Permit No. CP0002289

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

CONSTRUCTION PERMIT

The Missouri Department of Natural Resources hereby issues a permit to:

Justin Miller
McCoy Place Septic Association
762 Haw Thicket Lane
St. Louis, MO 63131

for the construction of (described facilities):

See attached.

Permit Conditions:

See attached.

Construction of such proposed facilities shall be in accordance with the provisions of the Missouri Clean Water Law, Chapter 644, RSMo, and regulation promulgated thereunder, or this permit may be revoked by the Department of Natural Resources (Department).

As the Department does not examine structural features of design or the efficiency of mechanical equipment, the issuance of this permit does not include approval of these features.

A representative of the Department may inspect the work covered by this permit during construction. Issuance of a permit to operate by the Department will be contingent on the work substantially adhering to the approved plans and specifications.

This permit applies only to the construction of water pollution control components; it does not apply to other environmentally regulated areas.

May 2, 2022
Effective Date

May 1, 2024
Expiration Date

Chris Wieberg

Chris Wieberg, Director, Water Protection Program

CONSTRUCTION PERMIT

I. CONSTRUCTION DESCRIPTION

This project will construct a STEP collection system and collection basin to pump effluent to a Membrane BioReactor, which will treat domestic wastewater from two single-family residences on McCoy Cove in Lake of the Ozarks. Sludge will be pumped and hauled to a permitted facility by contractor. The homes are currently utilizing individual on-site sewage systems with subsurface dispersal. The homes have noted failures in their current systems.

This project will also include general site work appropriate to the scope and purpose of the project and all necessary appurtenances to make a complete and usable wastewater treatment facility.

II. COST ANALYSIS FOR COMPLIANCE

Pursuant to Section 644.145, RSMo, when issuing permits under this chapter that incorporate a new requirement for discharges from publicly owned combined or separate sanitary or storm sewer systems or publicly owned treatment works, or when enforcing provisions of this chapter or the Federal Water Pollution Control Act, 33 U.S.C. 1251 et seq., pertaining to any portion of a publicly owned combined or separate sanitary or storm sewer system or [publicly owned] treatment works, the Department of Natural Resources shall make a "finding of affordability" on the costs to be incurred and the impact of any rate changes on ratepayers upon which to base such permits and decisions, to the extent allowable under this chapter and the Federal Water Pollution Control Act. This process is completed through a cost analysis for compliance. Permits that do not include new requirements may be deemed affordable.

The Department is not required to complete a cost analysis for compliance because the facility is not a combined or separate sanitary sewer system for a publically-owned treatment works.

III. CONSTRUCTION PERMIT CONDITIONS

The permittee is authorized to construct subject to the following conditions:

1. This construction permit does not authorize discharge.

2. All construction shall be consistent with plans and specifications signed and sealed by Ethan Shackelford with R. Miller Companies, LLC and as described in this permit.

3. The Department must be contacted in writing prior to making any changes to the plans and specifications that would directly or indirectly have an impact on the capacity, flow, system layout, or reliability of the proposed wastewater treatment facilities or any design parameter that is addressed by 10 CSR 20-8, in accordance with 10 CSR 20-8.110(11).

4. State and federal law does not permit bypassing of raw wastewater, therefore steps must be taken to ensure that raw wastewater does not discharge during construction. If a sanitary sewer overflow or bypass occurs, report the appropriate information to the Department's Southwest Regional Office per 10 CSR 20-7.015(9)(G).

5. The wastewater treatment facility shall be located at least fifty feet (50') from any dwelling or establishment. 10 CSR 20-8.140(C)(2)

6. The wastewater treatment facility shall be located above the twenty-five (25)-year flood level.

7. The wastewater facility structures, electrical equipment, and mechanical equipment shall be protected from physical damage by not less than the one hundred- (100-) year flood elevation per 10 CSR 20-8.140(2)(B).The minimum distance between wastewater treatment facilities and all potable water sources shall be at least three hundred feet (300') per 10 CSR 20-8.140(2)(C)1.

8. In addition to the requirements for a construction permit, 10 CSR 20-6.200 requires land disturbance activities of 1 acre or more to obtain a Missouri state operating permit to discharge stormwater. The permit requires best management practices sufficient to control runoff and sedimentation to protect waters of the state. Land disturbance permits will only be obtained by means of the Department's ePermitting system available online at https://dnr.mo.gov/data-e-services/missouri-gateway-environmental-management-mogem. See https://dnr.mo.gov/data-e-services/water/electronic-permitting-epermitting for more information.

9. A United States Army Corps of Engineers (USACE) Clean Water Act Section 404 Department of the Army permit and a Section 401 Water Quality Certification issued by the Department may be required for the activities described in this permit. This permit is not valid until these requirements are satisfied or notification is provided that no Section 404 permit is required by the USACE. You must contact your local USACE district since they determine what waters are jurisdictional and which permitting requirements may apply. You may call the Department's Water Protection Program, Operating Permits Section at 573-522-4502 for more information. See https://dnr.mo.gov/water/business-industry-other-entities/permits-certification-engineering-fees/section-401-water-quality for more information.

10. All construction must adhere to applicable 10 CSR 20-8 (Chapter 8) requirements listed below.

- Flood protection shall apply to new construction and to existing facilities undergoing major modification. The wastewater facility structures, electrical equipment, and mechanical equipment shall be protected from physical damage by not less than the one hundred- (100-) year flood elevation. 10 CSR 20-8.140 (2) (B)

- Unless another distance is determined by the Missouri Geological Survey or by the department's Public Drinking Water Branch, the minimum distance between wastewater treatment facilities and all potable water sources shall be at least three hundred feet (300'). 10 CSR 20-8.140 (2) (C) 1.

- No treatment unit with a capacity of twenty-two thousand five hundred gallons per day (22,500 gpd) or less shall be located closer than the minimum distance of 50' to a neighboring residence. See 10 CSR 20-2.010(68) for the definition of a residence. 10 CSR 20-8.140 (2) (C) 2.

- Facilities shall be readily accessible by authorized personnel from a public right–of-way at all times. 10 CSR 20-8.140 (2) (D)

- The outfall shall be so constructed and protected against the effects of flood water, ice, or other hazards as to reasonably ensure its structural stability and freedom from stoppage. 10 CSR 20-8.140 (6) (A)

- All sampling points shall be designed so that a representative and discrete grab sample of the effluent discharge can be obtained at a point after the final treatment process and before discharge to or mixing with the receiving waters. 10 CSR 20-8.140 (6) (B)

- All outfalls shall be posted with a permanent sign indicating the outfall number (i.e., Outfall #001). 10 CSR 20-8.140 (6) (C)

- All wastewater treatment facilities shall be provided with an alternate source of electric power or pumping capability to allow continuity of operation during power failures. 10 CSR 20-8.140 (7) (A) 1.

- An audiovisual alarm or a more advanced alert system, with a self-contained power supply, capable of monitoring the condition of equipment whose failure could result in a violation of the operating permit, shall be provided for all wastewater treatment facilities. 10 CSR 20-8.140 (7) (C)

- No piping or other connections shall exist in any part of the wastewater treatment facility that might cause the contamination of a potable water supply. 10 CSR 20-8.140 (7) (D) 1.

- A means of flow measurement shall be provided at all wastewater treatment facilities. 10 CSR 20-8.140 (7) (E)

- Adequate provisions shall be made to effectively protect facility personnel and visitors from hazards. The following shall be provided to fulfill the particular needs of each wastewater treatment facility:
    - Fencing. Enclose the facility site with a fence designed to discourage the entrance of unauthorized persons and animals; 10 CSR 20-8.140 (8) (A)
    - Gratings over appropriate areas of treatment units where access for maintenance is necessary; 10 CSR 20-8.140 (8) (B)
    - First aid equipment; 10 CSR 20-8.140 (8) (C)
    - Posted "No Smoking" signs in hazardous areas; 10 CSR 20-8.140 (8) (D)
    - Appropriate personal protective equipment (PPE); 10 CSR 20-8.140 (8) (E)

  - 10 CSR 20-8.140 (8) (G) Portable lighting equipment complying with NEC requirements. See subsection (7)(B) of this rule;
  - Appropriately-placed warning signs for slippery areas, non-potable water fixtures (see subparagraph (7)(D)3.B. of this rule), low head clearance areas, open service manholes, hazardous chemical storage areas, flammable fuel storage areas, high noise areas, etc.; 10 CSR 20-8.140 (8) (I)
  - Provisions for local lockout/tagout on stop motor controls and other devices; 10 CSR 20-8.140 (8) (L)
  - Provisions for an arc flash hazard analysis and determination of the flash protection boundary distance and type of PPE to reduce exposure to major electrical hazards shall be in accordance with NFPA 70E *Standard for Electrical Safety in the Workplace* (2018 Edition), as approved and published August 21, 2017. 10 CSR 20-8.140 (8) (M)

- A septic tank must have a minimum capacity of at least one thousand (1,000) gallons. 10 CSR 20-8.180 (2) (A)

- The septic tank shall be baffled. 10 CSR 20-8.180 (2) (B)

- Membrane Bioreactor design flux criteria must be satisfied with one (1) membrane module out-of-service (e.g., for external clean in place, recovery cleaning, repair). For purposes of these criteria, a membrane module is the smallest membrane unit capable of separate removal from the tank while maintaining operation of other membrane units in the same tank. 10 CSR 20-8.180 (7) (A) 2.

