E-Z EXCAVATING LLC.
1520 E. MAPLE AVE
MORA MN. 55051
Ph. 218-251-8564
DATE 07/15/2026

TYPE I MOUND DESIGN

LOCATION: 39698 10TH AVE. ISLE MN, 56342

OWNER: KEENAN WIND

SYSTEM TYPE: TYPE I MOUND

DESIGN FLOW: BEDROOM DESIGNED @ 450 GPD

TREATMENT AREA: 380 SQ.FT.

SLOPE: 1.3 %

SEPTIC TANK: BROWN WILBERT 2000 GAL.
SPLIT/COMBO

PUMP TANK: BROWN WILBERT 1000 GAL.

PUMP: GOULDS WE 511H

FLOW METER: SJE RHOMBUS
MODEL# EZP11W6C0H1JV8G10EP17A22C

Kevin Herwig M.P.C.A. 1472
Todd Ball M.P.C.A 1472

CONSTRUCTION NOTES

07/15/2026

PRODUCT BRAND & MODELS LISTED IN DESIGN MUST BE USED:

BROWN WILBERT 2000 COMBO SEPTIC TANK

BROWN WILBERT 1000 PUMP TANK

*** PUMP CHAMBER & PUMP SETTINGS WILL NOT BE CORRECT IF OTHER PRODUCTS ARE USED.

PUMP, FLOW CONTROL & ALARM

GOULDS WE 551H PUMP, SJE RHOMBUS

MODEL # EZP11W6COH1JV8G10EP17A22C

A TWO-WAY CLEANOUT IS TO BE INSTALLED OUTSIDE OF HOME FOR SERVICE PURPOSES.

IT IS THE DESIGNER'S DISCRETION TO APPROVE OR DISPPROVE SUBSTITUTIONS. THE INSTALLER WILL BE RESPONSIBLE FOR DESIGN CHANGE FEE.

KEVIN HERWIG LIC # 1472

TODD BALL LIC # 1472

Preliminary Evaluation Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

1. Contact Information

v 04.07.2025

Property Owner/Client:	Keenan Wind	Date Completed:	7/15/2026
Site Address:	39698 10th Ave Isle MN 56342	Project ID:	
Email:	keenan@windyfishing.com	Phone:	
Mailing Address:		Alt Phone:	
Legal Description:			
Parcel ID:	07.00725.10	SEC: 18 TWP: 42 RNG: 24	

2. Flow and General System Information

A. Client-Provided Information

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

Project Use: ☑ Residential ☐ Other Establishment: House

Residential use: # Bedrooms: 3 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 ☐ Dishwasher ☐ Hot Tub*
☐ Sewage pump in basement ☐ Water Softener* ☐ Sump Pump*
☐ Large Bathtub >40 gallons ☐ Iron Filter* ☐ Self-Cleaning Humidifier*
☐ Clothes Washing Machine ☐ High Eff. Furnace* ☐ Other:

* Clear water source - should not go into system

Additional current or future uses:

Anticipated non-domestic waste: no

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

B. Designer-determined Flow and Anticipated Waste Strength Information

Attach additional information as necessary.

Design Flow: 450 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	140' ft away	856495	49				
2							
3							
4							

Additional Well Information:

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	

Water Supply Pipe Comments:

B. Site located in a shoreland district/area? No — Yes, name:

Elevation of ordinary high water level: N/A ft — Source: N/A

Classification: — Tank Setback: ft. — STA Setback: ft.

C. Site located in a floodplain? — Yes, Type(s):

Floodplain designation/elevation (10 Year): ft — Source:

Floodplain designation/elevation (100 Year): ft — Source:

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: c49a — Slope Range: 0-35 %

List landforms: moraines

Landform position(s): Summit

Parent materials: Loess

Depth to Bedrock/Restrictive Feature: 16 in — Depth to Watertable: n/a in

Map Unit Ratings

Septic Tank Absorption Field- At-grade:	
Septic Tank Absorption Field- Mound:	Not Limited
Septic Tank Absorption Field- Trench:	

5. Local Government Unit Information

Name of LGU:	Kanabec County
LGU Contact:	Ryan Carda
LGU-specific setbacks:	
LGU-specific design requirements:	
LGU-specific installation requirements:	

Notes:

Field Evaluation Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

1. Project Information

v 04.07.2025

Property Owner/Client: Keenan Wind | Project ID:

Site Address: 39698 10th Ave Isle MN 56342 | Date Completed: 7/15/2026

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): Lawn | Landscape position: Summit

Percent slope: 1.3 % | Slope shape: Linear, Linear | Slope direction: Southeast

Describe the flooding or run-on potential of site: None

Describe the need for Type III or Type IV system: none

Note:

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

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*:	16	in	**97.60**	ft
Periodically saturated soil:	16	in	97.60	ft
Standing water:	N/A	in	N/A	ft
Bedrock:	N/A	in	N/A	ft

**Most Restrictive Depth Identified from List Below*

Soil Texture: Silt Loam

Percolation Rate: min/inch

Soil Hyd Loading Rate: 0.78 gpd/sq.ft

Benchmark Elevation: 100.0 ft | Elevations and Benchmark on map? (Y/N): Yes

Benchmark Elevation Location: Corner of concrete slab by wood boiler

Differences between soil survey and field evaluation: N/A

Site evaluation issues / comments: None

Anticipated construction issues: Will need to cross boiler lines during piping and tank install. Will need to locate for that part of install.

Soil Observation Log

Project ID: v 04.07.2025

Client:	Keenan Wind	Location / Address:	39698 10th Ave Isle MN 56342

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

Landscape Position:	Summit	Slope %: 2.0	Slope shape:	Linear, Linear	Flooding/Run-On potential: No
Vegetation:	Lawn	Soil survey map units:	None		Surface Elevation-Relative to benchmark: 98.60
Date/Time of Day/Weather Conditions:	7/13/2026	9:30am	Partly Cloudy		Limiting Layer Elevation: 97.20
Observation #/Type/Location:	SB1	Pit	center of site		Depth to Standing Water-inches: N/A

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	Structure Shape	Structure Grade	Structure Consistence
0-5	Fine Sandy Loam	1	10YR 3/2				Blocky	Weak	Friable
5-16	Silt Loam	2	10YR 4/4				Blocky	Weak	Friable
16-25	Silt Loam	2	7.5YR 4/3	7.5YR 4/3	Concentrations	S2	Blocky	Weak	Friable
				10YR 5/2	Depletions	S2			
25-31	Medium Sand	>50	7.5YR 5/4				Granular	Weak	Loose

Comments:

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

KEVIN HERWIG/TODD BALL	Kevin Herwig T Ball	1472	7/13/2026
(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)

Soil Observation Log

Project ID:

v 04.07.2025

Client:	Keenan Wind			Location / Address:	39698 10th Ave Isle MN 56342
Soil parent material(s): (Check all that apply)	☐ Outwash	☐ Lacustrine	☑ Loess	☐ Till	☑ Alluvium ☐ Bedrock ☐ Organic Matter ☐ Disturbed/Fill
Landscape Position:	Summit	Slope %: 2.0	Slope shape:	Linear, Linear	Flooding/Run-On potential: No
Vegetation:	Lawn	Soil survey map units:	None		Surface Elevation-Relative to benchmark: 99.00
Date/Time of Day/Weather Conditions:	7/13/2026	10:00 AM	Partly Cloudy		Limiting Layer Elevation: 97.60
Observation #/Type/Location:	SB2	Auger	EAST		Depth to Standing Water-inches: N/A

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	Structure: Shape	Structure: Grade	Structure: Consistence
0-6	Fine Sandy Loam	1	10YR 3/2				Blocky	Weak	Friable
6-16	Silt Loam	2	10YR 4/4				Blocky	Weak	Friable
16-20	Silt Loam	2	10YR 4/4	7.5YR 4/6	Concentrations	S2	Blocky	Weak	Friable
				10YR 5/2	Depletions	S2			

Comments:

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

KEVIN HERWIG/TODD BALL		1472	7/13/2026
(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)

Soil Observation Log

Project ID: v 04.07.2025

Client:	Keenan Wind	Location / Address:	39698 10th Ave Isle MN 56342

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

Landscape Position:	Summit	Slope %: 2.0	Slope shape:	Linear, Linear	Flooding/Run-On potential: No
Vegetation:	Lawn	Soil survey map units:	None		Surface Elevation-Relative to benchmark: 98.90
Date/Time of Day/Weather Conditions:		7/13/2026	11:00AM	Partly cloudy	Limiting Layer Elevation: 97.50
Observation #/Type/Location:		SB3	Auger	SW	Depth to Standing Water-inches: N/A

