



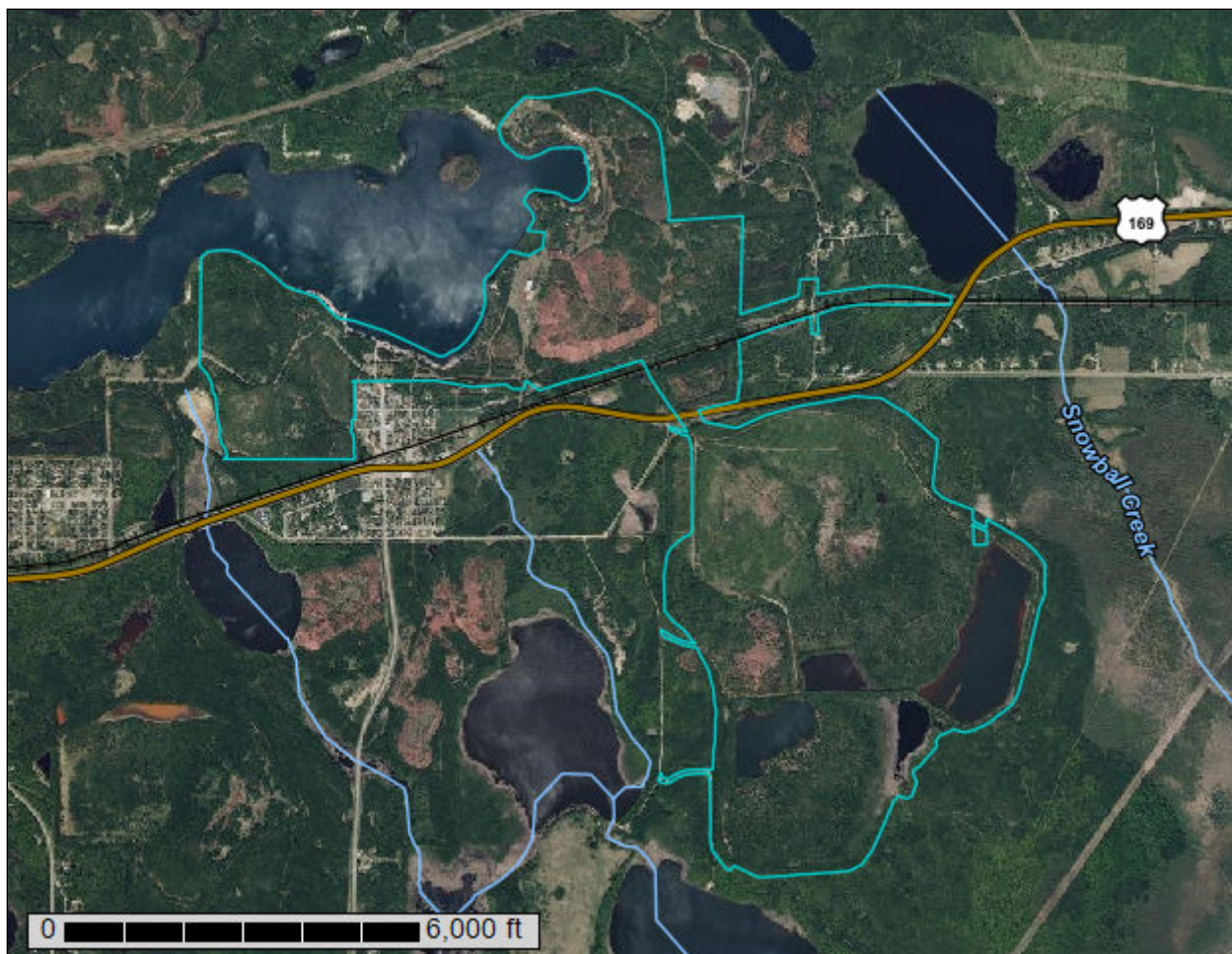
United States
Department of
Agriculture

NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for Itasca County, Minnesota



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Map Scale: 1:34,300 if printed on A landscape (11" x 8.5") sheet.

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

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MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Itasca County, Minnesota

Survey Area Data: Version 23, Sep 10, 2025

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 1, 2021—Oct 1, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
268B	Cromwell fine sandy loam, 1 to 10 percent slopes	1.9	0.1%
614	Blackhoof muck	0.1	0.0%
619	Keewatin silt loam	11.6	0.8%
622B	Nashwauk fine sandy loam, 1 to 10 percent slopes	61.5	4.3%
797	Mooselake and Lupton soils, 0 to 1 percent slopes	0.0	0.0%
868B	Mahtomedi and Graycalm soils, 1 to 10 percent slopes	4.2	0.3%
872	Pengilly-Winterfield association	3.5	0.2%
1041	Pits, mine	69.1	4.8%
1042	Dumps, mine	282.3	19.8%
1043C	Udorthents, nearly level to rolling	438.9	30.7%
1043F	Udorthents, very steep	61.9	4.3%
1044	Slickens	356.4	24.9%
A1C	Eagleview and Menahga soils, 3 to 15 percent slopes	3.4	0.2%
W	Water	134.3	9.4%
Totals for Area of Interest		1,429.5	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called

noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can

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be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Itasca County, Minnesota

268B—Cromwell fine sandy loam, 1 to 10 percent slopes

Map Unit Setting

National map unit symbol: fclr

Elevation: 980 to 1,640 feet

Mean annual precipitation: 24 to 27 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 100 to 120 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Cromwell and similar soils: 90 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cromwell

Setting

Landform: Outwash plains

Landform position (two-dimensional): Backslope, summit

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Sandy outwash

Typical profile

A - 0 to 3 inches: fine sandy loam

E,Bw,2Bw,2C - 3 to 60 inches: coarse sand

Properties and qualities

Slope: 1 to 10 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat excessively drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 3.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: B

Ecological site: F057XY022MN - Sandy Upland Moist Mixed Forest

Forage suitability group: Sandy (G057XN022MN)

Other vegetative classification: Sandy (G057XN022MN)

Hydric soil rating: No

Minor Components

Sago

Percent of map unit: 3 percent

Landform: Depressions

Hydric soil rating: Yes

Poorly drained sandy soils

Percent of map unit: 3 percent

Landform: Swales

Hydric soil rating: Yes

Cathro

Percent of map unit: 2 percent

Landform: Depressions

Hydric soil rating: Yes

Tawas

Percent of map unit: 2 percent

Landform: Depressions

Hydric soil rating: Yes

614—Blackhoof muck

Map Unit Setting

National map unit symbol: fcm2

Elevation: 980 to 1,640 feet

Mean annual precipitation: 24 to 27 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 100 to 120 days

Farmland classification: Not prime farmland

Map Unit Composition

Blackhoof and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blackhoof

Setting

Landform: Depressions on moraines

Down-slope shape: Concave

Across-slope shape: Concave

Parent material: Organic material over loamy till

Typical profile

Oa - 0 to 8 inches: muck

A - 8 to 11 inches: loam

Bg1-Bg3, Cg - 11 to 60 inches: loam

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Very poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

Depth to water table: About 0 inches

Frequency of flooding: None

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Frequency of ponding: Frequent

Calcium carbonate, maximum content: 5 percent

Available water supply, 0 to 60 inches: Very high (about 13.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6w

Hydrologic Soil Group: C/D

Ecological site: F057XY003MN - Peatland

Forage suitability group: Not Suited (G057XN024MN)

Other vegetative classification: Not Suited (G057XN024MN)

Hydric soil rating: Yes

Minor Components

Sandwich

Percent of map unit: 8 percent

Landform: Flats

Hydric soil rating: Yes

Keewatin

Percent of map unit: 7 percent

Landform: Moraines

Hydric soil rating: No

619—Keewatin silt loam

Map Unit Setting

National map unit symbol: fcm7

Elevation: 980 to 1,640 feet

Mean annual precipitation: 24 to 27 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 100 to 120 days

Farmland classification: Prime farmland if drained

Map Unit Composition

Keewatin and similar soils: 90 percent

Minor components: 10 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Keewatin

Setting

Landform: Swales on moraines

Down-slope shape: Linear

Across-slope shape: Concave

Parent material: Loamy till

Typical profile

A - 0 to 1 inches: silt loam

E1,E2 - 1 to 11 inches: fine sandy loam

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E3 - 11 to 16 inches: sandy loam
B/E,Bt1,Bt2 - 16 to 60 inches: loam
C - 60 to 65 inches: loam

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: 6 to 14 inches to densic material
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 6 percent
Available water supply, 0 to 60 inches: Very low (about 1.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: D
Ecological site: F057XY019MN - Dense Till Upland Hardwood Forest
Forage suitability group: Level Swale, Low AWC, Acid (G057XN007MN)
Other vegetative classification: Level Swale, Low AWC, Acid (G057XN007MN)
Hydric soil rating: No

