FIELD EVALUATION SHEET

PRELIMINARY EVALUATION DATE Oct. 23, 2019, FIELD EVALUATION DATE Oct. 23, 2019
PROPERTY OWNER: Gene Kelling PHONE
ADDRESS: 44638-State Hwy. 210 CITY, STATE, ZIP: Aitkin, Mn. 56431
LEGAL DESCRIPTION: W-330ft. of W-660ft of NE-SW
PIN# 01-0-070102 SEC 29 T 47 R 27 TWP NAME Aitkin
FIRE# 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 %		
DIRECTION OF SLOPE	S-N	
LANDSCAPE POSITION	E-W	
VEGETATION TYPES	Wooded	

REFERENCE BM ELEV. 100 FT.
REFERENCE BM DESCRIPTION Next to house by box with hose in it

DEPTH TO STANDING WATER OR MOTTLED SOIL: BORING# 1 14", 1A 15", 2 ,2A

BOTTOM ELEVATION–FIRST TRENCH OR BOTTOM OF ROCK BED: #1 102.5 FT., #2 FT.

SOIL SIZING FACTOR: SITE # 1 1.67, SITE #2

CONSTRUCTION RELATED ISSUES: Several large trees must be cut. The closer to the top of the slope by the field the flater the slope, but other trees may have to be cut

LIC# 22132 SITE EVALUATOR SIGNATURE: Tom O'Neil

SITE EVALUATOR NAME: Tom O'Neil TELEPHONE# 218-927-6070

LUG REVIEW DATE

Comments:

SOIL BORING LOGS ON REVERSE SIDE

APPROVED
✓ ONSITE INSPECTION
NO ONSITE INSPECTION
RS

Form des 2/20/98

SOILS DATA

#1

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-6	Sandy loam	10yr 3/2
6-12	fine Sand	10yr 4/4
12-30	fine Sand	10yr 4/6

Mottles at 14"

SOILS DATA

#2

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR
0-6	Sandy loam	10yr 3/2
6-16	fine Sand	10yr 4/4
16-40	fine Sand	10yr 4/6

Mottles at 15"

SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR

APPROVED
___ ONSITE INSPECTION
✓ NO ONSITE INSPECTION
SIGN [illegible] DATE 11/1/19

SOILS DATA

DEPTH (INCHES)	TEXTURE	MUNSELL COLOR

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

1,000 gallons *(see figure C-1)*
use a 1650 Combo Tank

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 = 1 feet
2. Depth of percolation tests = _____ feet
3. Texture Sandy loam topsoil
   Percolation rate 6-15 mpi
4. Soil loading rate .79 gpd/sqft *(see figure D-33)*
5. Percent land slope 8 %

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 = 375 sqft
2. Determine rock layer width = 0.83 sqft/gpd x linear Loading Rate (LLR)
   0.83 sqft/gpd x 12 gpd/sqft = 10 ft
3. Length of rock layer = area ÷ width =
   375 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

√ NO ONSITE INSPECTION
DATE 11/6/19

F. SEWAGE ABSORPTION WIDTH

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

1.5 x 10 ft = 15 ft

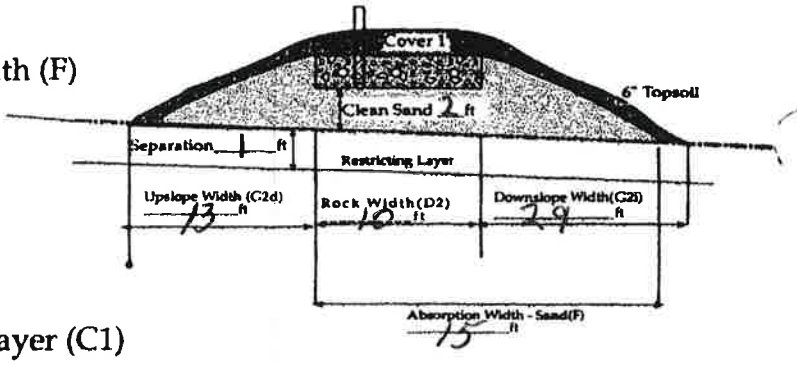
D-33: Absorption Width Sizing Table

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

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

Landslope > 1% slope



1. Downslope absorption width = absorption width (F) minus rock layer width (D2)
15 ft - 10 ft = 5 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
3.03 *(see figure D-34)*

d. Upslope width = berm multiplier (G2c) times upslope mound height (G2b):
3.03 x 4 ft = 13 ft

