Permit No. CP0002435

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

CONSTRUCTION PERMIT

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

Cup Tree Road, LLC
John Broker
Owner, 1002 West Main Street
Blue Springs, MO 64015

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.

October 24, 2024
Effective Date

October 23, 2026
Expiration Date

John Hoke, Director, Water Protection Program

CONSTRUCTION PERMIT

I. CONSTRUCTION DESCRIPTION

The project includes construction of a Wastewater Treatment Facility (WWTF) to treat domestic wastewater from the Cup Tree Road residential development at 1685 Cup Tree Road, Gravois Mills, Camden County, Missouri.

The proposed WWTF will serve one 6-unit motel and 17 residences at full development. The proposed treatment system consists of a Septic Tank Effluent Pumped (STEP) collection system and a WWTF. Wastewater from each service connection will first flow by gravity to a minimum 1,000-gallon septic tank for primary treatment before pumping effluent into a 5,500-gallon Membrane Bioreactor (MBR) treatment unit including a chemical addition to facilitate phosphorus removal for final treatment. The WWTF has a design average flow of 5,500 gallons per day. The facility will be equipped with a flow measurement device prior to discharge to the Lake of the Ozarks.

The project incorporates variance CWC-V-4-24 to 10 CSR 20-8.140(2)(C)1., which was approved by the Missouri Clean Water Commission on October 9, 2024. See Construction Permit Condition 7 in Section III of this permit regarding the noted variance.

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 James Jackson, Jr., P.E., with Lake Professional Engineering 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 Central Field Operations Regional Office per 10 CSR 20-7.015(9)(G).

5. In addition to the requirements for a construction permit, 10 CSR 20-6.200 requires land disturbance activities of one 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.

6. 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.

7. This permit incorporates a variance to 10 CSR 20-8.140(2)(C)1, requiring the minimum distance between wastewater treatment facilities and all potable water sources to be at least 300 feet, unless another distance is determined by the Missouri Geological Survey or by the department's Public Drinking Water Branch. For this project, the facility will maintain a setback of at least 200 feet from all portable water sources. The variance, CWC-V-4-24, was approved by the Clean Water Commission on October 9, 2024.

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

- The distance between wastewater pumping stations and all potable water sources shall be at least 50 feet in accordance with 10 CSR 23-3.010(1)(B). 10 CSR 20-8.120(5)(B); 10 CSR 20-8.125(4)(F).

- A cleansing velocity of at least two feet per second (ft/sec), at least once and preferably several times per day, shall be achieved. 10 CSR 20-8.125(5)(A)1.A.; 10 CSR 20-8.125(6)(A).

- The minimum diameter sewer main pipe shall not be less than 1.5 inches. 10 CSR 20-8.125(5)(A)2..; 10 CSR 20-8.125(6)(A).

- Locator wire must be utilized when sewer lines are installed within the public right-of-way in accordance with Section 319.033, RSMo. 10 CSR 20-8.125(5)(A)5..; 10 CSR 20-8.125(6)(A).

- Provide at least one septic tank to serve each EDU. 10 CSR 20-8.125(6)(D)1.

- Provide at least 1,000 gallons capacity. 10 CSR 20-8.125(6)(D)2.

- Provide 20 percent of the septic tank volume for freeboard and ventilation. 10 CSR 20-8.125(6)(D)2.

- When existing on-site septic tanks are proposed for reuse in an alternative sewer system, they must be inspected and verified watertight prior to acceptance. Follow the provisions in 10 CSR 20-8.125(6)(D) for the minimum design of acceptable existing septic tanks proposed for reuse. 10 CSR 20-8.125(6)(E).

- Duplex pumps shall be provided where the design flow from the EDUs, or other, is one thousand five hundred (1,500) gallons per day or greater. 10 CSR 20-8.125(6)(F)1.

- Submersible pumps shall be readily removable and replaceable without personnel entering, dewatering, or disconnecting any piping in the wet well. 10 CSR 20-8.125(6)(F)2; 10 CSR 20-8.130(5)(A).

- The following valves must be provided in the grinder pump vaults: A. A shutoff valve accessible from the ground surface; B. A check valve to prevent backflow; and C. An anti-siphon valve, where siphoning could occur. 10 CSR 20-8.125(5)(D)4.; 10 CSR 20-8.125(6)(F)3.

- Water level controls must be accessible without entering the wet well. 10 CSR 20-8.125(6)(F)4.

- Electrical equipment. Electrical equipment shall be provided with the following requirements:

  - 10 CSR 20-8.130(3)(B)2. A. Electrical equipment must comply with 10 CSR 20-8.140(7)(B);
  - Utilize corrosive resistant equipment located in the wet well; 10 CSR 20-8.130(3)(B)2.B.
  - Provide a watertight seal and separate strain relief for all flexible cable; 10 CSR 20-8.130(3)(B)2.C.
  - Install a fused disconnect switch located above ground for the main power feed for all pumping stations. 10 CSR 20-8.130(3)(B)2.D.
  - When such equipment is exposed to weather, it shall comply with the requirements of weather proof equipment; enclosure NEMA 4; NEMA 4X where necessary; and *NEMA Standard 250-2014*, published December 15, 2014. 10 CSR 20-8.130(3)(B)2.E.
  - Install lightning and surge protection systems; 10 CSR 20-8.130(3)(B)2.F.
  - Install a 110 volt (V) power receptacle inside the control panel located outdoors to facilitate maintenance; 10 CSR 20-8.130(3)(B)2.G.
  - Provide Ground Fault Circuit Interruption (GFCI) protection for all outdoor receptacles. 10 CSR 20-8.130(3)(B)2.H.

- 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 100-year flood elevation. 10 CSR 20-8.140(2)(B)

- No treatment unit with a capacity of 22,500 gallons per day (gpd) or less shall be located closer than the minimum distance of 200 feet to a neighboring residence and 50 feet to property line for lagoons; 200 feet to a neighboring residence for open recirculating media filters following primary treatment; and 50 feet to a neighboring residence for all other discharging facilities. 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 24-hour automatic composite sample or 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.

- Electrical systems and components in raw wastewater or in enclosed or partially enclosed spaces where hazardous concentrations of flammable gases or vapors that are normally present, shall comply with the NFPA 70 *National Electric Code (NEC)* (2017 Edition), as approved and published August 24, 2016, requirements for Class I, Division 1, Group D locations. 10 CSR 20-8.140(7)(B)

- 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.

- Where a potable water supply is to be used for any purpose in a wastewater treatment facility other than direct connections, a break tank, pressure pump, and pressure tank or a reduced pressure backflow preventer consistent with the department's Public Drinking Water Branch shall be provided. 10 CSR 20-8.140(7)(D)3.A.

- 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 in accordance with 10 CSR 20-8.140(8).

- Provide storage for a minimum of 30 days' supply of Aluminum Sulfate (Alum) solution, unless local suppliers and conditions indicate that such storage can be reduced without limiting the supply; 10 CSR 20-8.140(9)(B)1.

- The following shall be provided, where applicable, for the design of chemical handling:
    - Provide sufficient capacity of solution storage or day tanks feeding directly for 24- hour operation at design average flow; 10 CSR 20-8.140(9)(C)4.
    - Provide a minimum of two chemical feeders for continuous operability. Provide a standby unit or combination of units of sufficient capacity to replace the largest unit out-of-service; 10 CSR 20-8.140(9)(C)5.
    - Chemical feeders shall—
        - Be designed with chemical feed equipment to meet the maximum dosage requirements for the design average flow conditions; 10 CSR 20-8.140(9)(C)6.A.
        - Be able to supply, at all times, the necessary amounts of chemicals at an accurate rate throughout the range of feed; 10 CSR 20-8.140(9)(C)6.B.
        - Provide proportioning of chemical feed to the rate of flow where the flow rate is not constant; 10 CSR 20-8.140(9)(C)6.C.

        - Be designed to be readily accessible for servicing, repair, and observation; 10 CSR 20-8.140(9)(C)6.D.
        - Protect the entire feeder system against freezing; 10 CSR 20-8.140(9)(C)6.E.
        - Be located adjacent to points of application to minimize length of feed lines; 10 CSR 20-8.140(9)(C)6.F.
        - Provide for both automatic and manual operation for chemical feed control systems; 10 CSR 20-8.140(9)(C)6.G.

    - Provide for uniform strength of solution consistent with the nature of the chemical solution for solution tank dosing; 10 CSR 20-8.140(9)(C)8.

- The following chemical safety items shall be provided in addition to the safety provisions in section (8) of this rule:
    - Appropriate personal protective equipment (PPE). 10 CSR 20-8.140(9)(D)1.

- The identification and hazard warning data included on chemical shipping containers, when received, shall appear on all containers (regardless of size or type) used to store, carry, or use a hazardous substance. 10 CSR 20-8.140(9)(E)

- All wastewater treatment facilities must have a screening device, comminutor, or septic tank for the purpose of removing debris and nuisance materials from the influent wastewater. 10 CSR 20-8.150(2)

- A septic tank must have a minimum capacity of at least 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 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 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; or 10 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. 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.

9. Upon completion of construction:

    A. The Cup Tree Road LLC 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 Statement of Work Completed form to the department in accordance with 10 CSR 20-6.010(5)(N) (https://dnr.mo.gov/document-search/wastewater-construction-statement-work-completed-mo-780-2155) and submit a Form B - Application for an Operating Permit for Domestic or Municipal Wastewater (≤100,000 gallons per day), applicable leakage tests for the new WWTF including

leakage test for the WWTF containment tank, and fee to the Engineering Section of the Water Protection Program 60 days prior to operation. Identify that the application is for a General permit for non-publicly owned treatment works discharging less than or equal to 50,000 gpd, MO-GD00000.

IV. REVIEW SUMMARY

1. CONSTRUCTION PURPOSE

A new WWTF is proposed to serve 5 existing residences and an addition of one 6-unit motel and up to 12 new residences at full development.

2. FACILITY DESCRIPTION

Currently, there are six existing residences and a marina onsite. The existing properties are served by four private wells. Wastewater generated from five of the six residences is being sent to holding tanks. When the holding tanks become full, the tanks are pumped by a registered septic hauler. A new WWTF is proposed to serve the five existing residences and an addition of one 6-unit motel and 12 residences at full development. The remaining existing residence located at 1685 Cup Tree Road and the marina have their own on-site wastewater treatment system and will not be part of the WWTF.

Due to the size of the property, the proposed WWTF does not meet the 300-foot separation required by 10 CSR 20-8.140(2)(C)1. from the drinking water wells, the engineer proposes constructing the WWTF down gradient of the drinking water wells, towards the Lake of the Ozarks, and maintaining a separation distance of at least 200 feet from the wells; and includes mitigation with a request for a variance from the regulation. The mitigation includes plugging the drinking water well that is currently serves 1685 Cup Tree Road property because is located closer than 200 feet from the WWTF, constructing the WWTF inside a 28,700-gallon watertight concrete tank with a level alarm and a building will be constructed on top of the concrete tank, and conducting leakage test for the whole treatment system before applying for an operating permit. Variance CWC-V-4-24 to 10 CSR 20-8.140(2)(C)1 was public noticed from August 27, 2024, to September 26, 2024, and subsequently approved by the Missouri Clean Water Commission on October 9, 2024.

The new WWTF will be located near 1685 Cup Tree Road, Gravois Mills, in Camden County, Missouri. The facility has a design average flow of 5,500 gpd and serves a hydraulic population equivalent of approximately 81 people.

3. COMPLIANCE PARAMETERS

The proposed project is required to meet final effluent limits established in the Antidegradation review dated March 15, 2023.

