ENVIRONMENTAL SYSTEMS LLC.

2358 HWY# 23
MORA MN. 55051
Ph. 320-241-7036
06/15/2022

TYPE III MOUND DESIGN

LOCATION: 46458 GRACE LAKE RD SANDSTONE MN. 55072

OWNER: MILLE LACS BAND OF OJIBWE

SYSTEM TYPE: TYPE III MOUND

DESIGN FLOW: 4 BEDROOM DESIGNED @ 600 GPD

TREATMENT AREA: 500 SQ.FT.

SLOPE: 2 %

SEPTIC TANK: 2000 GAL. SPLIT/COMBO W/FILTER & ALARM

PUMP TANK: 1000 GAL.

PUMP: GOULDS PE51

CONTROL: SJE RHOMBUS

KEVIN HERWIG M.P.C.A 3945

CONSTRUCTION NOTES

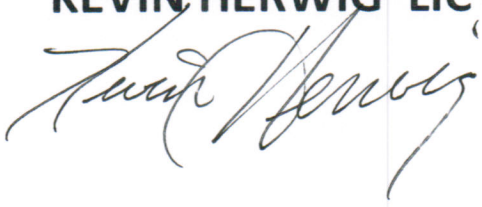
PRODUCT BRAND & MODEL LISTED IN DESIGN MUST BE USED. CEMSTONE TANKS – SEPTIC 2000 GAL. COMBO #9552001 W/ POLYLOK PL-122 FILTER WITH ALARM, PUMP TANK 1000 GAL.(# 9551001) PUMP – GOULDS PE51) PUMP CHAMBER AND PUMP SETTINGS WILL NOT BE CORRECT IF OTHER PRODUCTS ARE USED.**

SJE RHOMBUS EZPIIW6COHIJV8GI0EP17A22C CONTROL

IT IS THE DESIGNERS DISCRETION TO APPROVE OR DISAPPROVE SUBSTITUTIONS.THE INSTALLER WILL BE RESPONSIBLE FOR DESIGN CHANGE FEE.

ALL PRODUCTS AND CONSTRUCTION PRACTICES ARE TO MEET M.P.C.A. 7080 RULE AND MILLE LACS BAND SPECIFICATION FOR SEWAGE TREATMENT SYSTEMS

KEVIN HERWIG LIC # 3945



University of Minnesota Onsite Sewage Treatment Program

Preliminary Evaluation Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

1. Contact Information

v 04.01.2021

Property Owner/Client:	MILLE LACS BAND OF OJIBWE	Date Completed:	6/15/2022
Site Address:	46458 GRACE LAKE RD SANDSTONE MN.	Project ID:	
Email:		Phone:	
Mailing Address:		Alt Phone:	
Legal Description:			
Parcel ID:	SEC:	TWP:	RNG:

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: NA # 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: HOUSE UNDER CONSTRUCTION

Anticipated non-domestic waste:

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

B. Designer-determined flow Information

Attach additional information as necessary.

Design Flow: 600 GPD Anticipated Waste Type: Residential

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							
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:	
Elevation of ordinary high water level:	ft	Source:	
Classification:	Tank Setback: ft.	STA Setbk: 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: NA Slope Range: %

List landforms:

Landform position(s):

Parent materials: SAND LOAM

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

Map Unit Ratings

Septic Tank Absorption Field- At-grade:

Septic Tank Absorption Field- Mound:

Septic Tank Absorption Field- Trench:

5. Local Government Unit Information

Name of LGU: MILLE LACS BAND OF OJIBWE

LGU Contact:

LGU-specific setbacks:

LGU-specific design requirements:

LGU-specific installation requirements:

Notes:

University of Manitoba Onsite Sewage Treatment Program

Field Evaluation Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

v 04.01.2021

1. Project Information

Property Owner/Client: MILLE LACS BAND OF OJIBWE | Project ID:

Site Address: 46458 GRACE LAKE RD SANDSTONE MN. | Date Completed:

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): | Landscape position: Shoulder

Percent slope: 2 % | Slope shape: Linear, Linear | Slope direction:

Describe the flooding or run-on potential of site:

Describe the need for Type III or Type IV system:

Note:

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

4. General Soils Information

Filled, Compacted, Disturbed areas (Y/N): Yes

If yes, describe: NEXT TO ABSORPTION AREA

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*:		in	**98.0**	ft
Periodically saturated soil:		in	98.0	ft
Standing water:		in		ft
Bedrock:		in		ft
Benchmark Elevation:	100.0	ft		

Most Restrictive Depth Identified from List Below

Soil Texture: Fine Sandy Loam

Percolation Rate: min/inch

Soil Hyd Loading Rate: 0.68 gpd/ft^2

Elevations and Benchmark on map? (Y/N): Yes

Benchmark Elevation Location: TOP OF FOOTING BLOCK

Differences between soil survey and field evaluation: NO SURVEY

Site evaluation issues / comments:

Anticipated construction issues:

University of Minnesota Onsite Sewage Treatment Program

Soil Observation Log

Project ID:

v 04.01.2021

Client:	MILLE LACS BAND OF OJIBWE	Location / Address:	46458 GRACE LAKE RD SANDSTONE MN.

