# MEAD LAKE SANITARY SURVEY 

## PREPARED FOR:

CLARK COUNTY DEPARTMENT OF PLANNING, ZONING, AND SOLID WASTE

ROOM 204 A

## 517 COURT STREET

NEILLSVILLE, WISCONSIN 54456

MARCH 25, 1998
$\qquad$
Steve Kunze, Project Soil Scientist, CST
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Engineers/Photogrammetrists/Scientists/Surveyors
2445 Darwin Road
Madison, WI 53704-3186
(608) 249-0471, FAX (608) 249-2806

## PROJECT OBJECTIVE

The purpose of this sanitary survey was to inventory and to assess hydraulic performance and code compliance of onsite wastewater treatment systems serving properties adjacent to Mead Lake.

## PROJECT BACKGROUND

## Mead Lake History

Mead Lake is a man-made impoundment located in the Town of Mead, Clark County, Wisconsin. The South Fork of the Eau Claire River was dammed in the late 1940's creating Mead Lake. The dam consists of an earthen embankment and a concrete dam holding a series of manually operated bottom - draw gates used to control lake levels. The lake is approximately 320 acres in size with a maximum depth of 16 ft and a mean depth of 5 ft .

## Current Use

The Mead Dam Plat was approved in 1952 creating 191 small lots (typical size $=75$ feet by 200 feet). Additional lots were added to the plat after 1952 bringing the present total to 193 lots. Clark County retains ownership of 59 lots; some are used for parks, campgrounds and boat ramps for public lake access and others unsuitable for development. There are 128 improved and 6 unimproved lots in private ownership. The 128 improved lots contain 103 seasonal homes or cabins and 25 permanent residences. The lake provides recreational activities such as fishing, watercraft sports, snowmobiling, camping, picnicking and hiking for both the general public and the permanent and seasonal cabin/home owners. Map 1 illustrates lot ownership and residency status.

## Reason For Sanitary Survey

Development began around Mead Lake in the 1950s, with resultant onsite sewage systems installed under various sanitary codes. Since 1980, Clark County Zoning and Planning Department records indicate sanitary permits issued for 32 of 128 developed lots. Pre-1980 records provide limited information about system components or design. Current records indicate soil conditions around the lake are predominately suitable for at-grade or mound systems, and in many cases, only holding tanks. This implies that many of the installed treatment systems have their infiltrative surface in groundwater or in soils which are seasonally saturated.

The poor water quality and abundance of algae blooms in Mead Lake prompted a search for the nutrient sources causing these problems. One potential source of increased nutrients, phosphorous in particular, could be from partially or untreated septic tank effluent entering the lake via surface runoff or groundwater. A sanitary survey of Mead Lake would provide information about treatment system performance and compliance.

## SITE CONDITIONS

Mead Lake is located in Sections 28 and 29, T.27N., R.3W, Mead Township, Clark County, Wisconsin. The lake is 9 miles west of Greenwood, Wisconsin, and 13 miles south of Thorp, Wisconsin.

## Landscape Position

Mead Lake occupies an alluvial valley in an area consisting of glacial till. The topography surrounding the lake varies from wetlands to undulating hills and low sandstone mounds.

## Surface Waters

The surface area of Mead Lake covers 320 acres with an average depth of 5 feet. The lake is fed by the South Branch of the Eau Claire River and Rocky Run Creek which joins the South Branch approximately 1 mile above the headwaters of the lake. The watershed feeding Mead Lake encompasses over 100 square miles of forest and farmland and is part of the Chippewa River watershed which eventually enters the Mississippi River below the town of Pepin, Wisconsin.

The lake, whose water quality is considered as poor to very poor by the USGS, can be classified as eutrophic. The poor water quality results from high levels of seasonal algae growth which directly reduce water clarity and increase water temperature, and indirectly reduce the concentration of dissolved oxygen and cause offensive odors. In Mead Lake, as in many lakes, the availability of phosphorous limits the amount of plant and weed growth. When phosphorous concentrations are elevated, excessive algae growth can result. These elevated phosphorous levels can be impacted by leaking and failing septic tank systems, but more typically result from urban and/or agricultural runoff.

## Vegetation

Vegetation types associated with Mead Lake includes mixed maple/oak/pine forest on higher landscape positions tending to birch and aspen in wetter areas and cattail/sedge in ponded or wet areas. Several large expanses of undeveloped land are found along the lake typically in the wetter areas unsuitable for development. These areas are predominately vegetated by facultative or obligate wetland species.

## SURVEY PROCEDURE

The survey was conducted using homeowner questionnaires, existing county records, owner interviews, and field investigations completed during the fall of 1997.

A sanitary survey questionnaire was prepared by Ayres Associates in cooperation with Clark County Planning and Zoning departmental staff. They were mailed to property owners of the 133 private lots in August, 1997. The questionnaire elicited data about ownership, residency, sewage system information, system maintenance and performance history, and general comments. A site sketch was requested detailing locations of system components, buildings, and wells. At the start of the field work over $90 \%$ of the questionnaires had been completed and returned to the Zoning Department. This very high rate of questionnaire return suggests landowners consider this project a high priority. A copy of the questionnaire is found in Appendix A.

The field work was conducted by Ayres Associates personnel. Jay Shambeau, Clark County Zoning Administrator, provided access to county plats, records, maps, and historical information on the lake. Kent Langfoss, Clark County Land Technician, provided assistance in the field and with record searches. Leroy Jansky, Wisconsin Department of Commerce, provided procedural and code guidelines relative to sanitary survey procedures.

Survey procedures involved locating and identifying wastewater treatment system components for all privately-owned lots. System components were located using landowner supplied lot information, physical measurements and metal probes. Probes were also used to determine subsurface infiltrative surface depths. Where obvious, the physical condition of system components was noted. A hand augered soil boring was completed in the vicinity of each system to determine soil characteristics and depth to limiting conditions such as mottling, bedrock and groundwater. Described soil characteristics include texture, color, mottling, rooting and horizon depth. Descriptions utilized standard Natural Resource Conservation Service (NRCS) nomenclature. Setbacks from wells, lake, property boundaries, and buildings were measured from septic, dose and holding tanks, privies, and infiltration areas. Relative elevations were surveyed for soil borings, lake, bedrock, groundwater, mottles, and infiltrative surface. Elevations were tied to a benchmark set at the dam and correlated to the lake elevation. Lake elevation was checked each morning before field work began. Collected information was recorded on field data sheets and in a survey notebook. A copy of the survey data sheet, the survey data, and survey metadata are provided in Appendix A.

## SOILS INFORMATION

While the current soil survey for Clark County has been completed, the results have not yet been published. Available county soil data compiled by the NRCS was provided by the Clark County Zoning Department to the survey team. Map 2 details the soil types associated with Mead Lake.

Soils in the Mead lake area were formed in silty to sandy glacial till and alluvial deposits. These deposits overlay Cambrian sandstone at depths ranging from 3 to 20 feet. The bedrock at the soil/bedrock interface is typically eroded and weakly structured. Mottled conditions, resulting from the oxidation/reduction reactions of iron in the soil, are an indicator of zones of seasonally saturated soils. Typically, these conditions are found just above bedrock, the permanent water table, a perched water table or in very slowly permeable soils.

A typical soil profile for the Mead Lake lots consists of 4 inches of loam or sandy loam overlaying 30-50 inches of sand or fine sand with mottles appearing within 20 inches of the water table. The sands are typified by striking colors ranging from medium chroma and value yellow reds to medium value/high chroma reds. The lower, wetter areas containing organic soils within lot boundaries along the lake have typically been filled. Dredgings from lake construction was used extensively for fill along the south shore of the lake yielding a varied mixture of fine-textured surface horizons overlaying buried organic and mineral soils. As illustrated by the the soil map there are four soil mapping units (NRCS nomenclature) found in the survey area. The Eauclaire loamy sand (EaB) and Rockdam sand (RkA) are both moderately well-drained, non-hydric, sandy textured soils. Bedrock is found at depths greater than 60 inches. The Ludington-Fairchild sands complex (LxB) contain two series of sandy/loamy sand soils 20 to 40 inches over soft bedrock. The Ludington series is moderately well drained while the Fairchild is somewhat poorly drained; neither is a hydric soil. The Fairchild-Elm Lake complex (FeA) is composed of the Fairchild (see description above) and Elm

Lake soils. The Elm Lake series is poorly to very poorly drained sandy/loamy sand found 20 to 40 inches over soft bedrock. Ponding frequently occurs on this hydric soil. Detailed NRCS descriptions of these soils are included in Appendix B.

## RESULTS AND FINDINGS

The type of onsite treatment system for each private lot was determined using owner records, questionnaire results and onsite inspections. Existing onsite treatment system types are illustrated by map 3 and summarized in table 1 below.

TABLE 1. PRIVATE LOTS - TREATMENT SYSTEM TYPES

| SYSTEM TYPE | NUMBER | \% TOTAL |
| :--- | :---: | :---: |
| UNKNOWN | 2 | 0.8 |
| NONE | 8 | 6.0 |
| PRIVY | 11 | 8.2 |
| HOLDING TANK | 54 | 40.6 |
| SEEPAGE PIT | 6 | 4.5 |
| DRYWELL | 12 | 9.0 |
| AT-GRADE | 1 | 0.8 |
| MOUND | 2 | 1.5 |
| SEEPAGE TRENCH/BED | 38 | 28.6 |
| TOTALS | 134 | $100 \%$ |

System failures were identified by calculating the separation between the absorption area surface and limiting condition using survey data and also determining if surface discharge of sewage was occurring. The determination of failure is based on the definition of sewage system failure found in Section 145.245 (4), Wisconsin Statutes, which reads as follows:
"FAILING PRIVATE SEWAGE SYSTEMS. The department shall establish criteria for determining if a private sewage system is a failing private sewage system. A failing private sewage system is one which causes or results in any of the following conditions:
(a) The discharge of sewage into the surface water or groundwater.
(b) The introduction of sewage into zones of saturation which adversely affects the operation of a private sewage system.
(c) The discharge of sewage to a drain tile or into zones of bedrock.
(d) The discharge of sewage to the surface of the ground.
(e) The failure to accept sewage discharges and back up of sewage into the structure served by the private sewage system."

Note that (a), (b), and (c) above are currently interpreted as requiring the 3 foot vertical separation above groundwater and bedrock that is used in the above Failure - High Groundwater/Seasonally high groundwater/Bedrock categories.

It was not possible to determine or identify the number of systems that failed by back up of sewage during peak flow nor was it possible to determine number of systems that would fail from conversion of seasonal to permanent residency. These conversions can result in significant and rapid increases in hydraulic loading yielding failures resulting in surface discharge of sewage or back ups into the structure.

The onsite sewage system status for all lots is illustrated by map 4 and summarized below in table 2.

TABLE 2. ONSITE SEWAGE SYSTEM STATUS

| SYSTEM STATUS | NUMBER SYSTEMS | \% TOTAL |
| :--- | :---: | :---: |
| NO SYSTEM | 8 | 4.1 |
| PRIVIES | 11 | 5.7 |
| FAILURE - HIGH GROUNDWATER | 21 | 10.9 |
| FAILURE - BEDROCK | 3 | 1.6 |
| FAILURE - SURFACE DISCHARGE | 1 | 0.5 |
| FAILURE - SEASONALLY HIGH GROUNDWATER | 15 | 7.8 |
| INCONCLUSIVE | 13 | 6.7 |
| NO FAILURE | 8 | 4.1 |
| HOLDING TANKS | 54 | 28.0 |
| N/A - COUNTY LAND | 59 | 30.6 |
| TOTALS | 193 | $100 \%$ |

The system status conditions are grouped into the following categories:

1. No System. This category covers all private parcels which have no onsite sewage system on the premises. This includes all parcels which are vacant, owned as part of a double lot, and a few which have been improved.
2. Privies. This category covers all lots that have no treatment system but utilize a privy for waste disposal.
3. Failure: High Groundwater. Systems in this category are considered to be a serious health and environmental hazard due to pollution of groundwater. In general, the bottom of the system in or within three feet of the existing groundwater table.
4. Failure: Bedrock. The bottom of the absorption system is less than three feet above a bedrock condition. Systems installed in or too close to bedrock pose a serious threat to groundwater and public health due to groundwater pollution.
5. Failure: Surface Discharge or Backup. The operation of the system is considered to be a health hazard because untreated sewage is directly accessible to humans, animals, and insects which could spread disease or contaminants.
6. Failure: Seasonally High Groundwater. The existing system is considered to be a health hazard due to pollution of periodically high groundwater. This system lacks the minimum of 3 feet of separation from the system bottom to estimated high groundwater. Estimated high groundwater is based on soil mottles which indicate that soil saturation occurs periodically.
7. Inconclusive. Inconclusive evidence to determine condition of the existing system due to inability to determine infiltrative system type, location, or elevation.
8. No Failure. The existing soil absorption system has at least a 3 foot separation above soil mottling, observed groundwater and bedrock and shows no indication of surface discharge. This soil absorption system and/or septic tank may be undersized, but are otherwise compliant.
9. Holding Tank. Soil and site conditions have dictated the use of holding tanks as a treatment option.
10. N/A - County Land. Land owned by Clark County.

Map 5 illustrates compliance with setback distances by holding tanks, septic tanks, and infiltration systems from lakes, wells, inhabited buildings and property lines. The setback distances for septic and holding tanks are based on Wisconsin Department of Commerce ILHR 83.15 (Table 12m) code and appears as follows:

| MINIMUM SETBACK DISTANCES FOR TREATMENT TANKS, <br> PUMP AND SIPHON TANKS, SERVICING SUCTION LINES AND <br> PUMP DISCHARGE LINES |  |
| :--- | :---: |
| Setback Element | Horizontal distance <br> (feet) |
| All Structures, Swimming Pools | 5 |
| Lot or Property Line | 2 |
| Underground water supply System and Cistern | 10 |
| Well, High Water mark of Lake, Stream, Pond, <br> Flowage or Reservoir | 25 |

The setback distances for infiltration systems are based on Wisconsin Department of Commerce ILHR 83.10 (1) and reads as follows: "Site Requirements. (1).........(T)he soil absorption system shall be located not less than 5 feet from any lot line; 10 feet from a water service, or an uninhabited slab constructed building; 15 feet....from a habitable slab constructed building measured from the slab; 25 feet from the below grade foundation of any occupied or habitable building or dwelling, public water main or cistern; 50 feet from any water well, reservoir or from the high water mark of any lake, stream or other watercourse....."

