

Total Outdoor Solutions

4698 269th Ave NE
Isanti, MN 55040
612-490-3142 Cert # 114 Lic # 4203

*updated
with a (ew) to
10/19/22*

Date: 10/19/22

Contractor/Homeowner: Steve Storlie

Property address: 16040 478th Ln

City: Tamarac Permitting Authority: Aitkin County

This On-Site Sewage Treatment System is designed for a Type I, Shop (150 GPO flow) Shop in accordance with Minnesota Pollution Control Agency Chapter 7080 and local ordinance.

A seasonally high-water table or saturated soil layer was located at 19" (mottled soil). The bottom of the rock bed must be located at least 3' above the seasonally high-water table or saturated soil.

All wells are located greater than 50' away from proposed treatment system.

Keep all heavy equipment off the proposed area before and after construction. The treatment area should be marked off before construction. This design is not valid and the system will need to be relocated if failure to protect the area proposed for On-Site Sewage Treatment occurs.

With proper installation and maintenance, this system should have no problems treating septic effluent efficiently. Nothing other than gray water (laundry, shower, etc.), human waste and toilet tissue should be disposed of into the septic tank. Garbage disposals are not recommended. Smaller amounts of laundry soaps, dish soaps, cleaning agents, etc. are better for the system. Antibacterial soaps and chlorine agents may kill the bacteria needed to treat septic effluent properly. Additives are not recommended; they may cause harmful damage to your system. Recommended to pump and clean your tanks by a certified pumper every other year if you have 1 tank and every 2-3 years if you have a 2-tank system to insure proper maintenance.

Septic tank: 1500/2	System Type: Mound
Pump Size: 25GPM @14' of Head	Rock below pipe: 6"
Amount of Rock: 9 yards or 13 tons	Amount of washed sand: 74yards or 1041tons
Loamy Cap: 34yards or 48 ton	Topsoil: 41 yards or 57ton

If you have any questions feel free to call me at: 612-490-3142

**Michael Jungbauer
MPCA C 114**



Mound Design

Property Owner: **Steve Storie**

Date: **10/19/2022**

Site Address: **16040 478th Ln McGregor**

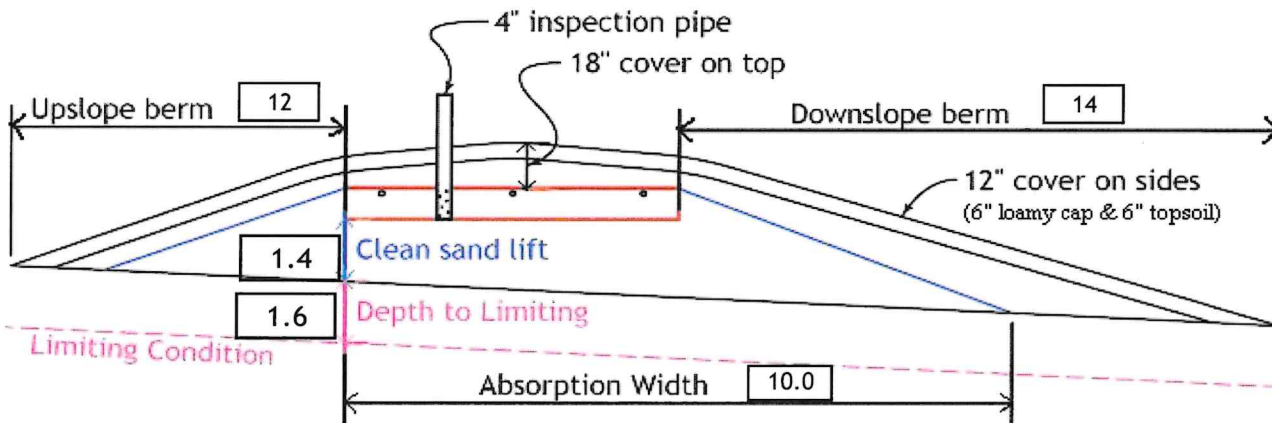
PID: **29-1-501103**

Comments: Large storage garage with entertainment area

Instructions: = enter data = adjust if desired = computer calculated - DO NOT CHANGE!

- 1) bedroom Type Other Establishment System
- 2) GPD design flow
- 3) Garbage disposal or pumped to septic
- 4) Gal Septic tank (code minimum) Gal Septic tank (design size / LUG req'd)
Tank options: none
- 5) GPD/ft² mound sand loading rate contour loading rate of req's a min ft. long rockbed
- 6) ft rockbed width ft rockbed length
- 7) ft lateral spacing ft perforation spacing (maximum of 3 for both)
 manifold connection
- 8) laterals feet long perfs / lateral perfs total
(1/2 a perf means the first perf starts at the middle feed manifold)
- 9) inch perfs at feet residual head gives gpm flow rate per perforation
for this perf size & spacing, & pipe size on line 12, max perfs/lateral = , line #8 must be less --> **OK**
- 10) doses per day (4 minimum)
- 11) gallons per dose (treatment volume)
- 12) inch diameter laterals must be used to meet "4x pipe volume" requirement
- 13) feet of inch supply line leads to gallons of drainback volume
(Tip: "top feed" manifold to control the drainback)
- 14) gallons TOTAL pump out volume (treatment + drainback)
- 15) feet vertical lift from pump to mound laterals, leads to a:
- 16) GPM @ feet of head, Pump requirement (note: >50gpm may require an extra 3-6' of head)
- 17) gal Dose tank (code minimum) gal Dose tank (design size / LUG req'd) at gpi
leads to a:
- 18) inch swing on Demand float, (this delivers Average flow, =70% of Peak design flow)
 min ON
- 19) inches from bottom of tank to "Pump OFF" float hrs OFF
- 20) inches from bottom of tank to "Pump ON" float inches to "Timer ON" float
- 21) inches from bottom of tank to "Hi Level" float inches to "Hi Level" float
- 22) gallons reserve capacity (after High Level Alarm is activated-demand dosed)