Minor Components

Nashwauk

Percent of map unit: 4 percent
Landform: Moraines
Hydric soil rating: No

Cathro

Percent of map unit: 3 percent
Landform: Depressions
Hydric soil rating: Yes

Blackhoof

Percent of map unit: 3 percent
Landform: Depressions
Hydric soil rating: Yes

622B—Nashwauk fine sandy loam, 1 to 10 percent slopes

Map Unit Setting

National map unit symbol: fcmb
Elevation: 980 to 1,640 feet
Mean annual precipitation: 24 to 27 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 100 to 120 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Nashwauk and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Nashwauk

Setting

Landform: Moraines

Landform position (two-dimensional): Backslope, summit

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Loamy till

Typical profile

A - 0 to 1 inches: fine sandy loam

E,Bw - 1 to 7 inches: fine sandy loam

E',B/E - 7 to 16 inches: loam

Bt1,Bt2,Bt3 - 16 to 58 inches: loam

C - 58 to 72 inches: silt loam

Properties and qualities

Slope: 1 to 10 percent

Depth to restrictive feature: 6 to 14 inches to densic material

Drainage class: Moderately well drained

Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.14 in/hr)

Depth to water table: About 30 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 6 percent

Available water supply, 0 to 60 inches: Very low (about 1.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: D

Ecological site: F057XY017MN - Steep Loamy Upland Forest

Forage suitability group: Sloping Upland, Low AWC, Acid (G057XN008MN)

Other vegetative classification: Sloping Upland, Low AWC, Acid (G057XN008MN)

Hydric soil rating: No

Minor Components

Keewatin

Percent of map unit: 5 percent

Landform: Swales

Hydric soil rating: No

Blackhoof

Percent of map unit: 4 percent

Landform: Depressions

Hydric soil rating: Yes

Cathro

Percent of map unit: 3 percent

Landform: Depressions

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Hydric soil rating: Yes

Cutaway

Percent of map unit: 3 percent

Hydric soil rating: No

797—Mooselake and Lupton soils, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2v0lt

Elevation: 590 to 2,030 feet

Mean annual precipitation: 23 to 33 inches

Mean annual air temperature: 36 to 48 degrees F

Frost-free period: 90 to 160 days

Farmland classification: Not prime farmland

Map Unit Composition

Mooselake and similar soils: 51 percent

Lupton and similar soils: 49 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mooselake

Setting

Landform: Depressions

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Woody organic material

Typical profile

Oa - 0 to 6 inches: muck

Oe - 6 to 79 inches: mucky peat

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Very poorly drained

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.20 to 6.00 in/hr)

Depth to water table: About 0 inches

Frequency of flooding: None

Frequency of ponding: None

Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water supply, 0 to 60 inches: Very high (about 29.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6w

Hydrologic Soil Group: A/D

Ecological site: F088XY005MN - Forestland Peatland

Forage suitability group: Not Suited (G088XN024MN)

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Other vegetative classification: Not Suited (G088XN024MN)
Hydric soil rating: Yes

Description of Lupton

Setting

Landform: Depressions
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Woody organic material

Typical profile

Oa1 - 0 to 16 inches: muck
Oa2 - 16 to 79 inches: muck

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.20 to 6.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Very high (about 23.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Ecological site: F088XY005MN - Forestland Peatland
Forage suitability group: Not Suited (G088XN024MN)
Other vegetative classification: Not Suited (G088XN024MN)
Hydric soil rating: Yes

868B—Mahtomedi and Graycalm soils, 1 to 10 percent slopes

Map Unit Setting

National map unit symbol: fcn2
Elevation: 980 to 1,640 feet
Mean annual precipitation: 24 to 27 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 100 to 120 days
Farmland classification: Not prime farmland

Map Unit Composition

Mahtomedi and similar soils: 53 percent
Graycalm and similar soils: 43 percent
Minor components: 4 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mahtomedi

Setting

Landform: Outwash plains
Landform position (two-dimensional): Backslope, summit
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy and gravelly outwash

Typical profile

A - 0 to 4 inches: loamy coarse sand
Bw1,Bw2,Bw3 - 4 to 34 inches: gravelly sand
C - 34 to 60 inches: gravelly sand

Properties and qualities

Slope: 1 to 10 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Low (about 4.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Ecological site: F057XY018MN - Steep Sandy Upland Forest
Forage suitability group: Sandy (G057XN022MN)
Other vegetative classification: Sandy (G057XN022MN)
Hydric soil rating: No

Description of Graycalm

Setting

Landform: Outwash plains
Landform position (two-dimensional): Backslope, summit
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy outwash

Typical profile

A - 0 to 1 inches: loamy sand
E,Bw1,Bw2 - 1 to 17 inches: loamy sand
E'1,E'2,E&Bt - 17 to 58 inches: sand
C - 58 to 60 inches: sand

Properties and qualities

Slope: 1 to 10 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat excessively drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches

Custom Soil Resource Report

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 4.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4s

Hydrologic Soil Group: A

Ecological site: F057XY023MN - Dry Sandy Upland Coniferous Forest

Forage suitability group: Sandy (G057XN022MN)

Other vegetative classification: Sandy (G057XN022MN)

Hydric soil rating: No

Minor Components

Meehan

Percent of map unit: 2 percent

Landform: Swales

Hydric soil rating: No

Tawas

Percent of map unit: 1 percent

Landform: Depressions

Hydric soil rating: Yes

Roscommon

Percent of map unit: 1 percent

Landform: Depressions

Hydric soil rating: Yes

872—Pengilly-Winterfield association

Map Unit Setting

National map unit symbol: fcn7

Elevation: 980 to 1,310 feet

Mean annual precipitation: 20 to 27 inches

Mean annual air temperature: 37 to 41 degrees F

Frost-free period: 95 to 105 days

Farmland classification: Not prime farmland

Map Unit Composition

Pengilly and similar soils: 60 percent

Winterfield and similar soils: 25 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pengilly

Setting

Landform: Flood plains

Custom Soil Resource Report

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

A - 0 to 4 inches: very fine sandy loam
C1,C2 - 4 to 60 inches: stratified loamy very fine sand to silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)
Depth to water table: About 6 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: High (about 9.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: B/D
Ecological site: F088XY006MN - Floodplain Forest Wet
Forage suitability group: Frequently Flooded (G088XN016MN)
Other vegetative classification: Frequently Flooded (G088XN016MN)
Hydric soil rating: Yes

Description of Winterfield

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Alluvium

Typical profile

A - 0 to 3 inches: loamy fine sand
C1 - 3 to 14 inches: loamy fine sand
C2,C3,C4 - 14 to 60 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (1.98 to 19.98 in/hr)
Depth to water table: About 18 inches
Frequency of flooding: Frequent
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Available water supply, 0 to 60 inches: Low (about 4.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D

Custom Soil Resource Report

Ecological site: F088XY009MN - Floodplain Terrace Forest

Forage suitability group: Frequently Flooded (G088XN016MN)

Other vegetative classification: Frequently Flooded (G088XN016MN)

Hydric soil rating: No

Minor Components

Sago

Percent of map unit: 5 percent

Landform: Depressions

Hydric soil rating: Yes

Cathro

Percent of map unit: 5 percent

Landform: Depressions

Hydric soil rating: Yes

Bowstring

Percent of map unit: 5 percent

Landform: Flood plains

Hydric soil rating: Yes

1041—Pits, mine

Map Unit Setting

National map unit symbol: fcl8

Elevation: 660 to 1,970 feet

Mean annual precipitation: 25 to 34 inches

Mean annual air temperature: 36 to 43 degrees F

Frost-free period: 80 to 140 days

Farmland classification: Not prime farmland

Map Unit Composition

Pits, mine: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pits, Mine

Interpretive groups

Land capability classification (irrigated): None specified

Forage suitability group: Not Suited (G093AN024MN)

Other vegetative classification: Not Suited (G093AN024MN)

1042—Dumps, mine

Map Unit Setting

National map unit symbol: fcl9
Elevation: 660 to 1,970 feet
Mean annual precipitation: 25 to 34 inches
Mean annual air temperature: 36 to 43 degrees F
Frost-free period: 80 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Dumps, mine: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dumps, Mine

Interpretive groups

Land capability classification (irrigated): None specified
Forage suitability group: Not Suited (G093AN024MN)
Other vegetative classification: Not Suited (G093AN024MN)

1043C—Udorthents, nearly level to rolling

Map Unit Setting

National map unit symbol: fclb
Elevation: 980 to 1,640 feet
Mean annual precipitation: 24 to 27 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 100 to 120 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents, nearly level to rolling, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents, Nearly Level To Rolling

Typical profile

A,C - 0 to 80 inches: loam

Properties and qualities

Slope: 2 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 5.95 in/hr)

Custom Soil Resource Report

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Ecological site: F093AY013MN - Loamy Upland
Forage suitability group: Sloping Upland, Calcareous (G093AN010MN)
Other vegetative classification: Sloping Upland, Calcareous (G093AN010MN)
Hydric soil rating: No