DOWNSLOPE

e. Drop in elevation = rock layer width (D2) times percent landslope (C5) + 100
12 ft x 8 % + 100 = 1 ft

f. Downslope mound height = depth of clean and for slope difference (G2e) at downslope rock edge plus the mound height at the upslope edge of rock layer (G2b)
1 ft + 4 ft = 5 ft

g. Downslope berm multiplier based on percent land slop
5.88 *(see figure D-34)*

h. Downslope width = downslope multiplier (G2g) times downslope mound height (G2f)
5.88 x 5 ft = 29 ft

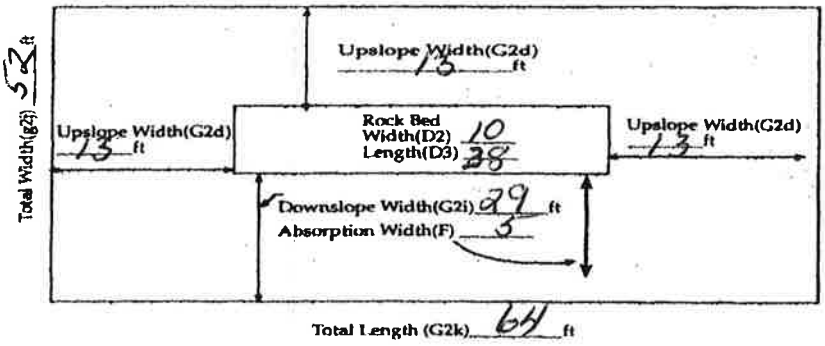
Select the greater of G1 and G2h as the downslope width: 29 ft

Total mound width is the sum of upslope width (G2d) width plus rock layer width (D2) plus downslope width (G2i)
13 ft + 10 ft + 29 ft = 52 ft

Total mound length is the sum of upslope width (G2d) plus rock layer length (D3) plus upslope width (G2d)
13 ft + 38 ft + 13 ft = 64 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:
52 x 64

~~ONSITE INSPECTION~~
~~NO ONSITE INSPECTION~~

RS 11/1/19
SIGNATURE DATE

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

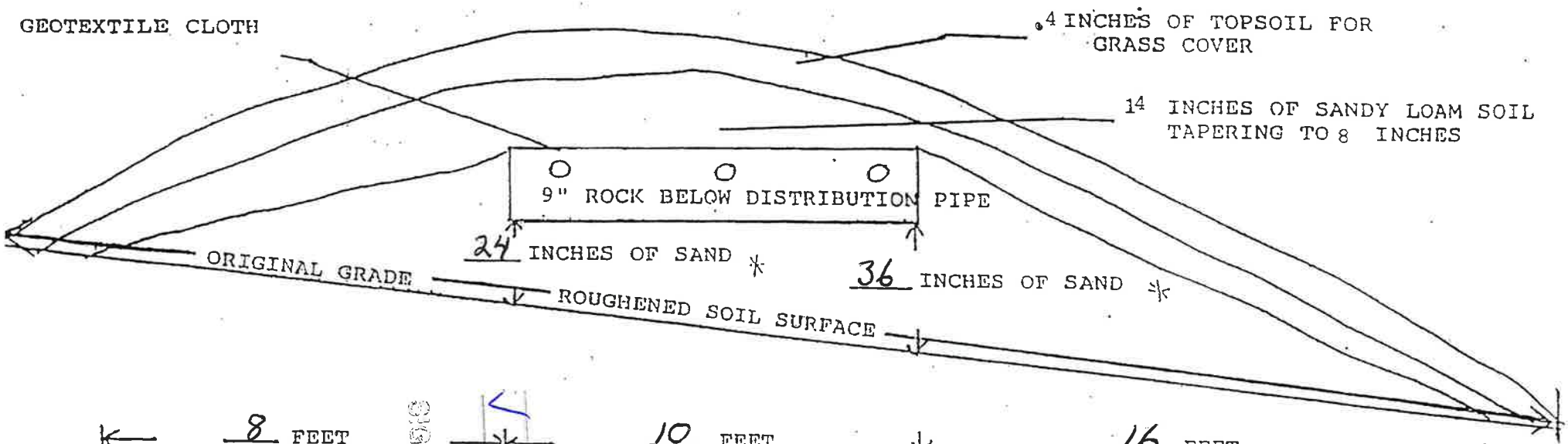
Tom O'Neil (signature) 42132 (license #) Oct. 23 2019 (date)