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	Structure: Shape	Structure: Grade	Structure: Consistence
0-5	Fine Sandy Loam	1	10YR 3/2				Blocky	Weak	Friable
5-16	Silt Loam	2	10YR 4/4				Blocky	Weak	Friable
16-30	Silt Loam	2	10YR 4/4	7.5YR 4/6 10YR 5/6	Concentrations Depletions	S2 S2	Blocky	Weak	Friable
30-36	Loamy Medium Sand	10	10YR 3/4				Granular	Structureless	Loose

Comments:

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

KEVIN HERWIG/TODD BALL		1472	7/13/2026
(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)

Proposed Design Map

MINNESOTA POLLUTION CONTROL AGENCY

Project ID: v 04.07.2025

Property Owner/Client: Keenan Wind

well to tank 94'

well to mound 140'

property line to mound N 125'

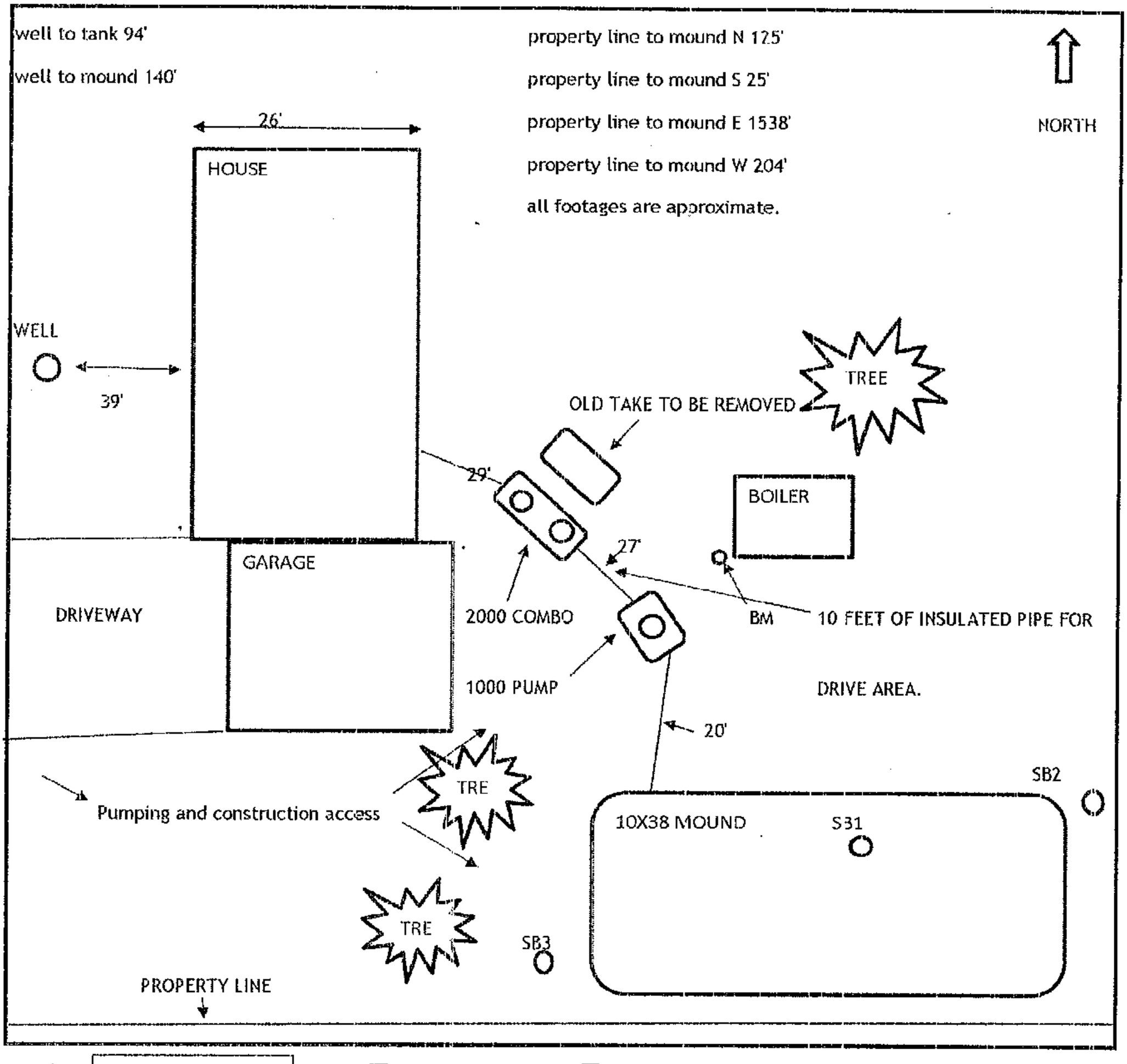
property line to mound S 25'

property line to mound E 1538'

property line to mound W 204'

all footages are approximate.

NORTH



Map scale: NOT TO SCALE ☑ Indicated north ☐ Show slope/contours

System Corners

1 2

3 4 N

Elevations in feet

Benchmark Elev: 100 ft Benchmark Location: ORNER OF CONCRETE BY BOIL

System Corners:		Soil Observation:			
Corner 1	99.02 ft	#1:	98.6 ft	Tank INLET:	92.6 ft
Corner 2	98.9 ft	#2:	99 ft	Other:	
Corner 3	99.04 ft	#3:	98.9 ft		ft
Corner 4	98.86 ft	#4:	ft		ft

Date Completed: 7/15/2026

Design Elevations Summary

MINNESOTA POLLUTION CONTROL AGENCY

Project ID: v 04.07.2025

Property Owner/Client: Keenan Wind

Property Address: 39698 10th Ave Isle MN 56342

Date Completed: 7/15/2026

Elevations in feet Benchmark: 100.0 ft BM Location - Corner of concrete slab by wood boiler

Primary STA

Elevations From Soil Logs

STA Area		Soil Observation Location Elev		Restrictive Layer Depth		Restrictive Layer Elev	
Corner 1	99.0 ft	SO 1	98.6 ft		inches	97.2	ft
Corner 2	98.9 ft	SO 2	99.0 ft		inches	97.6	ft
Corner 3	99.0 ft	SO 3	98.9 ft		inches	97.5	ft
Corner 4	98.9 ft	SO 4	ft		inches		ft
Average Slope	1.3 %	SO 5	ft		inches		ft
		SO 6	ft		inches		ft
		SO 7	ft		inches		ft

Mound

Upslope Elevation (ground)		98.9	ft
Sand Top Designed	24 in @	100.9	ft
Distribution Bottom 7080 Min		100.6	ft
Bottom of Laterals (+0.5' min)		101.4	ft
Top of Media (+0.3' min)		101.7	ft
Top of System (+1.0') Rockbed edge		102.7	ft

Mound Dimensions *details in mound design*

Width		Length	
10.0 ft	x	38.0 ft	Rockbed
24.0 ft	x	38.0 ft	Absorption Area
39.6 ft	x	62.8 ft	Berm

Corners

1 2

3 4 N

Site Plan and Label Corners

Atgrade

Upslope Elevation (ground)	ft
Bottom of Laterals (+0.5' min)	ft
Top of Media (+0.3' min)	ft
Top of System (+1.0')	ft

At Grade Dimensions *details in atgrade design*

Width		Length	
ft	x	ft	Rockbed/Absorption
ft	x	ft	Berm

Trenches *details in trench design*

Total Length ft long Width ft Total Area ft²

	Ground Elevation	Max. Depth in	Design Depth in	Trench Length
#1	ft	ft	ft	ft
#2	ft	ft	ft	ft
#3	ft	ft	ft	ft
#4	ft	ft	ft	ft
#5	ft	ft	ft	ft
#6	ft	ft	ft	ft
#7	ft	ft	ft	ft

Trenches at ft long

Bed

Upslope Elevation (ground)	ft
Bottom of Bed (excavation depth)	ft
Bottom of Laterals (+0.5' min)	ft
Top of Media (+0.3' min)	ft
Top of System (+1.0')	ft

Bed Corners

Corner 1	ft
Corner 2	ft
Corner 3	ft
Corner 4	ft

Bed Dimensions details in bed design

Width ft x Length ft Rockbed

Alternate STA			Soil Observation Elev		
Corner 1		ft	SO 1 Alt		ft
Corner 2		ft	SO 2 Alt		ft
Corner 3		ft	SO 3 Alt		ft
Corner 4		ft	SO 4 Alt		ft

