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OSTP Field Evaluation Form

v 03.19.15

1. Contact Information

Property Owner/Client: Bruce & Linda Maples
Project ID: Test 1
Address: 2042 Viking BLVD, NE Cedar MN 55011
Date: 10/3/2021
Client Phone Number: 763-234-3189
Weather Conditions: Cloudy

2. Utility and Structure Information

Utility Locations Identified
- [ ] Gopher State One Call #
- [ ] Any Private Utilities

Property Lines
- [x] Determined and Approved by Client
- [ ] Determined but not Approved
- [ ] Approximate
- [ ] Property Lines Surveyed

Client's Approval (initial):

Locate and Verify (*see Site Evaluation map*)
- [x] Existing Buildings
- [x] Improvements
- [ ] Easements
- [ ] Setbacks

3. Site Information

Percent Slope: 4
Landscape Position: Foot
Vegetation type(s): Wooded
Slope Direction: west
Slope Shape: Concave

Evidence of cut, fill, compacted or disturbed areas: [ ] Yes [x] No

Discuss the flooding or run-on potential of site: All water to be diverted around mound area.

Identify benchmarks and elevations (*Site Evaluation Map*): Bench mark = 100, existing garage floor

Proposed soil treatment area adequately protected: [x] Yes [ ] No

4. General Soils Information

Original soils: [x] Yes [ ] No
Type of observation: [ ] Soil Probe [x] Soil Boring [ ] Soil Pit
Number of soil observations: 2
Soil observations were conducted in the proposed system location: [x] Yes [ ] No
A soil observation was made within the most limiting area of the proposed system: [x] Yes [ ] No
Soil boring log forms completed and attached: [ ] Yes [ ] No
Percolation tests performed, forms completed and attached: [ ] Yes [ ] No

5. Phase I. Reporting Information

Depth to standing water		inches
Flood elevation	2154	feet
Depth to bedrock		inches
Depth to periodically saturated soil	24	inches
Maximum depth of system	Mound	inches
Elevation at system bottom	104	feet
Percolation rate		min/inch
Loading rate	0.79	gpd/ft^2
Contour loading rate	12	gpd/ft

Anticipated construction issues

Differences between soil survey and field evaluation
Soil Survey states- C72 D, Milaca-Millward Complex.
Soils on site are a sandy loam soil with large rocks at 25"

Site evaluation issues / comments

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

Greg Westerlund (Designer) | Greg Westerlund (Signature) | 663 (License #) | 10/3/21 (Date)

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OSTP Soil Observation Log

Project ID: Test 1 v 03.19.15

Client/ Address:	Bruce Maples	Legal Description/ GPS:	S110' Of N870' Lot 1& s100',of n870' NE NW, Sec17

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

Landscape Position: (check one) ☐ Summit ☐ Shoulder ☐ Back/Side Slope ☑ Foot Slope ☐ Toe Slope

Slope shape	convex						
Vegetation	wooded	Soil survey map units	C72D	Slope%	4.0	Elevation:	102
Weather Conditions/Time of Day:	Cloudy 10:00 AM			Date	10/03/21		
Observation #/Location:	Soil Boring #1, North west end of system area			Observation Type:	Auger		

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	Structure: Shape	Structure: Grade	Structure: Consistence
6	Loam	<35%	10YR 2/2				Single grain	Weak	Friable
19	Loamy Sand	<35%	10YR 4/4				Single grain	Weak	Friable
20	Loamy Sand	35-50%	10YR 4/4	7.5YR 4/3	Concentrations, depletions, gleyed	S1	Single grain	Structureless	Friable

Comments

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

Landscape Position: (check one) ☐ Summit ☐ Shoulder ☐ Back/Side Slope ☑ Foot Slope ☐ Toe Slope | Slope shape: convex

Vegetation	wooded	Soil survey map units	C72D	Slope%	4.0	Elevation:	102

Weather Conditions/Time of Day: Cloudy 10:00 AM | Date: 10/03/21

Observation #/Location: Soil Boring #2 South west end of system area | Observation Type: Auger

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	Structure: Shape	Structure: Grade	Structure: Consistence
8	Loam	<35%	10YR 2/2				Single grain	Weak	Friable
20	Loamy Sand	<35%	10YR 4/4				Single grain	Weak	Friable
21	Loamy Sand	35-50%	10YR 4/4	7.5YR 4/3	Concentrations, depletions, gleyed	S1	Single grain	Structureless	Friable

Comments:

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Greg Westerlund (Designer/Inspector)   Greg Westerlund (Signature)   663 (License #)   10/3/21 (Date)

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OSTP Mound Design Worksheet

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1. SYSTEM SIZING:

A. *Design Flow (Flow & Soil - 1.A) :* 300 GPD

B. *Soil Loading Rate (Flow & Soil-3.C):* .79 GPD/ft²

C. *Depth to Limiting Condition:* 1.5 ft

D. *Percent Land Slope:* 4 %

E. *Design Media Loading Rate:* 1.20 GPD/ft²

F. *Mound Absorption Ratio* (1.E÷1.B): 1.5

G. *Design Contour Loading Rate:* 12 GPD/ft
(From Table I - same as Linear Loading Rate)

Table I
MOUND CONTOUR LOADING RATES:

Measured Perc Rate		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*		≥5.0*		≤6*

*Systems with these values are not Type I systems. Contour Loading Rate is a recommended value.

2. DISPERSAL MEDIA SIZING

A. Calculate *Required Dispersal Bed Area: Design Flow* (1.A) ÷ *Design Media Loading Rate* (1.E) = ft²

300 GPD ÷ 1.2 GPD/ft² = 250 ft²

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

B. Calculate *Dispersal Bed Width: Contour Loading Rate* (1.G) ÷ *Design Media Loading Rate* (1.E) = *Bed Width*

12 ft ÷ 1.2 gpd/ft² = 10 ft

C. Calculate *Dispersal Bed Length: Dispersal Bed Area* (2.A) ÷ *Bed Width* (2.B) = *Bed Length*

250 ft² ÷ 10 ft = 25 ft

D. Select *Dispersal Media*:

☒ Rock

☐ Other Approved Media (Describe): ______

3. ABSORPTION AREA SIZING

Note: Mound setbacks are measured from the Absorption Area.

