

**MISSOURI**  
DEPARTMENT OF  
NATURAL RESOURCES

Michael L. Parson  
Governor

Dru Buntin  
Director

January 12, 2023

Kristin Doran  
Doran Apartments, LLC  
529 Storm Cove Drive  
Linn Creek, MO 65052

RE: Cool Water Townhomes Wastewater Treatment Facility, Construction Permit No.  
CP0002334, Camden County

Dear Kristin Doran:

The Missouri Department of Natural Resources' Water Protection Program has reviewed the plans and specifications submitted by Lake Professional Services, Inc., for Doran Apartments, LLC. Please find enclosed Construction Permit No. CP0002334. Upon completing construction covered under this permit, submit a Statement of Work Completed form ([dnr.mo.gov/document-search/wastewater-construction-statement-work-completed-mo-780-2155](https://dnr.mo.gov/document-search/wastewater-construction-statement-work-completed-mo-780-2155)) to the Department in accordance with 10 CSR 20-6.010(5)(N), as well as a completed Form B ([dnr.mo.gov/document-search/form-b-application-operating-permit-facilities-receive-primarily-domestic-waste-have-design-flow-less-or-equal-100000-gallons-day-mo-780-1512](https://dnr.mo.gov/document-search/form-b-application-operating-permit-facilities-receive-primarily-domestic-waste-have-design-flow-less-or-equal-100000-gallons-day-mo-780-1512)) requesting to issue a new MOGD operating permit. The initial operating permit fee of **\$300** will need to be paid at that time.

This construction permit will expire 24 months from the date of issuance. In accordance with 10 CSR 20-6.010(5)(J), the Department may grant an extension. If you believe that an extension is necessary, you must submit a request and a justification in writing for the extension at least 30 days prior to the permit expiration date. Expired construction permits require submittal of a new application and fee.

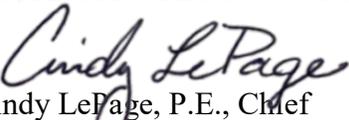
Nothing in this permit removes any obligations to comply with county or other local ordinances or restrictions.

If you have any questions concerning this matter, please contact Scott Adams, of the Water Protection Program, by phone at 573-751-9122 or by email at [scott.adams@dnr.mo.gov](mailto:scott.adams@dnr.mo.gov). You may also submit questions or comments in writing to the Department of Natural Resources, P.O. Box 176, Jefferson City, MO 65102.

Thank you for your efforts to help ensure clean water in Missouri.

Sincerely,

WATER PROTECTION PROGRAM

  
Cindy LePage, P.E., Chief  
Engineering Section

CL:saa

Enclosures

c: James O. Jackson, Jr., P.E., Lake Professional Services, Inc.



**STATE OF MISSOURI**  
**DEPARTMENT OF NATURAL RESOURCES**  
**MISSOURI CLEAN WATER COMMISSION**



**CONSTRUCTION PERMIT**

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

Kristin Doran  
Doran Apartments, LLC  
Cool Water Townhomes WWTF  
529 Storm Cove Drive  
Linn Creek, MO 65052

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.

January 12, 2023  
Effective Date

January 11, 2025  
Expiration Date

Chris Wieberg, Director, Water Protection Program

## **CONSTRUCTION PERMIT**

### **I. CONSTRUCTION DESCRIPTION**

Construction of an approximately 15,000-gallon septic tank (capable of holding at least 12,700 gallons), a Biomicrobics BioBarrier HSMBR 9.0 treatment system contained within an approximately 18,000-gallon concrete tank with filtrate pump, approximately 238 ft of 6-in PVC SDR-35 gravity pipe, and one manhole, to serve a design average flow of 7,700 gpd from a population equivalent of 104 persons.

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**

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, P.E., with Lake Professional Services, 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 Office per 10 CSR 20-7.015(9)(G).
5. The wastewater treatment facility shall be located at least fifty feet (50') from any dwelling or establishment per 10 CSR 20-8.140(2)(C)(2).
6. The wastewater facility structures, electrical equipment, and mechanical equipment shall be protected from physical damage by not less than the one hundred (100)-year flood elevation per 10 CSR 20-8.140(2)(B). The minimum distance between wastewater treatment facilities and all potable water sources shall be at least three hundred feet (300') per 10 CSR 20-8.140(2)(C)1.

7. 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.
8. 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.
9. All construction must adhere to applicable 10 CSR 20-8 requirements listed below:
  - Flood protection shall apply to new construction and to existing facilities undergoing major modification. The wastewater facility structures, electrical equipment, and mechanical equipment shall be protected from physical damage by not less than the one hundred (100)-year flood elevation. 10 CSR 20-8.140(2)(B)
  - Unless another distance is determined by the Missouri Geological Survey or by the department's Public Drinking Water Branch, the minimum distance between wastewater treatment facilities and all potable water sources shall be at least three hundred feet (300'). 10 CSR 20-8.140(2)(C)1.
  - No treatment unit with a capacity of twenty-two thousand five hundred gallons per day (22,500 gpd) or less shall be located closer than the minimum distance of 200' to a neighboring residence and 50' to property line for lagoons; 200' to a neighboring residence for open recirculating media filters following primary treatment; and 50' 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 twenty-four (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.
- For indirect connections, a sign shall be permanently posted at every hose bib, faucet, hydrant, or sill cock located on the water system beyond the break tank or backflow preventer to indicate that the water is not safe for drinking. 10 CSR 20-8.140(7)(D)3.B.
- A means of flow measurement shall be provided at all wastewater treatment facilities. 10 CSR 20-8.140(7)(E)
- Effluent twenty-four (24) hour composite automatic sampling equipment shall be provided at all mechanical wastewater treatment facilities and at other facilities where necessary under provisions of the operating permit. 10 CSR 20-8.140(7)(F)
- Adequate provisions shall be made to effectively protect facility personnel and visitors from hazards. The following shall be provided to fulfill the particular needs of each wastewater treatment facility:
  - In order to discourage the entrance of unauthorized persons and animals, the facility will include locking lids and locked panels in lieu of fencing. 10 CSR 20-8.140(8)(A)
  - First aid equipment; 10 CSR 20-8.140(8)(C)
  - Appropriate personal protective equipment (PPE); 10 CSR 20-8.140(8)(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 one thousand (1,000) gallons. 10 CSR 20-8.180(2)(A)
- The septic tank shall be baffled. 10 CSR 20-8.180(2)(B)
- Membrane Bioreactor design flux criteria must be satisfied with one (1) membrane module out-of-service (e.g., for external clean in place, recovery cleaning, repair). For purposes of these criteria, a membrane module is the smallest membrane unit capable of separate removal from the tank while maintaining operation of other membrane units in the same tank. 10 CSR 20-8.180(7)(A)2.

