PARCEL	
APP	SEPTIC
YEAR	
SCANNED	
LAKE	

RECEIVED
SEP 05 2012
ZONING

Or

060192000

915 Lake Ave,
Phone (218)-846-7314; Fax (218)-846-7266

1. **PROPERTY DATA (as it appears on the tax statement, purchase agreement or deed)**
Parcel Number(s) of property where the system will be installed: 06601920000

Is this a split of an existing property? Yes (No)
(If yes and a parcel number has not yet been assigned, indicate the main parcel number from which the new parcel was split.)

Section 15 Township 138 Range 43 Township Name Cormorant

Lake Name Nelson Lake Classification RD

Legal Description: Pt Govt Lot 2

Project Address: 14493 Nelson Lake Rd Lake Park

2. **PROPERTY OWNER INFORMATION (as it appears on the tax statement, purchase agreement or deed)**
Owner's First Name Mark Owner's Last Name Boushee

Mailing Address P.O 104 City, State, Zip Lake Park, mn 56554

Phone Number 218-779-7359

3. **DESIGNER/INSTALLER INFORMATION**
Designer Name Randy Anderson Company Name Anderson on-site License # 634

Address P.O 1421 Detroit Lakes Phone Number 849 3072

Installer Name TODD Boit Company Name _____ License # _____

Address _____ Phone Number _____

4. **SYSTEM DESIGN INFORMATION**

System Status

- X Vacant Lot-No existing system-new structure
- _____ Replacement – structure removed and being rebuilt
- _____ Failing –Replacement- cesspool/seepage pit or other
- _____ Enlargement of system-Undersized
- _____ Repairs Needed to existing
- _____ Additional system on property

What will new system serve? Check one

- X Dwelling
- _____ Resort/Commercial
- _____ Commercial (Non-resort)
- _____ Other – explain below

8-15-12 Date of site evaluation

Design Flow 450 Gallons Per Day
Number of Bedrooms 3
Garbage Disposal ____ Yes X No
Dishwasher X Yes ___ No
Lift station in House ___ Yes X No
Grinder pump in House ___ Yes X No

Well Depth to be drilled
Depth of other wells within 100 ft of system Deep

Original Soil X Compacted Soil ____
Type of Soil Observation
____ Pit ____ Probe X Boring
Depth to Restricting Layer 20"
Maximum Depth of System mound

Size of All Tanks to be installed

- _____ gal Single Compartment Septic Tank
- 1500 gal Compartmented Tank
- _____ Pit Privy
- _____ gal Separate Lift Station
- _____ gal Holding Tank
- _____ Existing Tank to be used
- _____ Existing tank w/new Additional Tank
- _____ Existing tank w/new Lift Station
- _____ Holding Tank with Privy

Total Number of tanks to be installed in this system 1 (This # will be reported to MPCA at end of year.)

PARCEL	
APP	SEPTIC
YEAR	

Type of Drainfield	Full Size of Drainfield	Reduced/Warrantied size
_____ Chamber Trench	_____ sq ft	_____ sq ft
_____ Rock Trench	_____ sq ft	_____ sq ft
_____ Gravelless	_____ sq ft	_____ sq ft
X Mound	912 sq ft ***	
_____ Pressure Bed	_____ sq ft ***	
_____ Seepage Bed	_____ sq ft ***	
_____ At-grade	_____ sq ft ***	
_____ Alternative / Performance	_____ sq ft ***	***Attach Worksheets

Type of chamber _____
Depth of Rock _____

Alarm? Yes X No _____
Type of Alarm Elec
Size of Lift Pump .29 gpm @ 15' Head
Size of Lift Line 2"

PROPOSED SETBACKS

	TANK	DRAINFIELD
Distance to Well	135	140
Distance to Building	15	25
Distance to Property Line	80	10
Distance to OHW of Lake	135	115
Distance to Pressure Line	50+	50+
Distance to Wetland/Protected Water	-	-

Perc Rate 24 Soil Sizing Factor 1.67 *If SSF other than .83, attach Perc Test Data

Soil Borings (three are required)

Depth	Texture	Color	Structure		Depth	Texture	Color	Structure
0-18	loam	10YR 2/2	Blocky		0-12	loam	10YR 2/2	Blocky
18-21	loam	2.5Y 4/4	"		12-20	loam	2.5Y 4/4	"
21-28	clay loam	2.5Y 5/4	"		20+	loam	2.5Y 5/4	mottled
mottled 21"								

