FIELD EVALUATION SHEET

PRELIMINARY EVALUATION DATE 7/5/16, FIELD EVALUATION DATE 7/6/16
PROPERTY OWNER: Brent+Shelly Welk PHONE 218-380-6939
ADDRESS: 62612 OsPrey AV CITY,STATE,ZIP: Swatara Minn 55783
LEGAL DESCRIPTION:
PIN# 20-0-011801 SEC 8 T 51 R 26 TWP NAME Macville
FIRE# 62612 LAKE/RIVER LAKE CLASS — OHWL — FT.

DESCRIPTION OF SOIL TREATMENT AREAS

	AREA #1	AREA #2
DISTURBED AREAS	YES___ NO X	YES___ NO___
COMPACTED AREAS	YES___ NO X	YES___ NO___
FLOODING	YES___ NO X	YES___ NO___
RUN ON POTENTIAL	YES___ NO X	YES___ NO___
SLOPE %	1-2%	
DIRECTION OF SLOPE	W TO E	
LANDSCAPE POSITION		
VEGETATION TYPES	Brush	

REFERENCE BM ELEV.____FT.
REFERENCE BM DESCRIPTION

DEPTH TO STANDING WATER OR MOTTLED SOIL: BORING# 1 18", 1A 26", 2____,2A____

BOTTOM ELEVATION--FIRST TRENCH OR BOTTOM OF ROCK BED: #1____FT., #2____FT.

SOIL SIZING FACTOR: SITE # 1____, SITE #2____

CONSTRUCTION RELATED ISSUES: At this Time, going to use existing Sept and Add New lift, pumper to Varify

LIC# 1174 SITE EVALUATOR SIGNATURE: D. Lange

SITE EVALUATOR NAME: DAVID LANGE TELEPHONE# 218-380-6939

LUG REVIEW____DATE____

Comments:

SOIL BORING LOGS ON REVERSE SIDE

APPROVED
X ONSITE INSPECTION
___ NO ONSITE INSPECTION
SIGN [signature] DATE 7/6/16

Form des 2/20/98

SOILS CHARTS FOR BOTH PROPOSED AND ALTERNATE SITES

1 (PROPOSED) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-8"	Loam	10YR 3/1
9-13"	Silty Loam	10YR 5/4
14-18"	Loamy Sand	10YR 5/3
19	Silty Loam	10YR 6/4
	depletion	10YR 5/8

2 (PROPOSED) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-6"	Silty Loam	10YR 2/1
7-14	Silt	10YR 4/4
15-24	Medium Sand	10YR 4/6
26	Clay	10YR 6/4
		10YR 5/8