- 23) **1.60** gpd/ft² Absorption area Soil Loading Rate, which gives a mound ratio of **0.8** (minimum)
 (this must match the soil boring log) desired mound ratio **0.8**
- 24) **1** percent site slope (0-20% range) **1** (% downslope site slope, if different than upslope)
- 25) **19** inches, or **1.6** ft. to Redox or other limiting condition (need at least 12" to be a Type I)
 Treatment zone contains **0** inches of 0% soil credit, and **0** inches of 50% soil credit. Giving a:
- 26) **17** inch, or **1.4** ft. Sand Lift Mound **CRITICAL FOR FUTURE CERTIFICATIONS!!!**
- 27) **10.0** ft. Total ABSORPTION width (with sand beyond rockbed as follows:)
- 28) **0.0** ft. upslope and sideslope
0.0 ft. Downslope
- Individual slope ratios give BERM widths (topsoil beyond rockbed) of:
- 29) **4:1** upslope ratio **12** ft. upslope berm
- 30) **4:1** sideslope **13** ft. sideslope berms
- 31) **4:1** downslope **14** ft. downslope berm
- 32) Overall Dimensions: **10.0** ft. wide by **25.0** ft. long Rock bed
36 ft. wide by **51** ft. long Mound footprint



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*.

- 33) Rock Bed:
10.0 ft. by **25.0** ft. by **6** inches under pipe, plus 20% gives **9** yd³ or *1.4= **13** ton
- 34) Mound Sand: (note: volume is based on 3:1/4:1 slope from top of rockbed, Exchange sand for loamy cap if desired)
17.9 up + **21.0** downslope + **9.4** ends + **13.6** under rock = **74** yd³ or *1.4= **104** ton
 plus 20%
- 35) Loamy Cap:
32 ft. by **47** ft. 6" deep, plus 20% gives **34** yd³ or *1.4= **48** ton
- 36) Topsoil:
36 ft. by **51** ft. 6" deep, plus 20% gives **41** yd³ or *1.4= **57** ton

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

[Signature]
 Designer Signature

Total Outdoor Solutions LLC
 Company

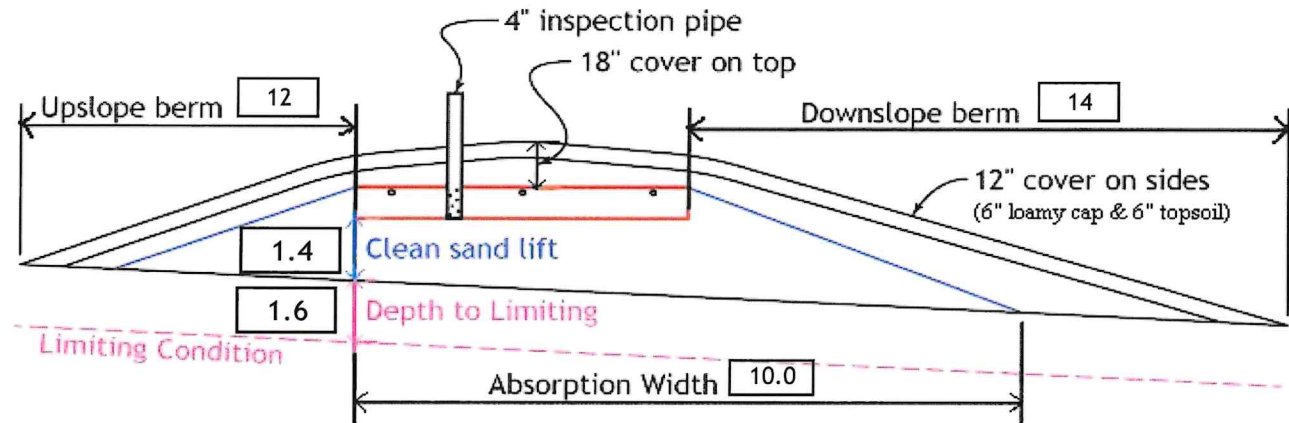
L4203
 License#

10/19/2022
 Date

Installer Summary

- 1000 gallon Septic tank (minimum) Tank options: none
- 500 gallon Dose tank (minimum) at 11.00 gpi
- 25 GPM @ 14 ft. of head, Pump required
- 7.6 inch swing on Demand float which translates to roughly 4.8 inches of float tether length
- Optional Time dosing of:
 - 3.4 minutes ON
 - 8.5 hours OFF
 - 12 inches to "timer ON" float
 - 33 inches to "Hi level" float
- 20 inches from bottom of tank to "pump ON" float, or
- 23 inches from bottom of tank to "Hi Level Alarm" or
- 50 ft. of 2.0 inch supply line with end feed manifold connection
(Tip: "top feed" manifold to control drainback)
- 17 inch, or 1.4 ft. Sand Lift Mound
- 10.0 ft. wide by 25.0 ft. long Rock bed
- 3 laterals 2.00 inch diameter 23.0 ft. long 3.0 ft. lateral spacing
- 1/4" inch perfs 3.0 ft. perforation spacing
- No Effluent filter & alarm
- 3 clean out & valve box assemblies
- 10.0 ft. Total sand ABSORPTION width (minimum)
 - 0.0 ft. upslope and sideslope (sand beyond rockbed, minimum)
 - 0.0 ft. Downslope (sand beyond rockbed, minimum)
- Specific slope ratios give BERM widths (topsoil beyond rockbed) of:

4:1 upslope ratio	12 ft. upslope berm
4:1 sideslope	13 ft. sideslope berms
4:1 downslope	14 ft. downslope berm



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*.