The limits following the completion of construction will be applicable to the facility:

Parameter	Units	Monthly average limit
Biochemical Oxygen Demand$_5$	mg/L	10
Total Suspended Solids	mg/L	15
Ammonia as N-summer	mg/L	1.4
Ammonia as N-winter	mg/L	2.9
pH	SU	6.5-9.0
Total Phosphorus	mg/L	0.5
E. coli	#/100mL	126

4. ANTIDEGRADATION

The department has reviewed the antidegradation report for this facility and issued the Water Quality and Antidegradation Review dated March 15, 2023, due to a new discharge. See **APPENDIX – ANTIDEGRADATION**.

5. REVIEW of MAJOR TREATMENT DESIGN CRITERIA

Construction will cover the following items:

- Components are designed for a Population Equivalent of 81 based on hydraulic loading to the system.

- STEP system-
  - Septic Tank – A septic tank provides passive primary treatment as the settleable solids in raw wastewater settle onto the bottom of the tank. Raw wastewater will flow from each of the connections to a minimum 1,000-gallon septic tank. For this project, there will be a total 11 septic tanks including five 1,000-gallon tanks for five 2-bedroom houses, five 1,250-gallon tanks for five 4-bedroom houses, and one 2,000-gallon tank for the 6-unit motel.
    - The septic tanks provide approximately 3 days of detention at design average flow.
    - Settled solids in the septic tank shall be removed by a contract hauler.
    - Annually 1.13 dry tons per year of solids is expected in the septic tanks based on sludge production of 0.014 dry ton per population equivalent.

  - STEP pump units-There will be 11 STEP units, one for each of the septic tanks.

- The STEP unit will have a 10 gpm simplex pump to pump the water through 2-inch SDR-21 PVC force main to the WWTF.
- There will be audiovisual alarms on the septic tanks and pumps to notify the owner that service is needed.

- Membrane Bioreactor (MBR) — The MBR system is a BioBarrier® HSMBR 6.0-N by BioMicrobics. The system is capable of treating 5,500 gpd and consists of a 10,000-gallon treatment tank.
  - The membrane is a flat plate membrane utilizing a combination of ultrafiltration and microfiltration.
  - The design flux rate through the membranes at peak flow is 4.55 gallons/ft^2/day (7.74 L/m^2/hour) at peak flow with a maximum operating flux of 8.82 gallons/ft^2/day (15 L/m^2/hour).
  - The surface area of the membranes is 112 m^2
  - The filtration rate through the membranes is 7.40 gpm
  - The minimum design SRT is 140 days
  - The maximum MLSS is 10,000 mg/L
  - The maximum F/M ratio at design flow 0.1
  - Total air supplied through the membrane is 100 scfm which is greater than the required 57.7 scfm at peak flow.
  - 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.

- Containment Tank – Installation of a 28,700-gallon watertight concrete tank with a level alarm level. The proposed MBR treatment plant will be placed in the tank to ensure any wastewater leaking from the treatment plant will be contained in the tank. A leakage test shall be conducted on the tank to ensure watertightness.

- Chemical Addition to Facilitate Phosphorus Removal – The system includes two 15-gallon solution tanks each equipment with a metering pump that delivers Aluminum Sulphate (Alum) solution to the MBR. The metering pump is capable of dosing 0.05 to 0.92 gallons of solution per hour.

- Flow Measurement – Installation of accurate flow measurement devices will give the treatment facility a means of improved data analysis.
  - Thel-Mar Volumetric Weir –A 6-inch Thel-Mar volumetric weir having a 90-degree V-notch section and rectangular section; appropriate for flows between 57 gpd and 3700 gpd for the V-notch section and up to 46,000 gpd for the rectangular section. This measurement device does not include flow totalizing or recording. The MBR's effluent will flow by gravity through flow measurement equipment and to the Lake of the Ozarks.

6. OPERATING PERMIT

After completion of construction project submit statement of work completed, as-builts if the project was not constructed in accordance with previously submitted plans and specifications, and ensure that Application Form B, applicable leakage tests for the WWTF, and fee has been submitted. Missouri State Operating Permit, General Permit MO-GDxxxxx, will be issued after receipt of the above documents.

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

Sieu T. Dang, P.E.
Engineering Section
sieu.dang@dnr.mo.gov

APPENDIX: Antidegradation

Missouri Department of Natural Resources
Water Protection Program
Water Pollution Control Branch
Engineering Section

Water Quality and Antidegradation Review

Department's Alternatives Analysis for Domestic Wastewater Facilities with Design Flow Less Than 50,000 Gallons per Day

For Protection of Water Quality
and Determination of Effluent Limits at

Cup Tree Road WWTF

March 15, 2023

Table of Contents

1. WATER QUALITY 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 Missouri Department of Natural Resources (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 that 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 Antidegradation Implementation Procedure (AIP)* for new and expanded wastewater discharges.

2. APPLICABILITY

This Water Quality and Antidegradation Review is for facilities that produce primarily domestic wastewater and discharge less than 50,000 gallons per day. This General Antidegradation Review is not applicable to facilities where the receiving waterbody, or downstream waterbodies, have a Total Maximum Daily Load (TMDL) or are 303(d) or 305(b) listed for the pollutants of concern (POCs) addressed in this alternatives analysis, with an exception for waterbodies that are listed for *E. coli* since disinfection will be required. For receiving waters that are impaired for pollutants other than *E. coli*, the Antidegradation Implementation Procedure requires a Tier 1 approach and the applicant must demonstrate that the discharge will not "cause or contribute" to the impairment. For these site-specific mixed tier reviews (where some POCs are Tier 1 and others are Tier 2) applicants may use the alternative analysis presented in this document for the Tier 2 pollutants.

Facilities that are currently under enforcement will need to coordinate with the Water Protection Program's compliance and enforcement section to determine applicability for the Department's Alternatives Analysis. No mixing will be included in this review for receiving waterbodies. If the applicant would like to have effluent limitation derivation include mixing considerations, a site-specific alternatives analysis will need to be completed.

3. TIER DETERMINATION

Below is a list of pollutants of concern reasonably expected to be in the discharge for a domestic wastewater treatment facility. Pollutants of concern are defined as those pollutants "proposed for discharge that affects beneficial use(s) in waters of the state. POCs include pollutants that create conditions unfavorable to beneficial uses in the water body receiving the discharge or proposed to receive the discharge" (AIP, Page 7). No existing water quality data is required because all POCs were considered to be Tier 2 and significantly degrading in the absence of existing water quality. Assumed uses for the receiving waterbody are General Criteria, Protection of Warm Water Aquatic Life (AQL), Human Health Protection (HHP), Irrigation (IRR), and Livestock & Wildlife Protection (LWP). If any Tier 1 Pollutants of Concern not addressed in this alternatives analysis will be discharged, the applicant must submit the *Path D: Tier 1 Preliminary Review Request form* for those pollutants.

Table 1. Pollutants of Concern and Tier Determination

POLLUTANTS OF CONCERN	TIER*	DEGRADATION	COMMENT****
Biochemical Oxygen Demand (BOD_5)/DO	2	Significant	
Total Suspended Solids (TSS)	**	Significant	
Ammonia	2	Significant	
pH	***	Significant	Permit limits applied
Escherichia coli (*E. coli*)	2	Significant	
Total Phosphorus (TP)	2	Significant	

* Tier assumed.
** Tier determination not possible: No in-stream standard for this parameter.
*** The standard for this parameter is a range.

**** Permit limits for other parameters including Oil & Grease, Total Residual Chlorine, and Nitrates will be applied based on water quality standards and criteria as applicable.

Total Residual Chlorine (TRC) effluent limits of 0.017 mg/L daily maximum, 0.008 mg/L monthly average are recommended if chlorine is used as a disinfectant. Standard compliance language for TRC, including the minimum level (ML), may be included in the operating permit.

4. DEMONSTRATION OF NECESSITY AND SOCIAL AND ECONOMIC IMPORTANCE

Missouri's Antidegradation Implementation Procedures (AIP) specify 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 applicant must submit the Antidegradation Review Submittal: Voluntary Tier 2 – Significant Degradation for Domestic Wastewater Facilities with Design Flow Less Than 50,000 Gallons per Day form. This analysis will serve as the applicant's alternatives analysis to fulfill the requirements of the AIP.

A Geohydrologic Evaluation must be submitted with the Antidegradation Review Request.

A Missouri Department of Conservation Natural Heritage Review Report must be obtained by the applicant. The applicant should review the Natural Heritage Review and contact the U.S. Fish and Wildlife Service and the Missouri Department of Conservation for further coordination if necessary.

4.1 NO DISCHARGE EVALUATION

According to 10 CSR 20-6.010(4)(A)5.B., facility plans must include an evaluation of the feasibility of constructing and operating a facility with no discharge to waters of the state if the report is for a new or modified wastewater treatment facility. Per the Antidegradation Implementation Procedure Section II.B.1, for discharges likely to cause significant degradation, applicants must provide an analysis of non-degrading alternatives. No-discharge alternatives may include surface land application, subsurface land application, and connection to a regional treatment facility.

The applicant must submit the *Antidegradation: Regionalization and No-Discharge Evaluation* form to demonstrate that a no-discharge facility is not feasible for this site. If the information provided on the form is not sufficient to demonstrate that a no-discharge facility is not feasible, a more detailed evaluation of no discharge options will be required before the Department can complete its determination.

4.2 DEMONSTRATION OF NECESSITY

The Department has used available data to complete an alternatives analysis of previously evaluated treatment technologies and expected performance. Data from fifty-four Water Quality and Antidegradation Reviews (WQARs) completed between March 2011 and April 2018 was evaluated and results are presented in Figure 1, Figure 2, and Table 2 below.

The data include eleven facilities designed to provide a high level of treatment to meet more stringent potential future ammonia as N effluent limits based on the 2013 EPA Ammonia criteria for the protection of mussels and gill-breathing snails. The data available to date indicates that the cost of facilities of this size range designed to meet these more stringent ammonia criteria is not substantively higher than other facilities designed to meet the current ammonia criteria.

The data include sixteen facilities designed to meet BOD and TSS effluent limits of 10 mg/L monthly average and 15 mg/L daily maximum or weekly average. The data available to date indicates that the cost of facilities designed to meet BOD and TSS effluent limits of 10 mg/L monthly average and 15 mg/L daily maximum or weekly average is not substantively higher than other facilities of this size range designed to meet less stringent BOD and TSS effluent limits.

The data include 28 facilities that will discharge to lakes. Of those facilities, 12 received ammonia limits in line with water quality based effluent limits for discharges to streams without mixing of around 3.7 mg/L summer daily maximum, 1.4 mg/L summer monthly average and 7.5 mg/L winter daily max, 2.9 mg/L winter monthly average. Two of the lake-discharging facilities received more stringent ammonia limits of 1.7 mg/L daily maximum, 0.6 mg/L monthly average; and one received ammonia limits of 1.7 mg/L summer daily maximum, 0.6 mg/L summer monthly average and 5.6 mg/L winter daily max, 2.1 mg/L winter monthly average. The data available indicate that the cost for facilities designed to meet ammonia limits in line with water quality based effluent limits for streams without mixing (3.7/1.4, 7.5/2.9) is not higher than other facilities of this size range designed to meet less stringent ammonia limits. These limits are more protective than existing water quality based effluent limits for discharges to lakes where the acute criteria is used to determine the baseline (12.1 mg/L daily maximum, 4.6 mg/L monthly average).

Facilities that were designed to meet limits based on the 2013 EPA ammonia criteria included a membrane bioreactor, extended aeration package plant, recirculating textile filter, recirculating sand filter, recirculating sand filter with moving bed biofilm reactor, sequencing batch reactor, integrated fixed film activated sludge system, and a proprietary aeration system.