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

Landscape Position: (select one)	Shoulder	Slope %: 6.0	Slope shape	Linear, Linear	Elevation-relative to benchmark: 98.1
Vegetation:	Lawn	Soil survey map units:			Limiting Layer Elevation: 98.1
Weather Conditions/Time of Day:	VERY DRY (DROUGHT)			Date	06/11/22
Observation #/Location:	1	N.W.		Observation Type:	Pit

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	Structure: Shape	Structure: Grade	Structure: Consistence
0-3	Fine Sandy Loam	<35%	7.5YR 2.5/3	2.5YR 4/6	Concentrations, depletions	T5	Granular	Weak	Friable
3-7	Fine Sandy Loam	<35%	7.5YR 4/4	7.5YR 4/6	Concentrations	S1	Platy	Weak	Friable
				7.5YR 4/3	Depletions	S1			
7-14	Fine Sandy Loam	<35%	7.5YR 4/6	2.5YR 4/6	Concentrations	S1	Blocky	Weak	Friable
				7.5YR 4/3	Depletions	S1			

Comments

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

KEVIN HERWIG		3945	6/11/2022
(Designer/Inspector)	(Signature)	(License #)	(Date)

University of Minnesota Onsite Sewage Treatment Program

Soil Observation Log

Project ID:

v 04.01.2021

Client:	MILLE LACS BAND OF OJIBWE	Location / Address:	46458 GRACE LAKE RD SANDSTONE MN.

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

Landscape Position: (select one)	Shoulder	Slope %: 6.0	Slope shape	Linear, Linear	Elevation-relative to benchmark: 97.7
Vegetation:	Lawn	Soil survey map units:	NA		Limiting Layer Elevation: 97.7
Weather Conditions/Time of Day:	WET CLOUDY			Date	06/11/22
Observation #/Location:	2	E CENTER		Observation Type:	Pit

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	Structure: Shape	Structure: Grade	Structure: Consistence
0-3	Fine Sandy Loam	<35%	7.5YR 2.5/3	2.5YR 4/6	Concentrations, depletions	T5	Granular	Weak	Friable
3-7	Fine Sandy Loam	<35%	7.5YR 4/4	7.5YR 4/6	Concentrations	S1	Platy	Weak	Friable
				7.5YR 4/3	Depletions	S1			
7-14	Fine Sandy Loam	<35%	7.5YR 4/6	2.5YR 4/6	Concentrations	S1	Blocky	Weak	Friable
				7.5YR 4/3	Depletions	S1			

Comments

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KEVIN HERWIG		3945	6/11/2022
(Designer/Inspector)	(Signature)	(License #)	(Date)

University of Minnesota Onsite Sewage Treatment Program

Soil Observation Log

Project ID:

v 04.01.2021

Client:	MILLE LACS BAND OF OJIBWE	Location / Address:	46458 GRACE LAKE RD SANDSTONE MN.

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

Landscape Position: (select one)	Shoulder	Slope %: 6.0	Slope shape	Linear, Linear	Elevation-relative to benchmark: 97.6
Vegetation:	Lawn	Soil survey map units:	NA		Limiting Layer Elevation: 98.1
Weather Conditions/Time of Day:	WET CLOUDY			Date	06/11/22
Observation #/Location:	3	S.CENTER		Observation Type:	Pit

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	Structure: Shape	Structure: Grade	Structure: Consistence
0-6	Fill Soil	<35%	7.5YR 2.5/3	2.5YR 4/6	Concentrations, depletions	T5	Granular	Weak	Friable
6-9	Fine Sandy Loam	<35%	7.5YR 2.5/3	2.5Y 4/6	Concentrations	S1	Platy	Weak	Friable
				7.5YR 4/3	Depletions	S1			
9-15	Fine Sandy Loam	<35%	7.5YR 4/4	7.5YR 4/6	Concentrations	S1	Blocky	Weak	Friable
				7.5YR 4/3	Depletions	S1			

Comments

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

KEVIN HERWIG		3945	6/11/2022
(Designer/Inspector)	(Signature)	(License #)	(Date)