- Membranes placed in the aeration basin(s) rather than a separate membrane tank shall have—
  - Individual modules and individual diffusers that can be removed separately for maintenance and repair; 10 CSR 20-8.180(7)(A)3.A. and
  - Aeration basin(s) volume sized for complete nitrification; 10 CSR 20-8.180(7)(A)3.B.
- Membrane Bioreactor preliminary treatment systems shall be consistent with the membrane manufacturer recommendations; 10 CSR 20-8.180(7)(B)1.
- Grit removal facilities are required for wastewater treatment facilities that utilize membrane bioreactors for secondary treatment. The septic tank is being used for grit removal and screening. 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; and 10 CSR 20-8.180(7)(B)4.
- The Membrane Bioreactor's aeration blowers must provide adequate air for membrane scour and process demands. 10 CSR 20-8.180(7)(C)
- Redundancy. The Membrane Bioreactor shall have at least one (1) of the following:
  - The ability to run in full programmable logic control (PLC) or standby power mode in case of an automatic control failure; 10 CSR 20-8.180(7)(D)1.
  - An operational battery backup PLC if manual control is not possible; 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.
  - Provide on-line continuous turbidity monitoring of filtrate or an equivalent for operational control and indirect membrane integrity monitoring for a treatment plant with design average flow greater than or equal to one hundred thousand gallons per day (100,000 gpd); 10 CSR 20-8.180(7)(E)2. and
  - Include provisions to remove membrane cassette for cleaning considering the membrane cassette wet weight plus additional weight of the solids accumulated on the membranes. 10 CSR 20-8.180(7)(E)3.

10. Upon completion of construction:

- A. Doran Apartments, LLC, will become the continuing authority for operation and maintenance of these facilities;
- B. Submit an electronic copy of the as-built plans if the project was not constructed in accordance with previously submitted plans and specifications; and

- C. Submit the enclosed form Statement of Work Completed to the Department in accordance with 10 CSR 20-6.010(5)(N) and submit a Form B - Application for an Operating Permit for Domestic or Municipal Wastewater ( $\leq 100,000$  gallons per day) and \$300 fee to the Engineering Section of the Water Protection Program 60 days prior to operation. Identify that the application is for an MO-GD General permit for a non-publically owned treatment works (POTW) discharging  $\leq 50,000$  gpd.

#### **IV. REVIEW SUMMARY**

##### **1. CONSTRUCTION PURPOSE**

This treatment facility is to serve a new subdivision development consisting of seven buildings, each with four units (a total of 28 residential units).

##### **2. FACILITY DESCRIPTION**

This new facility will consist of a pretreatment septic tank (~ 15,000-gallon tank, capable of holding at least 12,700 gallons of wastewater to the design water elevation), a membrane bioreactor (Biomicrobics BioBarrier HSMBR 9.0 treatment system or equivalent (MBR)) contained within an approximately 18,000-gallon concrete tank with filtrate pump. A sampling port will follow the MBR filtrate pump, prior to the outfall.

The collection system will include approximately 238 ft of 6-in PVC SDR-35 gravity pipe between the one upstream manhole and the septic tank.

The Cool Water Townhomes WWTF is located east of Crystal Spring Rd, in Linn Creek, Camden County, Missouri. The facility has a design average flow of 7,700 gpd and serves a hydraulic population equivalent of approximately 104 people.

##### **3. COMPLIANCE PARAMETERS**

Upon completion of construction, the effluent discharge from this facility will be required to meet the applicable requirements of the issued MOGD general operating permit, currently Table F of the MOGD with an expiration date of June 30, 2024.

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

Parameter	Units	Monthly average limit
Biochemical Oxygen Demands	mg/L	10
Total Suspended Solids	mg/L	10
Ammonia as N-summer	mg/L	0.6
Ammonia as N-winter	mg/L	2.1
pH	SU	6.5-9.0
Total Residual Chlorine	$\mu\text{g/L}$	8 (130 ML)
<i>E. coli</i>	#/100mL	126 (daily max)

#### 4. ANTIDegradation

The Department has reviewed the antidegradation report for this facility and issued the Water Quality and Antidegradation Review dated August 1, 2022, due to a new discharge. See APPENDIX – ANTIDegradation.

#### 5. REVIEW of MAJOR TREATMENT DESIGN CRITERIA

**Construction will cover the following items:**

- 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 by gravity to the 12,700-gallon, two-compartment septic tank. When the water level reaches a certain height, the wastewater flows into the second compartment by two tee-drop pipes. Each septic tank compartment is 10 ft x 10 ft x 10 ft with a water level depth of 8½ ft. The septic tanks provide approximately 1.6 days of detention at design average flow. Settled solids in the septic tank shall be removed by a contract hauler.
- Membrane Bioreactor (MBR) — The MBR system is the BioMicrobics BioBarrier HSMBR 9.0 or approved equal, contained within an 18,000-gallon concrete tank. The system is capable of treating up to 9,000 gpd of wastewater.
  - The membrane is a flat sheet membrane using ultrafiltration (0.03 µm pore size).
  - The design flux rate through the membranes is 4.56 gpd/ft<sup>2</sup> (7.74 lmh) at peak flow with a maximum operating flux of 8.84 gpd/ft<sup>2</sup> (15 lmh). The minimum filtration rate is listed as 11.1 gpm. The filtration rate through the membranes at average design flow is 5.73 gpm.
  - Total membrane surface area is 168 m<sup>2</sup> (154 m<sup>2</sup> with one cartridge stack removed).
  - At peak hourly flow, the tank will hold approximately two to three hours of flow above the design maximum water level.
  - The filtrate pump is a Goulds J10S, with VFD, to provide a vacuum of 4-in Hg at a design rate of 12 gpm.
  - The minimum design SRT is 30 days
  - The maximum MLSS is 10,000 mg/L
  - The maximum F/M ratio at design flow 0.15
  - Total air supplied through the membrane is 180 scfm which is greater than the required 58.9 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.
- Outfall – The outfall consists of a 4-in PVC discharge pipe, with a v-notch weir in a sample chamber. A drop of approximately 6 in allows for discrete effluent samples.
- Flow Measurement – Installation of accurate flow measurement devices will give the treatment facility a means of improved data analysis.

