	moderate	1.5 to 1.8 in	5.6 to 7.3
BC -- 35 to 44 in	sandy loam	moderately slow	1.1 to 1.4 in	5.6 to 7.3
Cd -- 44 to 60 in	sandy loam	impermeable	0.0 to 0.6 in	6.6 to 8.4

### 730A--Sanburn sandy loam, 1 to 3 percent slopes

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 730A--Sanburn sandy loam, 1 to 3 percent slopes

#### Sanburn

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on outwash plains

*Slope gradient:* 1 to 3 percent

*Parent material:* loamy mantled outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat excessively drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .24

*Land capability class, nonirrigated:* 3e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 3 in	sandy loam	moderately rapid	0.4 to 0.5 in	5.1 to 6.5
E -- 3 to 16 in	sandy loam	moderately rapid	0.9 to 1.2 in	5.1 to 6.5
Bt -- 16 to 22 in	gravelly sandy loam	moderately rapid	0.4 to 0.7 in	5.1 to 6.5
2BC,2C -- 22 to 60 in	gravelly sand	rapid	0.8 to 1.5 in	5.1 to 6.5

### 730B--Sanburn sandy loam, 3 to 8 percent slopes

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 730B--Sanburn sandy loam, 3 to 8 percent slopes

#### Sanburn

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on outwash plains

*Slope gradient:* 3 to 8 percent

*Parent material:* loamy mantled outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat excessively drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .24

*Land capability class, nonirrigated:* 3e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 5 in	sandy loam	moderately rapid	0.6 to 0.8 in	5.1 to 6.5
E -- 5 to 16 in	sandy loam	moderately rapid	0.8 to 1.0 in	5.1 to 6.5
2Bt -- 16 to 21 in	gravelly sandy loam	moderately rapid	0.3 to 0.6 in	5.1 to 6.5
2C -- 21 to 60 in	gravelly coarse sand	rapid	0.8 to 1.6 in	5.1 to 6.5

### 730C--Sanburn sandy loam, 8 to 15 percent slopes

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 730C--Sanburn sandy loam, 8 to 15 percent slopes

#### Sanburn

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on outwash plains

*Slope gradient:* 8 to 15 percent

*Parent material:* loamy mantled outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat excessively drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .24

*Land capability class, nonirrigated:* 4e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 7 in	sandy loam	moderately rapid	0.9 to 1.1 in	5.1 to 6.5
E -- 7 to 16 in	sandy loam	moderately rapid	0.6 to 0.8 in	5.1 to 6.5
Bt -- 16 to 23 in	sandy loam	moderately rapid	0.5 to 0.8 in	5.1 to 6.5
2C -- 23 to 60 in	coarse sand	rapid	0.7 to 1.5 in	5.1 to 6.5

### 731A--Sanburn loamy sand, 0 to 3 percent slopes

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 731A--Sanburn loamy sand, 0 to 3 percent slopes

#### Sanburn

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on outwash plains

*Slope gradient:* 0 to 3 percent

*Parent material:* sandy outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat excessively drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 3s

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E1 -- 0 to 6 in	loamy sand	moderately rapid	0.5 to 0.6 in	5.1 to 6.5
E2 -- 6 to 15 in	loamy sand	moderately rapid	0.7 to 0.9 in	5.1 to 6.5
Bt -- 15 to 26 in	sandy loam	moderately rapid	0.7 to 1.3 in	5.1 to 6.5
2BC,2C -- 26 to 60 in	sand	rapid	0.7 to 1.4 in	5.1 to 6.5

### 731B--Sanburn loamy sand, 3 to 8 percent slopes

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 731B--Sanburn loamy sand, 3 to 8 percent slopes

#### Sanburn

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on outwash plains

*Slope gradient:* 3 to 8 percent

*Parent material:* sandy outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat excessively drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 3s

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 8 in	loamy sand	moderately rapid	0.7 to 0.9 in	5.1 to 6.5
E -- 8 to 19 in	loamy sand	moderately rapid	0.8 to 1.0 in	5.1 to 6.5
Bt -- 19 to 30 in	sandy loam	moderately rapid	0.8 to 1.3 in	5.1 to 6.5
2C -- 30 to 60 in	sand	rapid	0.6 to 1.2 in	5.1 to 6.5

### 731C--Sanburn loamy sand, 8 to 15 percent slopes

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 731C--Sanburn loamy sand, 8 to 15 percent slopes

#### Sanburn

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on outwash plains

*Slope gradient:* 8 to 15 percent

*Parent material:* sandy outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat excessively drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 8 in	loamy sand	moderately rapid	0.7 to 0.9 in	5.1 to 6.5
E -- 8 to 14 in	loamy sand	moderately rapid	0.4 to 0.6 in	5.1 to 6.5
Bt -- 14 to 22 in	sandy loam	moderately rapid	0.6 to 0.9 in	5.1 to 6.5
C -- 22 to 60 in	coarse sand	rapid	0.8 to 1.5 in	5.1 to 6.5

### 732--Bushville loamy sand, 1 to 3 percent slopes

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 732--Bushville loamy sand, 1 to 3 percent slopes

#### Bushville

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on drumlins, hillslopes on moraines

*Slope gradient:* 1 to 3 percent

*Parent material:* sandy outwash over dense basal till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat poorly drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG):* 2

*Wind erodibility index (WEI):* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 3s

*Hydric soil:* no

*Hydrologic group:* C

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 5 in	loamy sand	rapid	0.5 to 0.6 in	5.1 to 6.5
E -- 5 to 27 in	loamy fine sand	rapid	1.3 to 1.9 in	5.1 to 6.5
2Bt -- 27 to 38 in	sandy loam	moderate	1.1 to 1.7 in	5.1 to 6.5
2BC -- 38 to 48 in	sandy loam	slow	0.3 to 0.8 in	5.1 to 7.3
2Cd -- 48 to 60 in	sandy loam	impermeable	0.0 to 0.5 in	5.6 to 7.3

### 739B--Wabedo sandy loam, 1 to 6 percent slopes, very stony

#### Wabedo, very stony

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on drumlins

*Slope gradient:* 1 to 6 percent

*Parent material:* loamy dense basal till

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* none

*Drainage class:* moderately well drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG):* 3

*Wind erodibility index (WEI):* 86

*Kw (surface layer):* .15

*Land capability class, nonirrigated:* 6s

*Hydric soil:* no

*Hydrologic group:* C

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 5 in	sandy loam	moderately rapid	0.7 to 0.9 in	4.5 to 6.0
Bw -- 5 to 27 in	sandy loam	moderate	2.6 to 3.5 in	4.5 to 6.5
BC -- 27 to 47 in	sandy loam	slow	0.6 to 1.6 in	5.1 to 7.3
Cd -- 47 to 60 in	sandy loam	impermeable	0.0 to 0.5 in	5.1 to 7.3

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 739B--Wabedo sandy loam, 1 to 6 percent slopes, very stony

### 742B--Flak sandy loam, 3 to 8 percent slopes, very stony

#### Flak, very stony

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on drumlins, hillslopes on moraines

*Slope gradient:* 3 to 8 percent

*Parent material:* loamy dense basal till

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG):* 3

*Wind erodibility index (WEI):* 86

*Kw (surface layer):* .15

*Land capability class, nonirrigated:* 6s

*Hydric soil:* no

*Hydrologic group:* C

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 4 in	sandy loam	moderately rapid	0.5 to 0.7 in	4.5 to 6.5
E -- 4 to 13 in	sandy loam	moderately rapid	1.1 to 1.4 in	5.1 to 6.5
Bt -- 13 to 22 in	sandy loam	moderate	1.1 to 1.4 in	5.1 to 6.5
BC -- 22 to 41 in	sandy loam	slow	0.0 to 1.1 in	5.1 to 7.3
Cd -- 41 to 60 in	sandy loam	impermeable	0.0 to 0.8 in	5.6 to 7.3

### 742C--Flak sandy loam, 8 to 15 percent slopes, very stony

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 742C--Flak sandy loam, 8 to 15 percent slopes, very stony

#### Flak, very stony

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on drumlins, hillslopes on moraines

*Slope gradient:* 8 to 15 percent

*Parent material:* loamy dense basal till

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .15

*Land capability class, nonirrigated:* 7s

*Hydric soil:* no

*Hydrologic group* C

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 4 in	sandy loam	moderately rapid	0.5 to 0.7 in	4.5 to 6.5
E -- 4 to 15 in	sandy loam	moderately rapid	1.3 to 1.8 in	5.1 to 6.5
Bt -- 15 to 24 in	sandy loam	moderate	1.1 to 1.4 in	5.1 to 6.5
BC -- 24 to 30 in	sandy loam	slow	0.0 to 0.4 in	5.1 to 7.3
Cd -- 30 to 60 in	sandy loam	impermeable	0.0 to 1.2 in	5.6 to 7.3

### 750B--Pomroy loamy sand, 3 to 8 percent slopes, very stony

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 750B--Pomroy loamy sand, 3 to 8 percent slopes, very stony

#### Pomroy, very stony

*Extent:* 85 percent of the unit

*Landform(s):* hillslopes on drumlins

*Slope gradient:* 3 to 8 percent

*Parent material:* sandy outwash over dense basal till

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .15

*Land capability class, nonirrigated:* 6s

*Hydric soil:* no

*Hydrologic group* C

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 4 in	loamy sand	rapid	0.4 to 0.5 in	5.1 to 6.5
Bw,E1 -- 4 to 14 in	loamy fine sand	rapid	0.6 to 0.9 in	5.1 to 6.5
E2 -- 14 to 24 in	fine sand	moderately slow	0.0 to 0.8 in	5.1 to 6.5
2Bt -- 24 to 42 in	sandy loam	slow	0.0 to 1.4 in	5.6 to 7.3
2Cd -- 42 to 60 in	sandy loam	moderately slow	0.0 to 0.7 in	5.6 to 7.3

### 750C--Pomroy loamy sand, 8 to 15 percent slopes, very stony

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 750C--Pomroy loamy sand, 8 to 15 percent slopes, very stony

#### Pomroy, very stony

*Extent:* 85 percent of the unit

*Landform(s):* hillslopes on drumlins

*Slope gradient:* 8 to 15 percent

*Parent material:* sandy outwash over dense basal till

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .15

*Land capability class, nonirrigated:* 6s

*Hydric soil:* no

*Hydrologic group* C

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 3 in	loamy sand	rapid	0.3 to 0.4 in	5.1 to 6.5
E -- 3 to 7 in	sand	rapid	0.2 to 0.4 in	5.1 to 6.5
Bw -- 7 to 34 in	sand	moderately slow	0.0 to 2.1 in	5.1 to 6.5
2Bt -- 34 to 40 in	sandy loam	slow	0.0 to 0.5 in	5.6 to 7.3
2Cd -- 40 to 60 in	sandy loam	moderately slow	0.0 to 0.8 in	5.6 to 7.3

### 773B--Warba-Cromwell complex, 1 to 8 percent slopes

#### Warba

*Extent:* 45 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 3 to 8 percent

*Parent material:* loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .24

*Land capability class, nonirrigated:* 2e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 17 in	very fine sandy loam	moderately rapid	3.0 to 3.9 in	5.1 to 6.5
E/B,B/E,Bt -- 17 to 36 in	loam	moderately slow	3.0 to 3.6 in	5.1 to 7.3
C -- 36 to 60 in	loam	moderate	3.8 to 4.6 in	6.6 to 8.4

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 773B--Warba-Cromwell complex, 1 to 8 percent slopes