Membrane bioreactor (MBR) systems combine a suspended growth biological reactor with solids removal via filtration across a membrane. The membranes can be designed for and operated in small spaces and with high removal efficiency of contaminants such as nitrogen, phosphorus, bacteria, biochemical oxygen demand, and total suspended solids. Membrane filtration allows a higher biomass concentration to be maintained in the treatment tank, thereby allowing smaller bioreactors to be used for a smaller footprint. MBR systems provide operational flexibility with respect to flow rates, as well as the ability to readily add or subtract units as needed, but that flexibility has limits. Membranes typically require that the water surface be maintained above a minimum elevation so that the membranes remain wet during operation. Throughput limitations are dictated by the physical properties of the membrane, and the result is that peak design flows generally should be no more than 1.5 to 2 times the average design flow. If peak flows exceed that limit, additional membranes may be needed to process the peak flow, or equalization may need to be included in the design. MBR systems typically have higher capital and operating costs than conventional systems.

The extended aeration process is a modification of the activated sludge process that provides biological treatment for the removal of biodegradable organic wastes under aerobic conditions. Wastewater in the aeration tank is mixed and oxygen is provided to the microorganisms. The mixed liquor then flows to a clarifier or settling chamber where most microorganisms settle to the bottom of the clarifier and a portion are pumped back to the beginning of the plant. The clarified wastewater flows over a weir and into a collection channel before being disinfected and discharged. Extended aeration is often used in smaller prefabricated package-type plants where lower operating efficiency is offset by mechanical simplicity and minimized design costs. In comparison to traditional activated sludge, longer mixing time with aged sludge and light loading (low F:M) offers a stable biological ecosystem better adapted for effectively treating waste load fluctuations from variable occupancy situations. Although the process is stable and easier to operate, extended aeration systems may discharge higher effluent suspended solids than found under conventional loadings.

Moving Bed Biofilm reactor (MBBR) systems may be a single aerated reactor, or several in series, with a buoyant free-moving plastic biofilm carrier media. MBBR systems can be designed to be capable of meeting more stringent total nitrogen limits. They produce a significantly reduced solids loading to the liquid-solids separation unit, the biofilm improves process stability, they offer flexibility to meet specific treatment objectives, and they are well suited for retrofit into existing treatment systems. MBBR systems require a smaller tank volume than a conventional activated sludge system and therefore have a smaller

footprint. Adequate mixing must be provided to ensure that free-floating media remains uniformly distributed and screens must be provided to retain the media within the reactors.

Integrated fixed film activated sludge (IFAS) systems add fixed or free-floating media to an activated sludge basin. The process gets its name from combining a conventional activated sludge process with a fixed film system. This treatment system is similar to an MBBR; however MBBR systems do not recycle sludge. IFAS systems are often installed as a retrofit solution to conventional activated sludge systems. They require a smaller tank volume than a conventional activated sludge system and therefore have a smaller footprint. The biofilm combines aerobic, anaerobic, and anoxic zones promoting better nitrification compared to conventional activated sludge systems and the biofilm improves process stability. Adequate mixing must be provided to ensure that free-floating media remains uniformly distributed and to slough biomass from the media. Higher dissolved oxygen concentrations may be required as compared to conventional activated sludge. Screens must be provided to retain the media within the reactors.

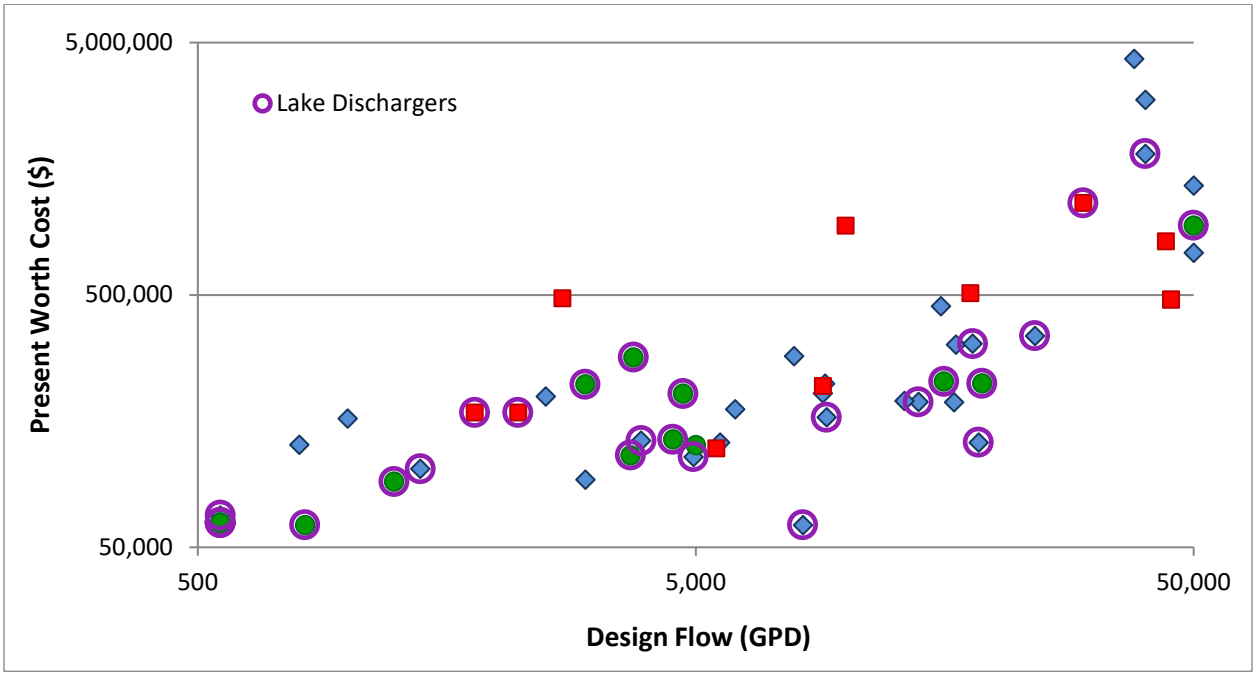
Recirculating sand filters (RSF) remove contaminants in wastewater through physical, chemical, and, most importantly, biological processes. The three common components are a pretreatment unit (generally a septic tank), a recirculation tank, and a sand filter. In the recirculation tank, raw effluent from the septic tank and the sand filter filtrate are mixed and pumped back to the sand filter bed. RSFs are effective in applications with high levels of BOD and can provide a good effluent quality with 85 – 95 percent removal of BOD and TSS. They can be designed to provide nitrification, but this requires increased surface area. Treatment is affected by extremely cold weather. Treatment capacity can be expanded through modular design. RSFs require routine maintenance, although the complexity of maintenance is generally minimal.

Recirculating textile filters systems are configured similar to an RSF except the filter media is an engineered fabric textile. They can be configured to provide nitrification, but this may require additional treatment units. They have a small operating footprint, are more aesthetically pleasing than some other treatment options, produce minimal noise, have the ability to handle variable flows, and have simple maintenance.

In addition to the treatment technologies listed above, all of which had previous WQARs that established advanced ammonia limits, there are other technology alternatives that can meet the advanced ammonia limits including conventional activated sludge, oxidation ditch, and lagoon retrofits. To obtain this level of performance, all technologies must be properly designed to accommodate nitrification and de-nitrification and they must be properly and actively operated.

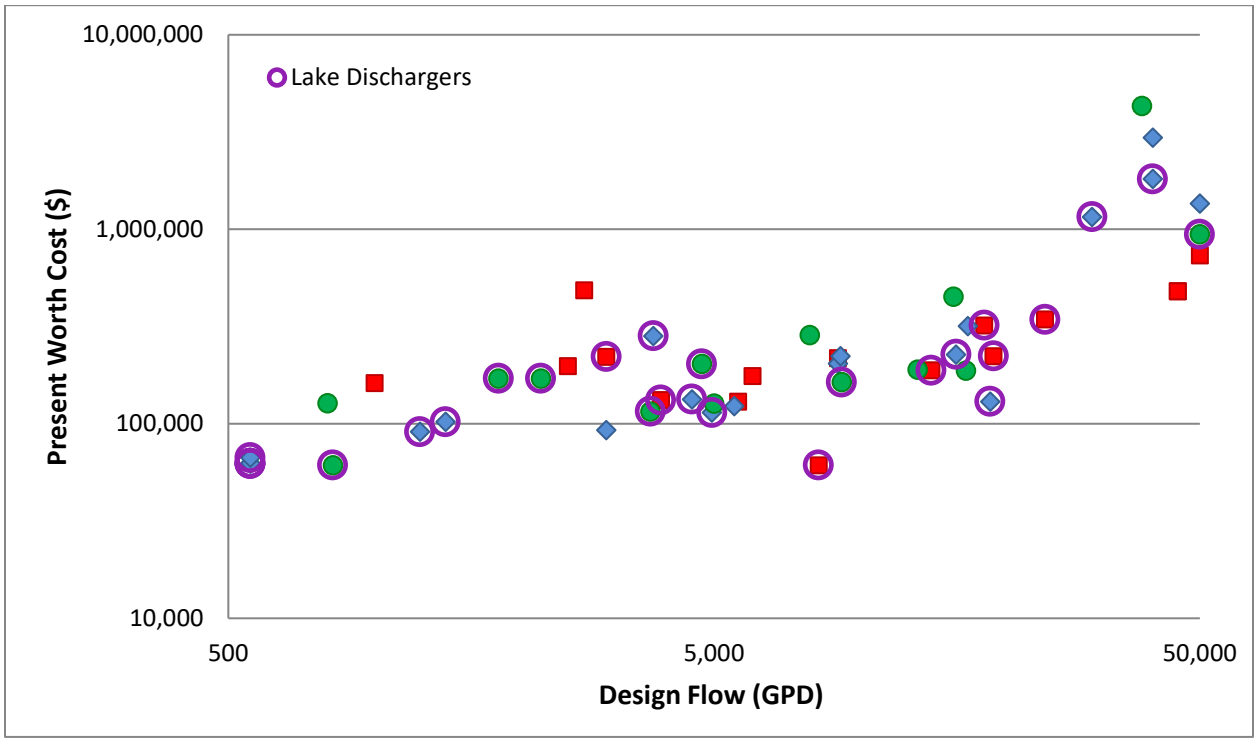
The above treatment system descriptions were adapted from EPA technology fact sheets and *Design of Municipal Wastewater Treatment Plants: WEF Manual of Practice No. 8 ASCE Manuals and Reports on Engineering Practice No. 76; Fifth Edition*, as well as other readily available sources and previous Water Quality and Antidegradation Reviews.