Rock Bed:	9.0 yd ³ or *1.4=	13 ton	6 inches under pipe
Mound Sand:	74 yd ³ or *1.4=	104 ton	calculation based on 3:1/4:1 slope from top of rockbed
Loamy Cap:	34 yd ³ or *1.4=	48 ton	6" deep
Topsoil:	41 yd ³ or *1.4=	57 ton	6" deep

INSPECTOR CHECKLIST - mound

16040 4/8th Ln McGregor

- WELL setbacks: 20'- 50' to sewer line req's MDH pressure test form (5 psi for 15 min)
50' to everything 100' to drainfield with shallow well
- PROPERTY LINES setback: 10' to everything
- Road setback: platted: 10' prop line. Metes & bounds: out of road easement, or outer ditch.
- LAKE / BLUFF setback: 20' for bluff. Lakes: GD ____, RD ____, NE _____. Protected wetland ____.
- Building setbacks: 10' for everything, 20' for dispersal area.
- WATER LINE under pressure 10' to bed, tank & sewer line. (else sewer line > 12" below)

- Sewer line & tank connection (no hard 90's, long sweep 90 or 2-45's, slope minimum 1" in 8' = 1%)
(no depth req's, clean out every 100', Sch 40 pipe)

- Septic tank and risers (water tight risers, baffles, insulated, proper depth, existing verified by pumping)
mfg _____ 1000 gallons none _____

- Riser over outlet, riser over inlet or center, and 6"+ inspection pipe over any remaining baffles.
- No effluent filter & alarm

- Dose tank, risers and piping (water tight risers, insulated, proper depth, drainback)
mfg _____ 500 gallons

- dose pump _____ 25 gpm 14 head VERIFY PUMP CURVE

Optional Time dosing of:
3.4 min ON 8.5 hr OFF

- verify that installed "vertical lift from pump to laterals" is no more than design value of 6 feet
- float setting drop 7.6 inches at 11.0 gpi "DESIGNED" 4.8 inches approx float tether length
- 84.0 gal dose divided by _____ gpi "INSTALLED" = _____ inches float drop (field corrected)

LABEL pump requirements and drawdown on riser or panel

- Cam lock reachable from grade - 30" max. J-hook weep hole. Supply line access (no hard 90's)
- 2.0 inch supply pipe: Sch40, sloped 1/8"+, supported by 4" sch40 sleeve or compacted, and buried 6"+.
- splice box / control panel / electrical connections / Hi Level Alarm
- flow measurement: CT, ETM, time dosed, home water meter

- mound absorption area rough up
- mound rock dimensions $\frac{10.0}{17}$ X $\frac{25.0}{}$
- Sand lift depth _____ inches. (Jar test : 2" sand leaves < 1/8" silt after 30 min)

- Absorption Sand beyond rock $\frac{0.0}{}$ upslope $\frac{0.0}{}$ downslope

- Bermed topsoil beyond rockbed $\frac{12}{}$ upslope $\frac{13}{}$ sideslope $\frac{14}{}$ downslope

- cover depth of 12-18"+ VERIFY

- 3 laterals (1-2' from edge of rock)
- 2.00 inch pipe size (Sch40 pipe & fittings)
- 3.0 ft lateral spacing

- 1/4" inch perforations
- 3.0 ft perforation spacing

- Air inlet at end of laterals, and at top feed manifold if necessary. VERIFY

- clean outs (no hard 90's)
- 4" inspection pipe to bottom of rock, anchored VERIFY

- Abandon existing system - if necessary Re-use existing tank certification
- monitoring plan and type _____
- well abandonment form - if necessary

County Rd 6

478th Lane

North

174.71'±

22.50'

73'

49'

41'

41'

36'

2.70'

5.012'

Mark
Trench
25' Setback

Future
Well
Mark
Trench
100' from
Setback

Mark
Trench
170'
Setback

3,624.51'±

30'

62'

275.31'±

Approximate
130'

Approximate
Setback
10'

300.31'±

478th Lane

Scale
1" = 25'

Per Lidar
Elevations
B1 + B4

341.14'±



Soil Observation Log

Owner Information		
Property Owner / project:	<u>Steve Storlie</u>	Date <u>9/22/2022</u>
Property Address / PID:	<u>16040 478th Ln McGregor</u>	

Soil Survey Information		<input type="checkbox"/> refer to attached soil survey
Parent mat'l's:	<input type="checkbox"/> Till <input checked="" type="checkbox"/> Outwash <input type="checkbox"/> Lacustrine <input type="checkbox"/> Alluvium <input type="checkbox"/> Organic <input type="checkbox"/> Bedrock	
landscape position:	<input checked="" type="checkbox"/> Summit <input type="checkbox"/> Shoulder <input type="checkbox"/> Side slope <input type="checkbox"/> Toe slope	
soil survey map units:	<u>685, 268B</u> slope <u>1</u> % direction- <u>downhill</u>	

Soil Log #1							
		<input checked="" type="checkbox"/> Boring	<input type="checkbox"/> Pit	Elevation <u>1262</u>		Depth to SHWT <u>19"</u>	
Depth (in)	Texture	fragment %	matrix color	redox color	consistence	grade	shape
0-9	Fine Sandy Loam	<35	10YR3/3		Firm	Moderate	Blocky
9-15	Sandy Loam	<35	10YR3/2		Friable	Weak	Blocky
15-21	Loamy Sand	<35	10YR3/4	19" 7.5YR4/6	Friable	Weak	Granular
		<35 35 - 50 >50			loose friable firm rigid	loose weak moderate strong	single grain granular blocky prismatic platy massive
		<35 35 - 50 >50			loose friable firm rigid	loose weak moderate strong	single grain granular blocky prismatic platy massive

Comments: Redox Varied on the site from 19" to no redox in gravelly sands

16040 478th Ln McGregor								Soil Log #2	
		<input checked="" type="checkbox"/> Boring	<input type="checkbox"/> Pit	Elevation <u>1263</u>		Depth to SHWT _____			
Depth (in)	Texture	fragment %	matrix color	redox color	consistence	grade	shape		
0-11	Sandy Loam	<35	10YR3/2		Firm	Moderate	Blocky		
11-20	Sandy Loam	<35	10YR3/6		Friable	Weak	Blocky		
20-27	Loamy sand some gravel	<35	10YR3/6	23" 7.5YR4/6	Loose	Loose	Granular		
		<35 35 - 50 >50			loose friable firm rigid	loose weak moderate strong	single grain granular blocky prismatic platy massive		
		<35 35 - 50 >50			loose friable firm rigid	loose weak moderate strong	single grain granular blocky prismatic platy massive		