- Membranes placed in the aeration basin(s) rather than a separate membrane tank shall have—

  - Individual modules and individual diffusers that can be removed separately for maintenance and repair; 10 CSR 20-8.180 (7) (A) 3. A. and
  - Aeration basin(s) volume sized for complete nitrification; 10 CSR 20-8.180 (7) (A) 3. B.

- Membrane Bioreactor preliminary treatment systems shall be consistent with the membrane manufacturer recommendations. 10 CSR 20-8.180 (7) (B) 1.

- Grit removal facilities are required for wastewater treatment facilities that utilize membrane bioreactors for secondary treatment. 10 CSR 20-8.150 (6) and 10 CSR 20-8.180 (7) (B) 2.

- Membrane Bioreactors shall provide oil and grease removal when the levels in the influent may cause damage to the membranes; 10 CSR 20-8.180 (7) (B) 3.

- Membrane Bioreactors shall provide a fine screen and high water alarm, designed to treat peak hourly flow. Coarse screens followed by fine screens may be used in larger facilities to minimize the complications of fine screening; and10 CSR 20-8.180 (7) (B) 4.

- Membrane Bioreactor preliminary treatment shall comply with 10 CSR 20-8.150(4)(B) for reliability. 10 CSR 20-8.180 (7) (B) 5.

- The Membrane Bioreactor's aeration blowers must provide adequate air for membrane scour and process demands. 10 CSR 20-8.180 (7) (C)

- Redundancy. The Membrane Bioreactor shall have at least one (1) of the following:
    - The ability to run in full programmable logic control (PLC) or standby power mode in case of an automatic control failure; 10 CSR 20-8.180 (7) (D) 1.
    - An operational battery backup PLC if manual control is not possible; or10 CSR 20-8.180 (7) (D) 2.
    - Sufficient standby power generating capabilities to provide continuous flow through the membranes during a power outage (e.g., preliminary screening, process aeration, recycle/RAS/permeate pumps, air scour, vacuum pumps) or an adequate method to handle flow for an indefinite period (e.g., private control of influent combined with contingency methods). 10 CSR 20-8.180 (7) (D) 3.

- Operations and Maintenance. The MBR design shall—
    - Include provisions to monitor membrane integrity; 10 CSR 20-8.180 (7) (E) 1.
    - Provide on-line continuous turbidity monitoring of filtrate or an equivalent for operational control and indirect membrane integrity monitoring for a treatment plant with design average flow greater than or equal to one hundred thousand gallons per day (100,000 gpd); 10 CSR 20-8.180 (7) (E) 2. and
    - Include provisions to remove membrane cassette for cleaning considering the membrane cassette wet weight plus additional weight of the solids accumulated on the membranes. 10 CSR 20-8.180 (7) (E) 3.

11. Upon completion of construction:

    A. The McCoy Place Septic Association will become the continuing authority for operation and maintenance of these facilities;

    B. Submit an electronic copy of the as builts if the project was not constructed in accordance with previously submitted plans and specifications; and

    C. Submit the enclosed form Statement of Work Completed to the Department in accordance with 10 CSR 20-6.010(5)(N) and request the previously public noticed draft operating permit be issued.

IV. REVIEW SUMMARY

1. CONSTRUCTION PURPOSE

This project is new construction for two homes on Lake of the Ozarks.

2. FACILITY DESCRIPTION

The McCoy Place Septic Association WWTF will be located at 63 Susan Court, village of Four Seasons, in Camden County, Missouri.

The facility has a design average flow of 450 gpd and serves a population equivalent of approximately 6 people.

3. COMPLIANCE PARAMETERS

The proposed project is required to meet final effluent limits as established in Operating Permit MO-0139807.

EFFLUENT PARAMETER(S)	UNITS	FINAL EFFLUENT		
		DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE
Biochemical Oxygen Demand$_5$	mg/L		20	15
Total Suspended Solids	mg/L		20	15
E. coli	#/100mL	630		126
Ammonia as N	mg/L			
(Jan 1 – Mar 31)		4.6		3.1
(Apr 1 – Jun 30)		2.3		1.5
(Jul 1 – Sep 30)		1.8		1.2
(Oct 1 – Dec 31)	mg/L	3.6		2.4
Total Phosphorus	mg/L			1.0
pH – Units	SU	6.0-9.0		6.0-9.0

4. ANTIDEGRADATION

The Department has reviewed the antidegradation report for this facility and issued the Water Quality and Antidegradation Review dated February 2022, due to new construction. See **APPENDIX – ANTIDEGRADATION**.

5. REVIEW of MAJOR TREATMENT DESIGN CRITERIA

- STEP system- Septic Tank – A septic tank provides passive primary treatment as the settleable solids and grit in raw wastewater settle onto the bottom of the tank. Raw wastewater will flow from each house to a 500-gallon septic tank.
  - The septic tanks provide approximately 1.1 days of detention at design average flow.
  - Settled solids in the septic tank shall be removed by a contract hauler as needed, including in case of loss of power.
- Membrane Bioreactor (MBR) — The MBR system is by BioMicrobics. The system will be one 1,500 gallon system.
  - The membrane is a flat plate membrane provides fine screening by utilizing a combination of ultrafiltration and microfiltration.
  - The step tanks provide for the elimination of solids that can damage the membranes.

- Flow measurement and high water alarms are included in the MBR system.
- The design flux rate through the membranes at peak flow is 7.74 LMH at peak flow with a maximum operating flux of 15 LMH.
- The surface area of the membranes is 14 m^2.
- The filtration rate through the membranes is 0.92 gpm.
- Total air supplied through the membrane is 30 scfm.
- Disinfection is not proposed for this system because it utilizes ultrafiltration. The BioMicrobics system has been tested by National Science Foundation (NSF) and found to have an overall fecal coliform from 1.0 cfu/100 mL to 1.6 cfu/100 mL. In test done under the NSF Standard 350, the BioBarrier had a geometric average E. Coli of 1.3 MPN/100 mL.

6. OPERATING PERMIT

Operating permit MO-0139807 was successfully public noticed from March 4, 2022 to April 4, 2022 with no comments received. Submit the Statement of Work Completed to the Department in accordance with 10 CSR 20-6.010(5)(N) and request the operating permit be issued.

V. NOTICE OF RIGHT TO APPEAL

If you were adversely affected by this decision, you may be entitled to an appeal before the Administrative Hearing Commission (AHC) pursuant to Section 621.250 RSMo. To appeal, you must file a petition with the AHC within 30 days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC. Any appeal should be directed to:

Administrative Hearing Commission
U.S. Post Office Building, Third Floor
131 West High Street, P.O. Box 1557
Jefferson City, MO 65102-1557
Phone: 573-751-2422
Fax: 573-751-5018
Website: https://ahc.mo.gov

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John Rustige, P.E.
Engineering Section
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APPENDIX 1 - Water Quality Antidegradation Review

Water Quality and Antidegradation Review

For the Protection of Water Quality
and Determination of Effluent Limits for Discharge to

Lake of the Ozarks
by
McCoy Place Septic Association WWTF

February, 2022

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1. Purpose of Antidegradation Review Report

The proposed new facility will serve two 3-bedroom homes on McCoy Cove at Lake of the Ozarks. Each home will have a Septic Tank/Effluent Pump (STEP) which will gravity feed into a small membrane bio-reactor. Existing septic tanks will be used. The design flow is 720 gallons per day.

Ethan Shackelford, P.E. of R. Miller Companies, LLC, prepared the application and Antidegradation Review.

The applicant elected to assume that all pollutants of concern (POC) significantly degrade the receiving water body in the absence of existing water quality. An alternatives analysis was conducted to fulfill the requirements of the Antidegradation Implementation Policy (AIP).

2. Facility Information

Facility Name:	McCoy Place Septic Association
Address:	65 Susan Court
Permit #:	MO-0139548
County:	Camden
Facility Type:	Domestic
Owner:	McCoy Place Septic Association
Continuing Authority:	same
UTM Coordinates:	X = 529776 ; Y = 4229054
Legal Description:	Section 23 T40N R16W
Ecological Drainage Unit:	Ozark / Osage

3. Facility History

This is a new facility and has no history. The owners are concerned about the septic tanks' ability to pass County Health Department inspections.

A. Facility performance History:

There is no performance history for this facility since it is a new and proposed discharging facility.

