

Halling Engineering, Inc.

1121 Landings Lane • Watertown, MN 55388 • Phone: 952-440-1680

May 2, 2023

Kevin Turnock
Aitkin Co Planning & Zoning
307 Second St NW
Aitkin, MN 56431

Re: Design review for Wexco for modified MBBR treatment process used for pretreatment for Prairie River Retreat located at 51272 Lake Ave, McGregor, MN 55760

Dear Mr Turnock,

I have reviewed the proposed Type V (7080.2400) ISTS design at the above location. This design is considered a Type V for the following reason:

1. Use of a treatment product that is not on the registered product list for use in Level C application. (7080.2150 Subp.4)

A single lab sample tested at 526 mg/l CBOD. Below is a summary of the items that were reviewed for this project.

1. Treatment system: The MBBR design is based on a design flow of 750 gpd and a wastewater influent strength that is estimated at 526 mg/l cBOD and less than 50 mg/l FOG. The MBBR has been successfully used in other applications utilizing the same aerobic treatment process to remove CBOD in the effluent. The MBBR was designed using a media loading rates of 4.0 g BOD/m²/day which is typical for commercial strength applications. The MBBR standard oxygen requirement (SOR) was designed at 0.27 lb O₂/hr to maintain excess dissolved oxygen levels above 3 mg/l which will facilitate complete BOD removal. The system has flexibility for mitigation in that it is designed so that more media and increased air can easily be added to the tanks should future waste strength or flows be higher than was anticipated. The goal is to reduce the wastewater strength to 50 mg/l CBOD and 50 mg/l TSS which is substantially below Level C treatment. However, this design is based on the requirement to treat the wastewater to a level C. It is my professional opinion that the MBBR as designed will lower the CBOD values considerably below level C treatment and extend the life of the proposed dispersal system.

This system meets Minnesota Rules Chapter 7080.2400 Type V Systems requirements. This letter in no way guarantees the actual performance of the system.

Please contact me if you have any questions.

Sincerely,



Gregory, R. Halling, P.E. Mn Reg. No. 12783
MPCA Advanced Designer C914

Cc: Brian Koski

**Septic System Design
For:**

**Prairie River Retreat
51272 Lake Ave
McGregor, MN 55760**

Owner Address:

Sheryl Ruhnke/Grand Timber Bank
204 North Maddy Street
McGregor, MN 55760
Phone: 218-426-0010

Project Information:

Section 3, Township 49, Range 23
PID# 29-1-370500
51272 Lake Ave McGregor, MN 55760
Aitkin County

Septic System Design Completed By:

Brian Koski
Septic Check
6074 Keystone Road
Milaca, MN 56353
Lic # 2624
Phone: 888-983-2447

DESIGN DESCRIPTION
AND
MAINTENANCE REQUIREMENTS

Project Overview

Prairie River Retreat is a bar and grill open five days a week. They serve short-order food such as burger baskets, pizzas, soup, and salad with much of the business being carried out versus dine in.

Hours of Operation:

- Wednesday & Thursday 3pm - 10pm
- Friday & Saturday 3pm - 12am
- Sunday 3pm - 8pm

The bar and grill did not pass a compliance inspection on 8/24/19, therefore, a new system is required.

Existing Onsite Septic System Description:

The existing system consists of two tanks feeding a gravity bed. The existing tanks and drainfield will not be reused in the new design. The existing tanks will need to be pumped, crushed, and properly abandoned. The drainfield must be decommissioned and will remain in place.

Proposed System Design Flow – 750 GPD

The proposed design flow was determined using recorded flow data, as well as utilizing the maximum treatment area available on the property. The proposed 10' x 63' – rockbed mound with a 1' lift will support up to a 750 gallon a day. 70% of that design flow is 525 gallons a day which is much higher than the recorded peak flows of 220 GPD.

Design Flow Considerations

Recorded Flows:

The installer recorded flow meter readings during summer operations where the water usage is at its peak. The heaviest months were May – July with peak flows just under 220 gallons per day. Readings are included in this design. The gallon per day average was calculated using the actual days open per week and excluded the days closed to provide a more accurate daily flow.

Waste Strength:

The strength of the wastewater tested was 526 mg/l CBOD. A pretreatment device will be installed to reduce waste strength below level C effluent quality. Loading calculations are shown below:

$$750 \text{ GPD} \times 526 \text{ mg/l} \times 8.34 \text{ (/1,000,000)} = 3.29 \text{ lbs/CBOD/day}$$

Soil Investigation:

The soil investigation was completed on 9/9/21. A soil pit and two borings were completed in the proposed drainfield location. Each of the observations consisted of Loamy Fine Sand, followed by a Silt Loam in the soil pit and boring 2. For this design we will be using a soil loading rate for Loamy Fine Sand at 0.6 gpd/ft².

Proposed Onsite Septic System Description

Tanks, collection, and drainfields:

The existing tanks will be pumped, crushed, and properly abandoned. The new tanks will be placed west of the bar and grill. Connection of the new collection line will be made at the existing outlet. The new 4" collection line running under the portion of the driveway must be insulated.