16040 478th Ln McGregor								Soil Log #3	
		<input type="checkbox"/> Boring	<input type="checkbox"/> Pit	Elevation <u>1263</u>		Depth to SHWT _____			
Depth (in)	Texture	fragment %	matrix color	redox color	consistence	grade	shape		
0-11	Sandy Loam	<35	10YR3/2		Friable	Weak	Blocky		
11-25	Loamy Sand	<35	10YR4/4		Loose	Loose	Granular		
25-36	Loamy Sand/ gravelly	<35	10YR4/4	36" end on rock	Loose	Loose	Granular		
		<35 35 - 50 >50		No Redox	loose friable firm rigid	loose weak moderate strong	single grain granular blocky prismatic platy massive		
		<35 35 - 50 >50			loose friable firm rigid	loose weak moderate strong	single grain granular blocky prismatic platy massive		

I hereby certify this work was completed in accordance with MN 7080 and any local req's.



 Designer Signature

Total Outdoor Solutions LLC

 Company

L4203

 License #

 LUG soil verify Signature

+


 LUG media elev/depth Signature

= Soil Separation Report

16040 478th Ln McGregor		Soil Log #4					
<input type="checkbox"/> Boring <input type="checkbox"/> Pit		Elevation <u>1262</u>		Depth to SHWT _____			
Depth (in)	Texture	fragment %	matrix color	redox color	consistence	grade	shape
0-11	Sandy Loam	<35	10YR3/2		Friable	Weak	Blocky
11-19	Loamy Sand	<35	10YR4/4		Loose	Loose	Granular
19-28	Loamy Sand/ Gravelly	<35	10YR4/6	Rock end	Loose	Loose	Granular
		<35 35 - 50 >50		No redox	loose friable firm rigid	loose weak moderate strong	single grain granular blocky prismatic platy massive
		<35 35 - 50 >50			loose friable firm rigid	loose weak moderate strong	single grain granular blocky prismatic platy massive

16040 478th Ln McGregor		Soil Log #5					
<input type="checkbox"/> Boring <input type="checkbox"/> Pit		Elevation _____		Depth to SHWT _____			
Depth (in)	Texture	fragment %	matrix color	redox color	consistence	grade	shape
		<35 35 - 50 >50			loose friable firm rigid	loose weak moderate strong	single grain granular blocky prismatic platy massive
		<35 35 - 50 >50			loose friable firm rigid	loose weak moderate strong	single grain granular blocky prismatic platy massive
		<35 35 - 50 >50			loose friable firm rigid	loose weak moderate strong	single grain granular blocky prismatic platy massive
		<35 35 - 50 >50			loose friable firm rigid	loose weak moderate strong	single grain granular blocky prismatic platy massive
		<35 35 - 50 >50			loose friable firm rigid	loose weak moderate strong	single grain granular blocky prismatic platy massive

I hereby certify this work was completed in accordance with MN 7080 and any local req's.



 Designer Signature

Total Outdoor Solutions LLC
 Company

L4203
 License #

Preliminary & Field Evaluation Form

Owner Information

Date	<u>9/22/2022</u>	Sec / Twp / Rng	<u>25/49/23</u>
Parcel ID	<u>29-1-501103</u>	LUG (county, city, township)	<u>Aitkin</u>
Property Owner:	<u>Steve Storlie</u>	Owners address (if different)	
Property Address:	<u>16040 478th Ln McGregor</u>	<u>3948 Ensign Ave N</u>	
City / State / Zip:	<u>Tamarack, MN</u>	<u>New Hope MN 55427</u>	

Flow Information and Waste Type / Strength

Estimated Design flow	<u>150</u>	Anticipated Waste strength	<input type="checkbox"/> Hi Strength	<input checked="" type="checkbox"/> Domestic
Comments:		Any Non-Domestic Waste	<input type="checkbox"/> Yes (class V)	<input checked="" type="checkbox"/> No
		Sewage ejector/grinder pump	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
		Water softener	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
		Garbage Disposal	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
		Daycare / In home business	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No

Site Information


Existing & proposed lot improvements located (see site map)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Well casing depth	<u>New well TBD</u>	
Easements on lot located (see site map)	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Drainfield w/in 100' of residential well	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No
Property lines determined (see site map)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site w/in 200' of transient noncommunity water supply (TNCWS)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Req'd setbacks determined (see site map)	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Site w/in an inner wellhead mgmt zone (CWS/NTNCWS)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Utilities located & identified (gopher state one call)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Buried water supply pipe w/in 50' of system	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Access for system maintenance (shown on site map)	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site located in Shoreland (w/in 1000' of lake, 300' of river)	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Soil treatment area protected	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No	Site map prepared with previous items included	<input checked="" type="checkbox"/> Yes	<input type="checkbox"/> No

Construction related issues

Soil Information

		Evidence of site:	
		Cut	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
		Filled	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
		Compacted	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
		Disturbed	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
Original soils	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Soil logs completed and attached	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	Perk test completed and attached (if applicable)	<input type="checkbox"/> Yes <input type="checkbox"/> No
Soil loading rate (gpd/ft ²)	<u>0.60</u>	Percolation rate (if applicable)	_____
Depth/elev to SHWT	<u>19.00</u>	Flooding or run-on potential (comments)	<input type="checkbox"/> Yes <input type="checkbox"/> No
Depth to system bottom maximum (or elev minimum)	<u>-17.00</u>	Flood elevation (if applicable)	_____
Depth/elev to standing water (if applicable)	_____	Elevation of ordinary high water level (if applicable)	_____
Depth/elev to bedrock (if applicable)	_____	Floodplain designation and elev - 100 yr/10 yr (if applicable)	_____
Soil Survey information determined (see attachment)	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		
Differences between soil survey and field evaluation (if applicable)	<u>Owner says area was cut and filled but we definitely have gravelly sand</u>		
	<u>Matches soil description</u>		

I hereby certify this evaluation was completed in accordance with MN 7080 and any local req's.