B. Receiving Waterbody Information

OUTFALL(S) TABLE:

OUTFALL	DESIGN FLOW (CFS)	TREATMENT LEVEL	EFFLUENT TYPE
001	0.001	Secondary	Domestic

RECEIVING STREAM(S) TABLE:

WATER-BODY NAME	CLASS	WBID	DESIGNATED USES*	12-DIGIT HUC	DISTANCE TO CLASSIFIED SEGMENT (MI)
Lake of the Ozarks	L2	7205	AQL, WBC-A, SCR, IRR, HHP, LWW	10290109-0407	0

* Protection of Warm Water Aquatic Life (AQL), Cold Water Fishery (CDF), Cool Water Fishery (CLF), Whole Body Contact Recreation – Category A (WBC-A), Whole Body Contact Recreation – Category B (WBC-B), Secondary Contact Recreation (SCR), Human Health Protection (HHP), Irrigation (IRR), Livestock & Wildlife Watering (LWW), Drinking Water Supply (DWS), Industrial (IND), Groundwater (GRW).

RECEIVING STREAM(S) LOW-FLOW VALUES:

RECEIVING BODY	LOW-FLOW VALUES (CFS)		
	1Q10	7Q10	30Q10
Lake of the Ozarks		6.9	7.5

Receiving Water Body Segment Outfall #1:		
Upper end segment* UTM coordinates:	X = 529776 ; Y = 4229054	outfall
Lower end segment* UTM coordinates:	X = 530095 ; Y = 4229226	cove meets main lake body

*Segment is the portion of the stream where discharge occurs. Segment is used to track changes in assimilative capacity and is bound at a minimum by existing sources and confluences with other significant water bodies.

A Geohydrologic Evaluation was submitted with the request and the receiving stream is gaining for discharge purposes (see Appendix B).

C. Existing Water Quality

No existing water quality data was submitted. The facility discharges to Lake of the Ozarks, which is on the 303(d) list for fish trauma, but not for any POC.

D. Mixing Considerations

MIXING CONSIDERATIONS
Zone of Initial Dilution: Not Allowed [10 CSR 20-7.031(5)(A)4.B.(IV)(b)].

Mixing Zone (MZ) Parameters: The planned outfall is on a small cove of the lake. The mainstem lake width is approximately 600 feet, which is greater than the maximum allowed distance. Therefore MZ = 100 feet [10 CSR 20-7.031(5)(A)5.B.(IV)(a)].

Mixing Zone Volume: The flow volume approximates a triangular prism because of the slope of the lake bottom, where the formula is Volume = L*W*(D*0.5). The distance (L) from the outfall to the boat dock is 225 feet, so the maximum allowed length is 100 ft. The prism dimensions are length (L) = 100 ft., width (W) = 100 ft., and depth (D) = 5 ft. Depth was obtained from other WQARs for other facilities at the lake with outfalls on similar small arms..

Volume = L*W*(D*(0.5)) = (100')*(100')*(5'*(0.5)) = 25,000 ft^3.

The flow volume of 25,000 ft^3 is assumed as the daily mixing zone. Therefore;
30Q10 = (25,000 ft^3/day)*(1 day/86,400 sec) = 0.29 ft^3/sec.

4. Permit Limits and Monitoring Information

Proposed Monitoring Parameters and Effluent Limits

PARAMETER	Unit	Basis for Limits	Daily Maximum	Weekly Average	Monthly Average	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type ****
Flow	MGD		*		*				
BOD_5	mg/L	PEL		20	15				
TSS	mg/L	PEL		20	15				
*Escherichia coli***	#/100mL	WQBEL	630		126**				
Ammonia as N****									
(Jan 1 – Mar 31)			4.6		3.1				
(Apr 1 – Jun 30)	mg/L	PEL	2.3		1.5				
(Jul 1 – Sep 30)			1.8		1.2				
(Oct 1 – Dec 31)			3.6		2.4				
Oil & Grease	mg/L								
Total Phosphorus	mg/L		*		1.0				
Total Kjeldahl Nitrogen	mg/L								

PARAMETER	Unit	Basis for Limits	Minimum		Maximum	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type
pH	SU		6.0		9.0				

PARAMETER	Unit	Basis for Limits	Daily Minimum		Monthly Avg. Min	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type
Dissolved Oxygen (DO)	mg/L								
BOD_5 Percent Removal	%								
TSS Percent Removal	%								

* - Monitoring requirement only
** - #/100mL; the Monthly Average for *E. coli* is a geometric mean.
*** - Parameter not previously established in previous state operating permit.
**** - Values obtained by using base case value (1.2 mg/L as 3rd Q AML) and scaling others using WQBEL ratios.

Basis for Limitations Codes:

MDEL – Minimally Degrading Effluent Limit
NDEL – Non-Degrading Effluent Limit
PEL – Preferred Effluent Limit
TBEL – Technology-Based Effluent Limit
WQBEL – Water Quality-Based Effluent Limit

5. Receiving Water Monitoring Requirements

No receiving water monitoring requirements recommended at this time.

6. Antidegradation Review Information

In accordance with Missouri's Water Quality Standard [10 CSR 20-7.031(3)] and federal antidegradation policy at Title 40 Code of Federal Regulation (CFR) Section 131.12 (a), the department developed a statewide antidegradation policy and corresponding procedures to implement the policy. A proposed discharge to a water body will be required to undergo a level of Antidegradation Review, which documents that the use of a water body's available assimilative capacity is justified. Effective August 30, 2008, and revised July 13, 2016, a facility is required to use Missouri's AIP for new and expanded wastewater discharges.

The AIP specifies that if the proposed activity results in significant degradation then a demonstration of necessity (i.e., alternatives analysis) and a determination of social and economic importance are required.

The following is a review of the Wastewater Treatment Facility Antidegradation Review Report for McCoy Place Septic Association dated September 13, 2021.

A. Tier Determination

Waterbodies are assigned Tier 1, 2, or 3 protection levels.

Tier 1 protection is applied to a waterbody on a pollutant by pollutant basis for pollutants may cause or contribute to the impairment of a beneficial use or violation of Water Quality Criteria (WQC); and prohibit further degradation of Existing Water Quality (EWQ) where additional pollutants of concern (POCs) would result in the water being included on the 303(d) List.

Tier 2 level protection is assigned to the waterbody on a pollutant by pollutant basis that prohibits the degradation of water quality of a surface water unless a review of reasonable alternatives and social and economic considerations justifies the degradation in accordance with the methods presented in the AIP.

Tier 3 protection prohibits any degradation of water quality of Outstanding National Resource Waters and Outstanding State Resource Waters as identified in Tables D and E of the Water Quality Standards (WQS). Temporary degradation of water receiving Tier 3 protection may be allowed by the Department on a case-by-case basis as explained in Section VI of the AIP.

Below is a list of POCs reasonably expected and identified by the permittee in their application to be in the discharge. Pollutants of concern are defined as those pollutants "proposed for discharge that affect beneficial use(s) in waters of the state." They include pollutants that "create conditions unfavorable to beneficial uses in the water body receiving the discharge or proposed to receive the discharge" (AIP, Page 6).

The pollutants of concern; BOD, ammonia, total phosphorus, and *e. coli*, were assumed to be Tier 2 because no water quality study was performed. Other pollutants, TSS and pH are not assigned a tier but do have proposed limits.

Pollutants of Concern and Tier Determination

Pollutants of Concern	Tier	Degradation	Comment
Biological Oxygen Demand (BOD_5)/DO	2*	Significant	
Total Suspended Solids (TSS)	**		
Ammonia as N	2*	Significant	
Escherichia coli (E. coli)	2*	Significant	
pH	***		
Total Phosphorus	2*		

* Tier assumed.
** Tier determination not possible: No in-stream standards for these parameters.
*** Standards for these parameters are ranges.

B. Necessity of Degradation

The AIP specifies that if the proposed activity does result in significant degradation then a demonstration of necessity (i.e., alternatives analysis) and a determination of social and economic importance are required. Part of that analysis as shown below is the evaluation of non-degrading alternatives, such as regionalization or no discharge systems.

The applicant has the option of assuming discharge will be significant and proceeding directly to the alternatives analysis, thereby avoiding the determination of the assimilative capacity of the receiving water. The applicant has elected this option.

i. Regionalization

The closest regional collection system is Village of Four Seasons, MO, operated by Camden County Public Water and Sewer District #4. District #4 was contacted and indicated no plans for extending the existing collection system to the area is currently being considered. The distance from the proposed sewer main (not considering possible requirements for lift stations, upgrading to accommodate all properties along the available path, or monthly sewer bills) is 4,923 feet and is estimated to cost $157,536. This is far in excess of other treatment options and was not further considered.

ii. No Discharge Evaluation

Two options for no discharge were considered: hold & transport and subsurface irrigation. Hold and transport would cost an estimated $45,016 and was not considered practical. Subsurface irrigation was not possible due to lack of sufficient area because of neighboring properties.

iii. Alternatives to No discharge

The alternatives analysis included four options of three different technologies. The technologies were package plant, recirculating rock filter, and membrane bioreactor. The rock filter was evaluated with and without chlorination.

