Nonmetallic Mining Reclamation Permit Application

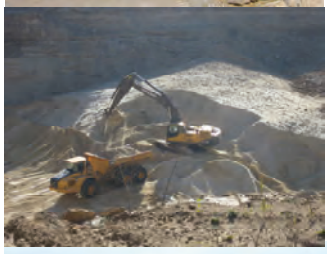
Wilton Quarry

Section 35 of Wilton Township,

Monroe County, Wisconsin

Submitted to:
Monroe County

Date: May 2014



MILESTONE MATERIALS
A DIVISION OF MATHY CONSTRUCTION
920 10TH AVENUE NORTH
ONALASKA, WISCONSIN 54650

Table of Contents

SECTION 1: INTRODUCTION

1.1 Purpose

This application to the Monroe County Land Conservation Department is a request for approval for a Nonmetallic Mining Reclamation Permit for Milestone Materials, a Division of Mathy Construction Company. This application describes the plans for the reclamation of a proposed nonmetallic mining operation of the Wilton Quarry property currently owned by Milestone Materials. The mailing address of the operator and owner are:

Operator
Milestone Materials
Division of Mathy Construction Company
920 10th Ave North
Onalaska, WI 54650

Legal description of the land within this request is:

THE NW/NW, THE NORTH HALF OF THE SW/NW, THE NE/SW, THE NW/SW EXCEPT FOR THE NORTH 198 FEET OF THE WEST 660 FEET, THAT PART OF THE NW/NE LYING WEST OF LOGAN ROAD EXCEPT FOR 20CSM036 (#562829) AND EXCEPT FOR BIKE TRAIL, THAT PART OF THE SW/NE LYING WEST OF LOGAN ROAD, THE NE/NW EXCEPT FOR 20CSM036 (#562829), THE SE/NW AND THE NW/SE, SECTION 35, T16N, R1W, TOWN OF WILTON, MONROE COUNTY, WISCONSIN. PARCEL CONTAINS 285 ACRES MORE OR LESS.

Of the approximately 285 acre site only approximately 135 acres is planned to mined. The entire property is presently zoned General Agriculture.

Milestone Materials proposes a plan for the progressive extraction of bedrock resources and the final reclamation of the mine site. Mining will occur as a progressive expansion that will limit disturbed area and incorporate contemporaneous reclamation of previously mined areas. This will result in an efficient mining operation with reduced environmental impact to neighboring properties.

1.2 Location

The Wilton Quarry is located approximately 3 miles east of Wilton, Wisconsin. The attached figure #1, Site Location Map, displays the property boundary and surrounding land uses.

1.3 Site Characteristics & Land Use

The existing conditions at the property, including neighboring buildings and residences is shown on both the Existing Conditions Map, Drawing No. 1 and Figure #1, Site Location Map. The site is currently used for agricultural purposes. The land adjacent to and surrounding the mining site is used for agricultural purposes and related farmsteads. There are no water bodies on the property and the nearest water body is the Kickapoo River to the north of the property.

1.4 Land Ownership

Land ownership of properties adjacent to the Wilton Quarry property is shown in Figure 1, Site Location Map, and Drawing No. 1, Existing Conditions Map.

1.5 Soils and Geology

Soils found within the proposed mining area are primarily of the Wildale, Valton, and Norden series. A soil resources report for the area of the site is attached as Appendix A. These three soil types, Wildale, Norden, & Valton, are deep, well drained soils that are moderately permeable in the upper part of the profile and slowly permeable in the lower part. These soils are found on ridgetops and valley slopes.

In general, these soil types have adequate drainage for crops and pasture. These soils are also suitable for woodlands. At this site, the bedrock is generally encountered ten to thirty (10-30) feet below ground surface. Beneath the soil is dolomitic limestone of the Oneota Member of the Prairie du Chien Formation, which is a carbonate stone of Ordovician age. The Oneota member varies from 50'-80' in thickness throughout Monroe County. The Oneota member directly overlies Cambrian age sandstone and shale bedrock of the Jordan, St Lawrence and Franconia formations. The base of the Oneota Dolomite at this site lies at approximately 1320' in elevation.

1.6 Groundwater

The groundwater elevation in the area of the site is estimated to lie between 1100' and 1140' msl. The water level elevation was estimated using area well construction reports from the Wisconsin DNR. This water level lies well below the deepest proposed quarry floor elevation of 1320' msl. Groundwater will not be encountered during the proposed nonmetallic mining operation and the final reclamation of the site does not include creation of a water body.

1.7 Biology

The original native tree vegetation of the Wilton Quarry property and surrounding area included hardwood timber consisting chiefly of oak, elm, maple, hickory and butternut. Oak, hickory, elm, ash, basswood and maple are the predominant tree types today with some aspen.

A variety of wildlife is found near the quarry. Some of the species present include white-tailed deer, coyote, red fox, raccoon, opossum, woodchuck, skunk, fox squirrel, gray squirrel, and cottontail rabbit. Resident birds found locally include wild turkey, ruffed grouse, crow, pheasant, great horned owl, red-tailed hawk, blue jay, cardinal, nuthatch, chickadee, several woodpeckers and starling. Migratory birds in the area include American robin, red-winged blackbird, and killdeer. Garter snakes and timber rattlesnakes are also present in the area.

SECTION 2: EROSION CONTROL PRACTICES

2.1 Erosion Control

Erosion control practices are addressed in the storm water pollution prevention plan prepared by Milestone Materials and implemented as part of Wisconsin Department of Natural Resources (WDNR) NR 216 Storm Water Group Permit. A copy of the WDNR NR 216 Storm Water Group Permit is provided in Appendix B.

Section 628 of the Wisconsin DOT Standard Specifications (see Appendix C) will serve as the standard for erosion control of soils. Erosion control mats, fences, screens, blankets, bale checks, dikes and other erosion control devices will be used as needed to minimize soil loss during berm and other soil disturbance activities. These erosion control devices will meet the minimum requirements described in Section 628.2 Materials and be installed according to the methods and procedures described in Section 628.3 Construction Methods of the Wisconsin DOT Standard Specifications.

2.2 Vegetation and Berms

Existing stands of trees will be left in place where possible to provide an established vegetative cover to prevent erosion when not in the path of the immediate extraction area. Trees will only be taken in the excavation area when stripping operations occur for the advancement of the next phase of mining. Berms may be constructed to control stormwater runoff. Berm height may vary somewhat in different areas of the property depending on the need to effectively contain and divert stormwater. The berms will be constructed of topsoil and subsoil removed from future areas to be mined and will be stabilized and seeded. When possible, the topsoil and subsoil stripped and removed will be placed directly into areas undergoing active reclamation. This procedure will reduce soil handling and help to preserve the soil viability for final reclamation and vegetation. Reclamation of depleted areas will be an on-going effort and will be completed in its entirety when all mining excavation is complete.

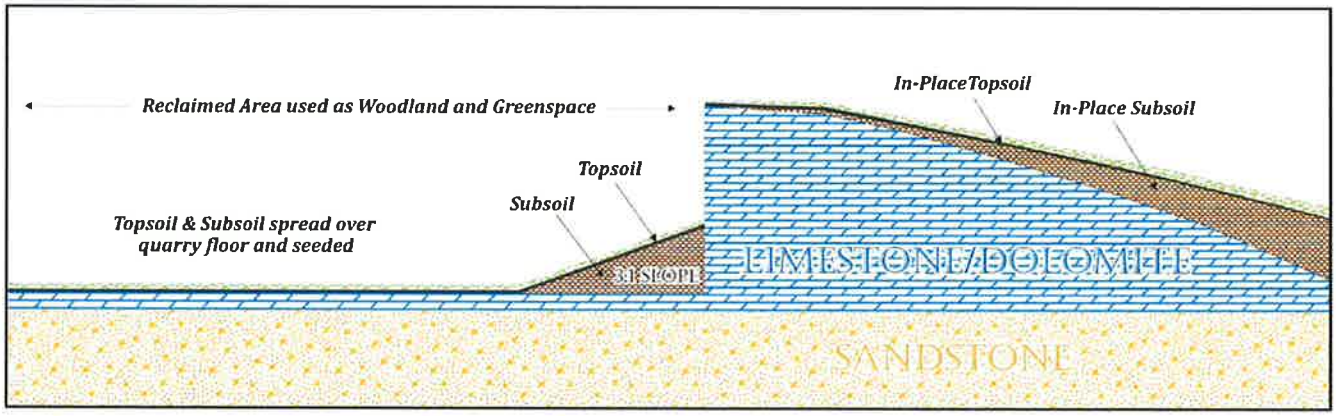
2.3 Stormwater

Rain that falls onto the excavation area will be contained within the excavation area and allowed to seep naturally into the underlying material or be directed to on-site containment areas. When and where necessary to prevent surface runoff from entering the mine, earthen berms will be constructed to direct surface water flow from the site.

SECTION 3: RECLAMATION PLAN

3.1 Post-Mining Land Use

Areas disturbed by the mining operation will be reclaimed to woodland and greenspace for passive recreation. The areas to be reclaimed are shown in Drawing 3, Reclamation Plan Map. The Reclamation Cross-Section in the following display is a typical cross section of the proposed final site reclamation and post-mining land use.

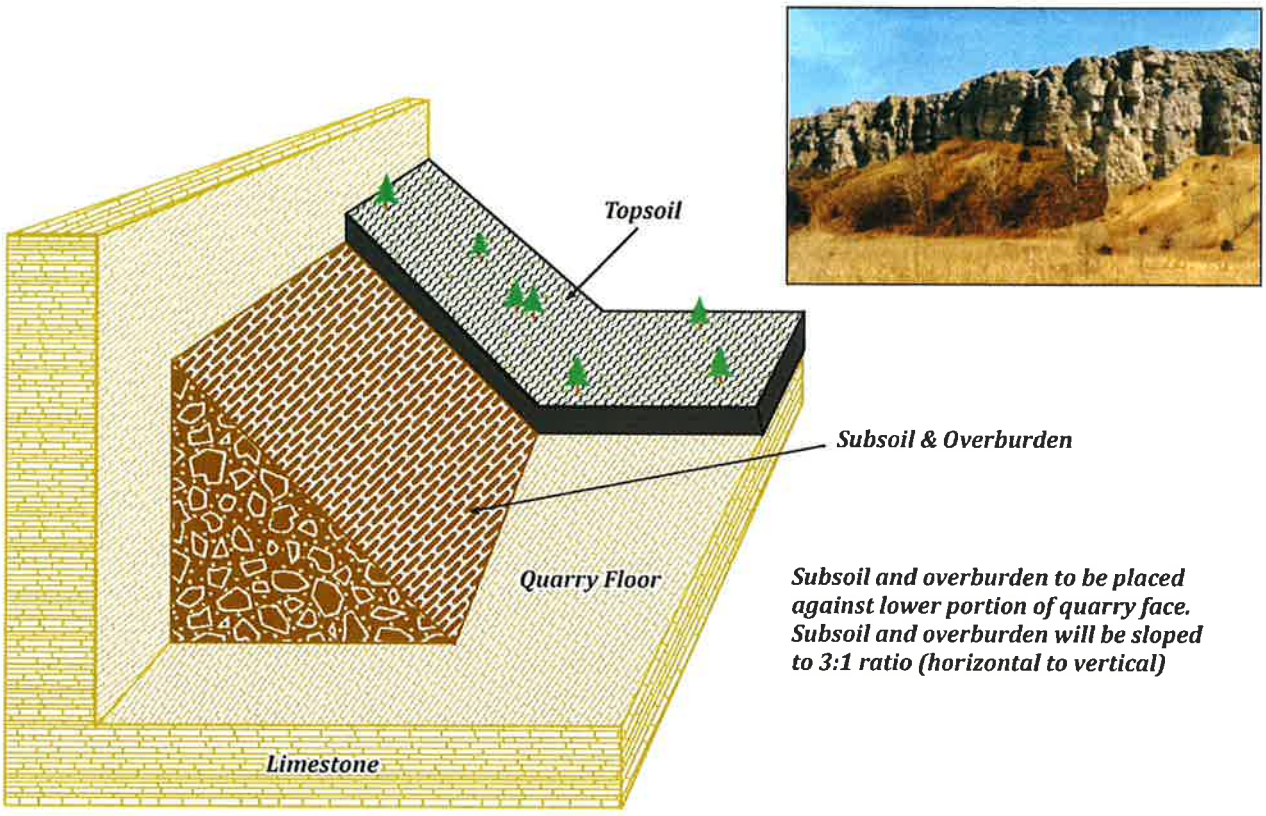


3.2 Reclamation Area

Reclamation will be completed contemporaneously as the limestone reserves are removed. The area to be reclaimed is shown in Drawing 3. Initial efforts will be directed toward stabilizing internal slopes through grading and landscaping and creating a more formalized appearance through additional grading and landscaping. Reclamation will continue to occur progressively and concurrently with the development and progression of mining activity through the various areas of the operation.

3.3 Reclamation Sequence

Reclamation will begin as limestone reserves are depleted and formerly excavated areas are no longer necessary for stockpiling and equipment setup. The reclamation process will involve the backfilling of the quarry floor with subsoil and backfilling against the exposed quarry highwall with overburden and subsoil materials with a minimum slope of 3:1, horizontal to vertical, see the following displays.



Part of the soil fill will come from the temporary berms that were constructed during mining process. The rest will come from direct stripping of overburden as new areas of the mine are developed. Slopes will be blended into surrounding topography and all areas will be graded to properly drain. Upon final placement and grading of subsoil, topsoil will be evenly placed on the backfilled areas, graded to properly drain and seeded according to the seeding plan. This procedure will be followed until the reclamation is completed.

All topsoil removed from the mined areas will be used for final cover, grading, and seeding. As overburden is removed from new areas of the operation, the topsoil will be separated and immediately placed on areas recently sloped and graded. If the topsoil is not immediately used, topsoil stockpiles will be sloped and seeded according to the seeding plan.

If quarry highwalls are determined to be unstable, they will be benched and terraced in order to make them safe and stable. Some of the quarry walls that are not excessively high will be completely backfilled with subsoil and topsoil and seeded, as determined in the field.

3.4 Seeding Plan

Disturbed and reclaimed areas will be seeded with Seed Mixture No. 20 as specified in Section 630 of the Wisconsin DOT Standard Specifications, or a native seed mixture at an appropriate application rate for the selected native seed mixture. Oats, rye or other equivalent early/late season grass seed mixture may be used as a cover crop if seeding occurs in the spring or early summer.

Mulching will be applied according to the standards in Section 627 of the DOT Standard Specifications (see Appendix C). Areas will be checked for nutrients and the "Standard" fertilizer will be applied to seeded areas according to the methods and rates prescribed in Section 629 of the DOT Standard Specifications (see Appendix C).

3.5 Reclamation Costs and Financial Assurance

An estimate of reclamation costs is provided in the table below. Financial assurance for reclamation will be in the form of a performance bond issued by an independent surety in an amount to cover acres disturbed annually.

Wilton Quarry: Reclamation Cost Estimates

Item	*Quantity*	*Acres*	*Unit Cost*	*Total Cost*
Subsoil and topsoil replacement against lower portion of face	*150,000 cy*	-	*$1.50/cy*	*$225,000*
Subsoil and topsoil replacement for quarry floor	-	*135 ac*	*$3,000/ac*	*$405,000*
Erosion control lump sum	-	-	-	*$60,000*
Seedbed preparation, seed, fertilizer, and mulch	-	*135 ac*	*$1,000/ac*	*$135,000*
Total Reclamation Cost	-	-	-	*$825,000*
Average Cost Per Acre	-	*135 ac*	-	*$6,111*

3.6 Criteria for Successful Reclamation

The County will determine criteria for successful reclamation in the field during annual inspections with input from Milestone Materials. If the County during these inspections recommends grading and/or seeding, remedial/repair measures, or additional erosion control, they will be implemented and later re-evaluated to accomplish successful reclamation and a release of bond.

3.7 Reclamation Certifications

Operator and Owner Certification

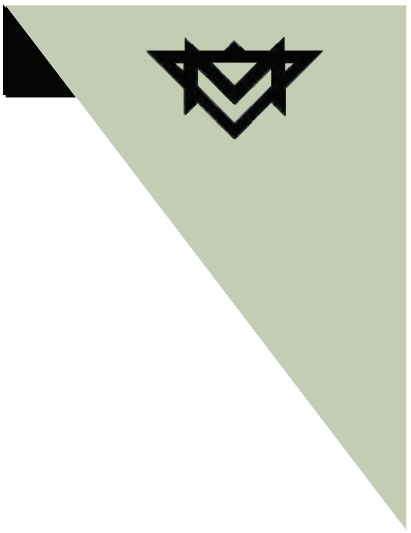
I hereby certify, as a duly authorized representative or agent, that this reclamation plan meet the requirements of Chapter NR 135, Wis. Adm. Code and that Milestone Materials will follow this plan as submitted unless a revisions is submitted and approved in writing by the regulatory authority.

Steven W. Stuhr

Signature of Applicant or Duly Authorized Agent

30 April, 2014

Date Signed



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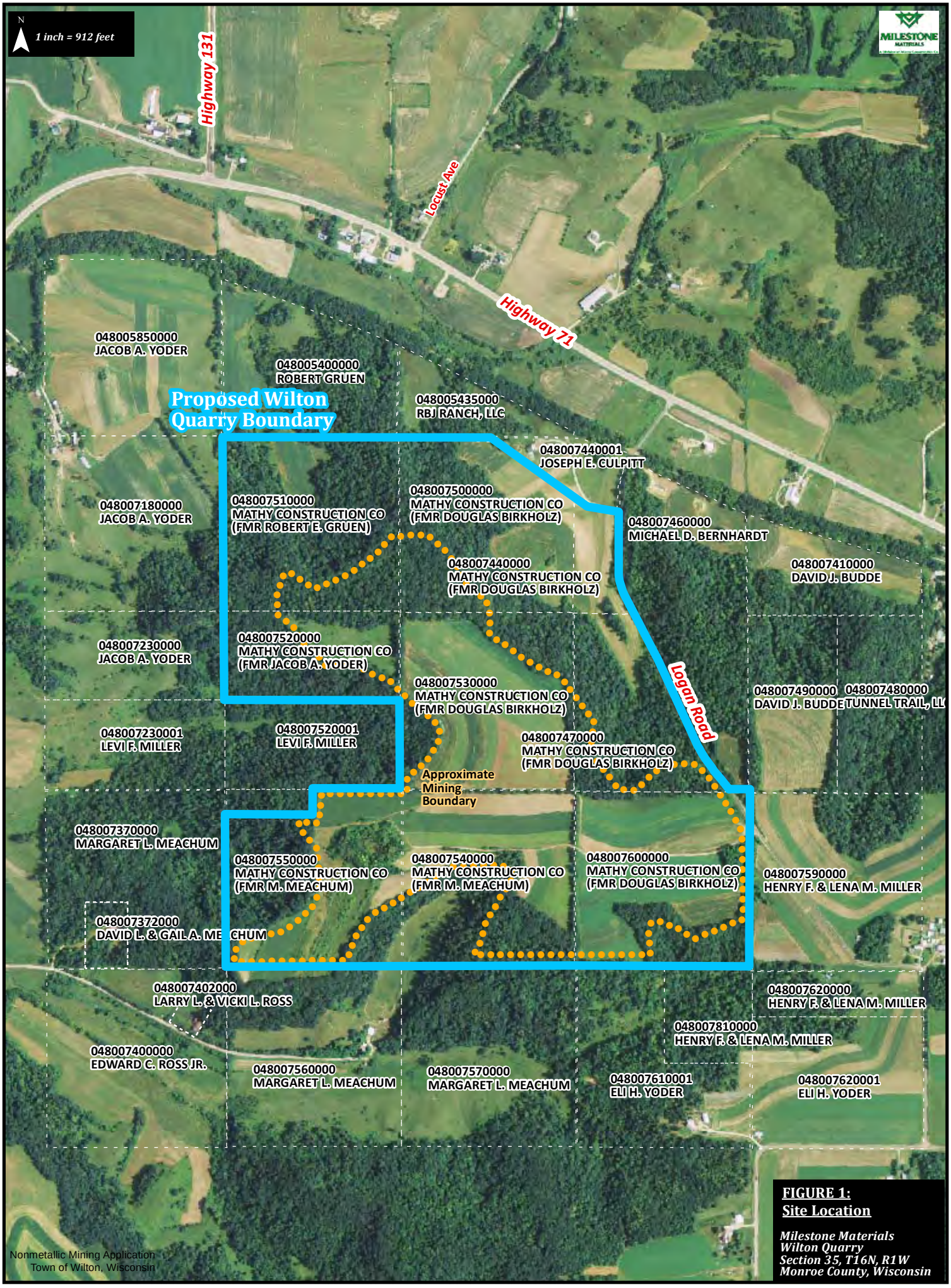
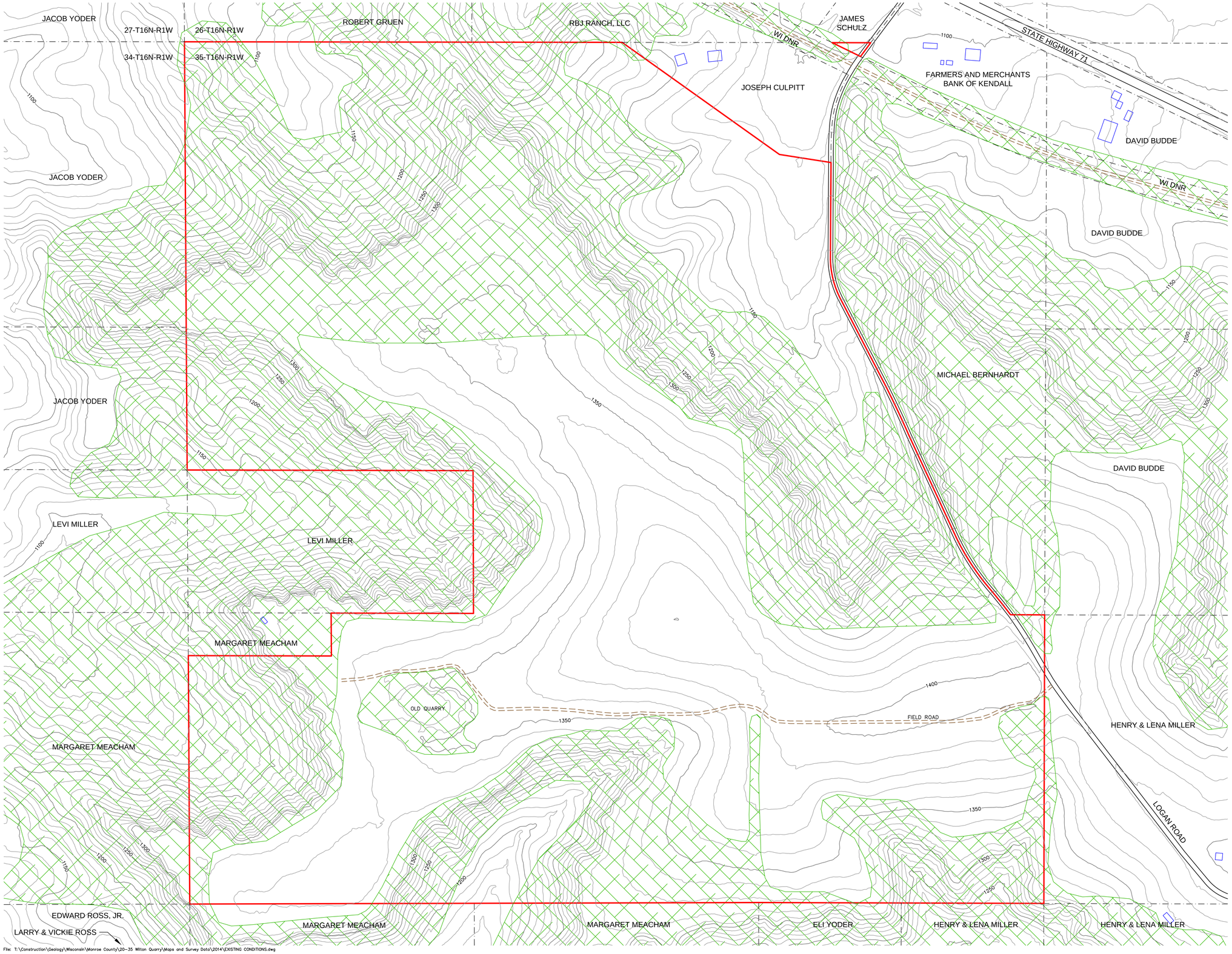


