FIELD EVALUATION SHEET

PRELIMINARY EVALUATION DATE 7-9-22, FIELD EVALUATION DATE 7-9-22
PROPERTY OWNER: Mark Leenay PHONE
ADDRESS: 20086 504th Lane CITY,STATE,ZIP: McGregor, MN 55760
LEGAL DESCRIPTION: Lot 5
PIN# 29-0-018501 SEC 8 T 49 R 23 TWP NAME Shamrock
FIRE# LAKE/RIVER Big Sandy Lake 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 %	0	
DIRECTION OF SLOPE	NA	
LANDSCAPE POSITION	Summit	
VEGETATION TYPES	Grass / wooded	

REFERENCE BM ELEV. FT.
REFERENCE BM DESCRIPTION

DEPTH TO STANDING WATER OR MOTTLED SOIL: BORING# 1 58", 1A , 2 50", 2A

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

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

CONSTRUCTION RELATED ISSUES:

LIC# 910 SITE EVALUATOR SIGNATURE: Ernie Darlow Jr
SITE EVALUATOR NAME: Ernie Darlow Jr. TELEPHONE# 218-426-4320
LUG REVIEW DATE 7-9-22
Comments: Gravity line out of cabin into a 1650 gallon combo tank pumped into a 2 bedroom pressure bed drain field.

SOIL BORING LOGS ON REVERSE SIDE

Form des 2/20/98

SOILS CHARTS FOR BOTH PROPOSED AND ALTERNATE SITES

1 (PROPOSED) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-7"	Top Soil	10yr 3/1
7"-48"	Sand	10yr 4/4
48"-66"	Sand	10yr 5/4
Mottles @ 58"	Lighter reds & grey	

2 (PROPOSED) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-6"	Top Soil	10yr 3/1
6"-40"	Sand	10yr 4/4
40"-60"	Sand	10yr 5/4
Mottles @ 50"	Lighter reds + grey	

1 (ALTERNATE) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR

2 (ALTERNATE) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR

ADDITIONAL SOIL BORINGS MAY BE REQUIRED

TRENCH AND BED WORKSHEET

1. AVERAGE DESIGN FLOW
A. Estimated 300 gpd gpd *(see figure A-1)*
or measured ___ x 1.5 *(safety factor)* = ___ gpd
B. Septic tank capacity _____ gal *(see figure C-1)*

2. SOILS *(Site evaluation data)* (50")
C. Depth to restricting layer = 4.16 ft
D. Max depth of system Item 2C - 3 ft = 4.16 ft - 3 ft = 1.16 ft (14")
E. Texture Sand Percolation rate _____ MPI
F. Soil Sizing Factor (SSF) 1.27 sqft/gpd *(see figure D-15)*
G. % Land Slope 0 %

3. TRENCH or BED BOTTOM AREA
H. For trenches with 6 inches of rock below the pipe:
A x F = 300 gpd x 1.27 sqft/gpd = 381 sqft
I. For trenches with 12 inches of rock below the pipe:
A x F x 0.8 = _____ gpd x _____ sqft/gpd x 0.8 = _____ sqft
J. For trenches with 18 inches of rock below the pipe:
A x F x 0.66 = _____ gpd x _____ sqft/gpd x 0.66 = _____ sqft
K. For trenches with 24 inches of rock below the pipe:
A x F x 0.6 = _____ gpd x _____ sqft/gpd x 0.6 = _____ sqft
L. For gravity beds with 6 or 12 inches of rock below the pipe;
1.5 x A x F = 1.5 x ___ gpd x ___ sqft/gpd = ___ sqft
For pressure beds with 6 or 12 inches of rock below the pipe;
A x F = ___ gpd x ___ sqft/gpd = _____ sqft

4. DISTRIBUTION *(Check all that apply)*
X Bed (< 6% slope) ___ Drop boxes (any slope) X Rock
___ Trenches ___ Distribution box (< 3%) ___ Chamber
X Pressure ___ Gravity ___ Gravelless