The package plant and recirculating rock filters were too large for the available space, regardless of cost or efficacy. The membrane bioreactor was described as a newer technology and therefore not having the same track record as the other options, but also mentioned that several other smaller systems at the Lake used membrane bioreactors with acceptable performance at a competitive cost.

The membrane bioreactor was selected as the preferred alternative only practical option.

Alternatives Analysis Comparison

Pollutant	Membrane Bioreactor (Preferred Alternative)	Recirculating Rock Filter	Recirculating Rock Filter w/ Chlorination	Package Plant
BOD_5	15 mg/l	20 mg/l	20 mg/l	20 mg/l
TSS	15 mg/l	20 mg/l	20 mg/l	20 mg/l
Ammonia as N	1.2 mg/l	4 mg/l	2.8 mg/l	4.6 mg/l
Escherichia coli (E. coli)	≤ 126 CFU/100ml	≤ 126 CFU/100ml	≤ 126 CFU/100ml	≤ 126 CFU/100ml
Total Phosphorus	1.0 mg/L	1.0 mg/L	1.0 mg/L	1.0 mg/L
Life Cycle Cost**	$112,660	$109,491	$109,491	$256,789
Ratio	100%	97%	97%	228%

* monitoring requirement
**Life cycle cost at 20 year design life and 1% interest

C. Social and Economic Importance

The affected community consists of the thirty homes directly connected to the proposed system and the Lake of the Ozarks region in general. Lake front property in the area is one of the largest sectors when evaluating tax base revenue. This project, and others like it, are essential to protecting property values in the region until residential population density is sufficient to expand larger regional infrastructure systems into remote areas. This project is directly funded by the owners, allowing local governments to focus its resources on developing regional infrastructure.

D. Natural Heritage Review

A Missouri Department of Conservation Natural Heritage Review was obtained by the applicant. There are no known species of concern within the defined project area (see Appendix C).

7. Receiving Water Monitoring Requirements

No receiving water monitoring requirements recommended at this time.

8. Derivation and Discussion of Parameters and Limits

Wasteload allocations and limits were calculated using two methods:

1) Water quality-based – Using water quality criteria or water quality model results and the dilution equation below:

$$C = \frac{(C_s \times Q_s) + (C_e \times Q_e)}{(Q_e + Q_s)}$$ (EPA/505/2-90-001, Section 4.5.5)

Where C = downstream concentration
C_s = upstream concentration
Q_s = upstream flow
C_e = effluent concentration
Q_e = effluent flow

Chronic wasteload allocations were determined using applicable chronic water quality criteria (CCC: criteria continuous concentration) and stream volume of flow at the edge of the mixing zone (MZ). Acute wasteload allocations were determined using applicable water quality criteria (CMC: criteria maximum concentration) and stream volume of flow at the edge of the zone of initial dilution (ZID).

Water quality-based maximum daily and average monthly effluent limitations were calculated using methods and procedures outlined in USEPA's "Technical Support Document For Water Quality-based Toxics Control" (EPA/505/2-90-001).

2) Alternative Analysis-based – Using the preferred alternative's treatment capacity for conventional pollutants such as BOD_5 and TSS that are provided by the consultant as the WLA, the significantly-degrading effluent average monthly and average weekly limits are determined by applying the WLA as the average monthly (AML) and multiplying the AML by 1.5 to derive the average weekly limit (AWL).

Note: Significantly-degrading effluent limits have been based on the authority included in Section I.A. of the AIP. Also under 40 CFR 133.105, permitting authorities shall require more stringent limitations than equivalent to secondary treatment limitations for 1) existing facilities if the permitting authority determines that the 30-day average and 7-day average BOD_5 and TSS effluent values could be achievable through proper operation and maintenance of the treatment works, and 2) new facilities if the permitting authority determines that the 30-day average and 7-day average BOD_5 and TSS effluent values could be achievable through proper operation and maintenance of the treatment works, considering the design capability of the treatment process.

Outfall #001 **– Main Facility Outfall**

- **Flow.** Though not limited itself, the volume of effluent discharged from each outfall is needed to assure compliance with permitted effluent limitations [40 CFR Part 122.44(i)(1)(ii)]. If the permittee is unable to obtain effluent flow, then it is the responsibility of the permittee to inform the department, which may require the submittal of an operating permit modification. Influent monitoring has been and will be required for this facility in its Missouri State Operating Permit.

- **Biochemical Oxygen Demand (BOD_5).** Effluent limits of 15 mg/L average monthly and 20 mg/L average weekly maximum were established as a result of a discharging technology alternatives analysis conducted by the applicant. These limits are at least as stringent as the minimum effluent regulations established in 10 CSR 20-7.015(3)(A)1.A..

- **Total Suspended Solids (TSS).** Effluent limits of 15 mg/L average monthly and 20 mg/L average weekly maximum were established as a result of a discharging technology alternatives analysis conducted by the applicant. These limits are at least as stringent as the minimum effluent regulations established in 10 CSR 20-7.015(3)(A)1.A..

- ***Escherichia coli (E. coli).*** Effluent limits of 126 CFU per 100 mL monthly average and 630 CFU per 100 mL as a daily max of geometric mean during the recreation season (April 1 – October 31) were established as a result of a discharging technology alternatives analysis conducted by the applicant. Disinfection to meet whole body contact requirements is not required because the manufacturer guarantees the system will meet the limit. (10 CSR
20-7.031(9)(J)1.xxx

- **Total Ammonia Nitrogen.** Early Life Stages Present Total Ammonia Nitrogen criteria apply [10 CSR 20-7.031(5)(B)7.C. & Table B3]. Background total ammonia nitrogen = 0.01 mg/L

Quarter	Temp (°C)*	pH (SU)*	Total Ammonia Nitrogen CCC (mg/L)	Total Ammonia Nitrogen CMC (mg/L)
1st	11.0	7.8	2.3	12.7
2nd	21.2	7.8	2.3	12.7
3rd	26.0	7.8	2.1	12.7
4th	15.5	7.8	1.2	7.2

* Ecoregion Data (Ozark Highlands)

1st Quarter
Chronic WLA: Ce = ((0.001+ 0.29)2.3 – (0. 29 * 0.01))/ 0.001= 666.4 mg/L
Acute WLA: Ce = ((0.001+ 0. 29)12.7 – (0. 29 * 0.01))/ 0.001= 12.7 mg/L
AML = 12.7 mg/L
MDL = 12.7 mg/L

2nd Quarter
Chronic WLA: Ce = ((0.001+ 0.29)2.3 – (0. 29 * 0.01))/ 0.001= 666.4 mg/L
Acute WLA: Ce = ((0.001+ 0. 29)12.7 – (0. 29 * 0.01))/ 0.001= 12.7 mg/L
AML = 12.7 mg/L
MDL = 12.7 mg/L

3rd Quarter
Chronic WLA: Ce = ((0.001+ 0. 29)2.1 – (0. 29 * 0.01))/ 0.001= 608.2 mg/L
Acute WLA: Ce = ((0.001+ 0. 29)12.7 – (0. 29 * 0.01))/ 0.001= 12.7 mg/L
AML = 12.7 mg/L
MDL = 12.7 mg/L

4th Quarter
Chronic WLA: Ce = ((0.001+ 0. 29)1.2 – (0. 29 * 0.01))/ 0.001= 346.3 mg/L
Acute WLA: Ce = ((0.001+ 0. 29)7.2 – (0. 29 * 0.01))/ 0.001= 7.2 mg/L
AML = 7.2 mg/L
MDL = 7.2 mg/L

The MBR is capable of much better ammonia control than WQBEL; therefore, the recommended limits are those of the MBR.

- **Oil & Grease.** Conventional pollutant, [10 CSR 20-7.031(4)(B)]. Waters shall be free from oil, scum, and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses.

- **Nutrients.** The preferred alternative selected for ammonia treatment serves as the base case for total phosphorus. Effluent limits of 1.0 mg/L average monthly was established as a result of a discharging technology alternatives analysis conducted by the applicant.

- **pH.** The preferred alternative selected for ammonia treatment serves as the base case for pH with effluent limit range of 6.0-9.0 SU. Technology based limits, 6.0/9.0 SU [10 CSR 20-7.015] are protective of the water quality standard [10 CSR 20-7.031(5)(E)], due to the buffering capacity of the mixing zone.

9. General Assumptions of the Water Quality and Antidegradation Review

A. A Water Quality and Antidegradation Review (WQAR) assumes that [10 CSR 20-6.010(3) Continuing Authorities and 10 CSR 20-6.010(4) (D), consideration for no discharge] has been or will be addressed in a Missouri State Operating Permit or Construction Permit Application.
B. A WQAR does not indicate approval or disapproval of alternative analysis as per [10 CSR 20-7.015(4) Losing Streams], and/or any section of the effluent regulations.
C. Changes to Federal and State Regulations (FSR) made after the drafting of this WQAR may alter Water Quality Based Effluent Limits (WQBEL).
D. Effluent limitations derived from FSR may be WQBEL or Effluent Limit Guidelines (ELG).
E. WQBEL supersede ELG only when they are more stringent. Mass limits derived from technology based limits are still appropriate.
F. A WQAR does not allow discharges to waters of the State, and shall not be construed as a National Pollution Discharge Elimination System (NPDES) or Missouri State Operating Permit to discharge or a permit to construct, modify, or upgrade.
G. Limitations and other requirements in a WQAR may change as Water Quality Standards (WQS), Methodology, and Implementation procedures change.
H. Nothing in this WQAR removes any obligations to comply with county or other local ordinances or restrictions.
I. The operating permit may contain additional requirements to evaluate the effectiveness of the technology once the facility is in operation. This Antidegradation Review is based on the information provided by the facility and is not a comprehensive review of the proposed treatment technology. If the review engineer determines the proposed technology will not consistently meet proposed effluent limits, the permittee will be required to revise their Antidegradation Report.