FIGURE 1:
Site Location

Milestone Materials
Wilton Quarry
Section 35, T16N, R1W
Monroe County, Wisconsin

Nonmetallic Mining Application
Town of Wilton, Wisconsin

Drawings



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LEGEND

- 100 — INDEX CONTOUR
- x 100.0 — SPOT ELEVATION
- OWNED PROPERTY
- SECTION LINE OR PARCEL LINE
- FENCE
- EDGE OF DISTURBANCE
- GRAVEL OR DIRT ROAD
- BUILDING OR STRUCTURE
- BERM
- RECLAIMED AREA
- RECLAIMED AREA – 3:1 SLOPES
- QUARRY OR PIT FACE
- STOCKPILE
- STRIPPED AREA
- TREES
- WATER
- SWAMP
- DIRECTION OF MINING
- XX–XX–XX — TEST HOLE
- PROPOSED MINING LIMITS
- DIRECTION OF WATER FLOW

NOTES

PART OF SECTION 35, T16N, R1W
TOWN OF WILTON, MONROE COUNTY, WISCONSIN

THIS IS NOT A SURVEY. PARCEL LINES SHOWN HEREON ARE APPROXIMATE.

TEN FOOT CONTOUR INTERVALS ARE FROM LIDAR.

0' 200' 400' 600'

Mathy Construction Co. is Committed to Protecting Our Environment and Natural Resources

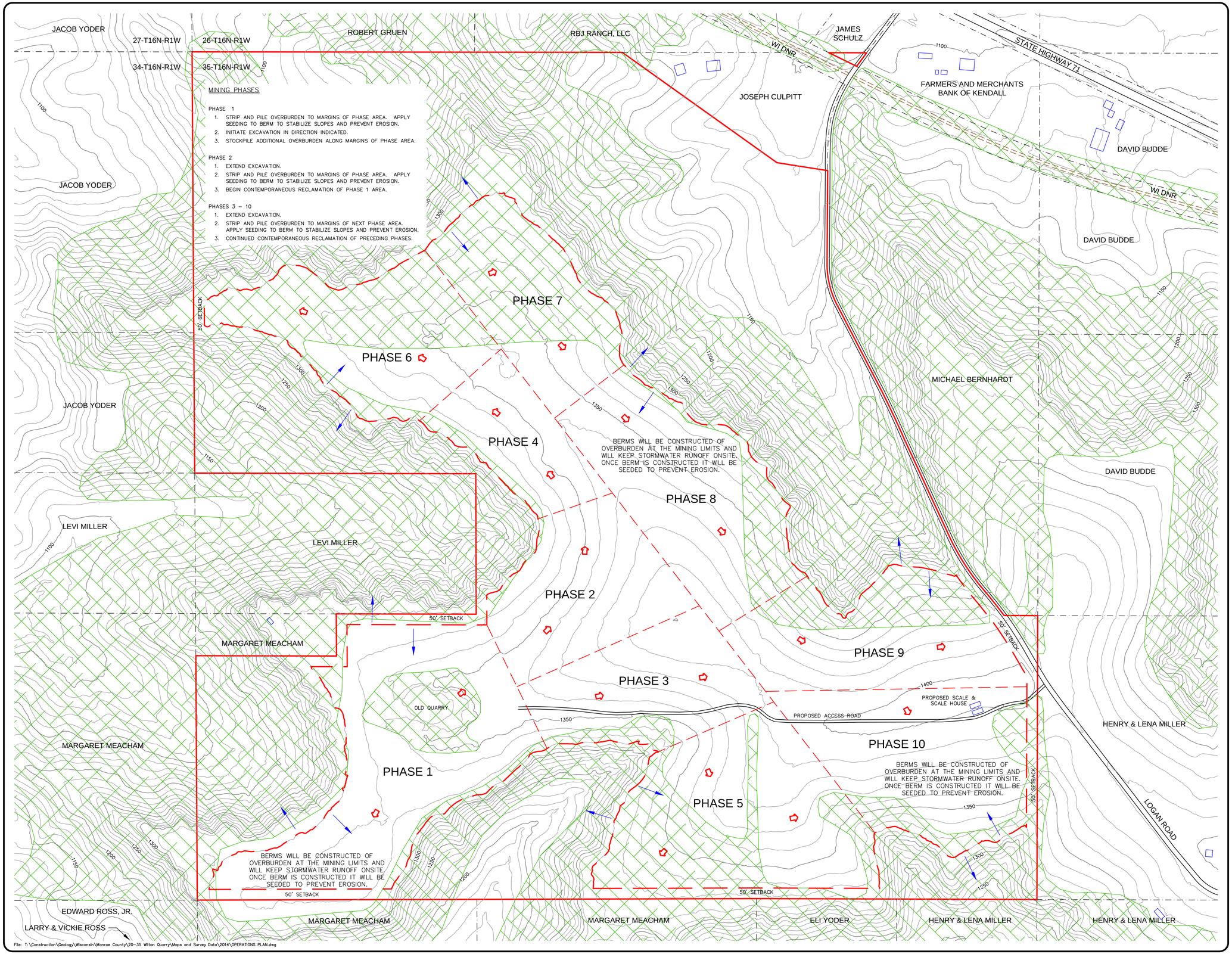
MILESTONE MATERIALS
A Division of Mathy Construction Co.

WILTON QUARRY

Milestone Materials
A Division of Mathy Construction Company
920 10th Avenue North, Onalaska WI 54650

Date	Scale
4-15-2014	1" = 200'
Drawn By	Drawing
Jonathan K.	Number 1

EXISTING CONDITIONS



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LEGEND

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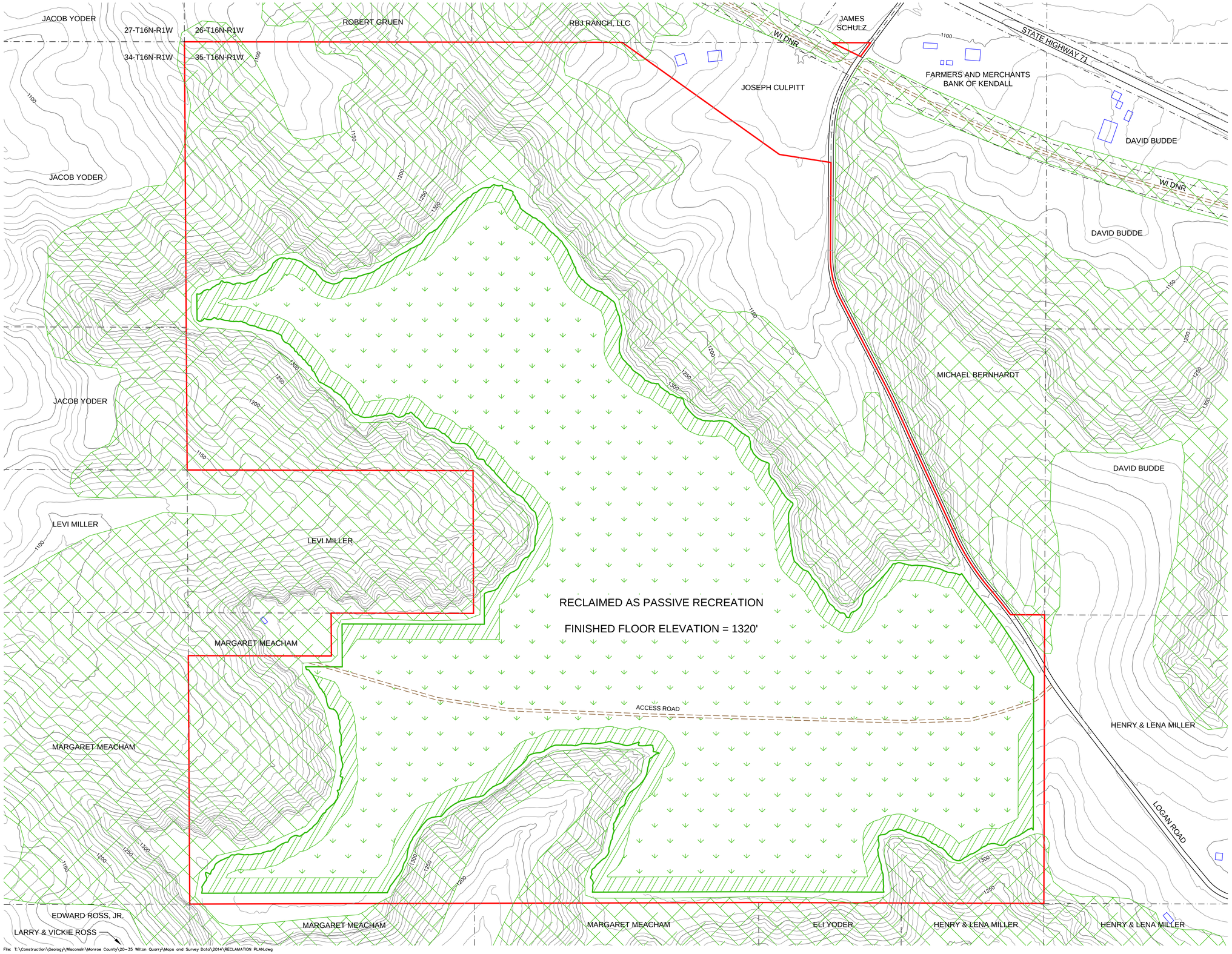
A Division of Mathy Construction Co.

WILTON QUARRY

Milestone Materials
A Division of Mathy Construction Company
920 10th Avenue North, Onalaska WI 54650

Date 4-15-2014	Scale 1" = 200'
Drawn By Jonathan K.	Drawing Number 2

OPERATIONS PLAN



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LEGEND

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920 10th Avenue North, Onalaska WI 54650

Date	Scale
4-15-2014	1" = 200'
Drawn By	Drawing
Jonathan K.	Number 3

RECLAMATION PLAN

Appendix A

NRCS Custom Soil Resources Report

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 Monroe County, Wisconsin

Wilton Quarry

April 30, 2014

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 (http://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.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

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Contents

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.

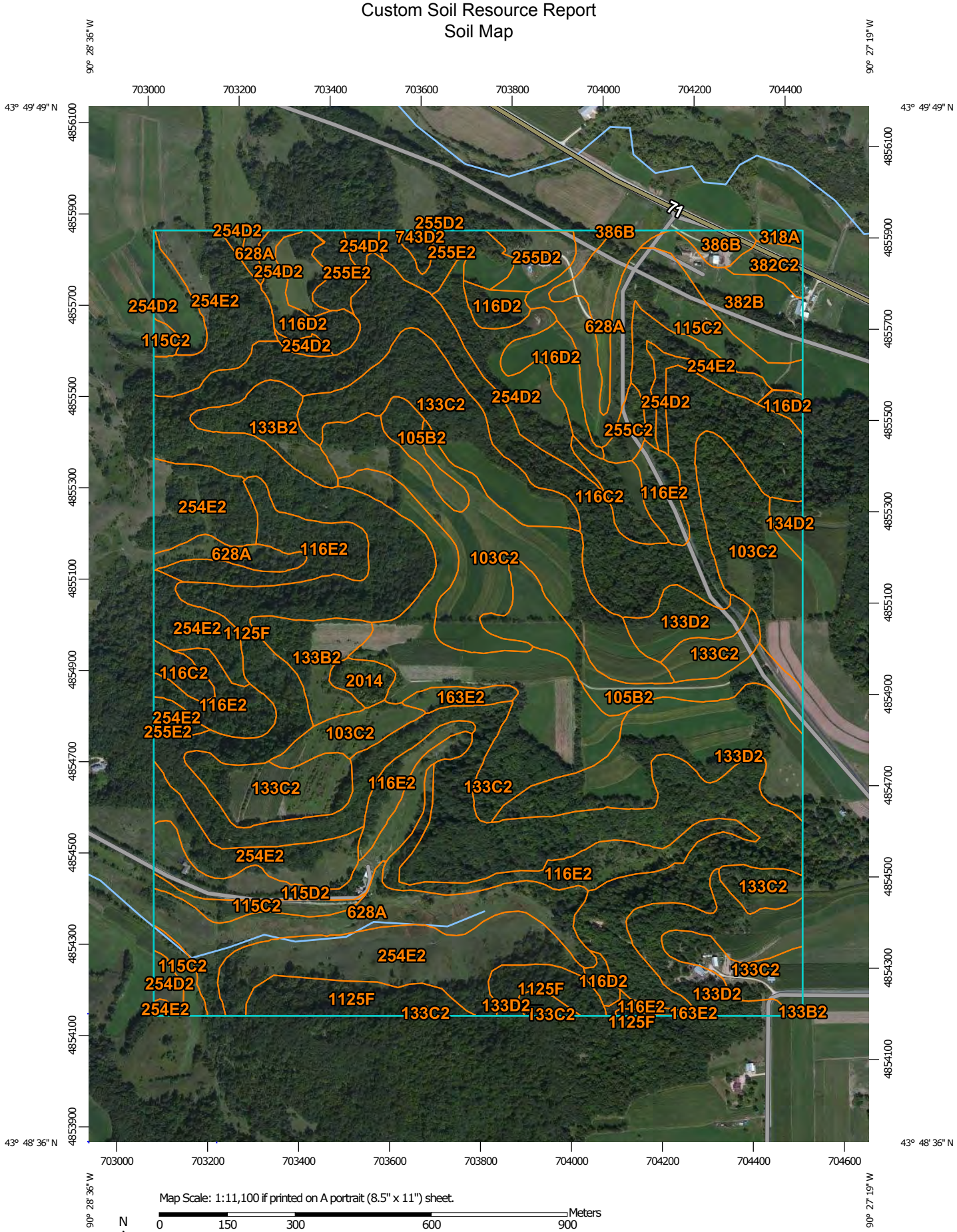
While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the 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 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.


90° 28' 36" W
90° 27' 19" W
43° 49' 49" N
43° 48' 36" N
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703400
703600
703800
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704200
704400
704600
4856100
4855900
4855700
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628A
254E2
115C2
254D2
254E2
1125F
133C2
133D2
133C2
116D2
1125F
116E2
163E2
133D2
133B2
1125F
Map Scale: 1:11,100 if printed on A portrait (8.5" x 11") sheet.
N
Meters
0
150
300
600
900
Feet
0
500
1000
2000
3000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

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 1:15,800.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
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: Monroe County, Wisconsin
Survey Area Data: Version 8, Dec 24, 2013

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

Date(s) aerial images were photographed: Aug 25, 2011—Oct 2, 2011

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

Monroe County, Wisconsin (WI081)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
103C2	Wildale cherty silt loam, 6 to 12 percent slopes, moderately eroded	51.5	8.5%
105B2	Wildale silt loam, 2 to 6 percent slopes, moderately eroded	16.6	2.7%
115C2	Seaton silt loam, 6 to 12 percent slopes, moderately eroded	25.2	4.1%
115D2	Seaton silt loam, 12 to 20 percent slopes, moderately eroded	11.1	1.8%
116C2	Churchtown silt loam, 6 to 12 percent slopes, moderately eroded	6.6	1.1%
116D2	Churchtown silt loam, 12 to 20 percent slopes, moderately eroded	15.2	2.5%
116E2	Churchtown silt loam, 20 to 30 percent slopes, moderately eroded	35.4	5.8%
133B2	Valton silt loam, 2 to 6 percent slopes, moderately eroded	15.2	2.5%
133C2	Valton silt loam, 6 to 12 percent slopes, moderately eroded	73.6	12.1%
133D2	Valton silt loam, 12 to 20 percent slopes, moderately eroded	44.2	7.3%
134D2	Lamoille silt loam, 12 to 20 percent slopes, moderately eroded	1.7	0.3%
163E2	Elbaville silt loam, 20 to 30 percent slopes, moderately eroded	2.5	0.4%
254D2	Norden silt loam, 12 to 20 percent slopes, moderately eroded	24.2	4.0%
254E2	Norden silt loam, 20 to 30 percent slopes, moderately eroded	68.1	11.2%
255C2	Urne fine sandy loam, 6 to 12 percent slopes, moderately eroded	2.3	0.4%
255D2	Urne fine sandy loam, 12 to 20 percent slopes, moderately eroded	4.6	0.8%
255E2	Urne fine sandy loam, 20 to 30 percent slopes, moderately eroded	9.7	1.6%

Monroe County, Wisconsin (WI081)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
318A	Bearpen silt loam, 0 to 3 percent slopes, rarely flooded	0.8	0.1%
382B	Bertrand silt loam, 1 to 6 percent slopes	9.7	1.6%
382C2	Bertrand silt loam, 6 to 12 percent slopes, moderately eroded	2.8	0.5%
386B	Jackson silt loam, 2 to 6 percent slopes	2.3	0.4%
628A	Orion silt loam, 0 to 3 percent slopes, occasionally flooded	30.5	5.0%
743D2	Council fine sandy loam, 12 to 20 percent slopes, moderately eroded	1.2	0.2%
1125F	Dorerton, very stony-Elbaville complex, 30 to 60 percent slopes	151.2	24.8%
2014	Pits, quarry, hard bedrock	2.6	0.4%
Totals for Area of Interest		**609.0**	**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 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.