Depth	Texture	Color	Structure		Depth	Texture	Color	Structure
0-16	loam	10YR 2/2	Blocky					
16-21	loam	2.5Y 4/4	"					
21+	mottled							

5. REQUIRED DOCUMENTS

U of MN worksheets are required for mounds, pressure beds, seepage beds, at-grades or Type IV or Type V systems. Are the required worksheets attached? X Yes _____ No

6. DESIGNER'S CERTIFIED STATEMENT

I, Randy Anderson (Print Name of Designer) certify that I have completed the preceding design work in accordance with all applicable requirements (including, but not limited to Minnesota Chapter 7080 and the Becker County Individual Sewage Treatment System Ordinance).

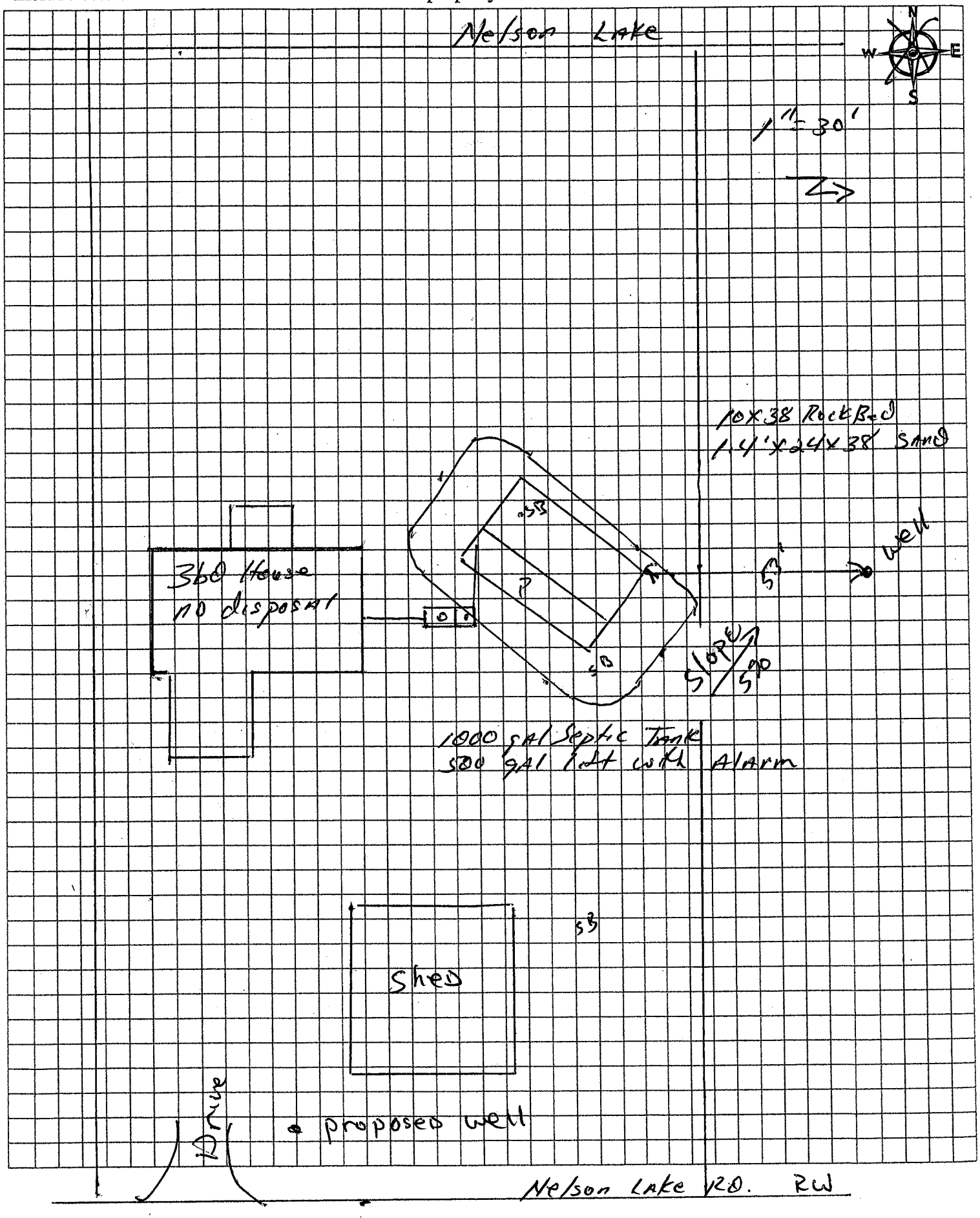
Signature of Designer

8-15-12
Date

SKETCH OF PROPERTY

Please sketch all structures and septic systems on the property;
Include setbacks and wells within 100 feet of the property.

