Becker County Planning & Zoning
915 Lake Ave
Detroit Lakes, MN 56501
(218) 846-7314
www.co.becker.mn.us

100391001-2025

Certificate of Compliance
Inspection Report - Permit #: SS2025-2389

Owner & Property Information

Owner Name:	TIMOTHY RICE
Mailing Address:	TIMOTHY RICE 17984 350 AVE DETROIT LAKES MN 56501
Parcel #:	100391001
Secondary Parcel #:	100415001

Site Address:	17984 350TH AVE
Township - Sec/Twp/Rng:	ERIE - 24/139/040
Legal Description:	PT S1/2 SE1/4 BEG 330' W & 800' S OF NE COR TH W 1197' SLY TO S LN SE1/4 E TO PT 330' W OF SE COR & N TO BEG
Designer:	Scott's Septic Services LLC, L3947 (Scott Ellingson)
Installer:	Metry Septic & Excavating LLC (Colin Metry)

Inspector Verified Specifications

Insp- Effluent Screen Installed:	No	**Insp- Tank Nbr/Size:**	1/2250/2
Insp- Alarm Required:	Yes	**Insp- Drainfield Type:**	Mound
Insp- Lift Pump in System:	Yes	**Insp- Drainfield Size:**	10X50 ROCK BED
Insp- Number of Bedrooms:	4	**Insp- Soil Verification:**	#1:SEE ATTACHED #2:N/A #3:N/A

Inspector Verified Setbacks

Insp- Tank Dist to Road	10+	**Insp- Drainfield Dist to Road**	10+
Insp- Tank Dist to Nearest Prop Line	10	**Insp- Drainfield Dist to Nearest Prop Line**	10
Insp- Tank Dist to Nearest Structure	10	**Insp- Drainfield Dist to Nearest Structure**	20
Insp- Tank Dist to Well	50+	**Insp- Drainfield Dist to Well**	50+
Insp- Tank Dist to OHW	NA	**Insp- Drainfield Dist to OHW**	NA
Insp- Tank Dist to Pond/Wetland	50	**Insp- Drainfield Dist to Pond/Wetland**	50
Insp- Tank Dist to Pressure Line		**Insp- Drainfield Dist to Pressure Line**	

Certificate of Compliance

(Yes) Certificate is hereby granted based upon the application, addendum from, plans, specifications and all other supporting data. With proper maintenance, this system can be expected to function satisfactory, however this is not a guarantee.

Certification Date: 07/01/2025

Zoning Office Signature:

Jeff Rusness - ISTS Inspector

*** Certificate of Compliance is not valid unless signed by a Registered Qualified Employee ***

Field Review Form

Permit # SS2025-2389

Property and Owner

Owner: **TIMOTHY RICE**	Parcel Number: **100391001**
Site Address: **17984 350TH AVE**	Secondary Parcel: **100415001**

Home Information

Does the structure contain any of the following elements?	Designer submitted	Inspector verified
	Garbage disposal: No Dishwasher: Grinder pump: Lift pump in bsmt:	Garbage disposal? Y (N) Dishwasher? (Y) N Grinder pump? Y (N) Lift pump in basement? Y (N)

Number of bedrooms: **4**	Review - Number of bedrooms: 4
Effluent screen	Effluent screen installed? Y (N) Mfr: NA
Alarm: **Yes** Type: **Electric**	Review - Alarm? (Y) N Type & Mfr: Pentair Deron -
Lift pump in system: **Yes**	Review - Lift pump in system? (Y) N Mfr: Zoeller BW153

Component Information

Tank size: **2250-2**	Review - Tank nbr: 1 size: 2250/2 Mfr: Thelen
Drainfield type: **Mound**	Review - Drainfield type: Mound Type 3
Drainfield size: Full size - **1352** Reduced/warr. size -	Review - Drainfield status: none / (installed) / next spring Review - Drainfield size: 10x52 Rockbed
Absorption area size: **9" Under Pipe**	Review - Absorption area size:
Chamber type/num: **NA** Trench sqft/chamber - **NA**	Review - Chamber type: Num: Review - Trench sqft/chamber: NA
Drainfield rock depth: **9" Under Pipe**	Review - Rock depth: ~~9"~~ 10"

Soil Verification

Vertical separation verified Type 3 system-	Boring #1: Boring #2: Boring #3:

Setback Verification

	Designer submitted		Inspector verified	
Distance to...	Tank	Drainfield	Tank	Drainfield
Road	250+	250+	10	10
Nearest prop line	50+	50+	10	10
Nearest structure	65	100+	10	20
Well	80	100+	50+	50+
OHW	NA	NA	NA	NA
Pond/Wetland	50+	50+	50	50
Pressure line	/		NA	NA

Date System Installed: 6-30-2025 Installer: Metro Septic Inspector: [signature]

PARCEL# 100391001

YEAR 2025

SCALE —

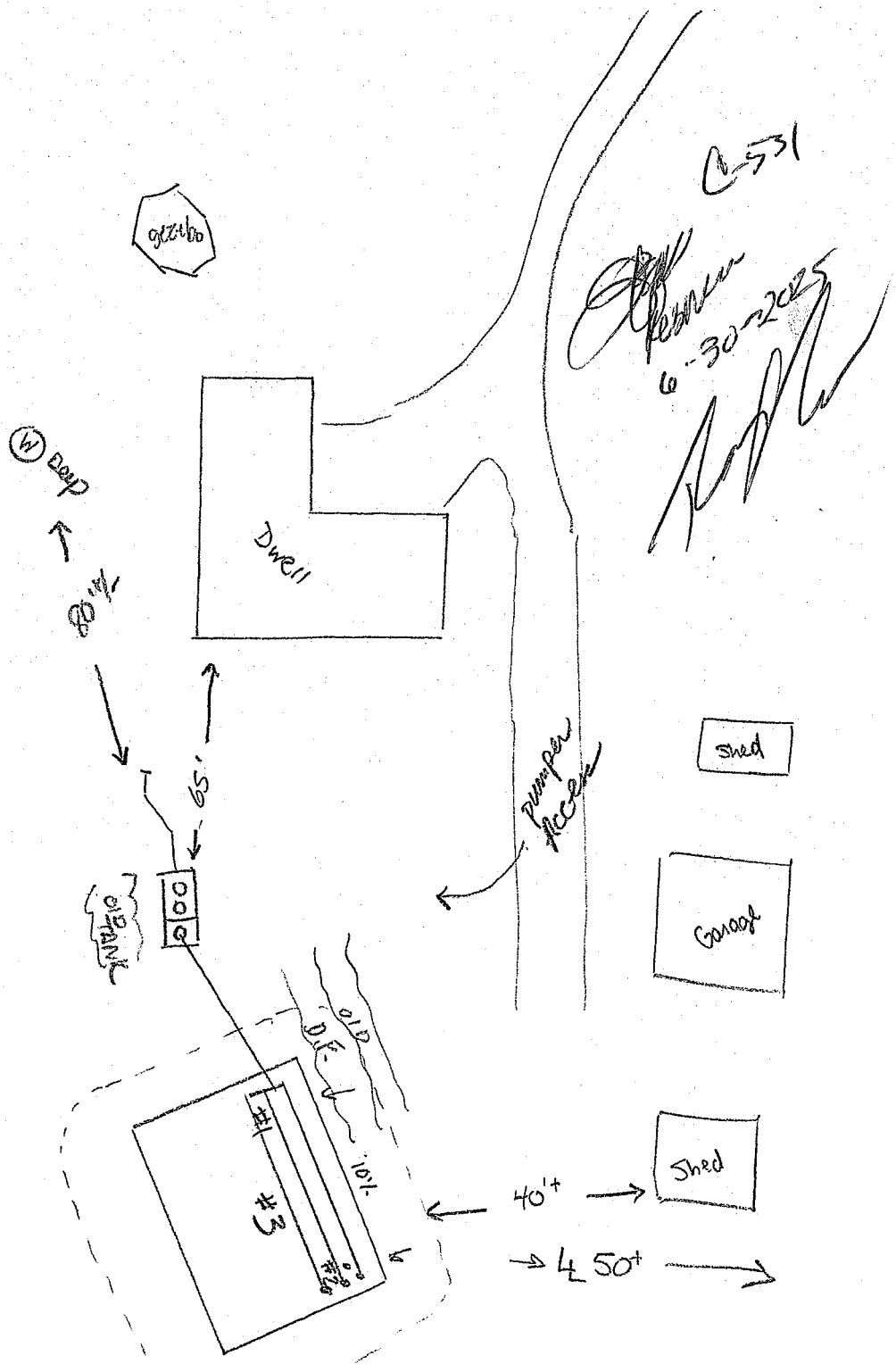
SKETCH OF PROPERTY

4 beds 600 gpd
NO G NOP

2250-2 Septic/Lift
Type III Mound
10'x52' Rock Bed
26'x52' SAA
1352 □
3' SAND Lift
2" Supply Line
1½" Laterals
3' Holes Apart
7/32" Holes
29 gpm
32.4 tdh

Inches per dose 4.3"
Alarm Depth 25.3"
pump ON 22.3"
pump off 18.0"

min dose 66
max dose 150
15.5 dose w/D.B.