Minor Components

Itasca

Percent of map unit: 5 percent
Landform: Moraines
Hydric soil rating: No

Blackhoof

Percent of map unit: 3 percent
Landform: Depressions
Hydric soil rating: Yes

Cathro

Percent of map unit: 2 percent
Landform: Depressions
Hydric soil rating: Yes

1043F—Udorthents, very steep

Map Unit Setting

National map unit symbol: fclc
Elevation: 980 to 1,640 feet
Mean annual precipitation: 24 to 27 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 100 to 120 days
Farmland classification: Not prime farmland

Map Unit Composition

Udorthents, very steep, and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents, Very Steep

Typical profile

A,C - 0 to 80 inches: loam

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Ecological site: F057XY017MN - Steep Loamy Upland Forest
Forage suitability group: Not Suited (G057XN024MN)
Other vegetative classification: Not Suited (G057XN024MN)
Hydric soil rating: No

Minor Components

Itasca

Percent of map unit: 5 percent
Landform: Moraines
Hydric soil rating: No

Blackhoof

Percent of map unit: 3 percent
Landform: Depressions
Hydric soil rating: Yes

Cathro

Percent of map unit: 2 percent
Landform: Depressions
Hydric soil rating: Yes

1044—Slickens

Map Unit Setting

National map unit symbol: fclD
Elevation: 660 to 1,970 feet
Mean annual precipitation: 25 to 34 inches
Mean annual air temperature: 36 to 43 degrees F
Frost-free period: 80 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Slickens: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Slickens

Interpretive groups

Land capability classification (irrigated): None specified

Forage suitability group: Not Suited (G093AN024MN)

Other vegetative classification: Not Suited (G093AN024MN)

A1C—Eagleview and Menahga soils, 3 to 15 percent slopes

Map Unit Setting

National map unit symbol: 2x14d

Elevation: 590 to 2,030 feet

Mean annual precipitation: 24 to 30 inches

Mean annual air temperature: 37 to 46 degrees F

Frost-free period: 110 to 160 days

Farmland classification: Not prime farmland

Map Unit Composition

Eagleview and similar soils: 65 percent

Menahga and similar soils: 20 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Eagleview

Setting

Landform: Hillslopes

Landform position (two-dimensional): Shoulder, backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Sandy outwash

Typical profile

A - 0 to 4 inches: loamy sand

E - 4 to 23 inches: sand

E and Bt - 23 to 37 inches: sand

C - 37 to 79 inches: sand

Properties and qualities

Slope: 3 to 15 percent

Surface area covered with cobbles, stones or boulders: 0.0 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat excessively drained

Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 10 percent

Custom Soil Resource Report

Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 3.7 inches)

Interpretive groups

Land capability classification (irrigated): 4s

Land capability classification (nonirrigated): 4s

Hydrologic Soil Group: A

Ecological site: F057XY023MN - Dry Sandy Upland Coniferous Forest

Forage suitability group: Sandy (G057XN022MN)

Other vegetative classification: Sandy (G057XN022MN)

Hydric soil rating: No

Description of Menahga

Setting

Landform: Hillslopes

Landform position (two-dimensional): Shoulder, backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Sandy outwash

Typical profile

A - 0 to 3 inches: loamy sand

Bw - 3 to 17 inches: loamy sand

C - 17 to 79 inches: sand

Properties and qualities

Slope: 3 to 15 percent

Surface area covered with cobbles, stones or boulders: 0.0 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Excessively drained

Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum content: 10 percent

Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): 4s

Land capability classification (nonirrigated): 4s

Hydrologic Soil Group: A

Ecological site: F057XY023MN - Dry Sandy Upland Coniferous Forest

Forage suitability group: Sandy (G057XN022MN)

Other vegetative classification: Sandy (G057XN022MN)

Hydric soil rating: No

Minor Components

Andrusia

Percent of map unit: 5 percent

Landform: Hillslopes

Landform position (two-dimensional): Shoulder, backslope

Landform position (three-dimensional): Side slope

Custom Soil Resource Report

Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: F057XY023MN - Dry Sandy Upland Coniferous Forest
Other vegetative classification: Sloping Upland, Low AWC, Neutral
(G057XN004MN)
Hydric soil rating: No

Roscommon

Percent of map unit: 5 percent
Landform: Hillslopes
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: F057XY002MN - Wet Depressional Forest
Other vegetative classification: Level Swale, Low AWC, Neutral (G057XN003MN)
Hydric soil rating: Yes

Meehan

Percent of map unit: 3 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Base slope
Down-slope shape: Concave
Across-slope shape: Linear
Ecological site: F057XY015MN - Wet Mixed Forest
Other vegetative classification: Level Swale, Low AWC, Acid (G057XN007MN)
Hydric soil rating: No

Leafriver, frequently ponded

Percent of map unit: 1 percent
Landform: Depressions
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: F057XY003MN - Peatland
Other vegetative classification: Not Suited (G057XN024MN)
Hydric soil rating: Yes

Wurtsmith

Percent of map unit: 1 percent
Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: F057XY023MN - Dry Sandy Upland Coniferous Forest
Other vegetative classification: Sloping Upland, Low AWC, Acid (G057XN008MN)
Hydric soil rating: No

W—Water

Map Unit Composition

Water: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

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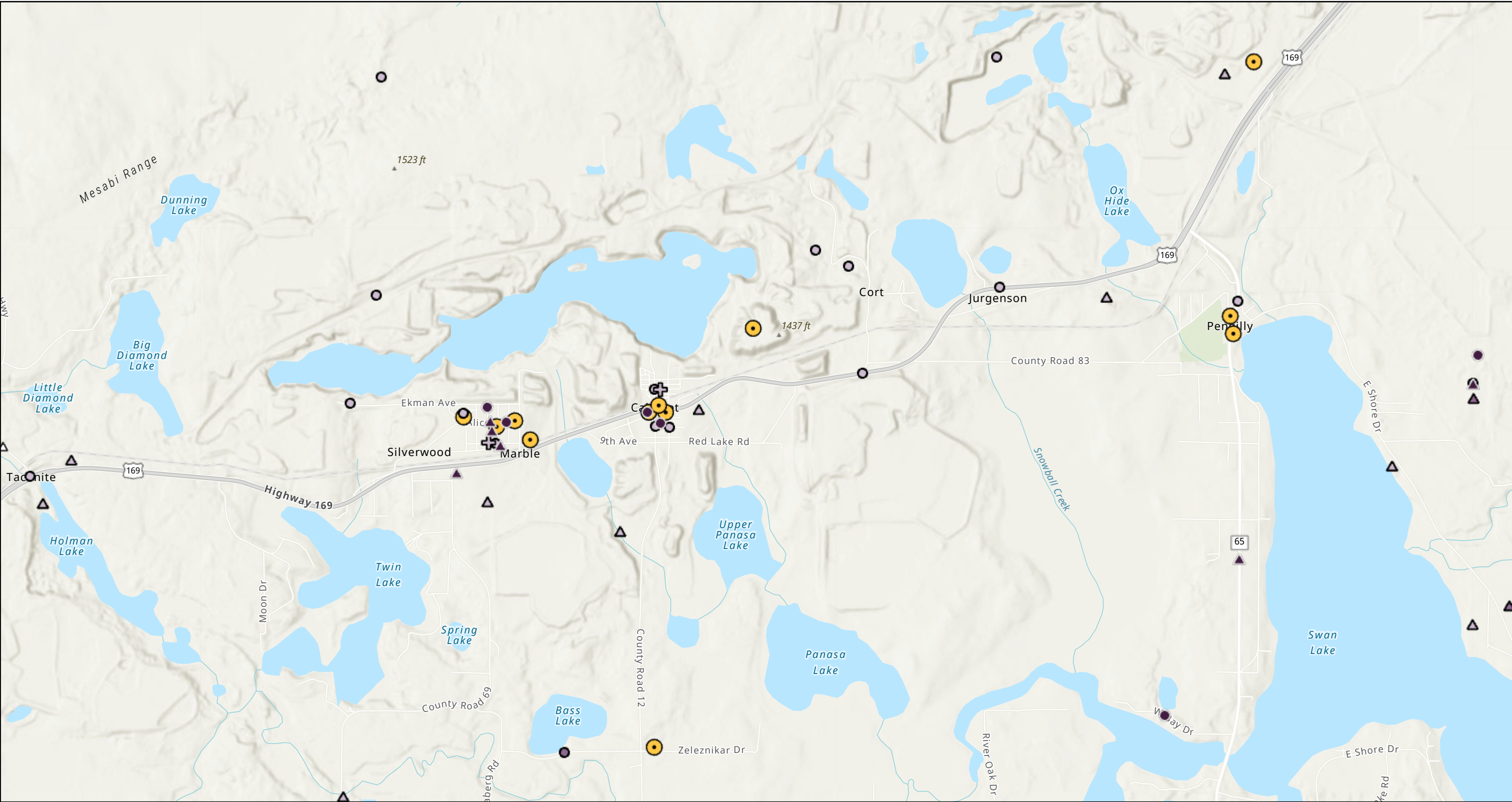
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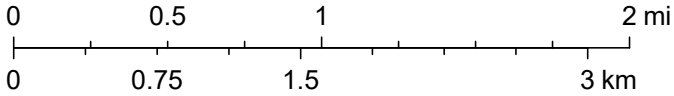
MPCA - What's in My Neighborhood



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World_Hillshade

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Minnesota Pollution Control Agency , Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Esri, NASA, NGA, USGS, FEMA

Ferrosilicon Gas Atomised Powder Safety Data Sheet

MATERIAL SAFETY DATA SHEET

FERROSILICON: GAS ATOMISED POWDER

COMPANY DETAILS

1. Product and Company Identification
 2. Composition:
 3. Hazards Identification:
 4. First Aid Measures:
 5. Fire Fighting Measures:
 6. Accidental Release Measures
 7. Handling and Storage:
 8. Exposure Controls/Personal Protection:
 9. Physical and Chemical Properties:
 10. Stability and Reactivity:
 11. Toxicological Information:
 12. Ecological Information:
 13. Disposal consideration:
 14. Transport Information:
 15. Regulatory Information:
 16. Other Information:
- Document Information

MATERIAL SAFETY DATA SHEET

FERROSILICON: GAS ATOMISED POWDER

COMPANY DETAILS

Name: Exxaro FerroAlloys (Pty) Ltd.