1 (ALTERNATE) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR

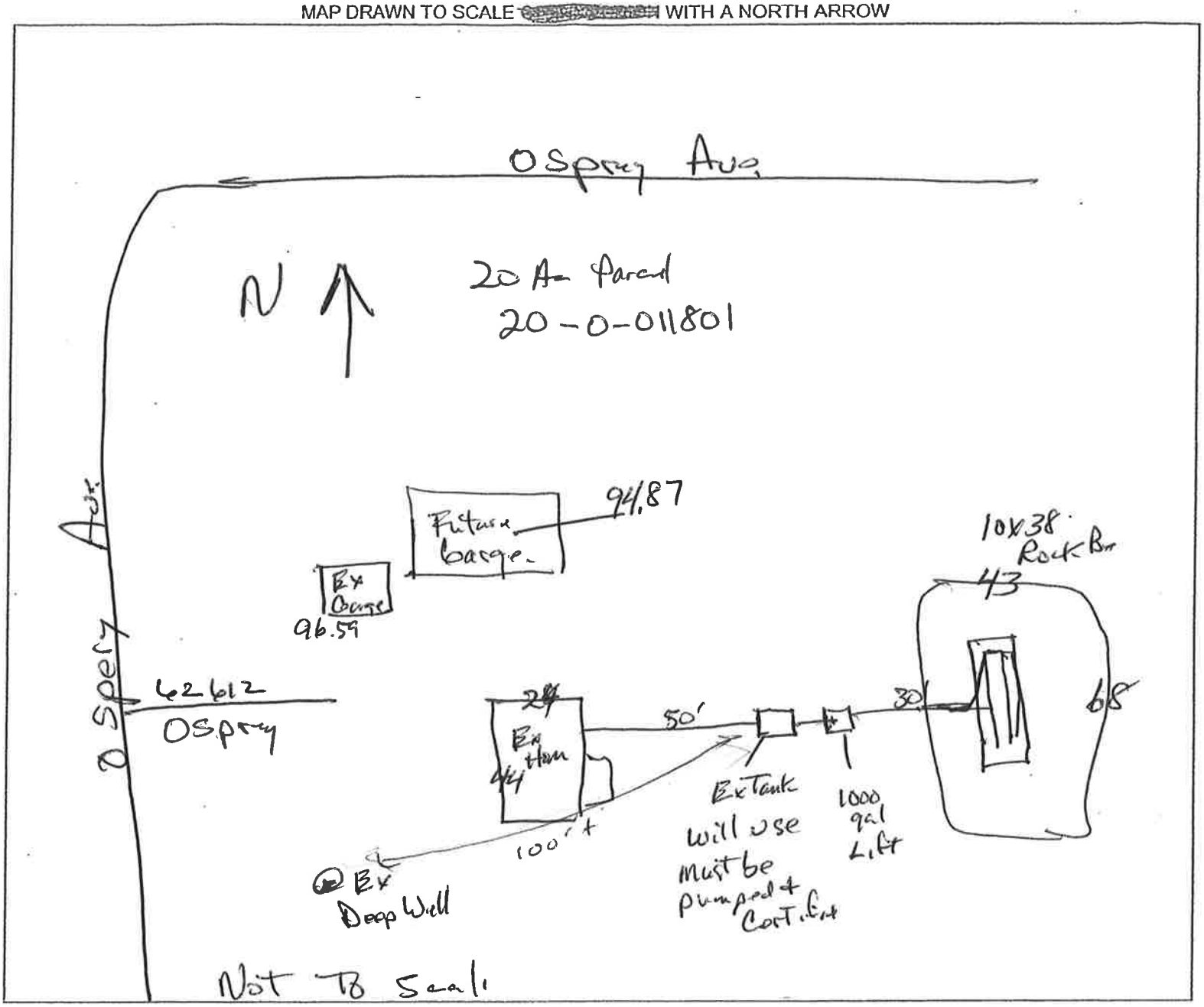
2 (ALTERNATE) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR

ADDITIONAL SOIL BORINGS MAY BE REQUIRED

CLIENT: Brent Welk DATE: 7/6/16

MAP DRAWN TO SCALE 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
- ☐ PROPERTY LINES
- ☐ OHWL

COMMENTS:

INDICATE ELEVATIONS

BENCHMARK	Top of Electric Bx
ELEVATION OF SEWER LINE @ HOUSE	
ELEVATION @ TANK INLET	92.25
ELEVATION @ BOTTOM OF ROCK LAYER	96
ELEVATION @ BOTTOM OF BORING OR RESTRICTIVE LAYER	93
ELEVATION OF PUMP	90
ELEVATION OF DISTRIBUTION DEVICE	96.75

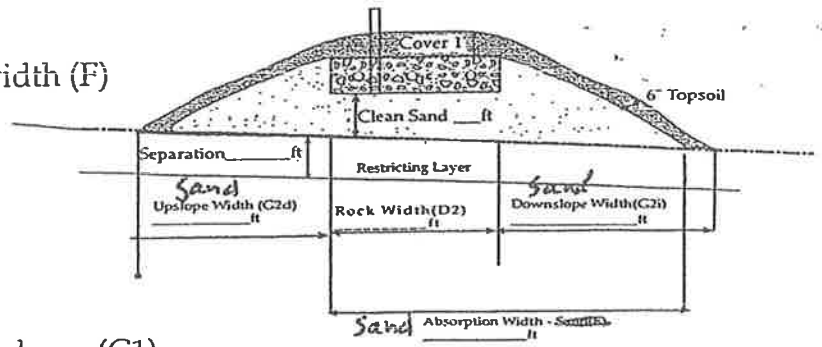
DESIGNER SIGNATURE

LICENSE# 11174

DATE 7/6/16

8

G. MOUND SLOPE WIDTH & LENGTH
(landslope greater than 1%)



1. Downslope absorption width = absorption width (F) minus rock layer width (D2)

24 ft - 10 ft = 14 ft

2. Calculate mound size

UPSLOPE

a. Depth of clean sand fill at upslope edge of rock layer = 3 ft minus the distance to restricting layer (C1)