University of Minnesota Onsite Sewage Treatment Program

Preliminary Evaluation Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

1. Contact Information

v 04.02.2024

Property Owner/Client: Timothy & Annenette Rice | Date Completed: 6/18/2025

Site Address: 17984 350th Ave. Detroit Lakes, MN 56501 | Project ID:

Email: | Phone:

Mailing Address: 17984 350th Ave. Detroit Lakes, MN 56501 | Alt Phone:

Legal Description: PT S 1/2 SE 1/4 BEG 330' W & 800' S...

Parcel ID: 100391001/100415001 | SEC: 24 | TWP: 139 | RNG: 40

2. Flow and General System Information

A. Client-Provided Information

Project Type: ☐ New Construction ☑ Replacement ☐ Expansion ☐ Repair

Project Use: ☑ Residential ☐ Other Establishment:

Residential use: # Bedrooms: 4 | Dwelling sq.ft.: | Unfinished sq.ft.:

Adults: | # Children: | # Teenagers:

In-home business (Y/N): No | If yes, describe:

Water-using devices (*check all that apply*):

- ☐ Garbage Disposal/Grinder
- ☐ Sewage pump in basement
- ☐ Large Bathtub >40 gallons
- ☑ Clothes Washing Machine
- ☑ Dishwasher
- ☑ Water Softener*
- ☐ Iron Filter*
- ☑ High Eff. Furnace*
- ☐ Hot Tub*
- ☐ Sump Pump*
- ☐ Self-Cleaning Humidifier*
- ☐ Other:

* Clear water source - should not go into system

Additional current or future uses:

Anticipated non-domestic waste:

The above is complete & accurate: *Client signature & date*

B. Designer-determined Flow and Anticipated Waste Strength Information

Attach additional information as necessary.

Design Flow: 600 GPD | Anticipated Waste Type: Residential

Maximum Concentration | BOD: 170 mg/L | TSS: 60 mg/L | Oil & Grease: 25 mg/L

3. Preliminary Site Information

A. Water Supply Wells

#	Description	Mn. ID#	Well Depth (ft.)	Casing Depth (ft.)	Confining Layer	STA Setback	Source
1	Deep Well					100+	Owner
2							
3							
4							

Additional Well Information:

University of Minnesota Onsite Sewage Treatment Program

Preliminary Evaluation Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

Site within 200' of noncommunity transient well (Y/N)	No	Yes, source:
Site within a drinking water supply management area (Y/N)	No	Yes, source:
Site in Well Head Protection inner wellhead management zone (Y/N)	No	Yes, source:
Buried water supply pipes within 50 ft of proposed system (Y/N)	No	
B. Site located in a shoreland district/area?	No	Yes, name: N/A
Elevation of ordinary high water level:	N/A ft	Source: N/A
Classification: N/A	Tank Setback: N/A ft.	STA Setback: N/A ft.
C. Site located in a floodplain?	No	Yes, Type(s): N/A
Floodplain designation/elevation (10 Year):	N/A ft	Source: N/A
Floodplain designation/elevation (100 Year):	N/A ft	Source: N/A

D. Property Line Id / Source: ☑ Owner ☐ Survey ☑ County GIS ☐ Plat Map ☐ Other:

E. ID distance of relevant setbacks on map: ☐ Water ☐ Easements ☑ Well(s) ☑ Building(s) ☑ Property Lines ☐ OHWL ☐ Other:

4. Preliminary Soil Profile Information From Web Soil Survey (attach map & description)

Map Units: 267E Snellman Sandy Loam — Slope Range: 15-30 %

List landforms: Moraines

Landform position(s): Back/ Side Slope

Parent materials: Till

Depth to Bedrock/Restrictive Feature: 6 in — Depth to Watertable: in

Map Unit Ratings

Septic Tank Absorption Field- At-grade:	Extremely Limited
Septic Tank Absorption Field- Mound:	Extremely Limited
Septic Tank Absorption Field- Trench:	Extremely Limited

5. Local Government Unit Information

Name of LGU: Becker County Planning & Zonning

LGU Contact: Kyle Vareberg

LGU-specific setbacks:

LGU-specific design requirements:

LGU-specific installation requirements:

Notes: Installing a Type III Mound System

University of Minnesota Onsite Sewage Treatment Program

Field Evaluation Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

v 04.02.2024

1. Project Information

Property Owner/Client: Timothy & Annenette Rice | Project ID:

Site Address: 17984 350th Ave. Detroit Lakes, MN 56501 | Date Completed: 6/18/2025

2. Utility and Structure Information

Utility Locations Identified ☐ Gopher State One Call # ☐ Any Private Utilities:

Locate and Verify (*see Site Evaluation map*) ☑ Existing Buildings ☐ Improvements ☐ Easements ☑ Setbacks

3. Site Information

Vegetation type(s): Grass | Landscape position: Back/ Side Slope

Percent slope: 10.0 % | Slope shape: Linear, Linear | Slope direction: northwest

Describe the flooding or run-on potential of site:

Describe the need for Type III or Type IV system: Top Soil to Restrictions

Note:

Proposed soil treatment area protected? (Y/N): Yes | If yes, describe: Flagged

4. General Soils Information

Filled, Compacted, Disturbed areas (Y/N): No

If yes, describe:

Soil observations were conducted in the proposed system location (Y/N): Yes

A soil observation in the most limiting area of the proposed system (Y/N): Yes

Number of soil observations: 3 | Soil observation logs attached (Y/N): Yes

Percolation tests performed & attached (Y/N): No

5. Phase I. Reporting Information

	Depth		Elevation	
Limiting Condition*:	0	in		ft
Periodically saturated soil:	0	in		ft
Standing water:		in		ft
Bedrock:		in		ft

*Most Restrictive Depth Identified from List Below

Soil Texture: Sandy Clay Loam

Percolation Rate: min/inch

Soil Hyd Loading Rate: 0.45 gpd/sq.ft

Benchmark Elevation: ft | Elevations and Benchmark on map? (Y/N):

Benchmark Elevation Location:

Differences between soil survey and field evaluation:

Site evaluation issues / comments:

Anticipated construction issues:

University of Minnesota Onsite Sewage Treatment Program

Soil Observation Log

Project ID:

v 04.02.2024

Client: Timothy & Annenette Rice

Location / Address: 17984 350th Ave. Detroit Lakes, MN 56501

Soil parent material(s): (Check all that apply) ☐ Outwash ☐ Lacustrine ☐ Loess ☑ Till ☐ Alluvium ☐ Bedrock ☐ Organic Matter ☐ Disturbed/Fill

Landscape Position: Back/Side Slope	Slope %: 10.0	Slope shape: Linear, Linear	Flooding/Run-On potential: No
Vegetation: Grass	Soil survey map units: 267E Snellman Sandy Loam		Surface Elevation-Relative to benchmark:
Date/Time of Day/Weather Conditions:	6/16/2025	PM	Cloudy
Observation #/Location: #1			Limiting Layer Elevation:
			Observation Type: Auger

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	Structure Shape	Structure Grade	Structure Consistence
0"-6"	Medium Sandy Loam	<10	10YR 3/2				Blocky	Weak	Friable
6"+	Sandy Clay Loam	<10	10YR 5/4	10YR 5/1 10YR 5/8	Depletions Concentrations	S2	Blocky	Moderate	Firm

Comments: 0.0" Credit Top Soil to Restrictions

I hereby certify that I have completed this work in accordance with all applicable ordinances, rules and laws.