PARCEL	
APP	SEPTIC
YEAR	2012



COUNTY OF BECKER

Planning and Zoning
915 Lake Ave, Detroit Lakes, MN 56501
Phone: 218-846-7314 ~ Fax: 218-846-7266

SSTS STATEMENT - # OF BEDROOMS AND WATER-USE APPLIANCES
Note: Form must be legible and completed in ink

Property Owner Name(s): Mark + Vicki Boushee

Address: 14493 Nelson Lake Road City, State, Zip: Lake Park, MN 56554

Phone: 218-779-7359 Alt. Phone: 218-779-7358

Legal Description: _____

Lake/River: _____ Tax Parcel No. _____

Property Address: _____

Definitions:

Bedroom – any room or unfinished area within a dwelling that might reasonably be used as a sleeping room. Lofts and unfinished basements (with at least one egress window and/or door) are counted as bedrooms.

Water-use Appliances – installed or anticipated: e.g. (automatic washer) (dishwasher) (water conditioning unit) whirlpool bath, garbage disposal, or self-cleaning humidifier in furnace. **Note:** A dishwasher with a built-in garbage disposal counts as two (2) water-use appliances.

Existing # of bedrooms: 3 + # of bedrooms yet to be constructed: _____ = Total # of bedrooms to be serviced by the SSTS: _____ (min. # bedrooms allowed by State is two)

Existing # of water-use appliances: 3 List each: _____
+ # of water-use appliances yet to be installed: _____ List each: _____
_____ = Total # of water-use appliances to be serviced by the SSTS: _____

I (we) do hereby swear and affirm that the above-stated number of bedrooms and water-use appliances exist and/or will be installed in the residence located on the property listed on this document such that they will be serviced by the subsurface sewage treatment system (SSTS) that will be designed for and connected to said residence and installed on said property.

Vicki A. Boushee
Property Owner(s) Signature(s)

Sept. 11, 2012
Date

Minnesota Pollution Control Agency

OSTP Design Summary Worksheet

University of Minnesota

v 11.09.22

Property Owner/Client: Mark Boushee **Project ID:**

Site Address: 14493 Nelson Lake Rd. Lake Park, MN 56554

1. AVERAGE DESIGN FLOW:

A. *Design Flow:* 450 Gallons Per Day (GPD)

Note: The estimated design flow is considered a peak flow rate including a safety factor. For long term performance, the average daily flow is recommended to be < 60% of this value.

B. *Septic Tank* capacity: 1000 Gallons

C. Number of *Septic Tanks* or *Compartments*: 1 *Effluent Screen & Alarm?* Optional

Type of Soil Treatment and Dispersal Area*

○ Trenches ○ Bed ◉ Mound ○ At-Grade

○ Drip Distrib. ○ Holding Tani ○ Other:

Type of Distribution*

○ Gravity Distribution ◉ Pressure Distribution-Level ○ Pressure Distribution-Unlevel

* Selection Required **Benchmark Elev =** 100 ft

Benchmark Location:

System Type

☑ Type I ☐ Type II ☐ Type III ☐ Type IV ☐ Type V

Type of Distribution Media: rock

D. *Pump Tank 1* Capacity: Gallons *Pump Tank 2* Capacity: Gallons

2. SITE EVALUATION:

A. *Depth to Limiting Layer*: 20 inches 1.7 ft **Elevation & Location of Limiting Layer:** ft

B. *Measured Percent Land Slope*: 5.0 % 0.0 **Location:** drainfield area

C. Soil Texture: loam Perc Rate: MPI

D. Soil Hydraulic Loading Rate: 0.60 GPD/ft² E. Contour Loading Rate 12.0 Gal/ft

3. DESIGN SUMMARY

Trench Design Summary

Dispersal Area ft² Sidewall Depth in Trench Width in

Total Lineal Feet ft Number of Trenches Maximum Trench Depth in

Designer's Max Trench Depth in

Bed Design Summary

Absorption Area ft² Media Below Pipe in Bed Length ft

Bed Width ft Maximum Bed Depth in Designer's Max Bed Depth in

Mound Design Summary

Absorption Area 375 ft² Bed Length 38 ft Bed Width 10.0 ft

Absorption Width 24.0 ft Clean Sand Lift 1.4 ft Berm Width (slope 0-1%) ft

Upslope Berm Width 11.3 ft Downslope Berm Width 19.5 ft Endslope Berm Width 15.6 ft