Sewage will flow by gravity into a Jacobson 1,820 gallon 2-compartment septic tank, from there sewage will flow into another Jacobson 1,820 gallon 2-compartment septic tank equipped with a Wexco Flex MBBR for the pretreatment. Effluent will then flow into the 2nd compartment serving as the clarifier with a sludge return air pump. The air lift return line will return effluent to the inlet of the septic tank. The outlet on the clarifier compartment will be equipped with a Polylok effluent filter. From there the effluent will flow into a Jacobson 1,820 gallon pump tank with a mole hole. The pump installed must deliver at least 37 GPM and 27.8 TDH. Effluent will be time dosed to a 10' x 63' rockbed mound for final dispersal that will have laterals, cleanouts, and inspection pipes to grade.

List of components:

- A Jacobson 1820 combo septic tank
- A second Jacobson 1820 combo septic tank
 - The first compartment has 1125 gallon capacity which will be used for septic and equipped with the Wexco Flex MBBR
 - The second compartment has 660 gallon capacity serving as the clarifier tank with sludge return air pump.
- Polylok PL-525 Effluent Filter
- Jacobson 1820 mole hole pump tank
- (8) 24" insulated manhole covers to grade.
- Ultra-rib riser attached with ADH 100 - or two-part epoxy
- All manholes will need to be installed to grade for ease of servicing
- Insulate top of tank if buried less than 2'
- Goulds WE07 effluent pump
- SJE Rhombus Installer Friendly Duplex Time Dose Panel
- 10' x 63' rockbed mound
- 4" insulated pipe under driveway OR securely insulate around the pipe
- (3) - 61' laterals using 2" SCH 40 pipe
- Elevations are referenced to the Benchmark
 - See Photos – top of nail in tree

Water supply / wells:

A deep well is located behind the bar and is more than 50 feet from any of the septic components. This well is also connected to the home on PID 29-1-370900 but it has been turned off. The home is not up to living conditions and the owner plans to take it down. There is also a capped well on that parcel which is shown on the site map.

Additional Notes:

Keep all vehicles and construction equipment off septic area. Rutting and/or compacting the soil will change the percolation rates and may lead to system failure.

Owner to verify all property lines.

Installer to verify all elevations, dimensions, and ensure proper fall to pipes.

Establish turf to prevent erosion and freezing. Final restoration includes seeding and straw mulch over the disturbed areas.

Each tank is to be pumped through the maintenance cover when serviced. Do not pump through inspection pipes.

Owner is responsible for all costs involved in servicing, monitoring, and mitigating the system.

All construction is to be performed in accordance with MN Rule 7080, and Aitkin County ordinance.

Maintenance Requirements

Bi-Annual maintenance is recommended for this system. Level C treatment was used in this design. Below is a list of maintenance requirements to be completed by the service provider, maintainer, and owner.

Owner requirements:

- Hire a licensed service provider to complete the tasks below and maintain compliance with the operating permit.
- The owner is to maintain compliance with the operating permit at all times or follow the mitigation plan to make changes to get back into compliance if operating permit limits are not being met.
- Record water meter readings daily and provide this information to the service provider.
- Maintain vegetation around tanks and mound systems. It is suggested the sites be mowed and trimmed twice per year.
- Update the service provider, designer, and county if changes in water use are expected such as adding food service or expansion of the building.
- Maintain access points for service equipment to reach tanks and other components.

Maintainer requirements:

- Pump and clean tanks when solids levels reach 33% of tank capacity.
- Pump and clean lift tanks when sludge levels exceed 4" in depth.
- Inspect tank integrity when pumping to ensure tank compliance.
- Clean baffles and effluent screens at each tank pumping.
- Report any unsafe conditions to owner and service provider.
- Report and note any issues such as infiltration, seepage, or other non-compliance issues.
- Follow local and state regulations when disposing of septage.

Service Provider requirements:

- Use the maintenance checklist below as a reference for service to be completed on the system at which frequency.
- Adjust or recommend changes in maintenance tasks and frequency based on operational results.
- Schedule or complete tank maintenance pumping when solids reach critical levels.
- Follow the County operating permit and sampling requirements. Send maintenance reports to the County.
- For detailed maintenance tasks or troubleshooting information, refer to the attached installation and operation & maintenance manual provided the manufacture.

Maintenance requirements:

Location	Description	Frequency
Septic tanks	Inspect manholes for infiltration	Semi-Annually
Septic tanks	Inspect inlet and outlet for infiltration	Semi-Annually
Septic tanks	Inspect and clean effluent filters	Semi-Annually
Septic tanks	Sample sludge and scum levels	Semi-Annually
Septic tanks	Pump tanks when solids level exceeds 33% of tank volume	As needed
Septic tanks	Inspect baffles, effluent screens, and tank integrity	Semi-Annually

Location	Description	Frequency
Lift Stations	Inspect manholes for infiltration	Semi-Annually
Lift Stations	Inspect inlet and outlet for infiltration	Semi-Annually
Lift Stations	Inspect pumps and floats for proper operation	Semi-Annually
Lift Stations	Inspect panel and alarm system for proper operation	Semi-Annually
Lift Stations	Record cycle counters and elapsed timer meters	Weekly
Lift Stations	Sample sludge and scum levels	Semi-Annually
Lift Stations	Pump tanks when solids level exceeds 6" in depth	As needed
Lift Stations	Sample effluent CBOD, TSS, FOG	As needed

