



1. Contact Information Project ID: _____ v 03.19.15

Property Owner/Client Tyler Kangas Client Phone Number: _____

Address 26968 295th ST, Aitkin MN 56431

Date 8/6/2021 Weather Conditions _____ Over cast

2. Utility and Structure Information

Utility Locations Identified Gopher State One Call # _____ Any Private Utilities _____

Property Lines Determined and Approved by Client _____ Client's Approval (initial) _____
 Determined but not Approved _____
 Approximate _____
 Property Lines Surveyed _____

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

3. Site Information

Percent Slope 1% Slope Direction South

Landscape Position slope Slope Shape concave

Vegetation type(s) _____ Lawn Grasses _____

Evidence of cut, fill, compacted or disturbed areas Yes No

Discuss the flooding or run-on potential of site Water to be diverted around pressure bed area

Identify benchmarks and elevations (Site Evaluation Map) BM = 100, Floor of existing building

Proposed soil treatment area adequately protected Yes No

4. General Soils Information

Original soils Yes No

Type of observation Soil Probe Soil Boring Soil Pit

Number of soil observations 2

Soil observations were conducted in the proposed system location Yes No

A soil observation was made within the most limiting area of the proposed system 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	<u>NA</u>	inches
Flood elevation	<u>NA</u>	feet
Depth to bedrock	<u>Clay loam at 6'</u>	inches
Depth to periodically saturated soil	<u>NA</u>	inches
Maximum depth of system	<u>1'</u>	inches
Elevation at system bottom	<u>98</u>	feet
Percolation rate		min/inch
Loading rate	<u>0.79</u>	gpd/ft ²
Contour loading rate	<u>12</u>	gpd/ft

Anticipated construction issues _____

Differences between soil survey and field evaluation
Soil Survey states - 454 Mahtomedi course sand.
Soils on site are a medium - fine sand

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) 063 (License #) 8/2/21 (Date)

OSTP Soil Observation Log

Project ID:

v 03.19.15



Client/ Address: Tyler Kangas Legal Description/ GPS: 208.7' x 208.7' sw corner of sw nw DOC 297509

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

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

Vegetation: Lawn Grasses Soil survey map units: 454 Mahtomedi Slope%: 1.0 Elevation:

Weather Conditions/Time of Day: Overcast Date: 08/06/21

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	Observation Type:		
							Shape	Structure	Consistence
6	Fine Sandy Loam	<35%	10YR 3/1				Single grain	Moderate	Friable
32	Sandy Loam	<35%	10YR 4/6				Single grain	Weak	Loose
40	Fine Sandy Loam	<35%	10YR 4/8				Single grain	Moderate	Firm
60	Coarse Sand	<35%	7.5YR 4/4				Granular	Weak	Loose

Comments

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

Designer/Inspector: Greg Westerland Signature: Greg Westerland License #: 663 Date: 8/2/21

OSTP Soil Observation Log

Project ID:

v 03.19.15



Client/ Address:

Tyler Kangas

Legal Description/ GPS:

208.7' x 208.7' sw corner of sw nw DOC 297509

Soil parent material(s): (Check all that apply)

- Summit Shoulder Back/Side Slope Foot Slope Toe Slope Slope shape
 Outwash Lacustrine Loess Till Alluvium Bedrock Organic Matter

Landscape Position: (check one)

- Summit Shoulder Back/Side Slope Foot Slope Toe Slope Slope shape

Vegetation

Lawn Grasses

Soil survey map units 454 Mahtomedi

Slope%

1.0

Elevation:

Weather Conditions/Time of Day:

Overcast

Date

08/06/21

Observation #/Location:

Soil Boring #2 - West end of disposal field

Observation Type:

Auger

Depth (in)	Texture	Rock Frag. %	Matrix Color(s)	Mottle Color(s)	Redox Kind(s)	Indicator(s)	Structure	
							Shape	Grade
6	Fine Sandy Loam	<35%	10YR 3/1			Single grain	Moderate	Friable
33	Sandy Loam	<35%	10YR 4/6			Single grain	Weak	Loose
38	Fine Sandy Loam	<35%	10YR 4/8			Single grain	Moderate	Firm
60	Coarse Sand	<35%	7.5YR 4/4			Granular	Weak	Loose

Comments

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Greg Websterlund
(Designer/Inspector)

Greg Websterlund
(Signature)