Scott Ellingson	Scott Ellingson	3947	6/18/2025
(Designer/Inspector)	(Signature)	(License #)	(Date)

Optional Verification: I hereby certify that this soil observation was verified according to Minn. R. 7082.0500 subp. 3 A. The signature below represents an infield verification of the periodically saturated soil or bedrock at the proposed soil treatment and dispersal site.

(LGU/Designer/Inspector)	(Signature)	(Cert #)	(Date)

University of Minnesota Onsite Sewage Treatment Program

Soil Observation Log

Project ID: v 04.02.2024

Client: Timothy & Annenette Rice | Location / Address: 17984 350th Ave. Detroit Lakes, MN 56501

Soil parent material(s): (Check all that apply) ☐ Outwash ☐ Lacustrine ☐ Loess ☑ Till ☐ Alluvium ☐ Bedrock ☐ Organic Matter ☐ Disturbed/Fill

Landscape Position: Back/Side Slope	Slope %: 10.0	Slope shape: Linear, Linear	Flooding/Run-On potential: No
Vegetation: Grass	Soil survey map units: 267E Snellman Sandy Loam		Surface Elevation-Relative to benchmark:
Date/Time of Day/Weather Conditions:	6/16/2025	PM	Cloudy
Observation #/Location: #2			Limiting Layer Elevation:
			Observation Type: Auger

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	Structure: Shape	Structure: Grade	Structure: Consistence
0"-8"	Medium Sandy Loam	<10	10YR 3/2				Blocky	Weak	Friable
8"-14"	Sandy Clay Loam	<10	10YR 4/4				Blocky	Moderate	Firm
14"+	Sandy Clay Loam	<10	10YR 4/4	10YR 5/1 10YR 5/8	Depletions Concentrations	S2	Blocky	Moderate	Firm

Comments: 14"

I hereby certify that I have completed this work in accordance with all applicable ordinances, rules and laws.

Scott Ellingson	Scott Ellingson	3947	6/18/2025
(Designer/Inspector)	(Signature)	(License #)	(Date)

Optional Verification: I hereby certify that this soil observation was verified according to Minn. R. 7082.0500 subp. 3 A. The signature below represents an infield verification of the periodically saturated soil or bedrock at the proposed soil treatment and dispersal site.

(LGU/Designer/Inspector)	(Signature)	(Cert #)	(Date)

University of Minnesota Onsite Sewage Treatment Program

Soil Observation Log

Project ID: v 04.02.2024

Client: Timothy & Annenette Rice | Location / Address: 17984 350th Ave. Detroit Lakes, MN 56501

Soil parent material(s): (Check all that apply) ☐ Outwash ☐ Lacustrine ☐ Loess ☑ Till ☐ Alluvium ☐ Bedrock ☐ Organic Matter ☐ Disturbed/Fill

Landscape Position	Slope %:	Slope shape:	Flooding/Run-On potential:
Back/Side Slope	10.0	Linear, Linear	No

Vegetation:	Soil survey map units:	Surface Elevation-Relative to benchmark:
Grass	267E Snellman Sandy Loam	

Date/Time of Day/Weather Conditions:			Limiting Layer Elevation:
6/16/2025	PM	Cloudy	

Observation #/Location:	Observation Type:
#3	Auger

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	Structure: Shape	Structure: Grade	Structure: Consistence
0"-8"	Medium Sandy Loam	<10	10YR 3/2				Blocky	Weak	Friable
8"-12"	Sandy Clay Loam	<10	10YR 4/4				Blocky	Moderate	Firm
12"+	Sandy Clay Loam	<10	10YR 4/4	10YR 5/1 10YR 5/8	Depletions Concentrations	S2	Blocky	Moderate	Firm

Comments: 12"

I hereby certify that I have completed this work in accordance with all applicable ordinances, rules and laws.

Scott Ellingson	Scott Ellingson	3947	6/18/2025
(Designer/Inspector)	(Signature)	(License #)	(Date)

Optional Verification: I hereby certify that this soil observation was verified according to Minn. R. 7082.0500 subp. 3 A. The signature below represents an infield verification of the periodically saturated soil or bedrock at the proposed soil treatment and dispersal site.

(LGU/Designer/Inspector)	(Signature)	(Cert #)	(Date)

University of Minnesota Onsite Sewage Treatment Program

Design Summary Page

MINNESOTA POLLUTION CONTROL AGENCY

1. PROJECT INFORMATION

v 04.02.2024

Property Owner/Client: Timothy & Annenette Rice
Project ID:
Site Address: 17984 350th Ave. Detroit Lakes, MN 56501
Date: 06/18/25
Email Address:
Phone:

2. DESIGN FLOW & WASTE STRENGTH

Design Flow: 600 GPD
Anticipated Waste Type: Residential
BOD: 170 mg/L TSS: 60 mg/L Oil & Grease: 25 mg/L
Treatment Level: C *Select Treatment Level C for residential septic tank effluent*

3. HOLDING TANK SIZING *Holding Tank Sizing: see 7080.2290*

Code Minimum **Holding Tank** Capacity: Gallons with Tanks or Compartments
Recommended **Holding Tank** Capacity: Gallons with Tanks or Compartments
The holding tank(s) will be: *Existing tank reuse requires a tank integrity assessment*
Type of High Level Alarm:
(Alarm Set @ 75% tank capacity measured from inlet to bottom)
Comments:

4. SEPTIC TANK SIZING *Sizing: See 7080.1930*

A. Residential dwellings:

Number of Bedrooms (Residential): 4
Code Minimum **Septic Tank** Capacity: 1500 Gallons with 1 Tanks or Compartments
Recommended **Septic Tank** Capacity: 1500 Gallons with 1 Tanks or Compartments
The septic tank(s) will be: All New *Existing tank reuse requires a tank integrity assessment*
Comments:
Effluent Screen & Alarm (Y/N): No Model/Type:

B. Other Establishments:

Waste received by: GPD x Days Hyd. Retention Time
7080 Minimum **Septic Tank** Capacity: Gallons with Tanks or Compartments
Designed **Septic Tank** Capacity: Gallons with Tanks or Compartments
The septic tank(s) will be: *Existing tank reuse requires a tank integrity assessment*
Comments:
Effluent Screen & Alarm (Y/N): Model/Type:

*** Other Establishments Require Department of Labor and Industry Approval and Inspection for Building Sewer ***

University of Minnesota Onsite Sewage Treatment Program

Design Summary Page

MINNESOTA POLLUTION CONTROL AGENCY

5. PUMP TANK SIZING *Sizing: see 7080.2100*

Soil Treatment Dosing Tank				Other Component Dosing Tank:			
Pump Tank Capacity (7080 Minimum):	500 Gal			Pump Tank Capacity (7080 Minimum):	Gal		
Pump Tank Capacity (Designed):	750 Gal			Pump Tank Capacity (Designed):	Gal		
Pump Req:	29.0 GPM	Total Head	32.4 ft	Pump Req:	GPM	Total Head	ft
Supply Pipe Dia.	2.00 in	Dose Vol:	67.0 gal	Supply Pipe Dia.	in	Dose Vol:	Gal

* Flow measurement device must be incorporated for any system with a pump *

6. SYSTEM AND DISTRIBUTION TYPE

Project ID:

Soil Treatment Type:	Mound	Distribution Type:	Pressure Distribution-Level
Elevation Benchmark:	ft	Benchmark Location:	
MPCA System Type:	Type III	Distribution Media:	Rock
Type III/IV/V Details:	Top Soil to Restrictions		

7. SITE EVALUATION SUMMARY:

Describe Limiting Condition: Redoximorphic Features/Saturated Soils

Layers with >35% Rock Fragments? (yes/no) No If yes, describe below: % rock and layer thickness, amount of soil credit and any additional information for addressing the rock fragments in this design.

Note:

	Depth		Depth		Elevation	
Limiting Condition:	0.0	inches	0.00	ft		ft
Minimum Req'd Separation:	36	inches	3.00	ft		
Distribution Media Bottom*:	Mound	inches	-3.00	ft	#VALUE!	ft

Elevations are critical for system compliance.

#VALUE!

*This is the maximum depth to the bottom of the distribution media for required separation. Negative Depth (ft) requires a mound.