5. SYSTEM WIDTH, LENGTH and VOLUME
M. Select trench width = 12 ft
N. If using rock, divide bottom area by width: (H, I, J,K or L) ÷ M =
381 sqft ÷ 12 ft = 32 lineal feet
Rock depth below distribution pipe plus 0.5 foot times bottom area:
Rock depth in feet + 0.5 feet x Area (H,I,J,K, or L)
(.5 ft + 0.5 ft) x 381 sqft = 381 cuft
Volume in cubic yards = cuft ÷27
381 cuft ÷ 27 = 15 cuyds
Weight of rock in tons = cubic yds x 1.4
15 cuyds x 1.4 = 20 tons
O. If using 10" Gravelless Pipe, Flow (A) x Gravelless SSF*(see figure D-9)*
_____ gpd x ___ lineal feet/gpd = _____ lineal feet
P. If using Chambers, H,I,J, or K(based on hieght of chamber slats) ÷ width of chamber in feet(M)
_____ sqft ÷ _____ ft= _____ lineal ft

6. LAWN AREA
Q. Select trench spacing, center to center = 12 feet
R. Multiply trench spacing by lineal feet R x Q = sqft of lawn area
12 ft x 32 ft = 381 sqft

7. Include a drawing with scale (one inch = 40 ft). Show pertinent boundaries, right of way, easements, location of house, garage, driveway, all other imporvements, existing or proposed soil treatment system, well and dimensions of all elevations, setbacks and separation distances.

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

Ernie Darko (signature) 910 (license #) 7-9-22 (date)

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% of the values in the Class I, II, or III columns.
3	450	300	218	
4	600	375	256	
5	750	450	294	
6	900	525	332	
7	1050	600	370	
8	1200	675	408	

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

D-15: Soil Characteristics and Soil:Sizing Factor (SSF) (> 3' separation)

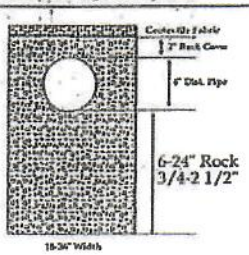
Percolation Rate minutes per inch (mpi)	Soil Texture	Soil Sizing Factor square feet/gallon per day(sqft/gpd)
faster than 0.1*	Coarse sand	0.83
0.1 to 5*	Medium sand Loamy sand	0.83
0.1 to 5**	Fine sand	1.67
6 to 15	Sandy loam	1.27
16 to 30	Loam	1.67
31 to 45	Silt loam Silt	2.00
46 to 60	Clay loam Sandy clay Silty clay	2.20
over 61 to 120***	Clay Sandy clay Silty clay	4.20
slower than 120****		

*Use systems for rapidly permeable soils: pressure distribution or serial distribution with no trench >25% of the total system.
**Soil having 50% or more fine sand plus very fine sand
***A mound must be used.
****An other or performance system must be used