A. Calculate *Absorption Width: Bed Width* (2.B) X *Mound Absorption Ratio* (1.F) = *Absorption Width*

10 ft X 1.5 = 15 ft

B. For slopes from 0 to 1%, the *Absorption Width* is measured from the bed equally in both directions.
Calculate *Absorption Width Beyond the Bed*: *Absorption Width* (3.A) - *Bed Width* (2.B) ÷ 2 = *Width beyond Bed*

(______ ft - ______ ft) ÷ ______ = ______ ft

C. For slopes >1%, the *Absorption Width* is measured downhill from the upslope edge of the *Bed*.
Calculate *Downslope Absorption Width*: *Absorption Width* (3.A) - *Bed Width* (2.B) = ft

15 ft - 10 ft = 5 ft

Comments:

Slope, CLR Choice, Material issues

4. MOUND SIZING

A. Calculate *Clean Sand Lift:* 3 feet minus *Depth to Limiting Condition* (1.C) = *Clean Sand Lift* (1 ft minimum)

3.0 ft - [1.5] ft = [1.5] ft

B. Calculate *Upslope Height: Clean Sand Lift* (4.A) + *media depth* (1 ft.) + *cover* (1 ft.) = *Upslope Height*

[1.5] ft + [1] ft + [1] ft = [3.5] ft

D-34: Slope Multiplier Table

Land Slope %		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
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	2.17	2.13	2.09	2.06	2.03	2.00	1.97	1.95	1.93	1.91	1.89	1.87	1.85
	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	2.62	2.55	2.48	2.41	2.35	2.29	2.23	2.18	2.13	2.08	2.03	1.98	1.93

Land Slope %		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
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	4.95	5.24	5.55	5.88	6.24	6.63	7.04	7.47	7.93	8.42	8.93	9.46	10.02
	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	8.29	8.92	9.57	10.24	10.94	11.67	12.42	13.19	13.99	14.82	15.67	16.54	17.44

C. Select *Upslope Berm Multiplier* (based on land slope): [3.45] (figure D-34)

D. Calculate *Upslope Berm Width*: *Multiplier* (4.C) X *Upslope Mound Height* (4.B) = *Upslope Berm Width*

[3.45] ft X [3.5] ft = [12.1] ft

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

[10] ft X [4] % ÷ 100 = [.4] ft

F. Calculate *Downslope Mound Height: Upslope Height* (4.B) + *Drop in Elevation* (4.E) = *Downslope Height*

[3.5] ft + [.4] ft = [3.9] ft

G. Select *Downslope Berm Multiplier* (based on land slope): [4.76] (figure D-34)

H. Calculate *Downslope Berm Width: Multiplier* (4.G) X *Downslope Height* (4.F) = *Downslope Berm Width*

[4.76] x [3.9] ft = [18.6] ft

I. Calculate *Minimum Berm to Cover Absorption Area: Downslope Absorption Width* (3.B or 3.C) + 4 ft. = ft

[5] ft + [4] ft = [9] ft

J. *Design Downslope Berm* = greater of 4H and 4I: [18.6] ft

K. Select *Endslope Berm Multiplier*: [4] (usually 3.0 or 4.0)

L. Calculate *Endslope Berm* (4.K) X *Downslope Mound Height* (4.F) = *Endslope Berm Width*

[4] ft X [3.9] ft = [15.6] ft

M. Calculate Mound Width: *Upslope Berm Width* (4.D) + *Bed Width* (2.B) + *Downslope Berm Width* (4.J) = ft

[12.1] ft + [10] ft + [18.6] ft = [40.7] ft

N. Calculate Mound Length: *Endslope Berm Width* (4.L) + *Bed Length* (2.C) + *Endslope Berm Width* (4.L) = ft

[15.6] ft + [25] ft + [15.6] ft = [56.2] ft

5. ORGANIC LOADING: (Optional)

A. *Organic Loading* = *Design Flow* X *Estimated BOD* in mg/L in the effluent X 8.35 ÷ 1,000,000

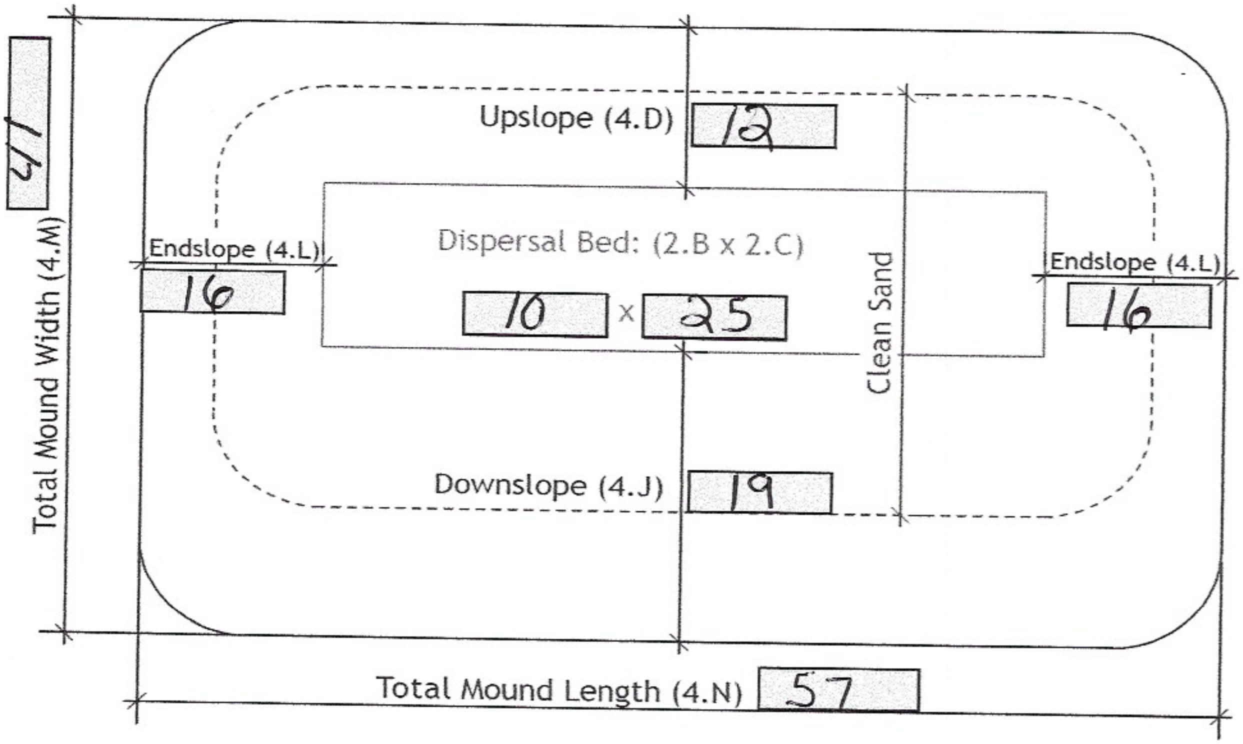
[ ] gpd X [ ] mg/L X 8.35 ÷ 1,000,000 = [ ] lbs BOD/day