Component Description: Wexco MBBR Aerobic Tanks		
Location	Description	Frequency
Pretreatment tank	Inspect effluent quality and odor. Effluent should be clear and should have a musty odor.	Semi-Annually
Pretreatment tank	Adjust blower based on effluent results.	Semi-Annually
Pretreatment tank	Clean or replace air filter on blower.	Semi-Annually
Pretreatment tank	Record pressure reading on blower.	Semi-Annually
Pretreatment tank	Inspect and clean media retention sieve	Semi-Annually
Pretreatment tank	Inspect media for plugging	Semi-Annually
Pretreatment tank	Inspect manholes for infiltration	Semi-Annually
Manhole	Inspect return pump for proper operation	Semi-Annually
Panel	Inspect panel and alarm system for proper operation	Semi-Annually
Panel	Record cycle counters and/or elapsed timer meters.	Semi-Annually
Panel	Adjust timer settings based on treatment results	As needed

Location	Description	Frequency
Drainfield	Inspect for ponding or seepage	Semi-Annually
Drainfield	Mow the drainfield area	As Needed
Drainfield	Clean lateral lines	As Needed

Mitigation:

Problem	Action	Mitigation Steps
Rockbeds ponding	<ul style="list-style-type: none"> • Verify flow and effluent results are within permit limits. • Verify equal distribution in bed dosing. • Inspect all beds to determine if it's isolated to one area or all beds. 	<ul style="list-style-type: none"> • If flow cannot be accepted by the beds, pump and haul excess effluent. • Complete pump calibration to verify timer settings are correct. • If dosing is not equal, adjust timer settings to each zone
Seepage below beds	<ul style="list-style-type: none"> • Verify dosing volumes and equal distribution • Inspect all beds to determine if it's isolated to one area or in all beds. • Verify pump operation • Review flow data • Inspect piezometer levels 	<ul style="list-style-type: none"> • Adjust timer settings to reduce flow entering the bed with seepage. • Complete pump calibration to verify timer settings are correct. • Shut down some bed zones to reduce seepage by closing valves of shutting pumps down in panel.
Treatment levels not meeting operating permit limits	<ul style="list-style-type: none"> • Verify flow, influent, and effluent results are within permit limits. • Adjust sludge return pump settings. • Verify blower and aeration network are working properly 	<ul style="list-style-type: none"> • If treatment levels cannot be met, expand the treatment system by adding media, or adding more tankage • Adjust dosing tank match long term daily flow averages as close as possible. • Sample influent tank to verify loading. • Sample dissolved oxygen and pH in Treatment tank. • Check blower air filter, amperage and pressure.
Flow limit exceeded	<ul style="list-style-type: none"> • Inspect for signs of infiltration in all tanks • Inspect building plumbing for leak fixtures or toilets. • Discuss water use patterns with the owner or mgmt. 	<ul style="list-style-type: none"> • Adjust timer settings within the permit limits and operating permit limits • Pump and haul excess flow.

DESIGN OUTLINE SUMMARY & PROPOSAL

Date:	5-2-2023
Project Name:	Prairie River Retreat
Project Location:	51272 Lake Ave McGregor MN
Design Outline Name:	750 GPD BOD removal only
Designer/Engineer:	Septic Check

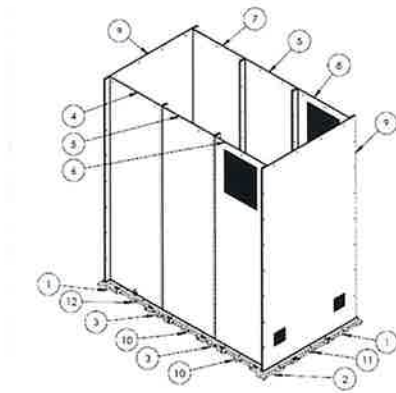
Project Summary:

Prairie River Retreat is a small short order restaurant on Big Sandy Lake in McGregor. Their existing system is non-compliant and requires an update. Due to the wastewater meeting high strength waste definition, pretreatment is required to lower the effluent strength to below level C effluent quality.

Proposed Biofilm Process:

For this application, we offer our complete mix fixed film (CMFF) MBBR treatment process. This process is designed to utilize the stability and versatility of the MBBR process to provide near complete BOD removal. Due to the small size of the system, the MBBR will be installed in the Alpha Flex configuration. This includes installation of an enclosure inside of a larger septic tank to be filled with media and aeration diffusers. The enclosure will house biofilm carriers, which have a high specific surface area of 650 m²/m³ for biofilm growth. Solids generated in the process will require clarification prior to discharge.