#### Cromwell

<i>Extent:</i> 40 percent of the unit	<i>Soil loss tolerance (T factor):</i> 3
<i>Landform(s):</i> hillslopes on moraines	<i>Wind erodibility group (WEG)</i> 3
<i>Slope gradient:</i> 1 to 8 percent	<i>Wind erodibility index (WEI)</i> 86
<i>Parent material:</i> loamy mantled outwash deposits	<i>Kw (surface layer):</i> .24
<i>Restrictive feature(s):</i>	<i>Land capability class, nonirrigated:</i> 3e
<i>Flooding:</i> none	<i>Hydric soil:</i> no
<i>Ponding:</i> none	<i>Hydrologic group</i> A
<i>Drainage class:</i> somewhat excessively drained	<i>Potential frost action:</i> low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,Bw -- 0 to 16 in	sandy loam	moderate	2.6 to 2.9 in	4.5 to 6.0
2Bw,2BC,2C -- 16 to 60 in	sand	rapid	2.2 to 3.1 in	5.1 to 7.3

### 773E--Warba-Cromwell complex, 8 to 25 percent slopes

#### Warba

<i>Extent:</i> 45 percent of the unit	<i>Soil loss tolerance (T factor):</i> 5
<i>Landform(s):</i> hillslopes on moraines	<i>Wind erodibility group (WEG)</i> 3
<i>Slope gradient:</i> 8 to 25 percent	<i>Wind erodibility index (WEI)</i> 86
<i>Parent material:</i> loamy glacial till	<i>Kw (surface layer):</i> .37
<i>Restrictive feature(s):</i>	<i>Land capability class, nonirrigated:</i> 4e
<i>Flooding:</i> none	<i>Hydric soil:</i> no
<i>Ponding:</i> none	<i>Hydrologic group</i> B
<i>Drainage class:</i> well drained	<i>Potential frost action:</i> moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 11 in	very fine sandy loam	moderately rapid	2.0 to 2.5 in	5.1 to 6.5
B/E,Bt -- 11 to 45 in	clay loam	moderately slow	5.4 to 6.4 in	5.1 to 7.3
C -- 45 to 60 in	loam	moderate	2.4 to 2.8 in	6.6 to 8.4

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 773E--Warba-Cromwell complex, 8 to 25 percent slopes

#### Cromwell

<i>Extent:</i> 40 percent of the unit	<i>Soil loss tolerance (T factor):</i> 3
<i>Landform(s):</i> hillslopes on moraines	<i>Wind erodibility group (WEG)</i> 3
<i>Slope gradient:</i> 8 to 25 percent	<i>Wind erodibility index (WEI)</i> 86
<i>Parent material:</i> loamy mantled outwash deposits	<i>Kw (surface layer):</i> .24
<i>Restrictive feature(s):</i>	<i>Land capability class, nonirrigated:</i> 6e
<i>Flooding:</i> none	<i>Hydric soil:</i> no
<i>Ponding:</i> none	<i>Hydrologic group</i> A
<i>Drainage class:</i> somewhat excessively drained	<i>Potential frost action:</i> low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,Bw -- 0 to 23 in	sandy loam	moderate	3.7 to 4.1 in	4.5 to 6.0
2Bw,2BC,2C -- 23 to 60 in	sand	rapid	1.9 to 2.6 in	5.1 to 7.3

### 788--Cathro-Seelyeville complex

#### Cathro

<i>Extent:</i> 45 percent of the unit	<i>Soil loss tolerance (T factor):</i> 2
<i>Landform(s):</i> depressions on moraines, depressions on till-floored lake plains	<i>Wind erodibility group (WEG)</i> 2
<i>Slope gradient:</i> 0 to 2 percent	<i>Wind erodibility index (WEI)</i> 134
<i>Parent material:</i> herbaceous organic material	<i>Kw (surface layer):</i> .02
<i>Restrictive feature(s):</i>	<i>Land capability class, nonirrigated:</i> 6w
<i>Flooding:</i> none	<i>Hydric soil:</i> yes
<i>Ponding:</i> frequent	<i>Hydrologic group</i> A/D
<i>Drainage class:</i> very poorly drained	<i>Potential frost action:</i> high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Oa -- 0 to 32 in	muck	moderately rapid	14.4 to 17.5 in	
Cg -- 32 to 60 in	very fine sandy loam	moderate	3.1 to 5.3 in	

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 788--Cathro-Seelyeville complex

#### Seelyeville

*Extent:* 40 percent of the unit

*Landform(s):* depressions on moraines, depressions on till-floored lake plains

*Slope gradient:* 0 to 1 percent

*Parent material:* herbaceous organic material

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* frequent

*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 3

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .02

*Land capability class, nonirrigated:* 6w

*Hydric soil:* yes

*Hydrologic group* A/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Oa1 -- 0 to 56 in	muck	moderately rapid	19.6 to 25.2 in	
Oa2 -- 56 to 60 in	fine sandy loam	moderate	0.4 to 0.7 in	

### 797--Mooselake and Lupton soils

#### Mooselake

*Extent:* 45 percent of the unit

*Landform(s):* depressions on moraines, depressions on outwash plains, depressions on till-floored lake plains

*Slope gradient:* 0 to 1 percent

*Parent material:* moderately decomposed woody organic material

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* frequent

*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 3

*Wind erodibility group (WEG)* 5

*Wind erodibility index (WEI)* 56

*Kw (surface layer):* .02

*Land capability class, nonirrigated:* 6w

*Hydric soil:* yes

*Hydrologic group* A/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Oe -- 0 to 29 in	mucky peat	rapid	10.2 to 16.0 in	
Oa,O'e1,O'e2 - 29 to 60 in	mucky peat	rapid	12.3 to 15.4 in	

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 797--Mooselake and Lupton soils

#### Lupton

*Extent:* 45 percent of the unit  
*Landform(s):* depressions on moraines, depressions on outwash plains, depressions on till-floored lake plains  
*Slope gradient:* 0 to 2 percent  
*Parent material:* highly decomposed woody organic material  
*Restrictive feature(s):*  
*Flooding:* none  
*Ponding:* frequent  
*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 3  
*Wind erodibility group (WEG)* 2  
*Wind erodibility index (WEI)* 134  
*Kw (surface layer):* .02  
*Land capability class, nonirrigated:* 7w  
*Hydric soil:* yes  
*Hydrologic group* A/D  
*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Oa1 -- 0 to 25 in	muck	moderately rapid	8.8 to 11.3 in	
Oa2 -- 25 to 60 in	muck	moderately rapid	12.1 to 15.6 in	

### 799--Bowstring-Seelyeville complex, frequently flooded

#### Bowstring, frequently flooded

*Extent:* 45 percent of the unit  
*Landform(s):* flood plains  
*Slope gradient:* 0 to 1 percent  
*Parent material:* herbaceous organic material  
*Restrictive feature(s):*  
*Flooding:* frequent  
*Ponding:* none  
*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 3  
*Wind erodibility group (WEG)* 8  
*Wind erodibility index (WEI)* 0  
*Kw (surface layer):* .02  
*Land capability class, nonirrigated:* 6w  
*Hydric soil:* yes  
*Hydrologic group* A/D  
*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Oa1 -- 0 to 32 in	muck	moderately rapid	11.2 to 14.4 in	
Cg -- 32 to 40 in	stratified sand to fine sandy loam	rapid	0.7 to 1.2 in	
Oa2 -- 40 to 60 in	muck	moderately rapid	6.9 to 8.9 in	

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 799--Bowstring-Seelyeville complex, frequently flooded

#### Seelyeville, frequently flooded

*Extent:* 40 percent of the unit

*Landform(s):* flood plains

*Slope gradient:* 0 to 2 percent

*Parent material:* herbaceous organic material

*Restrictive feature(s):*

*Flooding:* frequent

*Ponding:* none

*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 3

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .02

*Land capability class, nonirrigated:* 6w

*Hydric soil:* yes

*Hydrologic group* A/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Oa1 -- 0 to 10 in	muck	moderately rapid	3.4 to 4.4 in	
Oa2,Oa3 -- 10 to 60 in	muck	moderately rapid	17.5 to 22.5 in	

### 870B--Itasca-Goodland complex, 1 to 8 percent slopes

#### Itasca

*Extent:* 45 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 1 to 8 percent

*Parent material:* silty mantled loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 5

*Wind erodibility index (WEI)* 56

*Kw (surface layer):* .37

*Land capability class, nonirrigated:* 2e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
E,Bw -- 0 to 12 in	silt loam	moderate	2.6 to 2.8 in	5.1 to 6.5
E' -- 12 to 20 in	silt loam	moderate	1.4 to 1.8 in	5.1 to 6.0
E/B,2Bt -- 20 to 43 in	sandy loam	moderate	2.5 to 4.3 in	5.6 to 7.3
2C -- 43 to 60 in	sandy loam	moderate	1.9 to 3.2 in	6.6 to 8.4

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 870B--Itasca-Goodland complex, 1 to 8 percent slopes

#### Goodland

<p><i>Extent:</i> 40 percent of the unit</p> <p><i>Landform(s):</i> hillslopes on moraines</p> <p><i>Slope gradient:</i> 1 to 8 percent</p> <p><i>Parent material:</i> silty mantled loamy sediments over outwash</p> <p><i>Restrictive feature(s):</i></p> <p><i>Flooding:</i> none</p> <p><i>Ponding:</i> none</p> <p><i>Drainage class:</i> well drained</p>	<p><i>Soil loss tolerance (T factor):</i> 5</p> <p><i>Wind erodibility group (WEG)</i> 5</p> <p><i>Wind erodibility index (WEI)</i> 56</p> <p><i>Kw (surface layer):</i> .37</p> <p><i>Land capability class, nonirrigated:</i> 2e</p> <p><i>Hydric soil:</i> no</p> <p><i>Hydrologic group</i> B</p> <p><i>Potential frost action:</i> moderate</p>
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<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E,Bw,E' -- 0 to 13 in	silt loam	moderate	2.6 to 3.1 in	5.1 to 6.5
E/B,2Bt -- 13 to 27 in	sandy loam	moderate	1.7 to 2.6 in	5.1 to 6.5
3BC -- 27 to 35 in	loamy coarse sand	moderately rapid	0.5 to 0.8 in	5.1 to 6.5
3C -- 35 to 60 in	coarse sand	rapid	0.5 to 1.7 in	5.6 to 7.8

### 870C--Itasca-Goodland complex, 8 to 15 percent slopes

#### Itasca

<p><i>Extent:</i> 45 percent of the unit</p> <p><i>Landform(s):</i> hillslopes on moraines</p> <p><i>Slope gradient:</i> 8 to 15 percent</p> <p><i>Parent material:</i> silty mantled loamy glacial till</p> <p><i>Restrictive feature(s):</i></p> <p><i>Flooding:</i> none</p> <p><i>Ponding:</i> none</p> <p><i>Drainage class:</i> well drained</p>	<p><i>Soil loss tolerance (T factor):</i> 5</p> <p><i>Wind erodibility group (WEG)</i> 5</p> <p><i>Wind erodibility index (WEI)</i> 56</p> <p><i>Kw (surface layer):</i> .37</p> <p><i>Land capability class, nonirrigated:</i> 3e</p> <p><i>Hydric soil:</i> no</p> <p><i>Hydrologic group</i> B</p> <p><i>Potential frost action:</i> moderate</p>
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<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
E,Bw -- 0 to 6 in	silt loam	moderate	1.3 to 1.4 in	5.1 to 6.5
E' -- 6 to 20 in	very fine sandy loam	moderate	2.4 to 3.1 in	5.1 to 6.0
E/B,2Bt -- 20 to 48 in	sandy loam	moderate	3.1 to 5.3 in	5.6 to 7.3
2C -- 48 to 60 in	sandy loam	moderate	1.3 to 2.2 in	6.6 to 8.4

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 870C--Itasca-Goodland complex, 8 to 15 percent slopes