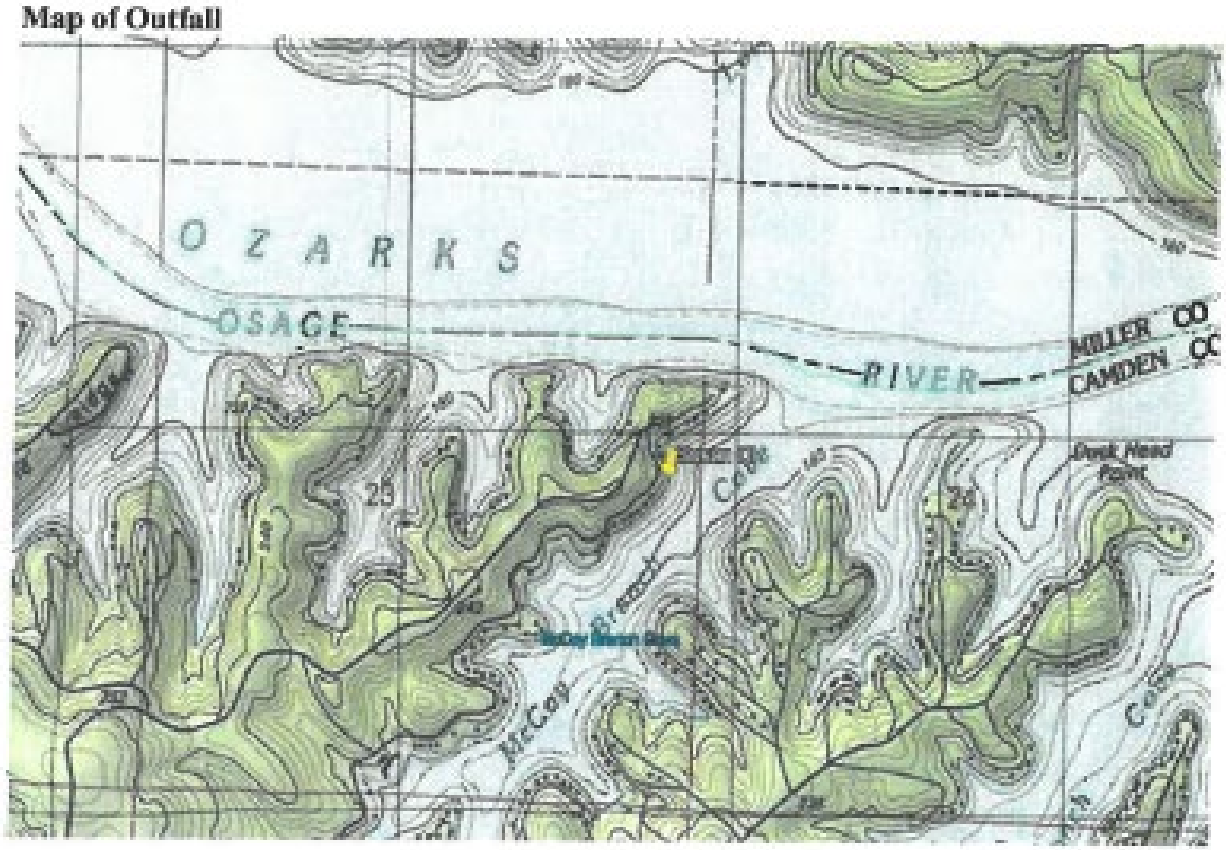
10. Antidegradation Review Preliminary Determination

The proposed new facility discharge location will result in degradation of a small cove on Lake of the Ozarks. A membrane bioreactor was found to be cost effective and provided slightly better pollutant reductions than the recirculating rock filters.

Per the requirements of the AIP, the effluent limits in this review were developed to be protective of beneficial uses and to attain the highest statutory and regulatory requirements. The Department has determined that the submitted review is sufficient and meets the requirements of the AIP. No further analysis is needed for this discharge.

Reviewer: Bern Johnson
Date: February, 2022
Unit Chief: John Rustige, P.E.

11. Appendix A: Map of Discharge Location



Portion of USGS Lake Ozark Quadrangle

12. Appendix B: Geohydrologic Evaluation

Missouri Department of dnr.mo.gov
NATURAL RESOURCES
Michael L. Parson, Governor
Dru Buntin, Director

LWE22014
Camden County

September 07, 2021

Ethan Shackelford
PO Box 282
Osage Beach, MO 65065

RE: McCoy Place Septic Association WWTF

Dear Ethan Shackelford:

On August 10, 2021, the Missouri Geological Survey received a request to perform a geohydrologic evaluation for the above referenced project located in Camden County. Included with this letter is a report that details the geologic and hydrologic conditions at the site and the potential for groundwater contamination in the event of wastewater treatment failure.

Thank you for the evaluation request. If you are in need of further assistance or have questions regarding the report, please contact our office at P.O Box 250, Rolla, Mo 65402-0250, by telephone at 573-368-2100 or gspgeol@dnr.mo.gov.

Sincerely,

MISSOURI GEOLOGICAL SURVEY

Kirsten Schaefer

Kirsten Schaefer
Geologist
Environmental Geology Section

STATE OF MISSOURI
REGISTERED GEOLOGIST

09/07/2021

c: Justin Miller
WPP
Southwest Regional Office

Missouri Department Of Natural Resources
Missouri Geological Survey
Geological Survey Program
Environmental Geology Section

Project ID Number
LWE22014
County
Camden

Request Details

Project: McCoy Place Septic Association WWTF

Legal Description: 23 T40N R16W

Quadrangle: LAKE OZARK
Latitude: 38 12 33.5
Longitude: -92 39 36.11

Organization Official
Name: Justin Miller
Address: 762 Haw Thicket Lane
City: Saint Louis, Missouri
State: MO Zip: 63131
Phone: 573-280-7542
Email:

Preparer
Name: Ethan Shackelford
Address: PO Box 282
City: Osage Beach
State: MO Zip: 65065
Phone: 573-348-8799
Email: ethan@hemilandos.com

Project Details

Report Date: 09/07/2021
Date of Field Visit: 08/25/2021

Previous Reports: Not Applicable

Facility Type
- [ ] Mechanical treatment plant
- [ ] Recirculating filter bed
- [ ] Land application
- [ ] Lagoon or storage basin
- [ ] Subsurface soil absorption system
- [ ] Lagoon or storage basin W/Land App
- [ ] Lagoon or storage basin W/SSAS
- [x] Other type of facility

Type of Waste
- [ ] Animal
- [x] Human
- [ ] Process or industrial
- [ ] Leachate
- [ ] Other waste type

Funding Source
- [x] IWT
- [ ] WWL-SRF

Additional Information
- [ ] Plans were submitted
- [ ] Site was investigated by NRCS
- [ ] Soil or geotechnical data were submitted

Geologic Stream Classification: [ ] Gaining [ ] Losing [x] No discharge

Overall Geologic Limitations
- [x] Slight
- [ ] Moderate
- [ ] Severe

Collapse Potential
- [x] Not applicable
- [ ] Slight
- [ ] Moderate
- [ ] Severe

Topography
- [x] <4%
- [x] 4% to 8%
- [x] 8% to 15%
- [ ] >15%

Landscape Position
- [ ] Broad uplands
- [ ] Floodplain
- [ ] Ridgetop
- [ ] Alluvial plain
- [x] Hillslope
- [ ] Terrace
- [ ] Narrow ravine
- [ ] Sinkhole

Bedrock: Bedrock onsite consists of approximately 100 feet of highly permeable Ordovician-age Gasconade Dolomite

Surficial Materials: : Surficial materials vary in thickness from not present to approximately 2 feet of highly permeable silt loam with approximately 50 percent pebble to gravel sized clasts

Missouri Department Of Natural Resources
Missouri Geological Survey
Geological Survey Program
Environmental Geology Section

Project ID Number
LWE22014
County
Camden

Recommended Construction Procedures for Earthen Facility

- ☐ Installation of clay pad and Compaction
- ☐ Diversion of subsurface flow
- ☐ Artificial sealing
- ☐ Rock excavation
- ☐ Limit excavation depth

Determine Overburden Properties

- ☐ Particle size analysis
- ☐ Atterberg limits
- ☐ 95% Max. dry density test method
- ☐ Overburden thickness
- ☐ Permeability coefficient-undisturbed
- ☐ Permeability coefficient-remolded

Determine Hydrologic Conditions

- ☐ Groundwater elevation
- ☐ Direction of groundwater flow
- ☐ 25-Year flood level
- ☐ 100-Year flood level

Remarks:

On August 25, 2021, a geologist from the Missouri Geological Survey (MGS) conducted a geohydrologic evaluation for a proposed discharging wastewater treatment facility in Camden County, Missouri. The site is situated on a hillslope on Susan Court in Lake Ozark, Missouri. The purpose of the site visit was to observe the geologic and hydrologic elements and determine the potential for groundwater contamination in the event of wastewater treatment failure.