Comments:

Sewer Pipe Elevation (estimated)

Sewer Pipe At house	EXISTING	ft	
Length of Building Sewer	29	ft	
Drop in Building Sewer to tank	0.29	ft - Minimum at 1 % Slope	Length of pipe (ft) x 1 in ÷ 8 ft ÷ 12

Tank Elevation			Depth below Grade		Tank Elevation			Depth below Grade	
1	Tank Ground	100.2 ft			2	Tank Ground	ft		
	Tank Inlet Invert	92.45 ft	7.8	ft		Tank Inlet Invert	ft		ft
	Tank Outlet Invert	92.12 ft	8.1	ft		Tank Outlet Invert	ft		ft
3	Tank Ground	ft			4	Tank Ground	ft		
	Tank Inlet Invert	ft		ft		Tank Inlet Invert	ft		ft
	Tank Outlet Invert	ft		ft		Tank Outlet Invert	ft		ft
PT 1	Tank Ground	99.6 ft			PT 2	Tank Ground	ft		
	Tank Inlet Invert	91.85 ft	7.8	ft		Tank Inlet Invert	ft		ft

ST = Septic Tank, HT = Holding Tank, PT = Pump Tank

Elevation Difference - Supply Line to Distribution

Supply Pipe Length:	20.0	ft
Supply Pipe Elevation Change	0.2	ft - Minimum at 1 % Slope = Length of pipe (ft) x 1 in ÷ 8 ft ÷ 12

99

Elevation Difference Pump to Distribution

Btm of Lateral - Pump Intake ft

Elevation to Rod Reading = Height of instrument + Benchmark - Elevation

Rod Reading = + 100.0 -

Comments:

Design Summary Page

MINNESOTA POLLUTION CONTROL AGENCY

1. PROJECT INFORMATION

v 04.07.2025

Property Owner/Client: Keenan Wind
Project ID:
Site Address: 39698 10th Ave Isle MN 56342
Date: 07/15/26
Email Address: keenan@windyfishing.com
Phone:

2. DESIGN FLOW & WASTE STRENGTH

Design Flow: 450 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): 3
Code Minimum Septic Tank Capacity: 1000 Gallons with 1 Tanks or Compartments
Recommended Septic Tank Capacity: 2000 Gallons with 2 Tanks or Compartments
The septic tank(s) will be: All New *Existing tank reuse requires a tank integrity assessment*
Comments: BROWN WILBERT 2000 COMBO
Effluent Screen & Alarm (Y/N): Optional Model/Type: POLYLOC PL122

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 ***

Individual On-Site 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):	Gal	Pump Tank Capacity (7080 Minimum):	Gal
Pump Tank Capacity (Designed):	Gal	Pump Tank Capacity (Designed):	Gal
Pump Req: GPM	Total Head ft	Pump Req: GPM	Total Head ft
Supply Pipe Dia. in	Dose Vol: 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:	100.00 ft	Benchmark Location:	Corner of concrete slab by wood
MPCA System Type:	Type I	Distribution Media:	Rock
Type III/IV/V Details:			

7. SITE EVALUATION SUMMARY:

Describe Limiting Condition: Redoximorphic Features/Saturated Soils

Layers with >35% Rock Fragments? (yes/no) Yes 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:	16.0	inches	1.33	ft	97.60	ft
Minimum Req'd Separation:	36	inches	3.00	ft		

Elevations are critical for system compliance.

Mound Minimum Sand Depth: 20 inches

Designed Distribution Media Bottom Elevation*: 2.00 ft Designed Separation: 40.0 inches

*This is the minimum elevation of the bottom of the distribution media for required separation related to the established benchmark

A. Soil Texture:	Silt Loam		
B. Soil Hyd. Loading Rate:	0.78 GPD/ft^2	C: Percolation Rate:	MPI
D. Contour Loading Rate:	12.0	Note:	
E. Measured Land Slope:	1.3 %	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

Onsite/Decentralized Sewage Treatment Program

Design Summary Page

MINNESOTA POLLUTION CONTROL AGENCY

Project ID:

Mound:

Dispersal Area	380.0	sq.ft	Media Length	38.0	ft	Media Width	10.0	ft
Absorption Width	24.0	ft	Clean Sand Lift	2.0	ft	Berm Width (0-1%)		ft
Upslope Berm Width	11.6	ft	Downslope Berm	18.0	ft	Endslope Berm Width	13.7	ft
Total System Length	62.8	ft	System Width	39.6	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	2.00	in	Lateral Spacing	2.5	ft
Perforation Spacing	3.0	ft	Perforation Diameter	1/4	in	Drainback Volume	3.4	gal
Min Dose Volume	73.4	gal	Max Dose Volume	112.5	gal	Total Dosing Volume	315.4	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. Minimum required area _____ sq.ft

Technology Strength Reduction (Treatment Level or HSW)