#### Goodland

<i>Extent:</i> 40 percent of the unit	<i>Soil loss tolerance (T factor):</i> 5
<i>Landform(s):</i> hillslopes on moraines	<i>Wind erodibility group (WEG)</i> 5
<i>Slope gradient:</i> 8 to 15 percent	<i>Wind erodibility index (WEI)</i> 56
<i>Parent material:</i> silty mantled loamy sediments over outwash	<i>Kw (surface layer):</i> .37
<i>Restrictive feature(s):</i>	<i>Land capability class, nonirrigated:</i> 3e
<i>Flooding:</i> none	<i>Hydric soil:</i> no
<i>Ponding:</i> none	<i>Hydrologic group</i> B
<i>Drainage class:</i> well drained	<i>Potential frost action:</i> moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E,Bw,E' -- 0 to 6 in	silt loam	moderate	1.2 to 1.4 in	5.1 to 6.5
E/B,2Bt -- 6 to 40 in	sandy loam	moderate	4.1 to 6.5 in	5.1 to 6.5
3BC -- 40 to 46 in	gravelly loamy sand	moderately rapid	0.4 to 0.6 in	5.1 to 6.5
3C -- 46 to 60 in	gravelly sand	rapid	0.3 to 1.0 in	5.6 to 7.8

### 928B--DeMontreville-Mahtomedi-Cushing complex, 2 to 8 percent slopes

#### DeMontreville

<i>Extent:</i> 40 percent of the unit	<i>Soil loss tolerance (T factor):</i> 5
<i>Landform(s):</i> hillslopes on moraines	<i>Wind erodibility group (WEG)</i> 2
<i>Slope gradient:</i> 2 to 8 percent	<i>Wind erodibility index (WEI)</i> 134
<i>Parent material:</i> sandy outwash over loamy glacial till	<i>Kw (surface layer):</i> .17
<i>Restrictive feature(s):</i>	<i>Land capability class, nonirrigated:</i> 3s
<i>Flooding:</i> none	<i>Hydric soil:</i> no
<i>Ponding:</i> none	<i>Hydrologic group</i> B
<i>Drainage class:</i> well drained	<i>Potential frost action:</i> low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 2 in	loamy sand	rapid	0.2 to 0.2 in	5.1 to 7.3
Bw -- 2 to 22 in	loamy sand	rapid	1.2 to 1.8 in	5.1 to 7.3
2B/E,2Bt -- 22 to 39 in	sandy loam	moderately slow	1.4 to 2.4 in	5.6 to 6.5
2C -- 39 to 60 in	sandy loam	moderately slow	1.3 to 2.1 in	5.6 to 7.3

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 928B--DeMontreville-Mahtomedi-Cushing complex, 2 to 8 percent slopes

#### Mahtomedi

*Extent:* 30 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 2 to 8 percent

*Parent material:* sandy and gravelly outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 2 in	loamy sand	rapid	0.2 to 0.2 in	5.1 to 6.5
E -- 2 to 9 in	loamy sand	rapid	0.4 to 0.6 in	5.1 to 6.5
Bw -- 9 to 16 in	loamy sand	rapid	0.4 to 0.5 in	5.1 to 6.5
C -- 16 to 60 in	gravelly sand	rapid	1.7 to 3.9 in	5.1 to 7.4

#### Cushing

*Extent:* 25 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 2 to 8 percent

*Parent material:* loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .24

*Land capability class, nonirrigated:* 2e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 3 in	fine sandy loam	moderate	0.3 to 0.7 in	5.1 to 7.8
E,B/E -- 3 to 19 in	sandy loam	moderate	1.6 to 3.5 in	5.1 to 7.8
Bt -- 19 to 32 in	loam	moderate	1.3 to 2.5 in	5.1 to 7.8
C -- 32 to 60 in	sandy loam	moderately slow	2.5 to 5.3 in	5.1 to 8.4

### 928C--DeMontreville-Mahtomedi-Cushing complex, 8 to 15 percent slopes

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 928C--DeMontreville-Mahtomedi-Cushing complex, 8 to 15 percent slopes

#### DeMontreville

*Extent:* 40 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 8 to 15 percent

*Parent material:* sandy outwash over loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 1 in	loamy sand	rapid	0.1 to 0.1 in	5.1 to 7.3
Bw -- 1 to 31 in	loamy sand	rapid	1.8 to 2.7 in	5.1 to 7.3
2B/E,2Bt -- 31 to 46 in	sandy loam	moderately slow	1.2 to 2.1 in	5.6 to 6.5
2C -- 46 to 60 in	sandy loam	moderately slow	0.8 to 1.4 in	5.6 to 7.3

#### Mahtomedi

*Extent:* 30 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 8 to 15 percent

*Parent material:* sandy and gravelly outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 6s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 2 in	loamy sand	rapid	0.2 to 0.2 in	5.1 to 6.5
E,B/E -- 2 to 4 in	loamy sand	rapid	0.1 to 0.2 in	5.1 to 6.5
Bw -- 4 to 19 in	loamy sand	rapid	0.7 to 1.0 in	5.1 to 6.5
C -- 19 to 60 in	gravelly coarse sand	rapid	1.6 to 3.7 in	5.1 to 7.4

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 928C--DeMontreville-Mahtomedi-Cushing complex, 8 to 15 percent slopes

#### Cushing

*Extent:* 25 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 8 to 15 percent

*Parent material:* loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .24

*Land capability class, nonirrigated:* 3e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 3 in	fine sandy loam	moderate	0.3 to 0.7 in	5.1 to 7.8
E,B/E -- 3 to 21 in	sandy loam	moderate	1.8 to 3.9 in	5.1 to 7.8
Bt -- 21 to 40 in	loam	moderate	1.9 to 3.7 in	5.1 to 7.8
C -- 40 to 60 in	sandy loam	moderately slow	1.8 to 3.7 in	5.1 to 8.4

### 928E--DeMontreville-Mahtomedi-Cushing complex, 15 to 40 percent slopes

#### DeMontreville

*Extent:* 40 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 15 to 40 percent

*Parent material:* sandy outwash over loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 7e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 4 in	loamy sand	rapid	0.4 to 0.5 in	5.1 to 7.3
Bw -- 4 to 33 in	sand	rapid	1.7 to 2.6 in	5.1 to 7.3
2B/E,2Bt -- 33 to 42 in	fine sandy loam	moderately slow	0.7 to 1.3 in	5.6 to 6.5
2C -- 42 to 60 in	sandy loam	moderately slow	1.1 to 1.8 in	5.6 to 7.3

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 928E--DeMontreville-Mahtomedi-Cushing complex, 15 to 40 percent slopes

#### Mahtomedi

*Extent:* 30 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 15 to 40 percent

*Parent material:* sandy and gravelly outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 7s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 3 in	loamy sand	rapid	0.3 to 0.4 in	5.1 to 6.5
Bw -- 3 to 23 in	sand	rapid	1.2 to 1.6 in	5.1 to 6.5
C -- 23 to 60 in	gravelly sand	rapid	1.5 to 3.3 in	5.1 to 7.4

#### Cushing

*Extent:* 25 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 15 to 30 percent

*Parent material:* loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .24

*Land capability class, nonirrigated:* 6e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 7 in	fine sandy loam	moderate	0.7 to 1.6 in	5.1 to 7.8
E,B/E -- 7 to 16 in	loam	moderate	0.9 to 2.0 in	5.1 to 7.8
Bt -- 16 to 49 in	clay loam	moderate	3.3 to 6.2 in	5.1 to 7.8
C -- 49 to 60 in	sandy clay loam	moderately slow	1.0 to 2.1 in	5.1 to 8.4

### 1002--Fluvaquents, frequently flooded

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 1002--Fluvaquents, frequently flooded

#### Fluvaquents, frequently flooded

*Extent:* 100 percent of the unit

*Landform(s):* flood plains

*Slope gradient:* 0 to 2 percent

*Parent material:* loamy and sandy alluvium

*Restrictive feature(s):*

*Flooding:* frequent

*Ponding:* none

*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 5

*Wind erodibility index (WEI)* 56

*Kw (surface layer):* .28

*Land capability class, nonirrigated:* 8w

*Hydric soil:* yes

*Hydrologic group* D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,Cg1 -- 0 to 12 in	silt loam	moderate	2.1 to 2.8 in	5.6 to 7.8
Cg2 -- 12 to 60 in	stratified loamy sand to silt loam	rapid	1.9 to 9.6 in	5.6 to 7.8

### 1141--Runeberg loam, acid substratum, depressional

#### Runeberg, acid substratum, depressional

*Extent:* 85 percent of the unit

*Landform(s):* depressions on interdrumlins, drainageways on interdrumlins, depressions on moraines

*Slope gradient:* 0 to 2 percent

*Parent material:* loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* poorly drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 5

*Wind erodibility index (WEI)* 56

*Kw (surface layer):* .24

*Land capability class, nonirrigated:* 2w

*Hydric soil:* yes

*Hydrologic group* C/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A1 -- 0 to 10 in	loam	moderate	1.8 to 2.2 in	6.1 to 7.3
A2,Bg -- 10 to 27 in	sandy loam	moderately slow	2.0 to 3.0 in	6.1 to 7.3
Cg -- 27 to 60 in	sandy loam	moderately slow	2.0 to 4.3 in	6.1 to 7.3

### 1151B--Blowers sandy loam, acid substratum, 1 to 5 percent slopes

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 1151B--Blowers sandy loam, acid substratum, 1 to 5 percent slopes

#### Blowers, acid substratum

*Extent:* 85 percent of the unit

*Landform(s):* hillslopes on drumlins

*Slope gradient:* 1 to 5 percent

*Parent material:* loamy dense basal till

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* none

*Drainage class:* moderately well drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .24

*Land capability class, nonirrigated:* 2e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 5 in	sandy loam	moderate	0.7 to 0.9 in	5.1 to 6.5
E,E/B -- 5 to 17 in	sandy loam	moderate	1.4 to 1.8 in	5.1 to 6.5
Bt1 -- 17 to 23 in	sandy loam	moderate	0.7 to 0.9 in	5.1 to 6.5
BC -- 23 to 35 in	sandy loam	moderately slow	1.5 to 1.8 in	5.1 to 6.5
Cd -- 35 to 60 in	sandy loam	impermeable	0.0 to 1.0 in	5.1 to 6.5

### 1153B--Huntersville loamy sand, acid substratum, 1 to 6 percent slopes

#### Huntersville, acid substratum

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on drumlins

*Slope gradient:* 1 to 6 percent

*Parent material:* sandy outwash over dense basal till

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* none

*Drainage class:* moderately well drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 3s

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 14 in	loamy sand	rapid	1.4 to 1.7 in	5.1 to 6.5
E/B,Bw -- 14 to 26 in	loamy sand	rapid	0.5 to 1.2 in	5.1 to 6.5
2Bt -- 26 to 58 in	sandy loam	moderately slow	3.5 to 4.1 in	5.1 to 6.5
2Cd -- 58 to 60 in	sandy loam	impermeable	0.0 to 0.1 in	5.1 to 6.5

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 1153B--Huntersville loamy sand, acid substratum, 1 to 6 percent slopes

### 1155--Staples loamy sand, acid substratum

#### Staples, acid substratum

*Extent:* 85 percent of the unit

*Landform(s):* drainageways on interdrumlins, hillslopes on interdrumlins, drainageways on interdrumlins

*Slope gradient:* 0 to 2 percent

*Parent material:* sandy outwash over dense basal till

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* none

*Drainage class:* poorly drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG):* 2

*Wind erodibility index (WEI):* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 3w

*Hydric soil:* yes

*Hydrologic group:* B/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Ap -- 0 to 4 in	loamy sand	rapid	0.4 to 0.5 in	5.1 to 6.5
Eg -- 4 to 27 in	loamy sand	rapid	1.6 to 2.3 in	5.1 to 6.5
2Btg -- 27 to 35 in	sandy loam	moderately slow	0.5 to 1.1 in	5.1 to 6.5
2BC,2Cd -- 35 to 60 in	sandy loam	impermeable	0.0 to 1.0 in	5.1 to 6.5