- Volumetric Weir – The volumetric weir is a compound weir that incorporates a 90° V-notch for measuring flows from 57 to 3700 gpd, as well as a rectangular section of the weir capable of measuring up to 35% of pipe capacity (~ 280 gpm; or 16,800 gph). This measurement device does not include flow totalizing or recording.
- Emergency Power – The owner proposes to rent a portable generator, as needed for emergency power. The engineer stated that a 7.5 hp motor is needed and that the BioBarrier control panel and alarm have a battery backup.

## **6. OPERATING PERMIT**

After completion of construction project submit:

- statement of work completed,
- as-built plans if the project was not constructed in accordance with previously submitted plans and specifications,
- application Form B, and
- initial operating permit fee.

A Missouri State Operating Permit, General Permit MO-GD, will be issued after receipt of the above documents.

## **V. NOTICE OF RIGHT TO APPEAL**

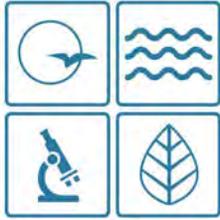
If you were adversely affected by this decision, you may be entitled to an appeal before the Administrative Hearing Commission (AHC) pursuant to Section 621.250 RSMo. To appeal, you must file a petition with the AHC within 30 days after the date this decision was mailed or the date it was delivered, 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>

Scott Adams, P.E.  
Engineering Section  
scott.adams@dnr.mo.gov

## **APPENDIX**

- **Water Quality and Antidegradation Review Report**



**MISSOURI**  
DEPARTMENT OF  
NATURAL RESOURCES

Michael L. Parson  
Governor

Dru Buntin  
Director

August 1, 2022

Kristin Doran  
Owner  
Cool Water Townhomes  
529 Storm Cove Drive  
Linn Creek, MO 65052

RE: Membrane Bioreactor Construction – Cool Water Townhomes Wastewater Treatment Facility, MO-NEW, Water Quality and Antidegradation Review Preliminary Determination, ACT1240, Camden County

Dear Representative:

Enclosed please find the finalized Water Quality and Antidegradation Review (WQAR) for the *Antidegradation Report for Coolwater Townhomes Wastewater Treatment Plant* received on July 19, 2022. The WQAR contains pertinent antidegradation review information for the facility discharge. It was developed in accordance with 10 CSR 20-7.031, the Clean Water Commission approved *Missouri Antidegradation Implementation Procedure (AIP)* dated July 13, 2016, U.S. Environmental Protection Agency (US EPA) guidance, the applicant-supplied antidegradation review documentation, and the State of Missouri's effluent regulations (10 CSR 20-7.015). Please refer to the *General Assumptions of the Water Quality and Antidegradation Review* section of the enclosed WQAR. The WQAR is preliminary and subject to change as new information becomes available during future permit application processing.

Based on the Missouri Department of Natural Resources' (department's) initial review, preliminary determination is that the applicant-supplied antidegradation review documentation satisfies the requirements of the AIP. This WQAR/preliminary determination may be appealed within 30 days of this letter in accordance with the AIP Section II.F.4.

The WQAR identifies a specific treatment technology for the preferred alternative; however, you may pursue construction of a different alternative evaluated during the review that will meet the effluent limits established in the WQAR.

You may proceed with submittal of an engineering report/facility plan for this project. Upon completion of that review the next step will be to submit a complete application for a construction permit. An operating permit application will also be required 180 days prior to expected discharge. These submittals must reflect the design flow, facility description, and general treatment components of this WQAR or this preliminary determination may have to be revisited. In addition to one set of paper copies, all materials are to be submitted electronically as well. This is typically done via compact disc or other removable electronic media. If space allows materials may be emailed to [DNR.WPPEngineeringSection@dnr.mo.gov](mailto:DNR.WPPEngineeringSection@dnr.mo.gov).

Following the department's public notice of a draft Missouri State Operating Permit including the antidegradation review findings and preliminary determination, the department will review any public notice comments received. If significant comments are made, the project may require another public notice and potentially another antidegradation review. If no comments are received or comments are resolved without another public notice, these findings and determinations will be considered final.

Following issuance of the construction permit and completion of the actual facility construction, the department will proceed with the issuance of the operating permit.

If you should have questions regarding the enclosed WQAR, please contact Thomas Silkwood by phone at 573-751-7466; by email at [thomas.silkwood@dnr.mo.gov](mailto:thomas.silkwood@dnr.mo.gov); or by mail at the Missouri Department of Natural Resources, Water Protection Program, P.O. Box 176, Jefferson City, Missouri 65102-0176.

Sincerely,

WATER PROTECTION PROGRAM



Cindy LePage, P.E., Chief  
Engineering Section

CL:tst

c: James O. Jackson Jr., P.E., Lake Professional Engineering Services, Inc.

**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*

*Cool Water Townhomes WWTF*

August, 2022



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### 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 <sub>5</sub> )/DO	2	Significant	
Total Suspended Solids (TSS)	**	Significant	
Ammonia	2	Significant	
pH	***	Significant	Permit limits applied
<i>Escherichia coli</i> ( <i>E. coli</i> )	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.