Designed Distribution Bottom Elevation: 3.00 ft Mound Minimum Sand Depth: 36 inches

A. Soil Texture:	Sandy Clay Loam		
B. Soil Hyd. Loading Rate:	0.45 GPD/ft^2	C: Percolation Rate:	MPI
D. Contour Loading Rate:	12.0	Note:	
E. Measured Land Slope:	10.0 %	Note:	
Comments:			

8. SOIL TREATMENT AREA DESIGN SUMMARY

Trench:

Dispersal Area	sq.ft	Sidewall Depth	in	Trench Width	ft
Total Lineal Feet	ft	No. of Trenches		Code Max. Trench Depth	in
Contour Loading Rate	ft	Minimum Length	ft	Designed Trench Depth	in

Bed:

Dispersal Area	sq.ft	Sidewall Depth	in	Maximum Bed Depth	in
Bed Width	ft	Bed Length	ft	Designed Bed Depth	in

University of Minnesota Onsite Sewage Treatment Program

Design Summary Page

MINNESOTA POLLUTION CONTROL AGENCY

Project ID:

Mound:

Dispersal Area	520.0	sq.ft	Bed Length	52.0	ft	Bed Width	10.0	ft
Absorption Width	26.0	ft	Clean Sand Lift	3.0	ft	Berm Width (0-1%)		ft
Upslope Berm Width	11.7	ft	Downslope Berm	26.1	ft	Endslope Berm Width	18.2	ft
Total System Length	88.5	ft	System Width	47.8	ft	Contour Loading Rate	12.0	gal/ft

At-Grade:

Dispersal Area		sq.ft	Bed Length		ft	Bed Width		ft
Upslope Berm		ft	Downslope Berm		ft	Finished Height		ft
System Length		ft	Endslope Berm		ft	System Width		ft

Level & Equal Pressure Distribution Soil Treatment Area

No. of Laterals	3		Lateral Diameter	1.50	in	Lateral Spacing	2.0	ft
Perforation Spacing	3.0	ft	Perforation Diameter	7/32	in	Drainback Volume	8.5	gal
Min Dose Volume	66.0	gal	Max Dose Volume	150.0	gal	Total Dosing Volume	75.5	gal

Non-Level and Unequal Pressure Distribution Soil Treatment Area

	Elevation (ft)	Pipe Size (in)	Pipe Volume (gal/ft)	Pipe Length (ft)	Perf Size (in)	Spacing (ft)	Spacing (in)
Lateral 1							
Lateral 2							
Lateral 3							
Lateral 4							
Lateral 5							
Lateral 6							

Minimum Dose Volume: gal

Maximum Dose Volume: gal

Total Dosing Volume: gal

9. Organic Loading and Additional Info for HSW or Type IV/V Design - See Organic Loading tab

Organic Loading to Soil Treatment (Based on Waste Strength Data and Organic Loading Design)

A. Organic Loading Based on: B. Minumum required area sq.ft

Technology Strength Reduction (Tretment Level or HSW)

A. Starting Waste Strength Treatment desinged to meet:

Pretreatment Technology: *Must Meet or Exceed Target Level

Model: Units:

Disinfection Technology: *Required for Levels A & B

Model: Units:

10. Comments/Special Design Considerations:

I hereby certify that I have completed this work in accordance with all applicable ordinances, rules and laws.

Scott Ellingson	Scott Ellingson	3947	6/18/2025
(Designer)	(Signature)	(License #)	(Date)

University of Minnesota Onsite Sewage Treatment Program

Mound Design Worksheet
≥1% Slope

MINNESOTA POLLUTION CONTROL AGENCY

1. SYSTEM SIZING: Project ID: v 04.02.2024

A. Design Flow:	600	GPD
B. Soil Loading Rate:	0.45	GPD/sqft
C. Depth to Limiting Condition		ft
D. Percent Land Slope:	10.0	%
E. Media (Sand) Loading Rate:	1.2	GPD/sqft
F. Mound Absorption Ratio:	2.60	

Table I
MOUND CONTOUR LOADING RATES:

Measured Perc Rate	← OR →	Texture - derived mound absorption ratio		Contour Loading Rate:
≤ 60mpi	← OR →	1.0, 1.3, 2.0, 2.4, 2.6	→	≤12
61-120 mpi		5.0	→	≤12
≥ 120 mpi*		>5.0*	→	≤6*

TABLE IXa
LOADING RATES FOR DETERMINING BOTTOM ABSORPTION AREA AND ABSORPTION RATIOS USING PERCOLATION TESTS

Percolation Rate (MPI)	Treatment Level C: Absorption Area Loading Rate (gpd/ft²)	Treatment Level C: Mound Absorption Ratio	Treatment Level A, A-2, B: Absorption Area Loading Rate (gpd/ft²)	Treatment Level A, A-2, B: Mound Absorption Ratio
<0.1	-	1	-	1
0.1 to 5	1.2	1	1.6	1
0.1 to 5 (fine sand and loamy fine sand)	0.6	2	1	1.6
6 to 15	0.78	1.5	1	1.6
16 to 30	0.6	2	0.78	2
31 to 45	0.5	2.4	0.78	2
46 to 60	0.45	2.6	0.6	2.6
61 to 120	-	5	0.3	5.3
>120	-	-	-	-

*Systems with these values are not Type I systems. Contour Loading Rate (linear loading rate) is a recommended value.

2. DISPERSAL MEDIA SIZING

A. Hydraulic Absorption Required Bottom Area: Design Flow (1A) ÷ Design Media Loading Rate(1E)

600 GPD ÷ 1.20 GPD/sqft = 500.0 sq.ft

Optional Upsizing of Dispersal Media Area

B. Larger Bed Area Size or Organic Sizing of Bed Area *[see organic loading sheet(2G)]* 520.0 sq.ft

C. Designed Dispersal Media Area: 520.0 sq.ft *Larger of 2A or 2B*

D. Enter Dispersal Bed Width: 10.0 ft *Can not exceed 10 feet*

E. Calculate Contour Loading Rate: Bed Width(2D) X Design Media Loading Rate(1E)

10.0 ft X 1.2 GPD/sqft = 12.0 gal/ft *Can not exceed Table 1*

F. Calculate Minimum Dispersal Bed Length: Dispersal Bed Area(2C) ÷ Bed Width(2D)

520 sqft ÷ 10.0 ft = 52.0 ft

If a larger dispersal media Length is desired, enter Length(ft): ft

3. ABSORPTION AREA SIZING

A. Calculate Absorption Width: Bed Width(2D) X Mound Absorption Ratio(1F)

10.0 ft X 2.6 = 26.0 ft

B. For slopes >1%, the Absorption Width is measured downhill from the upslope edge of the Bed.

Calculate Downslope Absorption Width: Absorption Width(3A) - Bed Width(2D)

26.0 ft - 10.0 ft = 16.0 ft

4. DISTRIBUTION MEDIA:

Project ID:

Select Dispersal Media: Rock — Enter Either 4A or 4B

A. Rock Depth Below Distribution Pipe

9 in

B. Registered Media

Registered Media Depth in

Check registered product information for specific application details and design

Specific Media Comments:

5. MOUND SIZING

Project ID:

A. Clean Sand Lift: Required Separation - Depth to Limiting Condition = Clean Sand Lift (1 ft minimum)

3.00 ft - ft = 3.00 ft Design Sand Lift (optional): ft

B. Upslope Height: Clean Sand Lift(5A) + Depth of Media(4AorB) +Depth to Cover Pipe+ Depth of Cover (1 ft)

3.00 ft + 0.75 ft + 0.33 ft + 1.00 ft = 5.08 ft

Land Slope %		0	1	2	3	4	5	6	7	8	9	10	11	12
Upslope Berm Ratio	3:1	3.00	2.91	2.83	2.75	2.68	2.61	2.54	2.48	2.42	2.36	2.31	2.26	2.21
	4:1	4.00	3.85	3.70	3.57	3.45	3.33	3.23	3.12	3.03	2.94	2.86	2.78	2.70