3 ft - 1 ft = 2 ft

b. Mound height at the upslope edge of rock layer = depth of clean sand for separation (G2a) at upslope edge plus depth of rock layer (1 ft) plus depth of cover (1 ft)

2 ft + 1ft + 1ft = 4 ft

c. Upslope berm multiplier based on land slope

3.7 *(see figure D-34)*

d. Upslope width = berm multiplier (G2c) x upslope mound height (G2b):

4 x 3.7 ft = 15 ft

DOWNSLOPE

e. Drop in elevation = rock layer width (D2) x percent landslope (C5) ÷ 100

10 ft x 2 % ÷ 100 = .2 ft

f. Downslope mound height = depth of clean sand for slope difference (G2e) at downslope rock edge plus the mound height at the upslope edge of rock layer (G2b)

4 ft + .2 ft = 4.2 ft

g. Downslope berm multiplier based on percent land slc

4.35 *(see figure D-34)*

h. Downslope width = downslope multiplier (G2g) times downslope mound height (G2f)

4.35 x 4.2 ft = 18 ft

i. Select the greater of G1 and G2h as the downslope width: 18 ft

j. Total mound width is the sum of upslope width (G2d) width plus rock layer width (D2) plus downslope width (G2i)

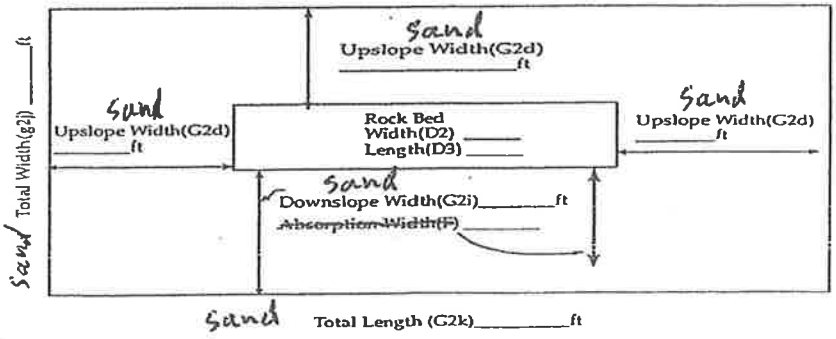
10 ft + 18 ft + 15 ft = 43 ft

k. Total mound length is the sum of upslope width (G2d) plus rock layer length (D3) plus upslope width (G2d)

38 ft + 17 ft + 15 ft = 68 feet

D-34: SLOPE MULTIPLIER TABLE

Land Slope, in %	UPSLOPE multipliers for various slope ratios						DOWNSLOPE multipliers for various slope ratios				
	3:1	4:1	5:1	6:1	7:1	8:1	3:1	4:1	5:1	6:1	7:1
0	3.0	4.0	5.0	6.0	7.0	8.0	3.0	4.0	5.0	6.0	7.0
1	2.91	3.85	4.76	5.66	6.54	7.41	3.09	4.17	5.26	6.38	7.53
2	2.83	3.70	4.54	5.36	6.14	6.90	3.19	4.35	5.56	6.82	8.14
3	2.75	3.57	4.35	5.08	5.79	6.45	3.30	4.54	5.88	7.32	8.86
4	2.68	3.45	4.17	4.84	5.46	6.06	3.41	4.76	6.25	7.89	9.72
5	2.61	3.33	4.00	4.62	5.19	5.71	3.53	5.00	6.67	8.57	10.77
6	2.54	3.23	3.85	4.41	4.93	5.41	3.66	5.26	7.14	9.38	12.07
7	2.48	3.12	3.70	4.23	4.70	5.13	3.80	5.56	7.69	10.34	13.73
8	2.42	3.03	3.57	4.05	4.49	4.88	3.95	5.88	8.33	11.54	15.91
9	2.36	2.94	3.45	3.90	4.30	4.65	4.11	6.25	9.09	13.04	18.92
10	2.31	2.86	3.33	3.75	4.12	4.44	4.29	6.67	10.00	15.00	23.33
11	2.26	2.78	3.23	3.61	3.95	4.26	4.48	7.14	11.11	17.65	30.43
12	2.21	2.70	3.12	3.49	3.80	4.08	4.69	7.69	12.50	21.43	43.75