6603
(License #)

8/2/21
(Date)



Minnesota Pollution Control Agency

OSTP Trench & Bed Design Worksheet

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1. SYSTEM SIZING:

A. Design Flow: GPD

B. Maximum Depth: inches

C. Soil Loading Rate: GPD/ft²

C(i). Recommended CLR: gal/ft

D. Required Bottom Area: Design Flow (1.A) ÷ Loading Rate (1.C) = Initial Required Bottom Area
 GPD ÷ GPD/ft² = ft²

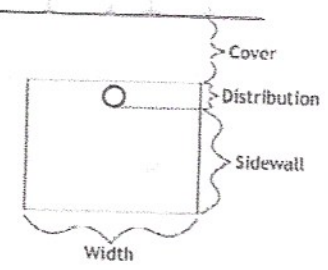
E. Select Dispersal Media: Rock
 Other Approved Media (Describe):

F. Select Distribution Method: Pressure (required for rapidly permeable soils)
 Gravity-Drop Box
 Gravity-Other (Describe):

G. Select Dispersal Type: Trench - Rock or equivalent (section 2 below)
 Trench - Registered Products (section 3 below)
 Bed (section 4 below)

2. TRENCH CONFIGURATION: (Rock or equivalent media)

A. Initial required trench bottom area (ft ²): (from 1.D)	Sidewall Absorption (inches)	Bottom Area Reduction	Bottom Area Multiplier	Design trench bottom area
	6 to 11	0%	1	
	12 to 17	20%	0.8	
	18 to 23	34%	0.66	
	24	40%	0.6	



B. Select Sidewall Height: inches = ft

C. Design Bottom Area (2.A): ft²

D. Select Trench Width: inches = ft

E. Total Designed Trench Length: Bottom Area (2.C) ÷ Trench Width (2.D) = Total Required Trench Length
 ft² ÷ ft = ft

F. Select Trench Spacing: ft (typically 5 - 12 ft from center to center)

G. Calculate Lawn Area: Trench Length (2.E) X Trench Spacing (2.F) = ft² lawn area
 ft X ft = ft² lawn area

H. Calculate Minimum length based on Contour Loading Rate: Design Flow(1A) ÷ CLR (1Ci) =
 gpd ÷ gal/ft = ft

I. If using rock or similar substitute media, select Depth Required to Cover Distribution Pipe:
 ft (0.33 for pressure, 0.5 for gravity)

J. Calculate Media Volume: (Sidewall Height (2.B) + Depth to Cover Pipe (2.H)) X Bottom Area (2.C) = cubic ft.
 (ft + ft) X ft² = ft³
 Divide ft³ by 27 ft³/yd³ to calculate cubic yards:
 ft³ ÷ 27 = yd³

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3. TRENCH CONFIGURATION: (Registered Products)

A. Registered Product: (from MPCA list)

B. Product Absorption Area: ft² / linear ft
(from MPCA Registered Product List)

C. Req'd Bottom Area (1.D): ft²

D. Total Required Trench Length: Bottom Area (4.C) ÷ Sizing Value (4.B) = Total Required Trench Length
 ft² ÷ ft² / lin. ft = ft

E. Select Trench Spacing : ft (typically 5 - 12 ft from center to center)

F. Calculate Lawn Area: Trench Length (3.D) X Trench Spacing (3.E) = ft² lawn area
 ft X ft = ft² lawn area

4. BED CONFIGURATION: (for sites with less than 6% slope)

A. Select size Multiplier : 1.0 = pressurized
1.5 = gravity (not allowed in rapidly permeable soils)

B. Req'd Bottom Area (1.D): ft²
Designed Bottom Area : ft²

C. Select Bed Width : ft Maximum width = 25 ft. (pressurized)
Maximum width = 12 ft. (gravity)

D. Calculate Bed Length: Designed Bottom Area (4.B) ÷ Bed Width (4.C) = Bed Length
 ft² ÷ ft = ft

E. Select Sidewall Absorption : inches below the pipe = ft

F. Calculate Media Volume : (Media Depth (4.E) + depth to cover pipe) X Designed Bottom Area (4.B) = ft³
(ft + ft) X ft² = ft³

Calculate Volume in cubic yards : Media volume in cubic feet (4.F) ÷ 27 = cubic yards
 ft³ ÷ 27 = yd³

