FIELD EVALUATION SHEET

PRELIMINARY EVALUATION DATE 7-12-19, FIELD EVALUATION DATE 7-12-19
PROPERTY OWNER: Scott Paulsen PHONE
ADDRESS: 49994 Kestrel Ave. CITY,STATE,ZIP: Aitkin, Mn 56431
LEGAL DESCRIPTION:
PIN# 10-0-015800 SEC 10 T 49 R 22 TWP NAME Haugen
FIRE# LAKE/RIVER Tamarack River LAKE CLASS NE OHWL FT.

DESCRIPTION OF SOIL TREATMENT AREAS

	AREA #1	AREA #2
DISTURBED AREAS	YES NO X	YES NO X
COMPACTED AREAS	YES NO X	YES NO X
FLOODING	YES NO X	YES NO X
RUN ON POTENTIAL	YES NO X	YES NO X
SLOPE %	0	0
DIRECTION OF SLOPE	—	—
LANDSCAPE POSITION	Backyard	Backyard
VEGETATION TYPES	grass	grass + brush

REFERENCE BM ELEV. FT.
REFERENCE BM DESCRIPTION

DEPTH TO STANDING WATER OR MOTTLED SOIL: BORING# 1 48", **1A** 51", **2** 48", **2A** 49"

BOTTOM ELEVATION--FIRST TRENCH OR BOTTOM OF ROCK BED: #1 10" **FT., #2** 10" **FT.**

SOIL SIZING FACTOR: SITE # 1 1.27, **SITE #2** 1.27

CONSTRUCTION RELATED ISSUES: Mottled Soil at 48-51" Bed must be 10" or less deep

LIC# 1054 SITE EVALUATOR SIGNATURE: Tom Antonsen
SITE EVALUATOR NAME: Tom Antonsen TELEPHONE# 218-851-7757
LUG REVIEW DATE

Comments:

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
7"	Topsoil	10yR 3/2
7-48"	Sand	10yR 4/4
48-51"	Sand	10yR 3/6

2 (PROPOSED) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
6"	Topsoil	10yR 3/2
6-48"	Sand	10yR 4/4
mottles past 48		

1 (ALTERNATE) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
6"	Topsoil	10yR 3/2
6-48"	Sand	10yR 4/4
mottles past 48"		

2 (ALTERNATE) SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
6"	Topsoil	10yR 3/2
6-49"	Sand	10yR 4/4
mottles past 49"		

ADDITIONAL SOIL BORINGS MAY BE REQUIRED

TRENCH AND BED WORKSHEET

1. AVERAGE DESIGN FLOW

A. Estimated 300 gpd *(see figure A-1)*
or measured ___ x 1.5 *(safety factor)* = ___ gpd

B. Septic tank capacity 1000 gal *(see figure C-1)* 1500 SAPTEC Compartment Tank (500 Lift)

2. SOILS *(Site evaluation data)*

C. Depth to restricting layer = 4 ft

D. Max depth of system Item 2C - 3 ft = 4 ft - 3 ft = 1 ft

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 = _____gpd x _____sqft/gpd = _____ 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 = 300 gpd x 1.27 sqft/gpd = 391 sqft 10 x 38

4. DISTRIBUTION *(Check all that apply)*

___ Bed (< 6% slope)	___ Drop boxes (any slope)	___ Rock
___ Trenches	___ Distribution box (< 3%)	___ Chamber
X Pressure	___ Gravity	___ Gravelless

5. SYSTEM WIDTH, LENGTH and VOLUME

M. Select trench width = _____ ft

N. If using rock, divide bottom area by width: (H, I, J,K or L) ÷ M =
_____sqft ÷ ____ ft= _____ 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)
(____ft + 0.5 ft) x ____sqft =_____cuft
Volume in cubic yards = cuft ÷27
_____cuft ÷ 27 = _____cuyds
Weight of rock in tons = cubic yds x 1.4
_____cuyds x 1.4 = _____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 10 X 38 Pressure Bed = 380 sq ft

Q. Select trench spacing, center to center = ____ feet

R. Multiply trench spacing by lineal feet R x Q = sqft of lawn area
_____ft x _____ft = _____ sqft

7. Include a drawing with scale (one inch = _____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.

Tom Tantoussom (signature) 1054 (license #) 7-19-20 (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%
3	450	300	218	of the
4	600	375	256	volues
5	750	450	294	in the
6	900	525	332	Class I,
7	1050	600	370	II, or III
8	1200	675	408	columns.