Monroe County, Wisconsin

103C2—Wildale cherty silt loam, 6 to 12 percent slopes, moderately eroded

Map Unit Setting

Elevation: 1,000 to 1,400 feet
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days

Map Unit Composition

Wildale and similar soils: 95 percent
Minor components: 5 percent

Description of Wildale

Setting

Landform: Hills
Landform position (two-dimensional): Backslope, shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Thin loess over clayey pedisediment

Properties and qualities

Slope: 6 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): 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
Available water capacity: Moderate (about 6.1 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 3e
Hydrologic Soil Group: C
Other vegetative classification: Unnamed (G105XY002WI)

Typical profile

0 to 9 inches: Silt loam
9 to 15 inches: Silty clay loam
15 to 73 inches: Clay

Minor Components

Newglarus

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY005WI)

105B2—Wildale silt loam, 2 to 6 percent slopes, moderately eroded

Map Unit Setting

Elevation: 700 to 1,400 feet
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days

Map Unit Composition

Wildale and similar soils: 91 percent
Minor components: 9 percent

Description of Wildale

Setting

Landform: Hills
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Crest
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over cherty clayey pedisediment derived from dolomite

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.1 inches)

Interpretive groups

Farmland classification: All areas are prime farmland
Land capability (nonirrigated): 2e
Hydrologic Soil Group: C
Other vegetative classification: Unnamed (G105XY005WI)

Typical profile

0 to 9 inches: Silt loam
9 to 15 inches: Silty clay loam
15 to 80 inches: Clay

Minor Components

Valton

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Summit, shoulder

Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY005WI)

Reedsburg
Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Summit
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Unnamed (G105XY004WI)

Fivepoints
Percent of map unit: 1 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY003WI)

115C2—Seaton silt loam, 6 to 12 percent slopes, moderately eroded

Map Unit Setting
Elevation: 800 to 1,400 feet
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days

Map Unit Composition
Seaton and similar soils: 100 percent

Description of Seaton

Setting
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess

Properties and qualities
Slope: 6 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 (0.60 to 2.00 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 capacity: Very high (about 12.7 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 3e
Hydrologic Soil Group: B
Other vegetative classification: Unnamed (G105XY008WI)

Typical profile

0 to 8 inches: Silt loam
8 to 13 inches: Silt loam
13 to 55 inches: Silt loam
55 to 80 inches: Silt loam

115D2—Seaton silt loam, 12 to 20 percent slopes, moderately eroded

Map Unit Setting

Elevation: 500 to 1,400 feet
Mean annual precipitation: 28 to 42 inches
Mean annual air temperature: 46 to 54 degrees F
Frost-free period: 135 to 180 days

Map Unit Composition

Seaton and similar soils: 95 percent
Minor components: 5 percent

Description of Seaton

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess

Properties and qualities

Slope: 12 to 20 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 (0.60 to 2.00 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 capacity: Very high (about 12.7 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4e
Hydrologic Soil Group: B
Other vegetative classification: Unnamed (G105XY009WI)

Typical profile

0 to 8 inches: Silt loam
8 to 13 inches: Silt loam
13 to 55 inches: Silt loam
55 to 80 inches: Silt loam

Minor Components

Timula

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY009WI)

116C2—Churchtown silt loam, 6 to 12 percent slopes, moderately eroded

Map Unit Setting

Elevation: 800 to 1,100 feet
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days

Map Unit Composition

Churchtown and similar soils: 97 percent
Minor components: 3 percent

Description of Churchtown

Setting

Landform: Hills
Landform position (two-dimensional): Footslope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy slope alluvium over loess

Properties and qualities

Slope: 6 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 (0.60 to 2.00 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 capacity: Very high (about 12.4 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 3e
Hydrologic Soil Group: B
Other vegetative classification: Unnamed (G105XY008WI)

Typical profile

0 to 9 inches: Silt loam
9 to 26 inches: Silt loam
26 to 63 inches: Silt loam
63 to 80 inches: Silt loam

Minor Components

Norden

Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY005WI)

116D2—Churchtown silt loam, 12 to 20 percent slopes, moderately eroded

Map Unit Setting

Elevation: 700 to 1,340 feet
Mean annual precipitation: 28 to 34 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 135 to 160 days

Map Unit Composition

Churchtown and similar soils: 92 percent
Minor components: 8 percent

Description of Churchtown

Setting

Landform: Hills
Landform position (two-dimensional): Footslope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy slope alluvium over loess

Properties and qualities

Slope: 12 to 20 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 (0.60 to 2.00 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 capacity: Very high (about 12.4 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4e
Hydrologic Soil Group: B
Other vegetative classification: Unnamed (G105XY009WI)

Typical profile

0 to 9 inches: Silt loam
9 to 26 inches: Silt loam
26 to 63 inches: Silt loam
63 to 80 inches: Silt loam

Minor Components

Norden

Percent of map unit: 4 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY006WI)

Brownchurch

Percent of map unit: 2 percent
Landform: Hills
Landform position (two-dimensional): Footslope
Down-slope shape: Concave
Across-slope shape: Linear
Other vegetative classification: Unnamed (G105XY006WI)

Beavercreek

Percent of map unit: 2 percent
Landform: Alluvial fans on hills, drainageways on hills
Down-slope shape: Linear
Across-slope shape: Convex, concave
Other vegetative classification: Unnamed (G105XY005WI)

116E2—Churchtown silt loam, 20 to 30 percent slopes, moderately eroded

Map Unit Setting

Elevation: 700 to 1,340 feet
Mean annual precipitation: 28 to 34 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 135 to 160 days

Map Unit Composition

Churchtown and similar soils: 90 percent
Minor components: 10 percent

Description of Churchtown

Setting

Landform: Hills
Landform position (two-dimensional): Footslope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy slope alluvium over loess

Properties and qualities

Slope: 20 to 30 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 (0.60 to 2.00 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 capacity: Very high (about 12.4 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 6e
Hydrologic Soil Group: B
Other vegetative classification: Unnamed (G105XY009WI)

Typical profile

0 to 9 inches: Silt loam
9 to 26 inches: Silt loam
26 to 63 inches: Silt loam
63 to 80 inches: Silt loam

Minor Components

Norden

Percent of map unit: 6 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY006WI)

Beavercreek

Percent of map unit: 2 percent
Landform: Alluvial fans on hills, drainageways on hills
Down-slope shape: Linear
Across-slope shape: Convex, concave
Other vegetative classification: Unnamed (G105XY005WI)

Brownchurch

Percent of map unit: 2 percent
Landform: Hills

Landform position (two-dimensional): Footslope
Down-slope shape: Concave
Across-slope shape: Linear
Other vegetative classification: Unnamed (G105XY006WI)

133B2—Valton silt loam, 2 to 6 percent slopes, moderately eroded

Map Unit Setting

Elevation: 680 to 1,400 feet
Mean annual precipitation: 28 to 35 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 135 to 160 days

Map Unit Composition

Valton and similar soils: 90 percent
Minor components: 10 percent

Description of Valton

Setting

Landform: Hills
Landform position (two-dimensional): Summit, shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over clayey pedisediment

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.01 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.8 inches)

Interpretive groups

Farmland classification: All areas are prime farmland
Land capability (nonirrigated): 2e
Hydrologic Soil Group: B
Other vegetative classification: Unnamed (G105XY005WI)

Typical profile

0 to 9 inches: Silt loam
9 to 22 inches: Silt loam
22 to 60 inches: Clay

Minor Components

Brinkman

Percent of map unit: 7 percent
Landform: Hills
Landform position (two-dimensional): Summit
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Unnamed (G105XY008WI)

Lamoille

Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Summit, shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY005WI)

133C2—Valton silt loam, 6 to 12 percent slopes, moderately eroded

Map Unit Setting

Elevation: 680 to 1,400 feet
Mean annual precipitation: 28 to 35 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 135 to 170 days

Map Unit Composition

Valton and similar soils: 90 percent
Minor components: 10 percent

Description of Valton

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over clayey pedisediment

Properties and qualities

Slope: 6 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): Low to moderately high (0.01 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.8 inches)

Interpretive groups

Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 3e
Hydrologic Soil Group: B
Other vegetative classification: Unnamed (G105XY005WI)

Typical profile

0 to 9 inches: Silt loam
9 to 22 inches: Silt loam
22 to 60 inches: Clay

Minor Components

Brinkman

Percent of map unit: 6 percent
Landform: Hills
Landform position (two-dimensional): Summit
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Unnamed (G105XY008WI)

Lamoille

Percent of map unit: 4 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY005WI)

133D2—Valton silt loam, 12 to 20 percent slopes, moderately eroded

Map Unit Setting

Elevation: 680 to 1,400 feet
Mean annual precipitation: 28 to 35 inches
Mean annual air temperature: 43 to 50 degrees F
Frost-free period: 135 to 170 days

Map Unit Composition

Valton and similar soils: 90 percent
Minor components: 10 percent

Description of Valton

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over clayey pedisediment

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.01 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 8.8 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4e
Hydrologic Soil Group: B
Other vegetative classification: Unnamed (G105XY006WI)

Typical profile

0 to 9 inches: Silt loam
9 to 22 inches: Silt loam
22 to 60 inches: Clay

Minor Components

Brinkman

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Unnamed (G105XY009WI)

Lamoille

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY006WI)

134D2—Lamoille silt loam, 12 to 20 percent slopes, moderately eroded

Map Unit Setting

Elevation: 680 to 1,400 feet
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 43 to 52 degrees F
Frost-free period: 135 to 160 days

Map Unit Composition

Lamoille and similar soils: 90 percent

Minor components: 10 percent

Description of Lamoille

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Nose slope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over clayey pedisediment over sketetal loamy colluvium

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Low to moderately high (0.01 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Available water capacity: Moderate (about 7.7 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4e
Hydrologic Soil Group: C
Other vegetative classification: Unnamed (G105XY006WI)

Typical profile

0 to 9 inches: Silt loam
9 to 13 inches: Silt loam
13 to 27 inches: Gravelly clay
27 to 37 inches: Very cobbly clay loam
37 to 60 inches: Very cobbly loam

Minor Components

Valton

Percent of map unit: 10 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY006WI)

163E2—Elbaville silt loam, 20 to 30 percent slopes, moderately eroded

Map Unit Setting

Elevation: 700 to 1,400 feet

Mean annual precipitation: 28 to 34 inches
Mean annual air temperature: 45 to 52 degrees F
Frost-free period: 135 to 160 days

Map Unit Composition
Elbaville and similar soils: 90 percent
Minor components: 10 percent

Description of Elbaville

Setting
Landform: Hills
Landform position (three-dimensional): Head slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loess over loamy and clayey colluvium over loamy and sandy residuum

Properties and qualities
Slope: 20 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Available water capacity: Moderate (about 7.1 inches)

Interpretive groups
Farmland classification: Not prime farmland
Land capability (nonirrigated): 6e
Hydrologic Soil Group: B
Other vegetative classification: Unnamed (G105XY006WI)

Typical profile
0 to 8 inches: Silt loam
8 to 11 inches: Silt loam
11 to 21 inches: Silt loam
21 to 26 inches: Silty clay
26 to 37 inches: Very flaggy silty clay loam
37 to 60 inches: Extremely flaggy sandy loam

Minor Components

Dorerton, very stony
Percent of map unit: 7 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Unnamed (G105XY006WI)

Valton
Percent of map unit: 3 percent
Landform: Hills

Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Head slope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY006WI)

254D2—Norden silt loam, 12 to 20 percent slopes, moderately eroded

Map Unit Setting

Elevation: 800 to 1,400 feet
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days

Map Unit Composition

Norden and similar soils: 90 percent
Minor components: 10 percent

Description of Norden

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over loamy and sandy residuum weathered from glauconitic sandstone

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.6 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4e
Hydrologic Soil Group: B
Other vegetative classification: Unnamed (G105XY006WI)

Typical profile

0 to 8 inches: Silt loam
8 to 20 inches: Silt loam
20 to 37 inches: Fine sandy loam
37 to 60 inches: Weathered bedrock

Minor Components

Urne

Percent of map unit: 6 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY006WI)

Greenridge

Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Backslope, shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY009WI)

Rockbridge

Percent of map unit: 1 percent
Landform: Pediments on hills
Landform position (three-dimensional): Riser
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY006WI)

254E2—Norden silt loam, 20 to 30 percent slopes, moderately eroded

Map Unit Setting

Elevation: 800 to 1,400 feet
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days

Map Unit Composition

Norden and similar soils: 90 percent
Minor components: 10 percent

Description of Norden

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over loamy and sandy residuum weathered from glauconitic sandstone

Properties and qualities

Slope: 20 to 30 percent

Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Moderate (about 6.6 inches)

Interpretive groups
Farmland classification: Not prime farmland
Land capability (nonirrigated): 6e
Hydrologic Soil Group: B
Other vegetative classification: Unnamed (G105XY006WI)

Typical profile
0 to 8 inches: Silt loam
8 to 20 inches: Silt loam
20 to 37 inches: Fine sandy loam
37 to 60 inches: Weathered bedrock

Minor Components

Urne
Percent of map unit: 6 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY006WI)

Greenridge
Percent of map unit: 2 percent
Landform: Hills
Landform position (two-dimensional): Backslope, shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY009WI)

Churchtown
Percent of map unit: 2 percent
Landform: Hills
Landform position (two-dimensional): Footslope
Down-slope shape: Concave
Across-slope shape: Linear
Other vegetative classification: Unnamed (G105XY009WI)

255C2—Urne fine sandy loam, 6 to 12 percent slopes, moderately eroded

Map Unit Setting
Elevation: 800 to 1,200 feet

Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days

Map Unit Composition
Urne and similar soils: 95 percent
Minor components: 5 percent

Description of Urne

Setting
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy slope alluvium over loamy and sandy residuum weathered from glauconitic sandstone

Properties and qualities
Slope: 6 to 12 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.7 inches)

Interpretive groups
Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 3e
Hydrologic Soil Group: B
Other vegetative classification: Unnamed (G105XY005WI)

Typical profile
0 to 9 inches: Fine sandy loam
9 to 28 inches: Fine sandy loam
28 to 36 inches: Fine sandy loam
36 to 60 inches: Weathered bedrock

Minor Components

Norden
Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY005WI)

Urne, shallow
Percent of map unit: 2 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex

Other vegetative classification: Unnamed (G105XY002WI)

255D2—Urne fine sandy loam, 12 to 20 percent slopes, moderately eroded

Map Unit Setting

Elevation: 800 to 1,200 feet
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days

Map Unit Composition

Urne and similar soils: 95 percent
Minor components: 5 percent

Description of Urne

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy slope alluvium over loamy and sandy residuum weathered from glauconitic sandstone

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.7 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4e
Hydrologic Soil Group: B
Other vegetative classification: Unnamed (G105XY006WI)

Typical profile

0 to 9 inches: Fine sandy loam
9 to 28 inches: Fine sandy loam
28 to 36 inches: Fine sandy loam
36 to 60 inches: Weathered bedrock

Minor Components

Norden

Percent of map unit: 3 percent

Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY006WI)

Urne, shallow
Percent of map unit: 2 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY003WI)

255E2—Urne fine sandy loam, 20 to 30 percent slopes, moderately eroded

Map Unit Setting
Elevation: 700 to 1,400 feet
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days

Map Unit Composition
Urne and similar soils: 95 percent
Minor components: 5 percent

Description of Urne

Setting
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy slope alluvium over loamy and sandy residuum weathered from glauconitic sandstone

Properties and qualities
Slope: 20 to 30 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to high (0.06 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: Low (about 5.7 inches)

Interpretive groups
Farmland classification: Not prime farmland
Land capability (nonirrigated): 6e
Hydrologic Soil Group: B

Other vegetative classification: Unnamed (G105XY006WI)

Typical profile

0 to 9 inches: Fine sandy loam
9 to 28 inches: Fine sandy loam
28 to 36 inches: Fine sandy loam
36 to 60 inches: Weathered bedrock

Minor Components

Norden

Percent of map unit: 2 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY006WI)

Council

Percent of map unit: 2 percent
Landform: Hills
Landform position (two-dimensional): Footslope
Down-slope shape: Concave
Across-slope shape: Linear
Other vegetative classification: Unnamed (G105XY009WI)

Urne, shallow

Percent of map unit: 1 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY003WI)

318A—Bearpen silt loam, 0 to 3 percent slopes, rarely flooded

Map Unit Setting

Elevation: 600 to 900 feet
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days

Map Unit Composition

Bearpen and similar soils: 90 percent
Minor components: 10 percent

Description of Bearpen

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread

Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loess and/or silty alluvium over stratified silty to sandy slackwater deposits

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 12 to 24 inches
Frequency of flooding: Rare
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water capacity: High (about 11.4 inches)

Interpretive groups

Farmland classification: Prime farmland if drained
Land capability (nonirrigated): 2w
Hydrologic Soil Group: C
Other vegetative classification: Unnamed (G105XY007WI)

Typical profile

0 to 18 inches: Silt loam
18 to 41 inches: Silt loam
41 to 50 inches: Stratified silty clay loam to sandy loam
50 to 60 inches: Stratified silty clay loam to sandy loam

Minor Components

Toddville

Percent of map unit: 4 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Unnamed (G105XY008WI)

Ettrick

Percent of map unit: 4 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Unnamed (G105XY007WI)

Orion

Percent of map unit: 2 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Unnamed (G105XY007WI)

382B—Bertrand silt loam, 1 to 6 percent slopes

Map Unit Setting

Elevation: 700 to 1,100 feet
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days

Map Unit Composition

Bertrand and similar soils: 90 percent
Minor components: 10 percent

Description of Bertrand

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium over siliceous sandy alluvium derived from sandstone

Properties and qualities

Slope: 1 to 6 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 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 10.5 inches)

Interpretive groups

Farmland classification: All areas are prime farmland
Land capability (nonirrigated): 2e
Hydrologic Soil Group: B
Other vegetative classification: Acer rubrum-Circaea (ArCi), Unnamed (G105XY008WI)

Typical profile

0 to 10 inches: Silt loam
10 to 46 inches: Silt loam
46 to 80 inches: Sand

Minor Components

Merit

Percent of map unit: 5 percent
Landform: Pediments
Landform position (two-dimensional): Toeslope

Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Unnamed (G105XY005WI)

Jackson
Percent of map unit: 5 percent
Landform: Pediments, stream terraces
Landform position (two-dimensional): Footslope, toeslope
Landform position (three-dimensional): Tread
Down-slope shape: Concave, linear
Across-slope shape: Linear
Other vegetative classification: Acer rubrum-Circaea (ArCi), Unnamed (G105XY008WI)

382C2—Bertrand silt loam, 6 to 12 percent slopes, moderately eroded

Map Unit Setting
Elevation: 700 to 1,100 feet
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days

Map Unit Composition
Bertrand and similar soils: 95 percent
Minor components: 5 percent

Description of Bertrand

Setting
Landform: Stream terraces
Landform position (three-dimensional): Riser
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty slope alluvium over siliceous sandy alluvium derived from sandstone

Properties and qualities
Slope: 6 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 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 10.5 inches)

Interpretive groups
Farmland classification: Farmland of statewide importance
Land capability (nonirrigated): 3e
Hydrologic Soil Group: B

Other vegetative classification: Acer rubrum-Circaea (ArCi), Unnamed (G105XY008WI)

Typical profile

0 to 10 inches: Silt loam
10 to 46 inches: Silt loam
46 to 80 inches: Sand

Minor Components

Jackson

Percent of map unit: 5 percent
Landform: Stream terraces
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Acer rubrum-Circaea (ArCi), Unnamed (G105XY008WI)

386B—Jackson silt loam, 2 to 6 percent slopes

Map Unit Setting

Elevation: 700 to 1,100 feet
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days

Map Unit Composition

Jackson and similar soils: 90 percent
Minor components: 10 percent

Description of Jackson

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium and/or loess over stratified sandy alluvium

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well 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 42 to 60 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 11.0 inches)

Interpretive groups

Farmland classification: All areas are prime farmland
Land capability (nonirrigated): 2e
Hydrologic Soil Group: B
Other vegetative classification: Acer rubrum-Circaea (ArCi), Unnamed (G105XY008WI)

Typical profile

0 to 9 inches: Silt loam
9 to 50 inches: Silt loam
50 to 60 inches: Sand

Minor Components

Toddville

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Unnamed (G105XY008WI)

Bertrand

Percent of map unit: 5 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Acer rubrum-Circaea (ArCi), Unnamed (G105XY008WI)

628A—Orion silt loam, 0 to 3 percent slopes, occasionally flooded

Map Unit Setting

Elevation: 700 to 1,020 feet
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days

Map Unit Composition

Orion and similar soils: 90 percent
Minor components: 10 percent

Description of Orion

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Silty alluvium

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 12 to 36 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water capacity: Very high (about 12.4 inches)

Interpretive groups

Farmland classification: Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
Land capability (nonirrigated): 2w
Hydrologic Soil Group: C
Other vegetative classification: Unnamed (G105XY007WI)

Typical profile

0 to 8 inches: Silt loam
8 to 32 inches: Silt loam
32 to 40 inches: Silt loam
40 to 60 inches: Stratified silt loam to very fine sand

Minor Components

Arenzville

Percent of map unit: 5 percent
Landform: Drainageways on stream terraces
Down-slope shape: Linear
Across-slope shape: Concave
Other vegetative classification: Unnamed (G105XY008WI)

Ettrick

Percent of map unit: 3 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Unnamed (G105XY007WI)

Bearpen

Percent of map unit: 1 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Unnamed (G105XY007WI)

Orion, loamy skeletal substratum

Percent of map unit: 1 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Unnamed (G105XY007WI)

743D2—Council fine sandy loam, 12 to 20 percent slopes, moderately eroded

Map Unit Setting

Elevation: 700 to 1,400 feet
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days

Map Unit Composition

Council and similar soils: 90 percent
Minor components: 10 percent

Description of Council

Setting

Landform: Hills
Landform position (two-dimensional): Footslope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Loamy slope alluvium

Properties and qualities

Slope: 12 to 20 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 (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water capacity: High (about 11.0 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 4e
Hydrologic Soil Group: B
Other vegetative classification: Unnamed (G105XY009WI)