5. ORGANIC LOADING: (Optional)

A. Organic Loading = Design Flow X Estimated BOD in mg/L in the effluent X 8.35 ÷ 1,000,000 (See Table III)
 gpd X mg/L X 8.35 ÷ 1,000,000 = lbs BOD/day

B. Calculate System Organic Loading: lbs. BOD/day (5.A) ÷ Bottom Area (2.C) , (3.C) or (4.A) = lbs/day/ft²
 lbs/day ÷ ft² = lbs/day/ft²

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Greg Westerland (Designer) Greg Westerland (Signature) 663 (License #) 8/2/21 (Date)

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Minnesota Pollution Control Agency

OSTP Pressure Distribution Design Worksheet

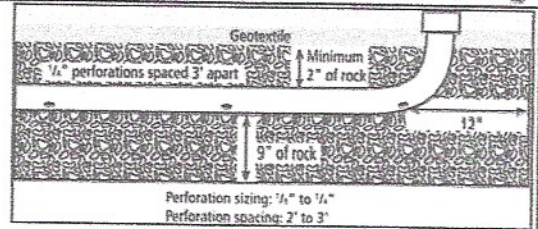
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1. Select Number of Perforated Laterals in system/zone:
(2 feet is minimum and 3 feet is maximum spacing)

2. Select Perforation Spacing: ft

3. Select Perforation Diameter Size 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 than 1 foot from edge)

$$\boxed{51} \text{ ft} - \boxed{2} \text{ ft} = \boxed{49} \text{ ft}$$

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.

$$\text{Number of Perforation Spaces} = \boxed{49} \text{ ft} \div \boxed{3} \text{ ft} = \boxed{16} \text{ Spaces}$$

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

$$\text{Perforations Per Lateral} = \boxed{16} \text{ Spaces} + 1 = \boxed{17} \text{ Perfs. Per Lateral}$$

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

$$\boxed{17} \text{ Perf. Per Lateral} \times \boxed{5} \text{ Number of Perf. Laterals} = \boxed{85} \text{ Total Number of Perf.}$$

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)

$$\boxed{51} \text{ ft} \times \boxed{15} \text{ ft} = \boxed{765} \text{ ft}^2$$

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

$$\boxed{765} \text{ ft}^2 \div \boxed{85} \text{ perforations} = \boxed{9} \text{ ft}^2/\text{perforations}$$

9. Select Minimum Average Head: ft

10. Select Perforation Discharge (GPM) based on Table III: GPM per Perforation

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.

11. Determine required Flow Rate by multiplying the Total Number of Perforations (Line 7) by the Perforation Discharge (Line 10).

$$\boxed{85} \text{ Perforations} \times \boxed{0.74} \text{ GPM per Perforation} = \boxed{62.9} \text{ GPM}$$

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	1 1/4	1 1/2	2	3		1	1 1/4	1 1/2	2	3
2	10	13	18	30	50	2	11	16	21	34	68
2 1/2	8	12	16	28	54	2 1/2	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	1 1/4	1 1/2	2	3		1	1 1/4	1 1/2	2	3
2	12	18	26	46	87	2	21	33	44	74	149
2 1/2	12	17	24	40	80	2 1/2	20	30	41	69	135
3	12	15	22	37	75	3	20	29	38	64	128

14. Select Lateral Diameter based on Table I: 1 1/2 in

15. Volume of Liquid Per Foot of Distribution Piping: 0.11 Gallons/ft

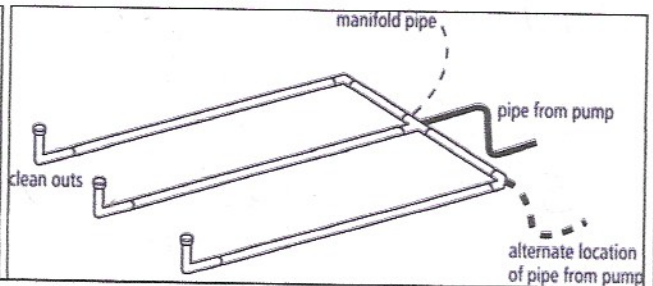
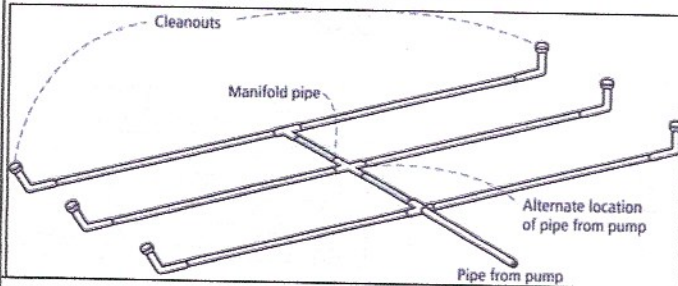
16. Volume of Distribution Piping =
= [Number of Perforated Laterals (Line 1) X Length of Laterals (Line 4) X
(Volume of Liquid Per Foot of Distribution Piping (Line 15))]