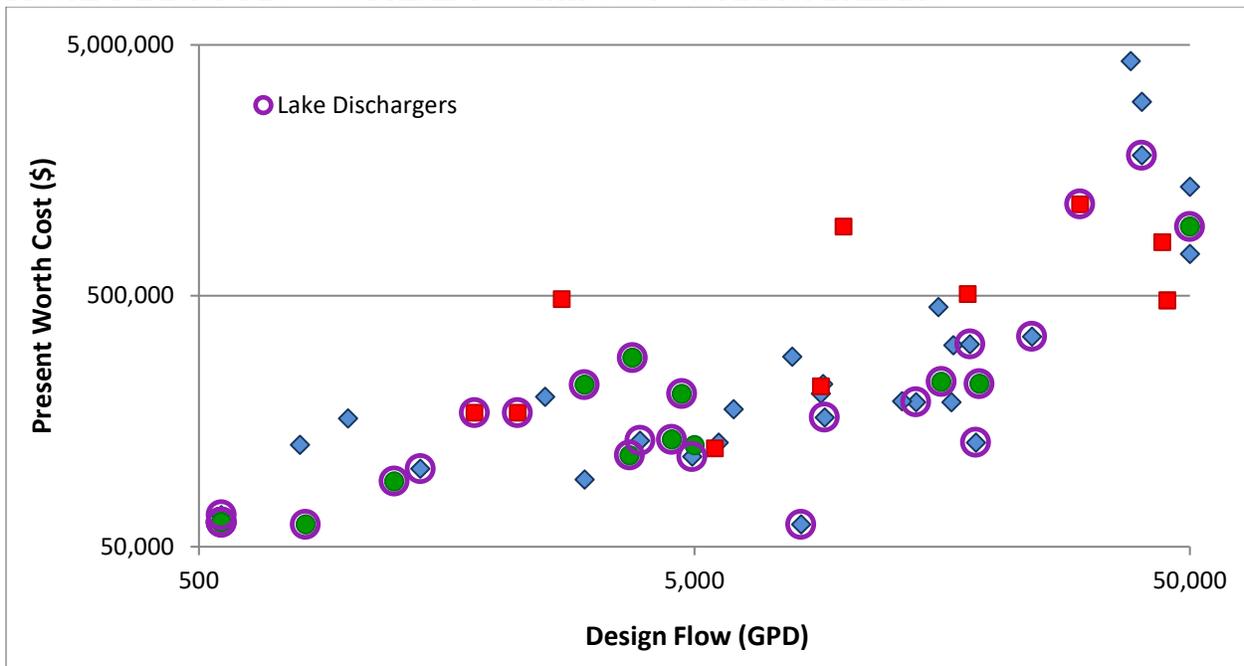
Recirculating sand filters (RSF) remove contaminants in wastewater through physical, chemical, and, most importantly, biological processes. The three common components are a pretreatment unit (generally a septic tank), a recirculation tank, and a sand filter. In the recirculation tank, raw effluent from 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% 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 denitrification and they must be properly and actively operated.

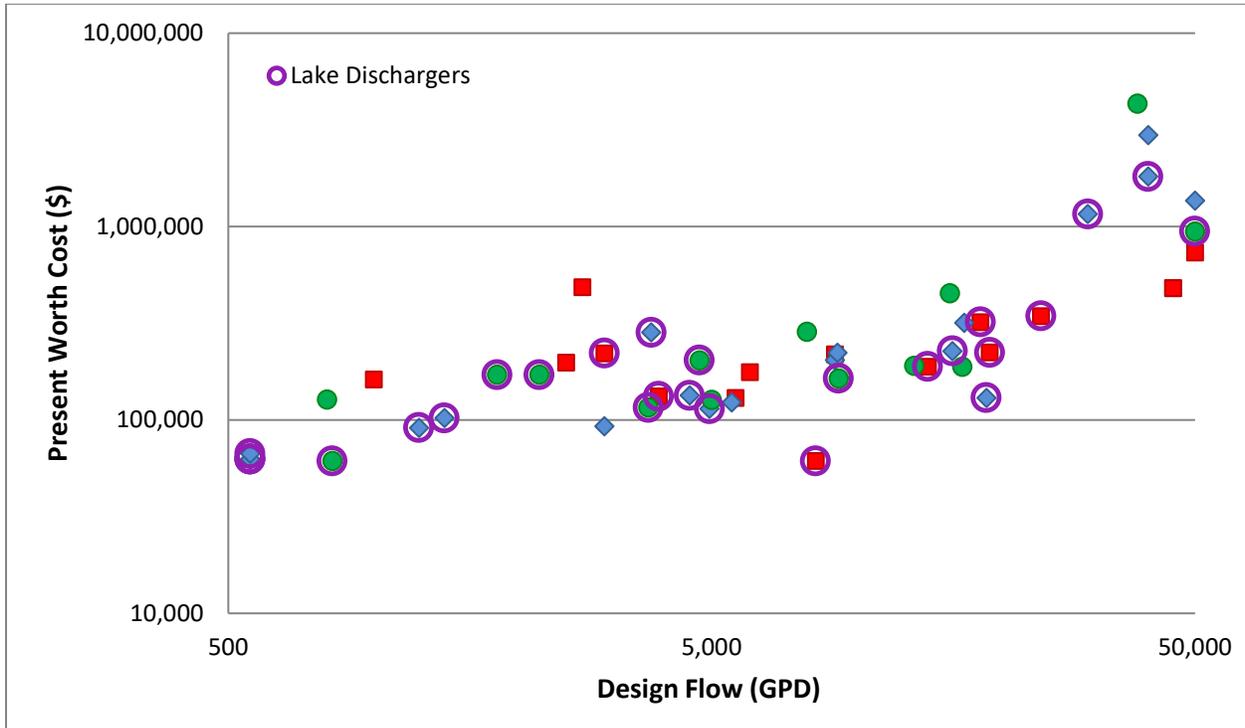
The above treatment system descriptions were adapted from EPA technology fact sheets and *Design of Municipal Wastewater Treatment Plants: WEF Manual of Practice No. 8 ASCE Manuals and Reports on Engineering Practice No. 76; Fifth Edition*, as well as other readily available sources and previous Water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

As a result of this alternatives analysis, the Department has determined that for a facility that discharges less than 50,000 gallons per day, 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 gallons per day were evaluated. A design flow maximum of 50,000 gallons per day 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 ALTERNATIVE**

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 ALTERNATIVE 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 <sub>5</sub> **	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
<i>ESCHERICHIA COLIFORM (E. COLI)</i>	WBC(A) AND WBC (B) (NOTE 3)	#/100ML	630***		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 <sub>5</sub> **	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
<i>ESCHERICHIA COLIFORM (E. COLI)</i>	#/100ML	630***		126	FSR	ONCE/QUARTER

\* Monitoring requirements only.