According to logs of nearby wells, previous mapping, and field observations; bedrock onsite consists of approximately 100 feet of solution weathered, highly permeable Ordovician-age Gasconade Dolomite. The Gasconade is a coarsely crystalline dolomite with high
secondary porosity. Surficial materials vary in thickness from not present to approximately 2 feet of highly permeable silt loam with approximately 50 percent pebble to gravel sized clasts. However, the proposed method does not rely on existing soils for treatment.

The proposed facility will discharge to the Lake of the Ozarks, adjacent to the site, which exhibited gaining characteristics. The site receives a slight overall geologic limitation rating. In the event of wastewater treatment failure, the local groundwater, and the surface waters of the Lake of the Ozarks, may be adversely impacted.

13. Appendix C: Natural Heritage Review

Missouri Department of Conservation

Missouri Department of Conservation's Mission is to protect and manage the forest, fish, and wildlife resources of the state and to facilitate and provide opportunities for all citizens to use, enjoy and learn about these resources.

Natural Heritage Review Level Three Report: Species Listed Under the Federal Endangered Species Act

There are records of species listed under the Federal Endangered Species Act, and possibly also records for species listed Endangered by the state, or Missouri Species and/or Natural Communities of Conservation Concern within or near the the defined Project Area. Please contact the U.S. Fish and Wildlife Service and the Missouri Department of Conservation for further coordination.

Foreword: Thank you for accessing the Missouri Natural Heritage Review Website developed by the Missouri Department of Conservation with assistance from the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, Missouri Department of Transportation and NatureServe. The purpose of this website is to provide information to federal, state and local agencies, organizations, municipalities, corporations and consultants regarding sensitive fish, wildlife, plants, natural communities and habitats to assist in planning, designing and permitting stages of projects.

PROJECT INFORMATION

Project Name and ID Number: McCoy Place Septic Association #9675
Project Description: New Domestic Wastewater Treatment Facility for 2 residential houses. Lat 38.1 Long -92.3
Project Type: Waste Transfer, Treatment, and Disposal, Liquid waste/Effluent, Effluent Discharge, New outfall/discharge (e.g., NPDES) to stream
Contact Person: Ethan Shackelford
Contact Information: ethan@themillercos.com or 573-348-8799

Disclaimer: The NATURAL HERITAGE REVIEW REPORT produced by this website identifies if a species tracked by the Natural Heritage Program is known to occur within or near the area submitted for your project, and shares suggested recommendations on ways to avoid or minimize project impacts to sensitive species or special habitats. If an occurrence record is present, or the proposed project might affect federally listed species, the user must contact the Department of Conservation or U.S. Fish and Wildlife Service for more information. The Natural Heritage Program tracks occurrences of sensitive species and natural communities where the species or natural community has been found. Lack of an occurrence record does not mean that a sensitive plant, animal or natural community is not present on or near the project area. Depending on the project, current habitat conditions, and geographic location in the state, surveys may be necessary. Additionally, because land use conditions change and animals move, the existence of an occurrence record does not mean the species/habitat is still present. Therefore, Reports include information about records near but not necessarily on the project site.

The Natural Heritage Report is not a site clearance letter for the project. It provides an indication of whether or not public lands and sensitive resources are known to be (or are likely to be) located close to the proposed project. Incorporating information from the Natural Heritage Program into project plans is an important step that can help reduce unnecessary impacts to Missouri's sensitive fish, forest and wildlife resources. However, the Natural Heritage Program is only one reference that should be used to evaluate potential adverse project impacts. Other types of information, such as wetland and soils maps and on-site inspections or surveys, should be considered. Reviewing current landscape and habitat information, and species' biological characteristics would additionally ensure that Missouri Species of Conservation Concern are appropriately identified and addressed in planning efforts.

U.S. Fish and Wildlife Service – Endangered Species Act (ESA) Coordination: Lack of a Natural Heritage Program occurrence record for federally listed species in your project area does not mean the species is not present, as the area may never have been surveyed. Presence of a Natural Heritage Program occurrence record does not mean the project will result in negative impacts. The information within this report is not intended to replace Endangered Species Act consultation with the U.S. Fish and Wildlife Service (USFWS) for listed species. Direct contact with the USFWS may be necessary to complete consultation and it is required for actions with a federal connection, such as federal funding or a federal permit; direct contact is also required if ESA concurrence is necessary. Visit the USFWS Information for Planning and Conservation (IPaC) website at https://ecos.fws.gov/ipac/ for further information. This site was developed to help streamline the USFWS environmental review process and is a first step in ESA coordination. The Columbia Missouri Ecological Field Services Office may be reached at 573-234-2132, or by mail at 101 Park DeVille Drive, Suite A, Columbia, MO 65203.

Transportation Projects: If the project involves the use of Federal Highway Administration transportation funds, these recommendations may not fulfill all contract requirements. Please contact the Missouri Department of Transportation at 573-526-4778 or visit https://www.modot.org/ for additional information on recommendations.

Species or Communities of Conservation Concern within the Area:

There are records of species listed under the Federal Endangered Species Act, and possibly also records for species listed Endangered by the state, or Missouri Species and/or Natural Communities of Conservation Concern within or near the the defined Project Area. Please contact the U.S. Fish and Wildlife Service and the Missouri Department of Conservation for further coordination.

MDC Natural Heritage Review
Science Branch
P.O. Box 180
Jefferson City, MO
65102-0180
Phone: 573-522-4115 ext. 3182
NaturalHeritageReview@mdc.mo.gov

U.S. Fish and Wildlife Service
Ecological Service
101 Park DeVille Drive
Suite A
Columbia, MO
65203-0007
Phone: 573-234-2132

Other Special Search Results:

No results have been identified for this project location.

Project Type Recommendations:
Waste Transfer, Treatment, and Disposal - Liquid Effluent Discharge - New or Renewal of Permit: Clean Water Act permits issued by other agencies regulate both construction and operation of wastewater systems, and provide many important protections for fish and wildlife resources throughout the project area and at some distance downstream. Fish and wildlife almost always benefit when unnatural pollutants are removed from water, and concerns are minimal if construction is managed to minimize erosion and sedimentation/runoff to nearby streams and lakes, including adherence to any "Clean Water Permit" conditions.
Revegetation of disturbed areas is recommended to minimize erosion, as is restoration with of native plant species compatible with the local landscape and for wildlife needs. Annuals like ryegrass may be combined with native perennials for quicker green-up. Avoid aggressive exotic perennials such as crown vetch and sericea lespedeza.

Project Location and/or Species Recommendations:

Endangered Species Act Coordination - Indiana bats (*Myotis sodalis*, federal- and state-listed endangered) and **Northern long-eared bats** (*Myotis septentrionalis*, federal-listed threatened) may occur near the project area. Both of these species of bats hibernate during winter months in caves and mines. During the summer months, they roost and raise young under the bark of trees in wooded areas, often riparian forests and upland forests near perennial streams. During project activities, avoid degrading stream quality and where possible leave snags standing and preserve mature forest canopy. Do not enter caves known to harbor Indiana bats or Northern long-eared bats, especially from September to April. **If any trees need to be removed for your project, please contact the U.S. Fish and Wildlife Service (Ecological Services, 101 Park DeVille Drive, Suite A, Columbia, Missouri 65203-0007; Phone 573-234-2132 ext. 100 for Ecological Services) for further coordination under the Endangered Species Act.**

The project location submitted and evaluated is within the geographic range of nesting Bald Eagles in Missouri. Bald Eagles (*Haliaeetus leucocephalus*) may nest near streams or water bodies in the project area. Nests are large and fairly easy to identify. Adults begin nesting activity in late December and January and young birds leave the nest in late spring to early summer. While no longer listed as endangered, eagles continue to be protected by the federal government under the Bald and Golden Eagle Protection Act. Work managers should be alert for nesting areas within 1500 meters of project activities, and follow federal guidelines at: http://www.fws.gov/midwest/MidwestBird/EaglePermits/index.html if eagle nests are seen.

The submitted project location is within the range of the Gray Myotis (i.e., Gray Bat) in Missouri. Depending on habitat conditions of your project's location, Gray Myotis (*Myotis grisescens*, federal and state-listed endangered) could occur within the project area, as they forage over streams, rivers, lakes, and reservoirs. Avoid entry or disturbance of any cave inhabited by Gray Myotis and when possible retain forest vegetation along the stream and from the cave opening to the stream.