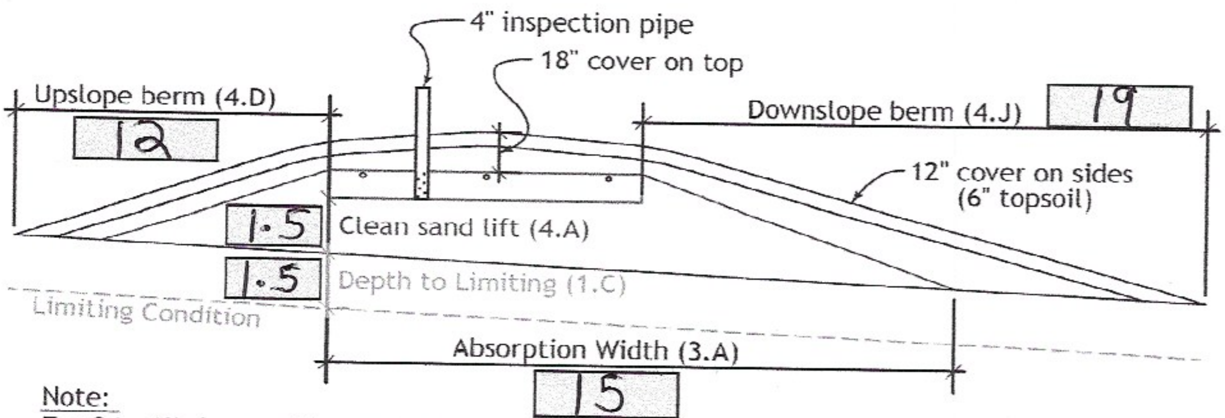
B. Calculate *System Organic Loading: lbs. BOD* (5.A) ÷ *Bed Area* (2.A) = lbs/day/ft²

[ ] lbs/day ÷ [ ] ft² = [ ] lbs/day/ft²

C. Recommended Organic Loading Rate: [ ] lbs/day/ft²

6. MOUND DIMENSIONS





Note:
For 0 to 1% slopes, *Absorption Width* is measured from the *Bed* equally in both directions.
For slopes >1%, *Absorption Width* is measured downhill from the upslope edge of the *Bed.*

Comments:

Divert surface water away from mound.

7. APPROXIMATE MOUND MATERIAL CALCULATIONS:

A. Calculate *Bed* (rock) *Volume*: *Bed Length* (2.C) X *Bed Width* (2.B) X *Depth* = *Volume* (ft^3)

25 ft X 10 ft X 1.0 = 250 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards:

250 ft^3 ÷ 27 = 9.26 yd^3

Add 20% for constructability: 9.26 yd^3 X 1.2 = 11.1 yd^3

B. Calculate *Clean Sand Volume*:

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

((3.5 ft - 1) X 3 ft X 25) ÷ 2 = 93.75 ft^3

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

((3.9 ft - 1) X 5 ft X 25) ÷ 2 = 362.5 ft^3

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

(3.9 ft - 1) X 3 ft X 10 ft = 87 ft^3

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

1.7 ft X 10 ft X 25 ft = 425 ft^3

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

93.75 ft^3 + 362.5 ft^3 + 87 ft^3 + 425 ft^3 = 968.25 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards: 968.25 ft^3 ÷ 27 = 35.86 yd^3

Add 20% for constructability: 35.86 yd^3 X 1.2 = 43.03 yd^3

C. Calculate *Sandy Berm Volume:*

Total Berm Volume (approx): ((Avg. Mound Height - .5 ft topsoil) x Mound Width x Mound Length) ÷ 2 = cu. ft.

(4 - 0.5)ft X 40 ft X 57) ÷ 2 = 3,990 ft^3

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

968.5 ft^3 - 250 ft^3 - 3,990 ft^3 = 2771.5 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards: 2771.5 ft^3 ÷ 27 = 102.65 yd^3

Add 20% for constructability: 102.65 yd^3 x 1.2 = 103.85 yd^3

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

40 ft X 57 ft X 0.5 ft = 1,140 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards: 1140 ft^3 ÷ 27 = 42.2 yd^3

Add 20% for constructability: 42.2 yd^3 x 1.2 = 50.66 yd^3

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

Greg Westerlund	[signature]	663	10/4/21
(Designer)	(Signature)	(License #)	(Date)

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OSTP Pressure Distribution Design Worksheet

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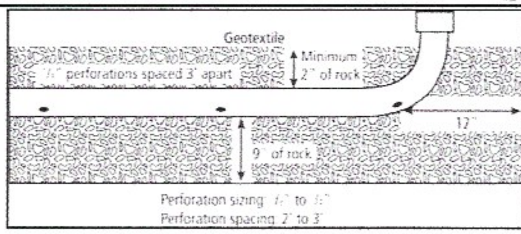

1. Select *Number of Perforated Laterals in system/zone*: [3]
   (2 feet is minimum and 3 feet is maximum spacing)
2. Select *Perforation Spacing*: [3] ft
3. Select *Perforation Diameter Size* [1/4] inch
4. *Length of Laterals* = Media Bed Length - distance from edge *(1 or 2 feet depending on manifold location as perfs can not be closer then 1 foot from edge)*

   [25] ft - [2] ft = [23] ft

5. Determine the *Number of Perforation Spaces*. Divide the *Length of Laterals* (Line 4) by the *Perforation Spacing* (Line 2) and round down to the nearest whole number.