The following tables summarize the survey results regarding setbacks.
TABLE 3A. SETBACK COMPLIANCE STATUS - SEPTIC TANK

| ELEMENT | \# COMPLIANT | \# NON-COMPLIANT | \# UNKNOWN |
| :--- | :---: | :---: | :---: |


| WELL | 43 | 8 | $9^{*}$ |
| :--- | :---: | :---: | :---: |
| LAKE | 59 | 0 | 1 |
| PROPERTY LINE | 57 | 1 | 2 |
| BUILDING | 55 | 3 | 2 |

* The high number of well setback unknowns is due to well location inside building.

TABLE 3B. SETBACK COMPLIANCE STATUS - INFILTRATION SYSTEM

| ELEMENT | \# COMPLIANT | \# NON-COMPLIANT | \# UNKNOWN |
| :--- | :---: | :---: | :---: |
| WELL | 34 | 15 | $11^{*}$ |
| LAKE | 50 | 7 | 3 |
| PROPERTY LINE | 53 | 4 | 3 |
| BUILDING | 48 | 9 | $3^{* *}$ |

* The high number of well setback unknowns is due to well location inside building.
** Setback from building is based on 15 foot distance.
TABLE 3C. SETBACK COMPLIANCE STATUS - HOLDING TANKS

| ELEMENT | \# COMPLIANT | \# NON-COMPLIANT | \# UNKNOWN |
| :--- | :---: | :---: | :---: |
| WELL | 47 | 4 | $3^{*}$ |
| LAKE | 54 | 0 | 0 |
| PROPERTY LINE | 54 | 0 | 0 |
| BUILDING | 52 | 2 | 0 |

* The high number of well setback unknowns is due to well location inside building.

The parcel ID number, residency status, owner's name and address, and status and compliance for each system are listed in Appendix C of this report.

## CONCLUSIONS

Of the 134 private lots surveyed, 2 sewage treatment systems meet all code requirements for setbacks, separation and surface discharge; 8 systems meet code criteria for separation and discharge but not setbacks. There was one system failure due to surface discharge and evidence that several other systems had experienced surface discharge though they were not in failure at the time of the survey. 39 infiltration systems were determined to be in failure due to insufficient separation distance from a limiting factor. Based on the age of many of the systems, it can be assumed there are deteriorating and leaking septic and holding tanks and undersized infiltration areas. Many of the failed systems were installed using methods and components not acceptable by present code. The two systems meeting all code requirements are mound systems installed after 1995.

Soil and site conditions at Mead Lake do not exclude the use of new or replacement onsite treatment systems. Numerous lots appear to have adequate soil for installation of onsite systems meeting all code requirements. A detailed soil evaluation would be required to determine site potential for replacement onsite treatment systems. Map 6 illustrates the depth to limiting factors from ground surface for all private lots.

Two points of concern relative to failed systems are phosphorous and health hazards associated with untreated wastewater reaching groundwater or the ground surface. As described previously, excess phosphorous introduced to a phosphorous limited lake can cause elevated levels of algae growth. While it can be assumed there is some contribution by failed
septic tank systems to this increase, it is minuscule compared to the phosphorous loading resulting from agricultural runoff and delivered by the lake's inflow. It is unlikely a noticeable difference in algae growth or water quality would result under a scenario whereby all septic tank systems were brought to code. Of greater concern is the possibility of fecal contamination of groundwater or lake water from improperly treated wastewater. The three foot separation rule was designed to provide adequate treatment of pathogens in wastewater by the soil. While systems located within three feet of limiting factors can provide satisfactory hydraulic treatment due to the high permeability of the sandy soils associated with Mead Lake, adequate biologic treatment is not taking place.

There are only 25 permanent residents along Mead Lake at this time. As evidenced elsewhere in similar scenarios, seasonal use is often replaced by permanent residency as owners retire or sell. Increased use will generate higher wastewater flows taxing already failed and inadequate systems. Higher flows increase the risk of environmental hazards or groundwater contamination in at least three ways: 1) elevated use of failed systems results in more untreated wastewater and associated pathogens reaching groundwater, 2) increased use of failed or undersized systems results in backups or surface discharge of sewage, and 3) the high percentage of shallow wells utilized by homeowners are more susceptible to contamination.

## ALTERNATIVES

## Treatment Options

Alternatives for treating wastewater generated by homes and cottages at Mead Lake include:

- No Action
- Upgrade Existing Onsites
- Holding Tanks
- Clusters
- Regional
- Construct Onsite Treatment Plant

No Action. This option would allow existing systems to continue at current treatment levels with no change in design or requirements. This option is unacceptable as many systems are in failure and posing serious health and environmental threats from untreated wastewater entering the groundwater or discharging to the surface; additionally, there is the potential, however small, of phosphorous contribution to the lake.

Upgrade Existing Onsites. This option would require all treatment systems be upgraded to meet current code requirements. In most cases the installation of at-grade or mound systems would be required due to shallow depths to groundwater, mottles, or bedrock. Providing infiltration sites that meet all separation and setback requirements could be difficult due to small lot sizes and central locations of structures and wells. While this would not be an equitable solution for all lot owners, it would greatly diminish potential for both fecal contamination of groundwater and phosphorous contribution to the lake.

Holding Tanks. At present, the most common form of treatment at Mead Lake. While holding tanks work well for low impact seasonal users, as permanent residency increases at Mead Lake, holding tanks become a poor option because higher costs resulting from increased
service requirement and escalating tipping fees. Based strictly on code, holding tanks can be used only if no other onsite treatment system is feasible on the property.

Cluster Systems. Cluster systems use a single infiltration area for groups or clusters of homes connected by a common collection system. The cluster system concept would be well suited for Mead Lake because of the natural grouping of improved lots. Based on existing soil mapping and topographic information there appears to be suitable soil available in the Mead Lake vicinity to provide treatment sites for clusters.

Regional. Regional treatment would entail constructing a sewer line from Mead Lake to Greenwood for final treatment. This option would be very expensive and is not considered a viable option.

Construct On Site Wastewater Treatment Plant. This option would require construction of a collection sewer and central onsite treatment plant at Mead Lake. Sewage would be treated and discharged to the South Fork of the Eau Claire River below the Mead Lake dam. This would be very expensive to construct and maintain and is not considered a viable choice for Mead Lake property owners.

## Recommendation:

Ayres Associates recommends that a cluster treatment system be considered at Mead Lake. There appears to be suitable soil for central infiltration areas, the lots are amenable to groupings, small diameter sewer would install easily, and costs could be shared equitably among all owners.

## APPENDIX A

## SANITARY SURVEY HOMEOWNER QUESTIONNAIRE SURVEY FIELD SHEET <br> SURVEY DATABASE <br> SURVEY DATABASE METADATA

## METADATA - SURVEY FIELD DATA

TOPIC: FIELD SURVEY DATA, SYSTEM STATUS AND SETBACK COMPLIANCE. DIGITAL FILE: ML3_ATTR.TXT

| Field Name | Field Type | Description |
| :---: | :---: | :---: |
| COMP_ID | NUMERIC | Parcel identification number derived from tax ID \#. |
| BLOCK | NUMERIC | Each platted parcel has a block and lot identification. Each block is a collection of lots. |
| LOT | NUMERIC | Identification number for individual lots within a block. |
| OWNERSHIP | CHARACTER | Denotes public or private ownership. |
| RESIDENCY | CHARACTER | Characterizes private ownership by permanent residency, seasonal use, or undeveloped lot. |
| SYSTEM | NUMERIC | Presence and type of wastewater treatment system. $1=\mathrm{N} / \mathrm{A}, 2=$ UNKNOWN, $3=$ NONE, $4=$ PRIVY, $5=$ HOLDING TANK, $6=$ SEEPAGE PIT, $7=$ DRYWELL, 8 = AT-GRADE, $9=$ MOUND, $10=$ TRENCH/BED. |
| SB_EL | NUMERIC | Surface elevation (ft.) of soil boring location. $10=\mathrm{N} / \mathrm{A}$. |
| SB_DEP | NUMERIC | Depth (in.) below land surface of soil boring. $10=\mathrm{N} / \mathrm{A}$ |
| DEP_MOT | CHARACTER | Depth (in.) below land surface to uppermost limit of soil mottling. |
| MOT_EL | CHARACTER | Elevation (ft.) of uppermost indication of soil mottling. |
| DEP_GW | CHARACTER | Depth (in.) below land surface to groundwater. |
| GW_EL | CHARACTER | Elevation (ft.) of groundwater. |
| DEP_BRO | CHARACTER | Depth (in.) below land surface to bedrock. |
| BROK_EL | CHARACTER | Elevation (ft.) of bedrock. |
| HT_VOL | CHARACTER | Holding tank volume in gallons. |
| ST_VOL | CHARACTER | Septic tank volume in gallons. |
| IA_SURF | CHARACTER | Elevation (ft.) of ground surface at infiltration area location. |
| DEP_SYS | CHARACTER | Depth (in.) below land surface to infiltrative surface. |
| SYS_EL | CHARACTER | Elevation(ft.) of infiltrative surface. |
| SEP_MOT | CHARACTER | Separation (ft.) between infiltration surface and mottled soil. |
| SEP_GW | CHARACTER | Separation (ft.) between infiltration surface and groundwater. |
| SEP_BRO | CHARACTER | Separation (ft.) between infiltration surface and bedrock. |
| STSB_WEL | CHARACTER | Horizontal distance (ft.) between septic tank and well. |
| STSB_LAK | CHARACTER | Horizontal distance (ft.) between septic tank and lake. |
| STSB_PL | CHARACTER | Horizontal distance (ft.) between septic tank and property line. |
| STSB_BLG | CHARACTER | Horizontal distance (ft.) between septic tank and inhabited building. |
| IASB_WEL | CHARACTER | Horizontal distance (ft.) between infiltration area and well. |
| IASB_LAK | CHARACTER | Horizontal distance (ft.) between infiltration area and lake. |
| IASB_PL | CHARACTER | Horizontal distance (ft.) between infiltration area and property line. |
| IASB_BLG | CHARACTER | Horizontal distance (ft.) between infiltration area and inhabited building. |
| STATUS | NUMERIC | Treatment system status based on separation to limiting factors as defined in Wisconsin Statutes and Wisconsin Department of Commerce code. 1 = NO SYSTEM, $2=$ PRIVY, $3=$ FAILURE - HIGH GROUNDWATER, 4 = FAILURE - BEDROCK, $5=$ FAILURE SURFACE DISCHARGE, 6 = FAILURE - SEASONALLY HIGH GROUNDWATER, 7 = INCONCLUSIVE DATA, 8 = NO FAILURE, 9 = HOLDING TANK, $10=$ COUNTY LAND - N/A. |
| POTENTIAL | NUMERIC | Site potential for onsite treatment system based on surface depth to limiting factor. $1=$ UNKNOWN, $2=<36$ " TO GROUNDWATER, $3=<$ $36^{\prime \prime}$ TO BEDROCK, $4=<36$ " TO MOTTLED SOIL, $5=>36$ " TO LIMITING FACTOR(S), $6=$ COUNTY LAND - N/A. |


| ST_WE_CO | NUMERIC | Septic, holding, pump tank setback compliance from well. $1=$ UNKNOWN, $2=$ N/A, $3=$ NON- COMPLIANT, $4=$ COMPLIANT, $5=$ COUNTY LAND - N/A |
| :---: | :---: | :---: |
| ST_LK_CO | NUMERIC | Septic, holding, pump tank setback compliance from lake. $1=$ UNKNOWN, $2=$ N/A, $3=$ NON- COMPLIANT, $4=$ COMPLIANT, $5=$ COUNTY LAND - N/A. |
| ST_PL_CO | NUMERIC | Septic, holding, pump tank setback compliance from property line. $1=$ UNKNOWN, $2=$ N/A, $3=$ NON-COMPLIANT, $4=$ COMPLIANT, 5 = COUNTY LAND - N/A. |
| ST_BG_CO | NUMERIC | Septic, holding, pump tank setback compliance from inhabited building. $1=$ UNKNOWN, $2=$ N/A, $3=$ NON-COMPLIANT, $4=$ COMPLIANT, $5=$ COUNTY LAND - N/A. |
| IA_WE_CO | NUMERIC | Infiltration area setback compliance from well. $1=$ UNKNOWN, $2=\mathrm{N} / \mathrm{A}$, 3 = NON-COMPLIANT, $4=$ COMPLIANT, $5=$ COUNTY LAND - N/A. |
| IA_LK_CO | NUMERIC | Infiltration area setback compliance from lake. $1=$ UNKNOWN, $2=$ N/A, 3 = NON-COMPLIANT, $4=$ COMPLIANT, $5=$ COUNTY LAND - N/A. |
| IA_PL_CO | NUMERIC | Infiltration area setback compliance from property line. $1=$ UNKNOWN, $2=$ N/A, $3=$ NON- COMPLIANT, $4=$ COMPLIANT, $5=$ COUNTY LAND - N/A. |
| IA_BG_CO | NUMERIC | Infiltration area setback compliance from inhabited building. $1=$ UNKNOWN, $2=$ N/A, $3=$ NONCOMPLIANT, $4=$ COMPLIANT, 5 = COUNTY LAND - N/A. |

METADATA - SOIL DATABASE

TOPIC: SOIL SERIES DATA
DIGITAL FILE: MEADSOIL.DBF

| Field Name | Field Type | Description |
| :--- | :--- | :--- |
| ENTITY | CHARACTER | Describes polygons as consisting of separate joined lines (complex <br> shape) or a single continuous line (shape). |
| LAYER | NUMERIC | Field generated by ArcView based on Level \# used in Microstation. |
| LEVEL | NUMERIC | Arbitrary numeric value assigned to specific layer or level of data in <br> Micrcostation drawing. |
| COLOR | NUMERIC | Color coding values used by Micrcostation. |
| FIELD_SYMB | CHARACTER | Value assigned to specific soil types on field sheets. |
| PUBLISHED_ | CHARACTER | Publication symbol used to represent specific soil type in all USDA- <br> NRCS publications. |
| SOIL NAME | CHARACTER | Official USDA-NRCS soil name. |
| SLOPE | CHARACTER | Slope range (\%) for each soil type. |