 Designer Signature

Total Outdoor Solutions LLC

 Company

L4203

 License #

Owners Septic System Management Plan

Date: 9/22/2022

Property Address: 16040 478th Ln McGregor

Septic Systems can be an expensive investment, good maintenance will ensure they last a lifetime. The purpose of a septic system is to properly "decompose" the pollutants before the water is recycled back into the groundwater. If you're not taking this seriously, ask yourself where your well water comes from.

Your septic design lists all the components of your system and their location. Keep the design, this management plan and the UofM "Septic System Owners Guide" in a safe place for future reference. For a copy of the Owners guide call the University of MN at 1-800-876-8636.

Some of the following tasks you can do yourself, some require a professional, but is it YOUR responsibility to see that it gets done.

Homeowner Tasks

- Do your best to conserve water. Don't overload your septic with multiple large water uses at the same time or on the same day.
- Fix household leaks promptly (leaky toilet, dripping faucets).
- Limit bleach and anti-bacterial products. Use Biodegradable dishwasher detergent.
- Consider a lint filter on your clothes washer.
- Regularly check for wet or spongy soil around your drainfield.
- Have a septic professional check your tanks every 3 years to determine if they need pumping.
- If you have a septic tank filter (effluent filter) clean it on a regular basis (or have a professional do it).
- If a septic alarm goes off, call your septic professional to diagnose the problem.
- Notify the County/City/Township when this management plan is not being met.
- Be aware of and protect your secondary drainfield site.

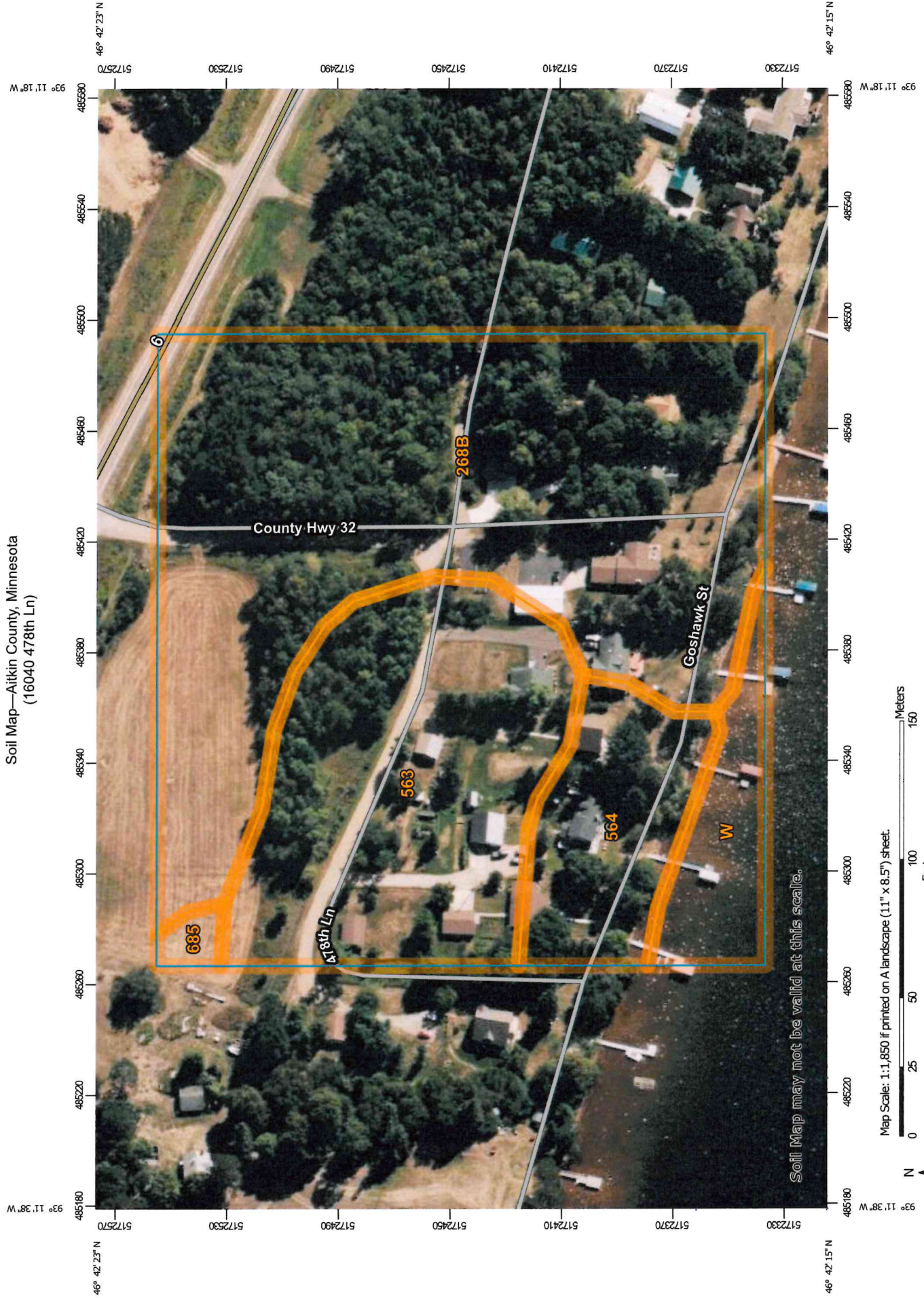
Professional Tasks

- Disclose the location of the secondary drainfield (if applicable).
- Respond to alarms and diagnose problems as needed.
- Review water use with the owner, check for a "soggy" drainfield.
- Pump the septic tanks as needed and ensure they are in proper working order.
- Verify the pump, dose amount, HI Level Alarm & drainback are all working properly.