\*\* Publicly owned treatment works will be required to meet a removal efficiency of 85% or more for BOD<sub>5</sub> and TSS. Influent BOD<sub>5</sub> 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 10% 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:

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

Where C = downstream concentration  
C<sub>s</sub> = upstream concentration  
Q<sub>s</sub> = upstream flow  
C<sub>e</sub> = effluent concentration  
Q<sub>e</sub> = 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<sub>5</sub> 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<sub>5</sub> 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<sub>5</sub>).** BOD<sub>5</sub> 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 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. 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 15 mg/L monthly average and 20 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:  $C_e = ((Q_e + 0.0)1.5 - (0.0 * 0.01)) / Q_e = 1.5 \text{ mg/L}$

Acute WLA:  $C_e = ((Q_e + 0.0)12.1 - (0.0 * 0.01)) / Q_e = 12.1 \text{ mg/L}$

$LTA_c = 1.5 \text{ mg/L} (0.780) = \mathbf{1.17 \text{ mg/L}}$  [CV = 0.6, 99<sup>th</sup> Percentile, 30 day avg.]

$$LTA_a = 12.1 \text{ mg/L } (0.321) = 3.89 \text{ mg/L} \quad [CV = 0.6, 99^{\text{th}} \text{ Percentile}]$$

$$MDL = 1.17 \text{ mg/L } (3.11) = 3.6 \text{ mg/L} \quad [CV = 0.6, 99^{\text{th}} \text{ Percentile}]$$

$$AML = 1.17 \text{ mg/L } (1.19) = 1.4 \text{ mg/L} \quad [CV = 0.6, 95^{\text{th}} \text{ Percentile, } n = 30]$$

Winter: October 1 – March 31

Chronic WLA:  $C_e = ((Q_e + 0.0)3.1 - (0.0 * 0.01))/Q_e = 3.1 \text{ mg/L}$

Acute WLA:  $C_e = ((Q_e + 0.0)12.1 - (0.0025 * 0.01))/Q_e = 12.1 \text{ mg/L}$

$$LTA_c = 3.1 \text{ mg/L } (0.780) = \mathbf{2.42 \text{ mg/L}} \quad [CV = 0.6, 99^{\text{th}} \text{ Percentile, 30 day avg.}]$$

$$LTA_a = 12.1 \text{ mg/L } (0.321) = 3.89 \text{ mg/L} \quad [CV = 0.6, 99^{\text{th}} \text{ Percentile}]$$

$$MDL = 2.42 \text{ mg/L } (3.11) = 7.5 \text{ mg/L} \quad [CV = 0.6, 99^{\text{th}} \text{ Percentile}]$$

$$AML = 2.42 \text{ mg/L } (1.19) = 2.9 \text{ mg/L} \quad [CV = 0.6, 95^{\text{th}} \text{ Percentile, } n = 30]$$

	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:  $C_e = ((Q_e + 0)12.1 - (0 * 0.01))/Q_e$

$$C_e = 12.1 \text{ mg/L}$$

$$LTA_a = 12.1 \text{ mg/L } (0.321) = \mathbf{3.88 \text{ mg/L}} \quad [CV = 0.6, 99^{\text{th}} \text{ Percentile}]$$

$$MDL = 3.88 \text{ mg/L } (3.11) = 12.1 \text{ mg/L} \quad [CV = 0.6, 99^{\text{th}} \text{ Percentile}]$$

$$AML = 3.88 \text{ mg/L } (1.19) = 4.6 \text{ mg/L} \quad [CV = 0.6, 95^{\text{th}} \text{ Percentile, } n = 30]$$

	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 10% 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:  $C_e = ((Q_e + 0.0)10 - (0.0 * 0.0)) / Q_e = 10 \mu\text{g/L}$

Acute WLA:  $C_e = ((Q_e + 0.0)19 - (0.0 * 0.0)) / Q_e = 19 \mu\text{g/L}$

$LTA_c = 10 \mu\text{g/L} (0.527) = 5.3 \mu\text{g/L}$  [CV = 0.6, 99<sup>th</sup> Percentile]

$LTA_a = 19 \mu\text{g/L} (0.321) = 6.1 \mu\text{g/L}$  [CV = 0.6, 99<sup>th</sup> Percentile]

$MDL = 5.3 \mu\text{g/L} (3.11) = 16.5 \mu\text{g/L}$  [CV = 0.6, 99<sup>th</sup> Percentile]

$AML = 5.3 \mu\text{g/L} (1.55) = 8.2 \mu\text{g/L}$  [CV = 0.6, 95<sup>th</sup> 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**