## METADATA - SYSTEM STATUS AND COMPLIANCE

TOPIC: SUMMARY DATA ON INDIVIDUAL LOTS DIGITAL FILE: ML_ADDRE.DBF

| Field Name | Field Type | Description |
| :---: | :---: | :---: |
| COMP ID | NUMERIC | Parcel identification number derived from tax ID \#. |
| BLOCK | NUMERIC | Each platted parcel has a block and lot identification. Each block is a collection of lots. |
| LOT | NUMERIC | Identification number for individual lots within a block. |
| OWNER | CHARACTER | Property owner's name. |
| STREET ADDRESS | CHARACTER | Owner's home street address. |
| CITY | CHARACTER | Address city. |
| STATE | CHARACTER | Address state. |
| ZIP CODE | NUMERIC | City zip code. |
| STATUS | NUMERIC | TREATMENT SYSTEM STATUS BASED ON SEPARATION TO LIMITING FACTORS AS DEFINED IN WISCONSIN STATUTES AND WISCONSIN DEPARTMENT OF COMMERCE DISCHARGE, $6=$ FAILURE - SEASONALLY HIGH GROUNDWATER, $7=$ INCONCLUSIVE DATA, 8 = NO FAILURE, 9 = HOLDING TANK, $10=$ COUNTY LAND - N/A. |
| ST1_COMP | NUMERIC | Septic tank, holding tank, pump tank compliant with well and lake setback codes. $1=$ UNKNOWN, $2=$ N/A, $3=$ NON-COMPLIANT (AT LEAST 1 DISTANCE), 4 = COMPLIANT (ALL SETBACKS COMPLIANT), 5 = CLARK COUNTY LAND |
| ST2_COMP | NUMERIC | Septic tank, holding tank, pump tank compliant with property line and habitable building setback codes. $1=$ UNKNOWN, $2=$ N/A, $3=$ NONCOMPLIANT (AT LEAST 1 DISTANCE), 4 = COMPLIANT (ALL SETBACKS COMPLIANT), 5 = CLARK COUNTY LAND. |
| IA1_COMP | NUMERIC | Infiltration area setback from lake and well. $1=$ Unknown, $2=\mathrm{N} / \mathrm{A}, 3=$ Non-Compliant (at least 1 distance), $4=$ Compliant (meets both requirements), $5=$ Clark County land. |
| IA2_COMP | NUMERIC | nfiltration area setback from property line and habitable building. (Building setback $=15$ feet). $1=$ Unknown, $2=$ N/A, $3=$ Non-Compliant (at least 1 distance), $4=$ Compliant (meets both requirements), $5=$ Clark County land. |
| ITOT_COMP | NUMERIC | Setback compliance with all lake, well, property line and habitable building setbacks. 1 = Unknown, $2=$ N/A, $3=$ Non-Compliant (at least 1 distance), $4=$ Compliant (all setback requirements met), $5=$ Clark County land. |
| FAIL_COMP | NUMERIC | Compliance with setback and hydraulic requirements for all lots. $1=$ N/A, $2=$ UK, $3=$ Hydraulic failure/setback compliant, $4=$ Hydraulically OK/setback non-compliant, 5 = Hydraulic failure/setback non-compliant, $6=$ Hydraulically OK/setback compliant, $7=$ Hydraulic failure/at least 1 unknown setback distance, 8 = Hydraulically unknown/setback compliant, $9=$ hydraulically OK/setback unknown |



|  |  |  | ${ }_{\text {Pa }}^{\text {PaNV }}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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|  |  |  | ${ }_{\text {Prav }}^{\text {Prav }}$ |  |  |  | 20, | 2 |  | $\frac{10}{5}$ | 为 |  | , ${ }^{227}$ | Uk |  | ${ }_{\text {uk }}^{\text {uk }}$ | $\xrightarrow{\text { SNa }}$ | ${ }_{\text {a }}^{\text {a }}$ | ${ }_{\text {NA }}^{\text {N, }}$ | ${ }^{\mathrm{Na}}$ | $\underset{\text { NA }}{\substack{\text { NA }}}$ | ${ }_{\text {NA }}^{\text {Nas }}$ | ${ }_{\text {NA }}^{\text {N, }}$ | ${ }_{\text {che }}^{\substack{\text { NA }}}$ |  |  | ${ }_{30}$ |  |  |  |  | ${ }^{\mathrm{Na}}$ | ${ }_{\substack{\text { N/ } \\ \text { N/ } \\ \text { N/ }}}$ |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  | $\frac{5}{\text { NA }}$ | 3,3 |  |  | ${ }^{u k}$ |  |  | U | ${ }^{\mathrm{NA}}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  | ${ }^{26}$ |  |  |  | ${ }_{\text {coin }}^{\substack{23 \\ 50}}$ |  | $\frac{\mathrm{Uk}}{\substack{\text { Uk }}}$ |  | $\underbrace{\substack{u k \\ U k}}_{\text {ck }}$ | $\underset{\substack{\text { NA } \\ \text { NAA }}}{\text { N/ }}$ | $\underset{\substack{\text { NA } \\ \text { UK}}}{\text { Uk }}$ |  |  |  |  |  | ¢ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |  | ${ }_{\text {NA }} \mathrm{NA}$ |  |  |  |  | $\frac{\mathrm{NA}}{\mathrm{NA}}$ |  |  |  |  |  |  | NA |  |  |  |  |  |  |  |  |  |  |  | ${ }^{\text {NA }}$ |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  | ${ }_{\frac{4}{56}}$ |  |  |  |  | ${ }^{\frac{9062}{302}}$ | $\stackrel{u}{\square}$ |  | Uk | N/ | $\stackrel{N A}{N A}$ | ${ }_{\text {N/ }}$ | ${ }^{\text {Na }}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  | ${ }^{\frac{102}{102}}$ | ${ }_{\text {gi }}^{60}$ |  |  | ${ }_{\text {mas, }}$ | $\xrightarrow{\text { UkK }}$ | ${ }_{\text {Uk }}^{\text {Uk }}$ | ${ }_{\text {UK }}^{\text {Uk }}$ |  | ${ }_{\text {uk }}^{\text {Uk }}$ | $\stackrel{\text { zeon }}{\text { UK }}$ | $\stackrel{N}{N A}$ | ${ }^{\mathrm{NA} A}$ | $\stackrel{\mathrm{NA}}{\mathrm{NA}}$ | NA | $\stackrel{\mathrm{NA}}{\text { NA }}$ | ${ }_{\text {NA }}$ | $\stackrel{\mathrm{NA}}{\mathrm{NA}}$ |  | ${ }^{130}$ | ${ }_{28}^{28}$ |  |  | $\frac{N A}{N A}$ | - $\frac{\mathrm{NA}}{\mathrm{NA}}$ | $\stackrel{\mathrm{NA}}{\mathrm{NA}}$ | ${ }^{\mathrm{N} A}$ |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | ${ }_{\text {prav }}^{\text {panv }}$ |  |  |  |  |  |  |  | ${ }_{\text {a }}^{\text {9,37 }}$ | ${ }_{\text {Uk }}^{\text {Uk }}$ | ${ }_{\text {Uk }}^{\text {Uk }}$ | ${ }_{4}^{\frac{54}{48}}$ |  |  | ${ }_{\text {geom }}^{\text {¢ }}$ | ${ }^{\text {NA }}$ | ${ }^{\mathrm{N} A} \mathrm{~A}$ | $\stackrel{N}{N}$ |  | $\frac{\mathrm{NA}}{\mathrm{NA}}$ | ${ }^{N(1)}$ |  |  |  |  |  |  |  |  | $\stackrel{\text { NA }}{\text { NA }}$ | ${ }^{\text {NA }}$ |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | ${ }_{\substack { \text { Prav } \\ \begin{subarray}{c}{\text { PaVN }{ \text { Prav } \\ \begin{subarray} { c } { \text { PaVN } } }\end{subarray}}$ |  |  |  |  | ${ }^{\frac{4}{24}}$ |  |  | ${ }_{\text {UK }}^{\text {U13, }}$ | $\frac{U K}{U K}$ | $\frac{U k}{\substack{\text { Uk }}}$ |  |  |  | $\stackrel{\text { NA }}{\substack{\text { N/ }}}$ | $\frac{100}{\text { Nat }}$ | ${ }^{106}$ |  | ${ }^{\text {NA }}$ | $\frac{u k}{\text { UA }}$ | $\frac{\mathrm{UK}}{\text { NA }}$ |  |  | ${ }^{\frac{71}{106}}$ |  |  |  | NA | $\frac{83}{\text { NA }}$ | $\frac{20}{N a}$ | $\stackrel{25}{\text { N/ }}$ |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | ${ }_{\text {Prav }}^{\text {Prav }}$ |  |  |  |  | ${ }_{\text {a }}^{0}$ |  |  | (1029 | $\frac{\frac{5}{4 k}}{\substack{\text { k }}}$ |  | $\stackrel{4}{4}$ |  |  |  |  |  |  |  |  | Uk |  | ${ }^{\frac{8}{88}}$ |  |  |  |  |  | $\stackrel{\mathrm{NA}}{8}$ | ${ }^{\text {N0 }}$ | $\stackrel{\text { NA }}{20}$ |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | ${ }_{\substack{\text { Prav } \\ \text { Prav }}}^{\text {Pr }}$ |  |  |  |  | ${ }^{\frac{30}{30}}$ |  |  |  | ${ }_{\substack{\text { 2k } \\ 20}}^{\substack{\text { a }}}$ | Uk | ${ }_{\text {uk }}^{\substack{\text { uk }}}$ |  | (iosk |  | ${ }_{\text {a }}^{\text {a }}$ | $\frac{100^{2}}{\text { NA }}$ |  |  | $\frac{\mathrm{OCA}}{\text { NA }}$ | $\frac{\mathrm{Uk}}{\text { NA }}$ |  |  | ${ }^{\frac{10}{165}}$ |  |  |  | ${ }_{\text {NA }}$ | ${ }_{\text {NA }}^{\text {NA }}$ | $\stackrel{\text { NA }}{\text { NA }}$ |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  | ${ }^{30}$ |  | $\stackrel{3}{\text { N }}$ |  | ${ }_{\substack{\text { a } \\ 36}}$ | cose | $\xrightarrow{\substack{\text { Uk } \\ N}}$ |  | ¢ | $\stackrel{\text { and }}{\text { Na }}$ |  |  |  |  |  | $\frac{N}{\text { NA }}$ | $\stackrel{Y}{\text { N }}$ | ${ }^{\frac{3}{40}}$ | ${ }^{\frac{15}{15}{ }^{\text {N/ }}}$ | $\underset{\substack{\text { I2 } \\ \text { NA }}}{ }$ |  | ${ }_{\text {NA }}^{\text {Na }}$ |  |  | $\stackrel{\text { Na }}{\text { N }}$ |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  | N | ${ }^{\text {NA }}$ |  |  | ${ }^{\text {NAA }}$ |  | ${ }_{\text {NA }}{ }_{\text {NA }}$ |  | $\stackrel{\text { NA }}{ }$ |  |  |  |  |  |  | ${ }^{\text {NA }}$ |  |  |  | $\stackrel{\text { NA }}{\text { NA }}$ | $\xrightarrow{\frac{N A}{N A}}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |  | ${ }^{\text {NAA }}$ |  |  | ${ }_{\text {N }}^{\text {NA }}$ | ${ }^{\mathrm{NA}}$ | ${ }^{\text {VA }}$ |  |  | $\stackrel{\times}{N}$ | $\stackrel{\text { NA }}{\text { NA }}$ | $\stackrel{N}{\text { NA }}$ | ${ }_{\text {NA }}^{\text {NA }}$ |  |  |  | ${ }_{\text {NA }}$ | $\stackrel{\mathrm{Na}}{\mathrm{NA}}$ |  |  |  |  |  |  |  | $\stackrel{N}{\text { NA }}$ |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | ${ }^{\text {PapN }}$ | ${ }_{5}$ | ${ }_{\text {NA }}^{\text {N/ }}$ |  |  | ${ }^{\text {NA }}$ |  |  | ${ }^{5678}$ |  |  | $\xrightarrow{\text { NAA }}$ |  | ¢ ${ }_{\text {NAA }}^{\text {Uk }}$ | NA |  | ${ }_{\text {NA }}^{\text {Nat }}$ | ${ }_{\text {NA }}^{\text {UA }}$ | $\xrightarrow{\text { NA }}$ |  | $\xrightarrow{\text { NAA }}$ | $\xrightarrow{\text { NA }}$ | $\frac{\mathrm{NA}}{\text { ata }}$ | ${ }_{\text {N/ }}$ | ${ }^{\frac{\mathrm{NA}}{36}}$ |  | $\frac{\mathrm{NA}}{5}$ | ${ }_{\text {NA }}^{\text {NK }}$ | $\xrightarrow{\text { NA }}$ | $\stackrel{\text { NK }}{\substack{\text { UK }}}$ | $\stackrel{\text { NA }}{\text { Uk }}$ |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | ${ }_{\text {Prav }}^{\text {Pap }}$ |  |  |  |  | ${ }^{18}{ }^{\frac{58}{89}}$ |  |  |  | $\frac{\text { UK }}{\text { UK }}$ | ${ }_{\text {Uk }}^{\text {Uk }}$ | $\xrightarrow{\frac{U k}{U k}}$ |  |  |  | $\stackrel{\text { UK }}{\text { UK }}$ | $\frac{\mathrm{UK}}{\mathrm{U} /{ }_{\text {a }}}$ | $\stackrel{U K}{\text { UA }}$ | ${ }_{\text {UK }}^{\text {UK }}$ | $\xrightarrow{\frac{U K}{N a}}$ | $\frac{\mathrm{UK}}{\mathrm{NA}}$ | - | ${ }^{236}$ |  |  |  |  |  | $\bigcirc$ | $\xrightarrow{\text { cta }}$ | - |  |  |  |  |  |  |  |  |  |  |  |
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|  |  |  |  |  |  |  |  |  |  |  |  |  |  | ${ }_{5}^{58}$ |  |  |  |  | ${ }_{\text {NA }}^{\text {NA }}$ |  |  |  | ${ }_{\text {NA }}^{\text {NA }}$ | $\stackrel{\mathrm{N}}{\stackrel{N}{N}}$ |  |  |  |  |  |  |  | $\stackrel{N A}{ }{ }_{\text {NA }}$ | $\stackrel{\mathrm{NA}}{\text { NA }}$ |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  | a, | - |  |  |  |  |  |  |  |  | ${ }_{\substack{\text { NA }}}^{\text {Uk }}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | ${ }_{\text {N }}^{\text {NA }}$ | ${ }^{2}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  | ${ }_{\text {cor }}^{\text {Lor }}$ |  |  | - |  |  |  | Uk |  | ${ }_{\text {Uk }}^{\text {Uk }}$ |  | Uk | ${ }_{\text {a }}^{\text {Nad }}$ | ${ }^{\text {NA }}$ | ${ }^{\text {NA }}$ |  |  | $\stackrel{N(1)}{N A}$ | ${ }_{\text {NA }}{ }_{\text {NA }}$ | $\stackrel{\text { NA }}{\text { NA }}$ |  |  |  |  |  |  |  | $\stackrel{N}{\text { NA }}$ | $\stackrel{N}{N A}$ |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  | ${ }_{\text {Uk }}^{\text {Uk }}$ |  |  |  | ${ }_{\text {NA }} \mathrm{NA}$ |  |  | $\stackrel{\mathrm{NA}}{\mathrm{NA}}$ |  | $\stackrel{N A}{N A}$ | $\frac{\mathrm{Na}}{\mathrm{NA}}$ |  | ${ }^{115}$ |  |  |  |  |  | $\stackrel{N A}{N A}$ | $\stackrel{\mathrm{NA}}{\mathrm{NA}}$ |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  | ${ }^{0335}$ | $\bigcirc$ |  |  |  |  |  | $\stackrel{\text { an }}{\text { NA }}$ | ${ }_{\text {a }}^{\text {ald }}$ |  | ${ }^{\text {NA }}$ |  |  |  |  |  |  |  |  | ${ }^{\text {Na }}$ | ${ }^{\frac{12}{\text { NA }}}$ |  |  |  |  |  |  |  |  |  |  |  |
|  | ${ }^{10}$ |  | ${ }_{\text {Pronv }}^{\text {Prove }}$ |  |  |  |  | ${ }^{\frac{18}{37}}$ |  |  | ${ }_{\text {\% }}^{6.685}$ | $\frac{U^{4}}{44}$ | ${ }_{\text {\% }}^{\text {U566 }}$ | $\stackrel{u k}{u k}$ |  | UK | ${ }^{\text {Nas }}$ | ${ }_{\text {cha }}^{\text {NA }}$ | ${ }_{\text {¢ }}^{\text {¢ }}$ | $\frac{13}{\text { Na }}$ | ${ }_{\text {¢ }}^{\text {¢ }}$ | $\frac{.069}{\text { Nat }}$ | $\stackrel{u k}{N A}$ | $\frac{\stackrel{U}{N A}}{N A}$ | ${ }_{35}$ | $\frac{45}{125}$ |  |  |  |  |  | $\stackrel{5}{\text { NA }}$ | $\stackrel{15}{\text { Na }}$ |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  | $\xrightarrow{\text { Pran }}$ |  | + |  |  | ${ }_{6}^{\text {NA }}$ |  | $\stackrel{\mathrm{Na}}{\text { N }}$ |  |  |  |  |  | $\xrightarrow{\text { NKG }}$ |  |  |  |  |  |  |  |  | $\stackrel{\text { NA }}{\substack{\text { a }}}$ |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