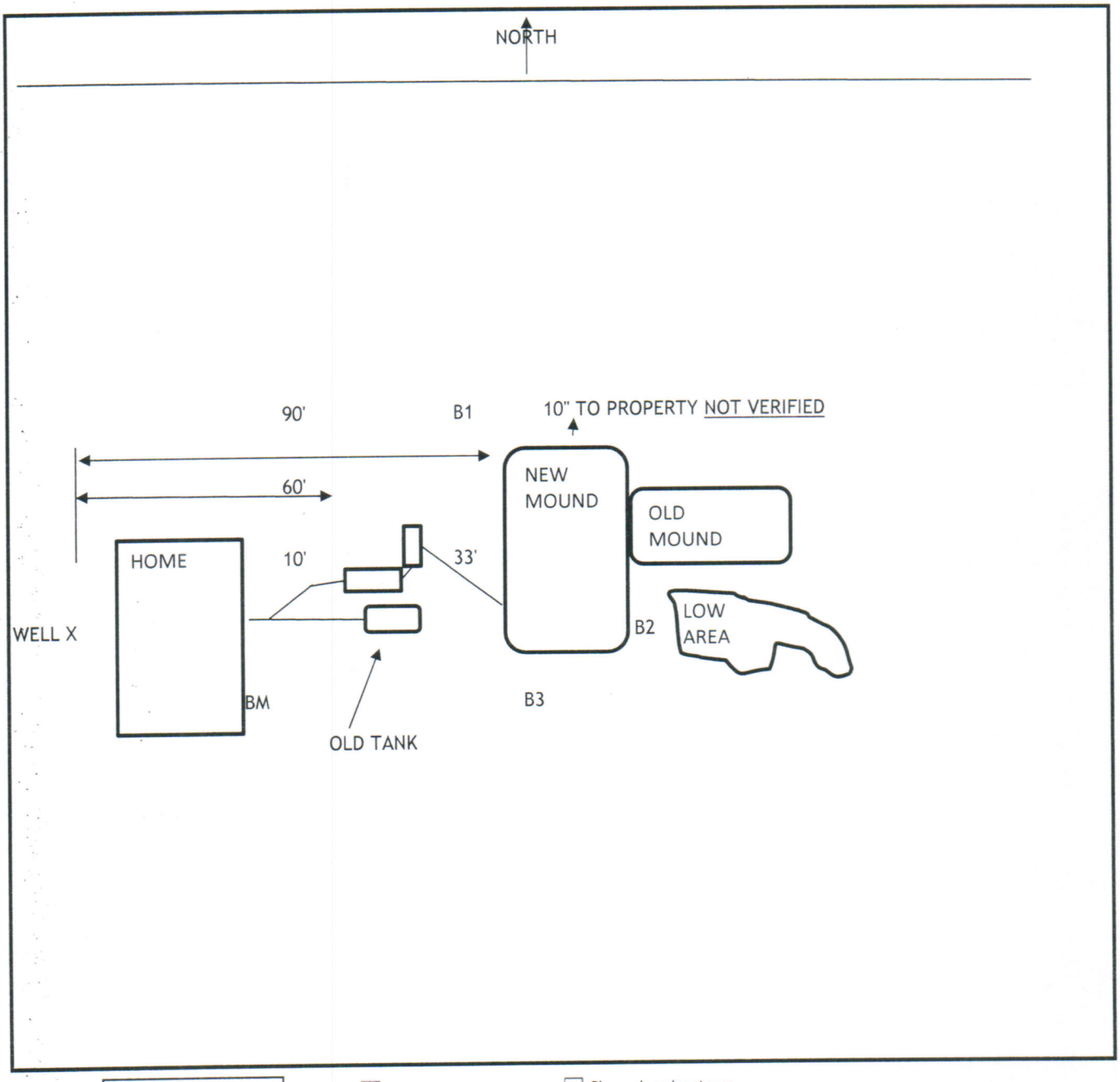
ONSITE SEWAGE TREATMENT PROGRAM

Proposed Design Map

MINNESOTA POLLUTION CONTROL AGENCY

Project ID: v 03.01.2021

Property Owner/Client: MILLE LACS BAND OF OJIBWE



Map scale: NONE ☑ Indicated north ☐ Show slope/contours

Elevations in feet Benchmark: 100 ft

System Corners:

NW:	97.9	ft
NE:	97.78	ft
SW:	97.95	ft
SE:	97.75	ft

Soil Borings:

#1:	98.1	ft
#2:	97.7	ft
#3:	97.6	ft

TANK INLET	95.75	ft
Other:		
PUMP TANK INLET	95.25	ft
		ft

Date Completed: 6/15/2022

University of Minnesota Onsite Sewage Treatment Program

Design Summary Page

MINNESOTA POLLUTION CONTROL AGENCY

v 04.01.2021

1. PROJECT INFORMATION

Property Owner/Client: MILLE LACS BAND OF OJIBWE
Project ID:
Site Address: 46458 GRACE LAKE RD SANDSTONE MN.
Date:
Email Address:
Phone:

2. DESIGN FLOW & WASTE STRENGTH

Attach data / estimate basis for Other Establishments

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

Minimum Capacity: Residential =400 gal/bedroom, Other Establishment = Design Flow x 5.0, Minimum size 1000 gallons

Code Minimum **Holding Tank** Capacity: Gallons in Tanks or Compartments
Recommended **Holding Tank** Capacity: Gallons in Tanks or Compartments
Type of High Level Alarm: (Set @ 75% tank capacity)
Comments:

4. SEPTIC TANK SIZING

A. Residential dwellings:

Number of Bedrooms (Residential): 4
Code Minimum **Septic Tank** Capacity: 1500 Gallons in 1 Tanks or Compartments
Recommended **Septic Tank** Capacity: 2000 Gallons in 2 Tanks or Compartments
Effluent Screen & Alarm (Y/N): Recommended Model/Type: POLYLOK PL-122