A. Starting Waste Strength _____ Treatment designed to meet: _____

Pretreatment Technology: _____ *Must Meet or Exceed Target Level

Model: _____ Units: _____

Disinfection Technology: _____ *Required for Levels A & B

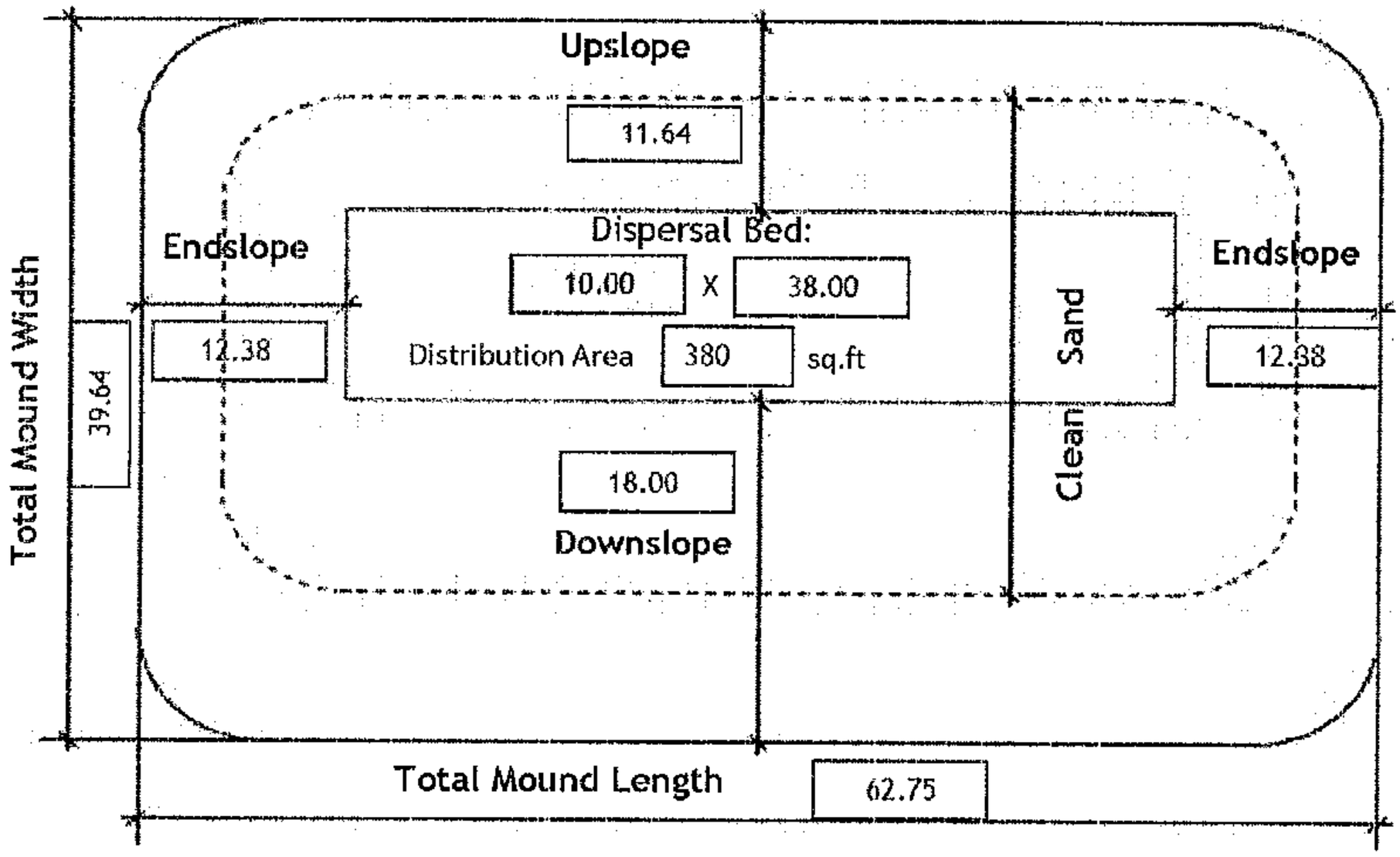
Model: _____ Units: _____

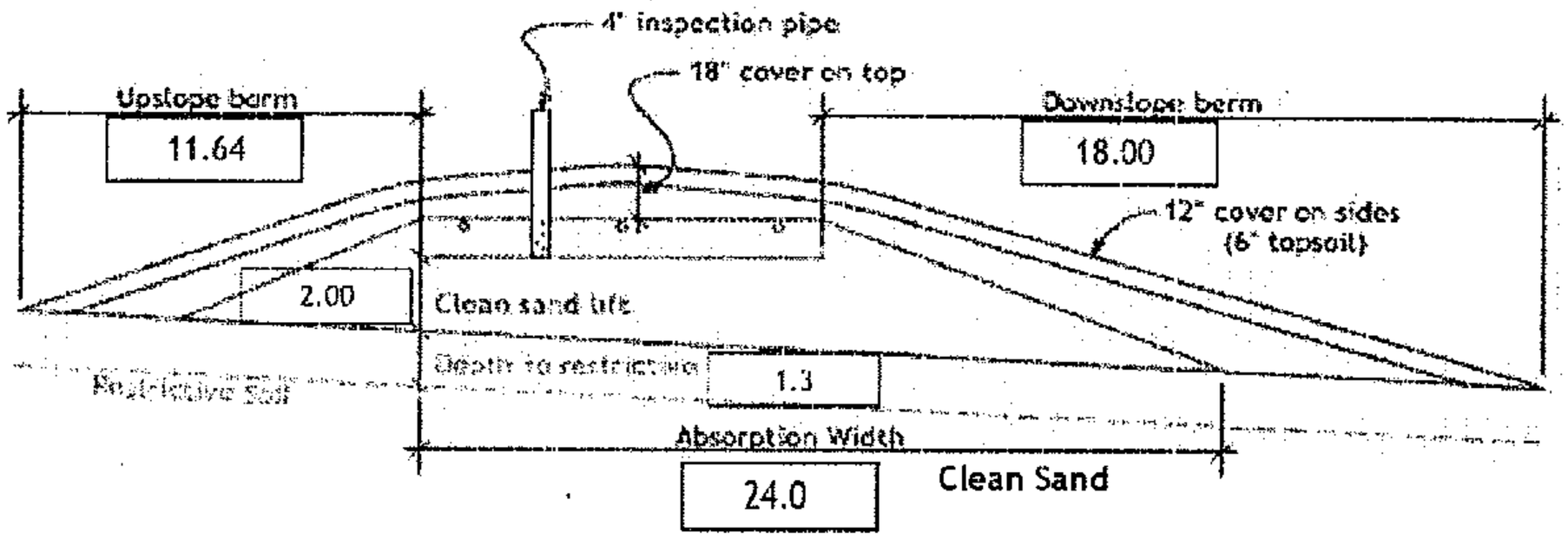
10. Comments/Special Design Considerations:

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

KEVIN HERWIG/TODD BALL		1472	7/15/2026
(Designer)	(Signature)	(License #)	(Date)

6. MOUND DIMENSIONS (Feet) Project ID:





Elevation to Benchmark

Required Separation: 36.0 (in) Elevation Limiting Layer: 97.60 ft

Distribution Media: Rock Elevation required Separation: 100.60 ft

Media Depth *Below Pipe* 6 (in) Elevation Distribution Media Bottom: 100.90 ft

Manifold Connection: END Lateral Pipe Diameter: 2.00 (in)

Perforation Size: 1/4 (in) Perforation Spacing: 36.0 (in)

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

Comments:

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 04.07.2025

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

(6 in + 0.5 in) ÷ 12 X 37.5 ft X 10.0 ft = 203.1 cu.ft

Divide cu.ft by 27 cu.ft/cu.yd to calculate cubic yards: 203.1 cu.ft ÷ 27 = 7.5 cu.yd

Add 30% for constructability: 7.5 cu.yd X 1.3 = 9.8 cu.yd

B. Calculate *Clean Sand Volume:*

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

2.1 ft X 10.0 ft X 38 ft = 784 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)

3.42 ft - 1) X X 37.5 ft = 6.0

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

3.42 ft - 1) X X 10 ft = 6.0

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

6.0 cu.ft + 6.0 cu.ft + 783.8 cu.ft = 795.8 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

((4.0 ft - 1) X 3.0 ft X 38.0) ÷ 2 = 171.0 cu.ft

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

((4.1 ft - 1) X 14.0 ft X 38.0) ÷ 2 = 831.3 cu.ft

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

(4.1 ft - 1) X 3.0 ft X 10.0 ft = 93.8 cu.ft

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

171.0 cu.ft + 831.3 cu.ft + 93.8 cu.ft + 783.8 cu.ft = 1879.8 cu.ft

Divide cu.ft by 27 cu.ft/cu.yd to calculate cubic yards: 1879.8 cu.ft ÷ 27 = 69.6 cu.yd

Add 30% for constructability: 69.6 cu.yd X 1.3 = 90.5 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

(4.1 - 0.5)ft X 39.6 ft X 64.8) ÷ 2 = 4577.8 cu.ft

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

4577.8 cu.ft - 1879.8 cu.ft - 203.1 cu.ft = 2494.9 cu.ft

Divide cu.ft by 27 cu.ft/cu.yd to calculate cubic yards: 2494.9 cu.ft ÷ 27 = 92.4 cu.yd

Add 30% for constructability: 92.4 yd^3 x 1.3 = 120.1 cu.yd

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

39.6 ft X 64.8 ft X 0.5 ft = 1285.0 cu.ft

Divide cu.ft by 27 cu.ft/cu.yd to calculate cubic yards: 1285.0 cu.ft ÷ 27 = 47.6 cu.yd

Add 30% for constructability: 47.6 cu.yd X 1.3 = 61.9 cu.yd

Onsite Sewage Treatment Program

Mound Design Worksheet
≥1% Slope

MINNESOTA POLLUTION CONTROL AGENCY

1. SYSTEM SIZING: Project ID: v 04.07.2025

A. Design Flow:	450	GPD
B. Soil Loading Rate:	0.78	GPD/sqft
C. Depth to Limiting Condition	1.3	ft
D. Percent Land Slope:	1.3	%
E. Media (Sand) Loading Rate:	1.2	GPD/sqft
F. Mound Absorption Ratio:	2.40	

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	← OR →	5.0	→	≤12
≥ 120 mpi*	← OR →	>5.0*	→	≤6*

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

Percolation Rate (MPI)	Treatment Level C		Treatment Level A, A-2, B,	
	Absorption Area Loading Rate (gpd/ft²)	Mound Absorption Ratio	Absorption Area Loading Rate (gpd/ft²)	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	1.6	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)

450 GPD ÷ 1.20 GPD/sqft = 375.0 sq.ft

Optional Upsizing of Dispersal Media Area

B. Larger Area Size or Organic Sizing of Area (see organic loading sheet - 2G) _____ sq.ft

C. Designed Dispersal Media Area: 375.0 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)

375 sqft ÷ 10.0 ft = 37.5 ft

If a longer dispersal media is desired, enter Length(ft): 38 ft

3. ABSORPTION AREA SIZING

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

10.0 ft X 2.4 = 24.0 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)

24.0 ft - 10.0 ft = 14.0 ft

4. DISTRIBUTION MEDIA:

Project ID:

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

A. Rock Depth Below Distribution Pipe

6 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 - 1.33 ft = 1.67 ft Design Sand Lift (optional): 2 ft

B. Upslope Height = Clean Sand Lift(5A) + Depth of Media(4AorB) + Depth to Cover Pipe(0.33ft) + Depth of Cover (1 ft)

2.00 ft + 0.50 ft + 0.50 ft + 1.00 ft = 4.00 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): 2.91

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

2.91 X 4.00 ft = 11.64 ft

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

10.00 ft X 1.3 % ÷ 100 = 0.13 ft

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

4.00 ft + 0.13 ft = 4.13 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): 3.09