C. Select Upslope Berm Multiplier (based on land slope): 2.31

D. Calculate Upslope Berm Width: Multiplier (5C) X Upslope Mound Height (5B)

2.31 X 5.08 ft = 11.73 ft

E. Calculate Drop in Elevation Under Bed: Bed Width(2D) X Land Slope(1D) ÷ 100 = Drop (ft)

10.00 ft X 10.0 % ÷ 100 = 1.00 ft

F. Calculate Downslope Mound Height: Upslope Height(5B) + Drop in Elevation(5E)

5.08 ft + 1.00 ft = 6.08 ft

Land Slope %		0	1	2	3	4	5	6	7	8	9	10	11	12
Downslope Berm Ratio	3:1	3.00	3.09	3.19	3.30	3.41	3.53	3.66	3.80	3.95	4.11	4.29	4.48	4.69
	4:1	4.00	4.17	4.35	4.54	4.76	5.00	5.26	5.56	5.88	6.25	6.67	7.14	7.69

G. Select Downslope Berm Multiplier (based on land slope): 4.29

H. Calculate Downslope Berm Width: Downslope Multiplier(5G) X Downslope Height (5F)

4.29 x 6.08 ft = 26.08 ft

I. Calculate Minimum Berm to Cover Absorption Area: Downslope Absorption Width(3B) + 4 feet

16.00 ft + 4.00 ft = 20.00 ft

J. Design Downslope Berm = greater of 5H and 5I: 26.08 ft

K. Select Endslope Berm Multiplier: 3.0 *(usually 3.0 or 4.0)*

L. Calculate Endslope Berm Width = Endslope Berm Multiplier(5K) X Downslope Mound Height(5F)

3.00 X 6.1 ft = 18.24 ft

M. Calculate Mound Width: Upslope Berm Width(5D) + Bed Width(2D) + Downslope Berm Width(5J)

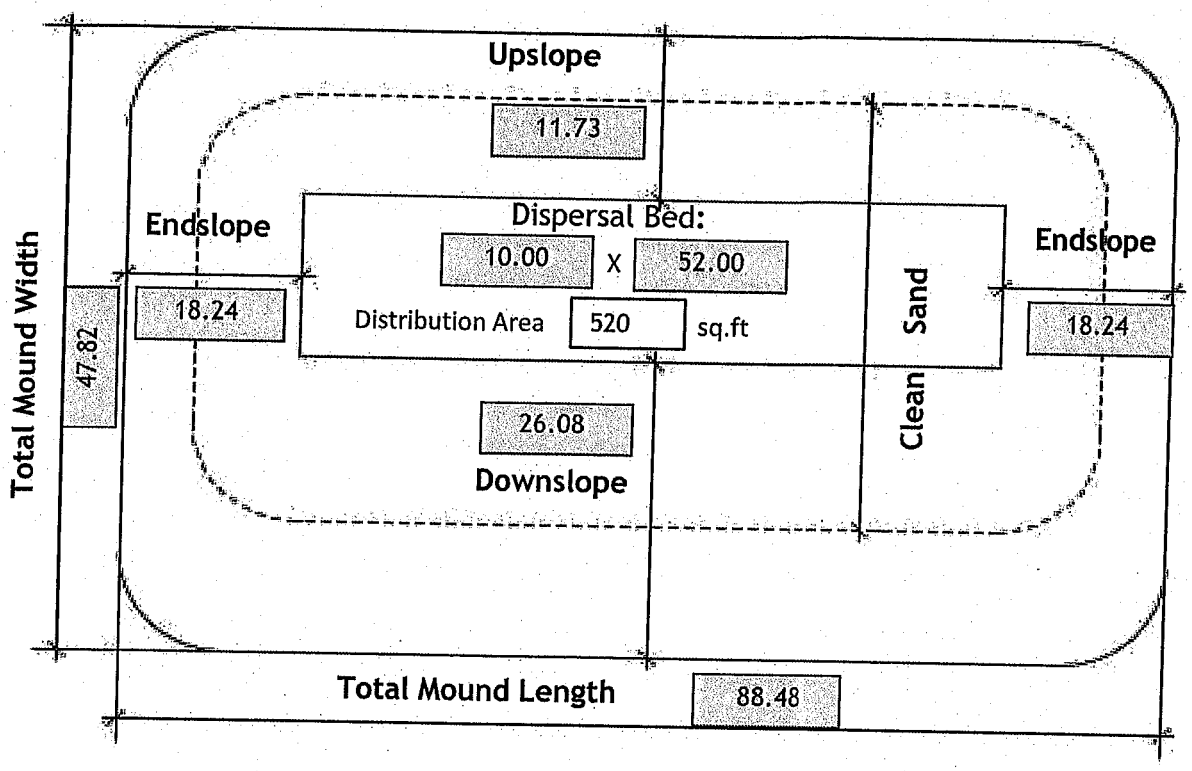
11.73 ft + 10.00 ft + 26.08 ft = 47.82 ft

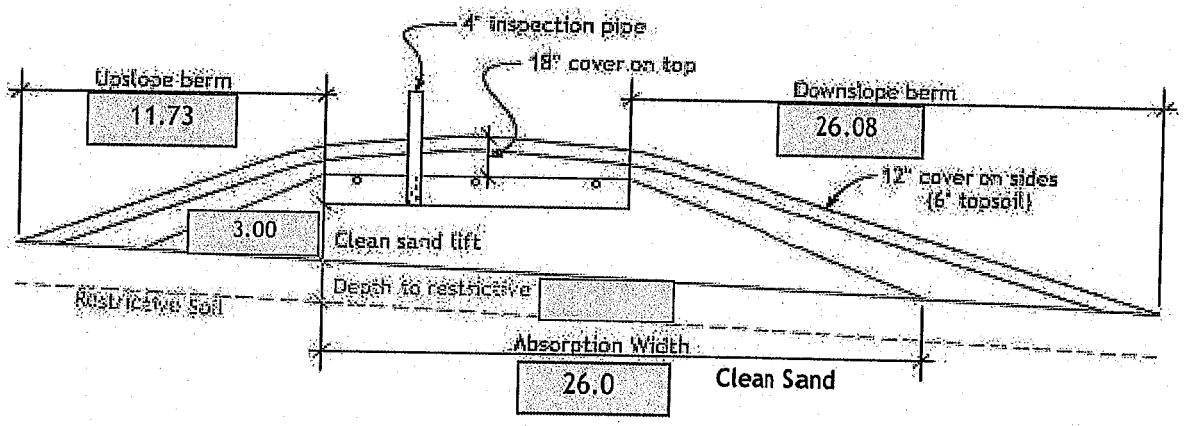
N. Calculate Mound Length: Endslope Berm Width (5L) + Bed Length(2F) + Endslope Berm Width(5L)

18.24 ft + 52.00 ft + 18.24 ft = 88.48 ft

6. MOUND DIMENSIONS (Feet)

Project ID:





Elevation to Benchmark

Required Separation: 36.0 (in)

Elevation Limiting Layer: ft

Distribution Media: Rock

Elevation required Separation: #VALUE! ft

Media Depth *Below Pipe*: 9 (in)

Elevation Distribution Media Bottom: 3.00 ft

Manifold Connection: End

Lateral Pipe Diameter: 1.50 (in)

Perforation Size: 7/32 (in)

Perforation Spacing: 36.0 (in)

If Split and Non-Level Pressure Distribution Used: See Non-Level Pressure Distribution Form

Comments:

University of Minnesota Onsite Sewage Treatment Program

Estimated Mound Materials Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

Mound to be constructed to dimensions in design. This is an estimate of materials needed.
Individual construction practices may vary quantities.