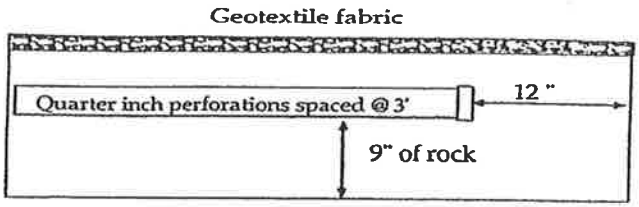
Final Dimensions:

43 x 68

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

[signature] (signature) 11174 (license #) 7/6/16 (date)

PRESSURE DISTRIBUTION SYSTEM



Perf Sizing 3/16" - 1/4"
Perf Spacing 1.5'- 5'

1. Select number of perforated laterals 3

2. Select perforation spacing = 3 ft

3. Since perforations should not be placed closer than 1 foot to the edge of the rock layer (see diagram), subtract 2 feet from the rock layer length.

   38 (Rock layer length) - 2 ft = 36 ft

4. Determine the number of spaces between perforations. Divide the length (3) by perforation spacing (2) and round down to nearest whole number.

   Perforation spacing = 3 ft ÷ 36 ft = 12 spaces

5. Number of perforations is equal to one plus the number of perforation spaces(4). *Check figure E-4 to assure the number of perforations per lateral guarantees <10% discharge variation.*

   12 spaces + 1 = 13 perforations/lateral

6. A. Total number of perforations = perforations per lateral (5) times number of laterals (1)

   13 perfs/lat x 3 lat = 39 perforations

   B. Calculate the square footage per perforation.
   Should be 6-10 sqft/perf. *Does not apply to at-grades.*
   Rock bed area = rock width (ft) x rock length (ft)
   10 ft x 38 ft = 380 sqft
   Square foot per perforation = Rock bed area ÷ number of perfs (6)
   380 sqft ÷ 39 perfs = 9 sqft/perf

7. Determine required flow rate by multiplying the total number of perforations (6A) by flow per perforation *(see figure E-6)*

   174 perfs x 39 gpm/perfs = 28.9 gpm

8. If laterals are connected to header pipe as shown on upper example, to select minimum required lateral diameter; enter figure E-4 with perforation spacing (2) and number of perforations per lateral (5) Select minimum diameter for perforated lateral = 1½ inches.

9. If perforated lateral system is attached to manifold pipe near the center, lower diagram, perforated lateral length (3) and number of perforations per lateral (5) will be approximately one half of that in step 8. Using these values, select minimum diameter for perforated lateral = 1¼ inches.

E-4: Maximum allowable number of 1/4-inch perforations per lateral to guarantee <10% discharge variation

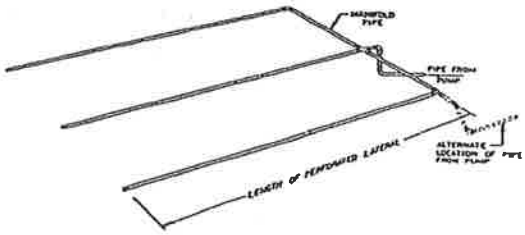
perforation spacing (feet)	1 inch	1.25 inch	1.5 inch	2.0 inch
2.5	8	14	18	28
3.0	8	13	17	26
3.3	7	12	16	25
4.0	7	11	15	23
5.0	6	10	14	22

E-6: Perforation Discharge in gpm

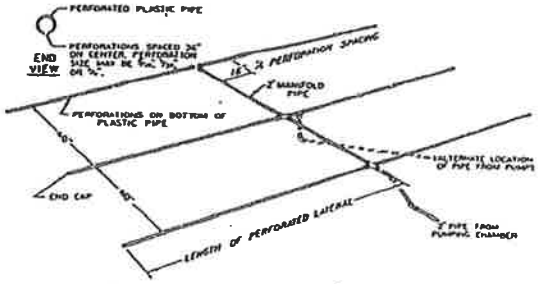
head (feet)	perforation diameter (inches) 1/8	3/16	7/32	1/4
1.0[a]	0.18	0.42	0.56	0.74
2.0[b]	0.26	0.59	0.80	1.04
5.0	0.41	0.94	1.26	1.65

[a] Use 1.0 foot for single-family homes.
[b] Use 2.0 feet for anything else.