ITEM NO.	PART NUMBER	DESCRIPTION	WEIGHT	QTY.
1	1031	RH CORNER BLOCK	0.56	2
2	1032	FL CORNER BLOCK	0.56	2
3	1033	CENTER TEE BLOCK	0.37	4
4	1024	PANEL 1	5.45	1
5	1035	PANEL 2	5.45	2
6	1036	PANEL 3	0.15	1
7	1037	PANEL 4	5.45	1
8	1038	PANEL 5	3.15	1
9	1039	PANEL END 6	9.22	2
10	1041	BLOCK EXTENSION	0.39	4
11	1042	BLOCK EXTENSION	0.37	2
12	1043	BLOCK EXTENSION	0.39	2
13	1045	COVER	4.87	1



The Biofilm Carrier:

The surface area for the support of biofilm growth consists of high-density polyethylene (HDPE) carriers with approximate dimensions of 14.5 mm high by 14.5 mm wide and 8 mm long (Figure 2). The interstitial openings have small fins on the interior square areas and nine cells. The biofilm carrier has an effective surface area for biofilm growth of 198.1 ft²/ft³ (650 m²/m³) and is used in reactors at fill rates of up to 70%.



Biofilm Carrier

Design Criteria:

Parameter	Influent to MBBR	Influent Lbs.	Effluent Requirements	Expected removal efficiency
Design Flow:	750 GPD			
cBOD ₅ :	525 mg/l	3.3	125 mg/l	85%
TSS:	200 mg/l	1.25	60 mg/l	85%
Temp F (summer):	50° F Min.			
pH:	7-8			

Proposed Treatment system overview: The proposed treatment system will require septic tank capacity of 5 days detention time. The Alpha Flex MBBR unit will be installed in the first compartment of the septic tank providing 1.5 days DT. Aeration equipment and MBBR media will provide the desired treatment levels and will be installed inside the enclosure. This treatment tank would be followed by a clarifier with effluent screen and air lift return pump. A sludge return pump will be plumbed to return sludge from the clarifier to the septic tank. A final dose tank would pump clean effluent to drainfields.

Design parameters used:

CBOD loading to reactor: 750 GPD x 525 mg/l CBOD =	3.3 lbs CBOD / day
Effluent goal to drainfields	50 mg/l CBOD 50 mg/l TSS
MBBR media	28 cu ft (62% fill)
Media loading rate	4 g/bod/m2
Aeration requirements	15 CFM 2.0 psi
Reactor Dissolved Oxygen goal	3 mg/l
MBBR SOR	0.27 lbs O2/hr
Reactor tank sizing	1125 gallons
Clarifier	660 gallons

Quotation:

Item Description	QTY	Cost Estimate
Air distribution headers	1	
Alpha Flex enclosure	1	
MBBR media (cu ft)	28	
FPZKO3 1hp blower, 230v 40 CFM	1	
Blower panel	1	
Sludge Return pump	1	
Outdoor blower enclosure	1	
Shipping	1	
Onsite installation assistance	4 hrs	
Start Up and O&M training	4 hrs	

****Does not include sales tax.**

Provided by Wexco Environmental

- MBBR and control panel
- Installation assistance and system startup as needed onsite
 - Install air distribution piping in tank
 - Install retention sieve in tank
 - Install carrier elements
 - Install blower and blower enclosure
 - Sludge return pump

- Excluded
 - Precast concrete tanks and risers
 - Piping and parts for all pumps, tanks, blowers, etc.
 - Dose Pumps, EQ Pumps
 - All excavation work
 - Labor and equipment to install tanks
 - Control panel, electrical connections, mounting panel, etc.

Terms:

50% down to order, balance due net 30 days of invoice. A 1-1/2% service charge per month will be applied to balance due after 30 days.

Quote valid for 30 days.

WEXCO Environmental
320-983-2447

Septic System Management Plan
Wexco MBBR treatment System
High Strength Waste (HSW)

This Management Plan identifies maintenance requirements for proper operation of the **Wexco MBBR** wastewater treatment device for high strength wastewater (HSW). Refer to the manufacturer's Operation and Maintenance Manual for MBBR wastewater treatment products for detailed instructions on proper system operation and maintenance. Refer to your soil treatment system management plan (below or above-grade) for additional management requirements.

The Moving Bed Bio Reactor (MBBR) system is engineered to the site specific needs of treatment levels. The management tasks for this system are shown in the table below, however the frequency of maintenance and system sampling can vary depending on the flow and expected treatment levels of the system.

Table 1 – Septic tank maintenance

Component Description: Septic tanks and grease traps			
Location	Description	Frequency	Responsible Party
Manholes	Inspect manholes for infiltration	See Table 4	Service Provider
Manholes	Inspect inlet and outlet for infiltration		
Manholes	Inspect and clean baffles or effluent filters if needed		
Inlet/outlet	Sample sludge and scum levels		
Septic tanks	Pump tanks when solids level exceeds 25% of tank volume or within 12" of outlet baffle.	As needed	Maintainer
Septic tanks	Inspect baffles and tank integrity		

Table 2 – Pretreatment maintenance

Component Description: MBBR pretreatment			
Location	Description	Frequency	Responsible Party
Pretreatment tank	Inspect effluent quality and odor. Effluent should be clear and should have a musty odor.	See Table 4 As needed	Service Provider
Pretreatment tank	Sample pretreatment and effluent DO and pH.		
Blower enclosure	Adjust blower run times based on effluent results.		
Blower enclosure	Clean or replace air filter on blower.		
Blower enclosure	Record pressure reading on blower.		
Pretreatment tank	Inspect and clean media retention sieve		
Pretreatment tank	Inspect media for plugging and proper movement.		
Tank pumping not required	!!DO NOT PUMP THIS TANK!!	DO NOT PUMP THIS TANK	DO NOT PUMP THIS TANK