B. Other Establishments:

Waste received by: GPD x Days Hyd. Retention Time
Code Minimum **Septic Tank** Capacity: Gallons In Tanks or Compartments
Recommended **Septic Tank** Capacity: Gallons In Tanks or Compartments
Effluent Screen & Alarm (Y/N): Model/Type:

5. PUMP TANK SIZING

Pump Tank 1 Capacity (Minimum): 500 Gal
Pump Tank 1 Capacity (Recommended): 1000 Gal
Pump 1 38.0 GPM Total Head 18.5 ft
Supply Pipe Dia. 2.00 in Dose Vol: 150.0 gal

Pump Tank 2 Capacity (Minimum): Gal
Pump Tank 2 Capacity (Recommended): Gal
Pump 2 GPM Total Head ft
Supply Pipe Dia. Dose Vol: Gal

University of Minnesota Onsite Sewage Treatment Program

Design Summary Page

MINNESOTA POLLUTION CONTROL AGENCY

6. SYSTEM AND DISTRIBUTION TYPE

Project ID:

Soil Treatment Type:	Mound	Distribution Type:	Pressure Distribution-Level
Elevation Benchmark:	100 ft	Benchmark Location:	TOP OF FOOTING BLOCK
MPCA System Type:	Type III	Distribution Media:	Rock
Type III/IV/V Details:	REDOX IN TOP 3' OF SOIL		

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 of Limiting Condition	
Limiting Condition:	0	inches	0.0	ft	97.95	ft
Minimum Req'd Separation:	36	inches	3.0	ft		
					Elevation	
Code Max System Depth:	Mound	inches	-3.0	ft	100.95	ft

Critical for system compliance

This is the maximimum depth to the bottom of the distribution media for required separation. Negative Depth (ft) means it must be a mound.

Soil Texture:	Loamy Fine Sand		
Soil Hyd. Loading Rate:	0.60 GPD/ft^2	Percolation Rate:	MPI
Contour Loading Rate:	12	Note:	
Measured Land Slope:	2 %	Note:	
Comments:			

8. SOIL TREATMENT AREA DESIGN SUMMARY

Trench:

Dispersal Area	ft^2	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	ft^2	Sidewall Depth	in	Maximum Bed Depth	in
Bed Width	ft	Bed Length	ft	Designed Bed Depth	in

Mound:

Dispersal Area	500.0 ft^2	Bed Length	50.0 ft	Bed Width	10.0 ft
Absorption Width	20.0 ft	Clean Sand Lift	3.0 ft	Berm Width (0-1%)	ft
Upslope Berm Width	13.7 ft	Downslope Berm	16.1 ft	Endslope Berm Width	15.2 ft
Total System Length	80.3 ft	System Width	39.8 ft	Contour Loading Rate	12.0 gal/ft

University of Minnesota Onsite Sewage Treatment Program

Design Summary Page

MINNESOTA POLLUTION CONTROL AGENCY

Project ID:

At-Grade:

Bed Width		ft	Bed Length		ft	Finished Height		ft
Contour Loading Rate		gal/ft	Upslope Berm		ft	Downslope Berm		ft
Endslope Berm		ft	System Length		ft	System Width		ft

Level & Equal Pressure Distribution

No. of Laterals	3		Perforation Spacing	3	ft	Perforation Diameter	1/4	in
Lateral Diameter	2.00	in	Min Dose Volume	98	gal	Max Dose Volume	150	gal

Non-Level and Unequal Pressure Distribution

	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

9. Additional Info for At-Risk, HSW or Type IV Design

A. Starting BOD Concentration = Design Flow X Starting BOD (mg/L) X 8.35 ÷ 1,000,000

_____ gpd X _____ mg/L X 8.35 ÷ 1,000,00 = _____ lbs. BOD/day

B. Target BOD Concentration = Design Flow X Target BOD (mg/L) X 8.35 ÷ 1,000,000

_____ gpd X _____ mg/L X 8.35 ÷ 1,000,00 = _____ lbs. BOD/day

Lbs. BOD To Be Removed: _____

PreTreatment Technology: _____ *Must Meet or Exceed Target

Disinfection Technology: _____ *Required for Levels A & B

C. Organic Loading to Soil Treatment Area:

_____ mg/L X _____ gpd x 8.35 ÷ 1,000,000 ÷ _____ ft^2 = _____ lbs./day/ft^2

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		3945	6/15/2022
(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 04.01.2021

A. Design Flow:	600	GPD
B. Soil Loading Rate:	0.60	GPD/ft²
C. Depth to Limiting Condition	0.0	ft
D. Percent Land Slope:	2.0	%
E. Design Media Loading Rate:	1.2	GPD/ft²
F. Mound Absorption Ratio:	2.00	

Table I
MOUND CONTOUR LOADING RATES:

Measured Perc Rate	← OR →	Texture - derived mound absorption ratio		Contour Loading Rate:
≤ 60mpi		1.0, 1.3, 2.0, 2.4, 2.6	→	≤12
61-120 mpi	← OR →	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		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	1.5	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. Calculate Dispersal Bed Area: Design Flow ÷ Design Media Loading Rate