MANIFOLD LOCATED AT END OF PRESSURE DISTRIBUTION SYSTEM



LAYOUT OF PERFORATED PIPE LATERALS FOR PRESSURE DISTRIBUTION IN MOUND



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

Dalage (signature) 1174 (license #) 7/6/16 (date)

Mound Sewage Treatment System Design

ID No: 41

For: Brent Welk
Date: 7/6/2016

Designer Name: Enter Company Name
DRP: Enter Company DRP
MPCA License No:

Job Address:
62612 Osprey AV

Legal Description:
Macville,

Delivery, Soils, and Site Information

Flow Rate:	450	GPD	Landslope:	2	%	System Type:	Standard
Septic Tank 1 Capacity:	1250	Gal	Percolation Rate:		MPI	Structure Type:	Residential
Septic Tank 2 Capacity:		Gal	Restrict Layer Depth:	12	In	Construction Type:	Existing
Lift Station Capacity:	1000	Gal	Garbage Disposal:	No		Soil Texture:	Silt Loam
			Raw Sewage Pump:	No		Soil Structure:	Spheroidal
						Soil Structure Grade:	Moderate

System Design Specifications

Clean Sand SSF:	0.83	GPD / Sq Ft
Rock Area:	380	Sq Ft
Rockbed Width:	10	Ft
Rockbed Length:	38	Ft

Rock Volume

Cubic Feet:	380
Cubic Yards:	14
Tonnage:	20

Washed Sand Volume:	169	Cu Yds
Fill Cover Volume:	74	Cu. Yds
Topsoil Volume:	130	Cu. Yds
Linear Loading Rate:	12	GPD / Ft

Absorbtion Width Ratio:	2	
Absorbtion Width:	20	Ft
Minimum Mound Width (Slopes less than 1%) OR Minimum Downslope Width (Slopes 1% or more):	10	Ft
Clean Sand Upslope:	24	In
Mound Height Upslope:	4	Ft
Upslope Berm Ratio:	4	Ft
Upslope Berm Width:	15	Ft
Elevation Drop:	0.2	Ft
Mound Height Downslope:	4.2	Ft
Downslope Berm Ratio:	4	Ft
Downslope Berm Width:	18	Ft
Actual Mound Width:	43	Ft
Actual Mound Length:	68	Ft

Pump Capacity

Number of Laterals:	3	
Lateral Diameter:	1.5	In
Perforation Diameter:	0.25	In
Perforation Spacing:	3	Ft
Perforation Head:	1	Ft
Perforation GPM:	0.74	Ft
Perforations Per Lateral:	13	
Maximum Perforations / Lateral:	17	
Total Perforations:	39	
Lateral Length:	36	Ft
Pump Capacity:	***28.9***	***GPM***

Pump Head

Elevation Difference - Pump to Discharge Point:	8	Ft
Total Pipe Length:	30	Ft
Pipe Diameter:	2	In
Friction Loss Per Foot:	1.7	
Total Friction Loss:	0.6	Ft
Manifold Location:	End	
Total Head:	***13.6***	***Ft***