## APPENDIX B

## DETAILED SOIL DESCRIPTIONS SOIL SERIES DATABASE SOIL SERIES DATABASE METADATA

## ROCKDAM SERIES

The Rockdam series consists of very deep, moderately well drained soils formed in siliceous sandy alluvium or residuum on pediments and stream terraces. Permeability is rapid or very rapid. Slopes range from 0 to 3 percent. Mean annual precipitation is about 30 inches. Mean annual temperature is about 42 degrees F .

TAXONOMIC CLASS: Sandy, siliceous, frigid Entic Haplorthods.
TYPICAL PEDON: Rockdam sand - on a plane, south facing, 1 percent slope in woodland at an elevation of about 990 feet. (Colors are for moist soil unless otherwise noted).

Oe--0 to 1 inch; very dark grayish brown (10YR 3/2) mucky peat (hemic material which is a mat of partially decomposed forest litter); weak thin platy structure; non-sticky; very strongly acid; abrupt wavy boundary. ( 0 to 2 inches thick).

A--1 to 3 inches; very dark gray (10YR 3/1) sand, gray (10YR 5/1) dry; weak fine granular structure; very friable; many fine, medium and coarse roots; very strongly acid; abrupt wavy boundary. (1 to 6 inches thick).

E--3 to 6 inches; dark grayish brown (10YR 4/2) sand, grayish brown (10YR 5/2) dry; weak medium subangular blocky structure; very friable; many fine and medium roots; very strongly acid; abrupt wavy boundary. (0 to 8 inches thick).

Bs1--6 to 10 inches; dark yellowish brown (7.5YR 3/4) sand; weak medium and coarse subangular blocky structure; very friable; common very fine and fine roots; very strongly acid; clear wavy boundary. (6 to 20 inches thick).

Bs2--10 to 19 inches; dark brown (7.5YR 4/4) sand; weak medium subangular blocky structure; very friable; common very fine and fine roots; strongly acid; clear wavy boundary. (Combined thickness of the Bs horizons ranges from 4 to 20 inches).

Bw--19 to 27 inches; yellowish brown (10YR 5/4) sand; weak coarse subangular blocky structure; very friable; few fine roots; strongly acid; clear wavy boundary. ( 0 to 25 inches thick).

C1--27 to 43 inches; brownish yellow (10YR 6/6) sand; single grain; loose; moderately acid; clear wavy boundary.
C2--43 to 53 inches; yellow (10YR 7/6) sand; common fine prominent reddish yellow (7.5YR 6/8) masses of iron accumulation; single grain; loose; slightly acid; clear smooth boundary.

C3--53 to 61 inches; light gray (10YR 7/2) sand; single grain; loose; common coarse distinct very pale brown (10YR 7/4) masses of iron accumulation; slightly acid.

TYPE LOCATION: Jackson County, Wisconsin; about 12.5 miles south and 2 miles west of Citypoint; 2400 feet north and 1640 feet east of the southwest corner of sec. 34, T.20N., R.1E.

RANGE IN CHARACTERISTICS: Solum thickness ranges from 20 to 40 inches. Volume of sandstone gravel or channers ranges from 0 to 5 percent throughout. Reaction typically ranges from extremely acid to slightly acid in the solum but ranges to neutral in the upper part, where the soil is limed. Reaction ranges from very strongly acid to slightly acid in the substratum. Redox features are within 72 inches and are within 40 inches in some pedons. Saturation for 1 month or more per year in 6 out of 10 years occurs below 40 inches. Some pedons are saturated within 40 inches for less than 1 month per year or less than 6 out of 10 years, or both.

The $O$ horizon has hue of 10 YR or is neutral in hue. Value is 2 or 3 and chroma is 0 to 2 . It is partially decomposed forest litter.

The A horizon has hue of 7.5 YR or 10 YR , value of 2 or 3 , and chroma of 1 to 3 . Some pedons have an Ap horizon with hue of 7.5 YR or 10 YR , value of 3 or 4 , and chroma of 2 or 3 .

The $E$ horizon has hue of 7.5 YR or 10 YR , value of 4 to 6 , and chroma of 2 or 3 . Colors of $4 / 3$ or $5 / 3$ have value dry of 7 or more. The $E$ horizon is sand or coarse sand.

The Bs horizon has hue of 5 YR value of 3 to 6 , and chroma of 4 to 6 or hue of 7.5 YR , value of 3 to 5 and chroma of 4. It is sand or coarse sand.

The Bw or BC horizon has hue of 7.5 YR or 10YR, value of 4 or 6 , and chroma of 4 to 8 . It is sand or coarse sand. Bw or BC horizons with spodic color have pH greater than 5.9 or have less than 0.6 percent organic carbon.

The $C$ horizon has hue of 7.5 YR or 10 YR , value of 4 to 7 , and chroma of 2 to 8 . It is sand or coarse sand.
COMPETING SERIES: This is the Arbutus series. Similar soils are the Croswell, Friendship, and Halfaday series. Arbutus soils have a lithic contact of igneous or metamorphic bedrock at 20 to 40 inches and do not have a water table. Croswell, Friendship, and Halfaday soils have mixed mineralogy. In addition, Friendship soils do not have a spodic horizon and Halfaday soils have a Bhs horizon.

GEOGRAPHIC SETTING: Rockdam soils are on pediments and stream terraces. Slope gradients range from 0 to 3 percent. These soils formed in siliceous sandy alluvium or residuum. Mean annual precipitation ranges from 28 to 33 inches. Mean annual temperature ranges from 39 to 45 degrees F. The frost free period ranges from about 90 to 135 days. Elevation ranges from 800 to 1400 feet.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Fairchild, Ironrun, Ludington, and Ponycreek soils. The somewhat poorly drained Ironrun soils and the poorly drained Ponycreek soils form a drainage sequence with the Rockdam soils. The somewhat poorly drained Fairchild soils and the moderately well drained Ludington soils form a drainage sequence in nearby areas where the siliceous sand is underlain by interbedded sandstone and shale at 20 to 40 inches.

DRAINAGE AND PERMEABILITY: Moderately well drained. Surface runoff is slow. Permeability is rapid or very rapid. These soils have an apparent seasonal high water table at a depth of 3.5 to 6 feet For 1 month or more per year at some time from November to May in 6 or more out of 10 years.

USE AND VEGETATION: Most areas of this soil are used for woodland. Native vegetation is mixed deciduous and coniferous forest with some grass in the understory. Common trees are jack pine, northern pin oak, and eastern white pine. Some areas are used for cropland. Common crops are corn, small grain, and hay. Some areas are used for pastureland.

DISTRIBUTION AND EXTENT: West Central Wisconsin. This series is of moderate extent.
MLRA OFFICE RESPONSIBLE: St. Paul, Minnesota
SERIES ESTABLISHED: Clark County, Wisconsin, 1994.
REMARKS: Diagnostic horizons and features recognized in this soil: ochric epipedon - 1 to 6 inches (A,E); albic horizon - 3 to 6 inches (E); spodic horizon - 6 to 19 inches (Bs1, Bs2); siliceous mineralogy - have less than 10 percent weatherable minerals in the particle-size control section.

ADDITIONAL DATA: Soil Interpretation Record - WI0435
National Cooperative Soil Survey U.S.A.

## METADATA - SURVEY FIELD DATA

TOPIC: FIELD SURVEY DATA, SYSTEM STATUS AND SETBACK COMPLIANCE. DIGITAL FILE: ML3_ATTR.TXT

| Field Name | Field Type | Description |
| :---: | :---: | :---: |
| COMP_ID | NUMERIC | Parcel identification number derived from tax ID \#. |
| BLOCK | NUMERIC | Each platted parcel has a block and lot identification. Each block is a collection of lots. |
| LOT | NUMERIC | Identification number for individual lots within a block. |
| OWNERSHIP | CHARACTER | Denotes public or private ownership. |
| RESIDENCY | CHARACTER | Characterizes private ownership by permanent residency, seasonal use, or undeveloped lot. |
| SYSTEM | NUMERIC | Presence and type of wastewater treatment system. $1=\mathrm{N} / \mathrm{A}, 2=$ UNKNOWN, 3 = NONE, 4 = PRIVY, 5 = HOLDING TANK, $6=$ SEEPAGE PIT, 7 = DRYWELL, 8 = AT-GRADE, 9 = MOUND, $10=$ TRENCH/BED. |
| SB_EL | NUMERIC | Surface elevation (ft.) of soil boring location. $10=\mathrm{N} / \mathrm{A}$. |
| SB_DEP | NUMERIC | Depth (in.) below land surface of soil boring. $10=\mathrm{N} / \mathrm{A}$ |
| DEP_MOT | CHARACTER | Depth (in.) below land surface to uppermost limit of soil mottling. |
| MOT_EL | CHARACTER | Elevation (ft.) of uppermost indication of soil mottling. |
| DEP_GW | CHARACTER | Depth (in.) below land surface to groundwater. |
| GW_EL | CHARACTER | Elevation (ft.) of groundwater. |
| DEP_BRO | CHARACTER | Depth (in.) below land surface to bedrock. |
| BROK_EL | CHARACTER | Elevation (ft.) of bedrock. |
| HT_VOL | CHARACTER | Holding tank volume in gallons. |
| ST_VOL | CHARACTER | Septic tank volume in gallons. |
| IA_SURF | CHARACTER | Elevation (ft.) of ground surface at infiltration area location. |
| DEP_SYS | CHARACTER | Depth (in.) below land surface to infiltrative surface. |
| SYS_EL | CHARACTER | Elevation(ft.) of infiltrative surface. |
| SEP_MOT | CHARACTER | Separation (ft.) between infiltration surface and mottled soil. |
| SEP_GW | CHARACTER | Separation (ft.) between infiltration surface and groundwater. |
| SEP_BRO | CHARACTER | Separation (ft.) between infiltration surface and bedrock. |
| STSB_WEL | CHARACTER | Horizontal distance (ft.) between septic tank and well. |
| STSB_LAK | CHARACTER | Horizontal distance (ft.) between septic tank and lake. |
| STSB_PL | CHARACTER | Horizontal distance (ft.) between septic tank and property line. |
| STSB_BLG | CHARACTER | Horizontal distance (ft.) between septic tank and inhabited building. |
| IASB_WEL | CHARACTER | Horizontal distance (ft.) between infiltration area and well. |
| IASB_LAK | CHARACTER | Horizontal distance (ft.) between infiltration area and lake. |
| IASB_PL | CHARACTER | Horizontal distance (ft.) between infiltration area and property line. |
| IASB_BLG | CHARACTER | Horizontal distance (ft.) between infiltration area and inhabited building. |
| STATUS | NUMERIC | Treatment system status based on separation to limiting factors as defined in Wisconsin Statutes and Wisconsin Department of Commerce code. 1 = NO SYSTEM, 2 = PRIVY, 3 = FAILURE - HIGH GROUNDWATER, 4 = FAILURE - BEDROCK, 5 = FAILURE SURFACE DISCHARGE, 6 = FAILURE - SEASONALLY HIGH GROUNDWATER, 7 = INCONCLUSIVE DATA, 8 = NO FAILURE, 9 = HOLDING TANK, 10 = COUNTY LAND - N/A. |
| POTENTIAL | NUMERIC | Site potential for onsite treatment system based on surface depth to limiting factor. $1=$ UNKNOWN, $2=<36$ " TO GROUNDWATER, $3=<$ $36 "$ TO BEDROCK, $4=<36 "$ TO MOTTLED SOIL, $5=>36$ " TO LIMITING FACTOR(S), $6=$ COUNTY LAND - N/A. |


| ST_WE_CO | NUMERIC | Septic, holding, pump tank setback compliance from well. 1 = UNKNOWN, $2=$ N/A, $3=$ NON-COMPLIANT, $4=$ COMPLIANT, $5=$ COUNTY LAND - N/A |
| :---: | :---: | :---: |
| ST_LK_CO | NUMERIC | Septic, holding, pump tank setback compliance from lake. $1=$ UNKNOWN, $2=$ N/A, $3=$ NON-COMPLIANT, $4=$ COMPLIANT, $5=$ COUNTY LAND - N/A. |
| ST_PL_CO | NUMERIC | Septic, holding, pump tank setback compliance from property line. 1 = UNKNOWN, $2=$ N/A, $3=$ NON-COMPLIANT, $4=$ COMPLIANT, $5=$ COUNTY LAND - N/A. |
| ST_BG_CO | NUMERIC | Septic, holding, pump tank setback compliance from inhabited building. $1=$ UNKNOWN, $2=$ N/A, $3=$ NON-COMPLIANT, $4=$ COMPLIANT, 5 = COUNTY LAND - N/A. |
| IA_WE_CO | NUMERIC | Infiltration area setback compliance from well. $1=$ UNKNOWN, $2=$ N/A, 3 = NON-COMPLIANT, $4=$ COMPLIANT, 5 = COUNTY LAND N/A. |
| IA_LK_CO | NUMERIC | Infiltration area setback compliance from lake. $1=$ UNKNOWN, 2 = N/A, 3 = NON-COMPLIANT, 4 = COMPLIANT, 5 = COUNTY LAND N/A. |
| IA_PL_CO | NUMERIC | Infiltration area setback compliance from property line. $1=$ UNKNOWN, $2=$ N/A, $3=$ NON-COMPLIANT, $4=$ COMPLIANT, $5=$ COUNTY LAND - N/A. |
| IA_BG_CO | NUMERIC | Infiltration area setback compliance from inhabited building. $1=$ UNKNOWN, $2=$ N/A, $3=$ NON-COMPLIANT, $4=$ COMPLIANT, $5=$ COUNTY LAND - N/A. |