"As the owner, I understand it is my responsibility to properly operate and maintain this septic system".

Property Owner Signature: _____ Date _____

Soil Map—Aitkin County, Minnesota
(16040 478th Ln)

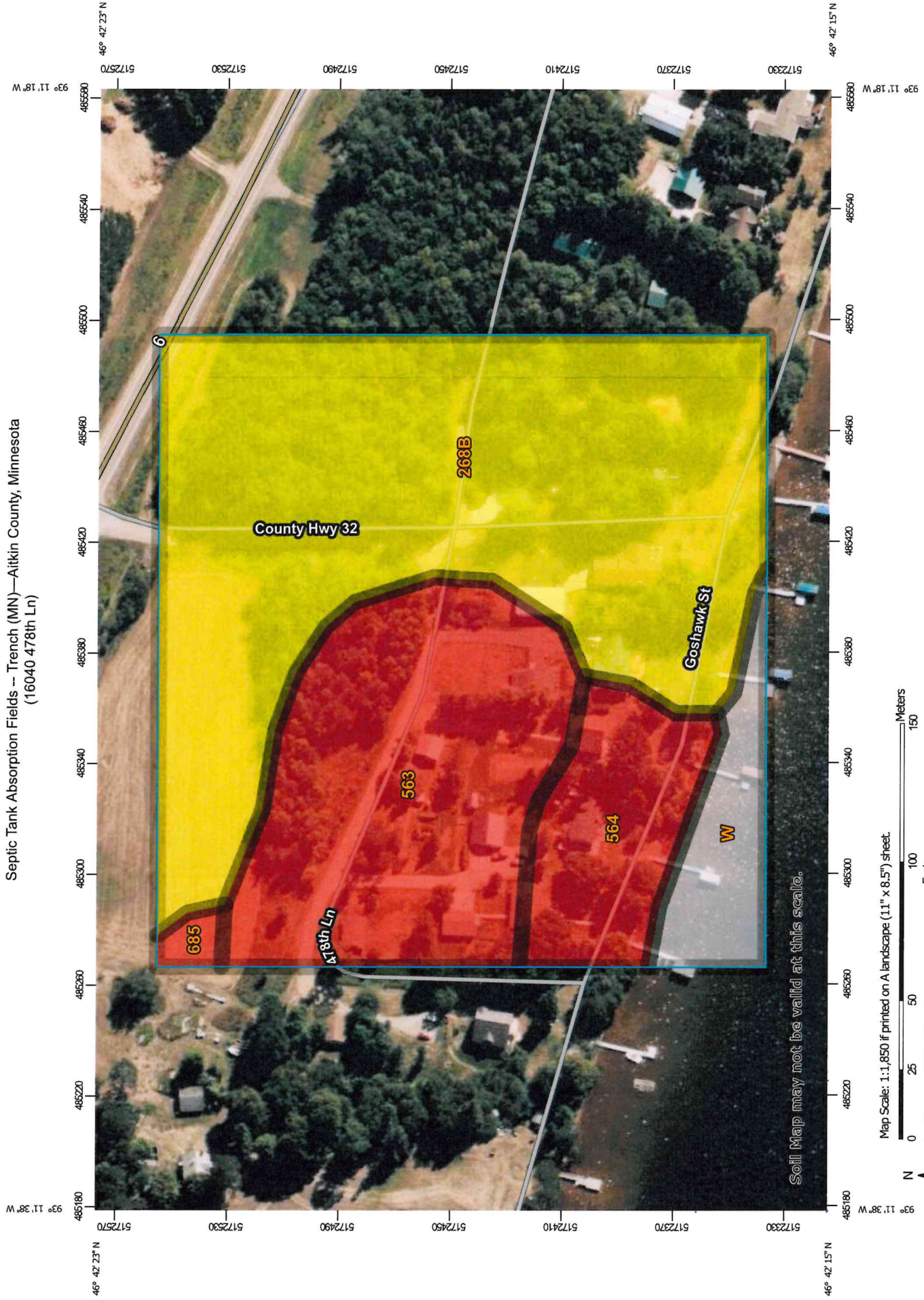


Soil Map may not be valid at this scale.

Map Scale: 1:1,850 if printed on A landscape (11" x 8.5") sheet.

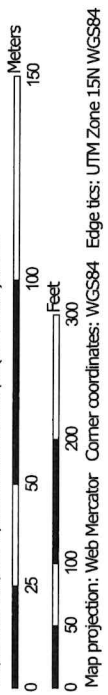
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

Septic Tank Absorption Fields -- Trench (MN)—Aitkin County, Minnesota
(16040 478th Ln)



Soil Map may not be valid at this scale.

Map Scale: 1:1,850 if printed on A landscape (11" x 8.5") sheet.









MAP LEGEND

Area of Interest (AOI)
 Area of Interest (AOI)

Soils







Soil Rating Polygons

-  Extremely limited
-  Very limited
-  Moderately limited
-  Slightly limited
-  Not limited
-  Not rated or not available


Soil Rating Lines







-  Extremely limited
-  Very limited
-  Moderately limited
-  Slightly limited
-  Not limited
-  Not rated or not available

Soil Rating Points

-  Extremely limited
-  Very limited
-  Moderately limited
-  Slightly limited
-  Not limited
-  Not rated or not available

Water Features

 Streams and Canals

- Transportation**
-  Rails
 -  Interstate Highways
 -  US Routes
 -  Major Roads
 -  Local Roads
- Background**
-  Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL:
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Aitkin County, Minnesota
 Survey Area Data: Version 22, Sep 10, 2021

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 13, 2021—Aug 14, 2021

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Septic Tank Absorption Fields — Trench (MN)