MOUND CROSS-SECTION

8 PERCENT SLOPE OF ORIGINAL SOIL

10 FT. x 38 FT. SIZE OF ROCKBED

34 FT. x 54 FT. SIZE OF SANDBASE



8 FEET
UPSLOPE SAND WIDTH

10 FEET
WIDTH OF ROCKBED

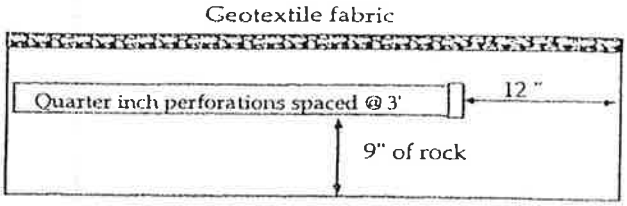
16 FEET
DOWNSLOPE SAND WIDTH

13 FEET
UPSLOPE COVER WIDTH

10 FEET
WIDTH OF ROCK

29 FEET
DOWNSLOPE COVER WIDTH

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 = 36 ft ÷ 3 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 = 9.07 sqft/perf

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

   39 perfs x .74 gpm/perfs = 29 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 = 1.25 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 inches.

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

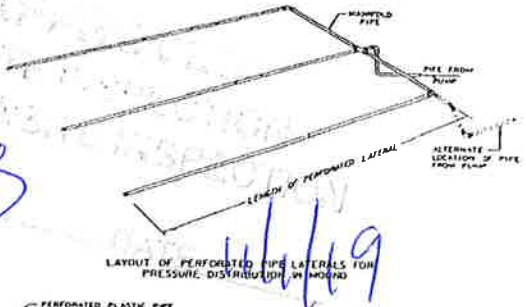
perforation spacing (feet)	1 inch	1.25 inch	1.5 inch	2.0 inch
2.5	8	14	18	28
3.0	8	13	17	26
3.3	7	12	16	25
4.0	7	11	15	23
5.0	6	10	14	22

E-6: Perforation Discharge in gpm

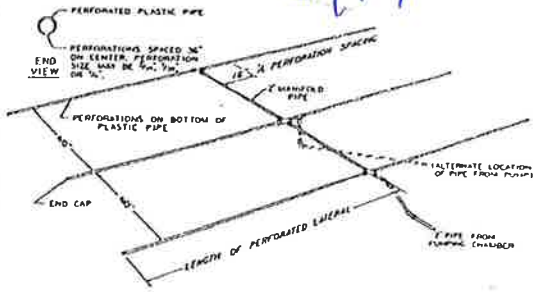
head (feet)	perforation diameter (inches) 1/8	3/16	7/32	1/4
1.0[a]	0.18	0.42	0.56	0.74
2.0[b]	0.26	0.59	0.80	1.04
5.0	0.41	0.94	1.26	1.65

[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 ON MOUND



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

Tom O'Neil (signature) L2132 (license #) Oct. 23, 2019 (date)

PUMP SELECTION PROCEDURE

A. Determine pump capacity

Gravity distribution

1. Minimum is 10 GPM
2. Maximum is 45 GPM

Pressure Distribution

3. a. Select number of perforated laterals 3.
   b. Select perforation spacing = 3 ft.
   c. Subtract 2 ft from rock layer length:
   38 - 2 = 36 feet. (Length of Laterals)

ROCK LAYER LENGTH

   d. Determine the number of spaces between perfs:
   36 / 3 = 12 spaces
   (length of lateral) / (perf. spacing)
   e. 12 spaces + 1 = 13 perforations per lateral
   f. Multiply perforations per lateral by number of laterals to get total number of perforations:
   13 x 3 = 39
   (perfs/lateral) x (laterals) = (perforations)
   g. 39 X .74 = 29 GPM
   (Perforations) x (gpm/perfs)

SELECTED PUMP CAPACITY 29 GPM

B. Determine head requirements:

1. Elevation difference beteween pump & point of discharge:
   18 feet
2. If pumping to a pressure distribution system, add 5 feet; for gravity add zero: 5 feet
3. Friction Loss
   a. Enter friction loss table with GPM and pipe diameter. Read friction loss in feet per 100 ft in table.
   F.L. = 1.55 ft/100 of pipe
   b. Determine total pipe length from pump to discharge point. Add 25% to pipe length for fitting loss.
   67 length x 1.25 84 feet.
   c. Calculate total friction loss by multiplying friction loss in 100 ft. of pipe by equivalent pipe length (B):

Total friction loss = 1.55 x 84 /100 = 2 feet

4. Total head required is the sum of the elevation difference, special head requirements and total friction loss:

18 (1) + 5 (2) + 2 (3c) **TOTAL HEAD** 25

SELECT A PUMP TO DELIVER AT LEAST 29 GPM WITH AT LEAST 25 FEET OF TOTAL HEAD.