METADATA - SOIL DATABASE

TOPIC: SOIL SERIES DATA
DIGITAL FILE: MEADSOIL.DBF

| Field Name | Field Type | Description |
| :--- | :--- | :--- |
| ENTITY | CHARACTER | Describes polygons as consisting of separate joined lines (complex <br> shape) or a s single continuous |
| LAYER | NUMERIC | Field generated by ArcView based on Level \# used in Microstation. |
| LEVEL | NUMERIC | Arbitrary numeric value assigned to specific layer or level of data in <br> Micrcostation drawing. |
| COLOR | NUMERIC | Color coding values used by Micrcostation. |
| FIELD_SYMB | CHARACTER | Value assigned to specific soil types on field sheets. |
| PUBLISHED_ | CHARACTER | Publication symbol used to represent specific soil type in all USDA- <br> NRCS publications. |
| SOIL NAME | CHARACTER | Official USDA-NRCS soil name. |
| SLOPE | CHARACTER | Slope range (\%) for each soil type. |

## METADATA - SYSTEM STATUS AND COMPLIANCE

TOPIC: SUMMARY DATA ON INDIVIDUAL LOTS
DIGITAL FILE: ML_ADDRE.DBF

| Field Name | Field Type | Description |
| :---: | :---: | :---: |
| COMP_ID | NUMERIC | Parcel identification number derived from tax ID \#. |
| BLOCK | NUMERIC | Each platted parcel has a block and lot identification. Each block is a collection of lots. |
| LOT | NUMERIC | Identification number for individual lots within a block. |
| OWNER | CHARACTER | Property owner's name. |
| STREET ADDRESS | CHARACTER | Owner's home street address. |
| CITY | CHARACTER | Address city. |
| STATE | CHARACTER | Address state. |
| ZIP CODE | NUMERIC | City zip code. |
| STATUS | NUMERIC | TREATMENT SYSTEM STATUS BASED ON SEPARATION TO LIMITING FACTORS AS DEFINED IN WISCONSIN STATUTES AND WISCONSIN DEPARTMENT OF COMMERCE DISCHARGE, 6 = FAILURE - SEASONALLY HIGH GROUNDWATER, $7=$ INCONCLUSIVE DATA, 8 = NO FAILURE, 9 = HOLDING TANK, $10=$ COUNTY LAND - N/A. |
| ST1_COMP | NUMERIC | Septic tank, holding tank, pump tank compliant with well and lake setback codes. $1=$ UNKNOWN, $2=$ N/A, $3=$ NON-COMPLIANT (AT LEAST 1 DISTANCE), 4 = COMPLIANT (ALL SETBACKS COMPLIANT), 5 = CLARK COUNTY LAND. |
| ST2_COMP | NUMERIC | Septic tank, holding tank, pump tank compliant with property line and habitable building setback codes. $1=$ UNKNOWN, $2=\mathrm{N} / \mathrm{A}, 3=$ NONCOMPLIANT (AT LEAST 1 DISTANCE), $4=$ COMPLIANT (ALL SETBACKS COMPLIANT), 5 = CLARK COUNTY LAND. |
| IA1_COMP | NUMERIC | Infiltration area setback from lake and well. $1=$ Unknown, $2=$ N/A, $3=$ Non-Compliant (at least 1 distance), $4=$ Compliant (meets both requirements), $5=$ Clark County land. |
| IA2_COMP | NUMERIC | Infiltration area setback from property line and habitable building. (Building setback $=15$ feet). $1=$ Unknown, $2=$ N/A, $3=$ NonCompliant (at least 1 distance), 4 = Compliant (meets both requirements), $5=$ Clark County land. |
| TOT_COMP | NUMERIC | Setback compliance with all lake, well, property line and habitable building setbacks. $1=$ Unknown, $2=$ N/A, $3=$ Non-Compliant (at least 1 distance), $4=$ Compliant (all setback requirements met), 5 = Clark County land |
| FAIL_COMP | NUMERIC | Compliance with setback and hydraulic requirements for all lots. $1=$ N/A, 2 = UK, 3 = Hydraulic failure/setback compliant, 4 = Hydraulically OK/setback non-compliant, 5 = Hydraulic failure/setback noncompliant, $6=$ Hydraulically OK/setback compliant, $7=$ Hydraulic failure/at least 1 unknown setback distance, $8=$ Hydraulically unknown/setback compliant, $9=$ hydraulically OK/setback unknown |


| ENTITY | LAYER | LEVEL | ELEVATION | COLOR | FIELD_SYMB | PUBLISHED |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| Complex Shape | 2 | 2 | 0.00000 | 4 | 210 | Ca |
| Complex Shape | 2 | 2 | 0.00000 | 8 | 8 | Cd |
| Complex Shape | 2 | 2 | 0.00000 | 95 | 205B | EaB |
| Complex Shape | 2 | 2 | 0.00000 | 39 | 301A | FeA |
| Complex Shape | 2 | 2 | 0.00000 | 39 | 301A | FeA |
| Complex Shape | 2 | 2 | 0.00000 | 39 | 301A | FeA |
| Complex Shape | 2 | 2 | 0.00000 | 39 | 301A | FeA |
| Complex Shape | 2 | 2 | 0.00000 | 39 | 301A | FeA |
| Complex Shape | 2 | 0 | 0.00000 | 0 | 301A | FeA |
| Complex Shape | 2 | 0 | 0.00000 | 0 | 301A | FeA |
| Complex Shape | 2 | 2 | 0.00000 | 16 | 220B | FkB |
| Complex Shape | 2 | 2 | 0.00000 | 161 | 420B | FIB |
| Shape | 2 | 2 | 1069.55300 | 66 | 73B | HuB |
| Shape | 2 | 2 | 1110.93800 | 66 | 73B | HuB |
| Complex Shape | 2 | 2 | 0.00000 | 66 | 73B | HuB |
| Shape | 2 | 2 | 1030.35000 | 66 | 73B | HuB |
| Shape | 2 | 2 | 1036.41400 | 66 | 73B | HuB |
| Complex Shape | 2 | 2 | 0.00000 | 155 | 274A | IXA |
| Complex Shape | 2 | 2 | 0.00000 | 155 | 274A | IXA |
| Complex Shape | 2 | 2 | 0.00000 | 155 | 274A | IXA |
| Complex Shape | 2 | 2 | 0.00000 | 155 | 274A | IxA |
| Complex Shape | 2 | 2 | 0.00000 | 19 | 751B | LuB |
| Complex Shape | 2 | 2 | 0.00000 | 19 | 751B | LuB |
| Complex Shape | 2 | 2 | 0.00000 | 18 | 751C | LuC |
| Complex Shape | 2 | 2 | 0.00000 | 18 | 751C | LuC |
| Complex Shape | 2 | 2 | 0.00000 | 18 | 751 C | LuC |
| Complex Shape | 2 | 2 | 0.00000 | 18 | 751C | LuC |
| Complex Shape | 2 | 2 | 0.00000 | 161 | 420B | FIB |
| Shape | 2 | 2 | 1092.72700 | 19 | 751B | LuB |
| Complex Shape | 2 | 2 | 0.00000 | 19 | 751B | LuB |
| Complex Shape | 2 | 2 | 0.00000 | 31 | 310B | LxB |
| Complex Shape | 2 | 2 | 0.00000 | 31 | 310B | LxB |
| Complex Shape | 2 | 2 | 0.00000 | 31 | 310B | LxB |
| Complex Shape | 2 | 2 | 0.00000 | 6 | 548 | Me |
| Complex Shape | 1 | 1 | 0.00000 | 150 | 1 | MxA |
| Complex Shape | 2 | 2 | 0.00000 | 142 | 248 | Pv |
| Complex Shape | 2 | 2 | 0.00000 | 142 | 248 | Pv |
| Complex Shape | 2 | 2 | 0.00000 | 142 | 248 | Pv |
| Complex Shape | 2 | 2 | 0.00000 | 140 | 89A | RkA |
| Complex Shape | 2 | 2 | 0.00000 | 140 | 89A | RkA |
| Shape | 2 | 2 | 1051.32400 | 140 | 89A | RkA |
| Complex Shape | 2 | 2 | 0.00000 | 140 | 89A | RkA |
| Complex Shape | 2 | 2 | 0.00000 | 140 | 89A | RkA |
| Shape | 2 | 2 | 1143.99100 | 140 | 89A | RkA |
| Complex Shape | 2 | 2 | 0.00000 | 140 | 89A | RkA |
| Complex Shape | 2 | 2 | 0.00000 | 140 | 89A | RkA |
| Complex Shape | 2 | 2 | 0.00000 | 140 | 89A | RkA |
| Complex Shape | 2 | 2 | 0.00000 | 140 | 89A | RkA |
| Complex Shape | 2 | 2 | 0.00000 | 140 | 89A | RkA |
| Complex Shape | 2 | 2 | 0.00000 | 173 | 374B | TrB |
| Shape | 2 | 2 | 1026.82900 | 173 | 374B | TrB |

## MEADSOIL

| Complex Shape | 2 | 2 | 0.00000 | 11 | 109 | Vs |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |


| SOIL_NAME | SLOPE |
| :--- | :---: |
| Capitola-Marshfield-Veedum comp | $0-2$ |
| Citypoint mucky peat | $0-1$ |
| Eauclaire loamy sand | $1-6$ |
| Fairchild-Elm Lake complex | $0-3$ |
| Fairchild-Elm Lake complex | $0-3$ |
| Fairchild-Elm Lake complex | $0-3$ |
| Fairchild-Elm Lake complex | $0-3$ |
| Fairchild-Elm Lake complex | $0-3$ |
| Fairchild-Elm Lake complex | $0-3$ |
| Fairchild-Elm Lake complex | $0-3$ |
| Flambeau sandy loam | $1-6$ |
| Flambeau-Humbird complex | $1-6$ |
| Humbird fine sandy loam | $1-6$ |
| Humbird fine sandy loam | $1-6$ |
| Humbird fine sandy loam | $1-6$ |
| Humbird fine sandy loam | $1-6$ |
| Humbird fine sandy loam | $1-6$ |
| ronrun-Ponycreek complex | $0-3$ |
| Ironrun-Ponycreek complex | $0-3$ |
| Ironrun-Ponycreek complex | $0-3$ |
| Ironrun-Ponycreek complex | $0-3$ |
| Ludington sand | $1-6$ |
| Ludington sand | $1-6$ |
| Ludington sand | $6-12$ |
| Ludington sand | $6-12$ |
| Ludington sand | $6-12$ |
| Ludington sand | $6-12$ |
| Ludington sand | $1-6$ |
| Ludington sand | $1-6$ |
| Ludington sand | $1-6$ |
| Ludington-Fairchild sands | $0-6$ |
| Ludington-Fairchild sands | $0-6$ |
| Ludington-Fairchild sands | $0-6$ |
| Markey-Newson mucks | $0-2$ |
| Moppet-Fordum complex | $0-3$ |
| Ponycreek-Dawsil complex | $0-2$ |
| Ponycreek-Dawsil complex | $0-2$ |
| Ponycreek-Dawsil complex | $0-2$ |
| Rockdam sand | $0-3$ |
| Rockdam sand | $0-3$ |
| Rockdam sand | $0-3$ |
| Rockdam sand | $0-3$ |
| Rockdam sand | $0-3$ |
| Rockdam sand | $0-3$ |
| Rockdam sand | $0-3$ |
| Rockdam sand | $0-3$ |
| Rockdam sand | $0-3$ |
| Rockdam sand | $0-3$ |
| Rockdam sand | Tarr sand |
| Tarr sand | $0-3$ |
|  |  |

## MEADSOIL

| Veedum-Elm Lake mucks | $0-2$ |
| :--- | :---: |

## LUDINGTON SERIES

The Ludington series consists of moderately well drained soils moderately deep to a paralithic contact with interbedded sandstone and shale. They formed in siliceous sandy alluvium and loamy residuum on pediments. Permeability is rapid or very rapid in the sandy alluvium, moderately slow or moderate in the loamy residuum, and very slow to moderately slow in the interbedded sandstone and shale. Slopes range from 1 to 20 percent. Mean annual precipitation is about 30 inches. Mean annual temperature is about 42 degrees F .

TAXONOMIC CLASS: Sandy over loamy, siliceous, frigid Oxyaquic Ultic Haplorthods
TYPICAL PEDON: Ludington sand (from an area of Ludington-Fairchild sands) - on a plane, north facing 2 percent slope in a wooded area at an elevation of about 930 feet. (Colors are for moist soil unless otherwise stated.)

Oe--0 to 1 inch; very dark grayish brown (10YR 3/2) mucky peat (hemic material which is a mat of partially decomposed forest litter); about 50 percent fiber and 25 percent rubbed; weak thin platy structure; non-sticky; very strongly acid; abrupt wavy boundary.

A--1 to 4 inches; black (10YR 2/1) sand, gray (10YR 5/1) dry; weak fine granular structure; very friable; common very fine and fine and few medium roots; extremely acid; abrupt wavy boundary. ( 1 to 3 inches thick).

E--4 to 11 inches; grayish brown (10YR 5/2) sand, light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure; very friable; common very fine and fine and few medium roots; extremely acid; abrupt wavy boundary. (1 to 10 inches thick).

Bs--11 to 16 inches; dark brown (7.5YR 4/4) sand; moderate medium subangular blocky structure; very friable; few very fine and fine roots; very strongly acid; clear wavy boundary. (4 to 10 inches thick).

Bw1--16 to 26 inches; yellowish brown (10YR 5/6) sand; weak medium subangular blocky structure; very friable; few very fine and fine roots; very strongly acid; clear wavy boundary.