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)

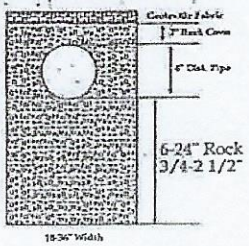
Percolation Rate minutes per inch (mpi)	Soil Texture	Soil Sizing Factor square feet/gallon per day(sqft/gpd)
faster than 0.1*	Coarse sand	0.83
0.1 to 5'	Medium sand Loamy sand	0.83
0.1 to 5**	Fine sand	1.67
6 to 15	Sandy loam	1.27
16 to 30	Loam	1.67
31 to 45	Silt loam Silt	2.00
46 to 60	Clay loam Sandy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

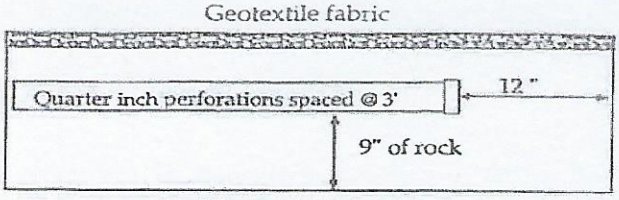
D-9: Soil Characteristics and Soil sizing factors (SSF) for Gravelless Pipe

percolation rate (minutes/inch)	soil texture	lineal feet/ gallon/day
Faster than 0.1 *	Coarse Sand	—
0.1 to 5	Medium Sand	0.28
	Loamy Sand	
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.



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 = 2.5 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 = 36 ft ÷ 2.5 ft = 14 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.*

   14 spaces + 1 = 15 perforations/lateral

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

   15 perfs/lat x 3 lat = 45 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 ÷ 45 perfs = 8.4 sqft/perf

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

   45 perfs x .74 gpm/perfs = 33 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 = _____ inches.

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

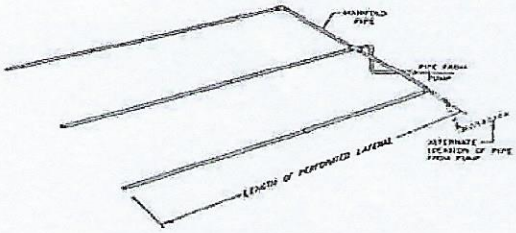
perforation spacing (feet)	1 inch	1.25 inch	1.5 inch	2.0 inch
2.5	8	14	18	28
3.0	8	13	17	26
3.3	7	12	16	25
4.0	7	11	15	23
5.0	6	10	14	22

E-6: Perforation Discharge in gpm

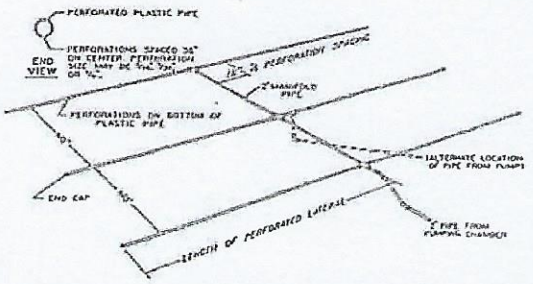
head (feet)	perforation diameter (inches)			
	1/8	3/16	7/32	1/4
1.0[a]	0.18	0.42	0.56	0.74
2.0[b]	0.26	0.59	0.80	1.04
5.0	0.41	0.94	1.26	1.65

[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.

Tom Antonsen (signature) 1057 (license #) 7-19-20 (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: 33 gpm

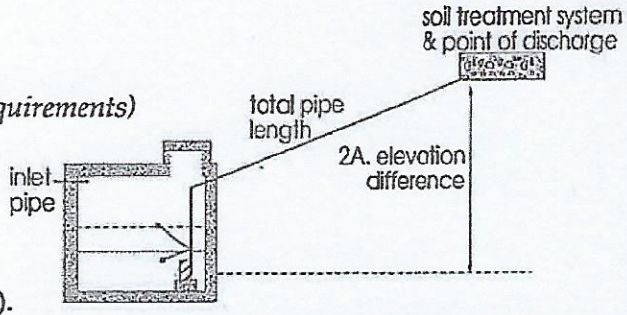
2. Determine pump head requirements:

A. Elevation difference between pump and point of discharge?

9 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 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 = 2.06 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

   85 feet x 1.25 = 106.25 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.