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

3.09 x 4.13 ft = 12.75 ft

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

14.00 ft + 4.00 ft = 18.00 ft

J. Design Downslope Berm = greater of 5H and 5I: 18.00 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 4.1 ft = 12.38 ft

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

11.64 ft + 10.00 ft + 18.00 ft = 39.64 ft

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

12.38 ft + 38.00 ft + 12.38 ft = 62.75 ft

Pressure Distribution Design Worksheet

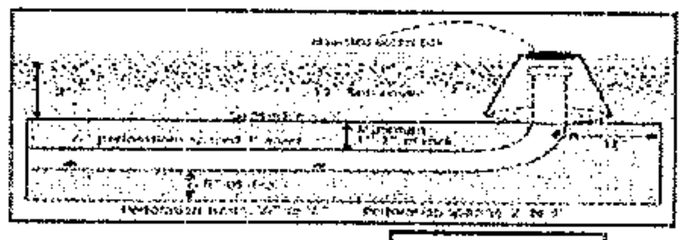
MINNESOTA POLLUTION CONTROL AGENCY

Project ID: v 04.07.2025

1. Media Bed Width: 10.0 ft
2. Media Bed Length: 38.0 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*: 2.50 ft
6. *Length of Laterals* = Media Bed Length(2.) - 2 Feet.

   38.0 - 2ft = 36.0 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 = 36.0 ft ÷ 3.0 ft = 12 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 = 12 Spaces + 1 = 13 Perfs. Per Lateral
10. Select *Perforation Diameter Size:* 1/4 in 0.25
11. *Select Lateral Diameter (See Table)*: 2.00 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

1/4 Inch Perforations

Perforation Spacing (Feet)	Pipe Diameter (Inches)				
	1	1¼	1½	2	3
2	10	13	18	30	60
2½	8	12	16	26	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

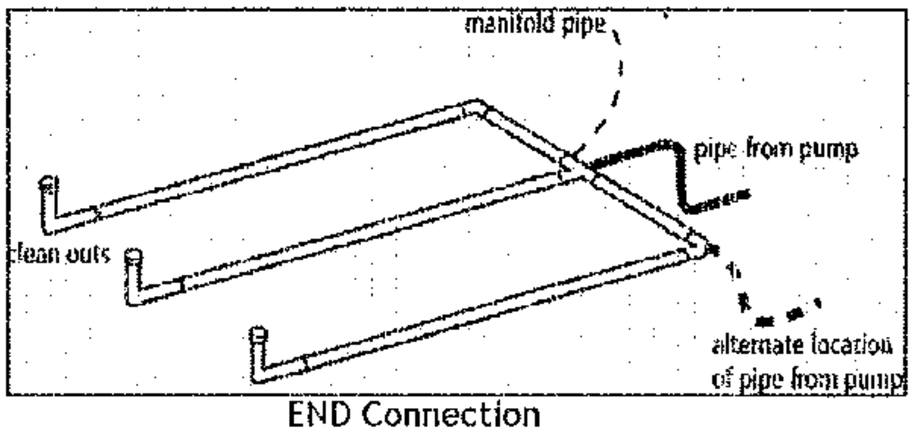
Perforation Spacing (Feet)	Pipe Diameter (Inches)				
	1	1¼	1½	2	3
2	12	18	26	46	87
2½	12	17	24	40	80
3	12	16	22	37	75

1/8 Inch Perforations

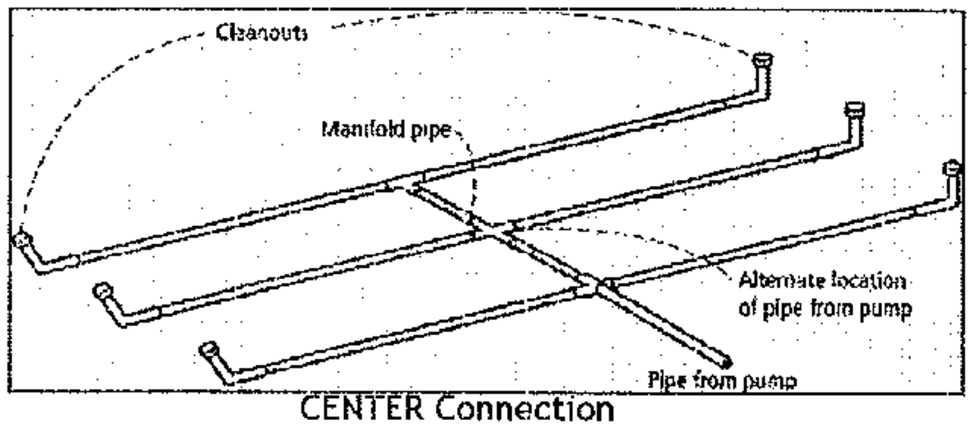
Perforation Spacing (Feet)	Pipe Diameter (Inches)				
	1	1¼	1½	2	3
2	21	33	44	74	149
2½	20	30	41	69	135
3	20	29	38	64	128

Pressure Distribution Design Worksheet

MINNESOTA POLLUTION CONTROL AGENCY



END Connection



CENTER Connection

Perf Per Lateral: 13

Perf Per Lateral Equal Split: 7 | 6

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

* must not exceed maximum number perfs per lateral in table

End Feed Lateral Min Diameter: 2.00

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.)*

13 Perf. Per Lat. X 3 Number of Perf. Lat. = 39 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 38.00 ft = 380 sq.ft

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

380 sqft ÷ 39 perf = 10 sq.ft/perf

15. Select *Minimum Average Head* : 1.0 ft

16. Select *Perforation Discharge* based on Table: 0.74 GPM per Perf

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

39 Perfs X 0.74 GPM per Perforation = 29.0 GPM

18. *Volume of Liquid Per Foot of Distribution Piping (Table II)* : 0.170 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 36.0 ft X 0.170 gal/ft = 18.4 Gallons

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

18.4 gal X 4 = 73.4 Gallons

21. Maximum Delivered Volume = Design flow x 25%

450 gpd X 25% = 112.5 Gallons

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

Perforation Discharge (GPH)				
Head (ft)	Perforation Diameter			
	1/8	3/16	7/32	1/4
1.0[a]	0.18	0.41	0.56	0.74
1.5	0.22	0.51	0.69	0.9
2.0[b]	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[b]	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:

Basic STA Pump Selection Design Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

1. PUMP CAPACITY

Project ID:

v 04.07.2025

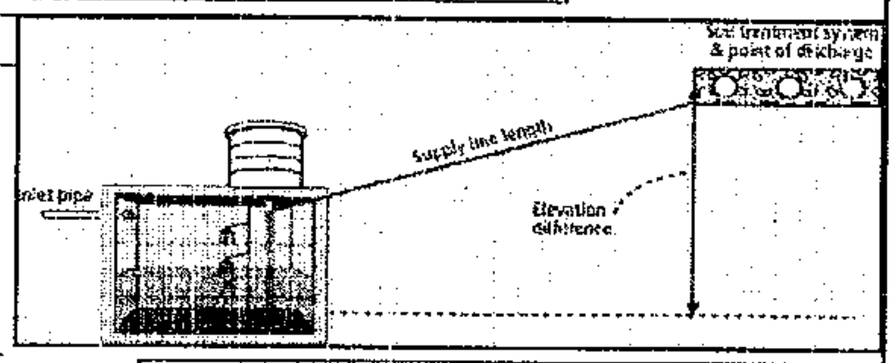
Pumping to Gravity or Pressure Distribution: Pressure

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: 14.0 ft

B. Distribution Head Loss: 5 ft

C. Additional Head Loss*: 0.0 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: 20 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*

20 ft X 1.25 = 25.0 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 25.0 ft ÷ 100 = 0.6 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)

14 ft + 5.0 ft + 0.0 ft + 0.6 ft = 19.6 ft

3. PUMP SELECTION

A pump must be selected to deliver at least **29.0** GPM with at least **19.6** feet of total head.