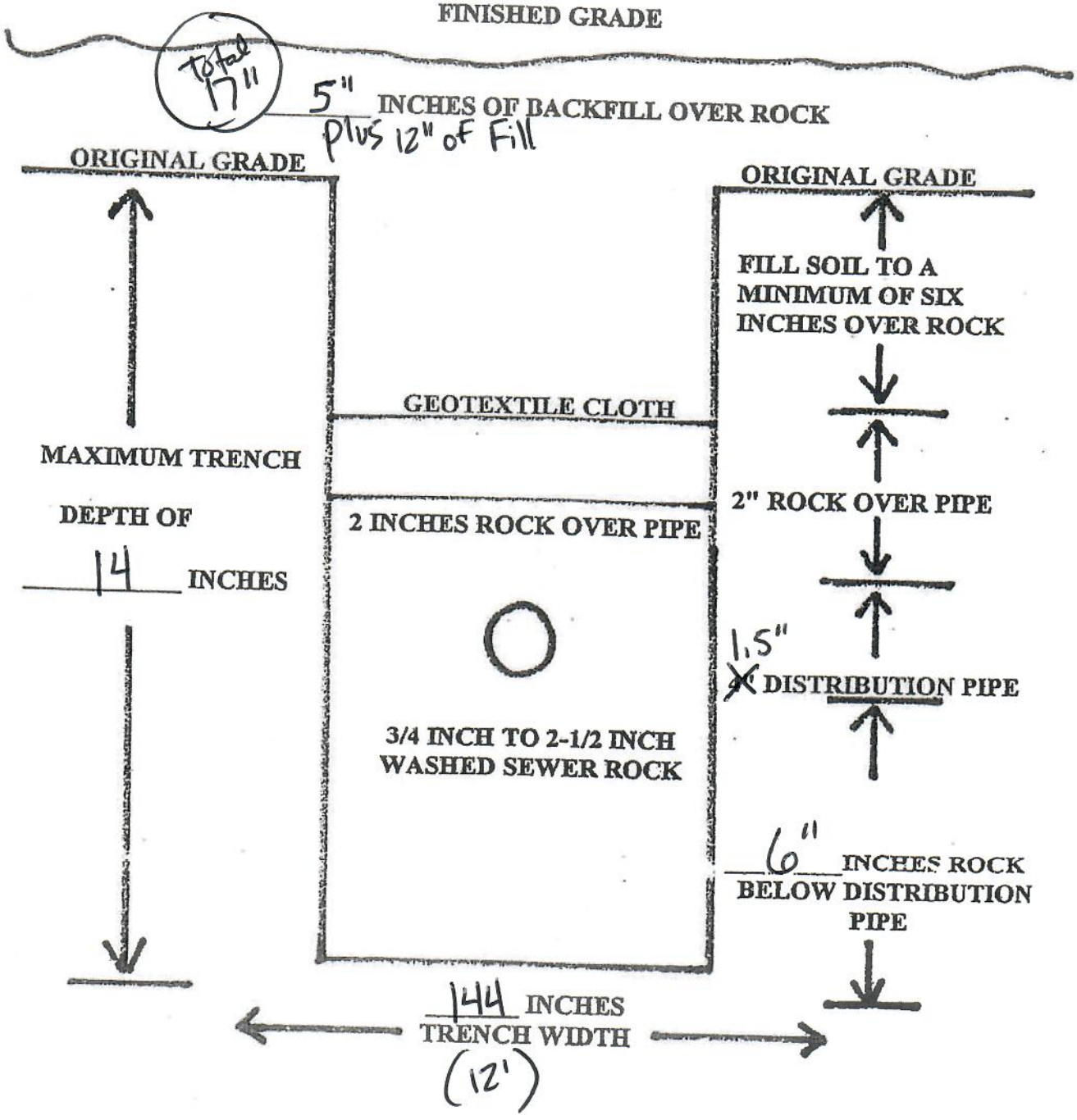
D-9: Soil Characteristics and Soil sizing factors (SSF) for Gravelless Pipe

percolation rate (minutes/inch)	soil texture	lineal feet/ gallon/day
Faster than 0.1 *	Coarse Sand	---
0.1 to 5	Medium Sand Loamy Sand	0.28
0.1 to 5	Fine Sand **	0.6
6 to 15	Sandy Loam	0.42
16 to 30	Loam	0.56
31 to 45	Silt Loam Silt	0.67
46 to 60	Clay Loam (CL) Sandy CL Silty CL	0.74
slower than 60***	Clay Sandy Clay Silty Clay	---

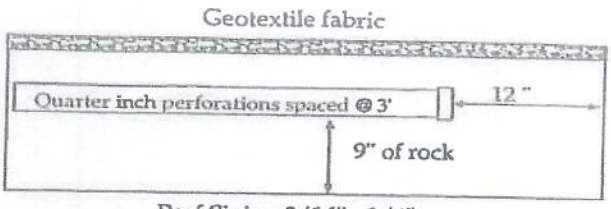
*Soil too coarse for sewage treatment. Use systems for rapidly permeable soils.
**Soil having 50% or more fine sand + very fine sand.
***Soil with too high a percentage of clay for installation of a standard inground system.



TRENCH CROSS-SECTION



PRESSURE DISTRIBUTION SYSTEM



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

1. Select number of perforated laterals 4

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.