   = 2.06 ft/100ft x 106.25 ÷100 = 2 ft

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

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

9 ft + 5 ft + 2 ft =

Total head: 16 feet

3. Pump selection

A pump must be selected to deliver at least 33 gpm (1A or B) with at least 16 feet of total head (2D)

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

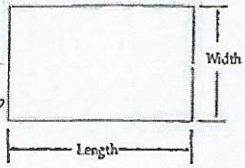
Tom Antosca (signature) 1054 (license #) 7-19-20 (date)

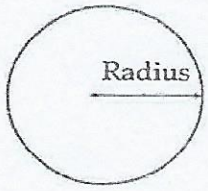
DOSING CHAMBER SIZING

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

Using 1500 Compartment Septic Tank 500 sqft - 42" deep

~~13~~ 9pI / 12





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 = ~~13~~ / 12 gallon per inch

3. Calculate total tank volume
   A. Depth from bottom of inlet pipe to tank bottom 42 in
   B. Total tank volume = depth from bottom of inlet pipe to tank bottom (3A) x gal/in (2)
   = 42 in x 12 gal/in = 504 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
   (12 in +2 in) x 12 gal/in = 168 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.

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, 85 feet
      2. Determine liquid volume of pipe, .17 gal per ft (*see figure E-20*)
      3. Drainback quantity = 85 ft (5B1) x .17 gal per ft (5B2) = 14.5 gal
   C. Total pump out volume = dose volume (5A) + drainback (5B3)
   75 gal + 14.5 gal = 89.5 Total gallon

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

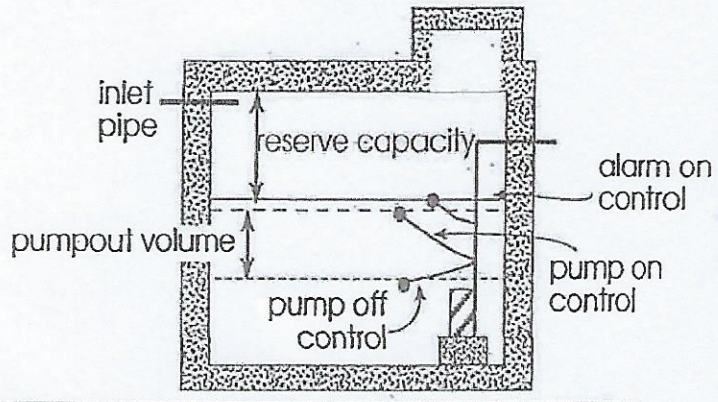
6. Float separation distance (using total pumpout volume)
   Total pumpout volume (5C) ÷ gal/inch (2)
   89.5 gal ÷ 12 gal/in= 7.5 inch

7. Calculate volume for alarm (typically 2 to 3 inches)
   Alarm depth (inch) x gallon/inch (2) = 3 in x 12 gal/in) = 36 gal

8. Calculate total gallon = gallons over pump (4) + gallons pumpout (5C) + gallons alarm (7)
   168 gal + 89.5 gal + 36 gal = 293.5 gallons

9. Total Tank Depth = total gallon (8) ÷ gallon/inch (2)
   293.5 gal ÷ 12 gal/in = 24.5 in

Recommended:
Calculate reserve capacity (75% the daily flow)
Daily flow x .75 = 300 x .75 = 225 gallons