Comments:

STA Dosing Pump Tank Design Worksheet (Demand Dose)

MINNESOTA POLLUTION CONTROL AGENCY

DETERMINE TANK CAPACITY AND DIMENSIONS | Project ID: | v 04.07.2025

1. A. Design Flow: 450 GPD C. Tank Use: Dosing
   B. Code minimum pump tank capacity: 500 Gal D. Designed pump tank capacity: 1000 Gal
2. A. Tank Manufacturer: Brown Wilbert B. Tank Model: 1000
   C. Capacity from manufacturer: 1000 Gallons
   D. Liquid depth of tank from manufacturer: 46.3 inches
   E. Gallons per inch from manufacturer: 29.2 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 29.2 Gallons Per Inch = 526 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 73.4 Gallons (Minimum dose) 2.52 inches/dose

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

   Design Flow: 450 GPD X 0.25 = 112.5 Gallons (Maximum dose) 3.85 inches/dose

6. *Select a pumpout volume that meets both Minimum and Maximum:* 112.0 Gallons

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

   450 gpd ÷ 112.0 gal = 4.0 *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 = 20 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)*

   20 ft X 0.170 gal/ft = 3.4 Gallons

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

   112.0 gal + 3.4 gal = 115.4 Gallons

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

    2 in X 29.2 gal/in = 58.4 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

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

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

    115.4 gal ÷ 29.2 gal/in = 3.95 inches

    See sensor accuracy or float tether chart from manufacturer for setting equivalent

12. 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

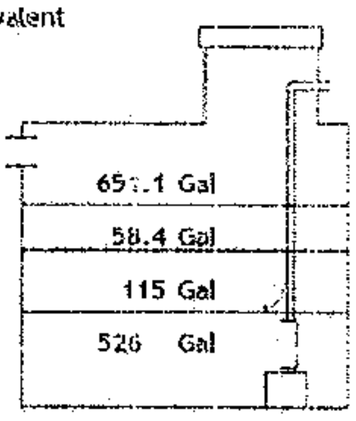
    B. *Distance to set Pump On Float=Distance to Set Pump-Off Float(12A) + Float Separation Distance(12.)*

    18.0 in + 4.0 in = 22.0 inches

    C. *Distance to set Alarm Float = Distance to set Pump-On Float(12B) + Alarm Depth* (2-3 inches)(10.)

    22.0 in + 2.0 in = 24.0 inches

Inches for Dose:	4.0	in
Alarm Depth	24.0	in
Pump On	22.0	in
Pump Off	18.0	in



13. Reserve Capacity Volume = [Tank Liquid Depth(2D) - Alarm Float Depth(12C)] x gallons per inch of tank(2E)

    [46.3 in - 24.0 in] X 29.2 gal/in = 651.1 Gallons

Tank Buoyancy Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

1. Tank Specifications

Project ID:

v 04.07.2025

A. Tank Manufacturer: BROWN WILBERT

Tank Model: 2000 Combo

B. Outside Tank Dimensions and Specifications:

Tank Use: Septic

Length: 166 in Width: 84 in Height: 57.75 in Diameter: in

Length: 13.8 ft Width: 7.0 ft Height: 4.8 ft Radius of Tank: in

2. Outside Volume of Tank

Rectangular Tank

A. Area of Tank = Length (ft) X Width (ft)

13.8 ft X 7.0 ft = 96.8 sq.ft

B. Volume of Tank = Area of Tank (2.A) X Height (ft)

96.8 sq.ft X 4.8 ft = 466.0 cu.ft

Circular Tank

A. Area of Tank = πr^2 = (3.14 X (Radius of Tank)^2)

3.14 X (ft)^2 = sq.ft

B. Volume of Tank = Area of Tank X Height (ft)

sq.ft X ft = cu.ft

3. Force of Tank Weight (F_{TW})

Weight of Tank (provided by manufacturer) 17400 lbs

4. Force of Soil Weight Over Tank (F_{SW})

A. Depth of Cover Over Tank: 92.6 in 7.7 ft

B. Weight of Soil Per Cubic Foot: 100 lbs/cu.ft

C. Volume of Soil Over Tank = Depth of Cover(4A) (ft) X Area of Tank(2A) (ft^2)

7.7 ft X 96.8 sq.ft = 747.2 cu.ft

D. Weight of Soil Over Tank = Volume of Soil Over Tank(4C) X Weight of Soil Per Cubic Foot

747.2 cu.ft X 100 lbs/cu.ft = 74,723.1 lbs *Note: Assumes saturation does not get over the lid of the tank*

Soil Type	Weight of Soil (lbs/ft^3)
Sandy	120
Loamy	100
Clay	90

5. Buoyant Force (F_B)

Buoyant Force (F_B) = Outside Volume of Tank(2B) X Weight of Water Per Cubic Foot (62.4 lbs/ft^3) X 1.2 (Safety Factor)

466 X 62.4 lbs/cu.ft X 1.2 = 34,894.9 lbs

6. Evaluation of Net Forces

A. Downward Force = Force of Tank Weight (F_{TW})(3.) + Force of Soil Weight of Soil (F_{SW})(4D.)

17400 lbs + 74723 lbs = 92,123.1 lbs

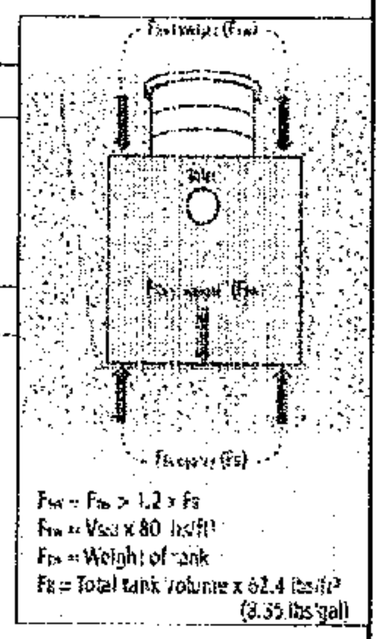
B. Net Difference = Downward Force(6A) - Buoyant Force Including Safety Factor (5.)

92123 lbs - 34895 lbs = 57,228.2 lbs

If the Net Difference is negative, counter measures will need to be taken to prevent the tank from floating out of the ground.

C. Feet of soil as counter measure = Net difference (6B)(if negative)(as absolute number) ÷ Weight of Soil ÷ Area of Tank (2A)

0 lbs ÷ 100 lbs/ft^3 ÷ 96.8 (ft^2) = ft of Soil Needed (minimum)



Comments/Solution:

Tank Buoyancy Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

1. Tank Specifications — Project ID: — v 04.07.2025

A. Tank Manufacturer: BROWN WILBERT — Tank Model: 1000

B. Outside Tank Dimensions and Specifications: — Tank Use: Dosing

Length:	98	in	Width:	68	in	Height:	61.25	in
Length:	8.2	ft	Width:	5.7	ft	Height:	5.1	ft

Diameter: in — Radius of Tank: in

2. Outside Volume of Tank

Rectangular Tank	Circular Tank
A. Area of Tank = Length (ft) X Width (ft)	A. Area of Tank = πr^2 = (3.14 X (Radius of Tank)^2)
8.2 ft X 5.7 ft = 46.3 sq.ft	3.14 X (ft)^2 = sq.ft
B. Volume of Tank = Area of Tank (2.A) X Height (ft)	B. Volume of Tank = Area of Tank X Height (ft)
46.3 sq.ft X 5.1 ft = 236.2 cu.ft	sq.ft X ft = cu.ft

3. Force of Tank Weight (F_{TW})

Weight of Tank (provided by manufacturer): 8650 lbs

4. Force of Soil Weight Over Tank (F_{SW})

A. Depth of Cover Over Tank: 93.6 in — 7.8 ft

B. Weight of Soil Per Cubic Foot: 100 lbs/cu.ft

C. Volume of Soil Over Tank = Depth of Cover(4A) (ft) X Area of Tank(2A) (ft^2)

7.8 ft X 46.3 sq.ft = 361.0 cu.ft

D. Weight of Soil Over Tank = Volume of Soil Over Tank(4C) X Weight of Soil Per Cubic Foot

361.0 cu.ft X 100 lbs/cu.ft = 36,096.7 lbs *Note: Assumes saturation does not get over the lid of the tank*

Soil Type	Weight of Soil (lbs/ft^3)
Sandy	120
Loamy	100
Clay	90

5. Buoyant Force (F_B)

Buoyant Force (F_B) = Outside Volume of Tank(2B) X Weight of Water Per Cubic Foot (62.4 lbs/ft^3) X 1.2 (Safety Factor)

236 X 62.4 lbs/cu.ft X 1.2 = 17,637.4 lbs

6. Evaluation of Net Forces

A. Downward Force = Force of Tank Weight (F_{TW})(3.) + Force of Soil Weight of Soil (F_{SW})(4D.)

8650 lbs + 36097 lbs = 44,746.7 lbs

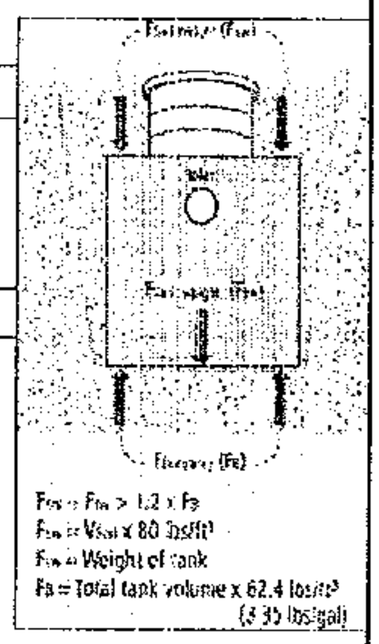
B. Net Difference = Downward Force(6A) - Buoyant Force Including Safety Factor (5.)