600 GPD ÷ 1.2 GPD/ft² = 500 ft²

If a larger dispersal media area is desired, enter size: 500 ft²

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

C. Calculate Contour Loading Rate: Bed Width X Design Media Loading Rate

10 ft² X 1.2 GPD/ft² = 12.0 gal/ft *Can not exceed Table 1*

D. Calculate Minimum Dispersal Bed Length: Dispersal Bed Area ÷ Bed Width

500 ft² ÷ 10.0 ft = 50.0 ft

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

3. ABSORPTION AREA SIZING

A. Calculate Absorption Width: Bed Width X Mound Absorption Ratio

10.0 ft X 2.0 = 20.0 ft

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

Calculate Downslope Absorption Width: Absorption Width - Bed Width

20.0 ft - 10.0 ft = 10.0 ft

4. DISTRIBUTION MEDIA: Project ID:

Select Dispersal Media: Rock Enter Either A. or B.

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:

6. MOUND SIZING

Project ID:

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

3.0 ft - [ ] ft = 3.0 ft Design Sand Lift (optional): 3 ft

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

3.0 ft + 0.50 ft + 0.35 ft + 1.0 ft = 4.9 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): 2.83

D. Calculate Upslope Berm Width: Multiplier X Upslope Mound Height

2.83 ft X 4.9 ft = 13.7 ft

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

10.0 ft X 2.0 % ÷ 100 = 0.20 ft

F. Calculate Downslope Mound Height: Upslope Height + Drop in Elevation

4.9 ft + 0.20 ft = 5.1 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): 3.19

H. Calculate Downslope Berm Width: Downslope Multiplier X Downslope Height

3.19 x 5.1 ft = 16.1 ft

I. Calculate Minimum Berm to Cover Absorption Area: Downslope Absorption Width + 4 feet

10.0 ft + 4 ft = 14.0 ft

J. Design Downslope Berm = greater of 4H and 4I: 16.1 ft

K. Select Endslope Berm Multiplier: 3.00 *(usually 3.0 or 4.0)*

L. Calculate Endslope Berm X Downslope Mound Height = Endslope Berm Width

3.00 ft X 5.1 ft = 15.2 ft

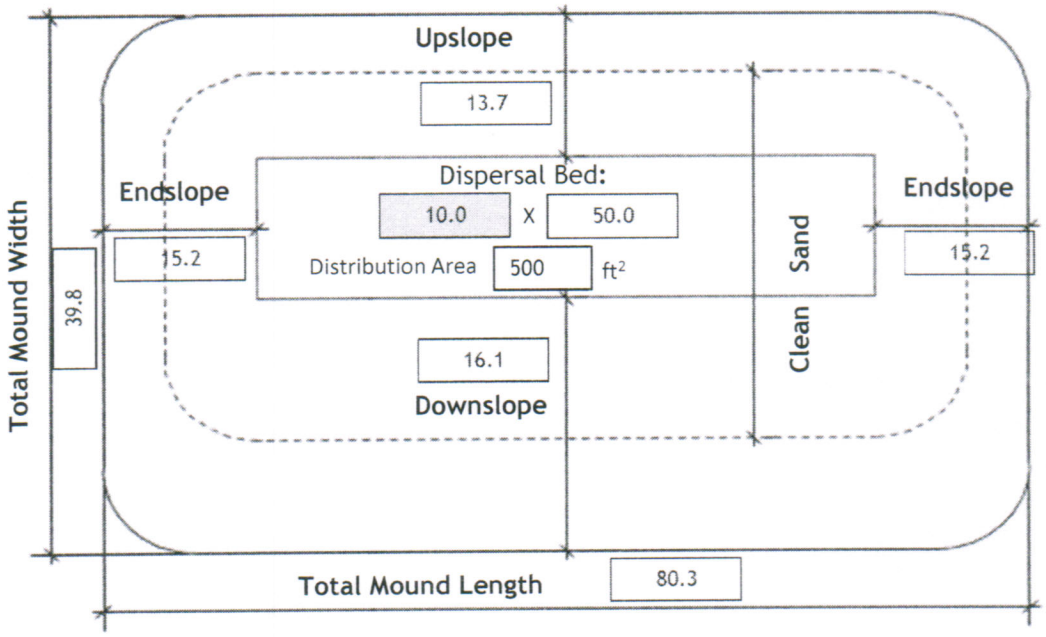
M. Calculate Mound Width: Upslope Berm Width + Bed Width + Downslope Berm Width