FIGURE 1. DESIGN FLOW VS. PRESENT WORTH COST VS. AMMONIA LIMITS



LEGEND		Summer Ammonia (mg/L)		Winter Ammonia (mg/L)	
		Daily Max	Monthly Avg.	Daily Max	Monthly Avg.
2013 EPA Criteria	■	≤1.7	≤0.6	≤5.6	≤2.1
Existing Aquatic Life Criteria (no mixing)	◆	approx. 3.7	approx. 1.4	approx. 7.5	approx. 2.9
Less Stringent (mixing)	●	>3.7	>1.4	>7.5	>2.9

FIGURE 2. DESIGN FLOW VS. PRESENT WORTH COST VS. BOD & TSS LIMITS



LEGEND	BOD (mg/L)		TSS (mg/L)	
	Daily Max	Monthly Avg.	Daily Max	Monthly Avg.
■	15	10	15	10
◆	15	10	>15	>10
●	>15	>10	>15	>10

TABLE 2. DESIGN FLOW VS. PRESENT WORTH COST

DATE	Design Flow (MGD)	Technology	BOD (mg/L)		TSS (mg/L)		Summer Ammonia (mg/L)		Winter Ammonia (mg/L)		Present Worth Cost ($)	$ PW/gpd
			Daily Max or Weekly Average	Monthly Average	Daily Max or Weekly Average	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	Monthly Average		
4/16/2018	*0.000450	Recirculating Textile Filter	15	10	20	15	3.7	1.4	7.5	2.9	66,838	149
5/2/2012	*0.000555	Recirculating Textile Filter	15	10	20	15	12.1	4.6	12.1	4.6	62,506	113
4/2/2013	*0.000555	Recirculating Textile Filter	15	10	20	15	12.1	4.6	12.1	4.6	62,506	113
10/1/2014	*0.000555	Extended Aeration Package Plant	15	10	22.5	15	7.8	3	7.8	3	62,506	113
4/17/2017	*0.000555	Recirculating Textile Filter	15	10	20	15	3.7	1.4	7.5	2.9	66,838	120
4/4/2012	0.000800	Recirculating Textile Filter	30	15	30	15	4	1.5	7.7	2.9	127,427	159
12/1/2013	*0.000821	Membrane Bioreactor	30	20	30	20	12.1	4.6	12.1	4.6	61,240	75
9/2/2012	0.001000	Recirculating Textile Filter	15	10	15	10	3.7	1.4	7.5	2.9	162,007	162
7/6/2011	*0.001240	Recirculating Textile Filter	15	10	22	15	6	3	6	3	91,000	73
1/1/2015	*0.001400	Recirculating Textile Filter	15	10	23	15	3.7	1.4	7.6	2.9	102,174	73
9/8/2017	*0.001800	Recirculating Textile Filter	30	20	30	20	1.7	0.6	1.7	0.6	170,879	95
9/5/2017	*0.002200	Recirculating Textile Filter	30	20	30	20	1.7	0.6	1.7	0.6	170,879	78
5/5/2011	0.002500	Extended Aeration	15	10	15	10	3.7	1.4	7.5	2.9	198,000	79
8/31/2017	0.002700	New Technology Primary Tank with Aeration	15	10	15	10	1.7	0.6	5.6	2.1	485,000	180
9/1/2011	*0.003000	Recirculating Textile Filter	15	10	15	10	12.1	4.6	12.1	4.6	220,915	74
3/1/2012	0.003000	Extended Aeration Package Plant	15	10	20	15	3.7	1.4	7.5	2.9	92,604	31
2/22/2016	*0.003700	Recirculating Rock Filter	30	20	30	20	7.3	2.8	7.3	2.8	115,688	31
7/4/2011	*0.003750	Recirculating Textile Filter	15	10	20	15	12.1	4.6	12.1	4.6	283,000	75
4/1/2014	*0.003885	Recirculating Sand Filter	15	10	15	10	3.7	1.4	7.5	2.9	132,185	34
12/1/2012	*0.004500	Recirculating Sand Filter	15	10	23	15	12.1	4.6	12.1	4.6	133,676	30
6/3/2013	*0.004718	Recirculating Sand Filter	30	20	30	20	12.1	4.6	12.1	4.6	203,060	43
11/2/2011	*0.004950	Recirculating Sand Filter	15	10	20	15	3.5	1.4	7.5	2.9	114,058	23
6/4/2011	0.005000	Moving Bed Biofilm Reactor	45	30	45	30	5.7	2.2	8.2	3.2	127,000	25
8/22/2017	0.005500	Recirculating Sand Filter	15	10	20	15	1.7	0.6	5.6	2.1	123,224	22
9/6/2012	0.005600	Extended Aeration with Filtration and Aerated Holding Tanks	15	10	15	10	3.7	1.4	7.5	2.9	130,000	23

DATE	Design Flow (MGD)	Technology	BOD (mg/L)		TSS (mg/L)		Summer Ammonia (mg/L)		Winter Ammonia (mg/L)		Present Worth Cost ($)	$ PW/gpd
			Daily Max or Weekly Average	Monthly Average	Daily Max or Weekly Average	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	Monthly Average		
6/1/2011	0.006000	Recirculating Sand Filter	15	10	15	10	3.7	1.4	7.5	2.9	176,239	29
3/1/2011	0.007875	Modular Fixed Film Activated Sludge with Constructed Wetlands	30	20	30	20	3.7	1.4	7.5	2.9	285,780	36
4/3/2012	*0.008210	Membrane Bioreactor	15	10	15	10	2.6	1	2.6	1	61,240	7
8/5/2014	0.009000	Recirculating Sand Filter	15	10	20	15	3.1	1.2	7.5	2.9	203,698	23
1/1/2014	0.009000	Membrane Bioreactor	15	10	15	10	1.6	0.6	5.5	2.1	217,739	24
4/6/2012	0.009100	Membrane Bioreactor	15	10	20	15	3.7	1.4	7.5	2.9	222,160	24
3/7/2012	*0.009158	Recirculating Gravel filter	30	20	30	20	3.7	1.5	6.5	2.5	163,681	18
3/6/2017	0.010000	Extended aeration	33	22	33	22	1.7	0.6	5.6	2.1	941,800	94
6/1/2014	0.013125	Recirculating Sand Filter	45	30	45	30	3	1.1	6	2.3	189,985	14
8/4/2012	*0.014000	Extended Aeration	15	10	15	10	3.7	1.4	7.5	2.8	188,208	13
7/1/2014	0.015540	Recirculating Sand Filter	23	15	23	15	3.9	1.5	7.8	3	450,986	29
7/5/2011	*0.015750	Recirculating Sand Filter	15	10	20	15	7.8	2.5	7.8	2.5	226,969	14
2/27/2015	0.016500	Extended Aeration Package Plant	45	30	45	30	3.7	1.4	7.5	2.9	187,957	11
7/1/2012	0.016650	Extended Aeration	15	10	20	15	3.7	1.4	7.5	2.9	317,750	19
9/3/2014	0.017800	Extended Aeration Package Plant	45	30	45	30	1.4	0.6	2.9	2.1	507,618	29
5/11/2015	*0.018000	Recirculating Sand Filter, Polishing Reactor, Chemical Phosphorus Removal	15	10	15	10	3.7	1.4	6.5	2.1	320,318	18
7/3/2013	*0.018500	Recirculating Textile Filter with Chemical & Filter Phosphorus Removal	15	10	20	15	3.7	1.4	7.5	2.9	130,000	7
12/7/2017	*0.018800	Recirculating Sand Filter	15	10	15	10	6	2.3	6	2.3	222,901	12
2/27/2015	*0.024000	Recirculating Gravel Filter and Chemical Phosphorus Removal	15	10	15	10	3.7	1.4	6.5	2.1	343,816	14
9/1/2014	*0.030000	Recirculating Sand Filter and Moving Bed Biofilm Reactor with Chemical Phosphorus Removal	15	10	20	15	1.7	0.6	5.6	2.1	1,157,390	39
6/2/2012	0.038000	Aerated Lagoon with Recirculating Sand Filter	45	30	45	30	3.7	1.4	7.5	2.9	4,309,665	113

DATE	Design Flow (MGD)	Technology	BOD (mg/L)		TSS (mg/L)		Summer Ammonia (mg/L)		Winter Ammonia (mg/L)		Present Worth Cost ($)	$ PW/gpd
			Daily Max or Weekly Average	Monthly Average	Daily Max or Weekly Average	Monthly Average	Daily Maximum	Monthly Average	Daily Maximum	Monthly Average		
2/3/2013	0.040000	Moving Bed Biofilm Reactor (can be operated as IFAS)	15	10	20	15	3.7	1.4	7.5	2.9	2,963,181	74
8/20/2015	*0.040000	Recirculating Sand Filter and Moving Bed Biofilm Reactor	15	10	20	15	3.7	1	5.6	2.1	1,812,000	45
12/1/2016	0.044000	Fixed Film Extended Aeration	30	20	45	30	1.7	0.6	5.6	2.1	816,367	19
6/4/2013	0.045000	Moving Bed Biofilm Reactor	15	10	15	10	1.7	0.6	5.6	2.1	479,344	11
3/9/2016	0.045000	Moving Bed Biofilm Reactor	15	10	15	10	1.7	0.6	5.6	2.1	479,344	11
6/4/2012	*0.050000	New Technology Package Plant	30	20	30	20	7.5	2.9	7.5	2.9	942,050	19
7/3/2011	0.050000	Extended Aeration Package Plant	15	10	20	15	3.7	1.4	7.5	2.9	1,357,506	27
8/3/2014	0.050000	Recirculating Sand Filter	15	10	15	10	3.7	1.4	7.5	2.9	733,723	15

* Lake Dischargers

Additionally, the table of wastewater treatment technologies in the *Ammonia Criteria: New EPA Recommended Criteria* factsheet includes several technologies that have demonstrated capability in meeting ammonia effluent limits of less than 0.7 mg/L when designed appropriately.

The EPA has approved the nutrient water quality standards at 10 CSR 20-7.031. Numeric water quality standards for specific lakes are listed in Table N of 10 CSR 20-7.031. Nutrient standards at 10 CSR 20-7.031(5)(N) apply to all other lakes that are waters of the state and have an area of at least ten acres during normal pool conditions, with the exception of the lakes located in the Big River Floodplain ecoregion (see 10 CSR 20-7.031(5)(N)2.). Waters that are 303(d) listed for nutrients will need to complete a site-specific antidegradation review to determine appropriate limits.

The base case treatment option for total phosphorus to ensure that water quality standards will be protected is assumed to be conventional secondary treatment. Total phosphorus effluent levels from conventional secondary treatment typically range from 1 to 4 mg/L. Three less degrading options that were considered are chemical addition for precipitation and settling, biological nutrient removal (BNR), and enhanced nutrient removal (ENR). Chemical addition is a common practice for phosphorus removal and has been used for a number of years in Southwest Missouri for discharges to lakes that are subject to the 0.5 mg/L effluent limits required at 10 CSR 20-7.015. An effluent limit of 0.5 mg/L was therefore determined to be a reasonable and economically efficient treatment level for the Department's Alternatives Analysis. The cost to treat beyond this level may not be economically efficient for facilities with a design flow less than 50,000 gpd.

As a result of this alternatives analysis, the Department has determined that for a facility that discharges less than 50,000 gpd, depending on site-specific conditions, there are technologies available that may be economically efficient and practicable, and that are capable of meeting the effluent limitations in Table 3 or Table 4. If the facility owners do not believe that there is a treatment technology that is both economically efficient and practicable for their facility to meet the limits in Table 3 or Table 4, a site-specific alternatives analysis may be required.

4.3 Design Flow Determination

As part of the Department's alternatives analysis, facilities up to 50,000 gpd were evaluated. A design flow maximum of 50,000 gpd was chosen for applicability of this alternatives analysis for a variety of reasons. As facilities increase in size, site-specific factors may require a more site-specific alternatives analysis. For example, larger facilities are more likely to have wet weather flows that must be addressed and are more likely to need Whole Effluent Toxicity testing or nutrient monitoring. Larger facilities are also more likely to discharge a larger variety of pollutants of concern, which may not be addressed in this review. Larger facilities also benefit from an economy of scale; smaller facilities tend to have a higher cost per gallon of wastewater treated, which is distributed over fewer paying customers. Finally, as we are working with a limited amount of data, limiting the design flow applicability for the Department's alternatives analysis ensures a factor of safety in our review.