5 x 49 ft x 0.11 gal/ft = 26.95 Gallons

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

26.95 gals x 5 = 134.75 Gallons

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



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Greg Westerland (Designer) Greg Westerland (Signature) 663 (License #) 8/2/21 (Date)

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Minnesota Pollution Control Agency

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

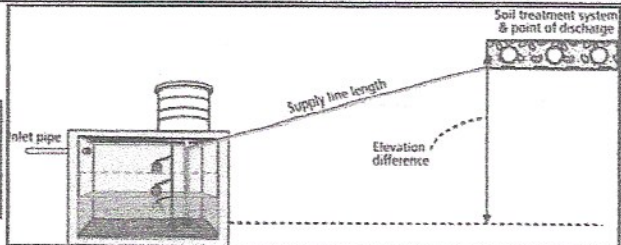
4. If pumping to a pressurized distribution system: GPM

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

2. HEAD REQUIREMENTS

3. Elevation Difference 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: 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

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	16.89	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

6. A. Supply Pipe Diameter: in

B. Supply Pipe Length: ft

7. Based on Friction Loss in Plastic Pipe per 100ft from Table 1:

Friction Loss = ft per 100ft of pipe

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

ft X 1.25 = 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 = ft per 100ft X ft ÷ 100 = ft



OSTP Pump Selection Design Worksheet



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		=	

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

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

$$(10.5 \div \text{Pipe Diameter}^{4.87}) \times (\text{Flow Rate} \div \text{Constant})^{1.85} \times \text{Total Pipe Length (10.B)}$$

$$(10.5 \div \text{in}^{4.87}) \times (\text{gpm} \div 130)^{1.85} \times \text{ft} = \text{ft}$$

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

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.

5 ft + 5 ft + 8 ft + ft = 18 ft

3. PUMP SELECTION

A pump must be selected to deliver at least 63 GPM (Line 1 or Line 2) with at least 18 feet of total head.

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Greg Westerland (Designer) Greg Westerland (Signature) 663 (License #) 8/2/21 (Date)

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Minnesota Pollution Control Agency

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

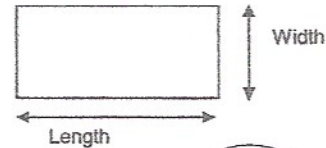
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DETERMINE AREA AND/OR GALLONS PER INCH

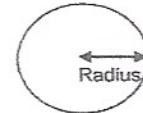
1. A. Rectangle area = Length (L) X Width (W)

$$4.17 \text{ ft} \times 6.25 \text{ ft} = 26.06 \text{ ft}^2$$



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

$$3.14 \times \boxed{}^2 \text{ ft} = \boxed{} \text{ ft}^2$$



- C. Get area from manufacturer

ft²

- D. Get gallons per inch from manufacture

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.

$$(\text{Area} \times 7.48 \text{ gallons/ft}^3) / (12 \text{ in/ft}) =$$

$$26.06 \text{ ft}^2 \times 7.48 \text{ gal/ft}^3 \div 12 \text{ in/ft} = 16.25 \text{ Gallons per inch}$$

TANK CAPACITY

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

4. Calculate Total Tank Volume

- A. Depth from bottom of inlet pipe to tank bottom: in

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

$$16.25 \text{ in} \times 40 \text{ Gallons Per Inch} = 650 \text{ Gallons}$$

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)

$$(\text{Pump and block height} + 2 \text{ inches}) \times \text{Gallons Per Inch (1D or 2)}$$

$$(\boxed{16} \text{ in} + 2 \text{ inches}) \times 16.25 \text{ Gallons Per Inch} = 260 \text{ Gallons}$$