   Number of Perforation Spaces = [23] ft ÷ [3] ft = [7] Spaces

6. *Number of Perforations per Lateral* is equal to 1.0 plus the *Number of Perforation Spaces* (Line 5).

   Perforations Per Lateral = [7] Spaces + 1 = [8] Perfs. Per Lateral

   Check Table I to verifty the number of perforations per lateral guarantees less than a 10% discharge variation. The value is double if the a center manifold is used.

7. *Total Number of Perforations* equals the *Number of Perforations per Lateral* (Line 6) multiplied by the *Number of Perforated Laterals* (Line 1).

   [8] Perf. Per Lateral X [3] Number of Perf. Laterals = [24] Total Number of Perf.

8. Calculate the *Square Feet per Perforation. Recommended value is 4-10 ft² per perforation.*
   Does not apply to At-Grades
   Bed Area = Bed Width (ft) X Bed Length (ft)

   [10] ft X [25] ft = [250] ft²

   Square Foot per Perforation = *Bed Area* divided by the *Total Number of Perforations* (Line 7).

   [250] ft² ÷ [24] perforations = [10] ft²/perforations

Table III				
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
2.0[b]	0.26	0.59	0.80	1.04
5.0[c]	0.41	0.93	1.26	1.65

a: Use 1.0 for dwellings using 1/4 inch or 3/16 inch holes.

b: Use 2.0 for dwellings using 1/8 inch holes: or, for other establishments using 1/4 inch or 3/16 inch holes.

c: Use 5.0 for other establishments using 1/8 inch perforations and media filters.

9. Select *Minimum Average Head*: [1] ft
10. Select *Perforation Discharge* (GPM) based on Table III: [.74] GPM per Perforation
11. Determine required *Flow Rate* by multiplying the *Total Number of Perforations* (Line 7) by the *Perforation Discharge* (Line 10).

    [24] Perforations X [.74] GPM per Perforation = [17.76] GPM

12. Select *Type of Manifold Connection* (End or Center): ☒ End ☐ Center

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OSTP Pressure Distribution Design Worksheet

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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	2[illegible]	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	37	2	21	33	44	74	149
2½	12	17	24	40	80	2½	20	30	4[illegible]	69	135
3	12	15	22	37	75	3	20	29	38	64	128

14. *Select Lateral Diameter* based on Table I: **1½** in

15. *Volume of Liquid Per Foot of Distribution Piping* : **.11** Gallons/ft

16. *Volume of Distribution Piping* =

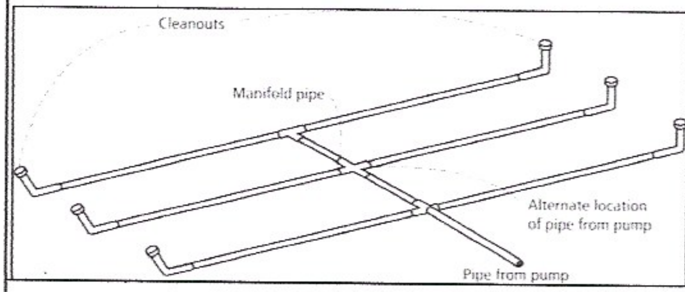
= [*Number of Perforated Laterals* (Line 1) X *Length of Laterals* (Line 4) X (Volume of Liquid Per Foot of Distribution Piping (Line 15)]

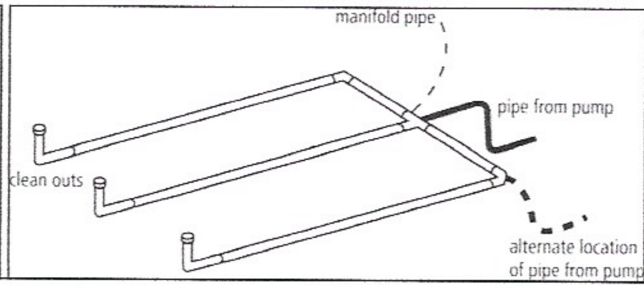
3 X **23** ft X **.11** gal/ft = **7.59** Gallons

17. Minimum Dose = Volume of Distribution Piping (Line 17) X 5

7.59 gals X 5 = **37.95** Gallons

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





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

Greg Westerlund (Designer) [signature] (Signature) 1063 (License #) 10/4/21 (Date)

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OSTP Pump Selection Design Worksheet

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1. PUMP CAPACITY

A. Pumping to Gravity or Pressure Distribution: ○ Gravity ● Pressure

1. If pumping to gravity enter the gallon per minute of the pump: [ ] GPM

2. If pumping to pressure, is the pump for the treatment system or the collection system:

   ● Treatment System ○ Collection System

3. If pumping to a pressurized treatment system, what part or type of system:

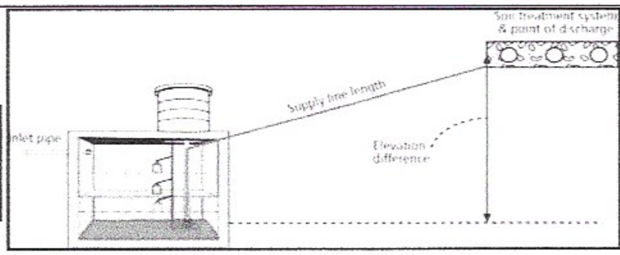
   ☑ Soil Treatment ☐ Media Filter ☐ Other

4. If pumping to a pressurized distribution system: [18] GPM

   (Line 11 of Pressure Distribution or Line 10 of Non-Level or enter if Collection System)

2. HEAD REQUIREMENTS

3. Elevation Difference [21] ft between pump and point of discharge:



> ***NOTE*** *: IF system is an individual subsurface sewage treatment system, complete steps 4 - 9. If system is a Collection System, skip steps 4, 5, 7 and 8 and go to Step 10.*

4. Distribution Head Loss: [5.0] ft

5. 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

6. A. Supply Pipe Diameter: [2] in

   B. Supply Pipe Length: [185] ft

7. Based on **Friction Loss in Plastic Pipe per 100ft** from Table I:

   Friction Loss = [.93] ft per 100ft of pipe

Friction Loss in Plastic Pipe per 100 ft (C=130)					
	Nominal Pipe Diameter				
Flow Rate (GPM)	1	1¼	1½	2	3
10	9.11	3.08	1.27	0.31	---
12	12.77	4.31	1.78	0.44	---
14	16.99	5.74	2.36	0.58	---
16	---	7.35	3.03	0.75	0.10
18	---	9.14	3.76	0.93	0.13
20	---	11.11	4.58	1.13	0.16
25	---	16.79	6.92	1.71	0.24
30	---	---	9.69	2.39	0.33
35	---	---	12.90	3.18	0.44
40	---	---	16.52	4.07	0.57
45	---	---	---	5.07	0.70
50	---	---	---	6.16	0.86
55	---	---	---	7.35	1.02
60	---	---	---	8.63	1.20
65	---	---	---	10.01	1.39
70	---	---	---	11.48	1.60

8. 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 (5.B)* X 1.25 = *Equivalent Pipe Length*

   [185] ft X 1.25 = [231.25] ft

9. Calculate *Supply Friction Loss* by multiplying *Friction Loss Per 100ft* (Line 6) by the *Equivalent Pipe Length* (Line 7) and divide by 100.