Bw2--26 to 33 inches; very pale brown (10YR 7/4) sand; weak coarse subangular blocky structure; very friable; few fine roots; many coarse prominent strong brown (7.5YR 5/8) masses of iron accumulation; very strongly acid; abrupt wavy boundary. (Combined thickness of the Bw horizon ranges from 8 to 32.).

2Bt--33 to 39 inches; light gray (5Y 7/2) sandy clay loam; moderate fine subangular blocky structure; firm; few fine roots; few faint light olive gray ( $5 \mathrm{Y} 6 / 2$ ) clay films on faces of peds; common medium prominent strong brown (7.5YR 5/6) masses of iron accumulation; about 5 percent sandstone channers; extremely acid; abrupt wavy boundary. (1 to 24 inches thick).

2Cr--39 to 60 inches; interbedded light gray (2.5YR 7/2) sandstone and light olive gray (5Y 6/2) shale.
TYPE LOCATION: Clark County, Wisconsin; about 1.5 miles north and 1 mile west of Hatfield; 1300 feet north and 1400 feet west of the southeast corner of sec. 28, T. 23 N., R. 3 W.; USGS Hatfield, WI quad.; lat. 44 degrees, 26', 26\" N., long. 90 degrees, 44', 48\" W.

RANGE IN CHARACTERISTICS: (Unless otherwise stated, thickness and depth are measured from the top of the mineral soil.) Thickness of the solum and depth to the paralithic contact with interbedded sandstone and shale range from 20 to 40 inches. Thickness of the sandy mantle and depth to loamy residuum from interbedded sandstone and shale ranges from 15 to 39 inches. The sandy mantle has less than 10 percent weatherable minerals ( 0.02 to 2 mm fraction). Base saturation (by sum of cations) is less than 35 percent throughout the argillic horizon. Coarse fragments are mostly sandstone channers but, in some places, these soils occur near higher lying glacial soils
and igneous fragments are in the upper part of some pedons. Volume of gravel or sandstone channers ranges from 0 to 15 percent in the sandy mantle. Volume of sandstone channers ranges from 3 to 15 percent in the residuum. Reaction typically ranges from extremely acid to moderately acid in the sandy mantle but ranges to neutral in the upper part, where the soil is limed. Reaction ranges from extremely acid to strongly acid in the loamy residuum. Redox accumulations are below the spodic horizon and within 40 inches. Saturation occurs within 40 inches for 1 month or more per year in most years.

The O horizon has hue of 7.5 YR or 10 YR or is neutral in hue. Value is 2 or 3 and chroma is 0 to 2 .
The A horizon has value of 2 or 3 and chroma of 1 or 2 . Cultivated pedons have an Ap horizon with hue of 10 YR , value of 3 or 4 , and chroma of 2 or 3 . The A or Ap is sand or loamy sand.

The E horizon has hue of 7.5 YR or 10 YR , value of 4 to 6 , and chroma of 2 or 3 . It is sand, coarse sand, loamy sand, or loamy coarse sand.

The Bs horizon has hue of 5 YR , value of 3 or 6 , and chroma of 4 to 6 or hue of 7.5 YR , value of 3 to 5 , and chroma of 4. It is sand, coarse sand, loamy sand, or loamy coarse sand.

The Bw horizon has hue of 7.5 YR or 10 YR , value of 5 to 7 and chroma of 4 to 6 . It is sand, coarse sand, loamy sand, or loamy coarse sand.

The 2 Bt horizon has hue of $2.5 \mathrm{YR}, 5 \mathrm{YR}, 7.5 \mathrm{YR}, 10 \mathrm{YR}, 2.5 \mathrm{Y}$, or 5 Y ; value of 4 to 7 ; and chroma of 2 to 6 . It is very fine sandy loam, fine sandy loam, sandy loam, sandy clay loam, loam, clay loam, or silty clay loam.

Thin strata of coarser or finer texture are in some pedons.
The 2Cr horizon has color like the 2Bt horizon described above. It is interbedded sandstone and shale.
COMPETING SERIES: There are no competing series. A similar soil is the Fairchild series. Fairchild soils have redox features and saturation in the spodic horizon.

GEOGRAPHIC SETTING: These soils are on pediments underlain by interbedded sandstone and shale (Eau Claire and Mt. Simon formations of the Elk Mound group). Slope gradients range from 1 to 20 percent. Ludington soils formed in siliceous sandy alluvium and in loamy residuum from the underlying interbedded sandstone and shale. Mean annual precipitation ranges from 28 to 33 inches. Mean annual temperature ranges from 39 to 45 degrees F. The frost-free period ranges from about 120 to 135 days. Elevation ranges from 700 to 1400 feet.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Elm Lake, Fairchild, Humbird, Merrillan, and Rockdam soils. The poorly drained Elm Lake soils and the somewhat poorly drained Fairchild soils are in lower landscape positions and form a drainage sequence with the Ludington soils. The somewhat poorly drained Merrillan soils and the moderately well drained Humbird soils form a drainage sequence in nearby areas where the sandy mantle is absent. The moderately well drained Rockdam soils are nearby on landscape positions similar to those of Ludington soils where the sandy mantle is more than 5 feet thick.

DRAINAGE AND PERMEABILITY: Moderately well drained. Surface runoff is medium or rapid. Permeability is rapid or very rapid in the sandy mantle, moderately slow or moderate in the loamy residuum, and very slow to moderately slow in the interbedded sandstone and shale. Ludington soils have a perched seasonal high water table at a depth of 1.5 to 3.5 feet for 1 month or more per year at some time during the period of October to May in 6 or more out of 10 years. Although the perched water table occurs fairly high in the soil, the duration of saturation is relatively short and the soil is moderately well drained.

USE AND VEGETATION: Most areas of this soil are used for woodland. Second growth forest is common with northern pin oak, jack pine, and some red maple and paper birch the common trees. Some areas are used for cropland. Corn, small grains and hay are common crops. Some areas have been planted to pine trees.

DISTRIBUTION AND EXTENT: West-central Wisconsin. These soils are of moderate extent.

MLRA OFFICE RESPONSIBLE: St. Paul, Minnesota.
SERIES ESTABLISHED: Eau Claire County, Wisconsin, 1974.
REMARKS: Diagnostic horizons and features recognized in this pedon are: ochric epipedon-1 to 11 inches (A, E); albic horizon - 4 to 11 inches (E); spodic horizon - 11 to 16 inches (Bs); argillic horizon - 33 to 39 inches (2Bt); siliceous feature - less than 10 percent weatherable minerals in the upper part of the series control section ( 0.02 to 2 mm fraction); oxyaquic feature - redox accumulations and saturation below the spodic horizon and within 40 inches for 1 month or more per year in most years; ultic features- base saturation less than 35 percent throughout the argillic horizon.

ADDITIONAL DATA: Soil Interpretation Record - WI0204. Refer to soil survey sample number S92WI-019-2 for NSSL data on the typical pedon.

National Cooperative Soil Survey U.S.A.

## FAIRCHILD SERIES

The Fairchild series consists of somewhat poorly drained soils moderately deep to a paralithic contact with interbedded sandstone and shale. They formed in siliceous sandy alluvium and loamy residuum on pediments. Permeability is rapid or very rapid in the sandy alluvium, moderately slow or moderate in the loamy residuum, and very slow to moderately slow in the interbedded sandstone and shale. Slopes range from 0 to 3 percent. Mean annual precipitation is about 30 inches. Mean annual temperature is about 42 degrees F .

TAXONOMIC CLASS: Sandy over loamy, siliceous, frigid Ultic Epiaquods.
TYPICAL PEDON: Fairchild sand (from an area of Fairchild-Elm Lake complex) - on a plane north facing 1 percent slope in a wooded area at an elevation of about 920 feet. (Colors are for moist soil unless otherwise stated.)

Oe--0 to 1 inches; very dark grayish brown (10YR 3/2) mucky peat (hemic material which is a mat of partially decomposed forest litter); about 40 percent fiber and 20 percent rubbed; weak thin platy structure; nonsticky; very strongly acid; abrupt wavy boundary. ( 0 to 3 inches thick).

A--1 to 4 inches; black (10YR 2/1) sand, dark gray (10YR 4/1) dry; weak fine granular structure; very friable; common very fine, fine, and medium roots; extremely acid; abrupt wavy boundary. ( 0 to 4 inches thick).

E--4 to 12 inches; grayish brown (10YR 5/2) sand, light brownish gray (10YR 6/2) dry; weak coarse subangular blocky structure; very friable; common very fine, fine, and medium roots; extremely acid; abrupt irregular boundary. (4 to 12 inches thick).

Bhs--12 to 14 inches; dusky red (2.5YR 3/2) sand; moderate medium subangular blocky structure; very friable; common very fine and fine roots; very strongly acid; abrupt wavy boundary. ( 0 to 5 inches thick).

Bs--14 to 19 inches; dark brown (7.5YR 4/4) sand; weak medium subangular blocky structure; very friable; common very fine and fine roots; few fine distinct strong brown (7.5YR 5/6) masses of iron accumulation; very strongly acid; abrupt wavy boundary. (4 to 8 inches thick).

Bw--19 to 27 inches; brown (10YR 5/3) sand; weak coarse subangular blocky structure; very friable; common very fine and fine roots; few fine prominent strong brown (7.5YR 5/8) masses of iron accumulation and common medium faint grayish brown (10YR 5/2) iron depletions; about 1 percent sandstone channers; very strongly acid; abrupt wavy boundary. (6 to 15 inches thick).

2Bt--27 to 33 inches; light olive gray (5Y 6/2) sandy clay loam; moderate fine subangular blocky structure; firm; common very fine and fine roots; few faint olive gray (5Y5/2) clay films on faces of peds; common fine prominent strong brown (7.5YR 5/8) masses of iron accumulation; about 14 percent sandstone channers; extremely acid; abrupt wavy boundary. (2 to 10 inches thick).

2Cr--33 to 60 inches; interbedded light gray (10YR 7/2) sandstone and light gray (5Y 7/2) shale.
TYPE LOCATION: Clark County, Wisconsin; about 5 miles south and 2 miles west of Columbia; about 1300 feet north and 2550 feet west of the southeast corner of sec. 28, T. 23 N., R. 3 W.

RANGE IN CHARACTERISTICS: (Unless otherwise stated, thickness and depth in this paragraph are measured from the top of the mineral soil.) Thickness of the solum and depth to the paralithic contact with interbedded sandstone and shale range from 20 to 40 inches. Thickness of the sandy alluvium and depth to residuum from
interbedded sandstone and shale ranges from 15 to 39 inches. The thickness and arrangement of layers in the residuum is extremely variable. Base saturation (by sum of cations) is less than 35 percent throughout the argillic horizon. Coarse fragments are mostly sandstone channers but, in some places, these soils occur near higher lying glacial soils and igneous fragments are in the upper part of some pedons. Volume of gravel or sandstone channers ranges from 0 to 15 percent in the sandy mantle. Volume of sandstone channers ranges from 3 to 15 percent in the residuum. Reaction typically ranges from extremely acid to moderately acid in the sandy mantle, but it ranges to neutral in the upper part, where the soil is limed. Reaction ranges from extremely acid to strongly acid in the residuum. Redox concentrations are in the albic or spodic horizons within a depth of 20 inches. Saturation occurs within 20 inches at some time in most years.

The O horizon has hue of 7.5 YR or 10 YR or is neutral in hue. Value is 2 or 3 and chroma is 0 to 2 . The O horizon is a layer of partially decomposed litter.

The A horizon has value of 2 to 4 dry, 2 or 3 moist and chroma of 1 or 2 . Cultivated pedons have an Ap horizon with hue of 10 YR , value of 2 to 4 , and chroma of 2 or 3 . The $A$ or $A p$ horizon is sand or loamy sand.

The E horizon has hue of 7.5 YR or 10 YR , value of 4 to 6 , and chroma of 2 or 3 . It is sand, coarse sand, loamy sand, or loamy coarse sand.

The Bhs horizon has hue of 2.5 YR , 5YR, or 7.5 YR ; value of 2 or 3 ; and chroma of 2 or 3 . It is sand, coarse sand, loamy sand, or loamy coarse sand.

The Bs horizon has hue of $5 Y R$, value of 3 to 6 , and chroma of 4 to 6 or hue of 7.5 YR , value of 3 to 5 , and chroma of 4. It has texture like the Bhs horizon.

The Bw horizon has hue of 7.5 YR or 10 YR , value of 5 or 6 , and chroma of 3 to 6 . It is sand, coarse sand, loamy sand, or loamy coarse sand.

The 2 Bt horizon has hue of $2.5 \mathrm{YR}, 5 \mathrm{YR}, 7.5 \mathrm{YR}, 10 \mathrm{YR}, 2.5 \mathrm{Y}$, or 5 Y ; value of 4 to 7 ; and chroma of 2 to 6 . It is very fine sandy loam, fine sandy loam, sandy loam, sandy clay loam, loam, clay loam, or silty clay loam.

Thin subhorizons of coarser or finer texture are in some pedons.
The 2 Cr horizon has hue of 2.5 YR . $5 \mathrm{YR}, 7.5 \mathrm{YR}, 10 \mathrm{YR}, 2.5 \mathrm{Y}$, or 5 Y ; value of 4 to 7 ; and chroma of 2 to 6 .
COMPETING SERIES: These are no competing series. Related soils are the Elm Lake and Ludington series. Elm Lake soils do not have a spodic or an argillic horizon. Ludington soils do not have redox features or saturation in the spodic horizon.

GEOGRAPHIC SETTING: These soils are on pediments underlain by interbedded sandstone and shale (Eau Claire and Mt. Simon formations of the Elk Mound group). Slope gradients range from 0 to 3 percent. Fairchild soils formed in siliceous sandy alluvium and in loamy residuum from the underlying interbedded sandstone and shale. Mean annual precipitation ranges from 28 to 33 inches. Mean annual temperature ranges from 39 to 45 degrees F. The frost free period ranges from about 120 to 135 days. Elevation ranges from 700 to 1400 feet.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Elm Lake, Humbird, Ludington, Merrillan, and Rockdam soils. The moderately well drained Ludington soils and the poorly drained Elm Lake soils form a drainage sequence with the Fairchild soils. The moderately well drained Humbird soils and the somewhat poorly drained Merrillan soils form a drainage sequence in nearby areas where the sandy mantle is absent. The moderately well drained Rockdam soils are nearby where the sandy mantle is more than 5 feet thick.
DRAINAGE AND PERMEABILITY: Somewhat poorly drained. Surface runoff is slow. Permeability is rapid or very rapid in the sandy alluvium, moderately slow or moderate in the loamy residuum, and very slow to moderately slow in the interbedded sandstone and shale. Fairchild soils have a perched seasonal high water table at a depth of 1 to 2 feet for 1 month or more per year at some time during the period of September to June in 6 out of 10 years.