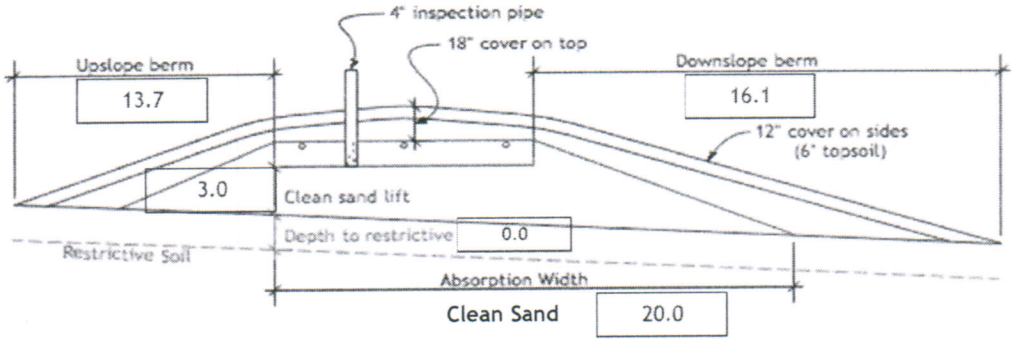
13.7 ft + 10.0 ft + 16.1 ft = 39.8 ft

N. Calculate Mound Length: Endslope Berm Width + Bed Length + Endslope Berm Width

15.2 ft + 50.0 ft + 15.2 ft = 80.3 ft

7. MOUND DIMENSIONS (Feet) Project ID:





Required Separation:	36 (in)	Distribution Media:	Rock
Manifold Connection:	End	Media Depth:	6.0 (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:

University of Minnesota Onsite Sewage Treatment Program

Mound Materials Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

Project ID:

v 04.01.2021

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

(6 in + 5.0 in) ÷ 12 X 50.0 ft X 10.0 ft = 458.3 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards: 458.3 ft^3 ÷ 27 = 17.0 yd^3

Add 30% for constructability: 17.0 yd^3 X 1.3 = 22.1 yd^3

B. Calculate *Clean Sand Volume:*

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

3.0 ft X 10.0 ft X 50 ft = 1475 ft^3

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*

ft^3 + ft^3 + ft^3 = ft^3

For a Mound on a slope greater than 1%

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

((4.9 ft - 1) X 3.0 ft X 50.0) ÷ 2 = 288.8 ft^3

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

((5.1 ft - 1) X 10.0 ft X 50.0) ÷ 2 = 1012.5 ft^3

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

(5.1 ft - 1) X 3.0 ft X 10.0 ft = 121.5 ft^3

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

288.8 ft^3 + 1012.5 ft^3 + 121.5 ft^3 + 1475.0 ft^3 = 2897.8 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards: 2897.8 ft^3 ÷ 27 = 107.3 yd^3

Add 30% for constructability: 107.3 yd^3 X 1.3 = 139.5 yd^3

C. Calculate *Sandy Berm Volume:*

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

(5.0 - 0.5)ft X 39.8 ft X 80.3) ÷ 2 = 7117.2 ft^3

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

7117.2 ft^3 - 2897.8 ft^3 - 458.3 ft^3 = 3761.1 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards: 3761.1 ft^3 ÷ 27 = 139.3 yd^3

Add 30% for constructability: 139.3 yd^3 x 1.3 = 181.1 yd^3

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

39.8 ft X 80.3 ft X 0.5 ft = 1599.4 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards: 1599.4 ft^3 ÷ 27 = 59.2 yd^3

Add 30% for constructability: 59.2 yd^3 x 1.3 = 77.0 yd^3

University of Minnesota Onsite Sewage Treatment Program

Pressure Distribution Design Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

Project ID: v 04.01.2021

1. Media Bed Width: 10 ft

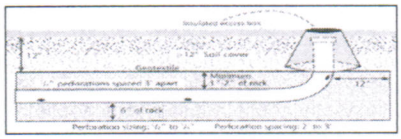
2. Minimum Number of Laterals in system/zone = Rounded up number of [(Media Bed Width - 4) ÷ 3] + 1.

   [(10 - 4) ÷ 3] + 1 = 3 laterals *Does not apply to at-grades*

3. Designer Selected *Number of Laterals*: 3 laterals
   Cannot be less than line 2 (Except in at-grades)

4. Select *Perforation Spacing*: 3.00 ft

5. Select *Perforation Diameter Size:* 1/4 in



6. *Length of Laterals* = Media Bed Length - 2 Feet.

   50.0 - 2ft = 48.0 ft *Perforation can not be closer then 1 foot from edge.*

7. Determine the *Number of Perforation Spaces*. Divide the *Length of Laterals* by the *Perforation Spacing* and round down to the nearest whole number.

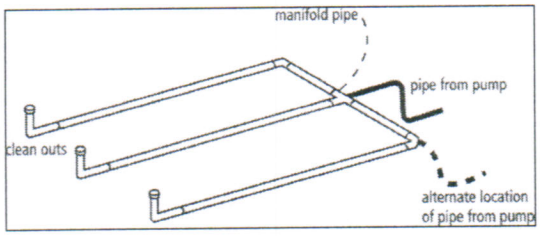
   Number of Perforation Spaces = 48.0 ft ÷ 3.0 ft = 16 Spaces

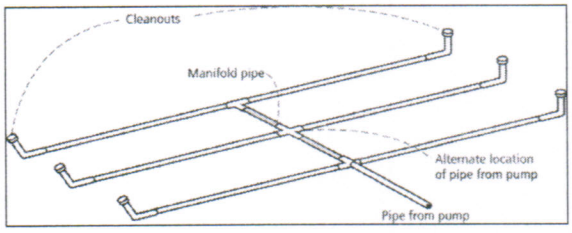
8. *Number of Perforations per Lateral* is equal to 1.0 plus the *Number of Perforation Spaces*. Check table below to verify the number of perforations per lateral guarantees less than a 10% discharge variation. The value is double with a center manifold.