   Supply Friction Loss =

   [.93] ft per 100ft X [231.25] ft ÷ 100 = [2.15] ft

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OSTP Pump Selection Design Worksheet

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10. Equivalent length of pipe fittings.

Section 10 is for Collection Systems ONLY and does NOT need to be completed for individual subsurface sewage treatment systems.

Quantity X Equivalent Length Factor = Equivalent Length

Fitting Type	Quantity		Equivalent Length Factor		Equivalent Length (ft)
Gate Valve		X		=	
90 Deg Elbow		X		=	
45 Deg Elbow		X		=	
Tee - Flow Thru		X		=	
Tee - Branch Flow		X		=	
Swing Check Valve		X		=	
Angle Valve		X		=	
Globe Valve		X		=	
Butterfly Valve		X		=	
Valve 10		X		=	
Valve 11		X		=	

Equivalent Length Factors (ft.) for PVC Pipe Fittings

Fitting Type	Pipe Diameter (in.)		
	1½	2	3
Gate Valve	1.07	1.38	2.04
90 Deg Elbow	4.03	5.17	7.67
45 Deg Elbow	2.15	2.76	4.09
Tee - Flow Thru	2.68	3.45	5.11
Tee - Branch Flow	8.05	10.30	15.30
Swing Check Valve	13.40	17.20	25.50
Angle Valve	20.10	25.80	38.40
Globe Valve	45.60	58.60	86.90
Butterfly Valve	-	7.75	11.50

NOTE: Equivalent length values for PVC pipe fittings are based on calculations using the Hazen-Williams Equation. See Advanced Designs for SSTS for equation. Other pipe material may require different equivalent length factors. Verify other equivalent length factors with pipe material manufacturer.

NOTE: System installer should contact system designer if the number of fittings varies from the design to the actual installation.

A. Sum of Equivalent Length due to pipe fittings: ______ ft

B. *Total Pipe Length* = Supply Pipe Length (5.B) + Equivalent Pipe Length (9.A.)

______ ft + ______ ft = ______ ft

Hazen-Williams Equation for h

$$h_f = \frac{10.5}{D^{4.87}} * (Q \div C)^{1.85} * L$$

Q in gpm L in feet D in inches C = 130

C. Hazen-Williams friction loss due to pipe fittings and supply pipe (h_f):

(10.5 ÷ Pipe Diameter$^{4.87}$) X (Flow Rate ÷ Constant)$^{1.85}$ X Total Pipe Length (10.B)

(10.5 ÷ ______ in$^{4.87}$) X (______ gpm ÷ 130)$^{1.85}$ X ______ ft = ______ ft

11. *Total Head* requirement is the sum of the *Elevation Difference* (Line 3), the Distribution Head Loss (Line 4), Additional Head Loss (Line 5), and either Supply Friction Loss (Line 9), **or** Friction Loss from the Supply Pipe and Pipe Fittings for collection systems (Line 10.C)

NOTE: Supply Friction Loss (Line 8) need ONLY be used if NOT a collection system.

NOTE: Friction Loss from the Supply Pipe and Pipe Fittings (Line 9.C) need ONLY be used if system is a collection system.

21 ft + 5 ft + 2.15 ft + ______ ft = 28.15 ft

3. PUMP SELECTION

A pump must be selected to deliver at least 18 GPM (Line 1 or Line 2) with at least 28 feet of total head.

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

Greg Westerlund	Greg Westerlund	663	10/4/21
(Designer)	(Signature)	(License #)	(Date)

Minnesota Pollution Control Agency

OSTP Pump Tank Sizing, Dosing and Float and Timer Setting Design Worksheet

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B. DEMAND DOSE FLOAT SETTINGS

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

Total Dosing Volume (Line 12)/Gallons Per Inch (Line 2)

105.6 gal ÷ 36.42 gal/in = 2.89 Inches

19. Measuring from bottom of tank:

A. *Distance to set Pump Off Float = Pump Height + Block Height* (Line 5) + *Alarm Depth* (Line 13)

16 in + 2 in = 18 Inches

B. *Distance to set Pump On Float=Distance to Set Pump-Off Float (Line 19.A) + Float Separation Distance (Line 18)*

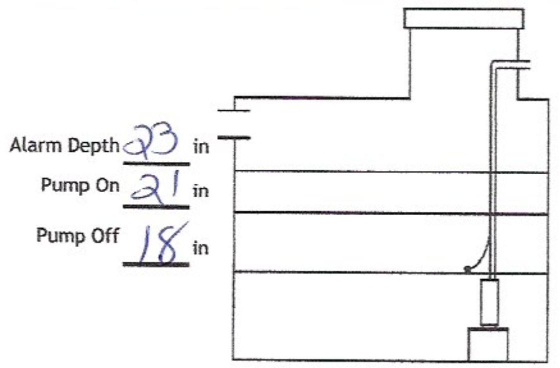
18 in + 2.89 in = 21 Inches

C. *Distance to set Alarm Float = Distance to set Pump-On Float* (19.B) + *Alarm Depth* (2-3 inches)

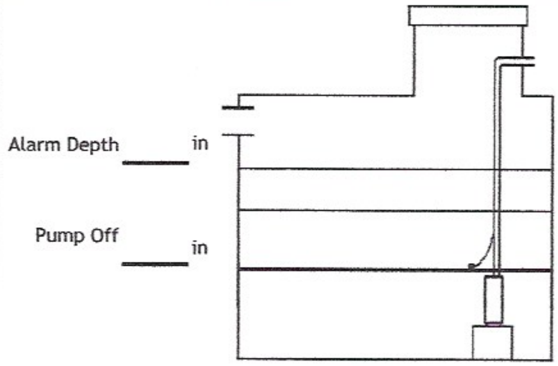
21 in + 2 in = 23 Inches

FLOAT SETTINGS

DEMAND DOSING



TIMED DOSING



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

Greg Westerlund (Designer) — Greg Westerlund (Signature) — 063 (License #) — 10/4/21 (Date)