Total System Length 69 ft Total System Width 41 ft

At-Grade Design Summary

Absorption Bed Width ft Absorption Bed Length ft System Height ft

Absorption Bed Area ft² Upslope Berm Width ft Downslope Berm Width ft

Endslope Berm Width ft System Length ft System Width ft

Minnesota Pollution Control Agency

OSTP Design Summary Worksheet

University of Minnesota

Pressure Distribution Summary

No. of Perforated Laterals	3	Perforation Spacing	3 ft	Perforation Diameter	1/4 in
Lateral Diameter	2.00 in	Supply Pipe Diameter	2.00 in	Minimum Dose Volume	0
Flow Rate	29 GPM	Total Head	15 ft	Maximum Dose Volume	112.5

Holding Tanks Only

Number of Holding Tanks _____ Total Volume of Holding Tanks _____ gallons

High Level Alarm? _____

4. Additional Info for Type IV/Pretreatment Design

Type of Pretreatment Unit Being Installed: _____

Organic Loading to Pretreatment Unit = *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

Calculate ***System Organic Loading***: *lbs. BOD/day ÷ Bottom Area* = lbs/day/ft^2

_____ lbs/day ÷ _____ ft^2 = _____ lbs/day/ft^2

Comments/Special Design Considerations:

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

Randy Anderson		634	
(Designer)	(Signature)	(License #)	(Date)

OSTP Mound Design Worksheet
>1% Slope

Minnesota Pollution Control Agency

University of Minnesota

1. SYSTEM SIZING: Project ID: v 11.09.22

A. *Design Flow (Flow & Soil - 1.A) :*	450	GPD
B. *Soil Loading Rate (Flow & Soil-3.C):*	0.60	GPD/ft²
C. *Depth to Limiting Condition:*	1.7	ft
D. *Percent Land Slope:*	5.0	%
E. *Design Media Loading Rate:*	1.2	GPD/ft²
F. *Mound Absorption Ratio* (Table IXa):	2.40	
G. *Design Contour Loading Rate:*	12.0	GPD/ft

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

450 GPD ÷ 1.20 GPD/ft² = 375 ft²

If a larger dispersal media area is desired, enter size: 380 ft²

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

12.0 ft ÷ 1.2 gpd/ft² = 10 ft

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

380 ft² ÷ 10 ft = 38 ft

D. Select *Dispersal Media*: rock

E. If using a registered product, enter the *Component Length*: ____ in ÷ 12 = ____ ft

F. If using a registered product, enter the *Component Width*: ____ in ÷ 12 = ____ ft

G. *Number of Components per Row = Bed Length* (2.C) divided by *Component Length* (4.J) (Round up)

____ ft ÷ ____ ft = ____ components/row

H. *Number of Rows = Bed Width* (2.B) divided by *Component Width* (4.K) (Round up)

Adjust Contour Loading Rate on Design Summary page until this number is a whole number

____ ft ÷ ____ ft = ____ rows

Note: CLR of 10.3 gal/ft results in 9 foot wide bed.

I. *Total Number of Components = Number of Components per Row X Number of Rows*

____ X ____ = ____ components

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*

10.0 ft X 2.4 = 24.0 ft

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

Calculate *Downslope Absorption Width*: *Absorption Width* (3.A) - *Bed Width* (2.B) = ft

24.0 ft - 10.0 ft = 14.0 ft

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 - 1.7 ft = 1.3 ft Design Sand Lift (optional): 1.4 1.4

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

1.4 ft + 1.0 ft + 1.0 ft = 3.4 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	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
Berm Ratio	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	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
Berm Ratio	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): 3.33 (figure D-34)