44747 lbs - 17687 lbs = 27,059.3 lbs

If the Net Difference is negative, counter measures will need to be taken to prevent the tank from floating out of the ground.

C. Feet of soil as counter measure = Net difference (6B)(if negative)(as absolute number) ÷ Weight of Soil ÷ Area of Tank (2A)

0 lbs ÷ 100 lbs/ft^3 ÷ 46.3 (ft^2) = ft of Soil Needed (minimum)



Comments/Solution:

UNIVERSITY
OF MINNESOTA

Septic System Management Plan for Above Grade Systems

The goal of a septic system is to protect human health and the environment by properly treating wastewater before returning it to the environment. Your septic system is designed to kill harmful organisms and remove pollutants before the water is recycled back into our lakes, streams and groundwater.

This **management plan** will identify the operation and maintenance activities necessary to ensure long-term performance of your septic system. Some of these activities must be performed by you, the homeowner. Other tasks must be performed by a licensed septic maintainer or service provider. However, it is **YOUR** responsibility to make sure all tasks get accomplished in a timely manner.

The University of Minnesota's *Septic System Owner's Guide* contains additional tips and recommendations designed to extend the effective life of your system and save you money over time.

Proper septic system design, installation, operation and maintenance means safe and clean water!

Property Owner	Keenan Wind	Email	keenan@windyfishi
Property Address	39698 10th Ave Isle MN 56342	Property ID	07.00725.10
System Designer	E-Z Excavating LLC	Contact Info	320-679-4031
System Installer		Contact Info	
Service Provider/Maintainer		Contact Info	
Permitting Authority	Kanabec County	Contact Info	320-679-6456
Permit #		Date Inspected	

Keep this Management Plan with your Septic System Owner's Guide. The Septic System Owner's Guide includes a folder to hold maintenance records including pumping, inspection and evaluation reports. Ask your septic professional to also:

- Attach permit information, designer drawings and as-built of your system, if they are available.
- Keep copies of all pumping records and other maintenance and repair invoices with this document.
- Review this document with your maintenance professional at each visit; discuss any changes in product use, activities, or water-use appliances.

For a copy of the *Septic System Owner's Guide*, visit www.bookstores.umn.edu and search for the word "septic" or call 800-322-8642.

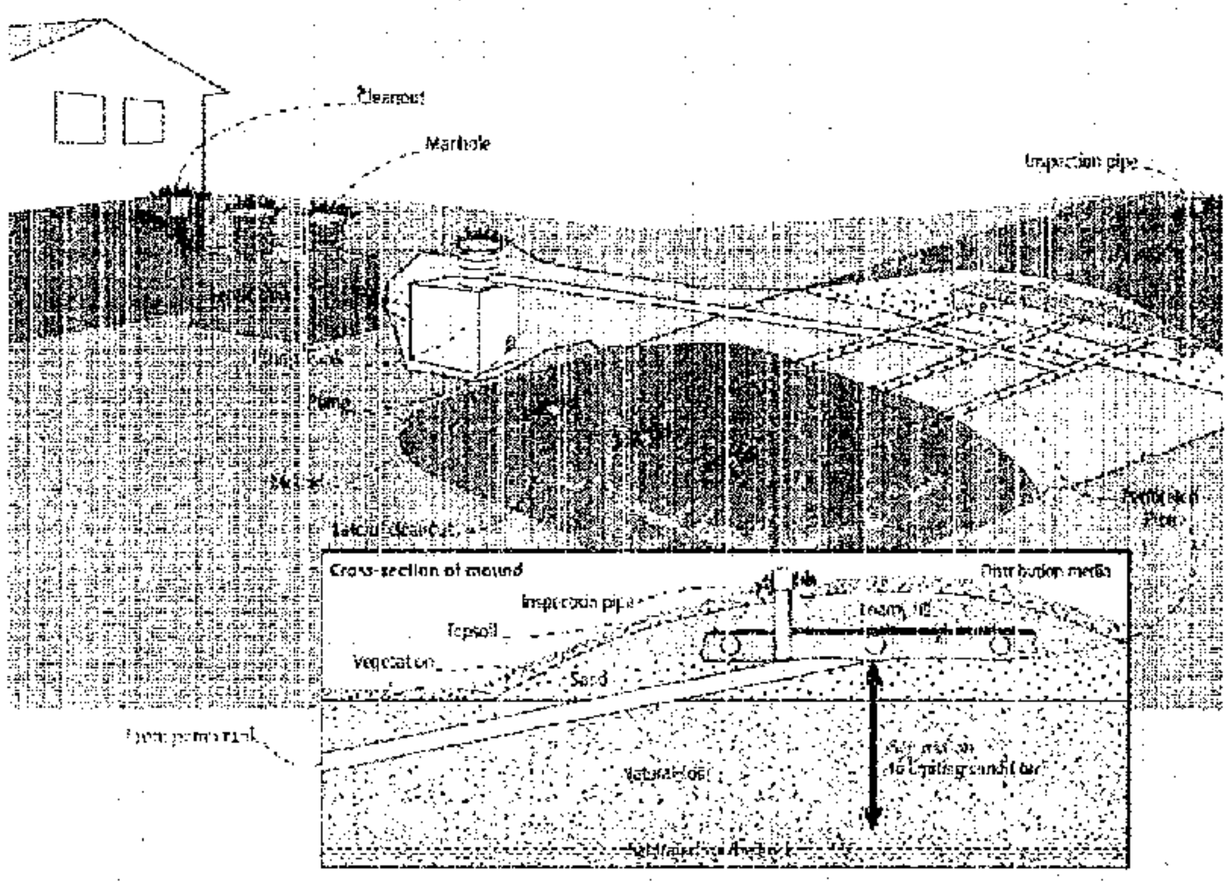
For more information see http://septic.umn.edu

Version: August 2015

UNIVERSITY OF MINNESOTA

Septic System Management Plan
for Above Grade Systems

Your Septic System



Septic System Specifics

System Type: (●) I ( ) II ( ) III ( ) IV* ( ) V*

(Based on MN Rules Chapter 7080.2200 – 2400)

**Additional Management Plan required*

☐ System is subject to operating permit*

☐ System uses UV disinfection unit*

Type of advanced treatment unit _____

Dwelling Type

Number of bedrooms: 3

System capacity/ design flow (gpd): 450

Anticipated average daily flow (gpd): <450

Comments _____

Business? : ( ) Y (●) N What type? _____

Well Construction

Well depth (ft): 49

- ❑ Cased well Casing depth: 49
- ❑ Other (specify): _____

Distance from septic (ft): 140

Is the well on the design drawing? (●) Y ( ) N

Septic Tank

- ❑ First tank *Tank volume:* 2000 *gallons*
  Does tank have two compartments? (●) Y ( ) N
- ❑ Second tank *Tank volume:* _____ *gallons*
- ❑ Tank is constructed of CONCRETE
- ❑ Effluent screen: ( ) Y (●) N Alarm (●) Y ( ) N

- ❑ Pump Tank 1000 *gallons*
- ❑ Effluent Pump *make/model:* GOULDS WE511H
  Pump capacity 29 GPM
  TDH 19.6 Feet of head
- ❑ Alarm location OUTDOOR

Soil Treatment Area (STA)

Mound/At-Grade area (width x length): 39.64 ft x 62.75 ft

Rock bed size (width x length): 10 ft x 38 ft

Location of additional STA: _____

Type of distribution media: ROCK

- ☑ Inspection ports ☑ Cleanouts
- ☑ Surface water diversions
- ☐ Additional STA not available

Homeowner Management Tasks

These op*eration and maintenance* activities are your responsibility. *Chart on page 6 can help track your activities.*

Your toilet is not a garbage can. Do not flush anything besides human waste and toilet paper. No wet wipes, cigarette butts, disposal diapers, used medicine, feminine products or other trash!