Address:

PO Box 9229
Pretoria 0001
South Africa

Telephone: +27 (12) 307 8519
Fax: +27 (12) 307 7157
Emergency Telephone no: 072 397 8936

1. Product and Company Identification

Trade name: Ferrosilicon 14/16
Chemical Family: Metal Alloy
Chemical Abstract no: 8049-17-0
NIOSH no: 7602
Hazchem code: [Not specified]
UN-no: [Not specified]

2. Composition:

Chemical Composition: - Fe = 85% - Si = 15% - Al, Mn, Cu, Cr, Ni, C and S less than 0.5%

Hazardous components: None

3. Hazards Identification:

None.

4. First Aid Measures:

Exposure Route	First Aid Procedure
Product in eye:	Wash, flush and clean
Product on skin:	Wash, flush and clean
Product ingested:	None
Product inhaled:	Remove patient to fresh air

5. Fire Fighting Measures:

Extinguishing methods:

Non-combustible. In the event of fire near or on top of ferrosilicon, the product does not restrict the extinguishing method.

Special hazards:

None.

Protective clothing:

None.

6. Accidental Release Measures

Situation	Response
Personal precautions:	Wear PPE at all times
Environmental precautions:	Avoid generation of dust. No special steps necessary
Small spills:	None
Large spills:	None

7. Handling and Storage:

Handling/storage precaution:

Ferrosilicon should be stored upright, in the plastic lined bags that the product is supplied in.

Store in an enclosed, dry, ventilated area away from moisture, water, acids and hydro-acids. The enclosed storage area should protect the material from nature elements (i.e. sunlight, rain, humidity, moisture).

Do not seal damp or wet material in containers. In the event of material getting wet, it should be used within one day in the normal application or dried in a suitable drying oven or open air.

Do not store with oxidising or flammable materials.

Do not expose to direct sunlight for long periods.

Do not stack store more than two bags on top of each other.

8. Exposure Controls/Personal Protection:

Occupational exposure limits:

None.

Engineering control measures:

None.

Personal protection - respiratory:

Depending on the dust concentration when opening a container or bag, the necessary respirator must be worn.

Personal protection - hand:

None.

Personal protection - eye:

Dust safety goggles may prevent dust in eyes.

Personal protection - skin:

None.

Other protection:

None.

9. Physical and Chemical Properties:

Property	Value
Appearance:	Metallic powder, consisting of tiny spherical particles: 100% <212µm, 50% to 70% <45µm
Odour:	None
pH:	-
Boiling point:	-
Melting point:	1400°C
Flash point:	-
Flammability:	-
Auto flammability:	None
Explosive properties:	None
Oxidising properties:	-
Vapour pressure:	-
Density:	Bulk density = 4.1 g/cc

10. Stability and Reactivity:

Conditions to avoid:

When in contact with strong acids or alkalis, small amounts of hydrogen, arsine and phosphine may be generated.

Incompatible materials:

None.

Hazardous decomposition products:

None.

Radioactivity:

None.

11. Toxicological Information:

Not classified as harmful.

12. Ecological Information:

Ferrosilicon is not considered environmentally harmful.

13. Disposal consideration:

No specific disposal considerations.

Only local in accordance with internal policy and external laws.

14. Transport Information:

No special steps necessary. Keep containers dry as far as possible.

15. Regulatory Information:

Not listed as Hazardous Chemical Substance (HCS).

16. Other Information:

None.

Document Information

Field	Value
Document Title:	MSDS FerroSilicon - Gas Atomised Powder
Document Owner:	Head Plant
Document No.:	FA-WI-086.01
Creation Date:	30 June 1996
Revision:	1
Effective Date:	27 June 2016

If printed, always refer to the electronic copy available on the document management system as that would serve as the only valid version at all times. Printed 27 June 2016.

Document prepared for accessibility compliance by: Northeast Technical Services, Inc.

Date: January 21, 2026

Company Logo: Exxaro FerroAlloys | ALLOYS

This document has been reformatted to meet ADA accessibility standards, including proper heading structure, table formatting, and semantic markup.

HYPERFLOC CP 627 Safety Data Sheet

SAFETY DATA SHEET

HYPERFLOC™ CP 627

SECTION 1: Identification of the substance/mixture and of the company/undertaking

SECTION 2: Hazards identification

SECTION 3: Composition/information on ingredients

SECTION 4: First aid measures

SECTION 5: Firefighting measures

SECTION 6: Accidental release measures

SECTION 7: Handling and storage

SECTION 8: Exposure controls/personal protection

SECTION 9: Physical and chemical properties

SECTION 10: Stability and reactivity

SECTION 11: Toxicological information

SECTION 12: Ecological information

SECTION 13: Disposal considerations

SECTION 14: Transport information

SECTION 15: Regulatory information

SECTION 16: Other information

SAFETY DATA SHEET

HYPERFLOC™ CP 627

According to U.S. Code of Federal Regulations 29 CFR 1910.1200, Hazard Communication

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Product name: HYPERFLOC™ CP 627

Type of product: Mixture

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Processing aid for industrial applications

Uses advised against: None

1.3 Details of the supplier of the safety data sheet

Company:

HYCHEM INC

10014 North Dale Mabry Highway

Tampa, FL 33618

USA

Telephone: (800) 327-2998

Telefax: (813) 960-0175

E-mail address: info@hychem.com

1.4 Emergency telephone number

24-hour emergency number: Chemtrec: 1-800-424-9300 (CCN 20412)

SECTION 2: Hazards identification

2.1 Classification of the substance or mixture

Classification according to paragraph (d) of 29 CFR 1910.1200:

Not classified

2.2 Label elements

Labelling according to paragraph (f) of 29 CFR 1910.1200:

Hazard symbol(s): None

Signal word: None

Hazard statement(s): None

Precautionary statement(s): None

2.3 Other hazards

Spills produce extremely slippery surfaces.

SECTION 3: Composition/information on ingredients

3.1 Substances

Not applicable, this product is a mixture.

3.2 Mixtures

Hazardous components:

Contains no reportable hazardous substances.

SECTION 4: First aid measures

4.1 Description of first aid measures

Inhalation:

Move to fresh air. No hazards which require special first aid measures.

Skin contact:

Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. In case of persistent skin irritation, consult a physician.

Eye contact:

Rinse immediately with plenty of water, also under the eyelids, for at least 15 minutes. Alternatively, rinse immediately with Diphoterine®. Get prompt medical attention.

Ingestion:

Rinse mouth with water. Do NOT induce vomiting. Get medical attention immediately if symptoms occur.

4.2 Most important symptoms and effects, both acute and delayed

None under normal use.

4.3 Indication of any immediate medical attention and special treatment needed

None reasonably foreseeable.

Other information: None

SECTION 5: Firefighting measures

5.1 Extinguishing media

Suitable extinguishing media:

Water, water spray, foam, carbon dioxide (CO₂), dry powder.

Warning: Spills produce extremely slippery surfaces.

Unsuitable extinguishing media:

None known.

5.2 Special hazards arising from the substance or mixture

Hazardous decomposition products:

Thermal decomposition may produce: hydrogen chloride gas, nitrogen oxides (NO_x), carbon oxides (CO_x). Hydrogen cyanide (hydrocyanic acid) may be produced in the event of combustion in an oxygen deficient atmosphere.

5.3 Advice for firefighters

Protective measures:

Wear self-contained breathing apparatus and protective suit.

Other information:

Spills produce extremely slippery surfaces.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures

Personal precautions:

Do not touch or walk through spilled material. Spills produce extremely slippery surfaces.

Protective equipment:

Wear adequate personal protective equipment (see Section 8 Exposure Controls/Personal Protection).

Emergency procedures:

Keep people away from spill/leak. Prevent further leakage or spillage if safe to do so.