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

3.33 ft X 3.4 ft = 11.3 ft

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

10.0 ft X 5.0 % ÷ 100 = 0.50 ft

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

3.4 ft + 0.50 ft = 3.9 ft

G. Select *Downslope Berm Multiplier* (based on land slope): 5.00 (figure D-34)

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

5.00 x 3.9 ft = 19.5 ft

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

14.0 ft + 4 ft = 18.0 ft

J. *Design Downslope Berm* = greater of 4H and 4I: 19.5 ft

K. Select *Endslope Berm Multiplier*: 4.00 (usually 3.0 or 4.0)

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

4.00 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

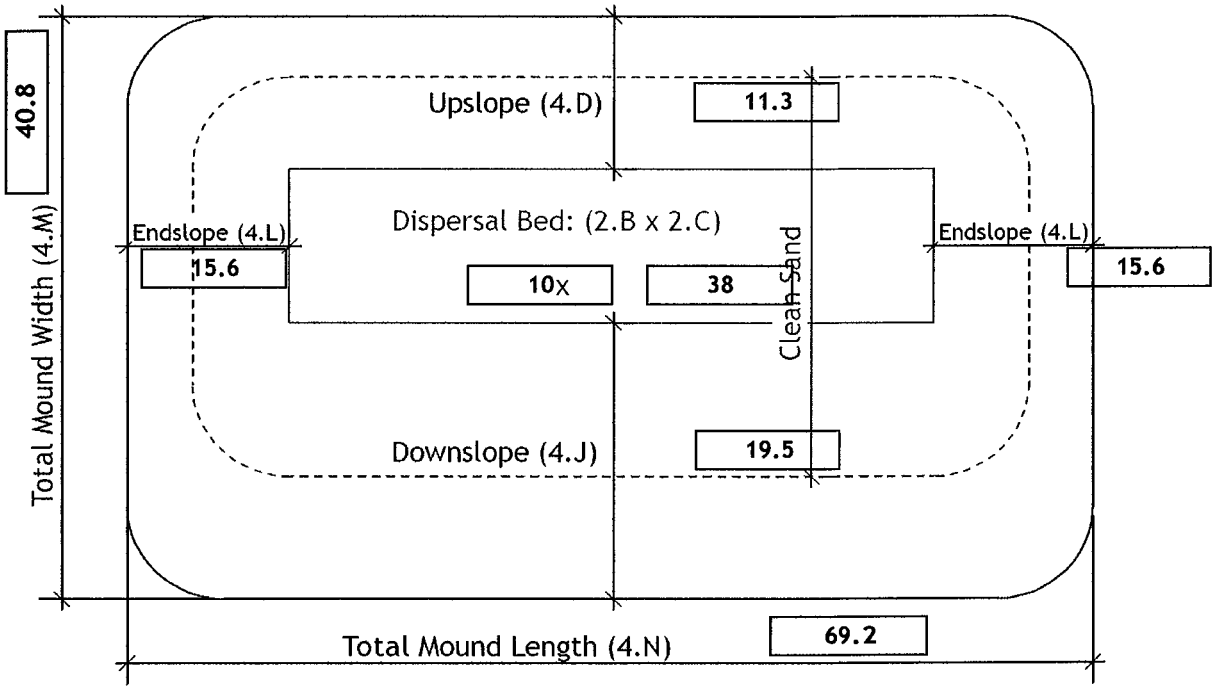
11.3 ft + 10.0 ft + 19.5 ft = 40.8 ft

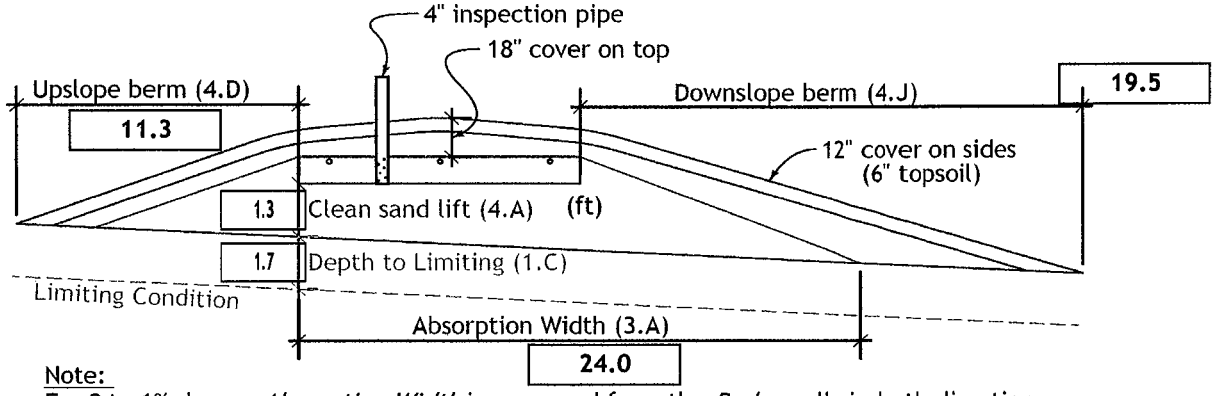
N. Calculate Mound Length: *Endslope Berm Width* (4.L) + *Bed Length* (2.C) + *Endslope Berm Width* (4.L) = ft