USE AND VEGETATION: Most areas of this soil are in second growth hardwood forest, principally red maple and paper birch with some jack pine and northern pin oak. Some areas are used for cropland or pastureland. Corn, small grains, and hay are the principal crops. Some areas have been planted to pine trees.

DISTRIBUTION AND EXTENT: West-central Wisconsin. These soils are of moderate extent.
MLRA OFFICE RESPONSIBLE: St. Paul, Minnesota
SERIES ESTABLISHED: Eau Claire County, Wisconsin, 1974.
REMARKS: The water table is perched on bedrock (2Cr). This water table technically fits neither the definition of epi-saturation nor of endo-saturation. We have suggested to the classification staff at NSSC that the definition of epi-saturation be expanded to include water tables perched on bedrock. Diagnostic horizons and features recognized in this pedon are: ochric epipedon - from 1 to 12 inches (A, E); albic horizon - from 4 to 12 inches ( E ); spodic horizon - from 12 to 19 inches (Bhs, Bs); argillic horizon - from 27 to 33 inches (2Bt); aquic feature - redox features and saturation in the spodic horizon within 20 inches; siliceous feature - less than 10 percent weatherable minerals in the sandy alluvium ( 0.2 to 20 mm fraction); ultic feature - base saturation (by sum of cations) less than 35 percent throughout the argillic horizon.

ADDITIONAL DATA: Soil Interpretation Record - WI0025. Refer to soil survey sample number S92WI-019-1 for NSSL data on the typical pedon.

National Cooperative Soil Survey U.S.A.

## ELM LAKE SERIES

The Elm Lake series consists of poorly drained soils which are moderately deep to a paralithic contact with interbedded sandstone and shale. These soils formed in siliceous sandy alluvium overlying loamy residuum from the underlying interbedded sandstone and shale on pediments. Permeability is rapid or very rapid in the sandy alluvium, moderately slow or moderate in the loamy residuum, and very slow to moderately slow in the interbedded sandstone and shale. Slopes range from 0 to 2 percent. Mean annual precipitation is about 30 inches. Mean annual temperature is about 40 degrees F .

TAXONOMIC CLASS: Sandy over loamy, siliceous, acid, frigid Humaqueptic Epiaquents
TYPICAL PEDON: Elm Lake muck - on a plane level slope in a woodland at an elevation of about 915 feet. (Colors are for moist soil unless otherwise stated.)

Oa--0 to 3 inches--black (N 2/0) broken face and rubbed muck (sapric material), black (10YR 2/1) dry: about 25 percent fiber and less than 5 percent rubbed; weak fine granular structure; nonsticky; many fine and very fine and few medium roots; extremely acid; abrupt smooth boundary. (0 to 7 inches thick).

A--3 to 4 inches; black (N 2/0) mucky sand, dark gray (10YR 4/1) dry; weak fine granular structure; very friable; common very fine and fine roots; extremely acid; abrupt wavy boundary. ( 0 to 9 inches thick).

Bg-- 4 to 16 inches; dark grayish brown (10YR 4/2) sand; weak coarse subangular blocky structure; very friable; few very fine and fine roots; the color is that of the uncoated sand grains with some organic staining; very strongly acid; clear wavy boundary. ( 0 to 24 inches thick).

Cg--16 to 24 inches; light gray (10YR 7/2) sand; single grain; loose; few fine roots; the color is that of uncoated sand grains; strongly acid; abrupt wavy boundary. (15 to 34 inches thick).
2Cg--24 to 36 inches; light olive gray ( $5 \mathrm{Y} 6 / 2$ ) silty clay loam; massive; firm; common medium prominent strong brown (7.5YR 6/8) masses of iron accumulation; about 5 percent sandstone channers; extremely acid; clear wavy boundary. (4 to 25 inches thick).

2Cr--36 to 60 inches; interbedded very pale brown (10YR 7/3) sandstone and red (2.5YR 4/6) and light brownish gray (2.5Y 6/2) shale.

TYPE LOCATION: Clark County, Wisconsin; about 5 miles south and 2 miles west of Columbia; 1350 feet north and 2350 feet east of the southwest corner of sec. 28, T. 23 N., R. 3 W.

RANGE IN CHARACTERISTICS: Depth to a paralithic contact with interbedded sandstone and shale ranges from 20 to 40 inches. Thickness of the sandy mantle and depth to loamy residuum range from 15 to 39 inches. Base saturation (by NH4OAc) is less than 50 percent at 40 inches. Base saturation (by sum of cations) is less than 35 percent in the loamy residuum. Coarse fragments typically are absent in the sandy mantle but the volume of gravel or sandstone channers ranges up to 15 percent in some pedons. Volume of sandstone channers ranges from 3 to 15 percent in the loamy residuum. Reaction ranges from extremely acid to moderately acid in the sandy mantle and from extremely acid to strongly acid in the loamy residuum. Saturation occurs at or near the surface much of the year in most years. Redox features are throughout the soil below the A horizon in some pedons.

The Oa horizon has hue of $5 \mathrm{YR}, 7.5 \mathrm{YR}$, or 10 YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2 .

The A horizon has hue of 10 YR or is neutral in hue. Value is 2 or 3 and chroma is 0 to 2. Value dry is less than 5.5 . The A horizon is loamy sand or mucky sand.

The Bg or B horizon has hue of $10 \mathrm{YR}, 2.5 \mathrm{Y}$, or 5 Y ; value of 4 to 7 , and chroma of 1 to 3 . Typically, it is the color of the uncoated sand grains with some organic staining. It is sand, coarse sand, loamy sand, or loamy coarse sand.

The Cg or C horizon has hue of $10 \mathrm{YR}, 2.5 \mathrm{Y}$, or 5 Y ; value of 4 to 7 , and chroma of 1 to 3 . The color is that of the uncoated sand grains. The Cg or C horizon is sand, coarse sand, loamy sand or loamy coarse sand.

The 2 Cg or 2 C horizon has hue of $2.5 \mathrm{YR}, 5 \mathrm{YR}, 7.5 \mathrm{YR}, 10 \mathrm{YR}, 2.5 \mathrm{Y}$, or 5 Y ; value of 4 to 7 ; and chroma of 1 to 6 .
It is silty clay loam, clay loam, sandy clay loam, loam, or sandy loam. Thin strata of coarser or finer texture are in some pedons. The 2Cg or 2C horizon averages 10 to 35 percent clay and 5 to 55 percent fine sand or coarser. The 2Cr horizon has has color and texture like the 2 Cg horizon described above. It is interbedded sandstone and shale.

COMPETING SERIES: There are no competing series. Related soils are the Fairchild, Ludington, and Veedum series. Fairchild and Ludington soils have spodic horizons. Veedum soils have a cambic horizon and are fineloamy.

GEOGRAPHIC SETTING: These soils are in drainageways and depressions on pediments underlain by interbedded sandstone and shale (Eau Claire and Mt. Simon formations of the Elk Mound group). Slope gradients range from 0 to 2 percent. Elm Lake soils formed in siliceous sandy alluvium over loamy residuum from the underlying interbedded sandstone and shale. Mean annual precipitation ranges from 28 to 33 inches. Mean annual temperature ranges from 38 to 42 degrees F. The frost free period ranges from about 90 to 130 days. Elevation ranges from 700 to 1400 feet.

GEOGRAPHICALLY ASSOCIATED SOILS: These are the Citypoint, Fairchild, Ludington, and Veedum soils. The very poorly drained Citypoint soils are nearby in landscape positions similar to those of Elm Lake soils where there is 16 to 51 inches of organic material over residuum from the underlying interbedded sandstone and shale. The moderately well drained Ludington soils and the somewhat poorly drained Fairchild soils form a drainage sequence with Elm Lake soils. The poorly drained Veedum soils are nearby in landscape positions similar to those of Elm Lake soils where there is 20 to 40 inches of loamy soil over interbedded sandstone and shale.

DRAINAGE AND PERMEABILITY: Poorly drained. Surface runoff is very slow or ponded. Permeability is moderately rapid or rapid in the sandy mantle, moderately slow or moderate in the loamy residuum, and very slow to moderately slow in the interbedded sandstone and shale. Elm Lake soils have a perched seasonal high water table at a depth from 1 foot above to 1 foot below the surface much of the time from September to June in most years.

USE AND VEGETATION: Most areas are in woodland. Common trees are red maple, quaking aspen, black ash, and paper birch. Some areas are used for pastureland.

DISTRIBUTION AND EXTENT: West-central Wisconsin. These soils are of moderate extent.
MLRA OFFICE RESPONSIBLE: St. Paul, Minnesota
SERIES ESTABLISHED: Wood County, Wisconsin, 1971.
REMARKS: The water table is perched on bedrock (2Cr). This water table fits neither the definition of episaturation or of endosaturation. We have suggested to the classification staff at NSSC that the definition of episaturation be expanded to include water tables perched on bedrock. Diagnostic horizon and features recognized in this pedon are: ochric epipedon - from 0 to 4 inches ( $\mathrm{Oa}, \mathrm{A}$ ); aquic feature - saturation at or near the surface much of the year typically with low chroma below the A horizon (Color below the A horizon is typically that of uncoated sand grains); Humaqueptic feature - it is assumed that mixing the upper 6 inches will result in an Ap horizon with value moist of 3 or less and value dry of 5 or less and base saturation (by NH4OAc) at 40 inches is less than 50 percent; siliceous feature - less than 10 percent weatherable minerals in the sandy alluvium ( 0.2 to 20 mm fraction).

ADDITIONAL DATA: - Soil Interpretation Record - WI0035
National Cooperative Soil Survey U.S.A.

## EAUCLAIRE SERIES

The Eauclaire series consists of very deep, moderately well drained soils formed in sandy alluvium and the underlying loamy till on remnants of moraines on summits and shoulders of dissected sandstone uplands. Permeability is rapid in the sandy mantle and moderately slow or moderate in the loamy till. Slopes range from 1 to 6 percent. Mean annual precipitation is about 30 inches. Mean annual temperature is about 42 degrees F .

TAXONOMIC CLASS: Sandy, mixed, frigid Alfic Oxyaquic Haplorthods
TYPICAL PEDON: Eauclaire loamy sand on a convex, northeast facing 4 percent slope in a hardwood forest at an elevation of 1,080 feet. (Colors are for moist soil unless otherwise stated.)

Oe--0 to 1 inch; very dark grayish brown (10YR 3/2) mucky peat (hemic material which is a mat of partially decomposed forest litter); about 50 percent fiber and 25 percent rubbed; weak thin platy structure; non-sticky; very strongly acid; abrupt smooth boundary. (0 to 2 inches thick)

A--1 to 2 inches; black (10YR 2/1) loamy sand, gray (10YR 5/1) and grayish brown (10YR 5/2) dry; weak fine granular structure; very friable; many very fine to coarse roots; about 10 percent gravel and 2 percent cobbles; very strongly acid; abrupt wavy boundary. (1 to 4 inches thick)

E--2 to 4 inches; grayish brown (10YR 5/2) sand, light brownish gray (10YR 6/2) dry; weak medium subangular blocky structure; very friable; many very fine to coarse roots; about 8 percent gravel and 2 percent cobbles; very strongly acid; abrupt wavy boundary. (1 to 5 inches thick).

Bs--4 to 12 inches; dark brown (7.5YR 4/4) loamy sand; moderate medium subangular blocky structure; very friable; many very fine to coarse roots; about 8 percent gravel and 2 percent cobbles; very strongly acid; clear wavy boundary. (6 to 21 inches thick).

Bw1--12 to 24 inches; yellowish brown (10YR 5/4) sand; weak coarse subangular blocky structure; very friable; common very fine to coarse roots; about 8 percent gravel and 2 percent cobbles; strongly acid; clear wavy boundary.

Bw2--24 to 34 inches; light yellowish brown (10YR 6/4) sand; weak coarse subangular blocky structure; very friable; common very fine to coarse roots; common medium distinct brownish yellow (10YR 6/8) and many coarse distinct yellowish brown (10YR 5/8) masses of iron accumulation; about 10 percent gravel and 2 percent cobbles; moderately acid; clear wavy boundary. (Combined thickness of the Bw horizons ranges from 13 to 26 inches).

2Bt1--34 to 39 inches; strong brown (7.5YR 5/6) gravelly sandy loam; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; few very fine to coarse roots; common distinct dark brown (7.5YR 4/4) clay films on faces of peds; many coarse distinct strong brown (7.5YR 5/8) masses of iron accumulation; and many coarse prominent light brownish gray ( $2.5 \mathrm{Y} 6 / 2$ ) masses of iron depletion; about 15 percent gravel and 2 percent cobbles; very strongly acid; clear wavy boundary.

2Bt2--39 to 66 inches; yellowish red (5YR 4/6) sandy loam; weak coarse prismatic structure parting to weak medium subangular blocky; firm; few fine and medium roots; common distinct reddish brown (5YR 4/4) clay films on faces of peds; common coarse prominent strong brown (7.5YR 5/8) masses of iron accumulation and light brownish gray ( $2.5 \mathrm{Y} 6 / 2$ ) masses of iron depletion; about 10 percent gravel and 3 percent cobbles; very strongly acid; gradual wavy boundary. (Combined thickness of the 2Bt horizons is 20 to 35 inches).

2C--66 to 80 inches; yellowish red (5YR 5/8) sandy loam, massive; firm; about 10 percent gravel and 2 percent cobbles; very strongly acid.

TYPE LOCATION: Clark County, Wisconsin; about 5 miles north and 2 miles west of Tioga; 400 feet north and 2000 feet west of the southeast corner of sec. 4, T. 26 N., R. 4 W.; USGS Mead Lake West, WI quad.; lat. 44 degrees, 45', 26\" N., long. 90 degrees, 52', 22\" W.

RANGE IN CHARACTERISTICS: (Unless otherwise indicated, thickness and depth are measured from the top of the mineral soil.) Thickness of the sandy mantle and depth to the argillic horizon in till range from 20 to 40 inches. Depth to the base of the argillic horizon ranges from 45 to 80 inches. Volume of gravel ranges from 0 to 20 percent in the sandy mantle and from 3 to 20 percent in the loamy till. Cobble content ranges from 0 to 5 percent throughout the pedon. Reaction typically ranges from very strongly acid to moderately acid throughout the solum but ranges to neutral in the upper part, where the soil is limed. Reaction ranges from very strongly acid to neutral in the substratum. Redox accumulations are below the spodic horizon and within 40 inches and redox depletions are in the upper part of the till in many pedons. Saturation occurs within 40 inches at some time in most years.

The O horizon has hue of 10 YR or is neutral in hue. Value is 2 or 3 and chroma is 1 or 2 . The O horizon is a mat of partially decomposed forest litter.