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

SECTION 13: Forms and Reference ■ 13-33



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

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DOSING VOLUME

7. Minimum Pumpout Volume - 5 X Volume of Distribution Piping:
- Line 17 of the Pressure Distribution or Line 11 of Non-level **134.75** Gallons

8. Calculate Maximum Pumpout Volume (25% of Design Flow)
Design Flow: **600** GPD X 0.25 = **150** Gallons

9. Select a pumpout volume that meets both items above (Line 7 & 8): **150** Gallons

10. Calculate Doses Per Day = Design Flow ÷ Dosing Volume
600 gpd ÷ **150** gal = **4** Doses

11. Calculate Drainback:

A. Diameter of Supply Pipe = **2** inches

B. Length of Supply Pipe = **60** feet

C. Volume of Liquid Per Lineal Foot of Pipe = **0.17** Gallons/ft

D. Drainback = Length of Supply Pipe X Volume of Liquid Per Lineal Foot of Pipe
60 ft X **0.17** gal/ft = **10.2** Gallons

12. Total Dosing Volume = Dosing Volume (Line 9) plus Drainback (Line 11.D)
150 gal + **10** gal = **160** 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 **16.25** gal/in = **32.5** 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

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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)

$$160 \text{ gal} \div 16.25 \text{ gal/in} = 10 \text{ Inches}$$

19. Measuring from bottom of tank:

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

$$18 \text{ in} + 2 \text{ in} = 20 \text{ inches}$$

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

$$20 \text{ in} + 10 \text{ in} = 30 \text{ inches}$$

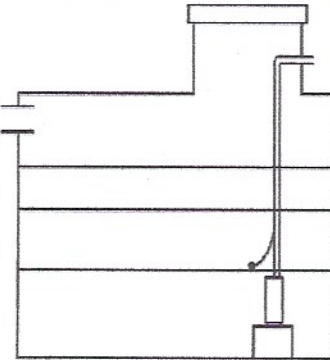
C. Distance to set Alarm Float = Distance to set Pump-On Float (19.B) + Alarm Depth (2-3 inches)