   32 (Rock layer length) - 2 ft = 30 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 = 30 ft ÷ 3 ft = 10 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.*

   10 spaces + 1 = 11 perforations/lateral

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

   11 perfs/lat x 4 lat = 44 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)
   12 ft x 32 ft = 381 sqft
   Square foot per perforation = Rock bed area ÷ number of perfs (6)
   381 sqft ÷ 44 perfs = 8.7 sqft/perf

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

   44 perfs x .56 gpm/perfs = 25 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 = 1.5 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 = 1.5 inches.

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

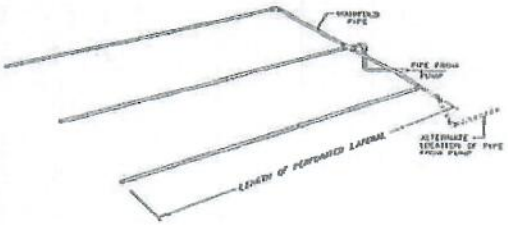
perforation spacing (feet)	1 inch	1.25 inch	1.5 inch	2.0 inch
2.5	8	14	18	28
3.0	8	13	17	26
3.3	7	12	16	25
4.0	7	11	15	23
5.0	6	10	14	22

E-6: Perforation Discharge in gpm

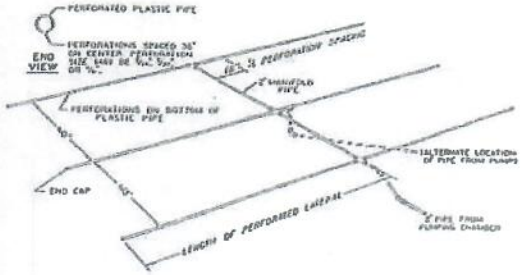
head (feet)	perforation diameter (inches) 1/8	3/16	7/32	1/4
1.0[a]	0.18	0.42	0.56	0.74
2.0[b]	0.26	0.59	0.80	1.04
5.0	0.41	0.94	1.26	1.65

[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.

Ernie Darla (signature) 910 (license #) 7-9-22 (date)

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

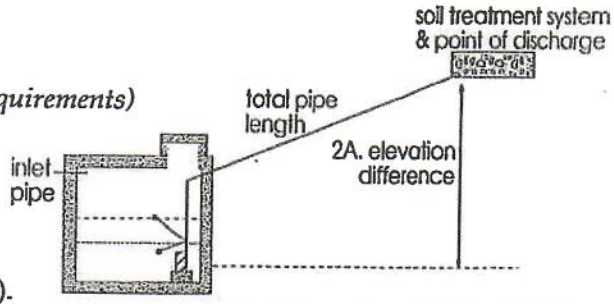
See pressure distribution work sheet

From A or B Selected pump capacity: 25 gpm

2. Determine pump head requirements:

A. Elevation difference between pump and point of discharge?
6 feet

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



Special Head Requirements	
Gravity Distribution	0 ft
Pressure Distribution	5 ft

C. Calculate Friction loss

1. Select pipe diameter 1.5 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 = 3.73 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
   15 feet x 1.25 = 18.75 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.
   = 3.73 ft/100ft x 18.75 ÷100 = 1 ft

D. Total head required is the sum of elevation difference (A), special head requirements (B), and total friction loss (C4)
6 ft + 5 ft+ 1 ft =

Total head: 12 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

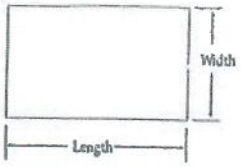
3. Pump selection

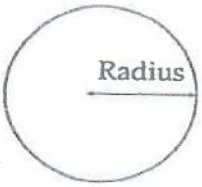
A pump must be selected to deliver at least 25 gpm (1A or B) with at least 12 feet of total head (2D)

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

Enrico Dark (signature) 910 (license #) 7-9-22 (date)

DOSING CHAMBER SIZING





1. Determine area
   A. Rectangle area = L x W
   _____ x _____ = _____ square feet
   B. Circle area = π (3.14) x radius in feet x radius in feet
   3.14 x _____ ft x _____ ft = _____ sqft
   C. Get area from manufacturer _____ sqft