### 1157--Paddock loam, acid substratum

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 1157--Paddock loam, acid substratum

#### Paddock, acid substratum

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on drumlins

*Slope gradient:* 0 to 2 percent

*Parent material:* sandy outwash over dense basal till

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat poorly drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 5

*Wind erodibility index (WEI)* 56

*Kw (surface layer):* .24

*Land capability class, nonirrigated:* 2w

*Hydric soil:* no

*Hydrologic group* C/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 7 in	loam	moderate	1.4 to 1.6 in	5.1 to 7.3
E, BE -- 7 to 20 in	sandy loam	moderate	1.6 to 2.1 in	5.1 to 6.5
Bt, BC -- 20 to 41 in	sandy loam	moderately slow	2.5 to 3.3 in	5.1 to 6.5
Cd -- 41 to 60 in	sandy loam	impermeable	0.0 to 0.8 in	5.1 to 6.5

### 1160B--Redeye loamy sand, acid substratum, 1 to 6 percent slopes

#### Redeye, acid substratum

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on drumlins

*Slope gradient:* 1 to 6 percent

*Parent material:* sandy outwash over dense basal till

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 3s

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 6 in	loamy sand	rapid	0.6 to 0.7 in	5.1 to 7.3
E -- 6 to 15 in	loamy fine sand	rapid	0.6 to 0.9 in	5.1 to 6.5
Bw -- 15 to 33 in	sand	rapid	1.3 to 1.8 in	5.1 to 6.5
2Bt -- 33 to 55 in	sandy loam	moderately slow	2.4 to 2.9 in	5.1 to 6.5
2Cd -- 55 to 60 in	sandy loam	impermeable	0.0 to 0.2 in	5.1 to 6.5

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 1160B--Redeye loamy sand, acid substratum, 1 to 6 percent slopes

### 1160C--Redeye loamy sand, acid substratum, 6 to 12 percent slopes

#### Redeye, acid substratum

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on drumlins

*Slope gradient:* 6 to 12 percent

*Parent material:* sandy outwash over dense basal till

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG):* 2

*Wind erodibility index (WEI):* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 3e

*Hydric soil:* no

*Hydrologic group:* B

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 7 in	loamy sand	rapid	0.7 to 0.9 in	5.1 to 7.3
E -- 7 to 14 in	loamy sand	rapid	0.5 to 0.7 in	5.1 to 6.5
Bw -- 14 to 27 in	loamy sand	rapid	0.9 to 1.3 in	5.1 to 6.5
2Bt -- 27 to 44 in	sandy loam	moderately slow	1.9 to 2.3 in	5.1 to 6.5
2Cd -- 44 to 60 in	sandy loam	impermeable	0.0 to 0.6 in	5.1 to 6.5

### 1943--Roscommon loamy sand

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 1943--Roscommon loamy sand

#### Roscommon

*Extent:* 85 percent of the unit  
*Landform(s):* depressions on outwash plains, drainageways on till-floored lake plains  
*Slope gradient:* 0 to 2 percent  
*Parent material:* sandy outwash deposits  
*Restrictive feature(s):*  
*Flooding:* none  
*Ponding:* frequent  
*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 5  
*Wind erodibility group (WEG)* 2  
*Wind erodibility index (WEI)* 134  
*Kw (surface layer):* .17  
*Land capability class, nonirrigated:* 4w  
*Hydric soil:* yes  
*Hydrologic group* A/D  
*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 6 in	loamy sand	rapid	0.5 to 1.2 in	5.6 to 7.8
Cg -- 6 to 60 in	sand	rapid	2.7 to 4.9 in	5.6 to 8.4

### 1956--Staples loamy sand

#### Staples

*Extent:* 85 percent of the unit  
*Landform(s):* drainageways on interdrumlins  
*Slope gradient:* 0 to 2 percent  
*Parent material:* sandy outwash over dense basal till  
*Restrictive feature(s):* dense material at 40 to 60 inches  
*Flooding:* none  
*Ponding:* none  
*Drainage class:* poorly drained

*Soil loss tolerance (T factor):* 4  
*Wind erodibility group (WEG)* 2  
*Wind erodibility index (WEI)* 134  
*Kw (surface layer):* .17  
*Land capability class, nonirrigated:* 3w  
*Hydric soil:* yes  
*Hydrologic group* B/D  
*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 7 in	loamy sand	rapid	0.7 to 0.9 in	5.1 to 7.3
Eg -- 7 to 36 in	sand	rapid	2.0 to 2.9 in	5.1 to 7.3
2Btg -- 36 to 44 in	sandy loam	moderately slow	0.5 to 1.1 in	5.1 to 7.3
2BC,2Cd -- 44 to 60 in	sandy loam	slow	0.0 to 0.6 in	6.6 to 7.8

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 1957B--Friendship loamy sand, loamy substratum, 1 to 6 percent slopes

#### Friendship, loamy substratum

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on drumlins, hillslopes on moraines, hillslopes on outwash plains

*Slope gradient:* 1 to 6 percent

*Parent material:* sandy outwash over loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* moderately well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 3s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 8 in	loamy sand	rapid	0.6 to 0.9 in	5.1 to 7.3
Bw,BC -- 8 to 48 in	sand	rapid	2.0 to 4.4 in	5.1 to 6.5
2C -- 48 to 60 in	loam	moderate	0.8 to 1.5 in	4.5 to 7.3

### 1970B--Menahga loamy sand, till substratum, 2 to 8 percent slopes

#### Menahga, till substratum

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on drumlins, hillslopes on moraines

*Slope gradient:* 2 to 8 percent

*Parent material:* sandy outwash over loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 4 in	loamy sand	rapid	0.4 to 0.5 in	5.1 to 7.3
E -- 4 to 9 in	loamy sand	rapid	0.5 to 0.6 in	5.1 to 6.5
Bw -- 9 to 49 in	sand	rapid	2.8 to 4.0 in	5.1 to 6.5
2C -- 49 to 60 in	sandy loam	impermeable	0.0 to 0.4 in	5.1 to 7.8

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 1970B--Menahga loamy sand, till substratum, 2 to 8 percent slopes

### 1970C--Menahga loamy sand, till substratum, 8 to 15 percent slopes

#### Menahga, till substratum

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on drumlins, hillslopes on moraines

*Slope gradient:* 8 to 15 percent

*Parent material:* sandy outwash over loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG):* 2

*Wind erodibility index (WEI):* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group:* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 3 in	loamy sand	rapid	0.3 to 0.4 in	5.1 to 7.3
E -- 3 to 7 in	sand	rapid	0.4 to 0.5 in	5.1 to 6.5
Bw -- 7 to 48 in	sand	rapid	2.9 to 4.1 in	5.1 to 6.5
2C -- 48 to 60 in	sandy loam	impermeable	0.0 to 0.5 in	5.1 to 7.8

### 1978--Nokay loam, very stony

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 1978--Nokay loam, very stony

#### Nokay, very stony

*Extent:* 90 percent of the unit

*Landform(s):* drainageways on interdrumlins, flats on interdrumlins

*Slope gradient:* 0 to 2 percent

*Parent material:* dense basal till

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat poorly drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 5

*Wind erodibility index (WEI)* 56

*Kw (surface layer):* .15

*Land capability class, nonirrigated:* 6s

*Hydric soil:* no

*Hydrologic group* C

*Potential frost action:* high

*Representative soil profile:*

		<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A --	0 to 5 in	loam	moderate	0.9 to 1.1 in	4.5 to 5.5
E --	5 to 17 in	sandy loam	moderately rapid	1.4 to 2.2 in	4.5 to 5.5
Bt --	17 to 33 in	sandy loam	moderate	1.9 to 3.1 in	5.1 to 6.5
BC --	33 to 41 in	sandy loam	slow	0.0 to 0.6 in	5.6 to 7.3
Cd --	41 to 60 in	sandy loam	impermeable	0.0 to 0.8 in	5.6 to 7.3

### 1995B--Bergkeller sandy loam, 1 to 6 percent slopes

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 1995B--Bergkeller sandy loam, 1 to 6 percent slopes

#### Bergkeller

*Extent:* 90 percent of the unit

*Landform(s):* flats on moraines

*Slope gradient:* 1 to 6 percent

*Parent material:* loamy glacial till over sandy and gravelly outwash

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .20

*Land capability class, nonirrigated:* 3e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 3 in	sandy loam	moderately rapid	0.5 to 0.6 in	4.5 to 6.0
Bw -- 3 to 21 in	loamy sand	moderately rapid	1.6 to 2.3 in	4.5 to 6.0
2Bt -- 21 to 32 in	sandy loam	moderate	1.1 to 1.8 in	5.1 to 6.0
3BC,3C -- 32 to 60 in	sand	rapid	1.4 to 2.0 in	5.6 to 7.3

### 1996--Cromwell sandy loam, moderately wet

#### Cromwell, moderately wet

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on moraines, hillslopes on outwash plains

*Slope gradient:* 0 to 2 percent

*Parent material:* loamy mantled outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* moderately well drained

*Soil loss tolerance (T factor):* 3

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .24

*Land capability class, nonirrigated:* 3s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,Bw -- 0 to 17 in	sandy loam	moderate	2.7 to 3.0 in	4.5 to 6.0
2Bw,2BC,2C -- 17 to 60 in	sand	rapid	2.1 to 3.0 in	5.1 to 6.5

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### A10--Glossaqualfs

#### Glossaqualfs

*Extent:* 85 percent of the unit

*Landform(s):* flats on moraines, swales on moraines

*Slope gradient:* 0 to 2 percent

*Parent material:* till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* poorly drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 5

*Wind erodibility index (WEI)* 56

*Kw (surface layer):* .32

*Land capability class, nonirrigated:* 4w

*Hydric soil:* yes

*Hydrologic group* B/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 3 in	loam	moderate	0.6 to 0.8 in	5.6 to 7.3
Eg,E/B -- 3 to 28 in	fine sandy loam	moderate	3.0 to 4.7 in	5.1 to 6.5
Btg -- 28 to 36 in	loam	moderate	1.2 to 1.5 in	5.6 to 7.8
Cg -- 36 to 60 in	sandy loam	moderate	2.6 to 4.6 in	7.4 to 8.4

### A12--Warba-Aquic Eutroboralfs, loamy-Aeric Glossaqualfs, loamy, association, nearly level to gently rolling

#### Warba

*Extent:* 40 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 0 to 10 percent

*Parent material:* loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .37

*Land capability class, nonirrigated:* 3e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 11 in	very fine sandy loam	moderately rapid	2.0 to 2.5 in	5.1 to 6.5
E/B,B/E,Bt -- 11 to 37 in	clay loam	moderately slow	4.2 to 4.9 in	5.1 to 7.3
C -- 37 to 60 in	loam	moderate	3.7 to 4.3 in	6.6 to 8.4

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### A12--Warba-Aquic Eutroboralfs, loamy-Aeric Glossaqualfs, loamy, association, nearly level to gently rolling

#### Aquic eutroboralfs, loamy

*Extent:* 30 percent of the unit

*Landform(s):* moraines

*Slope gradient:* 0 to 2 percent

*Parent material:* outwash over till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* moderately well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 3s

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 6 in	loamy fine sand	rapid	0.6 to 0.7 in	6.1 to 7.3
E -- 6 to 12 in	loamy fine sand	rapid	0.4 to 0.5 in	6.1 to 7.3
2Bt -- 12 to 32 in	clay loam	moderate	3.2 to 3.6 in	6.6 to 7.8
2C -- 32 to 60 in	loam	moderate	4.8 to 5.3 in	7.4 to 8.4

#### Aeric glossaqualfs, loamy

*Extent:* 15 percent of the unit

*Landform(s):* moraines

*Slope gradient:* 0 to 2 percent

*Parent material:* till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat poorly drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 5