The system and septic tanks needs to be checked every 36 months

Your service provider or pumper/maintainer should evaluate if your tank needs to be pumped more or less often.

Seasonally or several times per year

- *Leaks.* Check (listen, look) for leaks in toilets and dripping faucets. Repair leaks promptly.
- *Soil treatment area.* Regularly check for wet or spongy soil around your soil treatment area. If surfaced sewage or strong odors are not corrected by pumping the tank or fixing broken caps and leaks, call your service professional. *Untreated sewage may make humans and animals sick.* Keep bikes, snowmobiles and other traffic off and control borrowing animals.
- *Alarms.* Alarms signal when there is a problem; contact your service professional any time the alarm signals.
- *Lint filter.* If you have a lint filter, check for lint buildup and clean when necessary. If you do not have one, consider adding one after washing machine.
- *Effluent screen.* If you do not have one, consider having one installed the next time the tank is cleaned along with an alarm.

Annually

- *Water usage rate.* A water meter or another device can be used to monitor your average daily water use. Compare your water usage rate to the design flow of your system (listed on the next page). Contact your septic professional if your average daily flow over the course of a month exceeds 70% of the design flow for your system.
- *Caps.* Make sure that all caps and lids are intact and in place. Inspect for damaged caps at least every fall. Fix or replace damaged caps before winter to help prevent freezing issues.
- *Water conditioning devices.* See Page 5 for a list of devices. When possible, program the recharge frequency based on *water demand (gallons)* rather than *time (days).* Recharging too frequently may negatively impact your septic system. Consider updating to demand operation if your system currently uses time,
- *Review your water usage rate.* Review the Water Use Appliance chart on Page 5. Discuss any major changes with your service provider or pumper/maintainer.

During each visit by a service provider or pumper/maintainer

- Make sure that your service professional services the tank through the manhole. (NOT though a 4" or 6" diameter inspection port.)
- Ask how full your tank was with sludge and scum to determine if your service interval is appropriate.
- Ask your pumper/maintainer to accomplish the tasks listed on the Profcssional Tasks on Page 4.

Professional Management Tasks

These are the operation and maintenance activities that a pumper/maintainer performs to help ensure long-term performance of your system. At each visit a written report/record must be provided to homeowner.

Plumbing/Source of Wastewater

- Review the Water Use Appliance Chart on Page 5 with homeowner.
  Discuss any changes in water use and the impact those changes may have on the septic system.
- Review water usage rates (if available) with homeowner.

Septic Tank/Pump Tanks

- *Manhole lid.* A riser is recommended if the lid is not accessible from the ground surface. Insulate the riser cover for frost protection.
- *Liquid level.* Check to make sure the tank is not leaking. The liquid level should be level with the bottom of the outlet pipe. (If the water level is below the bottom of the outlet pipe, the tank may not be watertight. If the water level is higher than the bottom of the outlet pipe of the tank, the effluent screen may need cleaning, or there may be ponding in the soil treatment area.)
- *Inspection pipes.* Replace damaged or missing pipes and caps.
- *Baffles.* Check to make sure they are in place and attached, and that inlet/outlet baffles are clear of buildup or obstructions.
- *Effluent screen.* Check to make sure it is in place; clean per manufacturer recommendation. Recommend retrofitted installation if one is not present.
- *Alarm.* Verify that the alarm works.
- *Scum and sludge.* Measure scum and sludge in each compartment of each septic and pump tank, pump if needed.

Pump

- *Pump and controls.* Check to make sure the pump and controls are operating correctly.
- *Pump vault.* Check to make sure it is in place; clean per manufacturer recommendations.
- *Alarm.* Verify that the alarm works.
- *Drainback.* Check to make sure it is draining properly.
- *Event counter or elapsed time meter.* Check to see if there is an event counter or elapsed time meter for the pump. If there is one or both, calculate the water usage rate and compare to the anticipated use listed on Design and Page 2. Dose Volume: _____ gallons: Pump run time: _____ Minutes

Soil Treatment Area

- *Inspection pipes.* Check to make sure they are properly capped. Replace caps and pipes that are damaged.
- *Surfacing of effluent.* Check for surfacing effluent or other signs of problems.
- *Lateral flushing.* Check lateral distribution; if cleanouts exist, flush and clean at recommended frequency.
- *Vegetation* - Check to see that a good growth of vegetation is covering the system.

All other components -- evaluate as listed here:

UNIVERSITY OF MINNESOTA

Septic System Management Plan
for Above Grade Systems

Water-Use Appliances and Equipment in the Home

Appliance	Impacts on System	Management Tips
Garbage disposal	• Uses additional water. • Adds solids to the tank. • Finely-ground solids may not settle. Unsettled solids can exit the tank and enter the soil treatment area.	• Use of a garbage disposal is not recommended. • Minimize garbage disposal use. Compost instead. • To prevent solids from exiting the tank, have your tank pumped more frequently. • Add an effluent screen to your tank.
Washing machine	• Washing several loads on one day uses a lot of water and may overload your system. • Overloading your system may prevent solids from settling out in the tank. Unsettled solids can exit the tank and enter the soil treatment area.	• Choose a front-loader or water-saving top-loader, these units use less water than older models. • Limit the addition of extra solids to your tank by using liquid or easily biodegradable detergents. Limit use of bleach-based detergents and fabric softeners. • Install a lint filter after the washer and an effluent screen to your tank • Wash only full loads and think even – spread your laundry loads throughout the week.
Dishwasher	• Powdered and/or high-phosphorus detergents can negatively impact the performance of your tank and soil treatment area. • New models promote "no scraping". They have a garbage disposal inside.	• Use gel detergents. Powdered detergents may add solids to the tank. • Use detergents that are low or no-phosphorus. • Wash only full loads. • Scrape your dishes anyways to keep undigested solids out of your septic system.
Grinder pump (in home)	• Finely-ground solids may not settle. Unsettled solids can exit the tank and enter the soil treatment area.	• Expand septic tank capacity by a factor of 1.5. • Include pump monitoring in your maintenance schedule to ensure that it is working properly. • Add an effluent screen.
Large bathtub (whirlpool)	• Large volume of water may overload your system. • Heavy use of bath oils and soaps can impact biological activity in your tank and soil treatment area.	• Avoid using other water-use appliances at the same time. For example, don't wash clothes and take a bath at the same time. • Use oils, soaps, and cleaners in the bath or shower sparingly.
Clean Water Uses	**Impacts on System**	**Management Tips**
High-efficiency furnace	• Drip may result in frozen pipes during cold weather.	• Re-route water directly out of the house. Do not route furnace discharge to your septic system.
Water softener Iron filter Reverse osmosis	• Salt in recharge water may affect system performance. • Recharge water may hydraulically overload the system.	• These sources produce water that is not sewage and should not go into your septic system. • Reroute water from these sources to another outlet, such as a dry well, drain tile or old drainfield. • When replacing, consider using a demand-based recharge vs. a time-based recharge. • Check valves to ensure proper operation; have unit serviced per manufacturer directions
Surface drainage Footing drains	• Water from these sources will overload the system and is prohibited from entering septic system.	

UNIVERSITY OF MINNESOTA

Septic System Management Plan
for Above Grade Systems

Homeowner Maintenance Log

Track maintenance activities here for easy reference. See list of management tasks on pages 3 and 4.

Activity	Date accomplished									
Check frequently:										
Leaks: check for plumbing leaks*										
Soil treatment area check for surfacing**										
Lint filter: check, clean if needed*										
Effluent screen (if owner-maintained)***										
Alarm**										
Check annually:										
Water usage rate (maximum gpd _____)										
Caps: inspect, replace if needed										
Water use appliances – review use										
Other:										

*Monthly .

**Quarterly

***Bi-Annually

Notes:

"As the owner of this SSTS, I understand it is my responsibility to properly operate and maintain the sewage treatment system on this property, utilizing the Management Plan. If requirements in this Management Plan are not met, I will promptly notify the permitting authority and take necessary corrective actions. If I have a new system, I agree to adequately protect the reserve area for future use as a soil treatment system."

Property Owner Signature: _____ Date _____

Management Plan Prepared By: E-Z Excavating LLC Certification # 1472

Permitting Authority: Kanabec County