If laterals are connected to a header pipe in a pressure system, select the minimum size lateral diameter; enter the table with perforation spacing and the number of perforations per lateral.

Select minimum size of lateral 1 1/4

For a center manifold system the values will be ½ of above.

Perforation Discharges in GPM

Head (feet)	Perforation diameter (inches) 7/32	1/4
1.0a	0.56	(0.74)
1.5	0.69	0.90
2.0b	0.80	1.04

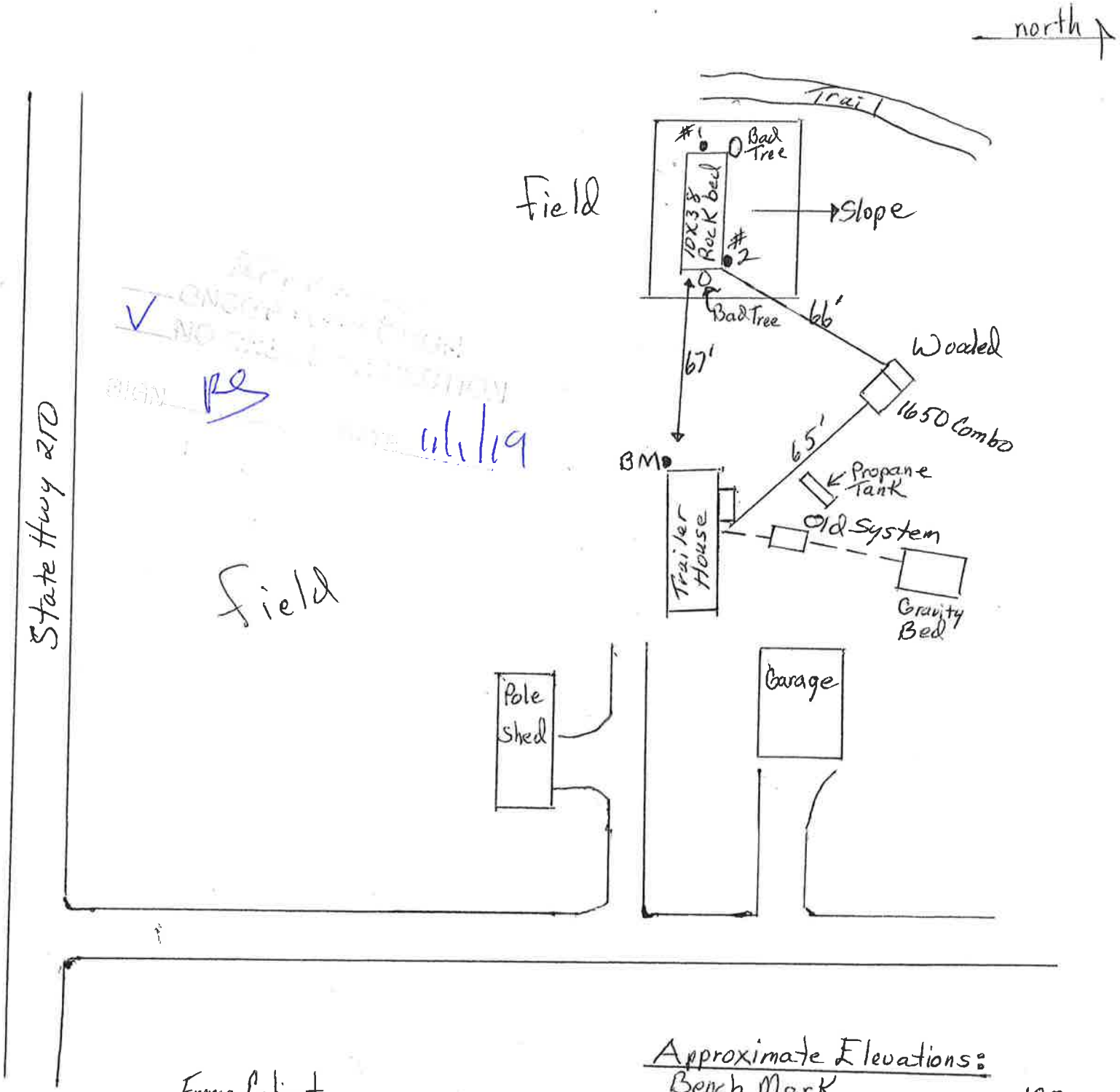
a. Use 1.0 foot single homes
b. Use 2.0 feet for anything else