6.2 Environmental precautions

Do not contaminate water.

6.3 Methods and material for containment and cleaning up

Small spills:

Do not flush with water. Soak up with inert absorbent material. Sweep up and shovel into suitable containers for disposal.

Large spills:

Do not flush with water. Dam up. Soak up with inert absorbent material. Clean up promptly by scoop or vacuum.

Residues:

After cleaning, flush away traces with water.

6.4 Reference to other sections

SECTION 7: Handling and storage; SECTION 8: Exposure controls/personal protection; SECTION 13: Disposal considerations

SECTION 7: Handling and storage

7.1 Precautions for safe handling

Avoid contact with skin and eyes. Renders surfaces extremely slippery when spilled. When using, do not eat, drink or smoke.

7.2 Conditions for safe storage, including any incompatibilities

Keep away from heat and sources of ignition. Freezing will affect the physical condition and may damage the material.

7.3 Specific end use(s)

This information is not available.

SECTION 8: Exposure controls/personal protection

8.1 Control parameters

Occupational exposure limits: None known

8.2 Exposure controls

Appropriate engineering controls:

Use local exhaust if misting occurs. Natural ventilation is adequate in absence of mists.

Individual protection measures, such as personal protective equipment:

a) Eye/face protection:

Safety glasses with side-shields. Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166 (EU).

b) Skin protection:

i) Hand protection:

PVC or other plastic material gloves. Be aware that liquid may permeate gloves, frequent change is advised. Suitable gloves can be recommended by the glove supplier. The selected protective gloves have to satisfy the specifications of EU Directive 89/686/EEC and the standard EN 374 derived from it.

ii) Other:

Wear coveralls and/or chemical apron and rubber footwear where physical contact can occur. The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

c) Respiratory protection:

No personal respiratory protective equipment normally required.

d) Additional advice:

Wash hands before breaks and at the end of workday. Wash hands before breaks and immediately after handling the product. Handle in accordance with good industrial hygiene and safety practice.

Environmental exposure controls:

Do not allow uncontrolled discharge of product into the environment.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Property	Value
a) Appearance:	Clear to slightly yellow liquid
b) Odour:	None
c) Odour Threshold:	Not applicable
d) pH:	3 - 7 (See Technical Bulletin or Product Specifications for a more precise value, if available)
e) Melting point/freezing point:	< 5°C
f) Initial boiling point and boiling range:	> 100°C
g) Flash point:	Does not flash
h) Evaporation rate:	No data available
i) Flammability (solid, gas):	Not applicable
j) Upper/lower flammability or explosive limits:	Not expected to create explosive atmospheres

Property	Value
k) Vapour pressure:	2.3 kPa @ 20°C
l) Vapour density:	0.804 g/L @ 20°C
m) Relative density:	1.0 - 1.2 (See Technical Bulletin or Product Specifications for a more precise value, if available)
n) Solubility(ies):	Completely miscible
o) Partition coefficient n-octanol/water (log value):	< 0
p) Autoignition temperature:	Does not self-ignite (based on the chemical structure)
q) Decomposition temperature:	> 150°C
r) Viscosity:	See Technical Bulletin
s) Kinematic viscosity:	No data available
t) Explosive properties:	Not expected to be explosive based on the chemical structure
u) Oxidizing properties:	Not expected to be oxidising based on the chemical structure
v) Particle characteristics:	Not applicable

9.2 Other information

None

SECTION 10: Stability and reactivity

10.1 Reactivity

Stable under recommended storage conditions.

10.2 Chemical stability

Stable under recommended storage conditions.

10.3 Possibility of hazardous reactions

None known.

10.4 Conditions to avoid

Protect from frost, heat and sunlight.

10.5 Incompatible materials

None known.

10.6 Hazardous decomposition products

Thermal decomposition may produce: hydrogen chloride gas, nitrogen oxides (NO_x), carbon oxides (CO_x). Hydrogen cyanide (hydrocyanic acid) may be produced in the event of combustion in an oxygen deficient atmosphere.

SECTION 11: Toxicological information

11.1 Information on toxicological effects

Information on the product as supplied:

Route	LD50/LC50
Acute oral toxicity:	LD50/oral/rat > 5000 mg/kg
Acute dermal toxicity:	LD50/dermal/rat > 5000 mg/kg
Acute inhalation toxicity:	Testing by the inhalation route is inappropriate because exposure of humans via inhalation is unlikely: the substance has no vapour pressure and there is practically no exposure to inhalable aerosols
Skin corrosion/irritation:	Not irritating
Serious eye damage/eye irritation:	Slightly irritating
Respiratory/skin sensitisation:	Not sensitizing to skin. No respiratory sensitization has been observed in the workplace
Mutagenicity:	Not mutagenic
Carcinogenicity:	By analogy with similar substances, this substance is not expected to be carcinogenic
Reproductive toxicity:	By analogy with similar substances, this substance is not expected to be toxic for reproduction
STOT - Single exposure:	No known effects
STOT - Repeated exposure:	No known effect
Aspiration hazard:	No hazards resulting from the material as supplied

SECTION 12: Ecological information

12.1 Toxicity

Information on the product as supplied:

Test Type	Result
Acute toxicity to fish:	LC50/Danio rerio/96 hours > 100 mg/L
Acute toxicity to invertebrates:	EC50/Daphnia magna/48 hours > 100 mg/L
Acute toxicity to algae:	Algal inhibition tests are not appropriate. The flocculation characteristics of the product interfere directly in the test medium preventing homogeneous distribution which invalidates the test
Chronic toxicity to fish:	No data available
Chronic toxicity to invertebrates:	No data available
Toxicity to microorganisms:	EC0/activated sludge/0.5 hours = 1000 mg/L (OECD 209)
Effects on terrestrial organisms:	Exposure to soil is unlikely
Sediment toxicity:	Exposure to sediment is unlikely

12.2 Persistence and degradability

Information on the product as supplied:

Property	Result
Degradation:	Not readily biodegradable
Hydrolysis:	Does not hydrolyse
Photolysis:	No data available

12.3 Bioaccumulative potential

Information on the product as supplied:

Not bioaccumulating

Property	Value
Partition co-efficient (Log Pow):	< 0
Bioconcentration factor (BCF):	~0

12.4 Mobility in soil

Information on the product as supplied:

Exposure to soil is not to be expected.

Koc: ~0

12.5 Other adverse effects

None known.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

Waste from residues/unused products:

Dispose in accordance with local and national regulations.

Contaminated packaging:

Rinse empty containers with water and use the rinse-water to prepare the working solution. If recycling is not practicable, dispose of in compliance with local regulations.

Recycling:

Store containers and offer for recycling of material when in accordance with the local regulations.

SECTION 14: Transport information

Land transport (DOT)

Not classified.

Sea transport (IMDG)

Not classified.

Air transport (IATA)

Not classified.

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture

Information on the product as supplied:

TSCA Chemical Substances Inventory:

All components of this product are either listed as active on the inventory or are exempt from listing.

US SARA Reporting Requirements:**SARA (Section 311/312) hazard class:**

Not concerned.

SARA Title III Sections:

- **Section 302 (TPQ) - Reportable Quantity:** Not concerned
- **Section 304 - Reportable Quantity:** Not concerned
- **Section 313 (De minimis concentration):** Not concerned

Clean Water Act:

- **Section 311 Hazardous Substances (40 CFR 117.3) - Reportable Quantity:** Not concerned

Clean Air Act:

- **Section 112(r) Accidental release prevention requirements (40 CFR 68) - Reportable Quantity:** Not concerned

CERCLA:

- **Hazardous Substances List (40 CFR 302.4) - Reportable Quantity:** Not concerned

RCRA status:

Not RCRA hazardous.

California Proposition 65 Information:

Not concerned.

SECTION 16: Other information

NFPA and HMIS Ratings:

NFPA: - Health: 0 - Flammability: 0 - Instability: 0

HMIS: - Health: 0 - Flammability: 0 - Physical Hazard: 0 - PPE Code: B

This data sheet contains changes from the previous version in section(s):

SECTION 5. Fire-fighting measures, SECTION 8. Exposure controls/personal protection, SECTION 10. Stability and reactivity, SECTION 15. Regulatory information, SECTION 16. Other Information.

Key or legend to abbreviations and acronyms used in the safety data sheet:**Acronyms:**

STOT = Specific target organ toxicity

Training advice:

Do not handle until all safety precautions have been read and understood.

This SDS was prepared in accordance with the following:

U.S. Code of Federal Regulations 29 CFR 1910.1200

Version: 22.01.a

Document Code: LDCC010A

Print Date: 03/03/2023

Revision date: 02/16/2023

Page: 1-11 of 11

The information provided in this Safety Data Sheet is correct to the best of our knowledge, information and belief at the date of its publication. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release and is not to be considered a warranty or quality specification. The information relates only to the specific material designated and may not be valid for such material used in combination with any other materials or in any process, unless specified in the text.

Document prepared for accessibility compliance by: Northeast Technical Services, Inc.