Project ID:

v 04.02.2024

A. Rock *Volume* : (Rock Below Pipe + Rock to cover pipe (*pipe outside dia + ~2 inch)*) X *Bed Length* X *Bed Width* = *Volume*

(9 in + 3.5 in) ÷ 12 X 52.0 ft X 10.0 ft = 541.7 cu.ft

Divide cu.ft by 27 cu.ft/cu.yd to calculate cubic yards: 541.7 cu.ft ÷ 27 = 20.1 cu.yd

Add 30% for constructability: 20.1 cu.yd X 1.3 = 26.1 cu.yd

B. Calculate *Clean Sand Volume:*

Volume Under Rock bed : *Average Sand Depth* x *Media Width* x *Media Length* = cubic feet

3.5 ft X 10.0 ft X 52 ft = 1820 cu.ft

For a Mound on a slope from 0-1%

Volume from Length = ((Upslope Mound Height - 1) X Absorption Width Beyond Bed X Media Bed Length)

ft - 1) X X ft =

Volume from Width = ((Upslope Mound Height - 1) X Absorption Width Beyond Bed X Media Bed Width)

ft - 1) X X ft =

Total Clean Sand Volume : *Volume from Length* + *Volume from Width* + *Volume Under Media*

cu.ft + cu.ft + cu.ft = cu.ft

For a Mound on a slope greater than 1%

Upslope Volume : ((*Upslope Mound Height - 1*) x 3 x *Bed Length*) ÷ 2 = cubic feet

((5.1 ft - 1) X 3.0 ft X 52.0) ÷ 2 = 318.2 cu.ft

Downslope Volume : ((*Downslope Height - 1)* x Downslope Absorption Width x *Media Length*) ÷ 2 = cubic feet

((6.1 ft - 1) X 16.0 ft X 52.0) ÷ 2 = 2113.3 cu.ft

Endslope Volume : (*Downslope Mound Height - 1)* x 3 x *Media Width* = cubic feet

(6.1 ft - 1) X 3.0 ft X 10.0 ft = 152.4 cu.ft

Total Clean Sand Volume : *Upslope Volume* + *Downslope Volume* + *Endslope Volume* + *Volume Under Media*

318.2 cu.ft + 2113.3 cu.ft + 152.4 cu.ft + 1820.0 cu.ft = 4403.9 cu.ft

Divide cu.ft by 27 cu.ft/cu.yd to calculate cubic yards: 4403.9 cu.ft ÷ 27 = 163.1 cu.yd

Add 30% for constructability: 163.1 cu.yd X 1.3 = 212.0 cu.yd

C. Calculate *Sandy Berm Volume:*

Total Berm Volume (approx.) : ((Avg. Mound Height - 0.5 ft topsoil) x Mound Width x Mound Length) ÷ 2

(5.6 - 0.5)ft X 47.8 ft X 88.5) ÷ 2 = 10746.6 cu.ft

Total Mound Volume - Clean Sand volume -Rock Volume = cubic feet

10746.6 cu.ft - 4403.9 cu.ft - 541.7 cu.ft = 5801.0 cu.ft

Divide cu.ft by 27 cu.ft/cu.yd to calculate cubic yards: 5801.0 cu.ft ÷ 27 = 214.9 cu.yd

Add 30% for constructability: 214.9 yd^3 x 1.3 = 279.3 cu.yd

D. Calculate *Topsoil Material Volume: Total Mound Width X Total Mound Length X .5 ft*

47.8 ft X 88.5 ft X 0.5 ft = 2115.5 cu.ft

Divide cu.ft by 27 cu.ft/cu.yd to calculate cubic yards: 2115.5 cu.ft ÷ 27 = 78.4 cu.yd

Add 30% for constructability: 78.4 cu.yd X 1.3 = 101.9 cu.yd

University of Minnesota Onsite Sewage Treatment Program

Pressure Distribution Design Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

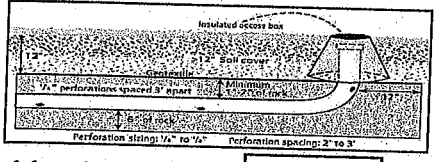
Project ID:

v 04.02.2024

1. Media Bed Width: 10.0 ft
2. Media Bed Length: 52.0 ft
3. Minimum Number of Laterals in system/zone = Rounded up number of [(Media Bed Width(1.) - 4) ÷ 3] + 1.

   [(10 - 4) ÷ 3] + 1 = 3 laterals *Does not apply to at-grades*
4. Designer Selected *Number of Laterals*: 3 laterals

   Cannot be less than line 2 (Except in at-grades)



5. Lateral spacing in Bed; *Must be greater than 1 foot and no more than 2 feet from Edge*: 2.00 ft
6. *Length of Laterals* = Media Bed Length(2.) - 2 Feet.

   52.0 - 2ft = 50.0 ft *Perforation can not be closer then 1 foot from edge.*
7. Select *Perforation Spacing*: 3.0 ft
8. Determine the *Number of Perforation Spaces*. Divide the *Length of Laterals(6.)* by the *Perforation Spacing* (7.) and round down to the nearest whole number.

   Number of Perforation Spaces = 50.0 ft ÷ 3.0 ft = 16 Spaces
9. *Number of Perforations per Lateral* is equal to 1.0 plus the *Number of Perforation Spaces(8.)*. Check table below to verify the number of perforations per lateral guarantees less than a 10% discharge variation. The value is double with a center manifold.

   Perforations Per Lateral = 16 Spaces + 1 = 17 Perfs. Per Lateral
10. Select *Perforation Diameter Size:* 7/32 in 0.21875
11. *Select Lateral Diameter (See Table)*: 1.50 in
12. Select *Manifold Connection* (End or Center): End

If Center Manifold Connection the max number of perfs per lateral in the table can be doubled.

Maximum Number of Perforations Per Lateral to Guarantee <10% Discharge Variation

¼ Inch Perforations

Perforation Spacing (Feet)	Pipe Diameter (Inches)				
	1	1¼	1½	2	3
2	10	13	18	30	60
2½	8	12	16	28	54
3	8	12	16	25	52

7/32 Inch Perforations

Perforation Spacing (Feet)	Pipe Diameter (Inches)				
	1	1¼	1½	2	3
2	11	16	21	34	68
2½	10	14	20	32	64
3	9	14	19	30	60

3/16 Inch Perforations

Perforation Spacing (Feet)	Pipe Diameter (Inches)				
	1	1¼	1½	2	3
2	12	18	26	46	87
2½	12	17	24	40	80
3	12	16	22	37	75

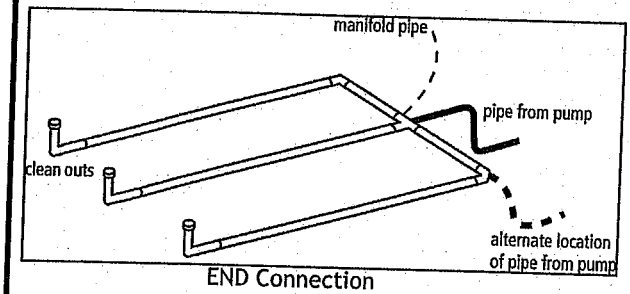
1/8 Inch Perforations

Perforation Spacing (Feet)	Pipe Diameter (Inches)				
	1	1¼	1½	2	3
2	21	33	44	74	149
2½	20	30	41	69	135
3	20	29	38	64	128

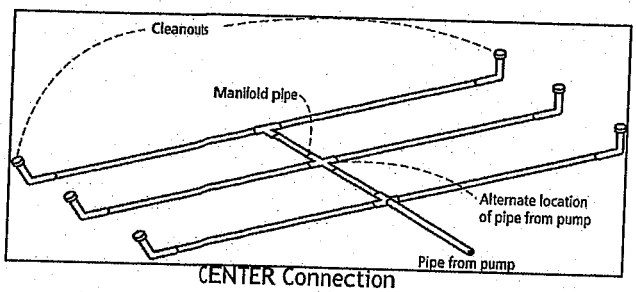
University of Minnesota Onsite Sewage Treatment Program

Pressure Distribution Design Worksheet

MINNESOTA POLLUTION CONTROL AGENCY



END Connection



CENTER Connection

Perf Per Lateral: 17

Perf Per Lateral Equal Split: 9 | 8

OPTIONAL Perf Per Lateral Non-Equal Split*: ____ | ____

* must not exceed maximum number perfs per lateral in table

End Feed Lateral Min Diameter: 1.50

Center Feed Lateral Min Diameter: ____

13. *Total Number of Perforations* equals the *Number of Perforations per Lateral (9.)* multiplied by the *Number of Perforated Laterals.(4.)*

17 Perf. Per Lat. X 3 Number of Perf. Lat. = 51 Total Number of Perf.

14. Calculate the *Square Feet per Perforation.*

Recommended value is 4-11 ft2 per perforation, Does not apply to At-Grades

a. *Bed Area* = Bed Width (ft)(1.) X Bed Length (ft)(2.)