FRICTION LOSS IN PLASTIC PIPE

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

Max. No. of 1/4" perfs per lateral. (10%var)

Perforation spacing. (feet)	1 1/4"	1 1/2"'	2"
2.5 feet	14	18	28
3.0 feet	13	17	26
3.3 feet	12	16	25
4.0 feet	11	15	23
5.0 feet	10	14	22



Approximate Elevations:

Bench Mark	100
Tank Inlet	89
Pump Elevation	85
Manifold	103
Bottom of Rock	102.25

Subsurface Sewage Treatment System Management Plan

Property Owner: Gene Kelling Phone: 218-927-3084 Date: Oct 23, 2019

Mailing Address: 44999-310th Street City: Aitkin, Mn. Zip: 56431

Site Address: 44638-State Hwy. 210 City: Aitkin, Mn. Zip: 56431

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 service provider.

System Designer: check every _____ months.
Local Government: check every _____ months.
State Requirement: check every 36 months.

(State requirements are based on MN Rules Chapter 7080.2450, Subp. 2 & 3)

My System needs to be checked every 36 months.

Homeowner Management Tasks

Leaks – Check (look, listen) for leaks in toilets and dripping faucets. Repair leaks promptly.

Surfacing sewage – Regularly check for wet or spongy soil around your soil treatment area.

Effluent filter – Inspect and clean twice a year or more.

Alarms – Alarm signals when there is a problem. Contact a service provider any time an alarm signals.

Event counter or water meter – Record your water use.

-recommend meter readings be conducted (*circle one:* DAILY WEEKLY MONTHLY)

Professional Management Tasks Have Tank Pumper check these when tank is pumped

- [x] Check to make sure tank is not leaking
- [x] Check and clean the in-tank effluent filter
- [x] Check the sludge/scum layer levels in all septic tanks
- [x] Recommend if tank should be pumped sooner
- [x] Check inlet and outlet baffles
- [ ] Check the drainfield effluent levels in the rock layer
- [x] Check the pump and alarm system functions
- [ ] Check wiring for corrosion and function
- [ ] Check dissolved oxygen and effluent temperature in tank
- [x] Provide homeowner with list of results and any action to be taken
- [ ] Flush and clean laterals if cleanouts exist

APPROVED
ONSITE INSPECTION
✓ NO ONSITE INSPECTION
SIGN PS DATE 11/1/19

"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 the 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: _____

Designer Signature: Tom O'Neil Date: Oct 23, 2019

See Reverse Side for Management Log

AITKIN COUNTY

Parcel Description -

INQPCL-1

Press Enter to continue or enter new parcel/tax year: 01-0-070102 2020

Parcel/Acct: 01-0-070102 768 GIS
Primary owner: 105592 KELLING, GENE
Taxpayer: 105592 KELLING, GENE
Undeliverable Tax Address: N
Ref. parcel: 00201000070102 **Unit:**
Lake #/Name:
Physical adr: 44638 STATE HWY 210
AITKIN 56431
User defined:

UTA-Twp/City: 1 AITKIN TWP
School: 1 AITKIN
State UTA: 1 1 00

Legal: W 330 FT OF W 660 FT OF NE-SW
(version 1)

Asmt/Tax year: 2019 / 2020 **Type:** RE **Data set:** PRD Production
Escrow:
FALCO: 1 F.O. **Notes:**
Hold tax stmt: **Emergency #:**
Lease type: **Surveyed:**
Com district: 1 **UDI:** 100.00%
MH court nbr: **Billing:** P
TIF district:
TIF Knock down date:

Unique Taxing Area

AMBU	****	****	****
00	00	00	00

Legal Description

Acres: 10.00 **Lot/Block:** /
Plat/Desc:
Sec/Twp/Rge: 29 47.0 27

lightgray #cdd8c6 #d8d0c4 lightsteelblue