Date: January 21, 2026

This document has been reformatted to meet ADA accessibility standards, including proper heading structure, table formatting, and semantic markup.



Minnesota Department of Natural Resources
Division of Ecological & Water Resources
500 Lafayette Road, Box 25
St. Paul, MN 55155-4025

October 29, 2025

Ben Czeck
HDR Inc

RE: Natural Heritage Review of the proposed **Hill Annex Scram Mine EAW**,
T56N R23W Sections 15-17, 20-23, and 26-27; Itasca County

Dear Ben Czeck,

For all correspondence regarding the Natural Heritage Review of this project please include the project ID **MCE-2025-00675** in the email subject line.

As requested, the [Minnesota Natural Heritage Information System](#) has been reviewed to determine if the proposed project has the potential to impact any rare species or other significant natural features. Based on the project details provided with the request, the following rare features may be impacted by the proposed project:

Ecologically Significant Areas

- The Minnesota Biological Survey (MBS) has identified **Swan Lake** as a Site of *Moderate* Biodiversity Significance adjacent to the proposed project. Sites of Biodiversity Significance (MBS Sites) have varying levels of native biodiversity and are ranked based on the relative significance of this biodiversity at a statewide level. Sites ranked as *Moderate* contain occurrences of rare species and/or moderately disturbed native plant communities, and/or landscapes that have a strong potential for recovery.

The proposed project is adjacent to **Northern Mesic Hardwood Forest** (MHn35), a DNR Native Plant Communities (NPC); this community is considered *uncommon but not rare* (S4) within Minnesota. NPCs are given a rank that reflects the relative rarity and endangerment of the community type in Minnesota. Ranks range from *critically imperiled* (S1) to *secure, common, widespread, and abundant* (S5). NPCs with a rank of S1, S2, or S3 are considered rare within Minnesota.

The DNR recommends that the project be designed to avoid impacts to these ecologically significant areas. Actions to avoid or minimize disturbance include, but are not limited to, the following recommendations:

- Avoid MBS Sites and rare NPCs (ranked S1, S2, or S3).
- Retain a buffer between proposed activities and the MBS Site.

- Minimize vehicular disturbance in the MBS Site (allow only vehicles/equipment necessary for construction activities).
- Do not park equipment or stockpile supplies in the MBS Site.
- Do not place spoil in the MBS Site or other sensitive areas.
- Use effective erosion prevention and sediment control measures.
- Inspect and clean equipment prior to operation and follow recommendations to [prevent the spread of invasive species](#).

MBS Sites of Biodiversity Significance and DNR Native Plant Communities can be viewed using the Explore page in [Minnesota Conservation Explorer](#) (MCE) or their GIS shapefiles can be downloaded from the [MN Geospatial Commons](#). Reference the [MBS Site Biodiversity Significance](#) and [Native Plant Community](#) websites for information on interpreting the data. To receive a list of MBS Sites of Biodiversity Significance and DNR Native Plant Communities in the vicinity of your project, create a Conservation Planning Report using the Explore page in MCE.

State-listed Species

- [Case's ladies' tresses](#) (*Spiranthes casei* var. *casei*), a state-listed threatened plant species, has been documented within the proposed project boundary in 2003. Habitat for Case's ladies' tresses include rocky hills, outcrops, meadows, pine barrens, open woodlands, and human disturbed landscapes including sediment basins, borrow pits, utility corridors, and old fields with early successional vegetation. Sites receive full sun and have dry to moderately moist acidic soils. Minnesota's Endangered Species Statute (Minnesota Statutes, section 84.0895) and associated Rules (Minnesota Rules, part 6212.1800 to 6212.2300 and 6134) prohibit the take of endangered or threatened plants or animals, including their parts or seeds, without a permit. **To demonstrate avoidance, a qualified surveyor will need to (1) resurvey known occurrences and (2) conduct a habitat assessment to determine if suitable habitat exists within the activity impact area and, if so, conduct a rare plant survey prior to any project activities.**

Surveys must be conducted by a qualified surveyor and follow the standards contained in the [Rare Species Survey Process](#) and [Rare Plant Guidance](#). Visit the [Natural Heritage Review](#) page for a list of certified surveyors and more information on this process. Survey proposals should be submitted to Reports.NHIS@state.mn.us prior to initiating survey work. Project planning should take into account that any botanical survey needs to be conducted during the appropriate time of the year, which may be limited. Please consult Review.NHIS@state.mn.us if you have any questions regarding this process.

- [Prairie moonwort](#) (*Botrychium campestre* var. *campestre*), [pale moonwort](#) (*Botrychium pallidum*), [least moonwort](#) (*Botrychium simplex*), and [St. Lawrence grapefern](#) (*Sceptridium rugulosum*), all state-listed plant species of special concern, were documented within the proposed project boundary (1998-2008) and their current extent is unknown. These species are found in open areas or in iron ore tailings ponds some years after the ponds have been drained. State-listed species of special concern are not protected under Minnesota's endangered species law.

- The Natural Heritage Information System (NHIS) tracks bat roost trees and hibernacula plus some acoustic data, but this information is not exhaustive. Even if there are no bat records listed nearby, all of Minnesota's bats, including the federally endangered northern long-eared bat ([Myotis septentrionalis](#)), can be found throughout Minnesota. During the active season (approximately April-November) bats roost underneath bark, in cavities, or in crevices of both live and dead trees. Tree removal can negatively impact bats by destroying roosting habitat, especially during the pup rearing season when females are forming maternity roosting colonies and the pups cannot yet fly. To minimize these impacts, **the DNR recommends that tree removal be avoided from June 1 through August 15.**
- Please visit the [DNR Rare Species Guide](#) for more information on the habitat use of state-listed species and recommended measures to avoid or minimize impacts.
- Please report incidental sightings of state-listed species via the [DNR Plant and Animal Observation Form](#).

Federally Protected Species

- To ensure compliance with federal law, conduct a federal regulatory review using the U.S. Fish and Wildlife Service's (USFWS) online [Information for Planning and Consultation \(IPaC\) tool](#).

Environmental Review and Permitting

- The Environmental Assessment Worksheet (EAW) should address whether the proposed project has the potential to adversely affect the above rare features and, if so, it should identify specific measures that will be taken to avoid or minimize disturbance. Sufficient information should be provided so the DNR can determine whether a permit to take will be needed for any of the above protected species.
- Please include a copy of this letter and the MCE-generated Final Project Report in any state or local license or permit application. Please note that measures to avoid or minimize disturbance to the above rare features may be included as restrictions or conditions in any required permits or licenses.

The Natural Heritage Information System (NHIS), a collection of databases that contains information about Minnesota's rare natural features, is maintained by the Division of Ecological and Water Resources, Department of Natural Resources. The NHIS is continually updated as new information becomes available and is the most complete source of data on Minnesota's native plant communities, rare species, and other rare features. However, the NHIS is not an exhaustive inventory and does not contain the locations of all rare features in the state. Therefore, ecologically significant features for which we have no records may exist within the project area. If additional information becomes available regarding rare features in the vicinity of the project, further review may be necessary.

For environmental review purposes, the results of this Natural Heritage Review are valid for one year; the results are only valid for the project location and project description provided with the request. **If project details change or the project has not occurred within one year, please resubmit the project for review within one year of initiating project activities.** Resubmit by selecting *Clone Project as Draft* on the project page in MCE.

The Natural Heritage Review does not constitute project approval by the Department of Natural Resources. Instead, it identifies issues regarding known occurrences of rare features and potential impacts to these rare features. Visit [Natural Heritage Review](#) for additional information regarding this process, survey guidance, and other related information. For information on the environmental review process or other natural resource concerns, please contact your [DNR Regional Environmental Assessment Ecologist](#).

Thank you for consulting us on this matter and for your interest in preserving Minnesota's rare natural resources.