*Wind erodibility index (WEI)* 56

*Kw (surface layer):* .20

*Land capability class, nonirrigated:* 2w

*Hydric soil:* no

*Hydrologic group* C

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 1 in	fine sandy loam	moderate	0.2 to 0.3 in	5.1 to 7.3
E -- 1 to 4 in	fine sandy loam	moderate	0.3 to 0.5 in	5.1 to 7.3
E/B -- 4 to 9 in	clay loam	moderate	0.8 to 1.0 in	5.1 to 7.3
Bt -- 9 to 26 in	clay loam	slow	1.4 to 3.4 in	5.1 to 7.3
Bk -- 26 to 80 in	silty clay loam	moderately slow	7.6 to 10.8 in	7.4 to 8.4

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### A13--Warba-Aquic Eutroboralfs, loamy-Aeric Glossaqualfs, loamy, association, nearly level to hilly

#### Warba

*Extent:* 40 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 10 to 25 percent

*Parent material:* loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .37

*Land capability class, nonirrigated:* 6e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 11 in	very fine sandy loam	moderately rapid	2.0 to 2.5 in	5.1 to 6.5
E/B,B/E,Bt -- 11 to 37 in	clay loam	moderately slow	4.2 to 4.9 in	5.1 to 7.3
C -- 37 to 60 in	loam	moderate	3.7 to 4.3 in	6.6 to 8.4

#### Aquic eutroboralfs, loamy

*Extent:* 30 percent of the unit

*Landform(s):* moraines

*Slope gradient:* 0 to 2 percent

*Parent material:* outwash over till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* moderately well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 3s

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 6 in	loamy fine sand	rapid	0.6 to 0.7 in	6.1 to 7.3
E -- 6 to 12 in	loamy fine sand	rapid	0.4 to 0.5 in	6.1 to 7.3
2Bt -- 12 to 32 in	clay loam	moderate	3.2 to 3.6 in	6.6 to 7.8
2C -- 32 to 60 in	loam	moderate	4.8 to 5.3 in	7.4 to 8.4

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### A13--Warba-Aquic Entroboralfs, loamy-Aeric Glossaqualfs, loamy, association, nearly level to hilly

#### Aeric glossaqualfs, loamy

*Extent:* 15 percent of the unit

*Landform(s):* moraines

*Slope gradient:* 0 to 2 percent

*Parent material:* till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat poorly drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG):* 5

*Wind erodibility index (WEI):* 56

*Kw (surface layer):* .20

*Land capability class, nonirrigated:* 2w

*Hydric soil:* no

*Hydrologic group:* C

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 1 in	fine sandy loam	moderate	0.2 to 0.3 in	5.1 to 7.3
E -- 1 to 4 in	fine sandy loam	moderate	0.3 to 0.5 in	5.1 to 7.3
E/B -- 4 to 9 in	clay loam	moderate	0.8 to 1.0 in	5.1 to 7.3
Bt -- 9 to 26 in	clay loam	slow	1.4 to 3.4 in	5.1 to 7.3
Bk -- 26 to 80 in	silty clay loam	moderately slow	7.6 to 10.8 in	7.4 to 8.4

### A15--Typic Udipsamments-Arenic Entroboralfs-Alfic Udispamments association, nearly level to gently rolling

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### A15--Typic Udipsamments-Arenic Eutroboralfs-Alfic Udispamments association, nearly level to gently rolling

#### Typic udipsamments

*Extent:* 45 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 0 to 10 percent

*Parent material:* sandy outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 3 in	loamy sand	rapid	0.3 to 0.4 in	4.5 to 6.5
Bw -- 3 to 20 in	sand	rapid	0.8 to 1.2 in	4.5 to 6.5
C -- 20 to 60 in	sand	rapid	2.0 to 2.8 in	5.6 to 7.8

#### Alfic udipsamments

*Extent:* 20 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 0 to 10 percent

*Parent material:* sandy outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 1

*Wind erodibility index (WEI)* 220

*Kw (surface layer):* .15

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 9 in	fine sand	rapid	0.6 to 0.8 in	5.1 to 6.5
E&Bt -- 9 to 60 in	fine sand	rapid	3.0 to 5.1 in	5.1 to 7.3

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### A15--Typic Udipsamments-Arenic Eutroboralfs-Alfic Udispamments association, nearly level to gently rolling

#### Arenic eutroboralfs

*Extent:* 20 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 0 to 10 percent

*Parent material:* sandy outwash over loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 3s

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 2 in	loamy sand	rapid	0.2 to 0.2 in	5.1 to 6.5
Bw -- 2 to 27 in	loamy sand	rapid	1.5 to 2.7 in	5.1 to 6.5
2E/B,2Bt,2BC - 27 to 42 in	loam	moderate	1.8 to 2.9 in	5.1 to 7.8
-				
2C -- 42 to 60 in	sandy loam	moderate	2.1 to 3.4 in	6.1 to 8.4

### A16--Warba-Dystric Eutrochrepts-Typic Udispamments association, nearly level to gently rolling

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### A16--Warba-Dystric Eutrochrepts-Typic Udispamments association, nearly level to gently rolling

#### Warba

*Extent:* 50 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 0 to 10 percent

*Parent material:* loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .37

*Land capability class, nonirrigated:* 2e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 28 in	very fine sandy loam	moderately rapid	5.0 to 6.4 in	5.1 to 6.5
E/B,B/E,Bt -- 28 to 40 in	clay loam	moderately slow	2.0 to 2.3 in	5.1 to 7.3
C -- 40 to 60 in	loam	moderate	3.1 to 3.7 in	6.6 to 8.4

#### Dystric eutrochrepts

*Extent:* 20 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 0 to 10 percent

*Parent material:* loamy mantled outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat excessively drained

*Soil loss tolerance (T factor):* 3

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .24

*Land capability class, nonirrigated:* 3e

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,Bw -- 0 to 33 in	sandy loam	moderate	5.3 to 6.0 in	4.5 to 6.0
2Bw,2BC,2C -- 33 to 60 in	sand	rapid	1.3 to 1.9 in	5.1 to 7.3

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### A16--Warba-Dystric Eutrochrepts-Typic Udispamments association, nearly level to gently rolling

#### Typic udipsamments

*Extent:* 15 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 0 to 10 percent

*Parent material:* sandy outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 2 in	loamy sand	rapid	0.2 to 0.2 in	4.5 to 6.5
Bw -- 2 to 16 in	sand	rapid	0.7 to 1.0 in	4.5 to 6.5
C -- 16 to 60 in	sand	rapid	2.2 to 3.1 in	5.6 to 7.8

### A17--Menahga-Cutaway-Glossic Eutroboralfs association, rolling and hilly

#### Menahga

*Extent:* 40 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 10 to 25 percent

*Parent material:* sandy outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 3 in	loamy sand	rapid	0.3 to 0.4 in	4.5 to 6.5
Bw -- 3 to 27 in	loamy sand	rapid	1.2 to 1.7 in	4.5 to 6.5
C -- 27 to 60 in	sand	rapid	1.7 to 2.3 in	5.6 to 7.8

## Map Unit Description (MN)

Cass County, Minnesota

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### A17--Menahga-Cutaway-Glossic Eutroboralfs association, rolling and hilly

#### Cutaway

<i>Extent:</i> 25 percent of the unit	<i>Soil loss tolerance (T factor):</i> 5
<i>Landform(s):</i> hillslopes on moraines	<i>Wind erodibility group (WEG)</i> 2
<i>Slope gradient:</i> 10 to 25 percent	<i>Wind erodibility index (WEI)</i> 134
<i>Parent material:</i> sandy outwash over loamy glacial till	<i>Kw (surface layer):</i> .17
<i>Restrictive feature(s):</i>	<i>Land capability class, nonirrigated:</i> 4e
<i>Flooding:</i> none	<i>Hydric soil:</i> no
<i>Ponding:</i> none	<i>Hydrologic group</i> B
<i>Drainage class:</i> well drained	<i>Potential frost action:</i> low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 3 in	loamy sand	rapid	0.3 to 0.4 in	5.1 to 6.5
Bw -- 3 to 31 in	loamy sand	rapid	1.7 to 3.1 in	5.1 to 6.5
2E/B,2Bt,2BC - -	loam	moderate	1.4 to 2.2 in	5.1 to 7.8
2C -- 43 to 60 in	sandy loam	moderate	2.0 to 3.2 in	6.1 to 8.4

#### Glossic eutroboralfs

<i>Extent:</i> 20 percent of the unit	<i>Soil loss tolerance (T factor):</i> 5
<i>Landform(s):</i> hillslopes on moraines	<i>Wind erodibility group (WEG)</i> 5
<i>Slope gradient:</i> 10 to 25 percent	<i>Wind erodibility index (WEI)</i> 56
<i>Parent material:</i> silty mantled loamy glacial till	<i>Kw (surface layer):</i> .37
<i>Restrictive feature(s):</i>	<i>Land capability class, nonirrigated:</i> 4e
<i>Flooding:</i> none	<i>Hydric soil:</i> no
<i>Ponding:</i> none	<i>Hydrologic group</i> B
<i>Drainage class:</i> well drained	<i>Potential frost action:</i> moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
E,Bw -- 0 to 6 in	silt loam	moderate	1.3 to 1.4 in	5.1 to 6.5
E' -- 6 to 20 in	very fine sandy loam	moderate	2.4 to 3.1 in	5.1 to 6.0
E/B,2Bt -- 20 to 48 in	sandy loam	moderate	3.1 to 5.3 in	5.6 to 7.3
2C -- 48 to 60 in	sandy loam	moderate	1.3 to 2.2 in	6.6 to 8.4

### A18--Arenic Eutroboralfs, nearly level to gently rolling

## Map Unit Description (MN)

Cass County, Minnesota

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### A18--Arenic Eutroboralfs, nearly level to gently rolling

#### Arenic eutroboralfs

*Extent:* 80 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 0 to 10 percent

*Parent material:* sandy outwash over loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 3s

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 2 in	loamy sand	rapid	0.2 to 0.2 in	5.1 to 6.5
Bw -- 2 to 27 in	loamy sand	rapid	1.5 to 2.7 in	5.1 to 6.5
2E/B,2Bt,2BC - -	loam	moderate	1.8 to 2.9 in	5.1 to 7.8
2C -- 42 to 60 in	sandy loam	moderate	2.1 to 3.4 in	6.1 to 8.4

### A19--Menahga loamy coarse sand, moraine, rolling and hilly

#### Menahga, moraine

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 10 to 25 percent

*Parent material:* sandy outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 5 in	loamy sand	rapid	0.5 to 0.6 in	4.5 to 6.5
Bw -- 5 to 20 in	sand	rapid	1.0 to 1.3 in	4.5 to 6.5
C -- 20 to 60 in	sand	rapid	2.0 to 2.8 in	5.6 to 6.5

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### A20--Typic Udipsamments, gravelly, rolling to very hilly

#### Typic udipsamments, gravelly

*Extent:* 80 percent of the unit

*Landform(s):* ridges on moraines, hillslopes on outwash plains

*Slope gradient:* 15 to 40 percent

*Parent material:* sandy and gravelly outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .15

*Land capability class, nonirrigated:* 7s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 2 in	loamy sand	rapid	0.2 to 0.2 in	5.1 to 6.5
E -- 2 to 6 in	loamy sand	rapid	0.2 to 0.3 in	5.1 to 6.5
Bw -- 6 to 20 in	sand	rapid	0.7 to 1.0 in	5.1 to 6.5
C -- 20 to 60 in	gravelly sand	rapid	1.6 to 3.6 in	5.1 to 7.4

### E57--Zimmerman loamy fine sand, nearly level and undulating

#### Zimmerman

*Extent:* 90 percent of the unit

*Landform(s):* hillslopes on lake plains, hillslopes on outwash plains

*Slope gradient:* 0 to 8 percent

*Parent material:* sandy outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 1