Septic System Management Plan
Wexco MBBR treatment System
High Strength Waste (HSW)

Table 3 – Post treatment clarifier maintenance

Component Description: Septic tanks and grease traps			
Location	Description	Frequency	Responsible Party
Manholes	Inspect manholes for infiltration	See Table 4	Service Provider
Manholes	Inspect inlet and outlet for infiltration		
Manholes	Inspect and clean baffles if needed		
Inlet/outlet	Sample sludge and scum levels		
Sludge return	Ensure proper operation of sludge return pump and adjust as needed to achieve desired effluent quality.		
Septic tanks	Pump tanks when solids level exceeds 25% of tank volume or within 12" of outlet baffle.	As needed	Maintainer
Septic tanks	Inspect baffles and tank integrity		

At the time of each service visit, the CIDWT Form 7-2: Aerobic Treatment Unit should be completed or a similar form. See <http://www.onsiteconsortium.org/omspchecklists.html>. **Sampling requirements** are specified in local operating permits but generally follow the table below. The protocol for collection of influent wastewater samples is within the effluent baffle area for grease trap or septic tank. Effluent samples are to be collected from the final pump tank. If there is no pump tank, then at effluent baffle or downstream from effluent filter in a gravity flow system post treatment.

Table 4 - Minimum sampling and service frequencies:

Treatment Goal	Design Flow (gpd)	Parameter (effluent)	Minimum Sampling Requirement*
C	<1,000 gpd	FLOW, BOD, TSS & O&G	Every 6 months
C	<2,500 gpd	FLOW, BOD, TSS & O&G	Every 4 months
C	<5,000 gpd	FLOW, BOD, TSS & O&G	Every 3 months
C	<10,000 gpd	FLOW, BOD, TSS & O&G	Every 1 month

*These minimum sampling requirements assume a system that is operated year round. These values may be reduced if the system is not used year round or system performance is established. Contact the manufacture for recommend service intervals if used seasonally or if more stringent treatment levels are required. If flow is seasonal, Start up the pretreatment system 2 weeks prior to use.



Septic System Management Plan for Above Grade Systems

The goal of a septic system is to protect human health and the environment by properly treating wastewater before returning it to the environment. Your septic system is designed to kill harmful organisms and remove pollutants before the water is recycled back into our lakes, streams and groundwater.

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 maintainer or service provider. However, it is **YOUR** responsibility to make sure all tasks get accomplished in a timely manner.

The University of Minnesota's *Septic System Owner's Guide* contains additional tips and recommendations designed to extend the effective life of your system and save you money over time.

Proper septic system design, installation, operation and maintenance means safe and clean water!

Property Owner	Prairie River Retreat	Email
Property Address	51272 Lake Ave McGregor, MN	Property ID 29-1-370500
System Designer	Septic Check	Contact Info 320-983-2447
System Installer		Contact Info ³
Service Provider/Maintainer		Contact Info
Permitting Authority	Aitkin County	Contact Info 218-927-7342
Permit #		Date Inspected

Keep this Management Plan with your Septic System Owner's Guide. The Septic System Owner's Guide includes a folder to hold maintenance records including pumping, inspection and evaluation reports. Ask your septic professional to also:

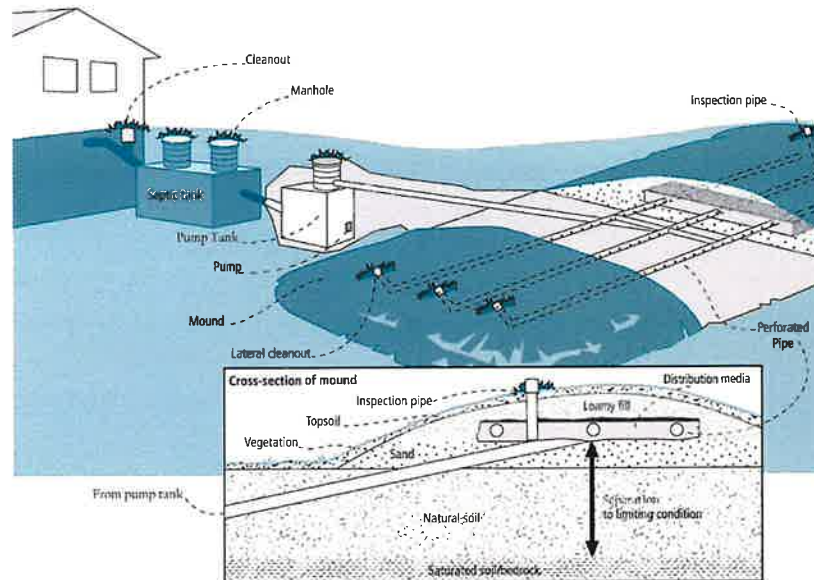
- Attach permit information, designer drawings and as-built of your system, if they are available.
- Keep copies of all pumping records and other maintenance and repair invoices with this document.
- Review this document with your maintenance professional at each visit; discuss any changes in product use, activities, or water-use appliances.