Minnesota Pollution Control Agency

OSTP Pump Tank Sizing, Dosing and Float and Timer Setting Design Worksheet

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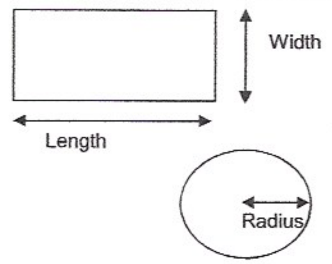
DETERMINE AREA AND/OR GALLONS PER INCH

1. A. Rectangle area = Length (L) X Width (W)

   [11.5] ft X [5.08] ft = [58.42] ft^2



   B. Circle area = $3.14r^2$ (3.14 X radius X radius)

   3.14 X [ ]^2 ft = [ ] ft^2

   C. Get area from manufacturer [ ] ft^2

   D. Get gallons per inch from manfufacture [ ] Gallons per inch

2. Calculate *Gallons Per Inch*:

   There are 7.48 gallons per cubic foot. Therefore, multiply the area from 1.A, 1.B, or 1.C by 7.48 to determine the gallons per foot the tank holds. Then divide that number by 12 to calculate the gallons per inch.

   (Area X 7.48 gallons/ft^3)/(12 in/ft) =

   [58.42] ft^2 X 7.48 gal/ft^3 ÷ 12 in/ft = [36.42] Gallons per inch

TANK CAPACITY

3. Enter the *Pump Tank Capacity (minimum* provided in the table below): [500] Gallons

4. Calculate *Total Tank Volume*

   A. *Depth from bottom of inlet pipe to tank bottom*: [30] in

   B. *Total Tank Volume = Depth from bottom of inlet pipe* (Line 4.A) X *Gallons/Inch* (Line 2)

   [~~500~~ 30] in X [36.42] Gallons Per Inch = [1092.6] Gallons

5. 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* (1D or 2)

   ([14] in + 2 inches) X [16] Gallons Per Inch = [582.72] Gallons

Design Flow (Gallons Per Day)	Minimum Pump Tank Capacity (Gallons)	
0-600	500	or Altnernating Dual Pumps
601-4,999	100% of the Design Flow	or Altnernating Dual Pumps
5,000-9,999	50% of the Design Flow	and Altnernating Dual Pumps

OSTP Pump Tank Sizing, Dosing and Float and Timer Setting Design Worksheet

Minnesota Pollution Control Agency

University of Minnesota

DOSING VOLUME

7. *Minimum Pumpout Volume* - 5 X Volume of Distribution Piping: [37.95] Gallons
   - *Line 17 of the Pressure Distribution or Line 11 of Non-level*

8. Calculate *Maximum Pumpout Volume* (25% of Design Flow)
   Design Flow: [300] GPD X 0.25 = [75] Gallons

9. *Select a pumpout volume that meets both items above (Line 7 & 8):* [75] Gallons

10. Calculate *Doses Per Day* = Design Flow ÷ *Dosing Volume*
    [300] gpd ÷ [4] gal = [75] *Doses*

11. Calculate Drainback:
    A. *Diameter of Supply Pipe* = [2] inches
    B. Length of Supply Pipe = [180] feet
    C. *Volume of Liquid Per Lineal Foot of Pipe* = [.17] Gallons/ft
    D. *Drainback* = *Length of Supply Pipe* X *Volume of Liquid Per Lineal Foot of Pipe*
    [180] ft X [.17] gal/ft = [30.6] Gallons

12. *Total Dosing Volume* = *Dosing Volume* (Line 9) plus *Drainback* (Line 11.D)
    [75] gal + [30.6] gal = [105.6] Gallons

13. Minimum Alarm Volume = Depth of alarm (2 or 3 inches) X gallons per inch of tank (Line 1 or 2)
    [2] in X [36.42] gal/in = [72.84] 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

TIMER or DEMAND FLOAT SETTINGS

Select Timer or Demand Dosing: ○ Timer ● Demand Dose

A. Timer Settings

14. Required *Flow Rate*:
    A. From Design (Line 11 of Pressure Distribution or Line 10 of Non-Level*): [ ] GPM
    B. Or calculated: GPM = Change in Depth (in) x Gallons Per Inch (Line 1 or 2) / Time Interval in Minutes
    [ ] in X [ ] gal/in ÷ [ ] min = [ ] GPM

**Note: This value must be adjusted after field measurement & calculation.*

15. Choose a Flow Rate from Line 14.A or 14.B above. [ ] **GPM**

16. Calculate **TIMER ON** setting:
    Total Dosing Volume (Line 12)/GPM(Line 15)
    [ ] gal ÷ [ ] gpm = [ ] Minutes ON