Typical profile

0 to 7 inches: Fine sandy loam
7 to 45 inches: Loam
45 to 60 inches: Silt loam

Minor Components

Norden

Percent of map unit: 4 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope

Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY006WI)

Elevasil
Percent of map unit: 4 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY006WI)

Seaton
Percent of map unit: 2 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY009WI)

1125F—Dorerton, very stony-Elbaville complex, 30 to 60 percent slopes

Map Unit Setting
Elevation: 800 to 1,400 feet
Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days

Map Unit Composition
Dorerton, very stony, and similar soils: 60 percent
Elbaville and similar soils: 25 percent
Minor components: 15 percent

Description of Dorerton, Very Stony

Setting
Landform: Hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Loamy colluvium over loamy and sandy residuum weathered from dolomite

Properties and qualities
Slope: 30 to 60 percent
Surface area covered with cobbles, stones or boulders: 2.0 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 (0.20 to 2.00 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 capacity: Low (about 5.6 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 7e
Hydrologic Soil Group: B
Other vegetative classification: Unnamed (G105XY006WI)

Typical profile

0 to 3 inches: Loam
3 to 15 inches: Loam
15 to 18 inches: Loam
18 to 30 inches: Very channery clay loam
30 to 60 inches: Very flaggy loamy sand

Description of Elbaville

Setting

Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loess over loamy and clayey colluvium over loamy and sandy residuum weathered from dolomite

Properties and qualities

Slope: 30 to 45 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 10 percent
Available water capacity: Moderate (about 7.1 inches)

Interpretive groups

Farmland classification: Not prime farmland
Land capability (nonirrigated): 7e
Hydrologic Soil Group: B
Other vegetative classification: Unnamed (G105XY006WI)

Typical profile

0 to 5 inches: Silt loam
5 to 11 inches: Silt loam
11 to 21 inches: Silt loam
21 to 26 inches: Silty clay
26 to 37 inches: Very flaggy silty clay loam
37 to 60 inches: Extremely flaggy sandy loam

Minor Components

Churchtown

Percent of map unit: 6 percent

Landform: Hills
Landform position (two-dimensional): Footslope
Down-slope shape: Concave
Across-slope shape: Linear
Other vegetative classification: Unnamed (G105XY009WI)

Dorerton, nonstony

Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Unnamed (G105XY006WI)

Rockbluff

Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Shoulder, backslope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY003WI)

Brodale

Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Shoulder
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Unnamed (G105XY003WI)

2014—Pits, quarry, hard bedrock

Map Unit Setting

Mean annual precipitation: 28 to 33 inches
Mean annual air temperature: 46 to 52 degrees F
Frost-free period: 135 to 160 days

Map Unit Composition

Pits, quarry, hard bedrock: 100 percent

Description of Pits, Quarry, Hard Bedrock

Setting

Parent material: Sandstone

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Appendix B

WPDES Permit No. WI-0046515-05
Nonmetallic Mining Operations
Wisconsin Department of Natural Resources

WISCONSIN
DEPT. OF NATURAL RESOURCES

STATE OF WISCONSIN
DEPARTMENT OF NATURAL RESOURCES

GENERAL PERMIT TO DISCHARGE UNDER THE WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM

In compliance with the provisions of Chapter 283, Wis. Statutes, any Wisconsin facility engaged in

NONMETALLIC MINING OPERATIONS

that meets the applicability criteria listed in Part 1 of this permit and that receives a letter from the Department granting coverage under this permit, is permitted to discharge storm water and process wastewater directly to surface waters of the state and/or indirectly to groundwater of the state in accordance with the effluent limitations, monitoring requirements and other conditions set forth in this permit.

State of Wisconsin Department of Natural Resources
For the Secretary

By _____
Russell A. Rasmussen, Director
Bureau of Watershed Management
Division of Water

June 29, 2009
Date Permit Signed

PERMIT EFFECTIVE DATE – July 1, 2009 **EXPIRATION DATE - March 31, 2014**

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Permit Part

1. APPLICABILITY CRITERIA

1.1. Activities Covered

This permit applies to discharges of wastewater and storm water from nonmetallic mining operations to surface waters or groundwater of Wisconsin directly or indirectly via a storm sewer or other conveyance. Concrete operations contiguous to or located within the mining site can also be covered under this permit when the nonmetallic mine operator has legal responsibility for the concrete plant's wastewater and storm water discharges. Concrete product process wastewater, such as contact cooling water, condensate, material washwater, and equipment washwater, may be discharged along with nonmetallic mining wastewater under this permit. Nonmetallic mining operations include sites and equipment engaged in excavation or processing of sand, gravel, dimension stone, crushed stone, rotten granite, clay, or other similar activities, that result in a discharge of one or more of the following:

- contaminated storm water as defined in s. NR 216.002(3), Wis. Adm. Code,
- washwater associated with cleaning or separating earthen materials,
- mining site dewatering wastewater,
- contact and noncontact cooling water, condensate or boiler water discharged in combination with other wastewater allowed under this permit,
- dust suppression water,
- water from the outside washing of vehicles, equipment, and other objects, or
- other similar wastewaters.

1.2. Activities Not Covered

This permit does not authorize discharge of contaminants from the following:

- wastewater from the following nonmetallic mining processes: crushed stone flotation, construction sand and gravel heavy liquid separation, industrial sand flotation, and industrial sand acid leaching;
- wastewater from the manufacturing of cement by the kiln dust process;
- wastewater from the washing of a precast concrete surface treated with retarder (to expose aggregate after the unset surface cement is cleaned off);
- wastewater from the regeneration of ion exchange water treatment units;
- wastewater from use of petroleum or halogenated hydrocarbon degreasing agents during the washing of vehicles, equipment or other objects;
- wastewater from dredging or excavation operations in areas that the Department has determined contain contaminated soils or sediments;
- noncontact cooling water treated with biocides, except that uncontaminated water from a municipal water supply may be discharged;

- wastewater to wetlands where the Department has determined the pollutant discharge does not meet Ch. NR 103 wetland protection requirements. Note: s. NR 103.06(4), Wis. Adm. Code, contains exemptions for certain sedimentation basins, storm water detention basins and artificial wetlands within active nonmetallic mining operations;

- wastewater directly to an outstanding resource water as defined in s. NR 102.10, Wis. Adm. Code, or a wastewater discharge that would lower the water quality of downstream outstanding resource waters;

- wastewater directly to an exceptional resource water as defined in s. NR 102.11, Wis. Adm. Code, or a wastewater discharge that would lower the water quality of downstream exceptional resource water;

- wastewater containing pollutants in quantities that must be limited to prevent harm to animals, aquatic life, or human health, to prevent violation of the surface water quality standards in chs. NR 102, NR 105, NR 106, and NR 207, Wis. Adm. Code, or to prevent violation of the groundwater standards in ch. NR 140, Wis. Adm. Code;

2. REQUIREMENTS FOR ALL DISCHARGES

2.1. Dikes and Berms

There shall be no above ground leakage through or flow over the top of dikes or berms utilized for holding or diverting wastewater or storm water. Outflow shall be through structures or channels designed to withstand the force of flowing water.

2.2. Adequate Design

Constructed wastewater disposal or treatment facilities shall have at least sufficient capacity to contain all wastewater discharges and any precipitation resulting from a 10-year, 24-hour storm event that falls within or flows into the area of disposal or treatment.

2.3. Dust Suppression Control for Roads

Collected storm water and process wastewaters may be used for road dust suppression. The permittee shall not use excess water in roadway dust suppression practices that will: (1) result in a discharge of the dust suppression water to surface waters, or (2) result in dust suppression water running off the nonmetallic mining site. Wastewaters contaminated with pollutants other than suspended solids (such as petroleum products, salt, solvent degreasers, etc.) may not be used for dust suppression activities. Road dust suppression water is not required to be monitored under this permit.

2.4. Water Treatment Additives

The water treatment additive discharge concentrations shall be below the level of concern for impacts to aquatic life and human health as specified in s. NR 106.10, Wis. Adm. Code, for surface water discharges, or for impacts to human health as specified in ch. NR 140, Wis. Adm. Code, for discharges to groundwater.

2.5. Requirements for Discharges to Impaired Surface Waters & to Surface Waters With Total Maximum Daily Load Allocations

2.5.1 "Pollutant(s) of concern" means a pollutant that is contributing to the impairment of a water body.

2.5.2 **By February 15th** of each calendar year, the permittee shall perform an **annual check** to determine

whether its facility discharges a pollutant of concern to an **impaired water body** listed in accordance with Section 303(d)(1) of the Federal Clean Water Act, 33 USC §1313(d)(1)(C), and the implementing regulation of the U.S. Environmental Protection Agency, 40 CFR §130.7(c)(1). Impaired waters are those listed as not meeting applicable surface water quality standards.

Note: The section 303(d) list of Wisconsin impaired surface water bodies may be obtained by contacting the Department or by searching for the section 303(d) list on the Department's Internet site. The Department updates the section 303(d) list approximately every two years. The updated list is effective upon approval by EPA. The current link to the section 303(d) list is: http://dnr.wi.gov/org/water/wm/wqs/303d/.

2.5.3, A permittee that discharges a pollutant of concern to an impaired water body shall, **within 180 days of the annual check** that determines the facility discharges to an **impaired water body,** include a written section in a storm water pollution prevention plan that specifically identifies control measures and management practices that will collectively be used to reduce, with the goal of eliminating, the storm water discharge of pollutant(s) of concern that contribute to the impairment of the water body and explain why these control measures and management practices were chosen as opposed to other alternatives. The discharge of a pollutant of concern from mining wastewater shall also be evaluated, within 180 days of identification that the discharge is to an impaired water body, to determine whether additional pollution prevention activities, pollutant control measures and treatment enhancements will be used to reduce, with the goal of eliminating, the discharge of a pollutant of concern that contributes to the impairment of the water body.

2.5.4 The permittee may not establish a **new** wastewater or storm water discharge of a pollutant concern to an impaired water body or **significantly increase** an existing discharge of a pollutant of concern to an **impaired water body** unless the new or increased discharge does not contribute to the receiving water impairment, or the discharge is consistent with a State and Federal approved total maximum daily load (TMDL) allocation for the impaired water body.

2.5.5 By February 15th each calendar year, the permittee shall perform an **annual check** to determine whether its facility discharges a wastewater or storm water pollutant of concern to a water body included in a **State and Federal Approved TMDL.** If so, the permittee shall assess whether the TMDL wasteload allocation for the facility's discharge is being met through the existing pollutant controls or whether additional control measures are necessary and feasible. The assessment of the feasibility of additional control measures shall focus on the ability to improve the wastewater pollution prevention and treatment system effectiveness and the adequacy of implementation and maintenance of the permittee's storm water pollution prevention plan controls.

Note: State and Federal Approved TMDLs can be identified by contacting the Department, or by searching for the State and Federal Approved TMDL list on the Department Internet site. The current link to identify the list of State and Federal Approved Final TMDLs is:
http://dnr.wi.gov/org/water/wm/wqs/303d/Approved_TMDLs.html

2.5.6 Within 180 days of the annual check that determines the facility discharges to a TMDL allocated water body, a permittee that is included in a **State and Federal Approved TMDL** shall submit to the Department a **proposed implementation plan** for the wastewater and storm water discharges that meets the requirements of the State and Federal Approved TMDL wasteload allocation for the facility. The proposed TMDL implementation plan shall specify any feasible pollution prevention and wastewater treatment improvements that could be made and specify any revisions or redesigns that could be implemented to increase the effectiveness of the permittee's storm water pollution prevention controls. The TMDL implementation plan shall also specify a time schedule for implementation of the pollutant controls necessary to meet the wasteload allocation for the facility.

3. STORM WATER CONTAMINANT CONTROL REQUIREMENTS

As authorized in ch. NR 216, Wis. Adm. Code, nonmetallic mining operations (including contiguous concrete product operations) that have storm water contact with raw materials, intermediate products, final products, waste materials, by-products, material handling equipment or other nonmetallic mining machinery shall implement storm water best management practices as specified below. **Facilities are exempted from parts 3.3 through 3.7 of the storm water control requirements listed below when they obtain Department concurrence that their storm water contaminants are limited to only earthen materials from the nonmetallic mining operation, the contaminated storm water is captured and seeped into the ground within the mining site (not including runoff from greater than a 10 year, 24 hour frequency storm), and the storm water contaminants are discharged to a previously non-wetland area or a wetland exempted under s. NR 103.06, Wis. Adm. Code.** Storm water treatment and seepage areas that are totally within the permittee's owned or leased property boundaries shall be considered part of the nonmetallic mining site.

3.1. Physical Controls

Nonmetallic mining operations (including any contiguous concrete operations) covered under this permit shall operate the following physical controls to prevent the discharge of storm water contaminants to surface or ground waters:

3.1.1. Source Area Pollution Prevention Best Management Practices (BMPs)

The permittee shall install, to the maximum extent practicable and to the extent it is cost effective, source area pollution prevention BMPs that are designed to prevent storm water from becoming contaminated at the site. Source area pollution prevention BMPs include:

3.1.1.1. Practices that prevent and control soil erosion and sediment movement including, but not limited to, soil stabilization practices, structural practices to divert overland storm flow away from exposed soil and material stockpiles, and minimization of tracking on access roads. Sound engineering principles and practices shall be utilized to minimize erosion and movement of sediment by storm water.

3.1.1.2. Practices that manage and control residual contaminants from the outside washing of vehicles, equipment, and other objects.

3.1.1.3. Practices that prevent storm water from being contaminated by maintenance fluids, fuels, and lubricants associated with vehicles and machinery, including: good house-keeping measures, preventative maintenance measures, visual inspections, spill prevention and response measures, and employee training and awareness.

3.1.1.4. Structures or materials that cover or otherwise enclose salt handling areas or storage piles so that neither precipitation nor storm water runoff comes into contact with the salt. Any salt spillage, resulting from activities such as loading or unloading, shall be managed to minimize contact with storm water. Permitees that use brine and have salt storage piles on impervious curbed surfaces shall have a means of diverting contaminated storm water to a brine treatment system to facilitate reuse.

3.1.1.5. Practices that use a combination of precipitation control, containment, drainage controls or diversions to control SARA section 313 water priority chemicals potentially discharged through the action of storm water runoff, leaching or wind.

3.1.1.6. Protection practices for petroleum product and chemical bulk storage structures that prevent any significant loss of the material to surface or ground waters.

3.1.2. Contaminated Storm Water Treatment Best Management Practices

When the permittee determines that source area pollution prevention BMPs are not feasible, not cost effective or are inadequate to control storm water contamination, or when the Department notifies the permittee that source area pollution prevention BMPs are inadequate to achieve a water quality standard, contaminated storm water shall be treated to reduce pollutant levels prior to discharge to waters of the state. Nonmetallic mining operations (including any contiguous concrete operations) that cannot prevent the exposure of earthen materials to precipitation shall implement sediment treatment BMPs as follows:

3.1.2.1. Storm water contaminated with sediment shall, to the maximum extent practicable, be captured on the nonmetallic mining site and then allowed to evaporate or infiltrate into the earth so the sediment is removed prior to discharge to groundwater. The tracking of sediment onto local roads shall be minimized by the use of BMPs such as, an asphalt or concrete approach to the road or use of a vehicle-tracking pad. There shall be no direct injection, through wells, of storm water into the groundwater.

3.1.2.2. Storm water discharges off the mining site, to wetlands not exempted under s. NR 103.06, Wis. Adm. Code or to surface waters from areas with exposed earthen materials (including aggregate materials stockpiled for reuse) shall be treated with solids separation best management practices to reduce the amount of sediment discharged to the maximum extent practicable. These treatment practices may include settling, sedimentation, filtration, and modifications to retain sediment at drainage inlets (e.g., storm sewer grates or drainage pipe openings) where they occur. [Note: Technical standards developed in accordance with NR 151, Wis. Adm. Code, such as #1063 Sediment Traps, #1001 Wet Detention Basins, # 1064 Sediment Basins, are available for control of erosion and pollutant runoff. This information can be accessed by contacting Department storm water program staff or by accessing the storm water page on the Department internet site. The current link to the storm water page is http://dnr.wi.gov/runoff/stormwater.htm]

3.1.2.3. An adequately sized, designed and functioning oil/water separation wastewater treatment device shall be provided for storm water significantly contaminated with petroleum products. The Department may require coverage under an additional WPDES permit for this wastewater if the discharge from the petroleum treatment devices is not limited to a daily maximum of 15 mg/L by the process wastewater sections of this permit.

3.2. Annual Facility Site Compliance Inspections

The permittee shall perform and document the results of an annual facility site compliance inspection for all nonmetallic mining operations and contiguous concrete operations covered under this permit. A qualified individual shall perform the inspections. The inspector shall verify that all pollution sources are correctly identified and that the site drainage pattern description remains accurate. The inspector shall also check that appropriate storm water pollution prevention and treatment best management practices have been chosen, and the practices are being implemented, properly operated and adequately maintained. The timing of the inspection shall include seasonal or cyclical activities at the facility so the inspection is representative of the full range of activities at the site. A report shall be completed for each inspection and shall include: the inspection date, inspection personnel, scope of the inspection, major observations, and a schedule for implementing any further actions needed to control storm water contaminants. The annual inspection reports shall be available for

Department review at the nonmetallic mining site, company headquarters, or any other location approved by the Department. The inspection reports shall be kept for the duration of this permit or three years after the report is generated whichever is longer. [An example annual facility site compliance inspection report is available on the Department website or can be obtained by contacting Department storm water staff].

When inspection activities are impractical at inactive facilities that have no product or waste stockpiles, inspections may be performed on the following alternate schedule: these facilities shall be inspected within 10 days of changing to active status or, at a minimum, once every three years.

3.3. Storm Water Pollution Prevention Plan (SWPPP)

Nonmetallic mining operations that have storm water contact with overburden, raw material, intermediate product, finished product or waste material and that storm water is discharged off the mining site, to a surface water (excluding mine water treatment ponds) or to a wetland not exempted under s. NR 103.06, Wis. Adm. Code shall be operated in compliance with a Storm Water Pollution Prevention Plan. Any concrete product operations covered under this permit and any portable nonmetallic mining equipment groupings specifically requested to be covered under this permit shall also be operated in compliance with a SWPPP. **The SWPPP and any amendments thereto shall be available for Department review and maintained at the nonmetallic mining site, company headquarters, or any other location approved by the Department.** [Note: A model SWPPP for nonmetallic mining operations is available on the Department internet site or by contacting Department industrial storm water staff in the region or Madison office.]

3.3.1. Purpose and Content of the Storm Water Pollution Prevention Plan

The SWPPP is a written document that: 1) identifies sources of storm water contamination; 2) prescribes appropriate source area pollution prevention best management practices designed to prevent or minimize storm water contamination; 3) prescribes storm water treatment best management practices to reduce storm water contaminants prior to discharge; 4) prescribes actions needed either to bring non-storm water discharges under a WPDES permit or to remove these discharges from the storm drainage system; and 5) includes schedules, as necessary, to ensure that the storm water management actions prescribed in the SWPPP are implemented and evaluated on a regular basis.

Source area pollution prevention and sediment treatment best management practices shall be utilized to minimize sediment discharge to the maximum extent practicable. Control of other storm water pollutants, such as salt, petroleum products, cement materials, or other materials potentially hazardous to groundwaters or surface waters shall be controlled to the maximum extent practicable by the use of source area pollution prevention best management practices and treatment best management practices.

3.3.2. SWPPP Contact

The SWPPP shall identify the job title of the person responsible for SWPPP development and implementation. The individual acting in that job title shall have the responsibility to coordinate the development, implementation, evaluation, maintenance, and amendment of the SWPPP. This person shall also coordinate facility compliance with the specific management actions identified in the SWPPP, including maintaining best management practices, conducting monitoring activities, preparing and submitting reports, and serving as facility contact for the Department.

3.3.3. Site Description and Drainage Base Map

The SWPPP for nonmetallic mining sites shall contain a drainage base map that depicts how storm water drains on, through and from the mining site (including any controlled contiguous concrete operations) to either surface waters, surface water tributaries, wetlands, or seepage to groundwater. The drainage base map shall show the following: site property boundaries; the storm drainage collection and disposal system (including all known surface and subsurface conveyances, with the conveyances named); any secondary containment structures; roadways (paved and unpaved); groundcover features (i.e., grass, wooded areas, etc.); the location of all water discharge outfall pipes (including any outfalls permitted under another WPDES permit) numbered for reference, that discharge channelized flow to surface water, groundwater or wetlands); the drainage area boundary for each outfall pipe; the approximate surface area in acres draining to each outfall; the name and location of any surface water features; source area control BMPs and storm water treatment BMPs that are in place at the facility.

The permittee shall also identify on the drainage base map any potential sources of pollution (materials or activities) and areas susceptible to erosion that have the potential to contaminate storm water. Such sources may include: disturbed areas with no stabilizing vegetative cover; product or waste stockpiles; truck loading and washing areas, haul roads; equipment storage and maintenance areas; and fuel storage areas.

3.3.4. Description of Storm Water Controls

The SWPPP shall describe (including diagrams as necessary) all source area pollution prevention BMPs and storm water treatment BMPs that are in place or will be implemented for the operation.