For a copy of the *Septic System Owner's Guide*, visit www.bookstores.umn.edu and search for the word "septic" or call 800-322-8642.

For more information see <http://septic.umn.edu>



Your Septic System



Septic System Specifics	
System Type: <input type="radio"/> I <input type="radio"/> II <input type="radio"/> III <input type="radio"/> IV* <input checked="" type="radio"/> V* (Based on MN Rules Chapter 7080.2200 – 2400) *Additional Management Plan required	<input checked="" type="checkbox"/> System is subject to operating permit* <input type="checkbox"/> System uses UV disinfection unit* Type of advanced treatment unit _____

Dwelling Type	Well Construction
Number of bedrooms: _____ System capacity/ design flow (gpd): <u>750</u> Anticipated average daily flow (gpd): <u>220</u> Comments _____ Business? : <input checked="" type="radio"/> Y <input type="radio"/> N What type? <u>Bar&Brill</u>	Well depth (ft): <u>>50'</u> <input checked="" type="checkbox"/> Cased well Casing depth: <u>>50'</u> <input type="checkbox"/> Other (specify): _____ Distance from septic (ft): <u>>50'</u> Is the well on the design drawing? <input checked="" type="radio"/> Y <input type="radio"/> N

Septic Tank	
<input type="checkbox"/> First tank Tank volume: <u>1820</u> gallons Does tank have two compartments? <input checked="" type="radio"/> Y <input type="radio"/> N <input type="checkbox"/> Second tank Tank volume: <u>1820</u> gallons <input type="checkbox"/> Tank is constructed of <u>Concrete</u> <input type="checkbox"/> Effluent screen: <input checked="" type="radio"/> Y <input type="radio"/> N Alarm <input checked="" type="radio"/> Y <input type="radio"/> N	<input type="checkbox"/> Pump Tank <u>1820</u> gallons <input type="checkbox"/> Effluent Pump make/model: <u>Goulds WE07</u> Pump capacity <u>37</u> GPM TDH <u>27.8</u> Feet of head <input type="checkbox"/> Alarm location <u>Outdoor Powerpost</u>

Soil Treatment Area (STA)	
Mound/At-Grade area (width x length): <u>35.2</u> ft x <u>87.2</u> ft Rock bed size (width x length): <u>10</u> ft x <u>63</u> ft Location of additional STA: _____ Type of distribution media: <u>1 1/2" Washed Rock</u>	<input checked="" type="checkbox"/> Inspection ports <input checked="" type="checkbox"/> Cleanouts <input type="checkbox"/> Surface water diversions <input type="checkbox"/> Additional STA not available



Homeowner Management Tasks

These *operation and maintenance* activities are your responsibility. *Chart on page 6 can help track your activities.*

Your toilet is not a garbage can. Do not flush anything besides human waste and toilet paper. No wet wipes, cigarette butts, disposal diapers, used medicine, feminine products or other trash!

The system and septic tanks needs to be
checked every 6 months

Your service provider or pumper/maintainer should evaluate if your tank needs to be pumped more or less often.

Seasonally or several times per year

- *Leaks.* Check (listen, look) for leaks in toilets and dripping faucets. Repair leaks promptly.
- *Soil treatment area.* Regularly check for wet or spongy soil around your soil treatment area. If surfaced sewage or strong odors are not corrected by pumping the tank or fixing broken caps and leaks, call your service professional. *Untreated sewage may make humans and animals sick.* Keep bikes, snowmobiles and other traffic off and control borrowing animals.
- *Alarms.* Alarms signal when there is a problem; contact your service professional any time the alarm signals.
- *Lint filter.* If you have a lint filter, check for lint buildup and clean when necessary. If you do not have one, consider adding one after washing machine.
- *Effluent screen.* If you do not have one, consider having one installed the next time the tank is cleaned along with an alarm.

Annually

- *Water usage rate.* A water meter or another device can be used to monitor your average daily water use. Compare your water usage rate to the design flow of your system (listed on the next page). Contact your septic professional if your average daily flow over the course of a month exceeds 70% of the design flow for your system.
- *Caps.* Make sure that all caps and lids are intact and in place. Inspect for damaged caps at least every fall. Fix or replace damaged caps before winter to help prevent freezing issues.
- *Water conditioning devices.* See Page 5 for a list of devices. When possible, program the recharge frequency based on *water demand (gallons)* rather than *time (days)*. Recharging too frequently may negatively impact your septic system. Consider updating to demand operation if your system currently uses time,
- *Review your water usage rate.* Review the Water Use Appliance chart on Page 5. Discuss any major changes with your service provider or pumper/maintainer.

During each visit by a service provider or pumper/maintainer

- Make sure that your service professional services the tank through the manhole. (NOT though a 4" or 6" diameter inspection port.)
- Ask how full your tank was with sludge and scum to determine if your service interval is appropriate.
- Ask your pumper/maintainer to accomplish the tasks listed on the Professional Tasks on Page 4.