15.6 ft + 38.0 ft + 15.6 ft = 69.2 ft

Comments:

5. 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*.

Minnesota Pollution Control Agency

OSTP Mound Materials Worksheet

University of Minnesota

Project ID: v 11.09.22

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

38.0 ft X 10.0 ft X 1.0 = 380.0 ft^3

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

380.0 ft^3 ÷ 27 = 14.1 yd^3

Add 20% for constructability: 14.1 yd^3 X 1.2 = 16.9 yd^3

B. Calculate *Clean Sand Volume:*

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

1.7 ft X 10.0 ft X 38.0 ft = 627.0 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

((3.4 ft - 1) X 3.0 ft X 38.0) ÷ 2 = 136.8 ft^3

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

((3.9 ft - 1) X 14.0 ft X 38.0) ÷ 2 = 771.4 ft^3

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

(3.9 ft - 1) X 3.0 ft X 10.0 ft = 87.0 ft^3

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

136.8 ft^3 + 771.4 ft^3 + 87.0 ft^3 + 627.0 ft^3 = 1622.2 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards: 1622.2 ft^3 ÷ 27 = 60.1 yd^3

Add 20% for constructability: 60.1 yd^3 X 1.2 = 72.1 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 = cubic feet

(3.7 - 0.5)ft X 40.8 ft X 69.2) ÷ 2 = 4449.2 ft^3

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

4449.2 ft^3 - 1622.2 ft^3 - 380.0 ft^3 = 2447.0 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards: 2447.0 ft^3 ÷ 27 = 90.6 yd^3

Add 20% for constructability: 90.6 yd^3 x 1.2 = 108.8 yd^3

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

40.8 ft X 69.2 ft X 0.5 ft = 1412.4 ft^3

Divide ft^3 by 27 ft^3/yd^3 to calculate cubic yards: 1412.4 ft^3 ÷ 27 = 52.3 yd^3

Add 20% for constructability: 52.3 yd^3 x 1.2 = 62.8 yd^3

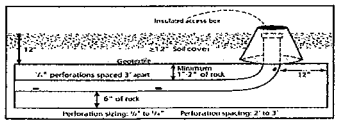
Minnesota Pollution Control Agency

OSTP Pressure Distribution Design Worksheet

University of Minnesota

Project ID: v 11.09.22

1. Select *Number of Perforated Laterals in system/zone*: **3**
   (2 feet is minimum and 3 feet is maximum spacing)
2. Select *Perforation Spacing*: **3.0** ft
3. Select *Perforation Diameter Size* **1/4** in



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

   38 - 2ft = **36** ft *Perforation can not be closer then 1 foot from edge.*

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 = **36** ft ÷ **3** ft = **12** Spaces

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

   Perforations Per Lateral = **12** Spaces + 1 = **13** Perfs. Per Lateral

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

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

1/4 Inch Perforations

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

7/32 Inch Perforations

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

3/16 Inch Perforations

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

1/8 Inch Perforations

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

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

   13 Perf. Per Lateral X **3** Number of Perf. Laterals = **39** 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 **38** ft = **380** ft²

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

   380 ft² ÷ **39** perforations = **9.7** ft²/perforations

Perforation Discharge (GPM)				
Head (ft)	Perforation Diameter 1/4	7/32	3/16	1/8
1.0*	0.18	0.41	0.56	0.74
1.5	0.22	0.51	0.69	0.9
2.0*	0.26	0.59	0.80	1.04
2.5	0.29	0.66	0.89	1.17
3.0	0.32	0.73	0.98	1.28
4.0	0.37	0.83	1.13	1.47
5.0*	0.41	0.92	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			
3 feet	Other establishments and MSTS with 1/8 inch perforations			

9. Select *Minimum Average Head*: **1.0** ft
10. Select *Perforation Discharge* (GPM) based on Table III: **0.74** GPM per Perforation
11. Determine required *Flow Rate* by multiplying the *Total Number of Perforations* (Line 7) by the *Perforation Discharge* (Line 10).