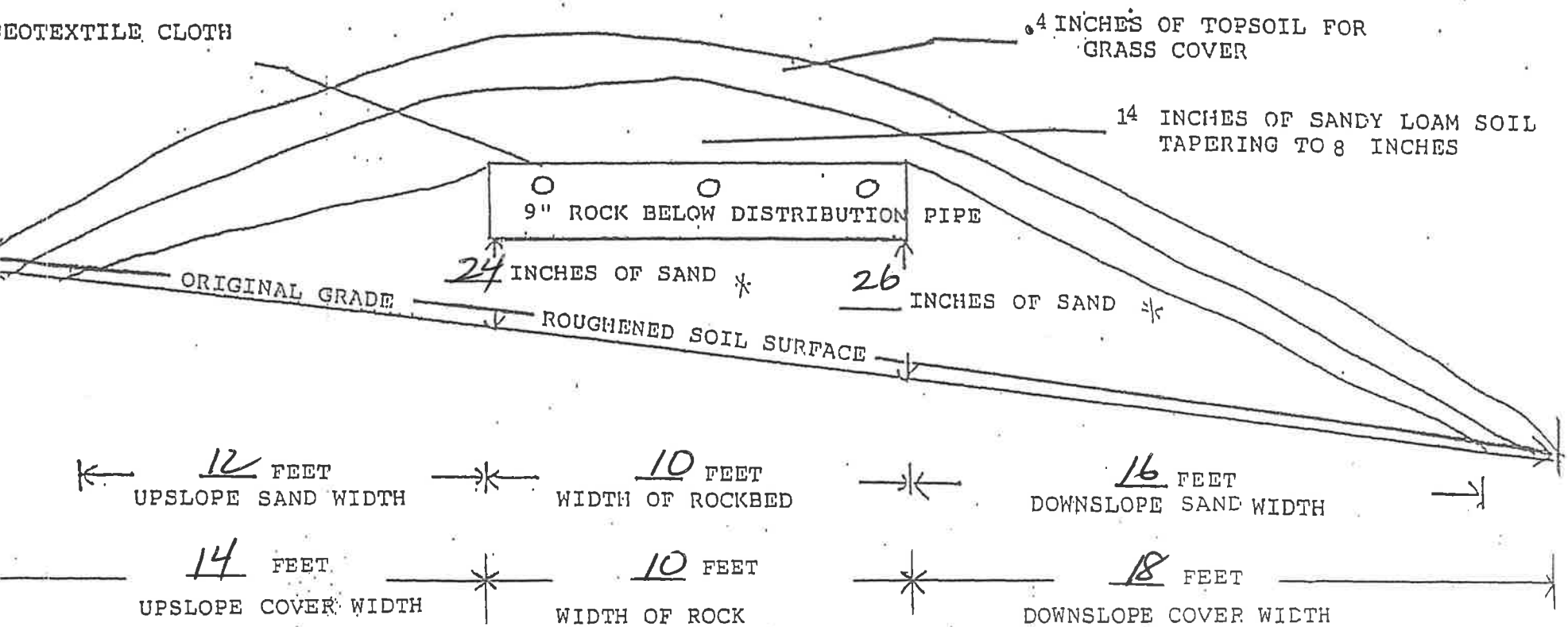
Comments: Number of bedrooms: 3. Install under dry conditions. Verify pump head before installing system.

LOCAL UNIT OF GOVERNMENT: ☐ APPROVED ☐ ADDITIONAL INFORMATION NEEDED ☐ DESIGN WORKSHEETS REQUIRED

MOUND CROSS-SECTION

2% PERCENT SLOPE OF ORIGINAL SOIL

10 FT. x 38 FT. SIZE OF ROCKBED 380 FT. x ____ FT. SIZE OF SANDBASE
2000 sq ft



12 FEET
UPSLOPE SAND WIDTH

10 FEET
WIDTH OF ROCKBED

16 FEET
DOWNSLOPE SAND WIDTH

14 FEET
UPSLOPE COVER WIDTH

10 FEET
WIDTH OF ROCK

18 FEET
DOWNSLOPE COVER WIDTH

Mound Sewage Treatment System Design

ID No: 41

For: Brent Welk
Date: 7/6/2016

Designer Name: Enter Company Name
DRP: Enter Company DRP
MPCA License No:

Job Address:	*Legal Description:*
62612 Osprey AV	Macville,

Delivery, Soils, and Site Information

Flow Rate:	450	GPD	Landslope:	2	%	System Type:	Standard
Septic Tank 1 Capacity:	1250	Gal	Percolation Rate:		MPI	Structure Type:	Residential
Septic Tank 2 Capacity:		Gal	Restrict Layer Depth:	12	In	Construction Type:	Existing
Lift Station Capacity:	1000	Gal	Garbage Disposal:	No		Soil Texture:	Silt Loam
			Raw Sewage Pump:	No		Soil Structure:	Spheroidal
						Soil Structure Grade:	Moderate

System Design Specifications

Clean Sand SSF:	0.83	GPD / Sq Ft
Rock Area:	380	Sq Ft
Rockbed Width:	10	Ft
Rockbed Length:	38	Ft

Rock Volume

Cubic Feet:	380
Cubic Yards:	14
Tonnage:	20

Washed Sand Volume:	169	Cu Yds
Fill Cover Volume:	74	Cu. Yds
Topsoil Volume:	130	Cu. Yds
Linear Loading Rate:	12	GPD / Ft