Professional Management Tasks

These are the operation and maintenance activities that a pumper/maintainer performs to help ensure long-term performance of your system. At each visit a written report/record must be provided to homeowner.

Plumbing/Source of Wastewater

- Review the Water Use Appliance Chart on Page 5 with homeowner. Discuss any changes in water use and the impact those changes may have on the septic system.
- Review water usage rates (if available) with homeowner.

Septic Tank/Pump Tanks

- *Manhole lid.* A riser is recommended if the lid is not accessible from the ground surface. Insulate the riser cover for frost protection.
- *Liquid level.* Check to make sure the tank is not leaking. The liquid level should be level with the bottom of the outlet pipe. (If the water level is below the bottom of the outlet pipe, the tank may not be watertight. If the water level is higher than the bottom of the outlet pipe of the tank, the effluent screen may need cleaning, or there may be ponding in the soil treatment area.)
- *Inspection pipes.* Replace damaged or missing pipes and caps.
- *Baffles.* Check to make sure they are in place and attached, and that inlet/outlet baffles are clear of buildup or obstructions.
- *Effluent screen.* Check to make sure it is in place; clean per manufacturer recommendation. Recommend retrofitted installation if one is not present.
- *Alarm.* Verify that the alarm works.
- *Scum and sludge.* Measure scum and sludge in each compartment of each septic and pump tank, pump if needed.

Pump

- *Pump and controls.* Check to make sure the pump and controls are operating correctly.
- *Pump vault.* Check to make sure it is in place; clean per manufacturer recommendations.
- *Alarm.* Verify that the alarm works.
- *Drainback.* Check to make sure it is draining properly.
- *Event counter or elapsed time meter.* Check to see if there is an event counter or elapsed time meter for the pump. If there is one or both, calculate the water usage rate and compare to the anticipated use listed on Design and Page 2. Dose Volume: 124.4 gallons: Pump run time: 3.9 Minutes

Soil Treatment Area

- *Inspection pipes.* Check to make sure they are properly capped. Replace caps and pipes that are damaged.
- *Surfacing of effluent.* Check for surfacing effluent or other signs of problems.
- *Lateral flushing.* Check lateral distribution; if cleanouts exist, flush and clean at recommended frequency.
- *Vegetation* - Check to see that a good growth of vegetation is covering the system.

All other components – evaluate as listed here: _____



**Water-Use Appliances and
Equipment in the Home**

Appliance	Impacts on System	Management Tips
Garbage disposal	<ul style="list-style-type: none"> • Uses additional water. • Adds solids to the tank. • Finely-ground solids may not settle. Unsettled solids can exit the tank and enter the soil treatment area. 	<ul style="list-style-type: none"> • Use of a garbage disposal is not recommended. • Minimize garbage disposal use. Compost instead. • To prevent solids from exiting the tank, have your tank pumped more frequently. • Add an effluent screen to your tank.
Washing machine	<ul style="list-style-type: none"> • Washing several loads on one day uses a lot of water and may overload your system. • Overloading your system may prevent solids from settling out in the tank. Unsettled solids can exit the tank and enter the soil treatment area. 	<ul style="list-style-type: none"> • Choose a front-loader or water-saving top-loader, these units use less water than older models. • Limit the addition of extra solids to your tank by using liquid or easily biodegradable detergents. Limit use of bleach-based detergents and fabric softeners. • Install a lint filter after the washer and an effluent screen to your tank • Wash only full loads and think even – spread your laundry loads throughout the week.
Dishwasher	<ul style="list-style-type: none"> • Powdered and/or high-phosphorus detergents can negatively impact the performance of your tank and soil treatment area. • New models promote “no scraping”. They have a garbage disposal inside. 	<ul style="list-style-type: none"> • Use gel detergents. Powdered detergents may add solids to the tank. • Use detergents that are low or no-phosphorus. • Wash only full loads. • Scrape your dishes anyways to keep undigested solids out of your septic system.
Grinder pump (in home)	<ul style="list-style-type: none"> • Finely-ground solids may not settle. Unsettled solids can exit the tank and enter the soil treatment area. 	<ul style="list-style-type: none"> • Expand septic tank capacity by a factor of 1.5. • Include pump monitoring in your maintenance schedule to ensure that it is working properly. • Add an effluent screen.
Large bathtub (whirlpool)	<ul style="list-style-type: none"> • Large volume of water may overload your system. • Heavy use of bath oils and soaps can impact biological activity in your tank and soil treatment area. 	<ul style="list-style-type: none"> • Avoid using other water-use appliances at the same time. For example, don’t wash clothes and take a bath at the same time. • Use oils, soaps, and cleaners in the bath or shower sparingly.
Clean Water Uses	Impacts on System	Management Tips
High-efficiency furnace	<ul style="list-style-type: none"> • Drip may result in frozen pipes during cold weather. 	<ul style="list-style-type: none"> • Re-route water directly out of the house. Do not route furnace discharge to your septic system.
Water softener Iron filter Reverse osmosis	<ul style="list-style-type: none"> • Salt in recharge water may affect system performance. • Recharge water may hydraulically overload the system. 	<ul style="list-style-type: none"> • These sources produce water that is not sewage and should not go into your septic system. • Reroute water from these sources to another outlet, such as a dry well, drain tile or old drainfield.
Surface drainage Footing drains	<ul style="list-style-type: none"> • Water from these sources will overload the system and is prohibited from entering septic system. 	<ul style="list-style-type: none"> • When replacing, consider using a demand-based recharge vs. a time-based recharge. • Check valves to ensure proper operation; have unit serviced per manufacturer directions



Homeowner Maintenance Log

Track maintenance activities here for easy reference. See list of management tasks on pages 3 and 4.