Sincerely,

Molly Barrett

Digitally signed by Molly Barrett

Date: 2025.10.29 09:37:04 -05'00'

Natural Heritage Review Specialist

molly.barrett@state.mn.us

Cc: [Jessica Parson](#), Regional Environmental Assessment Ecologist, Northeast (Region 2)

Cc: [Sophia Musiak](#), Assistant Regional Environmental Assessment Ecologist, Northeast (Region 2)



500 Lafayette Road • St. Paul, MN • 55155-40

July 1, 2025

Kelly Gragg-Johnson
Environmental Review Specialist
State Historic Preservation Office
Administration Building #203
50 Sherburne Ave.
Saint Paul, MN 55155

RE: Hill Annex Mine State Park
Calumet, Itasca County, Minnesota
Location: T56N R23W S16

Dear Ms. Gragg-Johnson:

As you are aware, the Minnesota Department of Natural Resources (DNR) is considering two applications for mining leases within the former Hill-Annex Mine State Park. The Hill-Annex Mine was listed in the National Register of Historic Places (NRHP) in 1986. The historic district has a period of significance of 1912-1956 and includes: one contributing site, the Hill-Annex Mine; seven contributing buildings; four contributing structures; and one non-contributing building (SHPO and Anderson 1985). The former state park is also located entirely on school trust land. The DNR, as landowner, is responsible for ensuring compliance under Minnesota State Statutes, Chapter 138, including the Minnesota Historic Sites Act (Minn. Stat. 2022 138.661-138.669), Minnesota Field Archaeology Act (Minn. Stat. 2022 138.31-138.42),¹ and Private Cemeteries Act (Minn. Stat. 2022 307.08).²

In May 2010, a Programmatic Agreement (PA) was executed between the Minnesota Historical Society (MNHS) and the DNR concerning resumption of mining activities. The agreement aims to identify solutions that avoid, minimize, or mitigate possible adverse effects to historic resources that may result from once again mining the property. Stipulations for the DNR include providing a work plan, identifying portions of the former park that will be affected by resumption of mining, and providing a copy of the mineland reclamation plan prior to cessation of mining activities. Together, the MNHS and DNR will work cooperatively to assess potential adverse effects and, if identified, will agree on measures to avoid, minimize, or mitigate such effects. Mitigation actions include documentation prior to mining activities, including photographic, oral, and written evidence of the mine's history. Finally, the agreement states that the MNHS and DNR will cooperatively devise a communication mechanism to address any questions that may arise from the proposal to resume mining activities (MNHS and DNR 2010). There is no designated length of time identified in the document for which these stipulations apply. Because the PA was signed when the Minnesota State Historic Preservation Office (SHPO) was within the MNHS, a revised PA between the SHPO and DNR is currently in progress, recognizing that the SHPO is no longer

¹ State of Minnesota, 2023 "Minnesota Statutes: Chapter 138." Electronic document, <https://www.revisor.mn.gov/statutes/cite/138>, accessed May 2025.

² State of Minnesota, 2023 "Minnesota Statutes: Chapter 307.08." Electronic document, <https://www.revisor.mn.gov/statutes/cite/307.08>, accessed May 2025.

within MNHS and is now in the Minnesota Department of Administration. The terms and recommendations of the previous PA remain valid.

In an effort to further the scam mining project proposed by Calumet Reclamation Company—which is the first of the two proposed leases to move forward—the Minnesota Iron Range Resources Rehabilitation Board (IRRRB) contracted 106 Group to prepare an assessment of effects and mitigation plan for the NRHP-listed Hill Annex Mine property as well as to complete a literature review and assessment of archaeological potential for the project as a whole. The DNR has received the report titled, *Mitigation Plan for the Hill Annex Mine Historic District and Archaeological Review for the Hill Annex Mine Project*, dated May 2025, completed by 106 Group. Staff from the Minnesota State Parks and Trails Cultural Resources Management Program (MSPATCRMP) of the MNHS reviewed the results and recommendations provided in the report.

Simply stated, the proposed project includes utilizing the iron bearing material leftover from previous mining operations in the stockpiles and tailings basins to supply as a feedstock used to produce pig iron. The stockpiles were created at different times and contain “a variety of ore types and rock sizes.” This material will be processed using either a Heavy Media Separation process, for the coarse material, or a Humphrey Spiral process for the undersized material. The rejects from both processes will be dewatered to reduce the moisture content...and disposed of in one of two waste management areas. The material will be compacted before the final product is shipped off site by a new facility on the Itasca County Regional Rail Authority line.³ 106 Group’s report summarizes that the project includes “demolition of all existing buildings and structures within the property parcel and the construction of a new plant building, loadout facility, product stockpiles, conveyor lines, water pipelines, access roads, and bridges.”⁴

Historic Properties

The proposed project area includes the Hill Annex Mine Historic District (IC-GRN-00002), which is listed in the NRHP. The historic district includes seven contributing buildings, four contributing structures, and one non-contributing building. The period of significance extends from 1912, coinciding with the commencement of mining operations, and ends in 1957. In addition, the Heavy Media Rejects Stockpile #2 has been previously determined eligible for listing in the NRHP but was not included in the original nomination.^{5,6} According to Calumet Reclamation Company’s project proposal, the Heavy Media Rejects Stockpile #2 is the largest in volume and tonnage, with an estimated 15 million tons of iron bearing reject material.³ The remainder of the project area does not contain designated State Historic Sites, properties listed in the State Register of Historic Places, or properties listed in the NRHP.

In the report, 106 Group states that “the Project will have permanent, direct, physical effects...” and “By removing all contributing resources within the District, the Project will eliminate all of the District’s integrity of location, setting, design, materials, workmanship, feeling, and

³ Northeast Technical Services, Inc. 2024. Calumet Reclamation Company: Project Description Hill Annex Scram Mine Project, Calumet, Minnesota. Submitted to the Minnesota DNR, July 2024, p. 4-5, 12.

⁴ 106 Group, 2025. *Mitigation Plan for the Hill Annex Mine Historic District and Archaeological Review for the Hill Annex Mine Project*. Submitted to the Minnesota Iron Range Resources Rehabilitation Board and Minnesota Department of Natural Resources. p. 43, 47-48, 54-55.

⁵ George, Doug, 2003. *Minnesota State Park Cultural Resource Management Program: Review of a Proposal to Remove a Lobe of the Heavy Media #2 Coarse Rejects Stockpile, Hill Annex Mine State Park, Itasca County, Minnesota*. On file at the Minnesota Department of Natural Resources, St. Paul, Minnesota.

⁶ Gimmetstad, Dennis, 2003. Dennis Gimmetstad to Bill Morrissey, letter dated March 28, 2003. On file in the Minnesota State Historic Preservation Office, Statewide Historic Inventory Portal: IC-GRN-00002.

association. Therefore, the Project will have an adverse effect on the District.”⁴ This adverse effect was anticipated and, thus, mitigation options have already been under discussion. The report goes on to recommend several options for mitigation, including preparation of a Level I Minnesota Historic Property Record (MHPR) and either a video of the site or digital mining history exhibit. Additional recommendations for machinery and equipment located on site but not necessarily included in the NRHP nomination are also provided, both for those believed to be historically associated with the site as well as those whose association is unknown. A spreadsheet of this machinery and equipment has been previously submitted to the SHPO and, with concurrence, items not believed to be historically associated have already been in the process of relocation. For the most part, relocation efforts will focus on cooperation with non-profits, libraries, local governments, etc. The items believed to be contributing to or associated with the site were identified as “A” items and are included in the 106 Group report in Table 1 as well as Appendix C. These items should remain in place on site at least until the photographic documentation is completed for the MHPR. Two of these “A” items have been requested by cities close to Hill Annex Mine. An up to date (as of June 2025) spreadsheet of requested items is included with this submission.

Archaeology

106 Group consulted SHPO and the Office of the State Archaeologist (OSA) records for previous sites and surveys within the project area, of which there were none. A previous non-systematic walkover of the Heavy Media #2 Course Rejects Pile was completed in 2003, identifying mining equipment but no site was formally recorded, the information instead being used for justification that the rejects pile be considered eligible as a contributing structure to the NRHP-listed historic district. 106 Group included an environmental history overview, identifying naturally occurring water sources within the study area boundary. A number of historical maps and aerial photographs were also consulted to better determine feature locations and potentially intact areas within the proposed project area. 106 Group determined that “there are no naturally occurring topographically prominent landscape features within the project area” but that “there are contemporary and historical water sources in proximity to the proposed project area which may have the potential to contain precontact archaeological resources, though they may be deeply buried.”⁴ Within Section 16, areas of non-extant mining resources as well as areas adjacent to extant structures have potential for increased post-contact archaeological resources. These resources have potential to contribute to the NRHP-listed historic district.

Within Section 16, or the Hill Annex Mine Historic District, 106 Group recommends that, in areas with high potential for intact post-contact archaeological resources, an archaeological research design be prepared, a Phase I survey should be conducted in areas with moderate to high potential for archaeological resources where ground disturbance is proposed, and a Phase II archaeological evaluation should occur if resources are discovered to determine if they may be individually eligible for NRHP listing, or contributing to the historic district. If significant resources are discovered, the DNR will consult with SHPO to determine avoidance, minimization, or mitigation efforts.⁴ It is also recommended that if any Project ground-disturbing activities overlap with areas of moderate to high potential for archaeological resources outside of Section 16, similar research designs and survey methods should be implemented.

It is recommended that the research, evaluation, and recommendations provided by 106 Group in the *Mitigation Plan for the Hill Annex Mine Historic District and Archaeological Review for the*

Hill Annex Mine Project constitutes a reasonable and good faith effort to identify and assess impacts to known historic properties that will be affected by the project. Further, the mitigation strategies for the impacts to the historic district are consistent with those previously outlined in the 2010 PA. The recommendations for archaeological investigations in moderate to high potential areas on non-federal public land that will be impacted by ground disturbance associated with the project are reasonable and consistent with the obligations of state agencies as outlined in Minnesota State Statutes, Chapter 138. As a result, the DNR concurs with the findings and recommendations presented in the report.

Please let me know if you have questions or concerns.