Map unit symbol	Map unit name	Rating	Component name (percent)	Rating reasons (numeric values)	Acres in AOI	Percent of AOI
268B	Cromwell fine sandy loam, 1 to 6 percent slopes	Moderately limited	Cromwell (85%)	Excessive percolation (0.21)	6.8	55.3%
563	Northwood muck	Extremely limited	Northwood (85%)	Ponding (1.00)	3.4	27.3%
				Soil saturation (1.00)		
				Organic soil (1.00)		
				Excessive percolation (0.11)		
564	Friendship loamy sand	Extremely limited	Friendship (85%)	Soil saturation (1.00)	1.3	10.2%
				Excessive percolation (0.42)		
685	Oesterle fine sandy loam	Extremely limited	Oesterle (85%)	Soil saturation (1.00)	0.1	0.9%
				Excessive percolation (0.21)		
W	Water	Not rated	Water (100%)		0.8	6.3%
Totals for Area of Interest					12.4	100.0%

Rating	Acres in AOI	Percent of AOI
Moderately limited	6.8	55.3%
Extremely limited	4.8	38.4%
Null or Not Rated	0.8	6.3%
Totals for Area of Interest	12.4	100.0%

Description

Trench septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through perforated pipe. In this system the drain field is placed in a trench and covered with soil material. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Saturated hydraulic conductivity (Ksat) is evaluated from a depth of 30 to 107 centimeters. Depth to saturation and depth to bedrock are evaluated from the surface to a depth of 203 centimeters. The frequency of ponding and flooding also is evaluated. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect this use. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Slightly limited" indicates that the soil has features that are favorable for the specified use. "Moderately limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Good performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without special design or expensive installation procedures. "Extremely limited" indicates that the soil has one or more features that are very unfavorable for the specified use. The limitations generally cannot be overcome.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as the one shown for the map unit. The percent composition of each component in a particular map unit is given to help the user better understand the extent to which the rating applies to the map unit.

Other components with different ratings may occur in each map unit. The ratings for all components, regardless the aggregated rating of the map unit, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

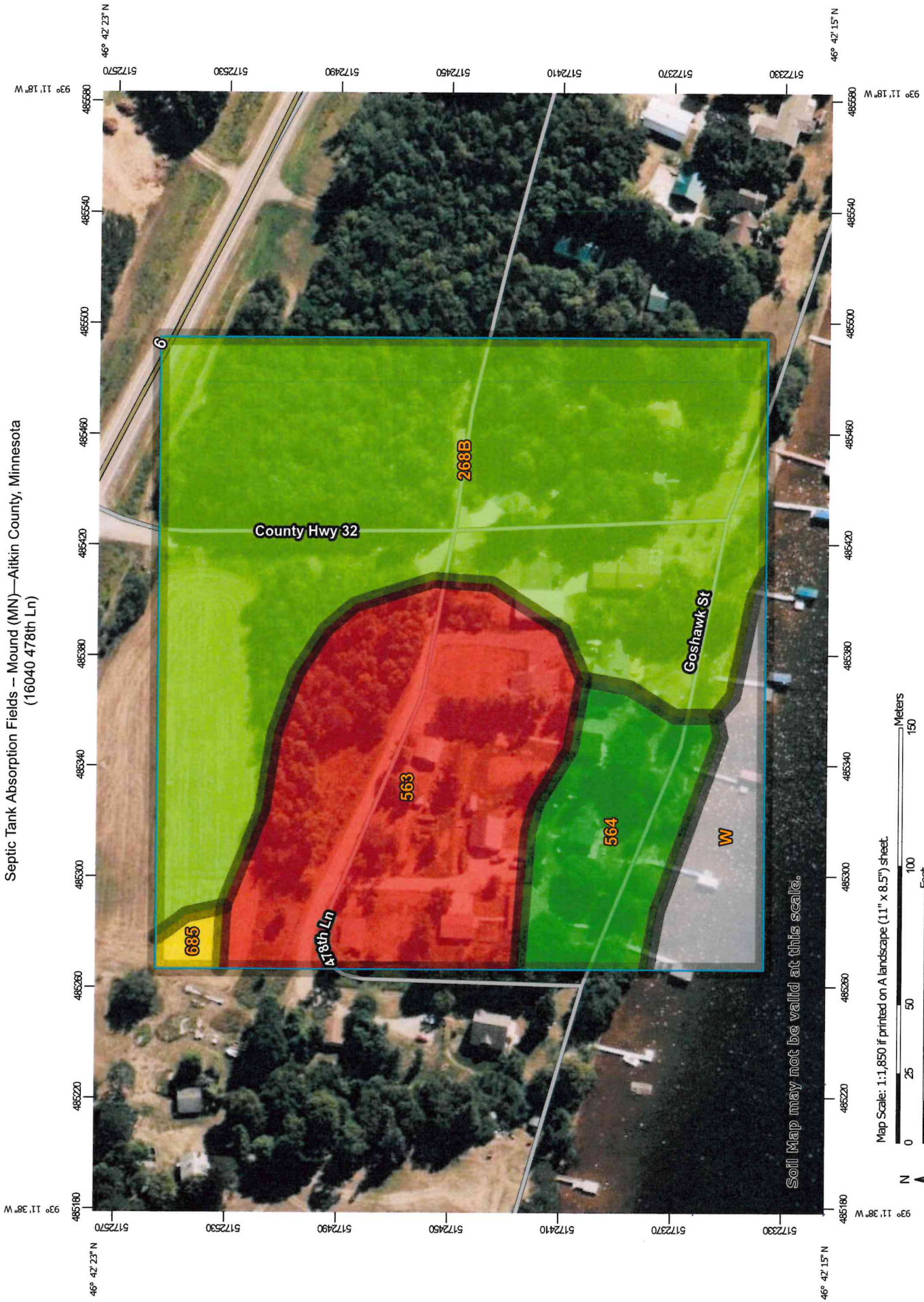
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Septic Tank Absorption Fields -- Mound (MN)—Aitkin County, Minnesota
(16040 478th Ln)



Soil Map may not be valid at this scale.