Activity	Date accomplished									
Check frequently:										
Leaks: check for plumbing leaks*										
Soil treatment area check for surfacing**										
Lint filter: check, clean if needed*										
Effluent screen (if owner-maintained)***										
Alarm**										
Check annually:										
Water usage rate (maximum gpd _____)										
Caps: inspect, replace if needed										
Water use appliances – review use										
Other:										

*Monthly

**Quarterly

***Bi-Annually

Notes: If flow exceeds system capacity, check for and repair any leaks into the system, including household plumbing fixtures. If system ponds or otherwise cannot handle flow, repair options include; add time dosing, adding pre-treatment, or expanding the system.

"As the owner of this SSTS, 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 this 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

Management Plan Prepared By: Brian Koski

Certification # 7989

Permitting Authority: Aitkin County

WATER METER DATA

Prairie River Retreat Meter Readings

Month	Per Month Flow	Per Day Flow
<u>2020</u>		
August	1,811	90.55
September	1,997	99.85
October	701	35.05
November	1,466	73.30
December	654	32.70
<hr/>		
<u>2021</u>		
January	2,158	107.90
February	474	23.70
March	2,205	110.25
April	2,885	144.25
May	3,771	188.55
June	4,318	215.90
July	4,366	218.20
August	2,127	106.35

Analysis Report

May 04, 2020

REPORT TO:

Septic Check, Inc.

6074 Keystone Road
Milaca MN 56353

INVOICE TO:

Septic Check, Inc.
Brian
6074 Keystone Road
Milaca MN 56353-

Date Rcvd-Brnd: 4/22/2020
Time Rcvd-Brnd: 16:33

Sampled By: Eric Otte
Sample Type: WW
Recv Temp°C: 5-8 on ice

LOCATION:
Prairie River Retreat

SITE / ANALYTE	Sample Date/Time	Analyzed Value	Units	Reporting Limit	Analytical Method	Analysis Date/Time	Analyst	Code #
Septic Tank	4/20/2020 @ 12:00							
Carbonaceous BOD, 5 Day		526	mg/L	2	HACH 10360 REV. 1.2	4/23/20 11:55	CJS	031162
Kjeldahl Nitrogen - Total		77	mg/L	0.2	EPA 351.2	4/28/20 09:00	MH	031162
Nitrate+Nitrite		0.036	mg/L	0.02	EPA 353.2	4/30/20 09:26	MH	031162
Residue-Nonfilterable (TSS)		29	mg/L	1	USGS I-3765-85	4/23/20 14:25	CJS	031162
Total Nitrogen, Calculated		77	mg/L	0.2	CALCULATED	4/30/20 13:17	MH	031162

Samples received past holding time for cBOD/BOD analysis, analyzed at clients request.

Approved By:



Date Approved: 5/4/2020

Sara Ahlers, Laboratory Director

A.W. Research Laboratories, Inc. is Certified by the Minnesota Department of Public Health and follows approved methods and procedures. Minnesota Laboratory Certification # 027-035-135. All data generated using certified methods noted as -C, all data generated using non-certified methods noted as -NC, and all analytes for which certification is unavailable - NA. The results above relate only to the samples tested. This report must not be reproduced, except in full, without the written approval of the laboratory. We appreciate your feedback, please email us at awlab@awlab.com with questions or comments. Thank you!

~End of Analysis Report~

Aitkin County, Minnesota

454C—Mahtomedi loamy coarse sand, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: gjgx
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

Mahtomedi and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mahtomedi

Setting

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

Typical profile

A - 0 to 4 inches: loamy coarse sand
E - 4 to 17 inches: gravelly coarse sand
Bw - 17 to 38 inches: gravelly sand
C - 38 to 60 inches: gravelly sand

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Excessively 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: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 15 percent
Available water supply, 0 to 60 inches: Low (about 4.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Forage suitability group: Sandy (G090AN022MN)
Other vegetative classification: Sandy (G090AN022MN)

Hydric soil rating: No

Minor Components

Soils with more gravel

Percent of map unit: 2 percent

Hydric soil rating: No

Meehan and similar soils

Percent of map unit: 2 percent

Hydric soil rating: No

Newson and similar soils

Percent of map unit: 2 percent

Landform: Swales

Hydric soil rating: Yes

Soils with less gravel

Percent of map unit: 2 percent

Hydric soil rating: No

Leafriver and similar soils

Percent of map unit: 2 percent

Landform: Depressions

Hydric soil rating: Yes

Data Source Information

Soil Survey Area: Aitkin County, Minnesota

Survey Area Data: Version 21, Jun 4, 2020