Invasive exotic species are a significant issue for fish, wildlife and agriculture in Missouri. Seeds, eggs, and larvae may be moved to new sites on boats or construction equipment. Please inspect and clean equipment thoroughly before moving between project sites. See https://mdc.mo.gov/community-conservation/managing-invasive-species-your-community for more information.

- Remove any mud, soil, trash, plants or animals from equipment before leaving any water body or work area.
- Drain water from boats and machinery that have operated in water, checking motor cavities, live-well, bilge and transom wells, tracks, buckets, and any other water reservoirs.
- When possible, wash and rinse equipment thoroughly with hard spray or HOT water (>140° F, typically available at do-it-yourself car wash sites), and dry in the hot sun before using again.

Streams and Wetlands – Clean Water Act Permits: Streams and wetlands in the project area should be protected from activities that degrade habitat conditions. For example, soil erosion, water pollution, placement of fill, dredging, in-stream activities, and riparian corridor removal, can modify or diminish aquatic habitats. Streams and wetlands may be protected under the Clean Water Act and require a permit for any activities that result in fill or other modifications to the site. Conditions provided within the U.S. Army Corps of Engineers (USACE) Clean Water Act Section 404 permit (http://www.nwk.usace.army.mil/Missions/Regulatory/Branch.aspx) and the Missouri Department of Natural Resources (DNR) issued Clean Water Act Section 401 Water Quality Certification (http://dnr.mo.gov/env/wpp/401/index.html), if required, should help minimize impacts to the aquatic organisms and aquatic habitat within the area. Depending on your project type, additional permits may be required by the Missouri Department of Natural Resources, such as permits for stormwater, wastewater treatment facilities, and confined animal feeding operations. Visit http://dnr.mo.gov/env/wpp/permits/index.html for more information on DNR permits. Visit both the USACE and DNR for more information on Clean Water Act permitting.

For further coordination with the Missouri Department of Conservation and the U.S. Fish and Wildlife Services, please see the contact information below:

MDC Natural Heritage Review
Science Branch
P.O. Box 180
Jefferson City, MO
65102-0180
Phone: 573-522-4115 ext. 3182
NaturalHeritageReview@mdc.mo.gov

U.S. Fish and Wildlife Service
Ecological Service
101 Park DeVille Drive
Suite A
Columbia, MO
65203-0007
Phone: 573-234-2132

Miscellaneous Information
FEDERAL Concerns are species/habitats protected under the Federal Endangered Species Act and that have been known near enough to the project site to warrant consideration. For these, project managers must contact the U.S. Fish and Wildlife Service Ecological Services (101 Park DeVille Drive Suite A, Columbia, Missouri 65203-0007; Phone 573-234-2132; Fax 573-234-2181) for consultation.
STATE Concerns are species/habitats known to exist near enough to the project site to warrant concern and that are protected under the Wildlife Code of Missouri (RSMo 3 CSR 1 0). "State Endangered Status" is determined by the Missouri Conservation Commission under constitutional authority, with requirements expressed in the Missouri Wildlife Code, rule 3CSR 1 0-4.111. Species tracked by the Natural Heritage Program have a "State Rank" which is a numeric rank of relative rarity. Species tracked by this program and all native Missouri wildlife are protected under rule 3CSR 10-4.110 General Provisions of the Wildlife Code.

See https://mdc.mo.gov/sites/default/files/mo_nature/downloads/2021_SGCC.pdf for a complete list of species and communities of conservation concern. Detailed information about the animals and some plants mentioned may be accessed at https://mdc12.mdc.mo.gov/Applications/mofwis/plantAnimal_search1.aspx. If you would like printed copies of best management practices cited as Internet URLs, please contact the Missouri Department of Conservation.

14. Appendix D: Antidegradation Review Summary Attachments

OCT 28 2021

Water Protection Program

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH
ANTIDEGRADATION REVIEW SUMMARY / REQUEST

FOR DEPARTMENT USE ONLY	
APP NO.	
FEE RECEIVED	CHECK NO.
DATE RECEIVED	

1. FACILITY

NAME			
McCoy Place Septic Association WWTF			COUNTY: Camden
ADDRESS (PHYSICAL): 65 Susan Court	CITY: Village of Four Seasons	STATE: MO	ZIP CODE: 65049
PERMIT NUMBER:	PROPOSED DESIGN FLOW: 0.00072MGD	SIC / NAICS CODE:	

2. OWNER

NAME			
McCoy Place Septic Association			
ADDRESS: 762 Haw Thicket Lane	CITY: St. Louis	STATE: MO	ZIP CODE: 63131
EMAIL ADDRESS: justinmillergps@gmail.com		TELEPHONE NUMBER WITH AREA CODE: 573-280-7542	

3. CONTINUING AUTHORITY The regulatory requirement regarding continuing authority is found in 10 CSR 20-6.010(2).

NAME			
Same as Above	SECRETARY OF STATE CHARTER NUMBER:		
ADDRESS:	CITY:	STATE:	ZIP CODE:
EMAIL ADDRESS:		TELEPHONE NUMBER WITH AREA CODE:	

4. CONSULTANT

PREPARER NAME	COMPANY NAME		
Ethan Shackelford	R. Miller Companies, LLC		
ADDRESS: PO Box 282	CITY: Osage Beach	STATE: MO	ZIP CODE: 65065
EMAIL ADDRESS: ethan@themillercos.com		TELEPHONE NUMBER WITH AREA CODE: 573-348-9799	

5. RECEIVING WATER BODY SEGMENT #1

NAME: Lake of the Ozarks

5.1 Upper end of segment – Location of discharge
UTM: X= _____, Y= _____ OR Lat 38.123350, Long -92.393611

5.2 Lower end of segment –
UTM: X= _____, Y= _____ OR Lat _____, Long _____

Per the Missouri Antidegradation Implementation Procedure (AIP), the definition of a segment, "a segment is a section of water that is bound, at a minimum, by significant existing sources and confluences with other significant water bodies."

6. WATER BODY SEGMENT #2 (IF APPLICABLE, Use another form if a third segment is needed)

NAME: NA

6.1 Upper end of segment – End of Segment #1
UTM: X= _____, Y= _____ OR Lat _____, Long _____

6.2 Lower end of segment –
UTM: X= _____, Y= _____ OR Lat _____, Long _____

7. DECHLORINATION

If chlorination and dechlorination is the existing or proposed method of disinfection treatment, will the effluent discharged be equal to or less than the Water Quality Standards for Total Residual Chlorine stated in Table A1 of 10 CSR 20-7.031?

☐ Yes ☑ No – What is the proposed method of disinfection? Membrane Bio-Reactor

Based on the disinfection treatment system being designed for total removal of Total Residual Chlorine, minimal degradation for Total Residual Chlorine is assumed and the facility will be required to meet the water quality based effluent limits. These compliance limits for Total Residual Chlorine are much less than the method detection limit of 0.13 mg/L.

8. SUMMARIZE THE FEASIBILITY OF CONSTRUCTING A NO-DISCHARGE TREATMENT WASTEWATER FACILITY

According to the Antidegradation Implementation Procedure Sections I.B. and II.B.1., the feasibility of no-discharge alternatives must be considered. No-discharge alternatives may include connection to a regional treatment facility, surface land application, subsurface land application, and recycle or reuse.

N/A

9. ADDITIONAL REQUIREMENTS

Complete and submit the following with this submittal:

- ☑ Copy of the Geohydrologic Evaluation – Submit request through the Missouri Geological Survey website
- ☑ Copy of the Missouri Natural Heritage from the Missouri Department of Conservation website
- ☑ Attach your Antidegradation Review Report and all supporting documentation as these forms are only a summary.
- ☐ If applicable, submit a copy of any Existing Water Quality data used in this process. Include the date range of the data, source(s) of the data, and location of data collection relative to the outfall. If using your own collected water quality data, submit a copy of the Quality Assurance Project Plan (QAPP) approved by the department's Watershed Protection Section. For more detailed information, see the Missouri Antidegradation Implementation Procedure (AIP), Section II.A.1.

10. PATH / TIER REVIEW ATTACHMENTS ENCLOSED

Path A: Tier 2 – Non-Degradation Mass Balance	☐ Yes	☑ No
Path B: Tier 2 – Minimal Degradation	☐ Yes	☑ No
Path C: Tier 2 – Significant Degradation	☑ Yes	☐ No
Path D: Tier 1 – Preliminary Review Request	☐ Yes	☑ No
Path E: Temporary Degradation	☐ Yes	☑ No

11. APPLICANT PROPOSED ANTIDEGRADATION REVIEW EFFLUENT LIMITS

Preliminary effluent limits for the proposed project are dependent upon the path selected:

Applicable Pollutants of Concern	Concentration*		Path / Tier Review Attachment Used for POC Evaluation	Average Monthly Limit	Daily Maximum Limit or Average Weekly Limit
	mg/L	µg/L			
BOD_5	X		2	15	
TSS	X		2	15	
Ammonia (Summer)	X		2	1.2	
Ammonia (Winter)	X		2	1.2	
Total Phosphorus	X				
Bacteria (E-Coli)			2	126	

* Place an X in appropriate box for the concentration units for each Pollutant of Concern.