The A horizon has hue of 7.5 YR or 10 YR or is neutral in hue. Value is 2 or 3 and chroma is 0 to 2 . Cultivated pedons have an Ap horizon with hue of 7.5 YR or 10 YR , value of 3 or 4 , and chroma of 2 or 3 .

The E horizon has hue of 7.5 YR or 10 YR , value of 4 to 6 , and chroma of 2 or 3 . Colors of $4 / 3$ or $5 / 3$ have value dry of 7 or more. Texture is sand, fine sand, loamy sand or the gravelly analogs. The E horizon is present in 50 percent or more of uncultivated pedons.
he Bs horizon has hue of 5 YR , value of 3 to 6 , and chroma of 4 to 6 or hue of 7.5 YR , value of 3 to 5 , and chroma of 4. It is sand, fine sand, loamy sand, or the gravelly analogs.

The Bw horizon has value and chroma of 4 to 6 . It is sand, fine sand, loamy sand or the gravelly analogs.
The 2 Bt horizon has hue of $5 \mathrm{YR}, 7.5 \mathrm{YR}$ or 10 YR , value of 4 or 5 , and chroma of 3 to 6 . It is sandy loam, fine sandy loam, sandy clay loam, loam, or the gravelly analogs. The argillic horizon averages less than 18 percent clay.

The 2C horizon has hue of 5YR or 7.5 YR , value of 4 or 5 , and chroma of 4 to 8 . It is sandy loam, fine sandy loam, or the gravelly analogs.

COMPETING SERIES: There are no competing series. Similar soils are the Menominee and Morganlake series. Menominee soils are Alfic Haplorthods. Morganlake soils have sandy over loamy particle-size.

GEOGRAPHIC SETTING: The Eauclaire soils are on remnants of moraines on summits and shoulders of dissected sandstone uplands. Slopes range from 1 to 6 percent. These soils formed in sandy outwash and the underlying loamy till. Mean annual precipitation ranges from 28 to 33 inches. Mean annual temperature ranges from 39 to 45 degrees F. The frost free period ranges from about 120 to 135 days. Elevation ranges from 800 to 1950 feet.

GEOGRAPHICALLY ASSOCIATED SOILS: Near the type location, these are the Fairchild, Fallcreek, Flambeau, Humbird and Ludington soils. The somewhat poorly drained Fairchild soils and the moderately well drained Ludington soils form a drainage sequence nearby where the till is absent and the soil is moderately deep to interbedded sandstone and shale. The somewhat poorly drained Fallcreek soils and the moderately well drained Flambeau soils form a drainage sequence on nearby ground moraines where the sandy mantle is absent and the till has more clay and less sand. The moderately well drained Humbird soil is nearby where the sandy mantle and the till are absent and the soil is moderately deep to interbedded sandstone and shale.

DRAINAGE AND PERMEABILITY: Moderately well drained. Surface runoff is slow. Permeability is rapid in the sandy mantle and moderately slow or moderate in the till. These soils have a perched seasonal high water table at a depth of 1.5 to 3.5 feet for 1 month or more per year at some time during the period October to May in 6 or more out of 10 years.

USE AND VEGETATION: Most areas are used for woodland. Common trees are northern red oak and northern pin oak with some white oak, paper birch, and quaking aspen. Some ares are used for cropland or pastureland. Common crops are corn, small grain, and hay.

DISTRIBUTION AND EXTENT: West-central Wisconsin. The series is of small extent. MLRA 90.
MLRA OFFICE RESPONSIBLE: St. Paul, Minnesota.
SERIES PROPOSED: Clark County, Wisconsin, 1993. The name is from neighboring Eau Claire County.
REMARKS: Diagnostic horizons recognized in this pedon are: ochric epipedon - 1 to 4 inches (A, E); albic horizon - 2 to 4 inches (E); spodic horizon - 4 to 12 inches (Bs); argillic horizon - 34 to 66 inches (2Bt1, 2Bt2); oxyaquic feature - redox acumulations and saturation below the spodic horizon and within 40 inches for 1 month or more per year in most years.

ADDITIONAL DATA: Soil Interpretation Record - WI0529.
National Cooperative Soil Survey U.S.A.

## METADATA - SURVEY FIELD DATA

TOPIC: FIELD SURVEY DATA, SYSTEM STATUS AND SETBACK COMPLIANCE. DIGITAL FILE: ML3_ATTR.TXT

| Field Name | Field Type | Description |
| :---: | :---: | :---: |
| COMP_ID | NUMERIC | Parcel identification number derived from tax ID \#. |
| BLOCK | NUMERIC | Each platted parcel has a block and lot identification. Each block is a collection of lots. |
| LOT | NUMERIC | Identification number for individual lots within a block. |
| OWNERSHIP | CHARACTER | Denotes public or private ownership. |
| RESIDENCY | CHARACTER | Characterizes private ownership by permanent residency, seasonal use, or undeveloped lot. |
| SYSTEM | NUMERIC | Presence and type of wastewater treatment system. $1=\mathrm{N} / \mathrm{A}, 2=$ UNKNOWN, 3 = NONE, 4 = PRIVY, 5 = HOLDING TANK, $6=$ SEEPAGE PIT, 7 = DRYWELL, 8 = AT-GRADE, 9 = MOUND, $10=$ TRENCH/BED. |
| SB_EL | NUMERIC | Surface elevation (ft.) of soil boring location. $10=\mathrm{N} / \mathrm{A}$. |
| SB_DEP | NUMERIC | Depth (in.) below land surface of soil boring. $10=\mathrm{N} / \mathrm{A}$ |
| DEP_MOT | CHARACTER | Depth (in.) below land surface to uppermost limit of soil mottling. |
| MOT_EL | CHARACTER | Elevation (ft.) of uppermost indication of soil mottling. |
| DEP_GW | CHARACTER | Depth (in.) below land surface to groundwater. |
| GW_EL | CHARACTER | Elevation (ft.) of groundwater. |
| DEP_BRO | CHARACTER | Depth (in.) below land surface to bedrock. |
| BROK_EL | CHARACTER | Elevation (ft.) of bedrock. |
| HT_VOL | CHARACTER | Holding tank volume in gallons. |
| ST_VOL | CHARACTER | Septic tank volume in gallons. |
| IA_SURF | CHARACTER | Elevation (ft.) of ground surface at infiltration area location. |
| DEP_SYS | CHARACTER | Depth (in.) below land surface to infiltrative surface. |
| SYS_EL | CHARACTER | Elevation(ft.) of infiltrative surface. |
| SEP_MOT | CHARACTER | Separation (ft.) between infiltration surface and mottled soil. |
| SEP_GW | CHARACTER | Separation (ft.) between infiltration surface and groundwater. |
| SEP_BRO | CHARACTER | Separation (ft.) between infiltration surface and bedrock. |
| STSB_WEL | CHARACTER | Horizontal distance (ft.) between septic tank and well. |
| STSB_LAK | CHARACTER | Horizontal distance (ft.) between septic tank and lake. |
| STSB_PL | CHARACTER | Horizontal distance (ft.) between septic tank and property line. |
| STSB_BLG | CHARACTER | Horizontal distance (ft.) between septic tank and inhabited building. |
| IASB_WEL | CHARACTER | Horizontal distance (ft.) between infiltration area and well. |
| IASB_LAK | CHARACTER | Horizontal distance (ft.) between infiltration area and lake. |
| IASB_PL | CHARACTER | Horizontal distance (ft.) between infiltration area and property line. |
| IASB_BLG | CHARACTER | Horizontal distance (ft.) between infiltration area and inhabited building. |
| STATUS | NUMERIC | Treatment system status based on separation to limiting factors as defined in Wisconsin Statutes and Wisconsin Department of Commerce code. 1 = NO SYSTEM, 2 = PRIVY, 3 = FAILURE - HIGH GROUNDWATER, 4 = FAILURE - BEDROCK, 5 = FAILURE SURFACE DISCHARGE, 6 = FAILURE - SEASONALLY HIGH GROUNDWATER, 7 = INCONCLUSIVE DATA, 8 = NO FAILURE, 9 = HOLDING TANK, 10 = COUNTY LAND - N/A. |
| POTENTIAL | NUMERIC | Site potential for onsite treatment system based on surface depth to limiting factor. $1=$ UNKNOWN, $2=<36$ " TO GROUNDWATER, $3=<$ $36 "$ TO BEDROCK, $4=<36 "$ TO MOTTLED SOIL, $5=>36$ " TO LIMITING FACTOR(S), $6=$ COUNTY LAND - N/A. |


| ST_WE_CO | NUMERIC | Septic, holding, pump tank setback compliance from well. 1 = UNKNOWN, $2=$ N/A, $3=$ NON-COMPLIANT, $4=$ COMPLIANT, $5=$ COUNTY LAND - N/A |
| :---: | :---: | :---: |
| ST_LK_CO | NUMERIC | Septic, holding, pump tank setback compliance from lake. $1=$ UNKNOWN, $2=$ N/A, $3=$ NON-COMPLIANT, $4=$ COMPLIANT, $5=$ COUNTY LAND - N/A. |
| ST_PL_CO | NUMERIC | Septic, holding, pump tank setback compliance from property line. 1 = UNKNOWN, $2=$ N/A, $3=$ NON-COMPLIANT, $4=$ COMPLIANT, $5=$ COUNTY LAND - N/A. |
| ST_BG_CO | NUMERIC | Septic, holding, pump tank setback compliance from inhabited building. $1=$ UNKNOWN, $2=$ N/A, $3=$ NON-COMPLIANT, $4=$ COMPLIANT, 5 = COUNTY LAND - N/A. |
| IA_WE_CO | NUMERIC | Infiltration area setback compliance from well. $1=$ UNKNOWN, $2=$ N/A, 3 = NON-COMPLIANT, $4=$ COMPLIANT, 5 = COUNTY LAND N/A. |
| IA_LK_CO | NUMERIC | Infiltration area setback compliance from lake. $1=$ UNKNOWN, 2 = N/A, 3 = NON-COMPLIANT, 4 = COMPLIANT, 5 = COUNTY LAND N/A. |
| IA_PL_CO | NUMERIC | Infiltration area setback compliance from property line. $1=$ UNKNOWN, $2=$ N/A, $3=$ NON-COMPLIANT, $4=$ COMPLIANT, $5=$ COUNTY LAND - N/A. |
| IA_BG_CO | NUMERIC | Infiltration area setback compliance from inhabited building. $1=$ UNKNOWN, $2=$ N/A, $3=$ NON-COMPLIANT, $4=$ COMPLIANT, $5=$ COUNTY LAND - N/A. |

METADATA - SOIL DATABASE

TOPIC: SOIL SERIES DATA
DIGITAL FILE: MEADSOIL.DBF

| Field Name | Field Type | Description |
| :--- | :--- | :--- |
| ENTITY | CHARACTER | Describes polygons as consisting of separate joined lines (complex <br> shape) or a s single continuous |
| LAYER | NUMERIC | Field generated by ArcView based on Level \# used in Microstation. |
| LEVEL | NUMERIC | Arbitrary numeric value assigned to specific layer or level of data in <br> Micrcostation drawing. |
| COLOR | NUMERIC | Color coding values used by Micrcostation. |
| FIELD_SYMB | CHARACTER | Value assigned to specific soil types on field sheets. |
| PUBLISHED_ | CHARACTER | Publication symbol used to represent specific soil type in all USDA- <br> NRCS publications. |
| SOIL NAME | CHARACTER | Official USDA-NRCS soil name. |
| SLOPE | CHARACTER | Slope range (\%) for each soil type. |

## METADATA - SYSTEM STATUS AND COMPLIANCE

TOPIC: SUMMARY DATA ON INDIVIDUAL LOTS
DIGITAL FILE: ML_ADDRE.DBF

| Field Name | Field Type | Description |
| :---: | :---: | :---: |
| COMP_ID | NUMERIC | Parcel identification number derived from tax ID \#. |
| BLOCK | NUMERIC | Each platted parcel has a block and lot identification. Each block is a collection of lots. |
| LOT | NUMERIC | Identification number for individual lots within a block. |
| OWNER | CHARACTER | Property owner's name. |
| STREET ADDRESS | CHARACTER | Owner's home street address. |
| CITY | CHARACTER | Address city. |
| STATE | CHARACTER | Address state. |
| ZIP CODE | NUMERIC | City zip code. |
| STATUS | NUMERIC | TREATMENT SYSTEM STATUS BASED ON SEPARATION TO LIMITING FACTORS AS DEFINED IN WISCONSIN STATUTES AND WISCONSIN DEPARTMENT OF COMMERCE DISCHARGE, 6 = FAILURE - SEASONALLY HIGH GROUNDWATER, $7=$ INCONCLUSIVE DATA, 8 = NO FAILURE, 9 = HOLDING TANK, $10=$ COUNTY LAND - N/A. |
| ST1_COMP | NUMERIC | Septic tank, holding tank, pump tank compliant with well and lake setback codes. $1=$ UNKNOWN, $2=$ N/A, $3=$ NON-COMPLIANT (AT LEAST 1 DISTANCE), 4 = COMPLIANT (ALL SETBACKS COMPLIANT), 5 = CLARK COUNTY LAND. |
| ST2_COMP | NUMERIC | Septic tank, holding tank, pump tank compliant with property line and habitable building setback codes. $1=$ UNKNOWN, $2=\mathrm{N} / \mathrm{A}, 3=$ NONCOMPLIANT (AT LEAST 1 DISTANCE), $4=$ COMPLIANT (ALL SETBACKS COMPLIANT), 5 = CLARK COUNTY LAND. |
| IA1_COMP | NUMERIC | Infiltration area setback from lake and well. $1=$ Unknown, $2=$ N/A, $3=$ Non-Compliant (at least 1 distance), $4=$ Compliant (meets both requirements), $5=$ Clark County land. |
| IA2_COMP | NUMERIC | Infiltration area setback from property line and habitable building. (Building setback $=15$ feet). $1=$ Unknown, $2=$ N/A, $3=$ NonCompliant (at least 1 distance), 4 = Compliant (meets both requirements), $5=$ Clark County land. |
| TOT_COMP | NUMERIC | Setback compliance with all lake, well, property line and habitable building setbacks. $1=$ Unknown, $2=$ N/A, $3=$ Non-Compliant (at least 1 distance), $4=$ Compliant (all setback requirements met), 5 = Clark County land |
| FAIL_COMP | NUMERIC | Compliance with setback and hydraulic requirements for all lots. $1=$ N/A, 2 = UK, 3 = Hydraulic failure/setback compliant, 4 = Hydraulically OK/setback non-compliant, 5 = Hydraulic failure/setback noncompliant, $6=$ Hydraulically OK/setback compliant, $7=$ Hydraulic failure/at least 1 unknown setback distance, $8=$ Hydraulically unknown/setback compliant, $9=$ hydraulically OK/setback unknown |