4.4 Regionalization Alterative

Within Section II B 1. of the AIP, discussion of the potential for discharge to a regional wastewater collection system is mentioned. The applicant must provide justification for not pursuing regionalization on the *Regionalization and No-Discharge Evaluation* form. If the information provided on the form is not sufficient to demonstrate that a regionalization alternative is not feasible, a more detailed evaluation will be required before the Department can complete its determination.

The applicant needs to fully evaluate regionalization and consolidation options when deciding on ways to comply with existing and future regulatory requirements. This includes evaluating connecting or selling their utility to a larger public or private utility. With the rising costs of compliance and often-limited resources

available to smaller facilities, not owning and operating a small utility may be the most beneficial and cost-effective alternative for achieving consistent compliance.

4.5 LOSING STREAM ALTERATIVE DISCHARGE LOCATION

Under 10 CSR 20-7.015(4)(A), *prior to discharging to a losing stream, alternatives such as relocating the discharge to a gaining stream, and connection to a regional wastewater treatment facility are to be evaluated and determined to be unacceptable for environmental and/or economic reasons*.

Information provided by the applicant on the *No Discharge Evaluation* form must include evaluation and justification for why the owner is not pursuing land application, or connection to a regional facility.

4.6 SOCIAL AND ECONOMIC IMPORTANCE EVALUATION

Missouri's antidegradation implementation procedures specify that if the proposed activity results in significant degradation then a determination of social and economic importance is required.

Information provided by the applicant in the *Antidegradation Review Submittal: Voluntary Tier 2 – Significant Degradation for Domestic Wastewater Facilities with Design Flow Less Than 50,000 Gallons per Day* form must include a detailed social and economic importance evaluation. If the information provided on the form is not sufficient to demonstrate important social and economic importance, then a more detailed evaluation will be required before the Department can complete its determination.

5. GENERAL ASSUMPTIONS OF THE WATER QUALITY AND ANTIDEGRADATION REVIEW

1. A Water Quality and Antidegradation Review (WQAR) assumes that [10 CSR 20-6.010(2) Continuing Authorities and 10 CSR 20-6.010(4)(A)5.B., evaluation of no discharge] has been or will be addressed in a Missouri State Operating Permit or Construction Permit Application.
2. 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.
3. Changes to Federal and State Regulations made after the drafting of this WQAR may alter Water Quality Based Effluent Limits (WQBEL).
4. Effluent limitations derived from Federal or Missouri State Regulations (FSR) may be WQBEL or Effluent Limit Guidelines (ELG).
5. WQBEL supersede ELG only when they are more stringent. Mass limits derived from technology based limits are still appropriate.
6. A WQAR does not allow discharges to waters of the state, and shall not be construed as a National Pollution Discharge Elimination System or Missouri State Operating Permit to discharge or a permit to construct, modify, or upgrade.
7. Limitations and other requirements in a WQAR may change as Water Quality Standards, Methodology, and Implementation procedures change.
8. Nothing in this WQAR removes any obligations to comply with county or other local ordinances or restrictions.
9. If the proposed treatment technology is not covered in 10 CSR 20-8 Minimum Design Standards, the treatment process may be considered a new technology. As a new technology, the permittee will need to work with the review engineer to ensure equipment is sized properly. 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.

6. PERMIT LIMITS AND MONITORING INFORMATION

TABLE 3. EFFLUENT LIMITS – ALL OUTFALLS

PARAMETER		UNITS	DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	BASIS FOR LIMIT (NOTE 1)	MONITORING FREQUENCY
FLOW		MGD	*		*	FSR	ONCE/QUARTER
BIOCHEMICAL OXYGEN DEMAND$_5$ **		MG/L		15	10	PEL	ONCE/QUARTER
TOTAL SUSPENDED SOLIDS **		MG/L		15	10	PEL	ONCE/QUARTER
PH		SU	6.5– 9.0		6.5 – 9.0	FSR	ONCE/QUARTER
AMMONIA AS N (APR 1 – SEPT 30)		MG/L	1.7		0.6	PEL	ONCE/QUARTER
AMMONIA AS N (OCT 1 – MAR 31)		MG/L	5.6		2.1	PEL	ONCE/QUARTER
TOTAL PHOSPHORUS (NOTE 2)		MG/L	*		0.5	PEL	ONCE/QUARTER
ESCHERICHIA COLIFORM (*E. COLI*)	WBC(A) AND WBC (B) (NOTE 3)	#/100ML	630***		126	FSR	ONCE/QUARTER
	LOSING STREAM (NOTE 4)	#/100ML	126***		*	FSR	ONCE/QUARTER

TABLE 4. EFFLUENT LIMITS – OUTFALLS TO LAKES

PARAMETER	UNITS	DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	BASIS FOR LIMIT (NOTE 1)	MONITORING FREQUENCY
FLOW	MGD	*		*	FSR	ONCE/QUARTER
BIOCHEMICAL OXYGEN DEMAND$_5$ **	MG/L		15	10	PEL	ONCE/QUARTER
TOTAL SUSPENDED SOLIDS **	MG/L		20	15	PEL	ONCE/QUARTER
PH	SU	6.5– 9.0		6.5 – 9.0	FSR	ONCE/QUARTER
AMMONIA AS N (APR 1 – SEPT 30)	MG/L	3.6		1.4	PEL	ONCE/QUARTER
AMMONIA AS N (OCT 1 – MAR 31)	MG/L	7.5		2.9	PEL	ONCE/QUARTER
TOTAL PHOSPHORUS (NOTE 2)	MG/L	*		0.5	PEL	ONCE/QUARTER
ESCHERICHIA COLIFORM (*E. COLI*)	#/100ML	630***		126	FSR	ONCE/QUARTER

* Monitoring requirements only.

** Publicly owned treatment works will be required to meet a removal efficiency of 85 percent or more for BOD_5 and TSS. Influent BOD_5 and TSS data should be reported to ensure removal efficiency requirements are met.

*** Publicly owned treatment works will receive a weekly average *E. coli* limit and private facilities will receive a daily maximum *E. coli* limit.

NOTE 1 – Preferred Alternative Effluent Limit – PEL; or Federal/State Regulation – FSR. Water Quality-Based Effluent Limitation – WQBEL Also, please see the **GENERAL ASSUMPTIONS OF THE WQAR #4 & #5.**

NOTE 2 – Total Phosphorus limits are only applicable to discharges to a lake or watershed of a lake that is a water of the state and has an area of at least ten acres during normal pool conditions

NOTE 3 - Effluent limitations and monitoring requirements for *E. coli* for WBC(A) and WBC(B) are applicable only during the recreational season from April 1 through October 31. The Monthly Average Limit for *E. coli* is expressed as a geometric mean. The Weekly Average for *E. coli* will be expressed as a geometric mean if more than one (1) sample is collected during a calendar week (Sunday through Saturday).

NOTE 4 – Effluent limits and monitoring requirements for *E. coli* are applicable year round for designated losing streams. No more than ten percent of samples over the course of a calendar year shall exceed the 126 #/100 mL daily maximum.

Permit limits or monitoring requirements for other applicable parameters, including Oil & Grease, Total Residual Chlorine, Dissolved Oxygen, Nitrates, Total Recoverable Aluminum, and Total Recoverable Iron, may be included in the operating permit based on water quality standards and criteria as applicable.

7. RECEIVING WATER MONITORING REQUIREMENTS

No receiving water monitoring requirements recommended at this time.

8. DERIVATION AND DISCUSSION OF LIMITS

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). Acute wasteload allocations were determined using applicable water quality criteria (CMC: criteria maximum concentration).

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).

Note: 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 that 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 that could be achievable through proper operation and maintenance of the treatment works, considering the design capability of the treatment process.

8.1 LIMIT DERIVATION

- **Flow**. In accordance with [40 CFR Part 122.44(i)(1)(ii)] the volume of effluent discharged from each outfall is needed to assure compliance with permitted effluent limitations. 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.

- **Biochemical Oxygen Demand (BOD_5).** BOD_5 limits of 10 mg/L monthly average and 15 mg/L average weekly were determined by the Department to be achievable and protective of beneficial uses and existing water quality.

  As per the *DO Modeling & BOD Effluent Limit Development Administrative Guidance for the Purpose of Conducting Water Quality Assistance Reviews*, facilities less than 100,000 gallons per day, and

proposing BOD treatment less than or equal to an average monthly of 10 mg/L and average weekly of 15 mg/L as demonstrated by performance specifications from a manufacturer or effluent sampling of an existing facility with the same treatment facility are exempt from the DO modeling requirement.

Influent monitoring may be required for this facility in its Missouri State Operating Permit.

- **Total Suspended Solids (TSS).**
  Table 3: TSS limits of ten mg/L monthly average and fifteen mg/L average weekly were determined by the Department to be achievable and protective of beneficial uses and existing water quality. According to EPA, because TSS and BOD are closely correlated, we apply the same limits for TSS as BOD.

  Table 4: For lake discharging facilities, TSS limits of fifteen mg/L monthly average and twenty mg/L average weekly were determined by the Department to be achievable and protective of beneficial uses and existing water quality for discharges to lakes where mixing would apply. These limits are more protective than the TSS limitations designated at 10 CSR 20-7.015(3)(A)1.A. for lakes and reservoirs.

  Influent monitoring may be required for this facility in its Missouri State Operating Permit.

- **pH**. – 6.5-9.0 SU. Technology based effluent limitations of 6.0-9.0 SU [10 CSR 20-7.015] are not protective of the Water Quality Standard, which states that water contaminants shall not cause pH to be outside the range of 6.5-9.0 SU. No mixing zone is allowed when using the Department's Alternatives Analysis, therefore the water quality standard must be met at the outfall.

- **Total Ammonia Nitrogen for Table 3**. The Department has determined that the alternatives analysis-based technology limits of 0.6 mg/L monthly average and 1.7 mg/L daily maximum in summer, and 2.1 mg/L monthly average and 5.6 mg/L daily maximum in winter are achievable by some treatment technologies. Because these limits are more protective than the water quality-based limits calculated below for a stream with no mixing, the technology-based limits were used.

  In choosing to use the Department's alternatives analysis, the facility is electing to build a treatment plant that provides a high level of treatment that meets potential future limits based on the 2013 EPA Ammonia criteria and will potentially reduce the need to upgrade in the near future. If the facility owners do not believe that there is a treatment technology that is both economically efficient and practicable for their facility to meet these limits, a site-specific alternatives analysis may be required.