3.4. Certification of SWPPP Completion

Nonmetallic mining operations required to have a SWPPP shall certify, in writing, to the Department that the operation has complied with the SWPPP requirements of this permit. A copy of the certification, showing the date mailed to the Department, must be retained as part of the SWPPP documentation. The certification shall contain the following statement and be signed in accordance with the Authorized Signature standard requirement in Part 6 of this permit:

"I certify under penalty of law that the Storm Water Pollution Prevention Plan (SWPPP) required by WPDES General Permit No. WI-0046515-5 has been completed and retained on site at the facility, at the company headquarters, or any other location approved by the Department. The SWPPP and attachments were completed under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information contained in the plan. Based on my inquiry of the person, or persons, who manage the system, or those persons directly responsible for gathering the information; the information contained in the SWPPP is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for providing false information, including the possibility of fine and imprisonment. In addition, I certify under penalty of law that, based upon inquiry of persons directly under my supervision, to the best of my knowledge and belief, the SWPPP adheres to the storm water control provisions of WPDES General Permit No. WI-0046515-5 for the development and implementation of a Storm Water Pollution Prevention Plan. I certify that the plan will be complied with."

3.5. SWPPP Amendments

The permittee shall amend the SWPPP and notify the Department, in writing, that an amendment has been made under the following circumstances:

3.5.1. When expansion, production increases, process modifications, changes in material handling or storage or other activities are planned, and the changes will result in a significant increase in the exposure of pollutants or a need for significant modifications to the treatment best management practices. The amendment shall contain: a description of the new activities that contribute to the increased pollutant loading, planned source control activities that will be used to minimize pollutant loads, an estimate of the new or increased discharge of pollutants following treatment, and a description of any treatment system modifications needed to manage the storm water contaminants.

3.5.2. Upon written notice that the Department finds the storm water controls to be ineffective in achieving the conditions of this permit.

3.6. Compliance with SWPPP Requirements

3.6.1. Nonmetallic mining operations that have previously submitted a SWPPP certification due to the previous version of this general permit (WI-0046515-4) may be considered to be in compliance with the SWPPP certification requirement specified in part 3.4 above if the previously submitted SWPPP meets the requirements of this permit.

3.6.2. Nonmetallic mining operations that include a contiguous concrete operation and have previously submitted a SWPPP certification due to a previous version of this general permit (WI-0046515-4) or the tier II storm water general permit (WI-S0067857) may be considered to be in compliance with the SWPPP certification requirement specified in part 3.4 above if the previously submitted SWPPP meets the requirements of this permit.

3.6.3. For existing nonmetallic mining operations found to be discharging without an industrial storm water WPDES permit, the Department may, through an appropriate enforcement action or stipulation, agree to cover the operation under this permit and specify a schedule for SWPPP development, implementation and certification within the shortest time practicable.

3.6.4. New nonmetallic mining operations covered under this permit shall comply with the SWPPP requirements of this permit and shall submit a SWPPP certification to the Department prior to initiating nonmetallic mining activities that result in a discharge of contaminated storm water.

3.7. Inspections for Facilities Required to Implement a SWPPP

3.7.1. Nonmetallic mining operations required to prepare and implement a SWPPP in part 3.3 above, shall inspect the system of storm water controls at least once each calendar quarter. A qualified individual shall perform the inspections. The inspector shall check that site drainage conditions and potential pollution sources identified in the SWPPP remain accurate, and that appropriate storm water pollution prevention and treatment best management practices are being implemented, properly operated and adequately maintained. A report shall be completed for each quarterly inspection and shall include: the inspection date, inspection personnel, scope of the inspection, major observations, possible sources of any observed storm water contamination, any appropriate revisions needed to the SWPPP, and a schedule for implementing any further actions needed to control storm water contaminants. The quarterly inspection reports shall be available for Department review at the nonmetallic mining site, company headquarters, or any other location approved by the Department. The inspection reports shall be kept for the duration of this permit or three years after the report is generated, whichever is longer.

3.7.2. Sites required to prepare and implement a SWPPP in part 3.3 above shall **visually check** the quality of storm water discharge within 60 minutes of a significant storm water runoff event. A qualified individual should be trained to perform this visual inspection at least once per quarter (except as provided below) for NMM operations that generally have staff on site. Remote, inactive and operations that do not generally have a qualified individual on site may perform this visual inspection on an alternate schedule of at least once every three years. A visual observation record shall be created for each visual runoff check that includes the discharge outfall location and any observations of color, odor, turbidity, floating solids, foam, oil sheen, or other obvious indicators associated with storm water contamination. The visual observation record shall be kept with, and for the same time period as, the quarterly inspection reports described above.

3.7.3. The quarterly inspection and/or the visual check requirement can be waived if any of the following apply: (1) the permittee indicates that an employee could not reasonably be present at the time of a snow melt or runoff event; (2) the permittee determines that attempts to complete the inspection would endanger employee safety or well being; (3) the permittee indicates that there were no snow melt or runoff events large enough to conduct a visual check at an outfall; (3) the permittee demonstrates that a quarterly inspection or visual check is impractical or unnecessary at an inactive or remote facility and an alternate inspection frequency of at least once every three years is established; or (4) the permittee demonstrates that the sources of storm water contamination are outside the site's property boundary and are not associated with the permittee's activities. These demonstrations shall be presented in the SWPPP and submitted to the Department as part of the SWPPP certification.

4. ADDITIONAL REQUIREMENTS FOR DISCHARGES OF NONMETALLIC MINING & CONCRETE WASTEWATERS TO GROUNDWATER VIA SEEPAGE

Discharges to groundwater that contain mine dewatering wastewater, equipment washwater, mining material or concrete material washwater, contact and noncontact cooling water, or other process wastewaters related to production of nonmetallic mining materials or concrete products shall comply with the limits and requirements listed below. The discharge of storm water to seepage areas within the mining site does not require monitoring under this section. Samples collected to fulfill the monitoring requirements shall be taken at each outfall following treatment (if applicable) and prior to discharge to groundwater. Monitoring during a specified sample period is only required when nonmetallic mining process wastewater or concrete product wastewater is being discharged to seepage during that period. The samples taken shall be representative of the discharge to groundwater.

Table 1

Limitations for Groundwater Discharges		Monitoring Requirements	
Parameter	Daily[(a)] Maximum	Sample[(b)] Frequency	Sample[(c,d)] Type
Discharge Flow (Gallons per Day)	-	Quarterly, or as specified in Part 4.3	Estimate
Oil and Grease	15 mg/l	Annually, or as specified in Part 4.4	Grab
Water Treatment Additives	-	Monthly	Keep Record of Usage on site

(a) A daily maximum effluent limitation is to be compared with each analysis for that day. Compliance is achieved when the result of each analysis is less than the maximum daily effluent limitation. If multiple samples are collected, all the test results should be reported.

(b) A quarterly sample frequency means performing the associated monitoring at least once during each of the four calendar quarters (Jan.-March, April-June, July-Sept., Oct.-Dec.). If there is no discharge during a quarter, the permittee shall enter a zero flow for that quarter on the annual discharge monitoring report.

(c) Flow estimate means a reasonable approximation of the average daily flow of process wastewater to groundwater based on amounts of makeup water added to a pond, estimates of pond seepage based on hydraulic conductivity and head, meter measurements of discharge to a seepage area, any other method specified in s. NR 218.05(1), Wis. Adm. Code. Seepage flow estimates need not include storm water that falls within the boundaries of or diffusely enters a pit or infiltration area.

(d) A grab sample means a single sample taken at one moment of time or a combination of several smaller samples of equal volume taken in less than a two-minute period.

4.1. Solids Removal

Solids shall be removed from seepage areas, if needed, to maintain the absorptive capacity of the soils and prevent plugging.

4.2. Water Treatment Additives

The permittee shall maintain records of monthly water treatment additive use including additive name, manufacturer, and maximum daily amount used.

4.3. Sample Frequency for Flow

The daily flow to seepage shall be estimated at least once per quarter, except that the permittee shall monitor flow to seepage **each month for 12 months** starting the month following a recorded daily discharge value greater than 200,000 gal/day. Facilities that monitor flow to seepage on a monthly frequency shall also report an estimate of the monthly total flow to seepage.

4.4. Sample Frequency for Oil and Grease

Oil & grease shall be monitored annually under this permit, except that: (1) the oil & grease monitoring frequency shall be **once each quarter for 4 calendar quarters** beginning the quarter following receipt of any sample result showing an oil & grease discharge above 15 mg/L, and (2) further annual monitoring is not required if the first annual sample result is less than 7.5 mg/L. An increased monitoring frequency is independent of any Department enforcement response to permit noncompliance. More frequent monitoring may be specified in an order or stipulation resulting from enforcement of permit noncompliance. For portable operations, any required monitoring for oil and grease may occur at any site where the unit is located during the specified sampling period. Samples shall be representative of the process wastewater (i.e., washwater or cooling water) discharge associated with operation of the portable unit.

4.5. pH of Discharges to Seepage

Any nonmetallic mining or concrete wastewater with a pH outside the range of 6.0 to 9.0 s.u. (such as concrete block curing condensate or concrete truck washwater) shall not be discharged directly to groundwater, but shall be passed through a soil zone to moderate the pH or mixed with other process or rinse waters to bring the pH to within the range of 6.0 to 9.0 Standard Units before the wastewater mixes with groundwater.

4.6. Outside Washing Activities

Wastewater from the outside washing of vehicles, equipment, and other objects used in the processing or transportation of earthen materials shall be diverted to seepage areas to the maximum extent practicable. Biodegradable soaps shall be used, and the washing of road deicing chemicals to seepage areas shall be minimized. Wash water containing petroleum products or volatile organic solvents (such as from engine degreasing, or washing off diesel or gasoline) shall not be discharged to seepage areas.

4.7. Monitoring Reports for Process Wastewaters

The permittee shall submit an annual report to the Department, by February 15th each year, that summarizes the monitoring information and shows all of the monitoring results required by this section of the permit during the previous calendar year. A Department monitoring form may be used to submit the annual data, or an alternate report format may be used that clearly shows the monitoring results from the previous calendar year. The annual report shall be submitted to: WI Department of Natural Resources, Attn: WPDES GP DMR, at (1) the office identified on the reporting form or the correspondence granting coverage under this permit, (2) the nearest Department of Natural Resources Regional Headquarters office, or (3) the watershed bureau address in Madison, Wisconsin. The operator of portable equipment groups specifically covered under this permit shall submit the annual reporting information, including the site and county where the monitoring data was collected, preferably to the Headquarters office of the Department Region in which the portable operation was primarily operated.

5. ADDITIONAL REQUIREMENTS FOR DISCHARGES OF NONMETALLIC MINING AND CONCRETE PROCESS WASTEWATER TO SURFACE WATERS

Discharges to surface waters of Wisconsin that contain mine dewatering wastewater, equipment washwater, mining material or concrete material washwaters, contact and noncontact cooling water, or other wastewaters related to production of nonmetallic mining materials or concrete products shall comply with the limits and requirements listed below. The pumping of excess ponded water (which may include storm water or groundwater) off the mining site is considered to be mine dewatering wastewater. Samples collected to fulfill the monitoring requirements shall be taken at each outfall following treatment (as applicable) and prior to discharge to surface waters. Monitoring during a specified sample period is only required when nonmetallic mining production wastewater or concrete product wastewater is being discharged during that period. The samples taken shall be representative of the discharge to surface waters.

Table 2

Limitations for Surface Water Discharges			Monitoring Requirements	
Parameter	Daily[(a)] Minimum	Daily[(b)] Maximum	Sample[(c)] Frequency	Sample[(d,e)] Type
Discharge Flow (Gallons Per Day)	-	-	Quarterly, or as specified in Part 5.4	Estimate
Flow – number of days of discharge	-	-	Quarterly	Record # of days with discharge flow in the quarter
Total Suspended Solids	-	40 mg/l	Quarterly, or as specified in Part 5.5	Grab, or as specified in Part 5.5
pH	6.0 s.u.	9.0 s.u.	NMM Annual, Concrete Quarterly, or as specified in Part 5.6	Grab
Oil and Grease	-	15 mg/l	Annually, or as specified in Part 5.7	Grab

(a) A daily minimum effluent limitation for pH is to be compared with each single daily analysis. Compliance is achieved when the result of each analysis is greater than the minimum daily effluent limitation.

(b) A daily maximum effluent limitation is to be compared with each analysis for that day. Compliance is achieved when the result of each analysis is less than the maximum daily effluent limitation. If multiple samples are collected, all the test results should be reported.

(c) A quarterly sample frequency means performing the associated monitoring once during each of the four calendar quarters (Jan.-March, April-June, July-Sept., Oct.-Dec.). If there is no discharge during a quarter, no sampling is required, and the permittee shall enter a zero flow for that quarter on the annual discharge monitoring report.

(d) An estimate means a reasonable approximation of the average daily flow based on s. NR 218.05(1), Wis. Adm. Code, or any other method approved by the Department.

(e) A grab sample means a single sample taken at one moment of time or a combination of several smaller samples of equal volume taken in less than a two-minute period.

5.1. Floating Solids and Foam

There shall be no discharge of floating solids or visible foam in other than trace amounts.

5.2. Suspended Solids Treatment and Solids Removal

Wastewater shall be treated for suspended solids removal prior to discharge to surface waters. Captured solids shall be removed from solids separation equipment or facilities as needed to maintain treatment unit hydraulic capacity and effective removal of suspended solids.

5.3. Water Treatment Additives

The permittee shall maintain records of monthly water treatment additive use including additive name, manufacturer, and maximum daily amount used.

5.4. Sample Frequency for Flow

The daily discharge flow shall be estimated at least once per quarter, except that the permittee shall monitor discharge flow **each month for 12 months** starting the month following a recorded daily discharge value greater than 200,000 gal/day. Facilities that monitor discharge flow on a monthly frequency shall also report an estimate of the total monthly discharge flow on the annual reporting form.

5.5. Sample Frequency and Sample Type for Total Suspended Solids

Total suspended solids (TSS) shall be monitored with a grab sample each quarter, except that the TSS monitoring frequency shall be **once per month for 12 months** beginning the month following receipt of a sample result showing a discharge TSS above 40 mg/L. When this monthly sampling requirement is effective, representative TSS **composite samples** shall be created by combining at least 3 individual grab samples of equal volume, taken at approximately equal intervals over a 3-hour period. This increased monitoring frequency is independent of any Department enforcement response to permit noncompliance. More frequent monitoring or a different sample type may be specified in an order or stipulation resulting from enforcement of permit noncompliance.

5.6. Sample Frequency for pH

Discharges of nonmetallic mining process wastewater shall be sampled for pH annually, except that no further pH monitoring is required if the first two annual samples are within the pH range of 6.7 to 8.3. Discharges containing process wastewater from concrete product operations shall be sampled quarterly for pH, except that pH monitoring is reduced to annually if four consecutive quarterly samples are within the range of 6.7 to 8.3 s.u.

5.7. Sample Frequency for Oil and Grease

Discharges containing nonmetallic mining or concrete product production wastewater shall be sampled annually under this permit for oil & grease, except that: (1) the monitoring frequency shall be **once each quarter for 4 calendar quarters** beginning the quarter following receipt of any sample result showing an oil & grease discharge above 15 mg/L, and (2) further annual oil & grease monitoring is not required if the first annual sample result is less than 7.5 mg/L. An increased monitoring frequency is independent of any Department enforcement response to permit noncompliance. More frequent monitoring may be specified in an order or stipulation resulting from enforcement of permit noncompliance.

5.8. Monitoring Portable Operations

For portable operations, any required monitoring for flow, total suspended solids, oil and grease or pH may occur at any site where the unit is located during the specified sampling period. Samples shall be representative of the process wastewater discharge associated with operation of the portable unit.

5.9. Outside Washing Activities

The discharge of wastewater to surface waters from the outside washing of vehicles, equipment, and other objects shall comply with the oil & grease, total suspended solids, pH and floating foam discharge requirements and limitations listed in Part 5 of this permit. Phosphorus free biodegradable soaps shall be used, and the washing of road deicing chemicals to surface water resources shall be minimized. Wash water containing significant levels of petroleum products (such as diesel or gasoline) or volatile organic solvents (such as from engine degreasing) shall not be discharged to surface waters.

5.10. Monitoring Reports for Process Wastewaters

The permittee shall submit an annual report to the Department, by February 15th each year, that summarizes the monitoring information and shows all of the monitoring results required by this section of the permit during the previous calendar year. A Department monitoring form may be used to submit the annual data, or an alternate report format may be used that clearly shows the monitoring results from the previous calendar year. The annual report shall be submitted to: WI Department of Natural Resources, Attn: WPDES GP DMR, at (1) the office identified on the reporting form or the correspondence granting coverage under this permit, (2) the nearest Department of Natural Resources Regional Headquarters office, or (3) the watershed bureau address in Madison, Wisconsin. The operator of portable equipment groups specifically covered under this permit shall submit the annual reporting information, including the site and county where the monitoring data was collected, preferably to the Headquarters office of the Department Region in which the portable operation was primarily operated.

6. STANDARD REQUIREMENTS

6.1. NR 205, Wisconsin Administrative Code: The conditions in ss. NR 205.07(1) and NR 205.07(3), Wis. Adm. Code, are included by reference in this permit. The permittee shall comply with all of these requirements, except for s. NR 205.07(1)(n), which does not apply to facilities covered under general permits. Selected s. NR 205.07 requirements are listed below for convenience.

6.2. Spill Reporting for Hazardous Substances: The permittee shall immediately notify the Department of an accidental release or spill of any hazardous substance to the environment as specified in ch. NR 706 and s. NR 205.07(3)(b), Wis. Adm. Code. The Department shall be notified via the 24-hour toll free spills hotline (1-800-943-0003).

6.3. Duty to Halt or Reduce Activity: Upon failure or impairment of treatment facility operation, the permittee shall as required in s. NR 205.07(3)(e) and to the extent necessary to maintain compliance with its permit, curtail production or wastewater discharges or both until the treatment facility operations are restored or an alternative method of treatment is provided.

6.4. Permit Noncompliance Reporting: As specified in s. NR 205.07(1)(s), Department notification is required within 24 hours of becoming aware of permit noncompliance.

6.5. Bypassing: As specified in s. NR 205.07(1)(u) & (v) bypass or overflow of wastewater at the treatment works or collection system is prohibited unless there were no feasible alternatives to the bypass, the bypass is necessary to prevent severe injury or property damage, and the permittee notified the Department as required in s NR 205 (1)(u)3.

6.6. Planned Changes: The permittee shall report to the Department any facility expansion, production increase or process modifications which will result in new, different or increased discharges of pollutants as set forth in s. NR 205.07(3)(c).

6.7. Inspection and Entry: The permittee shall allow an authorized representative of the Department, upon the presentation of credentials, to enter the permittee ' s premises, have access to records, and inspect and monitor the discharge as described in s. NR 205.07(1)(d).

6.8. Authorized Signature: Reports, records, and monitoring results required by this permit shall be signed by the permittee ' s authorized representative or, in his or her absence, as specified in s. NR 205.07(1)(g).

6.9. Water Quality Sampling and Testing Procedures: Sampling and laboratory testing procedures shall be performed as specified in s. NR 205.07(1)(p) and as set forth below. Sampling and analysis of effluent samples shall be performed as specified in chs. NR 218 and NR 219, Wis. Adm. Code, respectively and shall be performed by a laboratory certified or registered in accordance with the requirements of ch. NR 149.

6.10. Retention and Submittal of Reports, Records, and Monitoring Results: The permittee shall retain records of all monitoring required by this permit and report monitoring results as set forth in s. NR 205.07(1)(f) and (r) and as specified in 6.11 below. Reports (including storm water inspection reports), records, and monitoring results required by this permit shall be retained by the permittee for the duration of this permit or three years after this information is generated, whichever is longer.

6.11. Recording of Results: For each effluent measurement or sample taken, the permittee shall record the following information as required in s. NR 205.07(1)(e):

- The date, exact place, method and time of sampling or measurements,
- The individual who performed the sampling or measurements,
- The date of the analysis and the individual who performed the analysis,
- The analytical techniques or methods used, and the results of the analysis.

6.12. Conventions for the Reporting and Use of Low Level Results: The permittee shall use the following conventions when reporting effluent monitoring results: (a) non-detected pollutant results shall be reported as < (less than) the value of the analytical method ' s limit of detection; (b) pollutant concentrations equal to or greater than the limit of detection, but less than the limit of quantitation, shall be reported and the limit of quantitation shall be specified; and (c) a zero value may be substituted for any non-detected pollutant result for the purposes of calculating an average or a mass discharge.

6.13. Continuation of an Expired General Permit: As provided in s. NR 205.08(9), the terms and conditions of this general permit shall continue to apply until this general permit is reissued or revoked or until an individual permit is issued for the discharge to which the general permit applied. The status of a general permit and forms for updating facility information can be accessed on the Department website by searching for WPDES Wastewater Permits and selecting "General Permits".

6.14. Enforcement: Any violation of this permit is enforceable under ss. 283.89 and 283.91, Wisconsin Statures.

6.15. Severability: The provisions of this permit are severable, and if any provisions of this permit or the application of any provision of this permit to any circumstance is held invalid the remainder of this permit shall not be affected thereby.