$$30 \text{ in} + 2 \text{ in} = 32 \text{ inches}$$

FLOAT SETTINGS

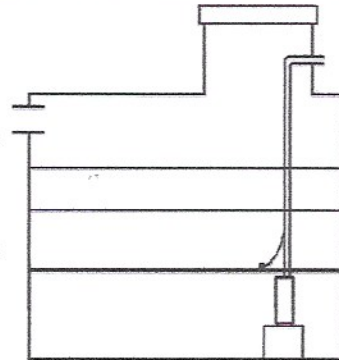
DEMAND DOSING

Alarm Depth 32 in
 Pump On 30 in
 Pump Off 20 in



TIMED DOSING

Alarm Depth _____ in
 Pump Off _____ in



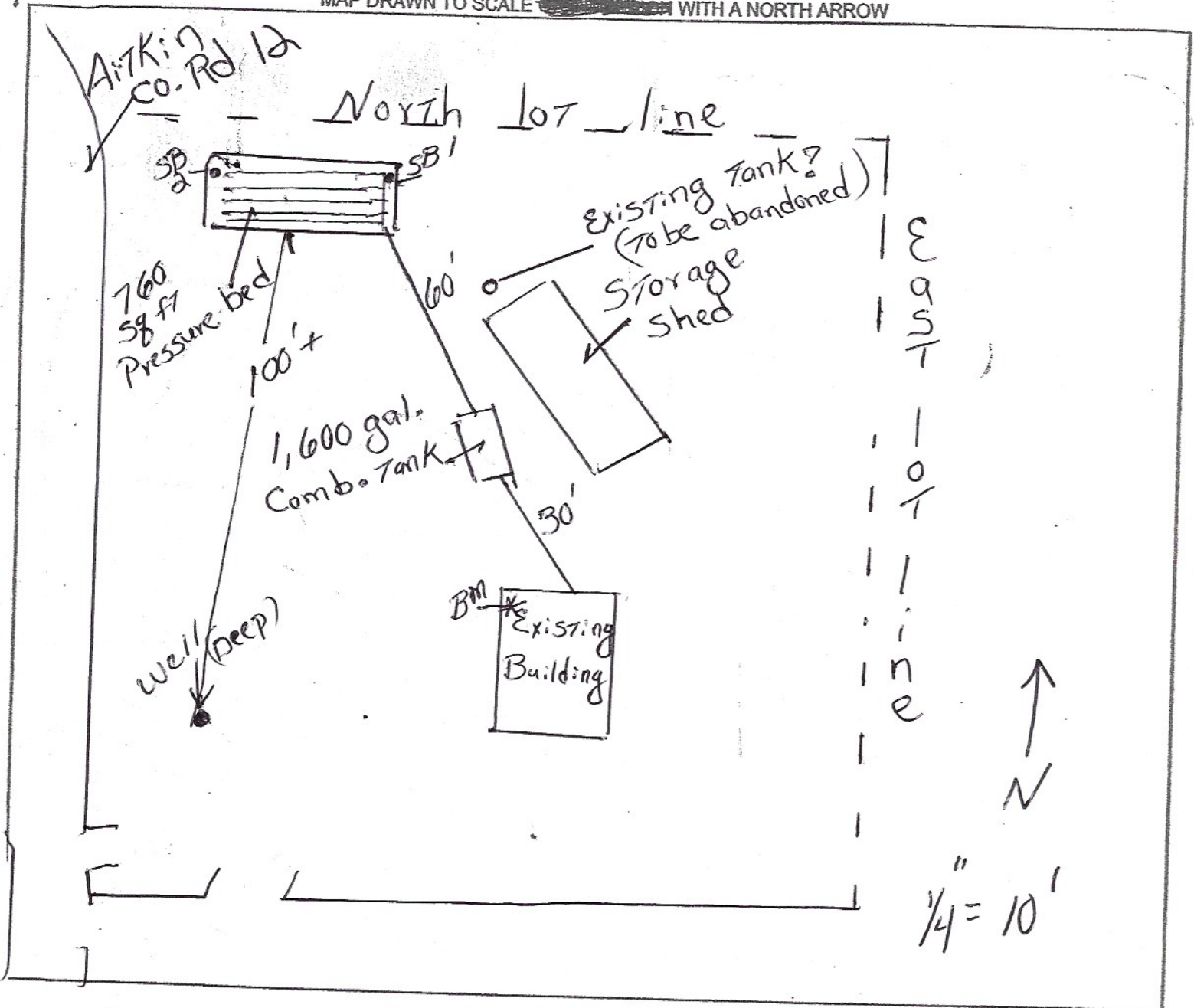
I hereby certify that I have completed this work in accordance with all applicable ordinances, rules and laws.

Greg Westerland (Designer) Greg Westerland (Signature) 663 (License #) 8/2/21 (Date)

CLIENT: Tyler Kangas

DATE: _____

MAP DRAWN TO SCALE _____ WITH A NORTH ARROW



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

- HOW EXISTING OR PROPOSED
- WATER WELLS WITHIN 100 FT OF TREATMENT AREAS
- PRESSURE WATER LINES WITHIN 10 FT OF TREATMENT AREAS
- STRUCTURES
- ALL SOIL TREATMENT AREAS
- HORIZONTAL AND VERTICAL REFERENCE
- POINT OF SOIL BORINGS
- LOT EASEMENTS
- DISTURBED/COMPACTED AREAS
- SITE PROTECTION-LATHE AND RIBBON EVERY 15 FT
- ACCESS ROUTE FOR TANK MAINTENANCE
- REQUIRED SETBACKS
- STRUCTURES
- OHWL
- COMMENTS:
- PROPERTY LINES

INDICATE ELEVATIONS

- BENCHMARK 100
- ELEVATION OF SEWER LINE @ HOUSE 99
- ELEVATION @ TANK INLET 98.5
- ELEVATION @ BOTTOM OF ROCK LAYER 98
- ELEVATION @ BOTTOM OF BORING OR RESTRICTIVE LAYER 93
- ELEVATION OF PUMP 94
- ELEVATION OF DISTRIBUTION DEVICE 99

DESIGNER SIGNATURE Greg Westlund

LICENSE# 663

DATE 8/2/21

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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	Tyler Kangas	
Property Address	26968 295 th ST, Aitkin	Property ID 24-0-051400
System Designer	Greg Westervlund	License # 663
System Installer	Greg Westervlund	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>