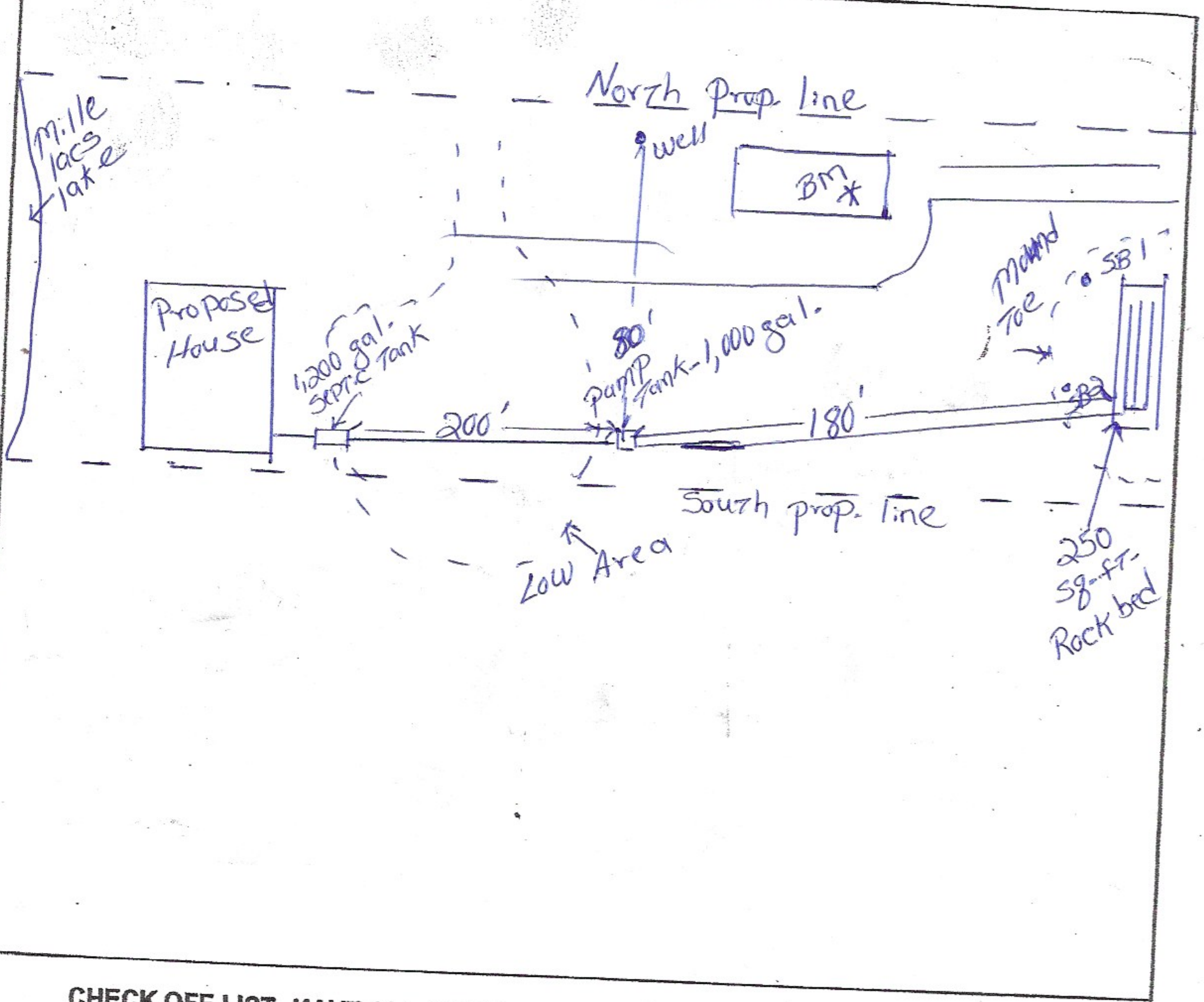
17. Calculate **TIMER OFF** setting:
    Minutes Per Day (1440)/*Doses Per Day (Line 10)* - Minutes On (Line 16)
    1440 min ÷ [ ] doses/day - [ ] min = [ ] Minutes OFF

17. Pump Off Float - Measuring from bottom of tank:
    Distance to set Pump Off Float=Gallons to Cover Pump (Line 5) / Gallons Per Inch (Line 1 or 2):
    [ ] gal ÷ [ ] gal/in = [ ] Inches

18. Alarm Float - Measuring from bottom of tank:
    Distance to set Alarm Float = Tank Depth(4A) - Alarm Depth (Line 13)
    [ ] in - [ ] in = [ ] in

CLIENT: Bruce Maples 16-0-025209 DATE: 10/4/21

MAP DRAWN TO SCALE [redacted] WITH A NORTH ARROW



CHECK OFF LIST--HAVE ALL OF THE FOLLOWING BEEN DRAWN ON THE MAP??

SHOW EXISTING OR PROPOSED

- ☐ WATER WELLS WITHIN 100 FT OF TREATMENT AREAS
- ☐ PRESSURE WATER LINES WITHIN 10 FT OF TREATMENT AREAS
- ☐ STRUCTURES
- ☐ LOT IMPROVEMENTS
- ☐ ALL SOIL TREATMENT AREAS
- ☐ ALL ISTS COMPONENTS
- ☐ HORIZONTAL AND VERTICALREFERENCE
- ☐ POINT OF SOIL BORINGS
- ☐ DIRECTION OF SLOPE
- ☐ LOT EASEMENTS
- ☐ ALL LOT DIMENSIONS
- ☐ DISTURBED/ COMPACTED AREAS
- ☐ SITE PROTECTION--LATHE AND RIBBON EVERY 15 FT
- ☐ ACCESS ROUTE FOR TANK MAINTENANCE

REQUIRED SETBACKS

- ☐ STRUCTURES
- ☐ OHWL
- ☐ PROPERTY LINES

COMMENTS:

DESIGNER SIGNATURE Greg Westerlund

LICENSE# 663

INDICATE ELEVATIONS

BENCHMARK 100 - floor, Existing Building

ELEVATION OF SEWER LINE @ HOUSE 99

ELEVATION @ TANK INLET 98.5

ELEVATION @ BOTTOM OF ROCK LAYER 104

ELEVATION @ BOTTOM OF BORING OR RESTRICTIVE LAYER 101

ELEVATION OF PUMP 84

ELEVATION OF DISTRIBUTION DEVICE 105

DATE 10/4/21

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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 Bruce & Linda Maples