    39 Perforations X **0.74** GPM per Perforation = **29** GPM

12. Select *Type of Manifold Connection* (End or Center): ☐ End ☐ Center
13. *Select Lateral Diameter*: **2.00** in
14. *Volume of Liquid Per Foot of Distribution Piping*: **0.170** Gallons/ft
15. *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 14)]

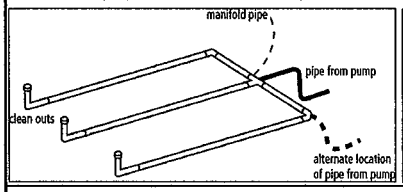
    3 X **36** ft X **0.170** gal/ft = **18.4** Gallons

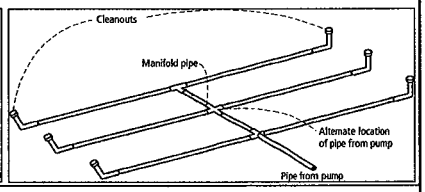
16. Minimum Dose = Volume of Distribution Piping (Line 15) X 4

    18.4 gals X 4 = **73.4** 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





Comments/Special Design Considerations:

Minnesota Pollution Control Agency

OSTP Basic Pump Selection Design Worksheet

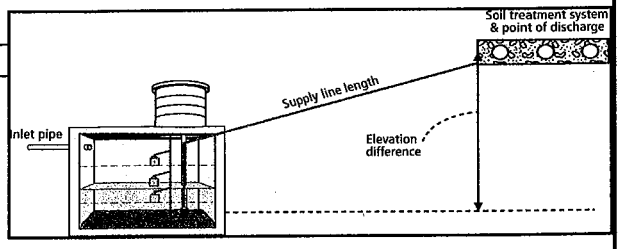
University of Minnesota

1. PUMP CAPACITY Project ID: v 11.09.22

Pumping to Gravity or Pressure Distribution: ○ Gravity ◉ Pressure **Selection required** 2

1. If pumping to gravity enter the gallon per minute of the pump: _____ GPM *(10 - 45 gpm)*
2. If pumping to a pressurized distribution system: **29.0** GPM

(Line 11 of Pressure Distribution)



2. HEAD REQUIREMENTS

A. Elevation Difference between pump and point of discharge: **9** 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: **25** ft

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

Friction Loss = **2.23** 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 (D.2)* X 1.25 = *Equivalent Pipe Length*

25 ft X 1.25 = **31.3** 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* (Line E) by the *Equivalent Pipe Length* (Line F) and divide by 100.

Supply Friction Loss =

2.23 ft per 100ft X **31.3** ft ÷ 100 = **0.7** ft

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

9.0 ft + **5.0** ft + _____ ft + **0.7** ft = **14.7** ft

3. PUMP SELECTION

A pump must be selected to deliver at least **29** GPM (Line 1 or Line 2) with at least **15** feet of total head.

Comments:

PERCOLATION TEST SHEET

Test hole location proposed Drain field Hole # _____ Date test hole was prepared: _____

Depth of hole bottom: _____ inches Diameter of hole: _____ inches

Soil Data from test hole:

depth, inches	soil texture:	soil color

Method of scratching sidewall: _____ Depth of pea size gravel in bottom of hole: _____ inches

Date and hour of initial water filling: _____ Depth of initial water filling: _____ above hole bottom

Method used to maintain 12" of water depth in hole for 4 hours: _____

Percolation test conducted by: Randy Anderson Percolation test started at _____ (am / pm).