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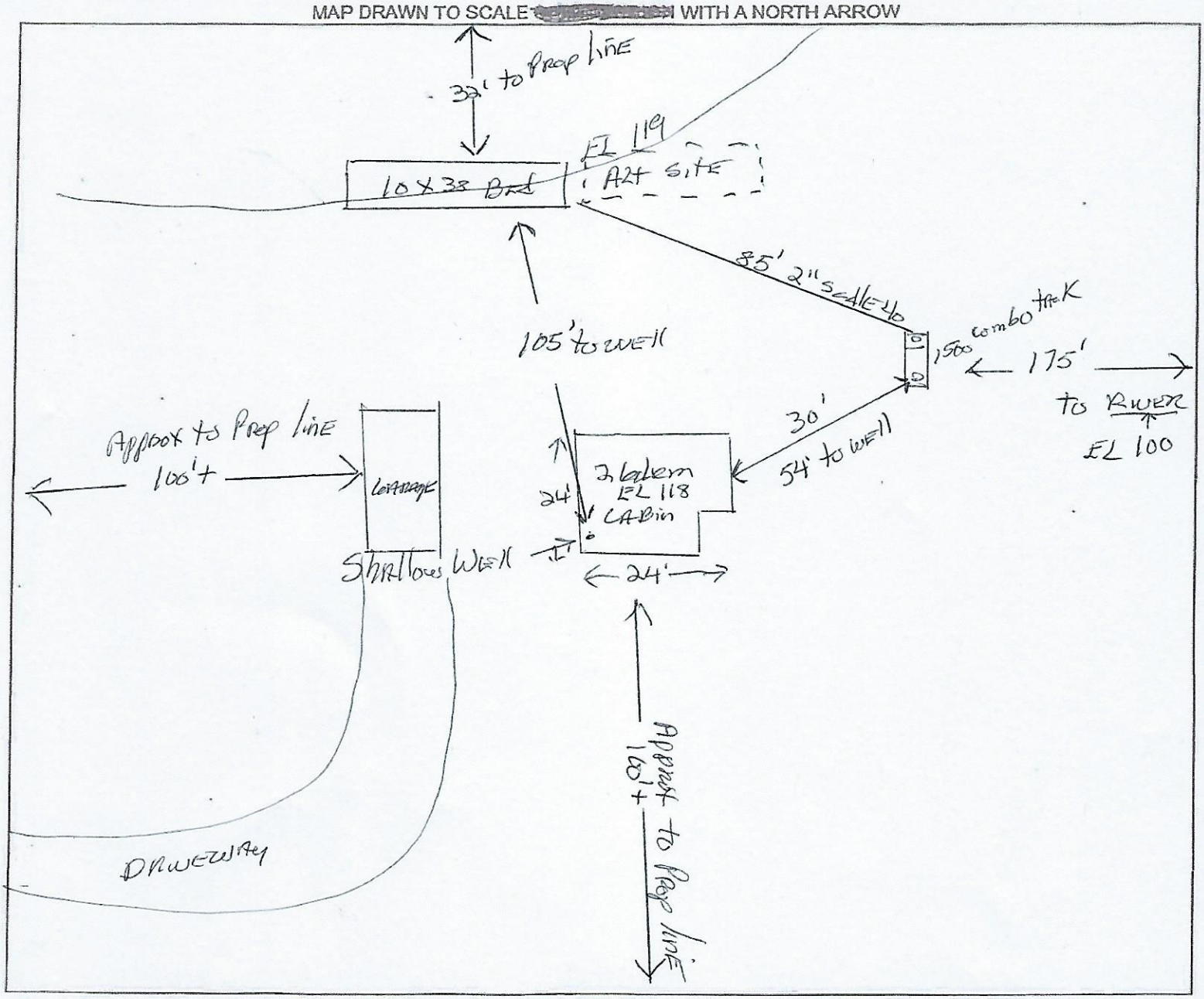
Tom Untiedt (signature) 1054 (license #) 7-19-20 (date)

SKETCH SHEET

CLIENT: Scott Paulsen DATE: 7-19-20

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:

DESIGNER SIGNATURE Tom Anderson

LICENSE# 1054

DATE 7-19-20

INDICATE ELEVATIONS

BENCHMARK	River = 100
ELEVATION OF SEWER LINE @ HOUSE	116
ELEVATION @ TANK INLET	115
ELEVATION @ BOTTOM OF ROCK LAYER	118
ELEVATION @ BOTTOM OF BORING OR RESTRICTIVE LAYER	115
ELEVATION OF PUMP	110
ELEVATION OF DISTRIBUTION DEVICE	118.5