Map Scale: 1:1,850 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 15N WGS84

Aitkin County, Minnesota

685—Oesterle fine sandy loam

Map Unit Setting

National map unit symbol: gjjd
Elevation: 980 to 1,640 feet
Mean annual precipitation: 25 to 30 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 120 to 140 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Oesterle and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Oesterle

Setting

Landform: Outwash plains
Landform position (two-dimensional): Footslope, toeslope
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Sandy and gravelly outwash

Typical profile

A - 0 to 2 inches: fine sandy loam
E,E/B,B/E,Bt - 2 to 21 inches: sandy loam
Bt2 - 21 to 34 inches: stratified loamy coarse sand to gravelly sand
2C - 34 to 60 inches: gravelly sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 12 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: A/D
Forage suitability group: Level Swale, Low AWC, Acid (G090AN007MN)
Other vegetative classification: Level Swale, Low AWC, Acid (G090AN007MN)

Hydric soil rating: No

Minor Components

Loamy till substratum

Percent of map unit: 4 percent

Hydric soil rating: No

Meehan and similar soils

Percent of map unit: 4 percent

Hydric soil rating: No

Nemadji and similar soils

Percent of map unit: 4 percent

Hydric soil rating: No

Leafriver and similar soils

Percent of map unit: 3 percent

Landform: Depressions

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Aitkin County, Minnesota

Survey Area Data: Version 22, Sep 10, 2021

Aitkin County, Minnesota

564—Friendship loamy sand

Map Unit Setting

National map unit symbol: gjhw
Elevation: 980 to 1,640 feet
Mean annual precipitation: 25 to 30 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 120 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Friendship and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Friendship

Setting

Landform: Outwash plains
Landform position (two-dimensional): Summit, backslope
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Sandy outwash

Typical profile

E - 0 to 3 inches: loamy sand
Bw1 - 3 to 6 inches: loamy sand
Bw2,Bw3,BC - 6 to 39 inches: sand
C1,C2 - 39 to 60 inches: sand

Properties and qualities

Slope: 0 to 3 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: About 41 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Forage suitability group: Sloping Upland, Low AWC, Acid (G090AN008MN)
Other vegetative classification: Sloping Upland, Low AWC, Acid (G090AN008MN)

Hydric soil rating: No

Minor Components

Leafriver and similar soils

Percent of map unit: 5 percent

Landform: Depressions

Hydric soil rating: Yes

Meehan and similar soils

Percent of map unit: 5 percent

Hydric soil rating: No

Menahga and similar soils

Percent of map unit: 5 percent

Hydric soil rating: No

Data Source Information

Soil Survey Area: Aitkin County, Minnesota

Survey Area Data: Version 22, Sep 10, 2021

Aitkin County, Minnesota

268B—Cromwell fine sandy loam, 1 to 6 percent slopes

Map Unit Setting

National map unit symbol: gjgc

Elevation: 980 to 1,640 feet

Mean annual precipitation: 25 to 30 inches

Mean annual air temperature: 39 to 45 degrees F

Frost-free period: 120 to 140 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Cromwell and similar soils: 85 percent

Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Cromwell

Setting

Landform: Outwash plains

Landform position (two-dimensional): Summit, backslope

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Sandy outwash

Typical profile

A - 0 to 2 inches: fine sandy loam

Bw,2Bw,2C - 2 to 60 inches: gravelly sand

Properties and qualities

Slope: 1 to 6 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat excessively drained

Capacity of the most limiting layer to transmit water

(Ksat): Moderately high to high (0.60 to 2.00 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: B

Forage suitability group: Sloping Upland, Low AWC, Acid
(G090AN008MN)

Other vegetative classification: Sloping Upland, Low AWC, Acid
(G090AN008MN)

Hydric soil rating: No

Minor Components

Oesterle and similar soils

Percent of map unit: 6 percent

Hydric soil rating: No

Cutaway and similar soils

Percent of map unit: 4 percent

Hydric soil rating: No

Leafriver and similar soils

Percent of map unit: 3 percent

Landform: Depressions

Hydric soil rating: Yes

Bushville and similar soils

Percent of map unit: 2 percent

Hydric soil rating: No

Data Source Information

Soil Survey Area: Aitkin County, Minnesota

Survey Area Data: Version 22, Sep 10, 2021

Aitkin County, Minnesota

563—Northwood muck

Map Unit Setting

National map unit symbol: gjhv
Elevation: 980 to 1,640 feet
Mean annual precipitation: 25 to 30 inches
Mean annual air temperature: 39 to 45 degrees F
Frost-free period: 120 to 140 days
Farmland classification: Not prime farmland

Map Unit Composition

Northwood and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Northwood

Setting

Landform: Depressions on moraines
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Organic material over sandy and silty glaciolacustrine deposits

Typical profile

Oa - 0 to 9 inches: muck
A - 9 to 13 inches: loamy sand
Bg1, Bg2 - 13 to 35 inches: coarse sand
2Cg - 35 to 60 inches: loam

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Very poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: High (about 10.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: B/D
Forage suitability group: Organic (G090AN014MN)
Other vegetative classification: Organic (G090AN014MN)
Hydric soil rating: Yes

Minor Components

Leafriver and similar soils

Percent of map unit: 3 percent

Landform: Flats

Hydric soil rating: Yes

Sandwick and similar soils

Percent of map unit: 3 percent

Landform: Flats

Hydric soil rating: Yes

Less decomposed

Percent of map unit: 3 percent

Landform: Depressions

Hydric soil rating: Yes

Markey and similar soils

Percent of map unit: 3 percent

Landform: Swamps

Hydric soil rating: Yes

Stuntz and similar soils

Percent of map unit: 3 percent

Hydric soil rating: No

Data Source Information

Soil Survey Area: Aitkin County, Minnesota

Survey Area Data: Version 22, Sep 10, 2021