6.16. Work near Surface Waters and Wetlands: Any work performed in wetland areas or within areas subject to local floodplain and shoreland regulations must conform to all applicable county or local ordinances. All applicable state permits and/or contracts required by chs. 30, 31 and 87, Wis. Stats. and sections 281.15, 281.17(10), 281.36 and 281.37, Wis. Stats. (or Wisconsin Administrative Code adopted under these laws), and applicable federal permits must be obtained as necessary.

6.17. Property Rights: This permit does not convey property rights of any sort, or any exclusive privilege. This permit does not authorize any injury or damage to private property, any invasion of personal rights, or any infringement of Federal, State, or local laws or regulations.

Appendix C

WisDOT Standard Specifications for Erosion Control

Section 627 Mulching

627.1 Description

(1) This section describes furnishing, placing, and anchoring a mulch cover, usually in connection with seeding the surfaces of the roadway.

627.2 Materials

(1) Mulching material consists of straw or hay in an air-dry condition, wood excelsior fiber, wood chips, or other suitable material of a similar nature that the engineer approves, and is substantially free of noxious weed seeds and objectionable foreign matter.

(2) If using tackifier, the department will prequalify it before use. Select tackifiers from the department's erosion control product acceptability list (PAL). The contractor may obtain a copy of the PAL and the prequalification procedure for products not on the PAL from the department.

627.3 Construction

627.3.1 General

(1) Unless directed otherwise, place the mulch on the specified area within 2 days after completing the seeding.

(2) The contractor shall not perform mulching during periods of excessively high winds that might preclude proper mulch placement.

(3) Place the mulch loosely or open enough to allow some sunlight to penetrate and air to slowly circulate, but thick enough to shade the ground, conserve soil moisture, and prevent or reduce erosion.

ASP 6 (4) Maintain the mulched areas and repair all areas damaged by wind, erosion, traffic, fire or other causes before final or partial acceptance of the work.

627.3.2 Placing

(1) The contractor may perform the work as specified in one of the following ways: Method A, Method B, or Method C, or a combination of the 3, unless a specific method is specified in the contract.

627.3.2.1 Method A, Netting

(1) Uniformly spread the mulching material over the designated areas to a loose depth of 1/2 to 1 1/2 inches. Use a specific rate of application; dependent on the character of the material, that results in a cover conforming to the requirements specified above in 627.3.1. Loosen or make fluffy the mulch material from compacted bales before spreading in place. Unless directed otherwise, begin mulching at the top of the slopes and proceed downward.

(2) Securely anchor straw or hay mulch by using engineer-approved netting anchored to the ground with pegs or staples to prevent it from floating as the vegetation grows. Instead of this anchorage, the contractor may secure mulch by heavy biodegradable twine fastened by pegs or staples to form a grid with 6 to 10 feet spacing.

(3) The contractor may use department-approved erosion control mats, listed in the PAL, instead of separately applying mulch and netting.

627.3.2.2 Method B, Tackifier

(1) Treat straw or hay with a tackifier, blow from a machine, and uniformly deposit over designated areas in one operation. Place straw or hay uniformly over the area 1/2 to 1 inch deep, using 1/2 to 3 tons of mulch per acre. Mix and place tackifier according to the PAL. Within the above limits, the engineer will determine, on the job, the application rate of the mulch and the tackifier, and the engineer may vary the rates during mulching to produce the desired results. Use an engineer-approved machine to place the mulch that blows or ejects by constant air stream a controlled amount of mulch and applies a spray of tackifier to partially coat the straw or hay, sufficient to hold together and keep in place the deposited straw or hay. The contractor may apply the tackifier as an overspray in a separate operation after placing the straw or hay.

(2) Apply wood fiber, wood chips, or similar material with engineer-approved blowing machines, or other engineer-approved methods, that place a controlled amount of mulch uniformly over the area 1/2 to 1 1/2 inches deep. Treat areas receiving wood chip mulch, with one pound of available nitrogen per 1000 square feet before or after applying the chips.

(3) Throughout the process, feed the mulch material into the blowing machine to produce a constant and uniform ejection from the discharge spout, and operate in a position to produce mulch of uniform depth and coverage.

627.3.2.3 Method C, Crimping

(1) Spread the straw or hay mulch uniformly over the designated areas to a loose depth of 1/2 to 1 1/2 inches, using 1/2 to 3 tons of mulch per acre, by blowing from a machine, as specified in Method B, or by other engineer-approved methods.

(2) Immediately after spreading, anchor the mulch in the soil by using a mulch crimper consisting of a series of dull, flat discs with notched edges. Space the 20 inch diameter discs at about 8 inch centers. Equip the crimper with a ballast compartment to allow adjusting the weight for depth control.

(3) Impress the mulch into the soil 1 1/2 to 2 1/2 inches deep in one pass of the crimper. The department will not allow mulch crimpers to operate on slopes so steep that damage to the mulch, seedbed, or soil occurs. Anchor the mulch on these areas by one of the following methods: Method A or Method B. Equip and operate tractors to minimize disturbing or displacing the soil. This process may require more than one pass of the crimper to ensure adequate anchoring of the mulch.

(4) The contractor shall not use Method C if it cannot impress the mulch to a minimum of 1 1/2 inch.

627.4 Measurement

(1) The department will measure Mulching acceptably completed by the square yard or by the ton, whichever the contract specifies.

(2) If measured by the square yard, the measured quantity equals the number of square yards of surface area that the contractor applied the mulch.

(3) If measured by the ton, the measured quantity equals the number of tons of mulch provided, placed, and acceptably completed.

(4) Tackifiers or nitrogen used for treating mulch are incidental to the cost of the work.

627.5 Payment

(1) The department will pay for measured quantities at the contract unit price under the following bid items:

ITEM NUMBER	DESCRIPTION	UNIT
627.0200	Mulching	SY
627.0205	Mulching	TON

(2) Payment for Mulching is full compensation for providing all materials, including tackifiers or nitrogen; for all hauling, treating, placing, spreading, and anchoring of the mulch material; and for maintaining the work and repairing all damaged areas.

(3) If the contractor opts to use department-approved erosion control mats instead of separately applying mulch and netting, the department will pay for it at the contract unit price for Mulching only.

Section 628 Erosion Control

628.1 Description

(1) This section describes furnishing and installing, or constructing erosion control mats, bale checks or dikes, fences, screens, blankets, and other erosion control devices.

(2) This section also describes cleaning sediment basins and mobilizations for erosion control.

628.2 Materials

628.2.1 General

628.2.1.1 Acronyms

(1) Interpret acronyms used throughout this section as follows:

PAL The department's erosion control product acceptability list. The contractor may obtain a copy of the PAL and the prequalification procedure for products not on the PAL from the department.

ECRM Class I, II, and IIIA erosion control revegetative mats.

TRM Class III B, C, and D turf reinforcement mats.

628.2.1.2 Product Acceptability

(1) The department prequalifies selected erosion control products in the PAL. If the contract specifies, furnish products of the class, type, and subject to the seasonal limitations the PAL designates. Before installing a PAL product, submit to the engineer a written copy of the manufacturer's specifications for installing that product on slopes, channels, shorelines, high wind locations, and next to live traffic lanes as applicable to the contract installation. Install PAL products conforming to those manufacturer's specifications. The department may specify modifications to the manufacturer's procedures for individual materials here within section 628.

(2) The department may sample and test products supplied in the field to verify that they conform to the PAL prequalification requirements. Provide samples as the engineer directs.

628.2.2 Erosion Mat

(1) The department must prequalify all erosion mat products before use. Furnish erosion mat products from the PAL.

(2) The PAL identifies prequalified erosion mat products by class and type. Use the required class and type of erosion mat the plans show or the engineer specifies. The contractor may furnish any prequalified erosion mat product of the class and type the plans show or that the engineer specifies.

(3) If using jute fabric for a Class II Type A erosion mat, use a woven fabric of a uniform open weave of single jute yarn. Use a jute yarn of loosely twisted construction with an average twist of not less than 1 1/2 turns per one inch. Ensure the average size of the warp and weft yarns are approximately the same. Furnish the woven fabric in rolled strips. Submit a certificate of compliance certifying that the jute fabric erosion mat conforms to the following:

- Is a minimum 48 inches wide with a tolerance of minus one inch.
- Has 78 warp ends, +/- one for each 48 inches of width. Has 45 weft yarns, +/- 2, per linear yard of length.
- Weighs 92 pounds per 100 square yards +/- 10 percent, measured under average atmospheric conditions.
- Is non-toxic to vegetation.

628.2.3 Staples

(1) Furnish U-shaped staples, made of No. 11 or larger diameter steel wire, or other engineer-approved material, are one to 2 inches wide, and not less than 6 inches long for firm soils and not less than 12 inches for loose soils. The contractor may use anchors the staple gun manufacturer recommends, either lighter gage staples or equivalent, for engineer-approved staple gun systems.

628.2.4 Bales

(1) For bales, use straw, hay, or other engineer-approved material, in good condition, of the dimensions the plans show.

628.2.5 Stakes

(1) Furnish wood or metal stakes of the dimensions the plans show.

628.2.6 Silt Fence

628.2.6.1 Geotextile Fabric

(1) Furnish one of the following geotextile fabrics: woven or non-woven polyester, polypropylene, stabilized nylon, polyethylene, or polyvinylidene chloride. For non-woven fabric the contractor may use needle punched, heat bonded, resin bonded, or combinations of all 3. Submit a certificate of compliance certifying that the geotextile conforms to the following:

TEST REQUIREMENT	METHOD	VALUE[1]
Minimum grab tensile strength (machine direction)	ASTM D4632	120 lb
Minimum grab tensile strength (cross machine direction)	ASTM D4632	100 lb
Maximum apparent opening size (equivalent standard sieve)	ASTM D4751	No. 30
Minimum Permittivity	ASTM D4491	0.05 s^{-1}
Minimum ultraviolet stability (strength retained at 500 hrs of exposure)	ASTM D4355	70 %

[1] All numerical values represent minimum or maximum average roll values. Average test results from all rolls in a lot must conform the tabulated values.

628.2.6.2 Fence Support System

(1) Conform to plan requirements.

628.2.7 Silt Screen

(1) Furnish fabric and submit a certificate of compliance certifying that the fabric conforms to the following:

Thickness ..... 15 mils
Minimum grab tensile strength..... 120 lb
Minimum equivalent opening ..... No.170 sieve

(2) Heat seal or sew all fabric seams.

(3) For flotation, use an 8-inch diameter solid expanded polystyrene log, or engineer-approved equal, with a buoyancy of approximately 20 pounds per foot. Do not use polystyrene beads or chips.

(4) For the main load line, use 5/16-inch cable. For ballast, use a 1/4-inch chain.

628.2.8 Sand Bags

(1) Furnish bags made of canvas, burlap, nylon, or other engineer-approved material filled with concrete sand or other engineer-approved granular material.

628.2.9 Polyethylene Sheeting

(1) Furnish 6 mil or thicker polyethylene sheeting conforming to ASTM D4397.

628.2.10 Turbidity Barriers

(1) Furnish barrier made of coated impervious fabric capable of containing all sediment at the location placed. It shall have a cable, with a 5/16 inch or larger diameter, capable of supporting the barrier at the required height above the water. It shall have a self-contained ballast that weighs at least 0.7 pound per foot. The ballast may be either chain or flexible cable. Barrier ends shall have grommets to lace together adjoining sections. For anchor posts use one of the following: steel fence posts, steel pipes, or steel channels.

(2) Submit a certificate of compliance certifying that the turbidity barrier fabric conforms to the following:

TEST REQUIREMENT	METHOD	VALUE[1]
Minimum grab tensile strength	ASTM D4632	200 lb
Minimum puncture strength	ASTM D4833	90 lb
Maximum permeability	ASTM D4491	$1x10^{-7}$ cm/s
Minimum ultraviolet stability (strength retained at 500 hrs of exposure)	ASTM D4355	70 %

[1] All numerical values represent minimum or maximum average roll values. Average test results from all rolls in a lot must conform the tabulated values.

628.2.11 Soil Stabilizer

(1) Soil stabilizer type A is one of the following: a cementitious soil binder added to wood cellulose fiber mulch, or a bonded fiber matrix. Soil stabilizer type B is a polyacrylimide.

(2) Furnish soil stabilizer products from the PAL.

628.2.12 Inlet Protection

(1) Use a type FF geotextile fabric conforming to 645.2.1 except use a woven polypropylene fabric. Furnish type FF geotextile fabrics, or bags manufactured from type FF geotextile fabrics, from the PAL.

628.2.13 Rock Bags

Revise 628.2.13(1) to change the design volume rock bags to make them easier to handle in the field. This change was implemented in ASP 6 effective with the November 2012 letting.

(1) Furnish rock bags made of a porous, ultraviolet resistant, high-density polyethylene or geotextile fabric that will retain 70% of its original strength after 500 hours of exposure according to ASTM D4355 and a minimum in-place filled size of 18 inches long by 12 inches wide by 6 inches high. Ensure that the fabric conforms to the following:

TEST REQUIREMENT	METHOD	VALUE
Minimum Tensile	ASTM D4632	
Machine direction		70 lb minimum
Cross direction		40 lb minimum
Elongation	ASTM D4632	
Machine direction		20% minimum
Cross direction		10 % min
Puncture	ASTM 4833	65 lbs minimum
Minimum Apparent Opening		0.0234 inches (No. 30 sieve)
Maximum Apparent Opening		0.0787 inches (No. 10 sieve)

(2) Fill the bags with a clean, sound, hard, durable, engineer-approved coarse aggregate conforming by visual inspection to the gradation specified for No. 2 coarse aggregate for concrete in 501.2.5.4.4.

628.2.14 Tracking Pads

(1) Furnish tracking pad aggregate conforming to 312.2 for select crushed material except the material shall be substantially free of particles passing the No. 10 sieve. Furnish type R geotextile conforming to 645.2.6.

628.3 Construction

628.3.1 General

(1) Arrange to have available a sufficient quantity of contract-required temporary erosion control materials to protect the project site from erosion at all times during construction. Include erosion mat, erosion bales, silt fence, manufactured alternative materials for temporary ditch checks, and other temporary erosion control materials the contract requires.

(2) Ensure that erosion control products selected from the PAL are properly installed and maintained to remain in place and functioning as the contract specifies.

628.3.2 Erosion Mat

(1) Furnish and install protective covering mats or soil retention mats for erosion control on prepared planting areas of slopes, ditches, channels, or shorelines, at locations the plans show or the engineer directs. Conform to the seasonal limitations designated in the PAL for photodegradable products.

(2) Install as the manufacturer specifies except as follows:

1. Do not use single roll material less than 6 feet wide in channels.
2. Entrench mats approximately 3 inches deep along the edge facing traffic for all installations within 5 feet of active traffic lanes.
3. Overlap mats by 3 inches or less and anchor with anchoring devices selected from the PAL for all mats the PAL designates as urban.

(3) Cover TRM's immediately after installation with materials from the PAL as follows:

1. On slopes use either an ECRM or a type A soil stabilizer. If using a soil stabilizer, apply at the manufacturer's recommended rate unless the contract or engineer specifies otherwise.

2. In channels use an ECRM of a class and type the PAL allows for channel applications.

(4) Remove all stones, clods, roots, sticks, or other foreign material that prevent the mat from bearing completely on the surface before placing the mat.

(5) Reseed any seeded areas damaged or destroyed during placement of the erosion mat as specified for the original seeding.

(6) Dispose of all surplus excavation or materials, and all stones, clods, or other foreign material removed in preparing for placing the mat.

(7) Apply water uniformly after placing the mat over a seeded area to sufficiently moisten the seedbed to a depth of 2 inches and in a way that precludes washing or erosion.

(8) Maintain the erosion mat and repair any damaged areas until the work is accepted.

(9) The contractor shall not overlap type urban erosion mat with type urban or other type erosion mat.

628.3.3 Erosion Bales

(1) Furnish bales of straw, hay, or other suitable baled material to form erosion control structures other than ditch checks. Install at locations the plans show or as the engineer directs.

(2) Maintain the bales as required including removing and disposing of sediment deposits. Remove erosion bales after slopes and ditches are stable and turf develops enough to make future erosion unlikely. The engineer will determine when the contractor meets these criteria satisfactorily. The contractor may use bales as mulch. Dispose of bales not used as mulch in a manner acceptable to the engineer. Reshape ditches; fill sumps and trenches; dispose of excess eroded material; and topsoil, fertilize, and seed the affected area.

628.3.4 Silt Fence

628.3.4.1 Installation and Removal

(1) Erect the silt fence before starting a construction operation that might cause sedimentation or siltation at the site of the proposed silt fence.

(2) If possible, construct the silt fence in an arc or horseshoe shape with its ends pointing up slope. Construct the silt fence to the dimensions, and according to the details the plans show. Remove silt fences, as the engineer determines, after stabilizing the slopes and ditches and developing the turf to the extent that future erosion is unlikely. Clean up and restore the surface after removal. The contractor owns all materials remaining after removal and is responsible for their disposal off the right of way.

628.3.4.2 Inspection and Maintenance

(1) Inspect all silt fences immediately after each rainfall and at least daily during prolonged rainfall. Correct any deficiencies immediately. Additionally, review the locations for silt fences and filter barriers in areas that construction activity changed the earth contour and drainage runoff on a daily basis to ensure that the silt fences are properly and effectively located. If deficiencies exist, install additional silt fences as the engineer directs or approves.

(2) Remove sediment deposits when the build-up exceeds approximately 1/2 the volume capacity of the silt fence. The engineer may order the contractor to remove deposits if the engineer determines deposits exceed 1/2 the volume capacity of the silt fence. The contractor shall dress, to the existing grade, sediment deposits remaining in place after the silt fence is no longer required, this includes topsoiling, fertilizing, and seeding the affected area.

628.3.5 Silt Screen

(1) Install the silt screen to prevent drift shoreward or downstream. Securely attach the flotation log to the fabric in both the horizontal and vertical direction.

(2) Attach the 5/16-inch cable at the flotation members and extend along the entire length of each section of silt screen. Seal a 1/4-inch chain in the lower hem for ballast.

(3) Use connectors to join the main load line and ballast chain to carry all tensile pressure. Join the fabric for its entire height with grommets and lacing rope.

(4) Ensure the silt screen extends from the water surface to a maximum 10 foot depth.

(5) Install anchorages or stakes on both shore and stream side to maintain stability. Use a post with deadman or engineer-approved equal for shore anchors. Ensure stream anchors are of sufficient size, type, and strength to stabilize the barrier beyond the construction area.

(6) Buoy anchors to prevent pulling the barrier under water. Use Danforth-type anchors in sandy bottom and heavy kedge type or mushroom anchors on mud bottoms.

(7) Maintain the barrier throughout construction operations.

(8) After completing the work, remove the barrier in a way that prevents siltation of the river.

628.3.6 Cleaning Sediment Basins

(1) Clean sediment basins when the engineer determines the sediment has accumulated to an extent that impairs the effectiveness of the sediment basin.

(2) Dispose of the surplus material according to 205.3.12 for disposal of surplus or unsuitable material.

628.3.7 Mobilizations for Erosion Control

(1) Move personnel, equipment, and materials to the project site for constructing erosion control items at the stages the contract indicates or the engineer directs.

(2) Submit for approval an ECIP required in 107.20 for accomplishing temporary and permanent erosion control work. Stage the ECIP erosion control work to conform to the number of Mobilizations Erosion Control bid items the contract plans show. The department will not allow any deviation from approved staging without the engineer's written approval. The engineer will direct each of the mobilizations. Mobilize with sufficient personnel, equipment, supplies, and incidentals, within 72 hours of the engineer's written order.

628.3.8 Mobilizations Emergency Erosion Control

(1) Move personnel, equipment, and materials to the project site to install temporary erosion control items on an emergency basis as the engineer directs.

(2) Mobilize with sufficient personnel, equipment, materials, and incidentals on the job site within 8 hours the engineer's written order to install temporary erosion control items on an emergency basis.

(3) An emergency is a sudden occurrence of a serious and urgent nature, beyond normal maintenance of erosion control items and mobilizations the ECIP includes. Under this definition, an emergency mobilization requires immediate action to move necessary personnel, equipment, and materials to the emergency site followed by immediate installation of temporary erosion control measures.

(4) Unless the engineer directs otherwise, replenish stockpiled material delivered as specified for plan quantities in 628.3.1 and subsequently used for emergency erosion control to the pre-emergency totals of these stockpiles.

628.3.9 Polyethylene Sheeting

(1) Install polyethylene sheeting at locations the plans show or as the engineer directs.

(2) Secure the sheeting from wind and water dislocation. Before placing, remove stones, roots, sticks, and other materials that interfere with the sheeting bearing completely on the soil. Overlap adjacent sheets a minimum of 3 feet in the direction of flow; and seal the edges with waterproof tape or other engineer-approved method. Patch damaged areas with sheeting overlapped a minimum of 3 feet and seal the joints with waterproof tape or other engineer-approved method. Maintain the sheeting and make satisfactory repairs of damaged areas.

(3) Upon completing the work, remove the polyethylene sheeting. The contractor shall assume ownership of all removed material.

628.3.10 Turbidity Barriers

(1) Install turbidity barriers at locations the plans show or as the engineer directs.