Maximum water depth above hole bottom during test: _____ inches

TIME	INTERVAL (MINUTES)	WATER DEPTH	WATER DROP (fraction)	WATER DROP (decimal)	PERC RATE CALCULATION
_____ _____	START 20	8 7 1/8	7/8	.83	20 TIME ÷ .83 DROP (Decimal) = 24 PERC **A**
_____ _____	REFILL 20	8 7 3/16	13/16	.81	20 TIME ÷ .81 DROP (Decimal) = 24.6 PERC **B**
_____ _____	REFILL 20	8 7 1/8	7/8	.83	20 TIME ÷ .83 DROP (Decimal) = 24 PERC **C**
_____ _____	REFILL _____ _____	_____ _____	_____	_____	_____ TIME ÷ _____ DROP (Decimal) = _____ PERC **D**
_____ _____	REFILL _____ _____	_____ _____	_____	_____	_____ TIME ÷ _____ DROP (Decimal) = _____ PERC **E**
_____ _____	REFILL _____ _____	_____ _____	_____	_____	_____ TIME ÷ _____ DROP (Decimal) = _____ PERC **F**
_____ _____	REFILL _____ _____	_____ _____	_____	_____	_____ TIME ÷ _____ DROP (Decimal) = _____ PERC **G**
_____ _____	REFILL _____ _____	_____ _____	_____	_____	_____ TIME ÷ _____ DROP (Decimal) = _____ PERC **H**

conversions

1/16 = .06
1/8 = .13
3/16 = .19
1/4 = .25
5/16 = .31
3/8 = .38
7/16 = .44
1/2 = .5
9/16 = .56
5/8 = .63
11/16 = .69
3/4 = .75
13/16 = .81
7/8 = .88
15/16 = .94

Ten Percent Calculation *

A,B,C

Largest # of ABC _____ Smallest # of ABC = _____

Smallest # of ABC × 0.10 = _____

B,C,D

Largest # of BCD _____ Smallest # of BCD = _____

Smallest # of BCD × 0.10 = _____

C,D,E

Largest # of CDE _____ Smallest # of CDE = _____

Smallest # of CDE × 0.10 = _____

D,E,F

Largest # of DEF _____ Smallest # of DEF = _____

Smallest # of DEF × 0.10 = _____

E,F,G

Largest # of EFG _____ Smallest # of EFG = _____

Smallest # of EFG × 0.10 = _____

F,G,H

Largest # of FGH _____ Smallest # of FGH = _____

Smallest # of FGH × 0.10 = _____

* If the top number in each set of boxes is larger than the bottom number, take another reading. If the top number is equal to or smaller than bottom number, average the 3 numbers for the perc rate.

********** FOR OFFICE USE ONLY **********

Application Approved by: Aleta Motl Date: 9-6-12

Amount Paid 150.00 Receipt Number 101446 Permit Number 513638

NOTES:

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INSPECTION REPORT

Home Information

Does the structure contain any of the following elements?

Garbage disposer ____ Yes ____ No Dishwasher ____ Yes ____ No

Grinder pump ____ Yes ____ No Lift pump in basement ____ Yes ____ No

Effluent screen installed? ____ Yes ____ No Effluent screen manufacturer ____

Alarm required? ✓ Yes ____ No Alarm Type ____ Alarm manufacturer ____

Lift pump in system? ✓ Yes ____ No Pump manufacturer ____

Number of bedrooms ____

Component Information

Tank size 1500 2/c Tank manufacturer Fergus Falls – Agg. Ind.

Drainfield size 380 sq ft.

Drainfield medium ____ Medium manufacturer 10' x 38' mound

Drainfield medium size/depth ____

Soil Verification

Vertical separation verified for Boring #1 on ____ Depth +36"

Vertical separation verified for Boring #2 on ____ Depth ____

Vertical separation verified for Boring #3 on ____ Depth ____

Setback Verification

	TANK	DRAINFIELD
Distance to Well	+50	+50
Distance to Building	+10	+20
Distance to Property Line	+10	+10
Distance to OHW of Lake	+75	+75
Distance to Pressure Line	50'	+50'
Distance to Wetland/Protected Water	N/A	N/A

Date System Installed 9/11/12 **Installer** Bolt Etc **Inspector** Jason Stoll

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CERTIFICATE OF COMPLIANCE

( ) Certificate Is Hereby Denied

(✓) Certificate is Hereby Granted Based upon the Application, addendum from, plans, specifications and all other supporting data. With property maintenance, this system can be expected to function satisfactory, however, this is not a guarantee.

Jason Stoll — Signature

ISTS Inspector — Title

9/11/12 — Date

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