10.00 ft X 52.00 ft = 520 sq.ft

b. *Square Foot per Perforation = Bed Area (14a)* ÷ by *Total Number of Perfs (13)*

520 sqft ÷ 51 perf = 10 sq.ft/perf

15. Select *Minimum Average Head*: 1.0 ft

16. Select *Perforation Discharge* based on Table: 0.56 GPM per Perf

17. *Flow Rate = Total Number of Perfs(13.) X Perforation Discharge(16.)*

51 Perfs X 0.56 GPM per Perforation = 29.0 GPM

18. *Volume of Liquid Per Foot of Distribution Piping (Table II)*: 0.110 Gallons/ft

19. *Volume of Distribution Piping = Number of Perforated Laterals(4.) X Length of Laterals(6.) X Volume of Liquid Per Foot of Distribution Piping (18.)*

3 X 50.0 ft X 0.110 gal/ft = 16.5 Gallons

20. Minimum Delivered Volume = Volume of Distribution Piping (19.) X 4

16.5 gal X 4 = 66.0 Gallons

21. Maximum Delivered Volume = Design flow x 25%

600 gpd X 25% = 150.0 Gallons

22. Minimum Delivered vs Maximum Delivered evaluation: Volume ratio correct

Perforation Discharge (GPM)				
Head (ft)	Perforation Diameter			
	1/8	3/16	7/32	1/4
1.0'	0.18	0.41	0.56	0.74
1.5	0.22	0.51	0.69	0.9
2.0'	0.26	0.59	0.80	1.04
2.5	0.29	0.65	0.89	1.17
3.0	0.32	0.72	0.98	1.28
4.0	0.37	0.83	1.13	1.47
5.0'	0.41	0.93	1.26	1.65
1 foot	Dwellings with 3/16 inch to 1/4 inch perforations			
2 feet	Dwellings with 1/8 inch perforations Other establishments and MSTS with 3/16 inch to 1/4 inch perforations			
5 feet	Other establishments and MSTS with 1/8 inch perforations			

Table II Volume of Liquid in Pipe	
Pipe Diameter (inches)	Liquid Per Foot (Gallons)
1	0.045
1.25	0.078
1.5	0.110
2	0.170
3	0.380
4	0.661

Comments/Special Design Considerations:

UNIVERSITY OF MINNESOTA ONSITE SEWAGE TREATMENT PROGRAM

Basic STA Pump Selection Design Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

1. PUMP CAPACITY

Project ID:

v 04.02.2024

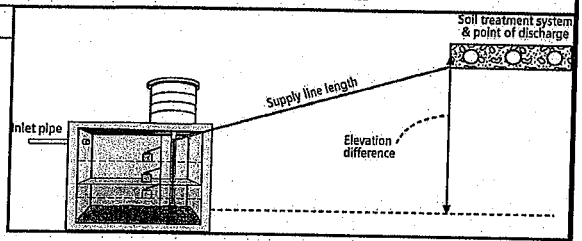
Pumping to Gravity or Pressure Distribution: Pressure

A. If pumping to gravity enter the gallon per minute of the pump: _____ GPM *(10 - 45 gpm)*

B. If pumping to a pressurized distribution system: 29.0 GPM

C. Enter pump description: Demand Dosing

2. HEAD REQUIREMENTS



A. Elevation Difference between pump and point of discharge: 16.0 ft

B. Distribution Head Loss: 5 ft

C. Additional Head Loss*: 10.0 ft (due to special equipment, etc.)

* Common additional head loss: gate valve = 1 ft each, globe valve = 1.5 ft each, splitter valve = see manufacturers details

Distribution Head Loss	
Gravity Distribution = 0ft	
Pressure Distribution based on Minimum Average Head Value on Pressure Distribution Worksheet:	
Minimum Average Head	**Distribution Head Loss**
1ft	5ft
2ft	6ft
5ft	10ft

D. 1. Supply Pipe Diameter: 2.0 in

2. Supply Pipe Length: 50 ft

E. Friction Loss in Plastic Pipe per 100ft from Table I:

Friction Loss = 2.2 ft per 100ft of pipe

F. Determine *Equivalent Pipe Length* from pump discharge to soil dispersal area discharge point. Estimate by adding 25% to supply pipe length for fitting loss. *Supply Pipe Length* X 1.25 = *Equivalent Pipe Length*

50 ft X 1.25 = 62.5 ft

Table I.Friction Loss in Plastic Pipe per 100ft

Flow Rate (GPM)	Pipe Diameter (inches)			
	1	1.25	1.5	2
10	9.1	3.1	1.3	0.3
12	12.8	4.3	1.8	0.4
14	17.0	5.7	2.4	0.6
16	21.8	7.3	3.0	0.7
18		9.1	3.8	0.9
20		11.1	4.6	1.1
25		16.8	6.9	1.7
30		23.5	9.7	2.4
35			12.9	3.2
40			16.5	4.1
45			20.5	5.0
50				6.1
55				7.3
60				8.6
65				10.0
70				11.4
75				13.0
85				16.4
95				20.1

G. Calculate *Supply Friction Loss* by multiplying *Friction Loss Per 100ft(E.)* by the *Equivalent Pipe Length(F.)* and divide by 100.

Supply Friction Loss =

2.2 ft per 100ft X 62.5 ft ÷ 100 = 1.4 ft

H. *Total Head* requirement is the sum of the *Elevation Difference(2A)* + Distribution Head Loss(2B) + Additional Head Loss(2C) + Supply Friction Loss(2G)

16 ft + 5.0 ft + 10.0 ft + 1.4 ft = 32.4 ft

3. PUMP SELECTION

A pump must be selected to deliver at least **29.0** GPM with at least **32.4** feet of total head.

Comments:

STA Dosing Pump Tank Design Worksheet (Demand Dose)

ONSITE SEWAGE TREATMENT PROGRAM — MINNESOTA POLLUTION CONTROL AGENCY

DETERMINE TANK CAPACITY AND DIMENSIONS — Project ID: — v 04.02.2024

1. A. Design Flow: 600 GPD — C. Tank Use: Dosing
   B. Code minimum pump tank capacity: 500 Gal — D. Designed pump tank capacity: 750 Gal
2. A. Tank Manufacturer: Brown Wilbert — B. Tank Model: 2250-2
   C. Capacity from manufacturer: 757 Gallons
   D. Liquid depth of tank from manufacturer: 48.0 inches
   E. Gallons per inch from manufacturer: 17.5 Gallons per inch

Note: Design calculations are based on this specific tank. Substituting a different tank model will change the pump float or timer settings. Contact designer if changes are necessary.

DETERMINE DOSING VOLUME

3. Calculate *Volume to Cover Pump* (The inlet of the pump must be at least 4-inches from the bottom of the pump tank & 2 inches of water covering the pump is recommended)

   (Pump and block height + 2 inches) X *Gallons Per Inch* (2E)

   (16 in + 2 inches) X 17.5 Gallons Per Inch = 315 Gallons

4. *Minimum Delivered Volume* = 4 X Volume of Distribution Piping:

   -Item 19 of the Pressure Distribution STA or Item 11 of Non-level STA — 66.0 Gallons (Minimum dose) — 3.77 inches/dose

5. Calculate *Maximum Pumpout Volume* (25% of Design Flow(1A))

   Design Flow: 600 GPD X 0.25 = 150.0 Gallons (Maximum dose) — 8.57 inches/dose

6. *Select a pumpout volume that meets both Minimum and Maximum:* 67.0 Gallons

7. Calculate *Doses Per Day* = Design Flow(1A) ÷ *Delivered Volume(6.)*

   600 gpd ÷ 67.0 gal = 9.0 *Doses**

   * Doses need to be equal to or greater than 4

8. Calculate Drainback:

   A. *Diameter of Supply Pipe* = 2 inches

   B. Length of Supply Pipe = 50 feet

   C. *Volume of Liquid Per Lineal Foot of Pipe* = 0.170 Gallons/ft

   D. *Drainback = Length of Supply Pipe(8B) X Volume of Liquid Per Lineal Foot of Pipe(8C)*

   50 ft X 0.170 gal/ft = 8.5 Gallons

9. *Total Dosing Volume = Delivered Volume(6.) + Drainback* (8D)