*Wind erodibility index (WEI)* 220

*Kw (surface layer):* .15

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 9 in	fine sand	rapid	0.6 to 0.8 in	5.1 to 6.5
E&Bt -- 9 to 60 in	fine sand	rapid	3.0 to 5.1 in	5.1 to 7.3

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### E58--Graycalm-Typic Udipsamments association, nearly level and undulating

#### Graycalm

*Extent:* 70 percent of the unit

*Landform(s):* hillslopes on moraines, hillslopes on outwash plains

*Slope gradient:* 0 to 8 percent

*Parent material:* sandy outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,Bw -- 0 to 8 in	loamy sand	rapid	0.5 to 0.9 in	3.5 to 6.5
E -- 8 to 32 in	sand	rapid	1.2 to 2.4 in	3.5 to 7.3
E&Bt -- 32 to 46 in	sand	rapid	0.6 to 1.3 in	3.5 to 7.3
C -- 46 to 60 in	sand	rapid	0.6 to 0.8 in	3.5 to 8.4

#### Typic udipsamments

*Extent:* 20 percent of the unit

*Landform(s):* hillslopes on moraines, hillslopes on outwash plains

*Slope gradient:* 0 to 8 percent

*Parent material:* sandy and gravelly outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .15

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 3 in	loamy sand	rapid	0.3 to 0.4 in	5.1 to 6.5
E -- 3 to 6 in	loamy sand	rapid	0.2 to 0.2 in	5.1 to 6.5
Bw -- 6 to 36 in	coarse sand	rapid	1.5 to 2.1 in	5.1 to 6.5
C -- 36 to 60 in	coarse sand	rapid	1.0 to 2.2 in	5.1 to 7.4

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### E59--Warba-Stuntz-Arenic Eutroboralfs association, nearly level and undulating

#### Warba

*Extent:* 40 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 0 to 8 percent

*Parent material:* loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .37

*Land capability class, nonirrigated:* 2e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 11 in	very fine sandy loam	moderately rapid	2.0 to 2.5 in	5.1 to 6.5
E/B,B/E,Bt -- 11 to 35 in	clay loam	moderately slow	3.8 to 4.6 in	5.1 to 7.3
C -- 35 to 60 in	loam	moderate	4.0 to 4.7 in	6.6 to 8.4

#### Stuntz

*Extent:* 30 percent of the unit

*Landform(s):* flats on moraines

*Slope gradient:* 0 to 2 percent

*Parent material:* loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat poorly drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .37

*Land capability class, nonirrigated:* 2w

*Hydric soil:* no

*Hydrologic group* C

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E,E/B -- 0 to 17 in	very fine sandy loam	moderately rapid	3.0 to 3.9 in	4.5 to 6.5
B/E,Btg -- 17 to 39 in	sandy clay loam	moderately slow	3.5 to 4.2 in	5.1 to 7.8
C -- 39 to 60 in	loam	moderately slow	3.3 to 4.0 in	6.6 to 8.4

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### E59--Warba-Stuntz-Arenic Eutroboralfs association, nearly level and undulating

#### Arenic eutroboralfs

*Extent:* 15 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 0 to 8 percent

*Parent material:* sandy outwash over loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 3s

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 10 in	loamy sand	rapid	1.0 to 1.2 in	5.1 to 6.5
Bw -- 10 to 30 in	loamy sand	rapid	1.2 to 2.2 in	5.1 to 6.5
2E/B,2Bt,2BC - -	loam	moderate	0.7 to 1.1 in	5.1 to 7.8
2C -- 36 to 60 in	sandy loam	moderate	2.9 to 4.6 in	6.1 to 8.4

### E60--Warba-Stuntz association, nearly level and undulating

#### Warba

*Extent:* 45 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 1 to 8 percent

*Parent material:* loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .37

*Land capability class, nonirrigated:* 2e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 18 in	very fine sandy loam	moderately rapid	3.3 to 4.2 in	5.1 to 6.5
E/B,B/E,Bt --	clay loam	moderately slow	3.5 to 4.2 in	5.1 to 7.3
C -- 40 to 60 in	loam	moderate	3.1 to 3.7 in	6.6 to 8.4

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### E60--Warba-Stuntz association, nearly level and undulating

#### Stuntz

*Extent:* 35 percent of the unit

*Landform(s):* flats on moraines

*Slope gradient:* 0 to 2 percent

*Parent material:* loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat poorly drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .37

*Land capability class, nonirrigated:* 2w

*Hydric soil:* no

*Hydrologic group* C

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E,E/B -- 0 to 17 in	very fine sandy loam	moderately rapid	3.0 to 3.9 in	4.5 to 6.5
B/E,Btg -- 17 to 39 in	sandy clay loam	moderately slow	3.5 to 4.2 in	5.1 to 7.8
C -- 39 to 60 in	loam	moderately slow	3.3 to 4.0 in	6.6 to 8.4

### E61--Glossic Eutroboralfs, loamy, rolling and hilly

#### Glossic eutroboralfs, loamy

*Extent:* 80 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 8 to 20 percent

*Parent material:* silty mantled loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 5

*Wind erodibility index (WEI)* 56

*Kw (surface layer):* .37

*Land capability class, nonirrigated:* 6e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
E,Bw -- 0 to 6 in	silt loam	moderate	1.3 to 1.4 in	5.1 to 6.5
E' -- 6 to 23 in	very fine sandy loam	moderate	2.9 to 3.7 in	5.1 to 6.0
E/B,2Bt -- 23 to 48 in	sandy loam	moderate	2.8 to 4.8 in	5.6 to 7.3
2C -- 48 to 60 in	sandy loam	moderate	1.3 to 2.2 in	6.6 to 8.4

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### E62--Warba-Histosols association, nearly level to gently rolling

#### Warba

*Extent:* 55 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 1 to 12 percent

*Parent material:* loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .37

*Land capability class, nonirrigated:* 2e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 16 in	very fine sandy loam	moderately rapid	2.9 to 3.7 in	5.1 to 6.5
E/B,B/E,Bt -- 16 to 35 in	clay loam	moderately slow	3.0 to 3.6 in	5.1 to 7.3
C -- 35 to 60 in	loam	moderate	4.0 to 4.7 in	6.6 to 8.4

#### Histosols

*Extent:* 30 percent of the unit

*Landform(s):* depressions on moraines

*Slope gradient:* 0 to 2 percent

*Parent material:* herbaceous organic material

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* frequent

*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 3

*Wind erodibility group (WEG)* 5

*Wind erodibility index (WEI)* 56

*Kw (surface layer):* .02

*Land capability class, nonirrigated:* 6w

*Hydric soil:* yes

*Hydrologic group* A/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Oe1 -- 0 to 32 in	mucky peat	rapid	15.3 to 18.5 in	
Oa1,Oa2 -- 32 to 60 in	muck	moderately rapid	9.8 to 12.6 in	

### E63--Aquic Eutroboralfs, clayey subsoil, nearly level and undulating

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### E63--Aquic Eutroboralfs, clayey subsoil, nearly level and undulating

#### Aquic eutroboralfs, clayey subsoil

<p><i>Extent:</i> 80 percent of the unit</p> <p><i>Landform(s):</i> hillslopes on moraines</p> <p><i>Slope gradient:</i> 8 to 20 percent</p> <p><i>Parent material:</i> loamy sediments over clayey till or glaciolacustrine deposits</p> <p><i>Restrictive feature(s):</i></p> <p><i>Flooding:</i> none</p> <p><i>Ponding:</i> none</p> <p><i>Drainage class:</i> moderately well drained</p>	<p><i>Soil loss tolerance (T factor):</i> 5</p> <p><i>Wind erodibility group (WEG)</i> 3</p> <p><i>Wind erodibility index (WEI)</i> 86</p> <p><i>Kw (surface layer):</i> .24</p> <p><i>Land capability class, nonirrigated:</i> 3e</p> <p><i>Hydric soil:</i> no</p> <p><i>Hydrologic group</i> C</p> <p><i>Potential frost action:</i> high</p>
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<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 2 in	fine sandy loam	moderately rapid	0.3 to 0.4 in	6.1 to 7.3
E -- 2 to 20 in	loam	moderately rapid	2.0 to 3.4 in	5.6 to 7.3
B/E,Bt -- 20 to 23 in	clay	slow	0.3 to 0.5 in	5.1 to 8.4
C -- 23 to 60 in	silty clay loam	slow	4.4 to 7.0 in	7.9 to 8.4

### E65--Aeric Glossaqualf, loamy

#### Aeric glossaqualfs, loamy

<p><i>Extent:</i> 75 percent of the unit</p> <p><i>Landform(s):</i> flats on moraines</p> <p><i>Slope gradient:</i> 0 to 2 percent</p> <p><i>Parent material:</i> loamy glacial till</p> <p><i>Restrictive feature(s):</i></p> <p><i>Flooding:</i> none</p> <p><i>Ponding:</i> none</p> <p><i>Drainage class:</i> somewhat poorly drained</p>	<p><i>Soil loss tolerance (T factor):</i> 5</p> <p><i>Wind erodibility group (WEG)</i> 3</p> <p><i>Wind erodibility index (WEI)</i> 86</p> <p><i>Kw (surface layer):</i> .37</p> <p><i>Land capability class, nonirrigated:</i> 2w</p> <p><i>Hydric soil:</i> no</p> <p><i>Hydrologic group</i> C</p> <p><i>Potential frost action:</i> high</p>
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<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E,E/B -- 0 to 17 in	very fine sandy loam	moderately rapid	3.0 to 3.9 in	4.5 to 6.5
B/E,Btg -- 17 to 39 in	clay loam	moderately slow	3.5 to 4.2 in	5.1 to 7.8
C -- 39 to 60 in	loam	moderately slow	3.3 to 4.0 in	6.6 to 8.4

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### E65--Aeric Glossaqualf, loamy

### F76--Warba very fine sandy loam, nearly level and undulating

#### Warba, nearly level

*Extent:* 75 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 0 to 8 percent

*Parent material:* loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG):* 3

*Wind erodibility index (WEI):* 86

*Kw (surface layer):* .24

*Land capability class, nonirrigated:* 2e

*Hydric soil:* no

*Hydrologic group:* B

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 18 in	very fine sandy loam	moderately rapid	3.3 to 4.2 in	5.1 to 6.5
E/B,B/E,Bt -- 18 to 40 in	loam	moderately slow	3.5 to 4.2 in	5.1 to 7.3
C -- 40 to 60 in	loam	moderate	3.1 to 3.7 in	6.6 to 8.4

### F77--Warba very fine sandy loam, rolling and hilly

#### Warba, rolling

*Extent:* 75 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 8 to 25 percent

*Parent material:* loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG):* 3

*Wind erodibility index (WEI):* 86

*Kw (surface layer):* .37

*Land capability class, nonirrigated:* 6e

*Hydric soil:* no

*Hydrologic group:* B

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 11 in	very fine sandy loam	moderately rapid	2.0 to 2.5 in	5.1 to 6.5
B/E,Bt -- 11 to 45 in	clay loam	moderately slow	5.4 to 6.4 in	5.1 to 7.3
C -- 45 to 60 in	loam	moderate	2.4 to 2.8 in	6.6 to 8.4

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### F77--Warba very fine sandy loam, rolling and hilly

### K22--Alfic Udipsamments, nearly level and undulating

#### Alfic udispamments

*Extent:* 75 percent of the unit

*Landform(s):* hillslopes on outwash plains

*Slope gradient:* 0 to 8 percent

*Parent material:* sandy outwash deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,Bw -- 0 to 4 in	loamy sand	rapid	0.2 to 0.5 in	3.5 to 6.5
E -- 4 to 28 in	sand	rapid	1.2 to 2.4 in	3.5 to 7.3
E&Bt -- 28 to 42 in	sand	rapid	0.6 to 1.3 in	3.5 to 7.3
C -- 42 to 60 in	sand	rapid	0.7 to 1.1 in	3.5 to 8.4