  Water Quality-Based Effluent Limits (WQBEL):
  Early Life Stages Present Total Ammonia Nitrogen criteria apply
  [10 CSR 20-7.031(5)(B)7.C. & Table B1 and Table B3]. Background total ammonia nitrogen = 0.01 mg/L

Season	Temp (°C)	pH (SU)	Total Ammonia Nitrogen CCC (mg N/L)	Total Ammonia Nitrogen CMC (mg N/L)
Summer	26	7.8	1.5	12.1
Winter	6	7.8	3.1	12.1

  Summer: April 1 – September 30

  $C_e = (((Q_e+Q_s)*C) - (Q_s*C_s))/Q_e$

  Chronic WLA: $C_e = ((Q_e + 0.0)1.5 – (0.0 * 0.01))/Q_e = 1.5$ mg/L

Acute WLA: $C_e = ((Q_e + 0.0)12.1 – (0.0 * 0.01))/Q_e = 12.1$ mg/L

LTA_c = 1.5 mg/L (0.780) = **1.17 mg/L** [CV = 0.6, 99th Percentile, 30 day avg.]
LTA_a = 12.1 mg/L (0.321) = 3.89 mg/L [CV = 0.6, 99th Percentile]

MDL = 1.17 mg/L (3.11) = 3.6 mg/L [CV = 0.6, 99th Percentile]
AML = 1.17 mg/L (1.19) = 1.4 mg/L [CV = 0.6, 95th Percentile, n = 30]

Winter: October 1 – March 31
Chronic WLA: $C_e = ((Q_e + 0.0)3.1 – (0.0 * 0.01))/Q_e = 3.1$ mg/L

Acute WLA: $C_e = ((Q_e + 0.0)12.1 – (0.0025 * 0.01))/Q_e = 12.1$ mg/L

LTA_c = 3.1 mg/L (0.780) = **2.42 mg/L** [CV = 0.6, 99th Percentile, 30 day avg.]
LTA_a = 12.1 mg/L (0.321) = 3.89 mg/L [CV = 0.6, 99th Percentile]

MDL = 2.42 mg/L (3.11) = 7.5 mg/L [CV = 0.6, 99th Percentile]
AML = 2.42 mg/L (1.19) = 2.9 mg/L [CV = 0.6, 95th Percentile, n = 30]

	Maximum Daily Limit (mg/l)		Average Monthly Limit (mg/l)	
	Summer	Winter	Summer	Winter
WQBEL	3.6	7.5	1.4	2.9
Alternatives Analysis Limits	1.7	5.6	0.6	2.1

- **Total Ammonia Nitrogen for Table 4**. The Department has determined that the alternatives analysis-based technology limits for lake discharging facilities of 3.6 mg/L summer daily maximum, 1.4 mg/L summer monthly average and 7.5 mg/L winter daily max, 2.9 mg/L winter monthly average are achievable by some treatment technologies. Because these proposed limits are more protective than the water quality-based limits calculated below for a lake with mixing where acute criteria would be applicable for determining the baseline limits, the alternatives analysis limits were used.

  Water Quality-Based Effluent Limits (WQBEL):
  Early Life Stages Present Total Ammonia Nitrogen criteria apply
  [10 CSR 20-7.031(5)(B)7.C. Table B1 & Table B3]. Background total ammonia nitrogen = 0.01 mg/L

Season	Temp (°C)	pH (SU)	Total Ammonia Nitrogen CCC (mg N/L)	Total Ammonia Nitrogen CMC (mg N/L)
Summer	26	7.8	1.5	12.1
Winter	6	7.8	3.1	12.1

$C_e = (((Q_e+Q_s)*C) - (Q_s*C_s))/Q_e$
Acute WLA: $C_e = ((Q_e + 0)12.1 – (0 * 0.01))/Q_e$
$C_e = 12.1$ mg/L

LTA_a = 12.1 mg/L (0.321) = **3.88 mg/L** [CV = 0.6, 99th Percentile]
MDL = 3.88 mg/L (3.11) = 12.1 mg/L [CV = 0.6, 99th Percentile]
AML = 3.88 mg/L (1.19) = 4.6 mg/L [CV = 0.6, 95th Percentile, n = 30]

	Maximum Daily Limit (mg/l)		Average Monthly Limit (mg/l)	
	Summer	Winter	Summer	Winter

WQBEL	12.1	12.1	4.6	4.6
Alternatives Analysis Limits	3.6	7.5	1.4	2.9

- **Total Phosphorus**. Total Phosphorus limits are only applicable to discharges to a lake or watershed of a lake that is a water of the state and has an area of at least ten acres during normal pool conditions. Monthly average of 0.5 mg/L and monitoring only for daily maximum were determined by the Department to be achievable and an appropriate target for the discharge to not cause or contribute to an instream water quality standard excursion or impairment should future modeling by the department occur.

- ***Escherichia coli (E. coli)***. Limits will be applied based on the receiving stream designated use.

  Whole Body Contact: Monthly average of 126 per 100 mL as a geometric mean and Daily Maximum or Weekly Average as a geometric mean of 630 per 100 mL during the recreational season (April 1 – October 31), to protect Whole Body Contact Recreation designated use of the receiving water body, as per 10 CSR 20-7.031(5)(C) and 10 CSR 20-7.015 (9)(B)1. An effluent limit for both monthly average and daily maximum or weekly average is required by 40 CFR 122.45(d). Publicly owned treatment works will receive weekly average limits, while non-publicly owned treatment works will receive daily maximum limits.

  Losing Stream: Discharges to losing streams shall not exceed 126 per 100 mL as a Daily Maximum at any time, as per 10 CSR 20-7.031(5)(C). Monitoring only for a monthly average. No more than ten percent of samples over the course of the calendar year shall exceed 126 #/100 mL daily maximum as per 10 CSR 20-7.015(9)(B)1.G.

  Per the effluent regulations, the *E. coli* sampling/monitoring frequency for facilities less than 100,000 gallons per day shall be set to match the monitoring frequency of wastewater and sludge sampling program for the receiving water category in 7.015(1)(B)3. during the recreational season (April 1 – October 31), with compliance to be determined by calculating the geometric mean of all samples collected during the reporting period (samples collected during the calendar week for the weekly average, and samples collected during the calendar month for the monthly average). Please see GENERAL ASSUMPTIONS OF THE WQAR #7

- **Total Residual Chlorine (TRC)**. These limits will apply to facilities that chlorinate. Warm-water Protection of Aquatic Life CCC = 10 µg/L, CMC = 19 µg/L [10 CSR 20-7.031, Table A1]. Background TRC = 0.0 µg/L.

  $C_e = (((Q_e+Q_s)*C) - (Q_s*C_s))/Q_e$

  Chronic WLA: $C_e = ((Q_e + 0.0)10 – (0.0 * 0.0))/ Q_e = 10$ µg/L

  Acute WLA: $C_e = ((Q_e + 0.0)19 – (0.0 * 0.0))/ Q_e = 19$ µg/L

  LTA_c = 10 µg/L (0.527) = **5.3 µg/L** [CV = 0.6, 99th Percentile]
  LTA_a = 19 µg/L (0.321) = 6.1 µg/L [CV = 0.6, 99th Percentile]

  MDL = **5.3 µg/L** (3.11) = 16.5 µg/L [CV = 0.6, 99th Percentile]
  AML = **5.3 µg/L** (1.55) = 8.2 µg/L [CV = 0.6, 95th Percentile, n = 4]

Total Residual Chlorine effluent limits of 0.017 mg/L daily maximum, 0.008 mg/L monthly average are recommended if chlorine is used as a disinfectant. Standard compliance language for TRC, including the minimum level (ML), should be included in the permit.

- **Aluminum, Total Recoverable**. Monitoring only. The facility may use chemicals for phosphorous removal that contain aluminum. Monitoring may be included in the operating permit to determine if reasonable potential exists for this facility's discharge to exceed water quality standards for Aluminum (Total Recoverable).

- **Iron, Total Recoverable.** Monitoring only. This facility may use chemicals for phosphorous removal that contain iron. Monitoring may be included in the operating permit to determine if reasonable potential exists for this facility's discharge to exceed water quality standards for Iron (Total Recoverable).

- **Oil & Grease**. These limits will apply to publicly owned treatment works and may apply to other facilities as appropriate. Conventional pollutant, [10 CSR 20-7.031, Table A1]. Effluent limitation for protection of aquatic life; 10 mg/L monthly average, 15 mg/L daily maximum.

Permit limits for any other applicable parameters may be included in the operating permit based on water quality standards and criteria as applicable.

9. ANTIDEGRADATION REVIEW PRELIMINARY DETERMINATION

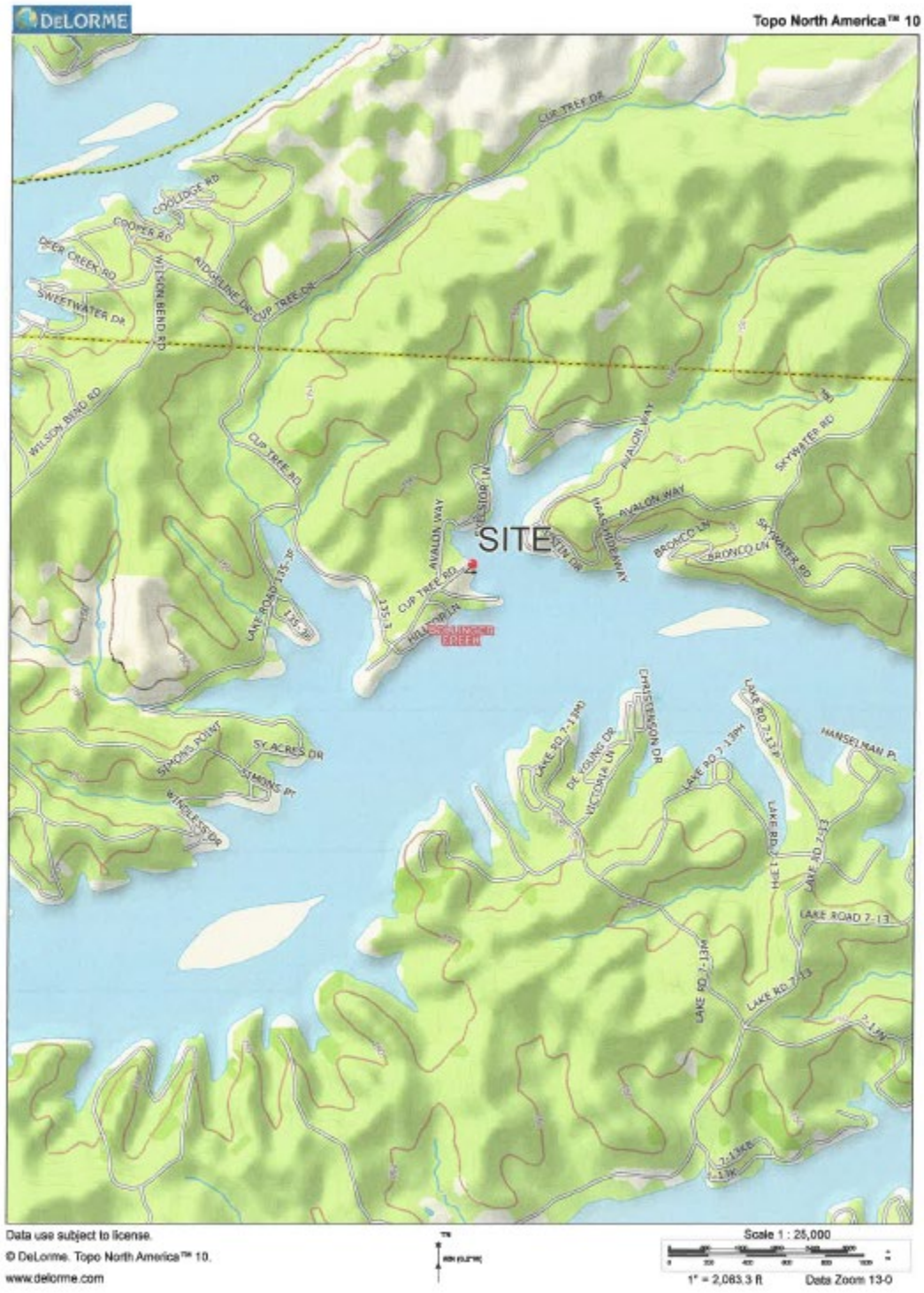
The proposed new or expanded facility discharge is assumed to result in significant degradation of the receiving waterbody. The Department has used available data to complete a review of available treatment technologies and expected performance. As a result of this review, the Department has determined that, depending on site specific conditions, there may be technologies available which are economically efficient and practicable for a facility that are capable of meeting the effluent limits in Table 3 or Table 4. If the facility owners do not believe that there is a treatment technology that is both economically efficient and practicable for their facility to meet the limits in Table 3 or Table 4, a site specific WQAR may be requested.