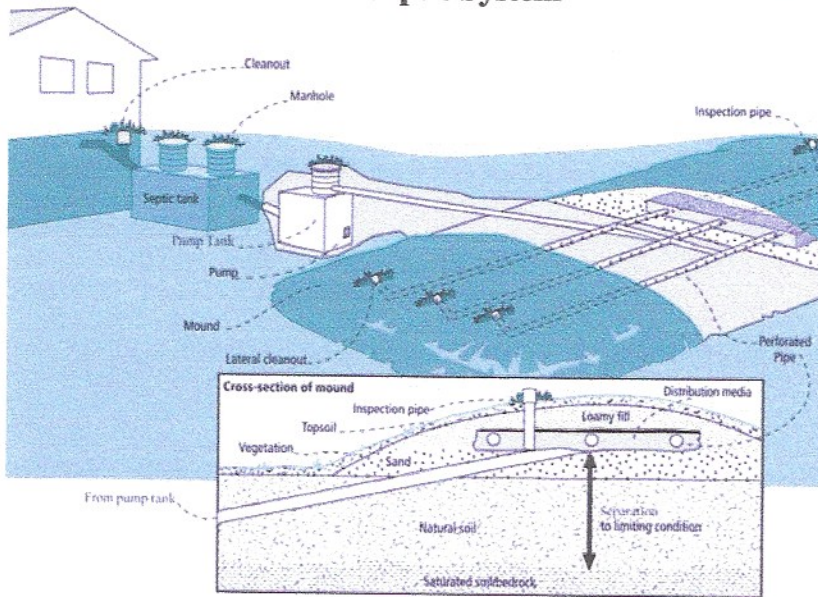
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Septic System Management Plan
for Above Grade Systems



Your Septic System



Septic System Specifics	
System Type: <u>I</u> II III IV* V* <i>(Based on MN Rules Chapter 7080.2200 – 2400)</i>	<input type="checkbox"/> System is subject to operating permit* <input type="checkbox"/> System uses UV disinfection unit* Type of advanced treatment unit _____ *Additional Management Plan required

Dwelling Type	Well Construction
Number of bedrooms: <u>4</u>	Well depth (ft): <u>Deep</u>
System capacity/ design flow (gpd): <u>6000</u>	<input checked="" type="checkbox"/> Cased well Casing depth: _____
Anticipated average daily flow (gpd): <u><6000</u>	<input type="checkbox"/> Other (specify): _____
Comments _____	Distance from septic (ft): <u>100' +</u>
In-home business? <u>N</u> What type? _____	Is the well on the design drawing? Y N

Septic Tank	
<input type="checkbox"/> One tank Tank volume: <u>1,000</u> gallons	<input type="checkbox"/> Pump Tank (if one) <u>600</u> gallons
Does tank have two compartments? <u>Y</u> N	<input type="checkbox"/> Effluent Pump type: <u>Zoriller</u>
<input type="checkbox"/> Two tanks Tank volume: _____ gallons	TDH <u>18</u> Feet of head
<input type="checkbox"/> Tank is constructed of <u>Precast</u>	Pump capacity <u>60</u> GPM
<input type="checkbox"/> Effluent Screen type: <u>N</u>	<input type="checkbox"/> Alarm <input checked="" type="checkbox"/> visual <input checked="" type="checkbox"/> audible

Soil Treatment Area	
Mound/At-Grade area (length x width): _____ ft x _____ ft	<input type="checkbox"/> Cleanouts or Inspection Ports
Rock bed size (length x width): <u>15</u> ft x <u>51</u> ft	<input type="checkbox"/> 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
Local Government: check every _____ months
State Requirement: check every 36 months

My tank needs to be checked
every _____ 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 through 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:



**Water-Use Appliances and
Equipment in the Home**

Appliance	Impacts on System	Management Tips
Garbage disposal	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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 lint 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.
2 nd floor laundry	<ul style="list-style-type: none"> • The rapid speed of water entering the tank may reduce performance. 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • Finely-ground solids may not settle. Unsettled solids can exit the tank and enter the soil treatment area. 	<ul style="list-style-type: none"> • 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)	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Drip may result in frozen pipes during cold weather. 	<ul style="list-style-type: none"> • 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	<ul style="list-style-type: none"> • Salt in recharge water may affect system performance. • Recharge water may hydraulically overload the system. 	<ul style="list-style-type: none"> • 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.
Surface drainage Footing drains	<ul style="list-style-type: none"> • Water from these sources will likely overload the system. 	<ul style="list-style-type: none"> • 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

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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: If Pressure bed should fail, AN Alternate site will be Available

"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 Westerland Certification # 824

Permitting Authority: _____

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