### K25--Eutroboralfs-Typic Ochraqualfs association, nearly level and undulating

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### K25--Eutroboralfs-Typic Ochraqualfs association, nearly level and undulating

#### Eutroboralfs

*Extent:* 50 percent of the unit

*Landform(s):* hillslopes on lake plains

*Slope gradient:* 0 to 8 percent

*Parent material:* sandy outwash over loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 3s

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 2 in	loamy sand	rapid	0.2 to 0.2 in	5.1 to 6.5
Bw -- 2 to 13 in	loamy sand	rapid	0.7 to 1.2 in	5.1 to 6.5
2B/E,2Bt -- 13 to 28 in	loam	moderate	1.8 to 2.8 in	5.1 to 7.8
2C -- 28 to 60 in	sandy loam	moderate	3.8 to 6.1 in	6.1 to 8.4

#### Typic ochraqualfs

*Extent:* 35 percent of the unit

*Landform(s):* flats on lake plains, swales on lake plains

*Slope gradient:* 0 to 2 percent

*Parent material:* silty glaciolacustrine deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* poorly drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .37

*Land capability class, nonirrigated:* 3w

*Hydric soil:* yes

*Hydrologic group* C/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 3 in	very fine sandy loam	moderately rapid	0.6 to 0.7 in	5.6 to 7.8
E -- 3 to 15 in	very fine sandy loam	moderately rapid	2.0 to 2.2 in	5.6 to 7.8
Btg -- 15 to 48 in	silty clay loam	moderate	5.6 to 7.3 in	6.1 to 7.8
Cg -- 48 to 60 in	silt loam	moderate	2.0 to 2.6 in	7.4 to 8.4

### K27--Aquic Eutroboralfs, loamy, nearly level and undulating

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### K27--Aquic Eutroboralfs, loamy, nearly level and undulating

#### Aquic eutroboralfs, loamy

*Extent:* 85 percent of the unit

*Landform(s):* rises on moraines

*Slope gradient:* 0 to 8 percent

*Parent material:* till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* moderately well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 3

*Wind erodibility index (WEI)* 86

*Kw (surface layer):* .24

*Land capability class, nonirrigated:* 2e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 4 in	fine sandy loam	moderately rapid	0.5 to 0.7 in	6.1 to 7.3
E -- 4 to 8 in	loamy sand	moderately rapid	0.4 to 0.7 in	5.6 to 7.3
Bt -- 8 to 47 in	loam	moderate	5.8 to 7.4 in	5.6 to 7.8
C -- 47 to 60 in	sandy loam	moderate	1.6 to 2.5 in	6.1 to 8.4

### K28--Aquic Eutroboralfs, silty, nearly level and undulating

#### Aquic eutroboralfs, silty

*Extent:* 75 percent of the unit

*Landform(s):* rises on lake plains

*Slope gradient:* 0 to 8 percent

*Parent material:* silty glaciolacustrine deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* moderately well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 6

*Wind erodibility index (WEI)* 48

*Kw (surface layer):* .37

*Land capability class, nonirrigated:* 2e

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 3 in	silt loam	moderate	0.6 to 0.7 in	5.6 to 7.3
E -- 3 to 10 in	silt loam	moderate	0.9 to 1.3 in	5.6 to 7.3
Bt,BC -- 10 to 32 in	silty clay loam	moderate	3.7 to 5.3 in	5.6 to 7.8
C -- 32 to 60 in	silt loam	moderate	4.8 to 6.1 in	7.4 to 8.4

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### K28--Aquic Eutroboralfs, silty, nearly level and undulating

### K30--Typic Ochraqualfs, clayey

#### Typic ochraqualfs, clayey

*Extent:* 75 percent of the unit

*Landform(s):* flats on moraines, swales on moraines

*Slope gradient:* 0 to 2 percent

*Parent material:* glaciofluvial deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* poorly drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG):* 5

*Wind erodibility index (WEI):* 56

*Kw (surface layer):* .37

*Land capability class, nonirrigated:* 2w

*Hydric soil:* yes

*Hydrologic group:* C

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 12 in	silt loam	moderate	2.4 to 2.8 in	5.6 to 7.3
B/E,Btg2 -- 12 to 26 in	silty clay	slow	1.7 to 2.7 in	5.1 to 8.4
Cg -- 26 to 60 in	clay loam	slow	4.1 to 6.4 in	7.9 to 8.4

### K31--Suomi-Aeric Glossaqualfs, loamy, association, nearly level and undulating

#### Suomi

*Extent:* 45 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 0 to 8 percent

*Parent material:* till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* moderately well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG):* 5

*Wind erodibility index (WEI):* 56

*Kw (surface layer):* .43

*Land capability class, nonirrigated:* 2e

*Hydric soil:* no

*Hydrologic group:* C

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 23 in	loam	moderate	4.6 to 5.5 in	5.1 to 7.3
Bt1,Bt2 -- 23 to 37 in	silty clay loam	slow	1.4 to 2.7 in	5.1 to 7.3
Bkg -- 37 to 60 in	clay loam	slow	2.5 to 3.9 in	7.4 to 8.4

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### K31--Suomi-Aeric Glossaqualfs, loamy, association, nearly level and undulating

#### Aeric glossaqualfs, loamy

*Extent:* 35 percent of the unit

*Landform(s):* flats on moraines

*Slope gradient:* 0 to 2 percent

*Parent material:* till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat poorly drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 5

*Wind erodibility index (WEI)* 56

*Kw (surface layer):* .20

*Land capability class, nonirrigated:* 2w

*Hydric soil:* no

*Hydrologic group* C

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 5 in	fine sandy loam	moderate	1.0 to 1.1 in	5.1 to 7.3
E -- 5 to 13 in	fine sandy loam	moderate	0.9 to 1.5 in	5.1 to 7.3
E/B -- 13 to 24 in	clay loam	moderate	1.7 to 2.2 in	5.1 to 7.3
Bt -- 24 to 35 in	clay loam	slow	0.9 to 2.2 in	5.1 to 7.3
Bk -- 35 to 80 in	silty clay loam	moderately slow	6.3 to 9.0 in	7.4 to 8.4

### K35--Typic Ochraqualfs, ponded

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### K35--Typic Ochraqualfs, ponded

#### Typic ochraqualfs, ponded

*Extent:* 80 percent of the unit

*Landform(s):* depressions on lake plains

*Slope gradient:* 0 to 2 percent

*Parent material:* loamy glaciolacustrine deposits over loamy till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* frequent

*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG):* 3

*Wind erodibility index (WEI):* 86

*Kw (surface layer):* .37

*Land capability class, nonirrigated:* 6w

*Hydric soil:* yes

*Hydrologic group:* B/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 5 in	very fine sandy loam	moderately rapid	1.0 to 1.1 in	5.6 to 7.8
E -- 5 to 10 in	very fine sandy loam	moderately rapid	0.8 to 0.9 in	5.6 to 7.8
Btg -- 10 to 35 in	clay loam	moderate	3.8 to 4.8 in	5.6 to 7.8
Cg -- 35 to 60 in	loam	moderate	2.7 to 4.7 in	7.4 to 8.4

### M-W--Water, miscellaneous

#### Water, miscellaneous

*Extent:* 100 percent of the unit

*Landform(s):*

*Slope gradient:*

*Parent material:*

*Restrictive feature(s):*

*Flooding:*

*Ponding:*

*Drainage class:*

*Soil loss tolerance (T factor):*

*Wind erodibility group (WEG):*

*Wind erodibility index (WEI):*

*Kw (surface layer):*

*Land capability class, nonirrigated:*

*Hydric soil:*

*Hydrologic group:*

*Potential frost action:*

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
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### N77--Udipsamments, nearly level and undulating

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### N77--Udipsamments, nearly level and undulating

#### Udipsamments

*Extent:* 85 percent of the unit

*Landform(s):* hillslopes on outwash plains

*Slope gradient:* 0 to 8 percent

*Parent material:* sandy outwash

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .15

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 6 in	loamy fine sand	rapid	0.6 to 0.7 in	5.1 to 6.0
Bw -- 6 to 40 in	fine sand	rapid	2.1 to 3.4 in	5.1 to 6.0
C -- 40 to 60 in	fine sand	rapid	1.0 to 1.8 in	5.6 to 7.3

### N78--Psammentic eutroboralfs, sandy, nearly level and undulating

#### Psammentic eutroboralfs, sandy, nearly level

*Extent:* 85 percent of the unit

*Landform(s):* hillslopes on outwash plains

*Slope gradient:* 0 to 8 percent

*Parent material:* outwash

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .15

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 5 in	loamy sand	rapid	0.3 to 0.6 in	3.5 to 6.5
Bw -- 5 to 32 in	sand	rapid	1.3 to 2.7 in	3.5 to 7.3
E&Bt -- 32 to 46 in	sand	rapid	0.6 to 1.3 in	3.5 to 7.3
C -- 46 to 60 in	sand	rapid	0.6 to 0.8 in	3.5 to 8.4

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### N78--Psammentic eutroboralfs, sandy, nearly level and undulating

### N79--Psammentic eutroboralfs, sandy, rolling and hilly

#### Psammentic eutroboralfs, sandy, rolling

*Extent:* 85 percent of the unit

*Landform(s):* hillslopes on outwash plains

*Slope gradient:* 8 to 20 percent

*Parent material:* outwash

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .15

*Land capability class, nonirrigated:* 6s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 3 in	loamy sand	rapid	0.2 to 0.4 in	3.5 to 6.5
Bw -- 3 to 30 in	sand	rapid	1.3 to 2.7 in	3.5 to 7.3
E&Bt -- 30 to 50 in	sand	rapid	0.8 to 1.8 in	3.5 to 7.3
C -- 50 to 60 in	sand	rapid	0.4 to 0.6 in	3.5 to 8.4

### N80--Cutaway-hiwood association, nearly level and undulating

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### N80--Cutaway-hiwood association, nearly level and undulating

#### Cutaway

*Extent:* 50 percent of the unit

*Landform(s):* hillslopes on outwash plains

*Slope gradient:* 0 to 8 percent

*Parent material:* outwash over till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 3s

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 3 in	loamy fine sand	rapid	0.3 to 0.4 in	5.1 to 6.5
E,Bw,E' -- 3 to 28 in	loamy fine sand	rapid	1.5 to 2.7 in	5.1 to 6.5
2B/E,2Bt -- 28 to 45 in	sandy clay loam	moderate	2.0 to 3.2 in	5.1 to 7.8
2C -- 45 to 60 in	sandy loam	moderate	1.8 to 2.8 in	6.1 to 8.4

#### Hiwood

*Extent:* 30 percent of the unit

*Landform(s):* flats on outwash plains

*Slope gradient:* 0 to 2 percent

*Parent material:* sandy glaciolacustrine deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* moderately well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 6 in	loamy fine sand	rapid	0.5 to 0.7 in	4.5 to 6.0
Bw1,Bw2 -- 6 to 26 in	fine sand	rapid	1.4 to 2.0 in	5.1 to 6.0
Bw3,C -- 26 to 60 in	fine sand	rapid	1.7 to 2.7 in	5.6 to 7.8

### O92--Hiwood-Zimmerman association, nearly level to hilly

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 092--Hiwood-Zimmerman association, nearly level to hilly

#### Hiwood

*Extent:* 40 percent of the unit

*Landform(s):* flats on outwash plains

*Slope gradient:* 0 to 3 percent

*Parent material:* sandy glaciolacustrine deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* moderately well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 4s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 6 in	loamy fine sand	rapid	0.5 to 0.7 in	4.5 to 6.0
Bw1,Bw2 -- 6 to 26 in	fine sand	rapid	1.4 to 2.0 in	5.1 to 6.0
Bw3,C -- 26 to 60 in	fine sand	rapid	1.7 to 2.7 in	5.6 to 7.8