2. Calculate gallons per inch
   There are 7.5 gallons per cubic foot of volume, therefore multiply the area (1A, B or C) times the conversion factor and divide by 12 inches per foot to calculate gallon per inch.
   Area x 7.5 ÷ 12 = _____ sqft x 7.5 ÷ 12 in/ft = 12.69 gallon per inch

3. Calculate total tank volume
   A. Depth from bottom of inlet pipe to tank bottom 48.5 in
   B. Total tank volume = depth from bottom of inlet pipe to tank bottom (3A) x gal/in (2)
   = 48.5 in x 12.69 gal/in = 615 gal

Legal Tank:
500 gallons or
100% the Daily flow
or
Alternating Pumps

4. Calculate gallons to cover pump (with 2-3 inches of water covering pump)
   (Pump and block height (inch) + 2 inch) x gallon/inch
   (14 in +2 in) x 12.69 gal/in = 203 gallon

5. Calculate total pumpout volume
   A. Select pump size for 4-5 does per day. Gallon per dose = gpd (see *figure A-1*)
   / doses per day = 300 gpd ÷ 4 doses/day = 75 gallons
   B. Calculate drainback
      1. Determine total pipe length, 15 feet
      2. Determine liquid volume of pipe, .11 gal per ft (*see figure E-20*)
      3. Drainback quantity = 15 ft (5B1) x .11 gal per ft (5B2) = 1.7 gal
   C. Total pump out volume = dose volume (5A) + drainback (5B3)
   75 gal + 1.7 gal = 77 Total gallon

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.

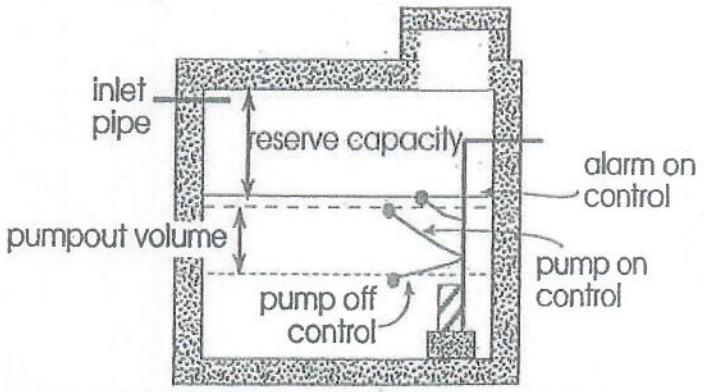
E-20: Volume of Liquid in Pipe	
Pipe Diameter *inches*	Gallons per foot
1	0.045
1.25	0.078
(1.5)	(0.11)
2	0.17
2.5	0.25
3	0.38
4	0.66

6. Float separation distance (using total pumpout volume)
   Total pumpout volume (5C) ÷ gal/inch (2)
   77 gal ÷ 12.69 gal/in = 6 inch

7. Calculate volume for alarm (typically 2 to 3 inches)
   Alarm depth (inch) x gallon/inch (2) = 2 in x 12.69 gal/in) = 25.4 gal

8. Calculate total gallon = gallons over pump (4) + gallons pumpout (5C) + gallons alarm (7)
   203 gal + 77 gal + 25.4 gal = 305.4 gallons

9. Total Tank Depth = total gallon (8) ÷ gallon/inch (2)
   305.4 gal ÷ 12.69 gal/in = 24 in



Recommended:
Calculate reserve capacity (75% the daily flow)
Daily flow x .75 = _____ x .75 = _____ gallons