   67.0 gal + 8.5 gal = 75.5 Gallons

10. Minimum Alarm Volume = Depth of alarm (2 or 3 inches) X gallons per inch of tank(2E)

    3 in X 17.5 gal/in = 52.5 Gallons

11. Reserve Capacity Volume = [Tank Liquid Depth(2D) - Alarm Float Depth(10.)] x gallons per inch of tank(2E)

    [48.0 in - 25.3 in] X 17.5 gal/in = 397.0 Gallons

Volume of Liquid in Pipe	
Pipe Diameter (inches)	Liquid Per Foot (Gallons)
1	0.045
1.25	0.078
1.5	0.110
2	0.170
3	0.380
4	0.661

DEMAND DOSE FLOAT SETTINGS — Alarm and Pump are to be wired on separate circuits and inspected by the electrical inspector

12. Calculate *Float Separation Distance* using *Dosing Volume*.

    Total Dosing Volume(9.) ÷ Gallons Per Inch(2E)

    75.5 gal ÷ 17.5 gal/in = 4.31 inches

13. Measuring from bottom of tank:

    A. *Distance to set Pump Off Float* = Pump + block height + 2 inches

    16.0 in + 2 in = 18.0 inches

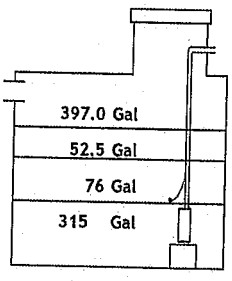
    B. *Distance to set Pump On Float=Distance to Set Pump-Off Float(13A) + Float Separation Distance(12.)*

    18.0 in + 4.3 in = 22.3 inches

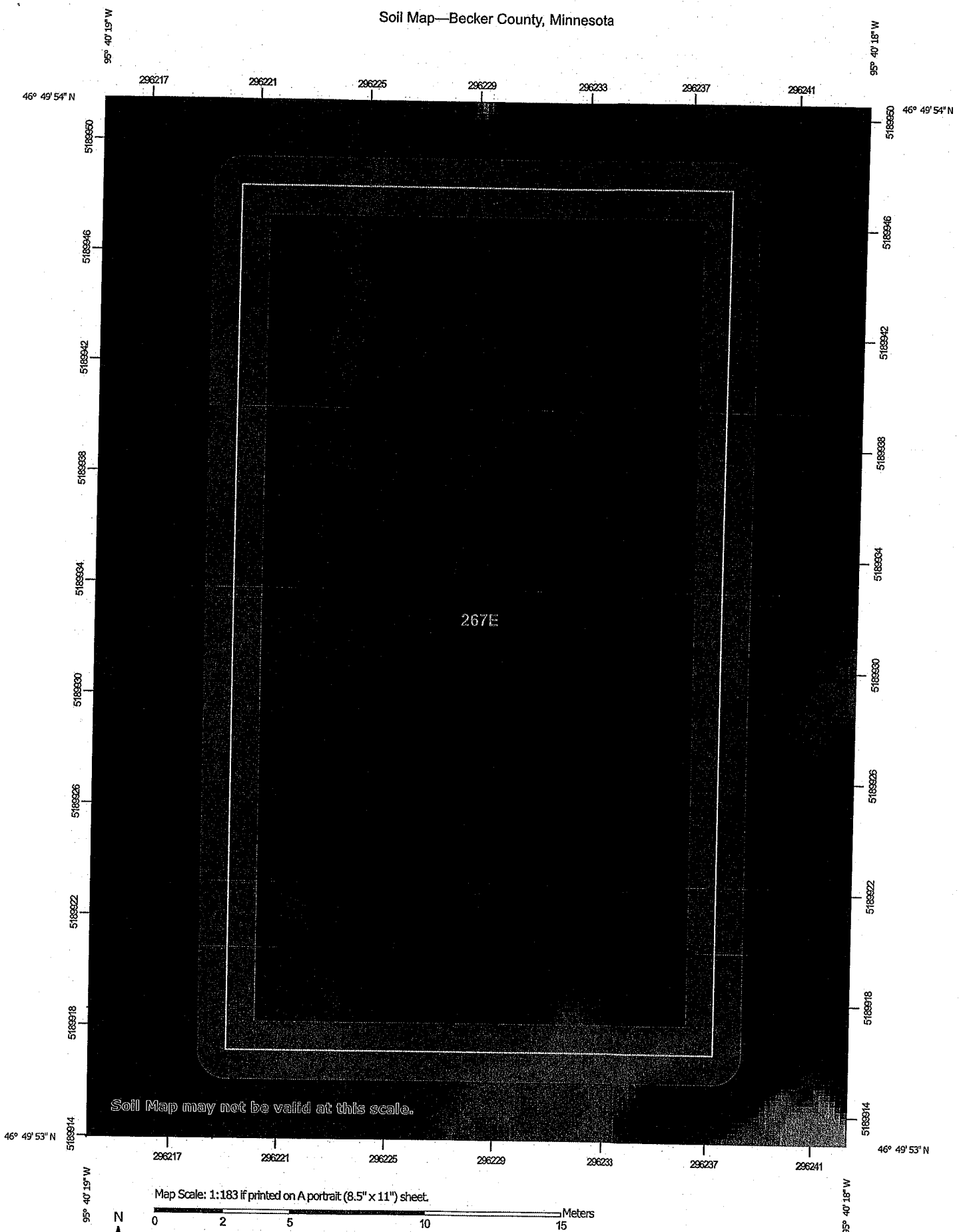
    C. *Distance to set Alarm Float = Distance to set Pump-On Float(13B) + Alarm Depth* (2-3 inches)(10.)

    22.3 in + 3.0 in = 25.3 inches

Inches for Dose:	4.3	in
Alarm Depth	25.3	in
Pump On	22.3	in
Pump Off	18.0	in



Soil Map—Becker County, Minnesota



Map Scale: 1:183 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 2 5 10 15

Feet: 0 5 10 20 30

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

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Becker County, Minnesota
Survey Area Data: Version 20, Sep 7, 2024

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

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

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
267E	Snellman sandy loam, 15 to 30 percent slopes	0.1	100.0%
Totals for Area of Interest		**0.1**	**100.0%**

Becker County, Minnesota

267E—Snellman sandy loam, 15 to 30 percent slopes

Map Unit Setting

National map unit symbol: 2v0ll
Elevation: 590 to 2,030 feet
Mean annual precipitation: 24 to 30 inches
Mean annual air temperature: 37 to 46 degrees F
Frost-free period: 110 to 160 days
Farmland classification: Not prime farmland

Map Unit Composition

Snellman and similar soils: 88 percent
Minor components: 12 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Snellman

Setting

Landform: Moraines
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Coarse-loamy till

Typical profile

A - 0 to 2 inches: sandy loam
E - 2 to 16 inches: loamy sand
Bt - 16 to 31 inches: sandy clay loam
C - 31 to 79 inches: sandy loam

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: B
Ecological site: F057XY018MN - Steep Sandy Upland Forest
Forage suitability group: Steep; Fine Texture (G057XN017MN)
Other vegetative classification: Steep; Fine Texture (G057XN017MN)
Hydric soil rating: No

Minor Components

Egglake
Percent of map unit: 3 percent
Landform: Moraines
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Concave
Ecological site: F057XY015MN - Wet Mixed Forest
Other vegetative classification: Level Swale, Neutral (G057XN001MN)
Hydric soil rating: Yes

Cathro, frequently ponded
Percent of map unit: 3 percent
Landform: Depressions on moraines
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: R102AY037SD - Deep Marsh
Other vegetative classification: Not Suited (G057XN024MN)
Hydric soil rating: Yes

Leaflake
Percent of map unit: 2 percent
Landform: Moraines
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: F057XY023MN - Dry Sandy Upland Coniferous Forest
Other vegetative classification: Sloping Upland, Neutral (G057XN002MN)
Hydric soil rating: No

Snellman, steep
Percent of map unit: 2 percent
Landform: Moraines
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Ecological site: F057XY023MN - Dry Sandy Upland Coniferous Forest
Other vegetative classification: Not Suited (G057XN024MN)

Hydric soil rating: No

Wykeham

Percent of map unit: 2 percent
Landform: Moraines
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Ecological site: F057XY021MN - Loamy Upland Moist Hardwood Forest
Other vegetative classification: Sloping Upland, Acid (G057XN006MN)
Hydric soil rating: No

Data Source Information

Soil Survey Area: Becker County, Minnesota
Survey Area Data: Version 20, Sep 7, 2024