Any treatment option designed to meet these effluent limits may be considered a reasonable alternative in moving forward with the appropriate facility plan, construction permit application, or other future submittals.

If the proposed treatment system is not covered in 10 CSR 20-8 Minimum Design Standards and is considered a new treatment technology, your construction permit application must address approvability of the technology in accordance with the *Approval Process for Innovative Technology – PUB2453* factsheet. If you have any questions regarding the new technology factsheet, please contact Cindy LePage of the Water Protection Program. The permittee will need to work with the review engineer to ensure equipment is sized properly and that the technology will consistently achieve the proposed effluent limits. The operating permit may contain additional requirements to evaluate the effectiveness of the technology once the facility is in operation.

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.

APPENDIX A: MAP OF DISCHARGE LOCATION



APPENDIX B: GEOHYDROLOGIC EVALUATION

MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

Michael L. Parson
Governor

Dru Buntin
Director

LWE23044
Camden County

RECEIVED
FEB 24 2023
Water Protection Program

November 10, 2022

Jim Jackson, Jr.
83 Oak Tree Rd
Camdenton, MO 65020

RE: Cup Tree Road LLC

Dear Jim Jackson, Jr.:

On October 12, 2022, 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 gspeg@dnr.mo.gov.

Sincerely,

MISSOURI GEOLOGICAL SURVEY

Fletcher N. Bone

Fletcher N. Bone
Geologist
Environmental Geology Section

STATE OF MISSOURI
FLETCHER N BONE
RG
2019001287
REGISTERED GEOLOGIST

11/10/2022

c: John Broker
WPP
Central Field Operations

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

Project ID Number
LWE23044
County
Camden County

Request Details

Project: Cup Tree Road LLC

Legal Description: 33 T40N R18W
Quadrangle: BOLLINGER CREEK
Latitude: 38 11 8.33
Longitude: -92 55 42.74

Organization Official

Name: John Broker
Address: 1002 West Main Street
City: Blue Springs
State: MO Zip: 64015
Phone: 816-918-5359
Email: jbroker23@gmail.com

Preparer

Name: Jim Jackson, Jr.
Address: 83 Oak Tree Rd
City: Camdenton
State: MO Zip: 65020
Phone: 573-873-3898
Email: jimjacksonjr@charter.net

Project Details

Report Date: 11/10/2022
Date of Field Visit: 10/20/2022

Previous Reports: Not Applicable

Facility Type
- [X] 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
- [ ] 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 [X] Losing [ ] 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%
- [X] >15%

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

Bedrock: The uppermost bedrock is Ordovician-age lower Gasconade Dolomite and Gunter Sandstone.

Surficial Materials: The surficial materials are colluvium and residuum that consists of gravelly, silty, clay and organic, silty, sandy gravel.

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

Project ID Number
LWE23044
County
Camden County

Recommended Construction Procedures for Earthen Facility	**Determine Overburden Properties**	**Determine Hydrologic Conditions**
	☐ Particle size analysis	☐ Groundwater elevation
☐ Installation of clay pad and Compaction	☐ Atterberg limits	☐ Direction of groundwater flow
☐ Diversion of subsurface flow	☐ 95% Max. dry density test method	☐ 25-Year flood level
☐ Artificial sealing	☐ Overburden thickness	☐ 100-Year flood level
☐ Rock excavation	☐ Permeability coefficient-undisturbed	
☐ Limit excavation depth	☐ Permeability coefficient-remolded	

Remarks:

On October 20, 2022, a geologist with the Missouri Geological Survey (MGS) performed a geohydrologic evaluation for a proposed discharging mechanical treatment plant (MTP) that will serve Cup Tree Road LLC. The purpose of the site visit is to observe the geologic and hydrologic elements of the site and determine the potential for groundwater contamination in the event of wastewater treatment failure.

The uppermost bedrock is highly weathered and highly permeable Ordovician-age lower Gasconade Dolomite and Gunter Sandstone. The surficial materials are colluvium and residuum that consists of gravelly, silty, clay near the upper portions of the site and organic, silty, sandy gravel at the lower portions of the site. The surficial materials are less than 5 feet thick and are highly permeable.

There are no known sinkholes or springs located within 1 mile of the site. However, the inactive Osage fault is located within 1 mile of the site.

The wastewater treatment facility will discharge to Lake of the Ozarks, which is considered gaining for discharge purposes. Based on the geologic and hydrologic conditions observed, the site receives an overall slight geologic limitations rating. In the event of treatment failure, the surface waters of Lake of the Ozarks, and shallow groundwater, may be adversely impacted.

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 report 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: Cup Tree Road #12267
Project Description: New Low Pressure Pipe subsurface system for residential housing. Lake of the Ozarks, Camden
Project Type: Waste Transfer, Treatment, and Disposal, Liquid waste/Effluent, Wastewater treatment plant, Construction or expansion
Contact Person: Jim Jackson
Contact Information: jimjacksonjr@charter.net or 573-873-3898

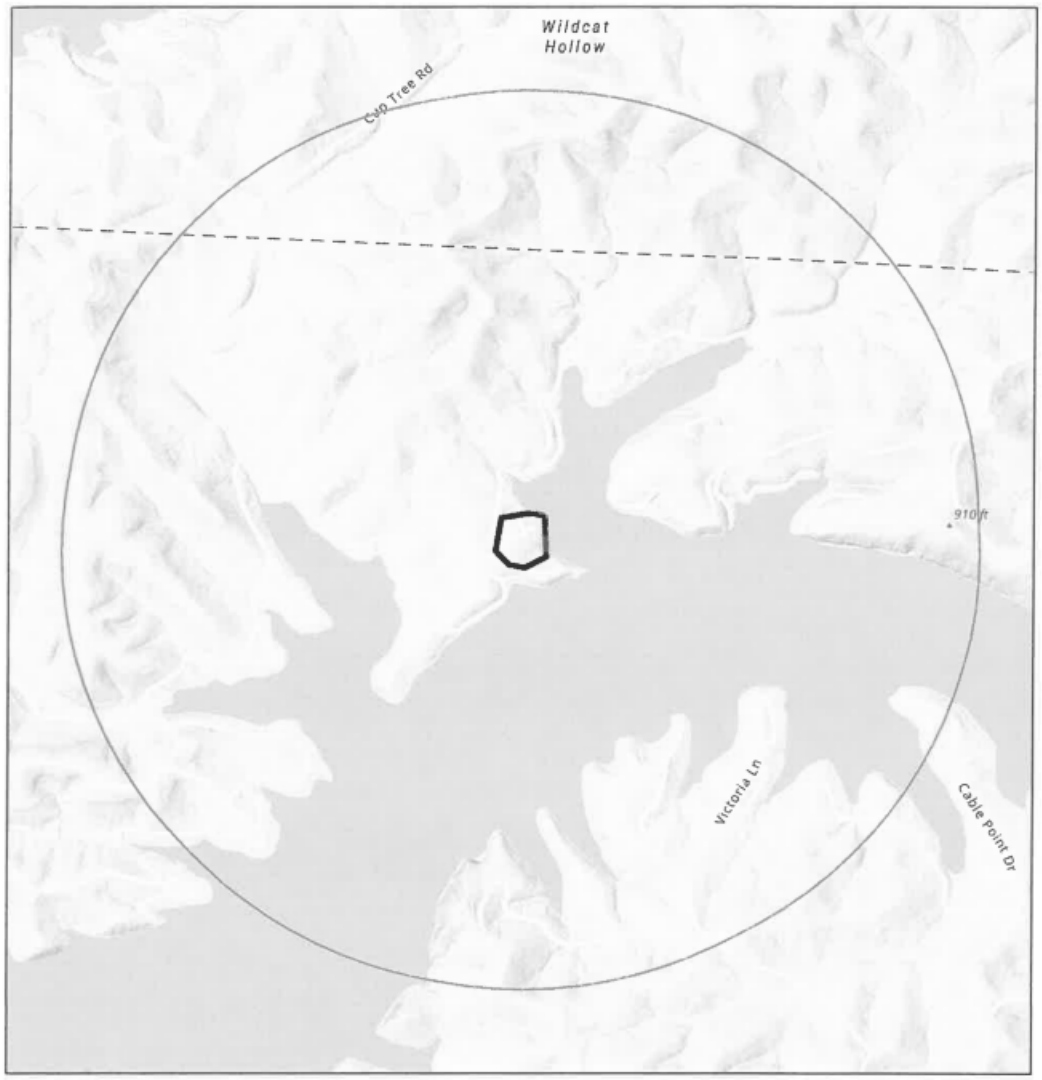
Disclaimer: This NATURAL HERITAGE REVIEW REPORT identifies if a species or natural community tracked by the Natural Heritage Program is known to occur within or near the project area submitted, and shares recommendations to avoid or minimize project impacts to sensitive species or natural habitats. Incorporating information from the Natural Heritage Program into project plans is an important step in reducing impacts to Missouri's sensitive natural resources. 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.

This Natural Heritage Review Report is not a site clearance letter for the project. Rather, it identifies public lands and records of sensitive resources located close to and/or potentially affected by the proposed project. If project plans or location change, this report may no longer be valid. 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. Lack of an occurrence record does not mean that a sensitive species or natural community is not present on or near the project area. On-site verification is the responsibility of the project. However, the Natural Heritage Program is only one reference that should be used to evaluate potential adverse project impacts and additional information (e.g. wetland or soils maps, 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. This report does not fulfill 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 IPaC: Home (fws.gov) to initiate USFWS Information for Planning and Conservation (IPaC) consultation. Contact the Columbia Missouri Ecological Field Services Office (573-234-2132, or by mail at 101 Park Deville Drive, Suite A, Columbia, MO 65203) for more information.

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 Home Page | Missouri Department of Transportation (modot.org) for additional information on recommendations.

Cup Tree Road



February 20, 2023

1:19,982

0 0.15 0.3 0.6 mi

0 0.28 0.55 1.1 km

Buffered Project Boundary

Project Boundary

Esri, NASA, NGA, USGS, FEMA, Missouri Dept. of Conservation, Missouri DNR, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA

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 defined Project Area. Please contact the U.S. Fish and Wildlife Service and the Missouri Department of Conservation for further coordination.

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

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 -Wastewater treatment plant: New or Maintenance; 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 Act permit conditions.

Revegetate disturbed areas to minimize erosion using native plant species compatible with the local landscape and wildlife needs. Annual ryegrass may be combined with native perennials for quicker green-up. Avoid aggressive exotic perennials such as crownvetch and sericea lespedeza. Please see Best Management Practices for Construction and Development Projects Affecting Missouri Rivers and Streams (mo.gov).

Project Location and/or Species Recommendations:

Endangered Species Act Coordination - If this project has the potential to alter habitat (e.g. tree removal, projects in karst habitat) or cause direct mortality of bats, please coordinate directly with 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. 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.

Bald Eagle: 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: Do I need an eagle take permit? | U.S. Fish & Wildlife Service (fws.gov) if eagle nests are seen.

Gray Bat: 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. Please see Best Management Practices for Construction and Development Projects Gray bat (mo.gov).

Karst: This county has known karst geologic features (e.g., caves, springs, and sinkholes, all characterized by subterranean water movement). Few karst features are recorded in Natural Heritage records, and ones not noted here may be encountered at the project site or affected by the project. Cave fauna (many of which are Species of Conservation Concern) are influenced by changes to water quality; please check your project site for any karst features and make every effort to protect groundwater in the project area. Additional information and specific recommendations are available at Management Recommendations for Construction and Development Projects Affecting Missouri Karst Habitat (mo.gov).