(2) Place all barriers, before beginning adjacent construction, in a way that causes minimum disturbance of the streambed and banks. Extend the barrier into the stream banks far enough to preclude washing out or erosion around the ends. Drive posts securely into the streambed at 10 foot intervals along the line of the barrier installation. Fasten the barrier to the posts and securely anchor the barrier load lines at the barrier ends and at 10 foot intervals between the barrier ends, unless the engineer directs otherwise. Provide additional anchoring if necessary to maintain the barrier location during construction operations. Install sand bags as the plans show to anchor the barrier to the streambed. The engineer may require additional sand bags to ensure adequate performance. The contractor, as required by permit under 107.19, shall provide and anchor both danger buoys and navigational markers.

(3) Maintain the integrity of the barrier as necessary to contain erosion from adjacent construction operations. Promptly correct all deficiencies. Barrier maintenance includes removing and disposing of accumulations of soil and other detrimental material.

(4) Remove the barrier after completing the adjacent work. Delay removal until removing and disposing of accumulated soils and other suspended materials, and all suspended materials settle. Minimize disturbing the streambed and banks during removal operations.

(5) If the engineer approves, the contractor may substitute sheet pile installed as a part of their construction operation for all or part of the turbidity barrier the plans show.

628.3.11 (Vacant)

628.3.12 Soil Stabilizer

628.3.12.1 General

(1) Provide soil stabilizer as a soil bonding agent to prevent or minimize erosion. Install on exposed soil surfaces of temporary or permanent slopes as the plans show or as the engineer directs.

628.3.12.2 Soil Stabilizer Type A

(1) Apply soil stabilizer with conventional hydraulic seeding equipment. Ensure that surrounding surfaces, structures, signs, trees, and shrubs are not over-sprayed. The engineer will not accept the work until the contractor satisfactorily cleans over-sprayed surfaces. Provide a finished application 3/16 inch to 1/4 inch thick.

(2) For permanent slope applications, sow seed separately, before applying the soil stabilizer, to ensure that the seed has direct contact with the soil.

628.3.12.3 Soil Stabilizer Type B

(1) Apply soil stabilizer with conventional hydraulic seeding equipment or by dry spreading. Apply the material at the manufacturer's recommended rate unless the engineer directs otherwise.

(2) For permanent slope applications, apply a department-approved mulch when applying the soil stabilizer or after applying it to protect the seed.

628.3.13 Inlet Protection

(1) Furnish, install, maintain, and remove type FF geotextile fabric, and fabric hold down and support systems for inlet protection where the plans show or the engineer directs. The contractor may provide manufactured alternatives selected from the PAL.

(2) For type A inlet protection, install around field inlets until establishing permanent soil stabilization; and around pavement inlets before placing curb, gutter, or curb & gutter.

(3) For type B inlet protection, install on curb, gutter, curb & gutter, and pavement inlets after placing the surrounding pavement surfaces.

(4) For type C inlet protection use a wooden 2 x 4, wrapped and secured in type FF geotextile fabric, installed in front of the curb head as the plans show. The wood shall not block the entire opening of the curb box.

(5) For type D inlet protection, the contractor may make the bag from type FF geotextile fabric or choose a manufactured type FF bag from the PAL. Ensure that the device is designed to fit the size and shape of the inlet. At a minimum, inspect and maintain after every precipitation event.

628.3.14 Temporary Ditch Checks

(1) Provide suitable ditch check materials, installed and maintained at locations the plans show or as the engineer directs.

(2) Construct temporary ditch checks using a double row of erosion bales or a manufactured alternative from the PAL. Place temporary ditch checks across ditches at locations the plans show or as the engineer directs immediately after shaping the ditches or slopes. Excavate upstream sumps as the engineer directs.

(3) Remove sediment deposits when the build-up exceeds approximately 1/2 the erosion bale structures volume capacity. The engineer may order the contractor to remove deposits if the engineer determines that sediment deposits exceed 1/2 the erosion bale structures volume capacity. Dispose of excess sediment as the engineer directs.

(4) Remove ditch checks after the slopes and ditches are stable and the turf develops enough to make future erosion unlikely. The engineer will determine when the contractor meets these criteria. The contractor may use bales as mulch. Dispose of bales not used as mulch in a manner acceptable to the engineer. Reshape the ditch; fill sumps and trenches; dispose of excess eroded material; and topsoil, fertilize, and seed the affected area.

628.3.15 Culvert Pipe Checks

(1) Install rock bag culvert pipe checks as the plans show and as the engineer directs. Place bags immediately after installing new culverts and before beginning earth disturbing activities in areas drained by existing culverts. Place rock bags on the inlet end of the culvert only. Leave rock bags in place until slopes and ditches are stable and turf develops enough to make future erosion unlikely. Periodically remove sediment to maintain effective function. Remove and dispose of the bags and rock filler when they are no longer needed to control erosion. Dispose of accumulated sediment and restore the site. The contractor may spread accumulated sediment to form a surface suitable for seeding.

628.3.16 Tracking Pads

(1) Install tracking pads at the locations the plans show, locations consistent with an engineer-approved ECIP, or where the engineer directs before allowing construction traffic to leave the site. Ensure that the pad is wide enough to cover the full width of the egress point. Design the installation to divert surface water flow away from the pad and, if field conditions dictate, provide a culvert to channel flow under the pad.

(2) Replace or rework material in the surface of the pad to ensure that the amount of material tracked onto public roads is minimized. Maintain the driving surface in a clean and safe operating condition. Remove the pad and restore the site upon completion of contract work.

628.3.17 Rock Bags

(1) Install rock bags as the plans show or the engineer directs either in conjunction with work done under other contract bid items or as stand-alone erosion control devices. Periodically remove sediment to maintain effective function. Remove and dispose of the bags and rock filler when they are no longer needed to control erosion. Dispose of accumulated sediment and restore the site. The contractor may spread accumulated sediment to form a surface suitable for seeding.

628.4 Measurement

628.4.1 General

628.4.1.1 Borrow Sites and Material Disposal Sites

(1) The department will measure work acceptably completed under selected bid items placed on borrow sites and material disposal sites if that work is consistent with an engineer-approved ECIP. The department will measure only the following bid items using the methods described in their respective measurement subsections:

Erosion Mat (type)	Soil Stabilizer (type)	Mulching
Erosion Bales	Culvert Pipe Checks	Seeding
Temporary Ditch Checks	Polyethylene Sheeting	Seeding Temporary
Silt Fence	Tracking Pads	Fertilizer Type (type)
Silt Fence Maintenance	Rock Bags	
Inlet Protection (type)	Mobilizations Emergency Erosion Control	

628.4.1.2 Sand Bags

(1) The department will not measure sand bags. Sand bags are incidental to the bid items that use sand bags.

628.4.2 Erosion Mat

(1) The department will measure the Erosion Mat bid items by the square yard acceptably completed. The department will not make allowance for portions of the mat that must be entrenched in the soil for any end or junction slot, or for required overlaps.

628.4.3 (Vacant)

628.4.4 Erosion Bales

(1) The department will measure Erosion Bales as each individual bale acceptably completed.

628.4.5 (Vacant)

628.4.6 Silt Fence

(1) The department will measure Silt Fence by the linear foot acceptably completed. The department will measure along the base of the fence, center-to-center of end post, for each section of fence.

628.4.7 (Vacant)

628.4.8 Silt Fence Maintenance

(1) The department will measure Silt Fence Maintenance by the linear foot acceptably completed. The department will measure along the base of the fence, end-to-end of the section maintained, for each time a section of fence is cleaned and repaired.

628.4.9 Silt Screen

(1) The department will measure Silt Screen by the linear foot acceptably completed.

628.4.10 Cleaning Sediment Basins

(1) The department will measure Cleaning Sediment Basins by the cubic yard acceptably completed, measured in the vehicle.

628.4.11 Mobilizations Erosion Control

(1) The department will measure Mobilizations Erosion Control by each individual mobilization acceptably completed. The department will not include the following:

1. Delivering and installing materials provided for in specific contract bid items.
2. Work specified under the Mobilizations Emergency Erosion Control bid item, or the work and operations necessary for normal contractor maintenance of erosion control items.
3. The movement of personnel, equipment, and materials to the work site to accomplish installing additional erosion control items the engineer deems necessary to control erosion between the stages contained in the department-approved plan of operations, unless the engineer directs otherwise in writing.

628.4.12 Mobilizations Emergency Erosion Control

(1) The department will measure Mobilizations Emergency Erosion Control by each individual mobilization acceptably completed. The department will not include delivering and installing temporary erosion control materials provided for in specific contract bid items.

628.4.13 Polyethylene Sheeting

(1) The department will measure Polyethylene Sheeting by the square yard acceptably completed.

628.4.14 Turbidity Barriers

(1) The department will measure Turbidity Barrier by the square yard acceptably completed. The department will make no allowance for portions of the turbidity barrier considered as part of the anchorages, required overlaps, or having a bottom flap greater than 48 inches.

(2) If the contractor substitutes sheet pile for turbidity barrier as allowed in 628.3.10, the department will measure that turbidity barrier as the plan quantity in square yards of material replaced.

628.4.15 Soil Stabilizer

(1) The department will measure the Soil Stabilizer bid items by the acre acceptably completed within the limits the contract designates or as the engineer directs.

628.4.16 Inlet Protection

(1) The department will measure the Inlet Protection bid items as each individual location and type acceptably completed.

628.4.17 Temporary Ditch Checks

(1) The department will measure Temporary Ditch Checks by the linear foot acceptably completed. If using erosion bales, the department will only measure the length across the ditch, not the length of each row of bales. The department will not measure ditch checks constructed with a single row of bales.

628.4.18 (Vacant)

628.4.19 Culvert Pipe Checks

(1) The department will measure Culvert Pipe Checks as each as each individual bag acceptably completed.

628.4.20 Tracking Pads

(1) The department will measure Tracking Pads as each individual location acceptably completed measured only at the locations the plans show, consistent with an engineer-approved ECIP, and where the engineer directs.

628.4.21 Rock Bags

(1) The department will measure Rock Bags as each individual bag acceptably completed.

628.5 Payment

628.5.1 General

(1) The department will pay for measured quantities at the contract unit price under the following bid items:

ITEM NUMBER	DESCRIPTION	UNIT
628.1104	Erosion Bales	EACH
628.1504	Silt Fence	LF
628.1520	Silt Fence Maintenance	LF
628.1550	Silt Screen	LF
628.1905	Mobilizations Erosion Control	EACH
628.1910	Mobilizations Emergency Erosion Control	EACH
628.1920	Cleaning Sediment Basins	CY
628.2000 - 2099	Erosion Mat (class) (type)	SY
628.5505	Polyethylene Sheeting	SY
628.6005	Turbidity Barriers	SY
628.6500 - 6599	Soil Stabilizer (type)	ACRE
628.7000 - 7099	Inlet Protection (type)	EACH
628.7504	Temporary Ditch Checks	LF
628.7555	Culvert Pipe Checks	EACH
628.7560	Tracking Pads	EACH
628.7570	Rock Bags	EACH

(2) The department will pay for measured quantities at the contract unit price under selected bid items placed on borrow sites and material disposal sites if that work is consistent with an engineer-approved ECIP. The department will pay for only the following bid items using the methods described in their respective payment subsections:

- Erosion Mat (type)
- Erosion Bales
- Temporary Ditch Checks
- Silt Fence
- Silt Fence Maintenance
- Inlet Protection (type)
- Soil Stabilizer (type)
- Culvert Pipe Checks
- Polyethylene Sheeting
- Tracking Pads
- Rock Bags
- Mobilizations Emergency Erosion Control
- Mulching
- Seeding
- Seeding Temporary
- Fertilizer Type (type)

628.5.2 Erosion Mat

(1) Payment for the Erosion Mat bid items is full compensation for providing, protecting, and storing erosion mat materials on the project; for placing and anchoring the mat, including staples; for preparing the seeded areas; for installing end and junction slots; for repairing and reseeding damaged areas; for providing and applying water; and for disposing of all surplus and waste materials.

(2) The department will pay separately for covering class III types B, C, and D mats with an ECRM under the applicable Erosion Mat bid item, or with type A soil stabilizer under the Soil Stabilizer Type A bid item.

628.5.3 (Vacant)

628.5.4 Erosion Bales

(1) Payment for Erosion Bales is full compensation for providing, protecting, and storing erosion bales on the project; for placing all materials, including stakes; for anchoring the bales; for all excavating, including trenches and sumps; for removing excess sediment during construction; for removing and disposing of the bales and all waste or surplus materials, including eroded materials; and for shaping and restoring ditches.

(2) The department will pay separately for any required topsoiling, fertilizing, or seeding under the applicable bid item.

628.5.5 (Vacant)

628.5.6 Silt Fence

(1) Payment for Silt Fence is full compensation for providing, protecting, and storing silt fence on the project; for erecting fence, including all excavating, placing posts, backfilling, and attaching geotextile fabric; and for removing the fence at project completion.

628.5.7 (Vacant)

628.5.8 Silt Fence Maintenance

(1) Payment for Silt Fence Maintenance is full compensation for all required cleaning and repairing; for removing or spreading the accumulated sediment to form a surface suitable for seeding; and for replacing silt fence and all damages caused by overloading sediment material or ponding water adjacent to the silt fence.

628.5.9 Silt Screen

(1) Payment for Silt Screen is full compensation for providing, assembling, erecting, maintaining, and removing the silt screen barrier.

628.5.10 Cleaning Sediment Basins

(1) Payment for Cleaning Sediment Basins is full compensation for all excavating; and for disposing of surplus material.

628.5.11 Mobilizations Erosion Control

(1) Payment for Mobilizations Erosion Control is full compensation for the staged moving of personnel, moving equipment, and moving materials. The department will pay separately for delivery and installation of erosion control devices under the other bid items in this section.

(2) Failure to mobilize within 72 hours of the engineer's written order will result in a $300 per calendar day deduction from money due under the contract, for each calendar day of delay. The engineer may extend the 72-hour period for delays not the contractor's fault.

628.5.12 Mobilizations Emergency Erosion Control

(1) Payment for Mobilizations Emergency Erosion Control is full compensation for the staged moving of personnel, moving equipment, and moving materials. The department will pay separately for delivery and installation of temporary erosion control devices under the other bid items in this section.

(2) Failure to mobilize within 8 hours, will result in a $300 per calendar day deduction from money due under the contract, for each calendar day of delay. The engineer may extend the 8-hour period for delays not the contractor's fault.

628.5.13 Polyethylene Sheeting

(1) Payment for Polyethylene Sheeting is full compensation for furnishing and delivering the polyethylene sheeting to the project site; for storing on the project; for installing the sheeting; for all excavating and backfilling; for securing the sheeting and sealing the edges of the sheeting; and for removing and disposing of the sheeting and surplus materials.

628.5.14 Turbidity Barriers

(1) Payment for Turbidity Barriers is full compensation for furnishing, assembling, installing, maintaining, and removing the turbidity barrier; and for sandbags, buoys, navigational markers, anchors, and anchor ropes.

(2) If the contractor substitutes sheet pile for turbidity barrier as allowed in 628.3.10, the department will pay for the plan quantity of turbidity barrier replaced.

628.5.15 Soil Stabilizer

(1) Payment for the Soil Stabilizer bid items is full compensation for furnishing, mixing, and applying soil stabilizer.

628.5.16 Inlet Protection

(1) Payment for the Inlet Protection bid items is full compensation for furnishing, transporting, and installing all materials; and for maintaining and removing the inlet protection devices.

628.5.17 Temporary Ditch Checks

(1) Payment for Temporary Ditch Checks is full compensation for providing, protecting, and storing ditch check materials on the project; for installing and removing ditch checks at project completion or as the engineer directs; for repairing and reseeding damaged areas; and for disposing of all surplus and waste material.

(2) The department will not pay for installing ditch checks if constructed of a single row of erosion bales.

628.5.18 (Vacant)

628.5.19 Culvert Pipe Checks

(1) Payment for Culvert Pipe Checks is full compensation for furnishing and installing rock bags;; for periodic sediment removal; for removing and disposing of rock bags and rock filler; for disposing of surplus eroded materials; and for restoring the site.

628.5.20 Tracking Pads

(1) Payment for Tracking Pads is full compensation for providing tracking pads including aggregate and geotextile; for replacing or reworking material as required to maintain performance; and for removing the pad and restoring the site.

628.5.21 Rock Bags

(1) Payment for Rock Bags is full compensation for providing rock bags; for periodic sediment removal; for removing and disposing of rock bags and rock filler; for disposing of surplus eroded materials; and for restoring the site.

Section 629 Fertilizer and Agricultural Limestone

629.1 Description

(1) This section describes furnishing and incorporating fertilizing material in the soil on areas of proposed seeding or proposed sodding.

(2) This section also describes furnishing and incorporating agricultural limestone in the soil.

629.2 Materials

629.2.1 Fertilizers

629.2.1.1 General

(1) Use fertilizers for seeding, sodding, or other planting that are standard, commercial, packaged or bulk products, in granular or liquid form conforming to Wisconsin statutes and the Wisconsin administrative code chapter ATCP 40. Ensure that each container of packaged fertilizer is plainly marked with the analysis of the contents showing minimum percentages of total nitrogen, available phosphoric acid, and soluble potash. If furnishing the fertilizer in bulk, include an invoice in each shipment indicating the minimum percentages of total nitrogen, available phosphoric acid, and soluble potash in the contents.

(2) If using fertilizer with a total of nitrogen, phosphoric acid, and potash greater than 32 percent for type A or 50 percent for type B, apply them at a rate that provides equal nitrogen, phosphoric acid, and potash.

629.2.1.2 Type A

(1) Type A fertilizer shall conform to the following minimum requirements:

Nitrogen, not less than	16%
Phosphoric Acid, not less than	6%
Potash, not less than	6%

(2) The total of nitrogen, phosphoric acid, and potash shall equal at least 32 percent.

(3) Total nitrogen shall at least equal the sum of the phosphoric acid and soluble potash.

629.2.1.3 Type B

(1) Type B fertilizer shall conform to the following minimum requirements:

Nitrogen, not less than	16%
Phosphoric Acid, not less than	6%
Potash, not less than	24%

(2) The total of nitrogen, phosphoric acid, and potash shall equal at least 50 percent.

629.2.2 Agricultural Limestone

(1) Conform to chapter 94.66 of the Wisconsin statutes and of the Wisconsin administrative code chapter ATCP 44. Furnish limestone with a neutralizing index of not less than 40 or more than 109.

(2) Before using, furnish a statement to the engineer indicating the index zone or grade of the limestone for each deposit.

629.3 Construction

629.3.1 Fertilizer

629.3.1.1 General

(1) Uniformly apply the fertilizer selected for the seeding areas and incorporate into the soil by light discing or harrowing. If applying granular fertilizer, ensure it is well pulverized and free from lumps.

(2) If incorporating fertilizer into topsoiled areas, the contractor may apply it just before, and in conjunction with, final discing or harrowing, or if hand manipulating the topsoil, apply it just before final raking and leveling.

(3) If placing fertilizer on surfaces with no topsoil, prepare the soil by discing or harrowing to at least 6 inches deep and then incorporate the fertilizer as specified above.

(4) If sowing seeding areas by pressure sprayer, then fertilize by placing the required amount of fertilizer in the tank, mixing with the water and the seed, agitating constantly, and apply during the seeding operation. If applying fertilizer this way then the department will not require discing and harrowing after placement.

(5) If fertilizing areas to receive sod, spread the fertilizer uniformly over the soil before sodding at the rate specified below, and then work the fertilizer into the soil while preparing as specified for preparing the earth bed in 631.3.1.

(6) If applying fertilizer for work specified under section 632, then apply the fertilizer as specified in that section.

629.3.1.2 Type A

(1) Apply fertilizer containing 32 percent total of nitrogen, phosphoric acid, and potash at 7 pounds per 1000 square feet, unless the contract specifies otherwise. For type A fertilizer that contains a different percentage of components, determine the new application rate by multiplying the specified rate by a dimensionless conversion factor determined as follows:

Conversion Factor = 32 / New Percentage of Components

629.3.1.3 Type B

(1) Apply fertilizer containing 50 percent total of nitrogen, phosphoric acid, and potash at 7 pounds per 1000 square feet, unless the contract specifies otherwise. For type B fertilizer that contains a different percentage of components, determine the new application rate by multiplying the specified rate by a dimensionless conversion factor determined as follows:

Conversion Factor = 50 / New Percentage of Components

629.3.2 Agricultural Limestone Treatment

(1) Unless the contract specifies otherwise, spread agricultural limestone over the contract-designated areas at a uniform rate, measured in pounds per 1000 square feet, as follows:

INDEX ZONES	40-49	50-59	60-69	70-79	80-89	90-99	100-109
RATE	140	120	100	90	80	70	60

(2) To conveniently check the required application rate, the contractor may measure materials used on a volumetric basis, providing the conversion from weight to volume is determined from representative samples of materials used.

(3) Incorporate the agricultural limestone with the required fertilizers into the soils in the designated areas. The pertinent construction requirements applicable to fertilizers shall apply to those materials also.

629.4 Measurement

(1) The department will measure the Fertilizer bid items by the hundred pounds (CWT) acceptably completed, measured based on an application rate of 7 pounds per 1000 square feet. The department will not measure fertilizer used for the bid items under section 632. The measured quantity equals the number of hundred-weight (CWT) of material determined by multiplying the actual number of cwt. of material incorporated by the ratio of the actual percentage of fertilizer components used to 32 percent for type A and to 50 percent for Type B.