12. PROPOSED PROJECT SUMMARY

Construct a STEP collection system where effluent will gravity drain to a Membrane Bio-Reactor. The MBR will treat the domestic waste from 2 existing 3-bedroom single family residences. Existing Tanks will be used for the solids STEP tank.

Applicants choosing to use a new wastewater technology that are considered an "unproven technology" in Missouri must comply with the requirements set forth in the *New Technology Definitions and Requirements fact sheet.*

13. CONTINUING AUTHORITY WAIVER (For New Discharges)

In accordance with 10 CSR 20-6.010(2)(C), applicants proposing use of a lower preference continuing authority, when the higher level authority is available, must submit a waiver from the existing higher authority one or other documentation for the department's review, provided it does not conflict with any area-wide management plan approved under section 208 of the Federal Clean Water Act or by the Missouri Clean Water Commission. Is the waiver necessary? ☐ Yes ☑ No

If yes, provide a copy.

14. APPLICATION FEE

☐ CHECK NUMBER ☑ JETPAY CONFIRMATION NUMBER: 20026754

15. SIGNATURE

I am authorized and hereby certify that I am familiar with the information contained in this document and to the best of my knowledge and belief such information is true, complete and accurate.

SIGNATURE	DATE
	9/13/2021
PRINT NAME	TITLE
Ethan Shackelford	Consultant - Miller Companies

PLEASE IDENTIFY YOUR STATUS FOR THIS PROJECT: ☐ OWNER ☐ CONTINUING AUTHORITY ☑ CONSULTANT

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MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH

ANTIDEGRADATION REVIEW SUMMARY
PATH C: TIER 2 – SIGNIFICANT DEGRADATION

1. FACILITY

NAME	COUNTY
McCoy Place Septic Association WWTF	Camden

2. SUMMARY OF THE POLLUTANTS OF CONCERN

Pollutants of Concern to be considered include those pollutants reasonably expected to be present in the discharge per the Antidegradation Implementation Procedure Section II.A. and assumed or demonstrated to cause significant degradation. The tier protection levels are specified and defined in rule at 10 CSR 20-7.031(2).

What are the proposed pollutants of concern and their respective effluent limits that the selected treatment option will comply with:

Pollutants of Concern*	Concentration*		Base Case Limit	Basis (WQS, WLA, ELG, Other)**
	mg/L	µg/L		
BODs	X		15	Other
TSS	X		15	Other
Ammonia (Summer)	X		1.2	Other
Ammonia (Winter)	X		1.2	Other
Total Nitrogen	X		1.2	Other
Total Phosphorus	X			
Bacteria (EColi)			126	Other

* Place an X in appropriate box for the concentration units for each Pollutant of Concern

** Provide the Basis for the Base Case Limit: WQS – Water Quality Standard, WLA – Wasteload Allocation, ELG – Effluent Limit Guideline, or describe other.

3. IDENTIFYING ALTERNATIVES

Supply a summary of the non-discharging alternatives considered. "For Discharges likely to cause significant degradation, an analysis of non-degrading and less-degrading alternatives must be provided," as stated in the Antidegradation Implementation Procedure Section II.B.1. These alternatives include no-discharge. Attach all supportive documentation in the Antidegradation Review report.

Feasibility of non-discharging alternatives (regionalization, land application, subsurface irrigation, and recycling or reuse):

No Non Degrading alternatives were found.

Minimum of three (preferably five or more) discharging alternatives* ranging from less-degrading to degrading including Preferred Alternative (All treatment levels for POCs must at a minimum meet water quality standards):

Discharging Alternative #	Treatment Type	Description
1	Package Plant	Collection plant with multiple chambers in which air is introduced.
2	Recirculating Rock Filter w/ chlorin	Rock filter with chlorination on end.
3	Recirculating Rock Filter	Rock filters the domestic waste prior to discharge.
4		
5		
6		

* Same technology may be multiple alternatives as you have the base unit and add to it with more capacity to provide additional treatment.

4. DETERMINATION OF THE REASONABLE ALTERNATIVE

Per the Antidegradation Implementation Procedure Section II.B.2, "a reasonable alternative is one that is practicable, economically efficient and affordable." Provide basis and supporting documentation in the Antidegradation Review report. **Please do not write "See Report" for any box below.**

Practicability Summary:

"The practicability of an alternative is considered by evaluating the effectiveness, reliability, and potential environmental impacts," according to the Antidegradation Implementation Procedure Section II.B.2.a. Examples of factors to consider, including secondary environmental impacts, are given in the Antidegradation Implementation Procedure Section II.B.2.a.

All less-degrading alternatives were found to be practicable.

Economic Efficiency Basis:

What is the design life cycle for the comparison? 15

What interest rate was used in the present worth calculations? 1%

Economic Efficiency Summary:

Alternatives that are deemed practicable must undergo a direct cost comparison in order to determine economic efficiency. Means to determine economic efficiency are provided in the Antidegradation Implementation Procedure Section II.B.2.b.

A present worth comparison of alternatives revealed the Recirculating Rock filter to have a cost ration of 0.97 and the package plant to have a cost ratio of 2.28 when compared to Membrane Bio Reactor.

TABLE OF THE ALTERNATIVES EVALUATION (Attach additional page if necessary)

PARAMETERS	Alternatives #					
	1	2	3	4	5	6
BODs – mg/L	20	20	20			
TSS – mg/L	20	20	20			
Ammonia (Summer) – mg/L	4.6	2.8	4			
Ammonia (Winter) – mg/L	4.6	12.8	4			
E. Coli – #/100 mL	126	126	126			
Total Nitrogen – mg/L						
Total Phosphorus – mg/L						
TRC - MG/L	0.019	0.019	0.019			
Construction Cost – $	60000	40000	40000			
Operating Cost – $	196788.76	69490.66	69490.66			
Present Worth – $	256788.76	109490.66	109490.66			
Ratio present worth to base case	2.28	0.97	0.97			

Affordability Summary:

Alternatives identified as most practicable and economically efficient are considered affordable if the applicant does not supply an affordability analysis. An affordability analysis per the Antidegradation Implementation Procedure Section II.B.2.c, "may be used to determine if the alternative is too expensive to reasonably implement."

All less-degrading alternatives are affordable except the package plant, however the limiting factor is the available space within the subdivision.

Justification for Preferred Alternative:

The Membrane Bio-Reactor was chosen due to the small footprint size of the treatment unit, as well as the restricted available space for a treatment facility. The present worth cost is a little higher than the recirculating rock filter. The MBR also has a cleaner effluent that other alternatives.

Reasons for Rejecting the other Evaluated Alternatives:

The other alternatives were rejected due to the limited space to construct the alternatives.

Comments/Discussion:

5. SOCIAL AND ECONOMIC IMPORTANCE OF THE PREFERRED ALTERNATIVE

If the preferred alternative will result in significant degradation, then it must be demonstrated that it will allow important economic and social development in accordance to the Antidegradation Implementation Procedure Section II.E. Social and Economic Importance is defined as the social and economic benefits to the community that will occur from any activity involving a new or expanding discharge.

Identify the affected community:

The affected community is defined in 10 CSR 20-7.031(2)(B) as the community "in the geographical area in which the waters are located. Per the Antidegradation Implementation Procedure Section II.E.1, "the affected community should include those living near the site of the proposed project as well as those in the community that are expected to directly or indirectly benefit from the project."

Affected community are those living in the Lake of the Ozarks region.

Identify relevant factors that characterize the social and economic conditions of the affected community:

Examples of social and economic factors are provided in the Antidegradation Implementation Procedure Section II.E.1., but specific community examples are encouraged.

Protecting property values for home owners and property tax lax revenue of properties with structures built prior to zoning ordinances, on-site sewage treatment system regulations.
Improving waste treatment by eliminating on-site sewage treatment systems that were constructed prior minimum design standards.

Describe the important social and economic development associated with the project:

Determining benefits for the community and the environment should be site specific and in accordance with the Antidegradation Implementation Procedure Section II.E.1.

Monitored wastewater treatment facilities ensure minimum levels of treatment are being obtained before effluent reaches public waters.
Existing development remains inhabitable. Anytime existing dwellings become uninhabitable would force relocation and increase the probability of blight in the area.
Privately funded small scale projects raise public awareness and add no funding burden to public entities.

PROPOSED PROJECT SUMMARY:

Construct a STEP collection system and treat effluent with Membrane Bio-Reactor. The MBR will treat the domestic waste from 2 existing 3-bedroom single family residences. Existing tanks will be used for the solids STEP tank.

Attach the Antidegradation Review report and all supporting documentation. This is a technical document, which must be signed, sealed and dated by a registered professional engineer of Missouri.