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 Managing Invasive Species in Your Community | Missouri Department of Conservation (mo.gov) 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 (Kansas City District Regulatory Branch (army.mil)) and the Missouri Department of Natural Resources (DNR) issued Clean Water Act Section 401 Water Quality Certification (Section 401 Water Quality Certification | Missouri Department of Natural Resources (mo.gov)), 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 Wastewater Permits | Missouri Department of Natural Resources (mo.gov) 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:

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

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 Missouri Species and Communities of Conservation Concern Checklist (mo.gov) for a complete list of species and communities of conservation concern. Detailed information about the animals and some plants mentioned may be accessed at Mofwis Search Results. Please contact the Missouri Department of Conservation to request printed copies of any materials linked in this document.

APPENDIX D: ANTIDEGRADATION REVIEW SUMMARY FORMS

The forms that follow contain summary information provided by the applicant. Department staff determined that the following changes must be made to the information contained within these forms:

1) Antidegradation Review Submittal: Voluntary Tier 2 – Significant Degradation for Domestic Wastewater Facilities with Design Flow Less Than 50,000 Gallons Per Day:

RECEIVED
FEB 24 2023
Water Protection Program

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

ANTIDEGRADATION REVIEW SUBMITTAL
VOLUNTARY TIER 2 – SIGNIFICANT DEGRADATION FOR DOMESTIC WASTEWATER FACILITIES WITH DESIGN FLOW LESS THAN 50,000 GALLONS PER DAY

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

1. APPLICABILITY

If you answer "Yes" to any of the below questions, a site-specific alternatives analysis may be required.

The Missouri Department of Natural Resources' alternatives analysis is *not* applicable to facilities that have a Total Maximum Daily Load (TMDL) or are 303(d) or 305(b) listed for the pollutants of concern addressed in this alternatives analysis, with an exception for *E. coli* since disinfection will be required.

Facilities currently under enforcement will need to coordinate with the Water Protection Program's compliance and enforcement section to determine applicability for the department's alternatives analysis.

1.1 Does the receiving waterbody or downstream waterbody have a Total Maximum Daily Load (TMDL)? ☐ Yes ☑ No

1.2 Is the receiving waterbody or downstream waterbody 303(d) or 305(b) listed as impaired or potentially impaired? ☐ Yes ☑ No

1.3 Is the facility currently under enforcement with the department or the U.S. Environmental Protection Agency? ☐ Yes ☑ No

1.4 Is the design flow 50,000 gallons per day or more? ☐ Yes ☑ No

1.5 Is a non-discharging system a viable option? ☐ Yes ☑ No

Submit the following with this form:

☒ Regionalization and No Discharge Evaluation Form – Available on the department's website

☒ Copy of the Geohydrologic Evaluation – Submit request through the Missouri Geological Survey website

☒ Copy of the Missouri Natural Heritage Review from the Missouri Department of Conservation website

2. FACILITY

NAME		COUNTY	
Cup Tree Road LLC		Camden	
ADDRESS (PHYSICAL)	CITY	STATE	ZIP CODE
1685 Cup Tree Road	Gravois Mills	MO	65037

3. OWNER

NAME			
John Broker			
ADDRESS	CITY	STATE	ZIP CODE
1002 West Main Street	Blue Springs	MO	64015
EMAIL ADDRESS	TELEPHONE NUMBER WITH AREA CODE		
jbroker23@gmail.com	816-918-5359		

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

NAME	SECRETARY OF STATE CHARTER NUMBER		
Cup Tree Road LLC			
ADDRESS	CITY	STATE	ZIP CODE
1002 West Main Street	Blue Springs	MO	64015
EMAIL ADDRESS	TELEPHONE NUMBER WITH AREA CODE		
jbroker23@gmail.com	816-918-5359		

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 N38d11'8.11", Long W92d55'40.08"

5.2 Lower end of segment –
UTM: X= _____, Y= _____ OR Lat _____, Long _____ Per the Missouri Antidegradation Implementation Procedure (AIP), the definition of 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 Necessary)

NAME

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. SOCIAL AND ECONOMIC IMPORTANCE OF THE PREFERRED ALTERNATIVE

This section must be completed with adequate and thorough descriptions of the social and economic importance associated with the proposed project in accordance with the Antidegradation Implementation Procedure Section II.E. for discharge to be allowed.

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.

7.1 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.")

he site for the proposed treatment plant is located on Cup Tree Road, Gravois Mills, Missouri. The subdivision is located approximately 9.5 miles from the city limits of Laurie. The area is primarily an undeveloped wooded area. The addition of the wastewater treatment plant would prevent the possibility of unmonitored septic drain fields for houses from the Lake of the Ozarks. The leaking drain field is an environmental hazard to the residents of the Lake of the Ozarks as well as to the surrounding animal life. The Lake of the Ozarks has been the target of an E.Coli investigation and there is pending legislation that would declare the Lake of the Ozarks as a distressed waterway. If the Lake of the Ozarks is declared a distressed waterway, septic fields will become the primary source of investigation. This proposed treatment plant would prevent the effluent of unmonitored septic fields from entering the Lake of the Ozarks. Therefore, the effected community is the people who vacation and enjoy the Lake of the Ozarks as well as the landowners and residents of the Lake of the Ozarks area.

7.2 Identify the important social and economic development associated with the project:

Will the proposed discharging activity:

Create or expand employment?	☑ Yes	☐ No	☐ Don't know	☐ N/A
Increase median family income?	☑ Yes	☐ No	☐ Don't know	☐ N/A
Reduce the number of households below the poverty line?	☑ Yes	☐ No	☑ Don't know	☐ N/A
Increase the community tax base?	☑ Yes	☐ No	☐ Don't know	☐ N/A
Increase needed housing supply?	☑ Yes	☐ No	☐ Don't know	☐ N/A
Provide necessary public services (e.g., school, infrastructure, fire department, etc.)?	☐ Yes	☑ No	☐ Don't know	☐ N/A
Correct a public health, safety, or environmental problem?	☐ Yes	☑ No	☐ Don't know	☐ N/A

Other:

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

The applicant must describe the expected changes in the factors identified in question 7.2 that are associated with the project and provide information on any additional items demonstrating important social and economic development. The applicant should first describe the existing condition of the affected community. This base condition should then be compared to the predicted change (benefit) in social and economic condition after the discharge is allowed. The social and economic measures identified above do not constitute a comprehensive list. Each situation and community is different and will require an analysis of unique social and economic factors in accordance with the Antidegradation Implementation Procedure Section II.E.1.

The construction of the wastewater treatment plant would prevent unmonitored on-site septic systems from leaching into the Lake of the Ozarks. This in turn would help keep the waters of the Lake of the Ozarks clean. The treatment plant would provide monitored sewage treatment at acceptable discharge levels utilizing a membrane bio reactor technology.

7.4 Is any other written correspondence or documentation included with this application to provide further evidence of social and economic importance:

☑ No

☐ Yes

- ☐ Letter(s) from the mayor or community in support of the proposed project
- ☐ Rezoning approval
- ☐ Other:

8. NO DISCHARGE ALTERNATIVES EVALUATION

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.

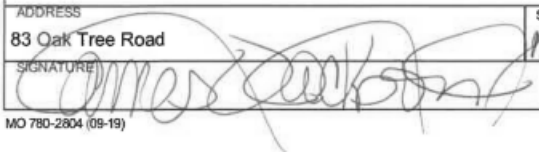
You must submit the *Regionalization and No-Discharge Evaluation Form* (780-2805) to demonstrate that a non-discharging alternative is not feasible. If sufficient information is not provided on the *No-Discharge Evaluation Form* to demonstrate that a non-discharging facility is not feasible, a more detailed evaluation of no discharge options must be submitted.

9. IDENTIFY PREFERRED TREATMENT ALTERNATIVE

Describe your preferred treatment alternative that has been recommended or approved by a registered professional engineer licensed to practice in Missouri. The preferred treatment alternative must be capable of meeting the effluent limits in the table under item 10 of this form.

Applicants choosing to use a new wastewater technology considered an "unproven technology" in Missouri must comply with the requirements set forth in the Innovative Technology factsheet found on the department's website.

The preferred alternative is the BioBarrier Membrane Bio Reactor. Although other forms of treatment were more economically efficient and performed just as effectively, the BioBarrier Membrane Bio Reactor is chosen due to the size constraints of the available area and the aesthetics of the BioBarrier Membrane Bio Reactor unit

ENGINEERING CONSULTANT NAME		COMPANY NAME	
James Jackson, Jr., PE		Lake Professional Engineering Services	
ADDRESS	STATE	ZIP CODE	TELEPHONE NUMBER WITH AREA CODE
83 Oak Tree Road	MO	65020	573-873-3898
SIGNATURE		EMAIL ADDRESS	
		jimjacksonjr@charter.net	

10. SUMMARY OF THE POLLUTANTS OF CONCERN AND EFFLUENT LIMITS

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). All POCs in this alternatives analysis were considered to be Tier 2 and significantly degrading in the absence of existing water quality.

As a result of this alternatives analysis review, the department has determined, depending on site specific conditions, there are treatment technologies available that may be economically efficient and practicable, which are capable of meeting the effluent limitations below. If the facility owners do not believe there is a treatment technology that is economically efficient, affordable, or practicable for their facility to meet these limits, a site-specific alternatives analysis will be required.

The chosen alternative must be capable of meeting the following effluent limitations:

EFFLUENT LIMITS – OUTFALLS TO LAKES

Pollutant of Concern*		Units	Daily Maximum	Weekly Average	Monthly Average
BOD_5		MG/L		15	10
TSS		MG/L		20	15
pH		SU	6.5– 9.0		6.5 – 9.0
Ammonia as N Summer		MG/L	3.6		1.4
Ammonia as N Winter		MG/L	7.5		2.9
Total Phosphorus****		MG/L	*		0.5
Escherichia coli (*E. coli*)		#/100ML	630***		126

EFFLUENT LIMITS – ALL OTHER OUTFALLS

BOD_5		mg/L		15	10
TSS		mg/L		15	10
pH		SU	6.5– 9.0		6.5 – 9.0
Ammonia as N Summer		mg/L	1.7		0.6
Ammonia as N Winter		mg/L	5.6		2.1
Total Phosphorus****		mg/L	*		0.5
Escherichia coli (*E. coli*)	WBC(A) AND WBC (B)	#/100 ML	630***		126
	Losing Stream**	#/100 ML	126***		Monitoring only

* Permit limits for other parameters, including oil and grease, total residual chlorine and nitrates, will be included in the operating permit based on applicable water quality standards and criteria.

Total residual chlorine (TRC) effluent limits of 0.017 mg/L daily maximum, 0.008 mg/L monthly average are recommended if chlorine is used as a disinfectant. Standard compliance language for TRC, including the minimum level (ML), may be included in the operating permit.

** For any facility that will discharge to a waterbody designated as a losing stream or within two miles flow distance upstream of a losing stream.

*** Publicly owned treatment works will receive a weekly average limit and private facilities will receive a daily maximum limit.

**** Total Phosphorus limits are only applicable to discharges to a lake or watershed of a lake that is a water of the state and has an area of at least 10 acres during normal pool conditions

If any Tier 1 Pollutants of Concern not addressed in this alternatives analysis will be discharged, the applicant must submit *Attachment D: Tier 1 Review* for those pollutants.

11. APPLICATION FEE	
☐ CHECK NUMBER	☐ JETPAY CONFIRMATION NUMBER

12. 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
	1-25-23
PRINT NAME: John Broker	TITLE: Partner

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