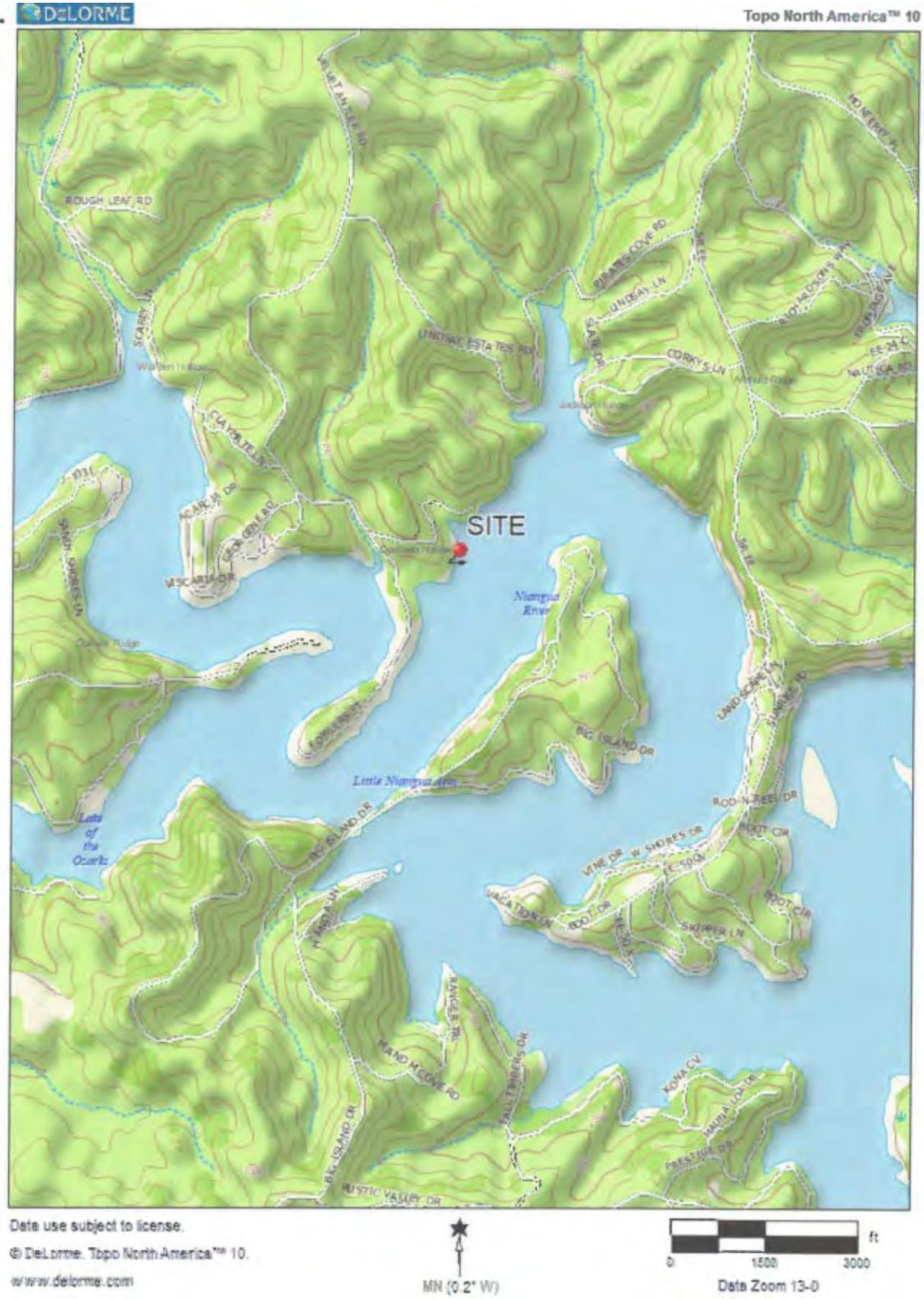
The proposed new or expanded facility discharge is assumed to result in significant degradation of the receiving waterbody. The Department has used available data to complete a review of available treatment technologies and expected performance. As a result of this review, the Department has determined 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**



Michael L. Parson  
Governor

Dru Buntin  
Director

LWE22089  
Camden County

May 23, 2022

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

**RE: Y Road Apartments**

Dear Jim Jackson, Jr.:

On April 04, 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 [gspg@dnr.mo.gov](mailto:gspg@dnr.mo.gov).

Sincerely,

MISSOURI GEOLOGICAL SURVEY

A handwritten signature in blue ink that reads "John Corley".

John Corley  
Geologist  
Environmental Geology Section

c: Kristin Doran  
WPP  
Southwest Regional Office



05/23/2022

	<b>Missouri Department Of Natural Resources</b> Missouri Geological Survey Geological Survey Program Environmental Geology Section	Project ID Number <b>LWE22089</b> County <b>Camden County</b>	
<b>Request Details</b>			
Project: Y Road Apartments  <b>Organization Official</b> Name: Kristin Doran Address: 529 Storm Cove Dr City: Linn Creek State: MO Zip: 65052 Phone: 573-434-6948 Email: kristindoran@gmail.com	Legal Description: 30 T39N R16W Quadrangle: CAMDENTON Latitude: 38 5 6.41 Longitude: -92 43 25.71  <b>Preparer</b> Name: Jim Jackson, Jr. Address: 83 Oak Tree Rd City: Camdenton State: MO Zip: 65020 Phone: 573-873-3898 Email: jimjacksonjr@charter.net		
<b>Project Details</b>			
Report Date: 05/23/2022 Date of Field Visit: 04/06/2022	Previous Reports: LWE08064		
<b>Facility Type</b> <input checked="" type="checkbox"/> Mechanical treatment plant  <input type="checkbox"/> Recirculating filter bed  <input type="checkbox"/> Land application  <input type="checkbox"/> Lagoon or storage basin  <input type="checkbox"/> Subsurface soil absorption system  <input type="checkbox"/> Lagoon or storage basin W/Land App  <input type="checkbox"/> Lagoon or storage basin W/SSAS  <input type="checkbox"/> Other type of facility	<b>Type of Waste</b> <input type="checkbox"/> Animal  <input checked="" type="checkbox"/> Human  <input type="checkbox"/> Process or industrial  <input type="checkbox"/> Leachate  <input type="checkbox"/> Other waste type	<b>Funding Source</b> <input checked="" type="checkbox"/> IWT  <input type="checkbox"/> WWL-SRF  <b>Additional Information</b> <input type="checkbox"/> Plans were submitted  <input type="checkbox"/> Site was investigated by NRCS  <input type="checkbox"/> Soil or geotechnical data were submitted	
<b>Geologic Stream Classification:</b> <input type="checkbox"/> Gaining <input checked="" type="checkbox"/> Losing <input type="checkbox"/> No discharge			
<b>Overall Geologic Limitations</b> <input type="checkbox"/> Slight  <input type="checkbox"/> Moderate  <input checked="" type="checkbox"/> Severe	<b>Collapse Potential</b> <input checked="" type="checkbox"/> Not applicable  <input type="checkbox"/> Slight  <input type="checkbox"/> Moderate  <input type="checkbox"/> Severe	<b>Topography</b> <input checked="" type="checkbox"/> <4%  <input checked="" type="checkbox"/> 4% to 8%  <input checked="" type="checkbox"/> 8% to 15%  <input checked="" type="checkbox"/> >15%	<b>Landscape Position</b> <input type="checkbox"/> Broad uplands <input type="checkbox"/> Floodplain <input checked="" type="checkbox"/> Ridgetop <input type="checkbox"/> Alluvial plain <input checked="" type="checkbox"/> Hillslope <input type="checkbox"/> Terrace <input checked="" type="checkbox"/> Narrow ravine <input type="checkbox"/> Sinkhole
<b>Bedrock:</b> Bedrock consists of highly permeable Ordovician-age Roubidoux Formation and Gasconade Dolomite.			
<b>Surficial Materials:</b> Surficial materials consist of moderate to highly permeable gravelly and silty residuum.			