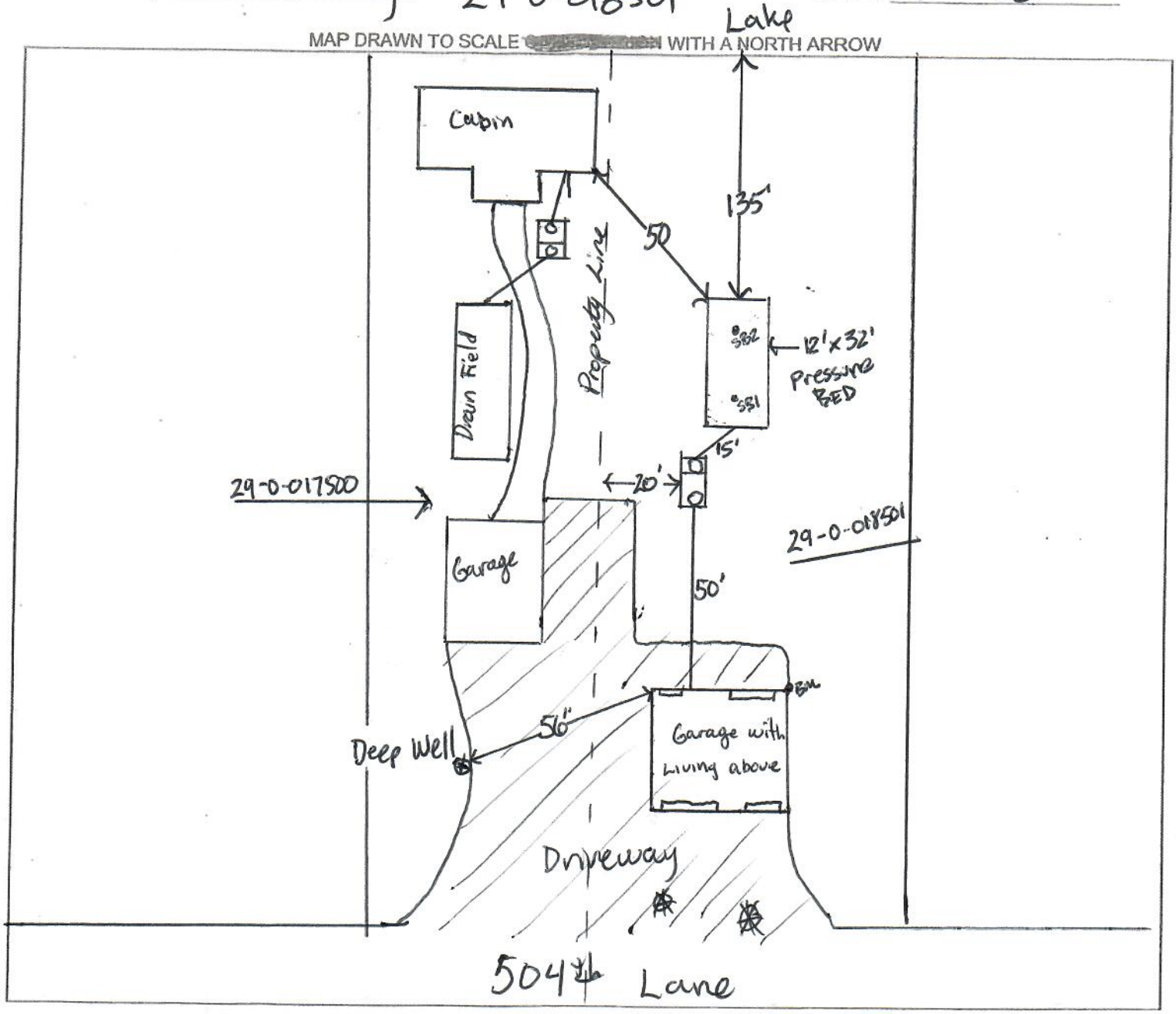
I hereby certify that I have completed this work in accordance with applicable ordinances, rules and laws.

Ernie Dark (signature) 910 (license #) 7-9-22 (date)

SKETCH SHEET

CLIENT: Mark Leenay 29-0-018501 DATE: 7-9-22

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
- ☐ PROPERTY LINES
- ☐ OHWL

COMMENTS:

INDICATE ELEVATIONS

100.0 BENCHMARK corner of garage
101.0 ELEVATION OF SEWER LINE @ HOUSE
102.0 ELEVATION @ TANK INLET
101.0 ELEVATION @ BOTTOM OF ROCK LAYER
104.0 ELEVATION @ BOTTOM OF BORING OR RESTRICTIVE LAYER
106.0 ELEVATION OF PUMP
100.5 ELEVATION OF DISTRIBUTION DEVICE

DESIGNER SIGNATURE Ernie Durken
LICENSE# 910 DATE 7-9-22