Absorbtion Width Ratio:	2	
Absorbtion Width:	20	Ft
Minimum Mound Width (Slopes less than 1%) OR Minimum Downslope Width (Slopes 1% or more):	10	Ft
Clean Sand Upslope:	24	In
Mound Height Upslope:	4	Ft
Upslope Berm Ratio:	4	Ft
Upslope Berm Width:	15	Ft
Elevation Drop:	0.2	Ft
Mound Height Downslope:	4.2	Ft
Downslope Berm Ratio:	4	Ft
Downslope Berm Width:	18	Ft
Actual Mound Width:	43	Ft
Actual Mound Length:	68	Ft

Pump Capacity

Number of Laterals:	3	
Lateral Diameter:	1.5	In
Perforation Diameter:	0.25	In
Perforation Spacing:	3	Ft
Perforation Head:	1	Ft
Perforation GPM:	0.74	Ft
Perforations Per Lateral:	13	
Maximum Perforations / Lateral:	17	
Total Perforations:	39	
Lateral Length:	36	Ft
Pump Capacity:	***28.9***	***GPM***

Pump Head

Elevation Difference - Pump to Discharge Point:	8	Ft
Total Pipe Length:	30	Ft
Pipe Diameter:	2	In
Friction Loss Per Foot:	1.7	
Total Friction Loss:	0.6	Ft
Manifold Location:	End	
Total Head:	***13.6***	***Ft***

Comments: Number of bedrooms: 3. Install under dry conditions. Verify pump head before installing system.

LOCAL UNIT OF GOVERNMENT: ☐ APPROVED ☐ ADDITIONAL INFORMATION NEEDED ☐ DESIGN WORKSHEETS REQUIRED

MOUND DESIGN WORK SHEET (For Flows up to 1200 gpd)

A. Average Design FLOW

Estimated 450 gpd *(see figure A-1)*
or measured _____ x 1.5 (safety *factor*) = _____ gpd

A-1: Estimated Sewage Flows in Gallons per Day				
number of bedrooms	Class I	Class II	Class III	Class IV
2	300	225	180	60%
3	450	300	218	of the
4	600	375	256	values
5	750	450	294	in the
6	900	525	332	Class I,
7	1050	600	370	II, or III
8	1200	675	408	columns.

B. SEPTIC TANK Capacity

1000 gallons *(see figure C-1)*

C-1: Septic Tank Capacities (in gallons)			
Number of Bedrooms	Minimum Liquid Capacity	Liquid capacity with garbage disposal	Liquid capacity with disposal & lift inside
2 or less	750	1125	1500
3 or 4	1000	1500	2000
5 or 6	1500	2250	3000
7, 8 or 9	2000	3000	4000

C. SOILS *(refer to site evaluation)*

1. Depth to restricting layer = _____ feet
2. Depth of percolation tests = ——— feet
3. Texture Silty Loam
   Percolation rate _____ mpi
4. Soil loading rate 150 gpd/sqft *(see figure D-33)*
5. Percent land slope 2 %

D. ROCK LAYER DIMENSIONS

1. Multiply average design flow (A) by 0.83 to obtain required rock layer area.
   450 gpd x 0.83 sqft/gpd = 380 sqft
2. Determine rock layer width = 0.83 sqft/gpd x linear Loading Rate (LLR)
   0.83 sqft/gpd x 450 gpd/sqft = 10 ft
3. Length of rock layer = area ÷ width =
   380 sqft (D1) ÷ 10 ft (D2) = 38 ft

Mound LLR	
< 120 MPI	≤ 12
≥ 120 MPI	≤ 6

E. ROCK VOLUME

1. Multiply rock area (D1) by rock depth of 1 ft to get cubic feet of rock
   380 sqft x 1 ft = 380 cuft
2. Divide cuft by 27 cuft/cuyd to get cubic yards
   380 cuft ÷ 27 cuyd/cuft = 14 cuyd
3. Multiply cubic yards by 1.4 to get weight of rock in tons
   14 cuyd x 1.4 ton/cuyd = 20 tons

F. SEWAGE ABSORPTION WIDTH

Absorption width equals absorption ratio (See Figure D-33) times rock layer width (D2)

2.4 x 10 ft = 24 ft

D-33: Absorption Width Sizing Table			
Percolation Rate in Minutes per Inch (MPI)	Soil Texture	Loading Rate Gallons per day per square foot	Absorption Ratio
Faster than 5	Coarse Sand Medium Sand Loamy Sand Fine Sand	1.20	1.00
6 to 15	Sandy Loam	0.79	1.50
16 to 30	Loam	0.60	2.00
31 to 45	Silt Loam Silt	0.50	2.40
46 to 60	Sandy Clay Loam Silty Clay Loam Clay Loam	0.45	2.67
61 to 120	Silty Clay Sandy Clay Clay	0.24	5.00
Slower than 120*			