(2) The department will measure Agricultural Limestone Treatment by the ton acceptably completed, measured based on an application rate of 100 pounds per 1000 square feet and an index zone of 60-69. The measured quantity equals the number of tons of material determined by multiplying the actual number of tons of material incorporated by 100 and dividing by the application rate required for the index zone of the material used.

629.5 Payment

(1) The department will pay for measured quantities at the contract unit price under the following bid items:

ITEM NUMBER	DESCRIPTION	UNIT
629.0200 - 0299	Fertilizer (type)	CWT
629.1100	Agricultural Limestone Treatment	TON

(2) Payment for the Fertilizer bid items is full compensation for providing, hauling, placing, and incorporating in the work.

(3) Payment for Agricultural Limestone Treatment is full compensation for furnishing, hauling, placing, and incorporating the required materials in the soil.

Section 630 Seeding

630.1 Description

(1) This section describes preparing seed beds and furnishing and sowing the required seed on slopes, appurtenances, and other areas, and on borrow pits and material disposal sites.

(2) This section also describes furnishing and sowing temporary seed mixture on the slopes and appurtenances of temporary embankments and roadways.

630.2 Materials

630.2.1 Seed

630.2.1.1 General Requirements

(1) Conform to the Wisconsin statutes and Wisconsin administrative code chapter ATCP 20 regarding noxious weed seed content and labeling.

(2) Use seed within one year of the test date appearing on the label.

(3) Seed mixtures 70, 70A, 75, and 80 contain wild type forbs and grasses. Wild type is defined as seed that is derived directly from native, wild stock, including seed that was wild collected and placed into production or has been harvested directly from native stands.

630.2.1.2 Purity and Germination

(1) Test seed according to the methods and procedures used for sampling and analyzing seed for purity, germination, and noxious weed seed content specified in the current edition of Rules for Testing Seed, published by the Association of Official Seed Analysts.

630.2.1.3 Inoculation

(1) Inoculate legume seed (white clover, red clover, ladino clover, alsike clover, alfalfa, partridge pea, purple prairie clover, Canada tick-trefoil, and lupine) unless it has been pre-inoculated by the vendor. Follow the inoculation instructions that come with the culture purchases. If applying the seed according to method B, 630.3.3.2, treat seeds requiring inoculation with 5 times the amount of inoculant recommended in the instructions.

(2) Avoid exposure of the culture or inoculated seed to the sunlight, and in no case shall any exposure exceed 1/2 hour.

630.2.1.4 Storing Seed

(1) Store any seed delivered before use in a way that protects it from damage by heat, moisture, rodents, or other causes. Discard and replace any previously tested and accepted seed that becomes damaged.

630.2.1.5 Seed Mixtures

630.2.1.5.1 Right of Way

630.2.1.5.1.1 Permanent

630.2.1.5.1.1.1 Composition

(1) Seed mixtures for use on the right of way and easements shall, unless specified otherwise, be composed of seeds of the purity, germination, and proportions, by weight, as given in the Table of Highway Seed Mixtures and the Table of Native Seed Mixtures.

(2) Use seed of the species and varieties listed below. If no variety is listed, there will be no restriction on the variety furnished, except as follows:

1. Species composed of pure live seed (PLS) shall contain no named or improved varieties. PLS shall be grown in Wisconsin or northern Illinois, northeastern Iowa, or eastern Minnesota. Seed produced out-of-state must be grown in one of the following counties:

1.1 From northern Illinois:

Boone	Bureau	Carroll	Cook	De Kalb	Du Page	Grundy
Henry	Jo Daviess	Kane	Kendall	Lake	La Salle	Lee
McHenry	Ogle	Putnam	Rock Island	Stevenson	Whiteside	Will
Winnebago						

1.2 From northeastern Iowa:

Allamakee	Benton	Black Hawk	Bremer	Buchanan	Cedar	Chickasaw
Clayton	Clinton	Delaware	Dubuque	Fayette	Floyd	Howard

Jackson	Johnson	Jones	Linn	Mitchell	Muscatine	Scott
Winneshiek						

1.3 From eastern Minnesota:

Aitkin	Anoka	Carlton	Carver	Chisago	Dakota	Dodge
Fillmore	Goodhue	Hennepin	Houston	Isanti	Kanabec	La Sueur
Mille Lacs	Mower	Olmsted	Pine	Ramsey	Rice	Scott
Sherburne	Steele	Wabasha	Washington	Winona	Wright	

2. PLS for seed mixtures 70, 70A, 75, and 80 shall be packaged separately by species and clearly labeled with the vendor's name, species common and botanical names, gross weight, percent PLS, year of harvest and any specialized treatments that have been applied to ensure or enhance germination. If PLS is not listed, determine PLS by multiplying the percent germination times the percent purity.

3. Minimum percent purity for native for species is 90 percent. If a listed species is not available, substitutions may be made with engineer's approval and must be documented.

(3) Mix native species at the project site. Clean and debeard seeds having awns or excessive hairs before mixing.

SPECIES COMMON NAME	SPECIES BOTANICAL NAME	ACCEPTABLE VARIETIES
Kentucky Bluegrass	Poa pratensis	Low Maintenance
Red Fescue	Festuca rubra	Creeping
Hard Fescue	Festuca ovina var. duriuscula	Improved
Tall Fescue	Festuca arundinacea	Improved turf type
Salt Grass	Puccinella distans	Fult's
	Puccinella distans	Salty
Redtop	Agrostis alba	
Timothy	Phleum pratense	
Canada Wild Rye[1]	Elymus canadensis	
Perennial Ryegrass	Lolium perenne	
Perennial Ryegrass	Lolium perenne	Improved Fine
Annual Ryegrass	Lolium multiflorum	
Alsike Clover	Trifolium hybridum	
Red Clover	Trifolium pratense	
White Clover	Trifolium repens	
Japanese Millet	Echinochola crusgalli var. frumentacea	
Annual Oats	Avena sativa	
Alfalfa	Medicago sativa	
Bromegrass	Bromus inermis	
Orchardgrass	Dactylis glomerata	
Ladino Clover	Trifolium repens var. latum	Ladino
Agricultural Rye	Secale cereale	
Winter Wheat	Triticum aestivum	

[1] Pure live seed

TABLE 630-1 HIGHWAY SEED MIXTURES

SPECIES	PURITY minimum %	GERMINATION minimum %	MIXTURE PROPORTIONS in percent				
			NO.10	NO.20	NO.30	NO.40	NO.60
Kentucky Bluegrass	98	85	40	6	10	35	
Red Fescue	97	85	25		30	20	
Hard Fescue	97	85		24	25	20	
Tall Fescue	98	85		40			
Salt Grass	98	85			15		
Redtop	92	85	5				
Timothy	98	90					12
Canada Wild Rye		PLS[1]					10
Perennial Ryegrass	97	90	20	30			
Improved Fine Perennial Ryegrass	96	85			20	25	
Annual Ryegrass	97	90					30
Alsike Clover	97	90					4
Red Clover	98	90					4
White Clover	95	90	10				
Japanese Millet	97	85					20
Annual Oats	98	90[1]					20

[1] Substitute winter wheat for annual oats in fall plantings started after September 1.

TABLE 630-2 NATIVE SEED MIXTURES

	SPECIES	SPECIES BOTANICAL NAME	PURITY & GERMINATION minimum %	MIXTURE PROPORTIONS in percent			
				NO. 70	NO. 70A	NO. 75	NO. 80
FORBES	Canada Anemone	*Anemone canadensis*	PLS	2			
	Butterflyweed	*Asclepias tuberosa*	PLS		2		
	New England Aster	*Aster novae-angliae*	PLS	2	2		
	Partridge-pea	*Chamaecrista (Cassia) fasciculata*	PLS		2		
	Purple Prairie Clover	*Dalea (Petalostemum) purpurea*	PLS	2	2	4	
	Canada Tick-trefoil	*Desmodium canadense*	PLS	2			
	Flowering Spurge	*Euphorbia corollata*	PLS		2		
	Wild Geranium	*Geranium maculatum*	PLS	2			
	Western Sunflower	*Helianthus occidentaalis*	PLS	3	2		
	Rough Blazingstar	*Liatris aspera*	PLS		2		
	Prairie Blazingstar	*Liatris pycnostachya*	PLS	2			
	Lupine	*Lupinus perennis*	PLS		3		
	Wild Bergamot	*Monarda fistulosa*	PLS	2			
	Horse Mint	*Monarda punctata*	PLS		2		
	Yellow Coneflower	*Ratibida pinnata*	PLS	2	2		
	Blackeyed Susan	*Rudbeckia hirta*	PLS			1	
	Showy Goldenrod	*Solidago speciosa*	PLS	2	2		
	Spiderwort	*Tradescantia ohiensis*	PLS	2	2		
	Golden Alexanders	*Zizia aurea*	PLS	2			
GRASSES	Big Bluestem	*Andropogon gerardi*	PLS	15	15	10	
	Sideoats Grama	*Bouteloua curtipendula*	PLS	15	20	20	25
	Canada Wildrye	*Elymus Canadensis*	PLS	15	15	35	23
	Slender Wheatgrass	*Elymus trachycaulus*	PLS				20
	Junegrass	*Koeleria macrantha*	PLS		5		
	Annual Ryegrass	*Lolium multiflorum*	[1]			10	10
	Switchgrass	*Panicum virgatum*	PLS				10
	Salt Grass	*Puccinella distans*	[1]				2
	Little Bluestem	*Schizachyrium (Andropogon) scoparium*	PLS	15	20	10	10
	Indiangrass	*Sorgastrum nutans*	PLS	15		10	
ALTERNATE FORBES	Sky Blue Aster	*Aster azureus*	PLS	[2]	[2]		
	White Wild Indigo	*Baptisia leucantha*	PLS	[2]	[2]		
	Pale Purple Coneflower	*Echinacea pallida*	PLS	[2]	[2]		
	White Prairie Clover	*Petalostemum candidum*	PLS	[2]	[2]		
	Stiff Goldenrod	*Solidago rigida*	PLS	[2]	[2]		
	Hoary Vervain	*Verbena stricta*	PLS	[2]	[2]		

[1] Provide the minimum purity and germination specified in 630.2.1.5.1.1.1(3) in the table of highway seed mixtures.

[2] The contractor may, if the engineer approves, substitute an alternate forb for a required forb that is not available using the same percentage as specified for the required forb. Use a different alternate forb for each unavailable required forb. Provide documentation showing that a required forb is not available before using an alternate.

630.2.1.5.1.1.2 Mixture

(1) The contractor shall select a seed mixture or mixtures that meet with the engineer's approval, and unless specified otherwise in the contract, shall conform to the following:

1. Use seed mixture No. 10 where average loam, heavy clay, or moist soils predominate.
2. Use seed mixture No. 20 where light, dry, well-drained, sandy, or gravelly soils predominate and for all high cut and fill slopes generally exceeding 6 to 8 feet, except where using No. 70.
3. Use seed mixture No. 10 or No. 20 on all ditches, inslopes, median areas, and low fills, except where using No. 30 or No. 70.
4. Use seed mixture No. 30 for medians and on slopes or ditches generally within 15 feet of the shoulder where a salt-tolerant turf is preferred.
5. Use seed mixture No. 40 in urban or other areas where a lawn type turf is preferred.
6. Use seed mixture No. 60 only on areas, the contract designates or the engineer specifies. Use it as a cover seeding for newly graded wet areas or as a nurse crop for specified wetland seed mixtures. The contractor shall not apply it to flooded areas.
7. Use seed mixture Nos. 70 and 70A on slopes and upland areas the contract designates or the engineer specifies. Use seed mixture No. 70 on loamy soils and seed mixture No. 70A on sandy soils.
8. Use seed mixture No. 75 where native grasses are desired for erosion control.
9. Use seed mixture No. 80 on inslopes where a salt tolerant seed mix containing native grasses is desired.

630.2.1.5.1.2 Temporary

(1) Under the Seeding Temporary bid item, use a temporary seed mixture conforming to 630.2.1.5.1.4. Use oats in spring and summer plantings. Use winter wheat or rye for fall plantings started after September 1.

630.2.1.5.1.3 Nurse Crop

(1) If seeding bare soil with either mixture 70, 70A, 75, or 80, include the Seeding Nurse Crop bid item.

630.2.1.5.1.4 Borrow Pits and Material Disposal Sites

(1) For seeding borrow pits and material disposal sites beyond the right of way, use seed mixtures conforming to seed mixture 10, 20, 70, 70A, or 75 of 630.2.1.5.1.1 or a borrow pit mixture composed of seeds of the species, purity, germination and proportions, by weight as given below:

PERMANENT		
SPECIES	% MINIMUM PURITY	% MINIMUM GERMINATION
Alfalfa	98	90
Bromegrass	85	85
Orchardgrass	80	85
Timothy	98	90
Red Clover	98	90
Alsike Clover	97	90
Ladino Clover	95	90
Kentucky Bluegrass	98	85

TEMPORARY		
SPECIES	% MINIMUM PURITY	% MINIMUM GERMINATION
Annual Oats	98	90
Agricultural Rye	97	85
Winter Wheat	95	90

NURSE CROP		
SPECIES	% MINIMUM PURITY	% MINIMUM GERMINATION
Annual Oats	98	90
Annual Ryegrass	97	90
Winter Wheat	95	90

(2) For the borrow pit mixture use, by weight, 60 percent temporary species seeds and 40 percent permanent species seeds.

(3) For the temporary component, use any combination of temporary seeds listed in the table above.

(4) For the permanent component, use seeds from not more than 4 of the permanent species listed in the table above in any combination.

(5) When nurse crop is required for spring seeding before June 15, use annual oats. For fall seeding after October 15, use winter wheat, or annual ryegrass.

630.3 Construction

630.3.1 General

(1) If not protecting with a mulch cover, perform seeding, except Nos. 60, 70 and 70A mixtures at times of the year when temperature and moisture conditions are suitable for seeding, except during midsummer.

(2) Perform seeding, except Nos. 60, 70 and 70A mixtures, in conjunction with mulching as specified in section 627 at any time the engineer allows.

(3) The contractor may perform seeding of Nos. 60, 70 and 70A mixtures at any time soil conditions are suitable, except between June15 and October 15, unless the engineer allows otherwise.

(4) Perform seeding with the selected seed mixture, sown at the specified rate.

630.3.2 Preparation of Seed Bed

(1) Complete grading, shouldering, topsoiling, and fertilizing, if part of the work under contract, before permanent seeding, except the contractor may place the fertilizer and seed mixture in one operation if using equipment designed for the purpose.

(2) Just before seeding, work the area being seeded with discs, harrows, or other appropriate equipment to obtain a reasonably even and loose seedbed. Place topsoil as specified in 625.3.3.

630.3.3 Sowing

(1) Select the method of sowing from either method A, method B, method C, or an appropriate combination of methods A, B, and C. Obtain the engineer's approval for the sowing method and specific procedures used for each seed mixture used before sowing that mixture.

630.3.3.1 Method A

(1) Sow the selected seed mixture using equipment adapted to the purpose, or by scattering it uniformly over the areas to be seeded. Lightly rake or drag to cover the seed with approximately 1/4 inch of soil. After seeding, lightly roll or compact the areas using suitable equipment, preferably the cultipacker type, when the engineer judges the seedbed too loose, or if the seedbed contains clods that might reduce seed germination. The contractor shall not roll slopes steeper than 1:3.

(2) If scattering seed by hand, perform this work with satisfactory hand seeders and only when the air is calm enough to prevent seeds from blowing away.

630.3.3.2 Method B

(1) Sow or spread the seed upon the prepared bed using a stream or spray of water under pressure and operated from an engineer-approved machine designed for that purpose. Place the selected seed mixture and water into a tank, provided within the machine, in sufficient quantities that when spraying the seed on a given area it is uniformly spread at the required application rate. During this process, keep the tank contents stirred or agitated to provide uniform distribution. Spread the tank contents within one hour after adding the seed to the tank. The engineer will reject seed that remains mixed with the water for longer than one hour. The engineer will not require dragging or rolling.

630.3.3.3 Method C

(1) For spring seeding of seed mixtures 70 and 70A into existing ground cover, mow existing vegetation to 4 inches or less in height 2 to 4 weeks before seeding. Ten to 14 days after mowing, spray with vegetation control herbicide conforming to 632.2.12.

(2) For fall seeding of seed mixtures 70 and 70A into existing ground cover, mow existing vegetation to 4 inches or less in height 4 to 6 weeks before seeding. Ten to 14 days after mowing, spray with vegetation control herbicide conforming to 632.2.12. Retreat with vegetation control herbicide 10 to 14 days after initial application if live vegetation persists.

(3) Seed with a rangeland type drill with one or more seed boxes that can be calibrated independently to deliver different sized seeds uniformly at the required rate and equipped with a rear-mounted press wheel for each seed drop tube. If seeding into existing vegetation or thatch, use a rangeland type drill equipped with a no-till attachment that can cut through the vegetation or thatch in front of the V disc and seed drop tube. If the configuration of the area to be seeded allows, apply seed at 1/2 the specified seed rate and apply the second 1/2 in a perpendicular direction.

630.3.3.4 Borrow Pits and Material Disposal Sites

(1) Seed borrow pits, and material disposal sites off the right of way, with the selected seed mixture specified in 630.2.1.5.1.4. Consult with the landowner or the landowner's agent when selecting the seed mixture.

630.3.3.5 Seeding Rates

630.3.3.5.1 Right of Way

(1) Use the following sowing rate for seeds in pounds per 1000 square feet:

- Seed mixture No. 10 at 1.5 pounds
- Seed mixture No. 20 at 3 pounds
- Seed mixture No. 30 at 2 pounds
- Seed mixture No. 40 at 2 pounds
- Seed mixture No. 60 at an equivalent seeding rate of 1.5 pounds[1]
- Seed mixture No. 70 or 70A at 0.4 pounds
- Seed mixture No. 75 at an equivalent seeding rate of 0.7 pounds[1]
- Seed mixture No. 80 at an equivalent seeding rate of 0.8 pounds[1]
- Temporary seeding at 3 pounds
- Nurse crop seeding at 0.8 pounds

[1] Determine the actual seeding rate by multiplying the equivalent seeding rate by the sum of the unadjusted and adjusted percentages of the various species in the seed mixtures as sown.

(2) The unadjusted percentage equals the minimum percent of purity and germination specified in the table of seed mixtures contained in 630.2.1.5.1.1.1 for the applicable species.

(3) Obtain the adjusted percentage for each of the PLS species by dividing the specified percentage of the species by the product of the percent of purity and the percent of germination for each of the PLS species as delivered.

630.3.3.5.2 Borrow Pits and Material Disposal Areas

(1) For seeding borrow pits and material disposal off the right of way, sow the seed mixtures specified in 630.2.1.5.1.4 at the following rates per pound per 1000 square feet:

- Seed mixture No. 10 at 0.75 pound
- Seed mixture No. 20 at 1 pound
- Seed mixture No. 70 or 70A at 0.4 pounds
- Seed mixture No 75 at 0.7 pounds
- Borrow pit mixture at 1.5 pounds

630.3.3.6 Establishment Period for Native Seeding

(1) During the growing season after planting seed mixture 70 or 70A, mow all seeded areas twice as the engineer directs. Mow vegetation back to 6 inches when it has reached a height of at least 12 inches.

(2) During the growing season after planting seed mixture 70 or 70A, eradicate the following species from the seeded areas as soon as they become evident:

SPECIES COMMON NAME	SPECIES BOTANICAL NAME
Musk thistle	Carduus nutans
Spotted knapweed	Centaurea maculosa
Canada thistle	Cirsium arvense
Bull thistle	Cirsium vulgare
Field bindweed	Convolvulus arvensis
Leafy spurge	Euphorbia esula
Sweetclover	Melilotus species
Wild parsnip	Pastinaca sativa

(3) Eradicate by hand pulling or by applying a vegetation control herbicide conforming to 632.2.12 to individual plants.

630.4 Measurement

(1) The department will measure the Seeding bid items by the pound acceptably completed.

(2) The department will measure quantities based on net weights of seed shipments, or on quantities weighed on department-approved scales the contractor furnishes.

(3) The department will make deductions for all quantities wasted or not actually incorporated in the work according to the contract.

(4) The department will determine the equivalent pounds of seed furnished and applied by dividing the actual pounds of seed applied by the sum of the unadjusted and adjusted percentages of the various species in the seed mixture sown.

(5) The department will use the unadjusted and adjusted percentages determined in 630.3.3.5.1.

630.5 Payment

(1) The department will pay for measured quantities at the contract unit price under the following bid items:

ITEM NUMBER	DESCRIPTION	UNIT
630.0100 - 0199	Seeding (mixture)	LB
630.0200	Seeding Temporary	LB
630.0300	Seeding Borrow Pit	LB
630.0400	Seeding Nurse Crop	LB

(2) Payment for the Seeding bid items is full compensation for providing, handling, and storing all seed; for providing the required culture and inoculating seed as specified; and for preparing the seed bed, sowing, covering and firming the seed. If the landowner does not want the pit or material disposal site seeded, or seeded with any of the mixtures allowed, the department will not pay for fertilization or seeding of those areas.