   Perforations Per Lateral = 16 Spaces + 1 = 17 Perfs. Per Lateral

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

1/4 Inch Perforations						7/32 Inch Perforations					
Perforation Spacing (Feet)	Pipe Diameter (Inches)					Perforation Spacing (Feet)	Pipe Diameter (Inches)				
	1	1¼	1½	2	3		1	1¼	1½	2	3
2	10	13	18	30	60	2	11	16	21	34	68
2½	8	12	16	28	54	2½	10	14	20	32	64
3	8	12	16	25	52	3	9	14	19	30	60
3/16 Inch Perforations						1/8 Inch Perforations					
Perforation Spacing (Feet)	Pipe Diameter (Inches)					Perforation Spacing (Feet)	Pipe Diameter (Inches)				
	1	1¼	1½	2	3		1	1¼	1½	2	3
2	12	18	26	46	87	2	21	33	44	74	149
2½	12	17	24	40	80	2½	20	30	41	69	135
3	12	16	22	37	75	3	20	29	38	64	128





9. *Total Number of Perforations* equals the *Number of Perforations per Lateral* multiplied by the *Number of Perforated Laterals.*

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

10. Spacing of laterals; Must be greater than 1 foot and no more than 3 feet: 3.0 ft

11. Select *Type of Manifold Connection* (End or Center): End

12. *Select Lateral Diameter (See Table)*: 2.00 in

University of Minnesota Onsite Sewage Treatment Program

Pressure Distribution Design Worksheet

MINNESOTA POLLUTION CONTROL AGENCY

13. 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) X Bed Length (ft)

10	ft X	50	ft =	500	ft^2

b. *Square Foot per Perforation* = *Bed Area* ÷ by the *Total Number of Perfs*

500	ft^2 ÷	51	perf =	9.8	ft^2/perf

14. Select *Minimum Average Head* : 1.0 ft

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

16. *Flow Rate* = *Total Number of Perfs X Perforation Discharge.*

51	Perfs X	0.74	GPM per Perforation =	38	GPM

17. *Volume of Liquid Per Foot of Distribution Piping (Table II)* : 0.170 Gallons/ft

18. *Volume of Distribution Piping* =

= [*Number of Perforated Laterals* X *Length of Laterals* X (Volume of Liquid Per Foot of Distribution Piping]

3	X	48	ft X	0.170	gal/ft	=	24.5 Gallons

19. Minimum Delivered Volume = Volume of Distribution Piping X 4

24.5	gals X	4	=	97.9 Gallons

Perforation Discharge (GPM)				
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[c]	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 Pump Selection Design Worksheet

ONSITE SEWAGE TREATMENT PROGRAM

MINNESOTA POLLUTION CONTROL AGENCY

1. PUMP CAPACITY

Project ID:

v 04.01.2021

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: 38.0 GPM

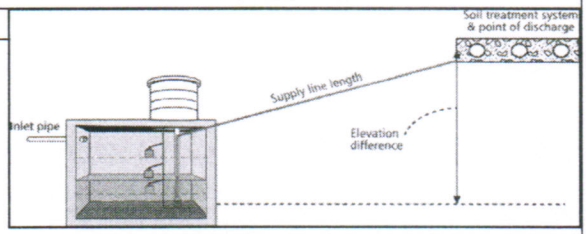
C. Enter pump description: Demand Dosing

2. HEAD REQUIREMENTS

A. Elevation Difference between pump and point of discharge: 12 ft

B. Distribution Head Loss: 5 ft

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



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: 33 ft

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

Friction Loss = 3.67 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*

33 ft X 1.25 = 41.3 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* by the *Equivalent Pipe Length* and divide by 100.

Supply Friction Loss =

3.67 ft per 100ft X 41.3 ft ÷ 100 = 1.5 ft

H. *Total Head* requirement is the sum of the *Elevation Difference* + Distribution Head Loss, + Additional Head Loss + Supply Friction Loss

12.0 ft + 5.0 ft + ____ ft + 1.5 ft = 18.5 ft

3. PUMP SELECTION

A pump must be selected to deliver at least **38.0** GPM with at least **18.5** feet of total head.