#### Zimmerman

*Extent:* 35 percent of the unit

*Landform(s):* hillslopes on outwash plains

*Slope gradient:* 0 to 20 percent

*Parent material:* outwash

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* excessively drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 6s

*Hydric soil:* no

*Hydrologic group* A

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A,E -- 0 to 12 in	loamy fine sand	rapid	1.2 to 1.4 in	5.1 to 6.5
Bw,E&Bt -- 12 to 60 in	fine sand	rapid	2.9 to 4.8 in	5.1 to 7.3

### 093--Eutroboralfs, nearly level and undulating

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### 093--Eutroboralfs, nearly level and undulating

#### Eutroboralfs

*Extent:* 75 percent of the unit

*Landform(s):* hillslopes on moraines

*Slope gradient:* 0 to 8 percent

*Parent material:* sandy outwash over loamy glacial till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* well drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 3s

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* low

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 2 in	loamy sand	rapid	0.2 to 0.2 in	5.1 to 6.5
E -- 2 to 21 in	loamy sand	rapid	1.1 to 2.1 in	5.1 to 6.5
2BE,2Bt -- 21 to 28 in	loam	moderate	0.9 to 1.3 in	5.1 to 7.8
2C -- 28 to 60 in	sandy loam	moderate	3.8 to 6.1 in	6.1 to 8.4

### 094--Redby fine sand

#### Redby

*Extent:* 80 percent of the unit

*Landform(s):* flats on outwash plains

*Slope gradient:* 0 to 2 percent

*Parent material:* sandy glaciolacustrine deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* somewhat poorly drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .17

*Land capability class, nonirrigated:* 3w

*Hydric soil:* no

*Hydrologic group* B

*Potential frost action:* moderate

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 3 in	loamy fine sand	rapid	0.3 to 0.4 in	5.1 to 6.5
E -- 3 to 8 in	fine sand	rapid	0.3 to 0.5 in	5.1 to 6.5
Bw,C -- 8 to 60 in	fine sand	rapid	3.1 to 4.2 in	6.1 to 7.8

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### O95--Humaquepts

#### Humaquepts

*Extent:* 85 percent of the unit

*Landform(s):* depressions on outwash plains

*Slope gradient:* 0 to 2 percent

*Parent material:* sandy outwash over loamy glaciofluvial deposits

*Restrictive feature(s):* dense material at 40 to 60 inches

*Flooding:* none

*Ponding:* frequent

*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .02

*Land capability class, nonirrigated:* 6w

*Hydric soil:* yes

*Hydrologic group* B/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Oa -- 0 to 4 in	muck	moderately rapid	1.4 to 1.8 in	
A -- 4 to 8 in	loamy fine sand	rapid	0.4 to 0.5 in	4.5 to 6.5
Bg -- 8 to 29 in	fine sand	rapid	1.3 to 2.6 in	4.5 to 7.3
2Bg -- 29 to 60 in	fine sandy loam	slow	0.0 to 2.5 in	4.5 to 7.3

### O96--Mollic Fluvaquents, frequently flooded

#### Mollic fluvaquents, frequently flooded

*Extent:* 80 percent of the unit

*Landform(s):* flood plains

*Slope gradient:* 0 to 2 percent

*Parent material:* alluvium

*Restrictive feature(s):*

*Flooding:* frequent

*Ponding:* none

*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 4

*Wind erodibility group (WEG)* 8

*Wind erodibility index (WEI)* 0

*Kw (surface layer):* .20

*Land capability class, nonirrigated:* 6w

*Hydric soil:* yes

*Hydrologic group* D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 8 in	fine sandy loam	moderately rapid	0.9 to 1.4 in	5.1 to 7.3
Cg -- 8 to 15 in	sandy loam	moderately rapid	0.7 to 1.6 in	5.1 to 7.3
2Cg -- 15 to 60 in	sand	rapid	1.8 to 4.5 in	5.6 to 7.3

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### O96--Mollic Fluvaquents, frequently flooded

### O97--Humaquepts, sandy

#### Humaquepts, sandy

*Extent:* 85 percent of the unit

*Landform(s):* depressions on outwash plains

*Slope gradient:* 0 to 2 percent

*Parent material:* herbaceous organic material over sandy glaciolacustrine deposits

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* frequent

*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 2

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .02

*Land capability class, nonirrigated:* 6w

*Hydric soil:* yes

*Hydrologic group* A/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Oa -- 0 to 4 in	muck	moderately rapid	1.4 to 1.8 in	
C -- 4 to 60 in	sand	rapid	1.7 to 4.5 in	

### W--Water

#### Water

*Extent:* 100 percent of the unit

*Landform(s):*

*Slope gradient:* 0 to 0 percent

*Parent material:*

*Restrictive feature(s):*

*Flooding:*

*Ponding:*

*Drainage class:*

*Soil loss tolerance (T factor):*

*Wind erodibility group (WEG)*

*Wind erodibility index (WEI)*

*Kw (surface layer):*

*Land capability class, nonirrigated:*

*Hydric soil:*

*Hydrologic group*

*Potential frost action:*

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### X01--Histosols, depressional

#### Histosols, depressional

*Extent:* 85 percent of the unit

*Landform(s):* depressions on moraines, depressions on outwash plains

*Slope gradient:* 0 to 2 percent

*Parent material:* herbaceous organic material

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* frequent

*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 3

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .02

*Land capability class, nonirrigated:* 6w

*Hydric soil:* yes

*Hydrologic group* A/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Oa1 -- 0 to 10 in	muck	moderately rapid	3.4 to 4.4 in	
Oa2 -- 10 to 60 in	muck	moderately rapid	17.5 to 22.5 in	

### X02--Typic borohemists, acid

#### Borohemists, acid

*Extent:* 85 percent of the unit

*Landform(s):* depressions on moraines, depressions on outwash plains

*Slope gradient:* 0 to 2 percent

*Parent material:* herbaceous organic material

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 3

*Wind erodibility group (WEG)* 7

*Wind erodibility index (WEI)* 38

*Kw (surface layer):* .02

*Land capability class, nonirrigated:* 7w

*Hydric soil:* yes

*Hydrologic group* D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Oi -- 0 to 4 in	peat	rapid	2.2 to 2.6 in	
Oe -- 4 to 63 in	mucky peat	moderately rapid	26.6 to 32.5 in	

### X03--Typic borohemists, nonacid-typic borosaprists association

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### X03--Typic borohemists, nonacid-typic borosaprists association

#### Borohemists, nonacid

*Extent:* 50 percent of the unit

*Landform(s):* depressions on moraines, depressions on outwash plains

*Slope gradient:* 0 to 2 percent

*Parent material:* herbaceous organic material

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* frequent

*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 3

*Wind erodibility group (WEG)* 5

*Wind erodibility index (WEI)* 56

*Kw (surface layer):* .02

*Land capability class, nonirrigated:* 6w

*Hydric soil:* yes

*Hydrologic group* A/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Oe1 -- 0 to 18 in	mucky peat	moderately rapid	8.7 to 10.5 in	
Oe2 -- 18 to 60 in	mucky peat	moderately rapid	20.0 to 24.2 in	

#### Borosaprists

*Extent:* 35 percent of the unit

*Landform(s):* depressions on moraines, depressions on outwash plains

*Slope gradient:* 0 to 2 percent

*Parent material:* herbaceous organic material

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* frequent

*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 3

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .02

*Land capability class, nonirrigated:* 6w

*Hydric soil:* yes

*Hydrologic group* A/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Oa1 -- 0 to 10 in	muck	moderately rapid	3.4 to 4.4 in	
Oa2 -- 10 to 60 in	muck	moderately rapid	17.5 to 22.5 in	

### X04--Typic borosaprist-bowstring association

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### X04--Typic borosaprist-bowstring association

#### Borosaprists, frequently flooded

*Extent:* 50 percent of the unit

*Landform(s):* flood plains

*Slope gradient:* 0 to 2 percent

*Parent material:* herbaceous organic material

*Restrictive feature(s):*

*Flooding:* frequent

*Ponding:* none

*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 3

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .02

*Land capability class, nonirrigated:* 6w

*Hydric soil:* yes

*Hydrologic group* A/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Oa1 -- 0 to 10 in	muck	moderately rapid	3.4 to 4.4 in	
Oa2 -- 10 to 60 in	muck	moderately rapid	17.5 to 22.5 in	

#### Bowstring, frequently flooded

*Extent:* 35 percent of the unit

*Landform(s):* flood plains

*Slope gradient:* 0 to 2 percent

*Parent material:* herbaceous organic material

*Restrictive feature(s):*

*Flooding:* frequent

*Ponding:* none

*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 3

*Wind erodibility group (WEG)* 8

*Wind erodibility index (WEI)* 0

*Kw (surface layer):* .02

*Land capability class, nonirrigated:* 6w

*Hydric soil:* yes

*Hydrologic group* D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Oa -- 0 to 35 in	muck	moderately rapid	12.3 to 15.8 in	
C -- 35 to 43 in	stratified sand to fine sandy loam	rapid	0.6 to 1.1 in	
O'a -- 43 to 60 in	muck	moderately rapid	5.9 to 7.6 in	

### X05--Typic borohemists, nonacid

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

### X05--Typic borohemists, nonacid

#### Borohemists, nonacid

*Extent:* 85 percent of the unit

*Landform(s):* depressions on moraines, depressions on outwash plains

*Slope gradient:* 0 to 2 percent

*Parent material:* herbaceous organic material

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* frequent

*Drainage class:* very poorly drained

*Soil loss tolerance (T factor):* 3

*Wind erodibility group (WEG)* 5

*Wind erodibility index (WEI)* 56

*Kw (surface layer):* .02

*Land capability class, nonirrigated:* 6w

*Hydric soil:* yes

*Hydrologic group* A/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
Oe1 -- 0 to 18 in	mucky peat	moderately rapid	8.7 to 10.5 in	
Oe2 -- 18 to 60 in	mucky peat	moderately rapid	20.0 to 24.2 in	

### XW1--Aqualfs

#### Aqualfs

*Extent:* 85 percent of the unit

*Landform(s):* flats on moraines, swales on moraines

*Slope gradient:* 0 to 2 percent

*Parent material:* sandy glaciolacustrine deposits over till

*Restrictive feature(s):*

*Flooding:* none

*Ponding:* none

*Drainage class:* poorly drained

*Soil loss tolerance (T factor):* 5

*Wind erodibility group (WEG)* 2

*Wind erodibility index (WEI)* 134

*Kw (surface layer):* .15

*Land capability class, nonirrigated:* 4w

*Hydric soil:* yes

*Hydrologic group* B/D

*Potential frost action:* high

<i>Representative soil profile:</i>	<i>Texture</i>	<i>Permeability</i>	<i>Available water capacity</i>	<i>pH</i>
A -- 0 to 3 in	loamy fine sand	rapid	0.4 to 0.5 in	6.1 to 7.3
Bg -- 3 to 17 in	loamy fine sand	rapid	0.8 to 1.5 in	6.6 to 7.8
Btg,Cg -- 17 to 60 in	clay loam	moderate	7.3 to 8.2 in	7.4 to 8.4

## Map Unit Description (MN)

Cass County, Minnesota

[Data apply to the entire extent of the map unit within the survey area. Map unit and soil properties for a specific parcel of land may vary somewhat and should be determined by onsite investigation]

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This report provides a semi tabular listing of some soil and site properties and interpretations valuable in communicating the concept of a map unit. It also includes commonly used conservation planning information in one place for easy access. Major soil components are always displayed and minor components are also displayed if they are included in the database and they are selected at the time the report is generated.