Sincerely,



Miranda Van Vleet
Historian III / Program Manager
MNHS Archaeology Dept.
miranda.vanvleet@state.mn.us
miranda.vanvleet@mnhs.org



Mandy Wintheiser
Archaeologist III
MNHS Archaeology Dept.
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Land Cover Type	Pre-Construction	¹ Post-Construction	Carbon Stock	Conversion Factor	GHG Emissions
	acres	acres	MT C/acre	C to CO ₂	kgCO ₂ e
Wetlands, forested	140.32	140.32	256.7	3.7	0
Wetlands, not forested	18.15	18.15	211.7	3.7	0
Forest (Deciduous, Evergreen, Mixed Forest)	669.82	669.82	99	3.7	0
Rivers and streams	0	0	-	3.7	0
Brush and grassland (Shrub/Scrub, Herbaceous)	192.98	192.98	40.8	3.7	0
Cropland	0	0	32.5	3.7	0
Livestock rangeland/pastureland (Hay/Pasture)	0.22	0.22	40.8	3.7	0
Lawn/landscaping (Developed, Open Space)	26.25	26.25	19.1	3.7	0
Green Infrastructure: Constructed wetlands, paved	0	0	-	3.7	0
Green Infrastructure: Constructed wetlands, vegetated	0	0	43.4	3.7	0
Green Infrastructure: Constructed green roofs	0	0	19.1	3.7	0
Green Infrastructure: Constructed permeable pavements	0	0	-	3.7	0
Impervious surface (Developed, Low and Medium Intensity)	14.68	14.68	-	3.7	0
Stormwater pond (wet sedimentation basin)	0	0	-	3.7	0

¹ Following the completion of land-disturbing activities, the site will be restored and revegetated in accordance with Minn. Rules 6130.3500 and 6130.3600. Native grass and forb seed mixes appropriate for Northern Minnesota will be used. It is anticipated that the Project area will be restored to similar cover types as existing conditions. Minor emissions (i.e., CO₂) would be released from the decomposition of wood chips and mulch would occur over multiple years, which would allow revegetated areas to establish and subsequently capture released CO₂. Should land cover types change, GHG emissions from vegetation removal are expected to be minimal, as such changes have a negligible effect on the overall Project estimated emissions.

																		Emission Factors (g/hp-hr) ^a										Emissions (tons / year)																												
Equipment																		MOVES assignment	Fuel	Fuel Type	HP	Typical Hours per day	Typical Days/Year	Count	Total Annual Hours Used	Load Factor ^b	CO	NO _x	SO ₂	VOC	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O ^c	CO ₂ e	CO	NO _x	SO ₂	VOC	PM ₁₀	PM _{2.5}	CO ₂ ^c	CH ₄	N ₂ O	CO ₂ e										
Equipment for Construction and Operations																																																								
Construction																																																								
nonroad	FRONT END LOADER (ASSUMED BACKHOE W/ LOADER 4X4 EQUIVALENT EMISSION FACTORS)																		Tractors/Loaders/Backhoes	Diesel	23	150	10	76	1	760	0.21	0.6662	1.3042	0.0018	0.2115	0.1384	0.1343	625.9409	0.0120	0.0576	641.5492	0.018	0.034	0.000	0.006	0.004	0.004	16,518	0.000	0.002	16,930									
onroad	WATER TRUCK (ASSUMED DUMP BOX TRUCK 1-1/4 & 1-1/2 T EQUIVALENT EMISSION FACTORS)																		Single Unit Short-haul Truck	Diesel	2	292	6	100	1	600	1	0.3525	1.0129	0.0026	0.0034	0.0228	0.0210	761.9344	0.0071	0.1021	792.1628	0.127	0.168	0.000	0.010	0.004	0.001	2,864.79	0.001	0.017	130,905									
onroad	EXCAVATOR																		Excavators	Diesel	23	150	10	76	1	760	0.21	0.0639	0.2020	0.0014	0.0102	0.0147	0.0142	536.8003	0.0008	0.0494	549.9181	0.002	0.005	0.000	0.000	0.000	0.000	14,166	0.000	0.001	14,512									
onroad	SKID STEER (ASSUMED SKID STEER LOADER 4X4 EQUIVALENT EMISSION FACTORS)																		Skid Steer Loaders	Diesel	23	75	10	76	1	760	0.43	3.8305	4.4237	0.0022	0.7492	0.5662	0.5492	693.8390	0.0300	0.0639	711.6065	-0.103	0.120	0.000	-0.020	0.015	0.015	18,746	0.001	0.002	19,226									
onroad	CONCRETE MIXER TRUCK (ASSUMED DUMP BOX TRUCK 1-1/4 & 1-1/2 T EQUIVALENT EMISSION FACTORS)																		Single Unit Short-haul Truck	Diesel	2	300	10	15	1	150	1	0.7652	1.0158	0.0020	0.0034	0.0228	0.0210	764.9344	0.0071	0.1021	792.1628	0.038	0.050	0.000	0.003	0.001	0.001	37,944	0.000	0.005	39,295									
onroad	ROLLER																		Rollers	Diesel	23	120	10	48	1	480	0.59	0.1301	0.3467	0.0014	0.0201	0.0329	0.0319	536.7737	0.0017	0.0494	549.9160	0.005	0.013	0.000	0.001	0.001	0.001	20,108	0.000	0.002	20,600									
onroad	DUMP BOX TRUCK 1-1/4 & 1-1/2 T																		Single Unit Short-haul Truck	Diesel	2	300	10	20	1	200	1	0.3525	1.0158	0.0026	0.0034	0.0228	0.0210	764.9344	0.0071	0.1021	792.1628	0.142	0.188	0.000	0.012	0.004	0.004	141,657	0.001	0.019	146,703									
onroad	BULLDOZER (USED DOZER 18 T W/ WINCH EQUIVALENT)																		Crawler Tractor/Dozers	Diesel	23	300	10	48	1	480	0.59	0.0405	0.1677	0.0014	0.0126	0.0102	0.0099	536.7918	0.0007	0.0494	549.9089	0.004	0.016	0.000	0.001	0.001	0.001	50,272	0.000	0.005	51,500									
onroad	PICKUP TRUCK 3/4 T																		Passenger Truck	Diesel	2	400	6	100	2	1200	1	1.4315	0.9801	0.0015	0.1455	0.0443	0.0400	455.2718	0.0009	0.0337	464.3053	-0.757	0.519	0.001	-0.077	0.023	0.022	240,889	0.004	0.018	245,711									
Operations																																																								
nonroad	FRONT END LOADER (ASSUMED BACKHOE W/ LOADER 4X4 EQUIVALENT EMISSION FACTORS)																		Tractors/Loaders/Backhoes	Diesel	23	150	20	224	4	17920	0.21	0.6662	1.3042	0.0018	0.2115	0.1384	0.1343	625.9409	0.0120	0.0576	641.5492	0.415	0.812	0.001	0.132	0.086	0.084	389,481	0.007	0.036	399,193									
onroad	WATER TRUCK (ASSUMED DUMP BOX TRUCK 1-1/4 & 1-1/2 T EQUIVALENT EMISSION FACTORS)																		Single Unit Short-haul Truck	Diesel	2	292	8	224	1	1344	1	0.3525	1.0158	0.0026	0.0034	0.0228	0.0210	764.9344	0.0071	0.1021	792.1628	0.280	0.376	0.001	0.023	0.008	0.008	283,314	0.001	0.008	293,406									
onroad	DOZER 18 T W/ WINCH																		Crawler Tractor/Dozers	Diesel	23	300	6	224	2	2688	0.59	0.0405	0.1677	0.0014	0.0126	0.0102	0.0099	536.7918	0.0007	0.0494	549.9089	0.021	0.080	0.001	0.007	0.005	0.005	281,522	0.000	0.026	288,402									
onroad	PICKUP TRUCK 3/4 T																		Passenger Truck	Diesel	2	400	6	224	4	5376	1	1.4315	0.9801	0.0015	0.1455	0.0443	0.0400	455.2718	0.0009	0.0337	464.3053	3.393	2.326	0.004	0.345	0.102	0.097	1079,101	0.010	0.080	1,100,785									

^a MOVES5 Nonroad Default Scale Run for Itasca County, MN.

^b Load Factors from Appendix A of EPA 420, P-04-005, Median Life, Annual Activity, and Load Factor Values for Nonroad Engine Emissions Modeling , USEPA, April 2004.

^c Minor emissions (i.e. CO₂) would be released from the decomposition of wood chips and mulch which would occur over multiple years, which would allow revegetated areas to establish and subsequently capture released CO₂

Assumption: 1 kWh = 1.34 hp-hr

	CO	NO _x	SO ₂	VOC	PM ₁₀	PM _{2.5}	CO ₂	CH ₄	N ₂ O	CO ₂ e
Construction Project Emissions (tons)	1.20	1.11	0.002	0.13	0.05	0.05	666.78	0.01	0.07	685.46
Operations Project Emissions (tons)	4.11	3.60	0.006	0.51	0.20	0.19	2033.50	0.03	0.18	2081.79