 <b>Missouri Department Of Natural Resources</b> Missouri Geological Survey Geological Survey Program Environmental Geology Section		Project ID Number <b>LWE22089</b> County <b>Camden County</b>
<b>Recommended Construction Procedures for Earthen Facility</b> <input type="checkbox"/> Installation of clay pad and Compaction <input type="checkbox"/> Diversion of subsurface flow <input type="checkbox"/> Artificial sealing <input type="checkbox"/> Rock excavation <input type="checkbox"/> Limit excavation depth	<b>Determine Overburden Properties</b> <input type="checkbox"/> Particle size analysis <input type="checkbox"/> Atterberg limits <input type="checkbox"/> 95% Max. dry density test method <input type="checkbox"/> Overburden thickness <input type="checkbox"/> Permeability coefficient-undisturbed <input type="checkbox"/> Permeability coefficient-remolded	<b>Determine Hydrologic Conditions</b> <input type="checkbox"/> Groundwater elevation <input type="checkbox"/> Direction of groundwater flow <input type="checkbox"/> 25-Year flood level <input type="checkbox"/> 100-Year flood level

**Remarks:**

On April 6, 2022, two geologists with the Geological Survey Program (GSP) performed a geohydrologic evaluation for a proposed mechanical treatment plant that will serve the proposed Y Road Apartments, located approximately 5.4 miles north-northeast of Camdenton, Missouri. The property is situated on a ridgetop with steep east-facing hillslopes and ravines. The purpose of the site visit was to observe the geologic and hydrologic elements and determine the potential for groundwater contamination in the event of wastewater treatment failure.

No bedrock was observed on site, but previous mapping indicates that bedrock in this area consists of highly permeable Ordovician-age Roubidoux Formation on the ridgetops, with the highly permeable Ordovician-age Gasconade Dolomite underlying the Roubidoux formation. Surficial materials at the site consists of silt and clay residuum with abundant chert gravels and cobbles. According to logs of nearby wells, the surficial material thickness is expected to be less than 30 feet.

Surface water flow is to the east towards an unnamed tributary of Lake of the Ozarks. This tributary has been previously classified as losing, and was confirmed as losing during the site evaluation. This site is approximately 0.75 miles upstream from the lake. In the event of wastewater treatment failure, shallow and local groundwater resources may be adversely affected. Due to the losing conditions of the receiving stream, the site receives a severe geologic limitations rating.

## APPENDIX C: NATURAL HERITAGE REVIEW



### Missouri Department of Conservation

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

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

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

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

#### **PROJECT INFORMATION**

**Project Name and ID Number:** Y-Road Apartments #11127

**Project Description:** Residential apartment buildings. Camden County

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

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

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

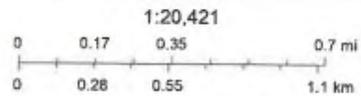
**Transportation Projects:** If the project involves the use of Federal Highway Administration transportation funds, these recommendations may not fulfill all contract requirements. Please contact the Missouri Department of Transportation at 573-526-4778 or visit <https://www.mdot.com/> for additional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

### Y-Road Apartments



July 4, 2022

-  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](mailto: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:**

Your project is near a designated Natural Area. Please contact Missouri Department of Conservation ([NaturalHeritageReview@mdc.mo.gov](mailto:NaturalHeritageReview@mdc.mo.gov)) for further coordination.

**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 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*. Management Recommendations for Construction Projects Affecting Missouri Rivers and Streams is available at <https://mdc.mo.gov/sites/default/files/2020-06/Streams.pdf>

**Project Location and/or Species Recommendations:**

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

The project location submitted and evaluated is within the geographic range of nesting Bald Eagles in Missouri. Bald Eagles (*Haliaeetus leucocephalus*) may nest near streams or water bodies in the project area. Nests are large and fairly easy to identify. Adults begin nesting activity in late December and January and young birds leave the nest in late spring to early summer. While no longer listed as endangered, eagles continue to be protected by the federal government under the Bald and Golden Eagle Protection Act. Work managers should be alert for nesting areas within 1500 meters of project activities, and follow federal guidelines at: [Do I need an eagle take permit? | U.S. Fish & Wildlife Service \(fws.gov\)](#) if eagle nests are seen.

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

**Invasive exotic species** are a significant issue for fish, wildlife and agriculture in Missouri. Seeds, eggs, and larvae may be moved to new sites on boats or construction equipment. Please inspect and clean equipment thoroughly before moving between project sites. See

<https://mdc.mo.gov/community-conservation/managing-invasive-species-your-community> for more information.

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

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

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

Email (preferred): [NaturalHeritageReview@mdc.mo.gov](mailto: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 [Missouri Fish and Wildlife Information System \(MOFWIS\)](#). 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:

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

 <b>MISSOURI DEPARTMENT OF NATURAL RESOURCES</b> WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH <b>ANTIDegradation REVIEW SUBMITTAL</b> <b>VOLUNTARY TIER 2 – SIGNIFICANT DEGRADATION FOR DOMESTIC WASTEWATER FACILITIES WITH DESIGN FLOW LESS THAN 50,000 GALLONS PER DAY</b>		<b>FOR DEPARTMENT USE ONLY</b> APP NO. CHECK NO.      CHECK NO. DATE RECEIVED	
<b>1. APPLICABILITY</b> 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 <i>not</i> 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 <i>E. coli</i> 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)?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
1.2	Is the receiving waterbody or downstream waterbody 303(d) or 305(b) listed as impaired or potentially impaired?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
1.3	Is the facility currently under enforcement with the department or the U.S. Environmental Protection Agency?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
1.4	Is the design flow 50,000 gallons per day or more?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
1.5	Is a non-discharging system a viable option?	<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No
Submit the following with this form: <input type="checkbox"/> Regionalization and No Discharge Evaluation Form – Available on the department's website <input type="checkbox"/> Copy of the Geohydrologic Evaluation – Submit request through the Missouri Geological Survey website <input type="checkbox"/> Copy of the Missouri Natural Heritage Review from the Missouri Department of Conservation website			
<b>2. FACILITY</b>			
NAME Cool Water Townhomes		COUNTY Camden	
ADDRESS Chrystal Spring Road	CITY Linn Creek	STATE MO	ZIP CODE 65052
<b>3. OWNER</b>			
NAME Kristin Doran			
ADDRESS 529 Storm Cove Drive	CITY Linn Creek	STATE MO	ZIP CODE 65052
EMAIL ADDRESS kristindoran@gmail.com		TELEPHONE NUMBER WITH AREA CODE 573-434-6948	
<b>4. CONTINUING AUTHORITY</b> The regulatory requirement regarding continuing authority is found in 10 CSR 20-6.010(2).			
NAME Doran Apartments, LLC		SECURITY DEPOSIT COMMITMENT LC001506103	
ADDRESS 529 Storm Cove Drive	CITY Linn Creek	STATE MO	ZIP CODE 65052
EMAIL ADDRESS kristindoran@gmail.com		TELEPHONE NUMBER WITH AREA CODE 573-434-6948	