Property Address 19825 327th Ave, Isle   Property ID 16-0-025209

System Designer Greg Westerlund   License # 663

System Installer Westerlund Const.   License # 663

Service Provider/Maintainer   Phone

Permitting Authority   Phone

Permit #   Date Inspected

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

- Attach permit information, designer drawings and as-builts 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*, call 1-800-876-8636 or go to http://shop.extension.umn.edu/

http://septic.umn.edu

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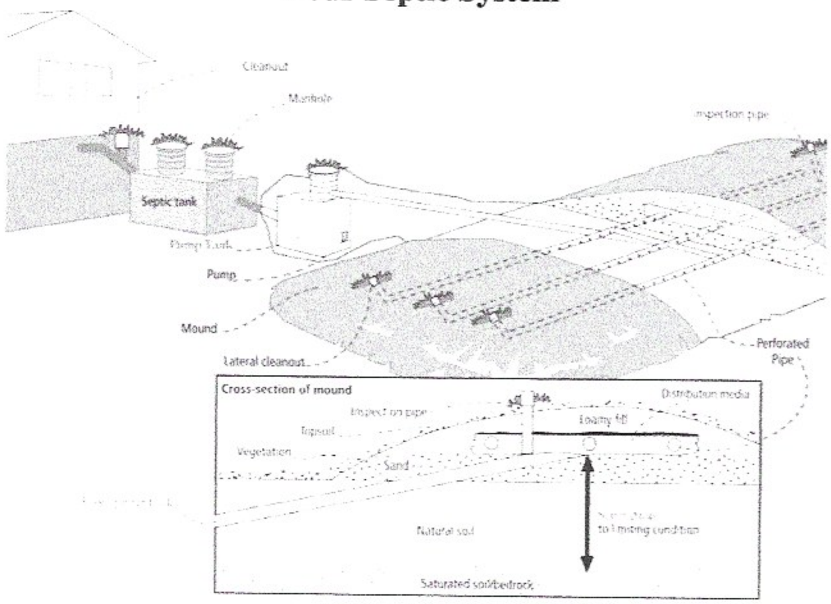
Septic System Management Plan
for Above Grade Systems

Your Septic System



Septic System Specifics	
System Type: (I) II III IV* V* *(Based on MN Rules Chapter 7080.2200 – 2400)*	❑ System is subject to operating permit* ❑ System uses UV disinfection unit* Type of advanced treatment unit ____________ **Additional Management Plan required*

Dwelling Type	Well Construction
Number of bedrooms: 2	Well depth (ft): ____________
System capacity/ design flow (gpd): 300	■ Cased well Casing depth: ____________
Anticipated average daily flow (gpd): <300	❑ Other (specify): ____________
Comments____________	Distance from septic (ft): 80'+
In-home business? N What type? ____________	Is the well on the design drawing? (Y) N

Septic Tank	
❑ One tank *Tank volume:* 1200 *gallons*	❑ Pump Tank (*if one*) 1,000 gallons
Does tank have two compartments? Y (N)	❑ Effluent Pump *type*: Zoeller
❑ Two tanks *Tank volume:* ________ *gallons*	TDH 18 Feet of head
❑ Tank is constructed of Pre Cast	Pump capacity 28 GPM
❑ Effluent Screen *type*: N	❑ Alarm ✓ visual ✓ audible

Soil Treatment Area	
Mound/At-Grade area (length x width): 40 ft x 57 ft	❑ Cleanouts or Inspection Ports
Rock bed size (length x width): 10 ft x 25 ft	❑ Surface Water Diversions

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Septic System Management Plan for Above Grade Systems

Homeowner Management Tasks

These operation and maintenance activities are your responsibility. Use the chart on page 6 to track your activities.

Identify the service intervals recommended by your system designer and your local government. The tank assessment for your system will be the shortest interval of these three intervals. Your pumper/maintainer will determine if your tank needs to be pumped.

System Designer:	check every 36 months	My tank needs to be checked every _____ months
Local Government:	check every _______ months	
State Requirement:	check every 36 months	

Seasonally or several times per year

- ❑ *Leaks.* Check (listen, look) for leaks in toilets and dripping faucets. Repair leaks promptly.
- ❑ *Surfacing sewage.* 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, call your service professional. *Untreated sewage may make humans and animals sick.*
- ❑ *Alarms.* Alarms signal when there is a problem; contact your maintainer any time the alarm signals.
- ❑ *Lint filter.* If you have a lint filter, check for lint buildup and clean when necessary. Consider adding one after washing machine.
- ❑ *Effluent screen.* If you do not have one, consider having one added the next time the tank is cleaned.

Annually

- ❑ *Water usage rate.* A water meter 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.
- ❑ *Review your water usage rate.* Review the Water Use Appliance chart on Page 5. Discuss any major changes with your pumper/maintainer.

During each visit by a pumper/maintainer

- ❑ Ask if your pumper/maintainer is licensed in Minnesota.
- ❑ Make sure that your pumper/maintainer services the tank through the manhole. (NOT though a 4" or 6" diameter inspection port.)
- ❑ Ask your pumper/maintainer to accomplish the tasks listed on the Professional Tasks on Page 4.

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Septic System Management Plan
for Above Grade Systems

Professional Management Tasks

These are the operation and maintenance activities that a pumper/maintainer performs to help ensure long-term performance of your system. Professionals should refer to the O/M Manual for detailed checklists for tanks, pumps, alarms and other components. Call 800-322-8642 for more details.

- ❑ Written record provided to homeowner after each visit.

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 drainfield.)
- ❑ *Inspection pipes.* Replace damaged 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 operating properly.
- ❑ *Event counter or run time.* Check to see if there is an event counter or run time log for the pump. If there is one, calculate the water usage rate and compare to the anticipated average daily flow listed on Page 2.

Soil Treatment Area

- ❑ *Inspection pipes.* Check to make sure they are properly capped. Replace caps that are damaged.
- ❑ *Surfacing of effluent.* Check for surfaced effluent or other signs of problems.
- ❑ *Lateral flushing.* Check lateral distribution; if cleanouts exist, flush and clean as needed.
- ❑ *Ponding.* Check for ponding. Excessive ponding in at-grade and mound beds indicates problems.

All other components – inspect as listed here:

____

____

____

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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 a liquid or easily biodegradable detergents. • Install a ling filter after the washer and an effluent screen on your tank. • Wash only full loads. • Limit use of bleach-based detergents. • Think even – spread your laundry loads throughout the week.
2nd floor laundry	• The rapid speed of water entering the tank may reduce performance.	• Install an effluent screen in the septic tank to prevent the release of excessive solids to the soil treatment area. • Be sure that you have adequate tank capacity.
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 into a sump pump or directly out of the house. Do not route furnace recharge 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, draintile 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 likely overload the system.	

09/09

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Septic System Management Plan
for Above Grade Systems

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										
Check annually:										
Water usage rate (monitor frequency____)										
Caps: inspect, replace if needed										
Water use appliances – review use										
Other:										

Notes: ______________________________

Mitigation/corrective action plan: ______________________________

"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: Greg Westerlund Certification # 824

Permitting Authority: ______________