*System designed for these soils must be other or performance

Elevations and Slopes Report

ID No: 41

Customer Name: Brent Welk
Date:

Tests By: Enter Company Name
DRP: Enter Company DRP
MPCA License No:

Site Address:	***Legal Description:***
62612 Osprey AV Macville,	 Macville,

Site Elevations

Benchmark: top of meter box Transit Reading: 3.42 Ft Elevation: 100 Ft

Description	Reading (Ft)	Elevation (Ft)
BM: top of meter box	3.42	100
ground at pole	8	95.42
drive way height	6.08	97.34
Ex slap	6.83	96.59
surface at tank	9.17	94.25
liquid level in tank	11.17	92.25
boring #2	10.25	93.17
Soil Boring One	9.23	94.19
center of garage grade area	8.55	94.87

Site Slopes

Description	Distance (Ft)	Drop (Ft)	Slope (%)
surface at tank to boring #2	60	1.1	1.8
drive way height to center of garage grade area	100	2.5	2.5

BEL53 MN Rule

PUMP SELECTION PROCEDURE

1. Determine pump capacity:

A. Gravity distribution

1. Minimum required discharge is 10 gpm
2. Maximum suggested discharge is 45 gpm. For other establishments at least 10% greater than the water supply rate, but no faster than the rate at which effluent will flow out of the distribution device.

B. Pressure distribution

See pressure distribution work sheet

From A or B Selected pump capacity: 28.9 gpm

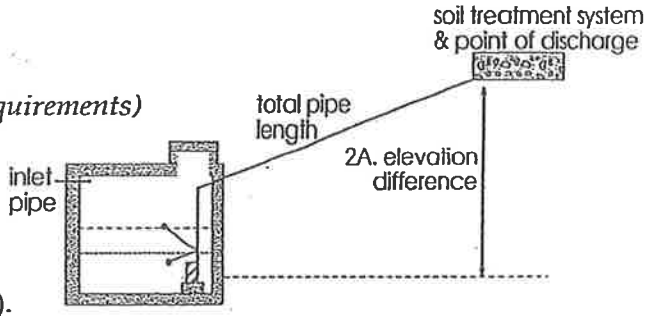
2. Determine pump head requirements:

A. Elevation difference between pump and point of discharge?

8 feet

B. Special head requirement? *(See Figure at right - Special Head Requirements)*

5 feet



C. Calculate Friction loss

1. Select pipe diameter 2 in
2. Enter *Figure E-9* with gpm (1A or B) and pipe diameter (C1).

   Read friction loss in feet per 100 feet from Figure E-9

   Friction Loss = 1.5 ft/100ft of pipe
3. Determine total pipe length from pump discharge to soil treatment discharge point. Estimate by adding 25 percent to pipe length for fitting loss. Total pipe length times 1.25 = equivalent pipe length

   30 feet x 1.25 = 37.5 feet
4. Calculate total friction loss by multiplying friction loss (C2) in ft/100 ft by the equivalent pipe length (C3) and divide by 100.

   = 37.5 ft/100ft x 1.5 ÷100 = 1.7 ft

Special Head Requirements	
Gravity Distribution	0 ft
Pressure Distribution	5 ft

D. Total head required is the sum of elevation difference (A), special head requirements (B), and total friction loss (C4)

5 ft + 1.7 ft+ 8 ft =

Total head: 14.7 feet

E-9: Friction Loss in Plastic Pipe Per 100 feet			
	nominal pipe diameter		
flow rate gpm	1.5"	2"	3"
20	2.47	0.73	0.11
25	3.73	1.11	0.16
30	5.23	1.55	0.23
35	6.96	2.06	0.30
40	8.91	2.64	0.39
45	11.07	3.28	0.48
50	13.46	3.99	0.58
55		4.76	0.70
60		5.60	0.82
65		6.48	0.95
70		7.44	1.09

3. Pump selection

A pump must be selected to deliver at least 30 gpm (1A or B) with at least 15 feet of total head (2D)

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

Dave (signature) 1174 (license #) 7/6/16 (date)