Comments:

Pump Tank Design Worksheet (Demand Dose)

Onsite Sewage Treatment Program

Minnesota Pollution Control Agency

DETERMINE TANK CAPACITY AND DIMENSIONS Project ID: v 04.01.2021

1. A. *Design Flow (Design Sum.1A)*: 600 GPD C. Tank Use:
   B. Min. required pump tank capacity: 500 Gal D. Recommended pump tank capacity: 1000 Gal

2. A. Tank Manufacturer: CEMSTONE B. Tank Model: 9551001
   C. Capacity from manufacturer: 1070 Gallons
   D. Gallons per inch from manufacturer: 32.0 Gallons per inch
   E. Liquid depth of tank from manufacturer: 32.0 inches

   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*

(12 in + 2 inches) X 32.0 Gallons Per Inch = 448 Gallons

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

-Item 18 of the Pressure Distribution or Item 11 of Non-level 98 **Gallons (Minimum dose)** 3.1 inches/dose

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

Design Flow: 600 GPD X 0.25 = 150 **Gallons (Maximum dose)** 4.7 inches/dose

6 *Select a pumpout volume that meets both Minimum and Maximum:* 150 Gallons

7 Calculate *Doses Per Day* = Design Flow ÷ *Delivered Volume*

600 gpd ÷ 150 gal = 4.00 *Doses*

8 Calculate Drainback:

A. *Diameter of Supply Pipe* = 2 inches

B. Length of Supply Pipe = 33 feet

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

D. *Drainback = Length of Supply Pipe X Volume of Liquid Per Lineal Foot of Pipe*

33 ft X 0.170 gal/ft = 5.6 Gallons

9. *Total Dosing Volume = Delivered Volume* plus *Drainback*

150 gal + 5.6 gal = 156 Gallons

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

2 in X 32.0 gal/in = 64.0 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

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

Total Dosing Volume /Gallons Per Inch

156 gal ÷ 32.0 gal/in = 4.9 Inches

12. Measuring from bottom of tank:

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

12 in + 2 in = 14 Inches

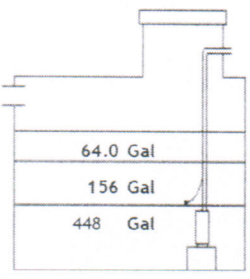
B. *Distance to set Pump On Float=Distance to Set Pump-Off Float + Float Separation Distance*

14 in + 4.9 in = 19 Inches

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

19 in + 2.0 in = 21 Inches

Inches for Dose: 4.9 in
Alarm Depth 20.9 in
Pump On 18.9 in
Pump Off 14.0 in



MONITORING AND MITIGATION

SEPTIC SYSTEM CLASSIFIED AS TYPE III

Should the system fail a new site for the septic system may be considered or the owner agrees to repair the septic system if it is possible. If the septic system is not repairable the homeowner agrees to disconnect the septic tanks from the septic system and use and maintain the septic tanks as holding tanks.

Mille Band of Ojibwe and Kevin Herwig are to be notified as soon as possible about any operational problems. If a failure occurs the septic pump must be disconnected immediately and remain disconnected until all repairs are completed. A pumping contract will need to be set up with a septic maintenance contractor. A copy of all documents must be submitted to the county.

The system must be monitored for a minimum of three years. The mound system is to be inspected by the homeowner for leaks or saturated areas. Inspections are to be done every month for 36 months. Any leaks or failures in system must be reported to the county within 24 hours.

All expenses for repair or replacement are the homeowner's responsibility.

Type III systems are not warranted by the Inspector, Designer, or Installer

I _____ , property owner of 46458 Grace Lake Rd. Sandstone Mn.

Hereby agree that as long as I am the owner of the property, to accept all legal and financial responsibility for future system repair and/or replacement expense in the event that failure of the system on the above referenced property occurs.

_____

Owner

_____

Date

Owners Septic System Management Plan

Date: 6/15/2022

Property Address: 58 GRACE LAKE RD. SANDSTONE

Septic Systems can be an expensive investment, good maintenance will ensure they last a lifetime. The purpose of a septic system is to properly "decompose" the pollutants before the water is recycled back into the groundwater. If you're not taking this seriously, ask yourself where your well water comes from.

Your septic design lists all the components of your system and their location. Keep the design, this management plan and the UofM "Septic System Owners Guide" in a safe place for future reference. For a copy of the Owners guide call the University of MN at 1-800-876-8636.

Some of the following tasks you can do yourself, some require a professional, but is it YOUR responsibility to see that it gets done.

Homeowner Tasks

- Do your best to conserve water. Don't overload your septic with multiple large water uses at the same time or on the same day.
- Fix household leaks promptly (leaky toilet, dripping faucets).
- Limit bleach and anti-bacterial products. Use Biodegradable dishwasher detergent.
- Consider a lint filter on your clothes washer.
- Regularly check for wet or spongy soil around your drainfield.
- Have a septic professional check your tanks every 3 years to determine if they need pumping.
- If you have a septic tank filter (effluent filter) clean it on a regular basis (or have a professional do it).
- If a septic alarm goes off, call your septic professional to diagnose the problem.
- Notify the County/City/Township when this management plan is not being met.
- Be aware of and protect your secondary drainfield site.

Professional Tasks

- Disclose the location of the secondary drainfield (if applicable).
- Respond to alarms and diagnose problems as needed.
- Review water use with the owner, check for a "soggy" drainfield.
- Pump the septic tanks as needed and ensure they are in proper working order.
- Verify the pump, dose amount, HI Level Alarm & drainback are all working properly.

"As the owner, I understand it is my responsibility to properly operate and maintain this septic system".

Property Owner Signature: _____ **Date** _____