<b>5. RECEIVING WATER BODY SEGMENT #1</b>	
NAME Unnamed Tributary to Lake of the Ozarks	
5.1 Upper end of segment – Location of discharge UTM: X= _____ Y= _____ OR Lat <u>N38d 05' 06.12"</u> , Long <u>W092d 43' 26.28"</u>	
5.2 Lower end of segment – UTM: X= _____ Y= _____ OR Lat <u>N38d 05' 18.20"</u> , Long <u>W092d 42' 48.50"</u> 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."	
<b>6. WATER BODY SEGMENT #2 (If Necessary)</b>	
NAME Lake of the Ozarks	
6.1 Upper end of segment – End of Segment #1 UTM: X= _____ Y= _____ OR Lat <u>N38d 05' 18.20"</u> , Long <u>W092d 42' 48.50"</u>	
6.2 Lower end of segment – UTM: X= _____ Y= _____ OR Lat <u>N38d 05' 54.52"</u> , Long <u>W092d 42' 39.31"</u>	
<b>7. SOCIAL AND ECONOMIC IMPORTANCE OF THE PREFERRED ALTERNATIVE</b>	
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.")  The site for the proposed treatment plant is located on Chrystal Springs Road, Linn Creek, Missouri. The town home development is located approximately 2.5 miles from the city limits of Linn Creek. The area is primarily an undeveloped wooded area. The addition of the wastewater treatment plant would prevent the possibility of unmonitored septic drain fields from entering the Lake of the Ozarks. 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 affected 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 developments associated with the project:	
Will the proposed discharging activity:	
Create or expand employment?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know <input type="checkbox"/> NA
Increase median family income?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know <input type="checkbox"/> NA
Reduce the number of households below the poverty line?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> Don't know <input type="checkbox"/> NA
Increase the community tax base?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know <input type="checkbox"/> NA
Increase needed housing supply?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Don't know <input type="checkbox"/> NA
Provide necessary public services (e.g., school, infrastructure, fire department, etc.)?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Don't know <input type="checkbox"/> NA
Correct a public health, safety, or environmental problem?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Don't know <input type="checkbox"/> NA
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 James Jackson, Jr., PE		COMPANY NAME Lake Professional Engineering Services, Inc.	
B3 Oak Tr... ..		STATE MO	TELEPHONE NUMBER WITH AREA CODE 573-873-3898
		ZIP CODE 65020	EMAIL ADDRESS jjmacksonjr@charter.net

10. SUMMARY OF THE POLLUTANTS OF CONCERN AND EFFLUENT LIMITS				
<p>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.</p> <p>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.</p>				
<p>The chosen alternative must be capable of meeting the following effluent limitations:</p>				
EFFLUENT LIMITS— OUTFALLS TO LAKES				
Pollutant of Concern*	Units	Daily Maximum	Weekly Average	Monthly Average
BOD <sub>5</sub>	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
<i>Escherichia coli</i> ( <i>E. coli</i> )	#/100ML		630***	126
EFFLUENT LIMITS— ALL OTHER OUTFALLS				
BOD <sub>5</sub>	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
<i>Escherichia coli</i> ( <i>E. coli</i> )	WBC(A) AND WBC (B)	#/100 mL	630***	126
	Losing Stream**	#/100 ML	126***	Monitoring only
<p>* 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.</p> <p>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.</p> <p>** 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.</p> <p>*** Publicly owned treatment works will receive a weekly average limit and private facilities will receive a daily maximum limit.</p> <p>**** 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.</p> <p>† 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.</p>				

<b>11. APPLICATION FEE</b>	
<input checked="" type="checkbox"/> CHECK NUMBER	<input type="checkbox"/> JETPAY CONFIRMATION NUMBER
<b>12. SIGNATURE</b>	
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 7-6-2022
PRINT NAME Kristin Doran	TITLE Owner
PLEASE IDENTIFY YOUR STATUS FOR THIS PROJECT: <input checked="" type="checkbox"/> OWNER <input checked="" type="checkbox"/> CONTINUING AUTHORITY <input type="checkbox"/> CONSULTANT	

2) Antidegradation: Regionalization and No-Discharge Evaluation:



MISSOURI DEPARTMENT OF NATURAL RESOURCES  
 WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH  
**ANTIDEGRADATION: REGIONALIZATION AND NO-DISCHARGE EVALUATION**

**REGIONALIZATION AND NO-DISCHARGE 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.

Please refer to the *No-Discharge Alternative Evaluation* fact sheet for examples of information to provide to justify common reasons for not pursuing regionalization or no-discharge land application. If sufficient information is not provided on this form to demonstrate that these alternatives are not feasible, a more detailed evaluation of no-discharge options may have to be submitted.

Additional pages may be attached if more room is needed.

**1. FACILITY:**

NAME	COUNTY
Cool Water Townhomes	Camden

**2. EVALUATION OF REGIONALIZATION (Complete all applicable reasons why regionalization was not pursued)**

**2.1 Regionalization Feasibility:**

- A. What is the distance to connect to the closest municipality's line or other facility's line? 2.5 Miles
- B. List facilities contacted about possible regionalization. None
- C. Is there any planning or zoning in the area regarding development and services? Yes
- D. Who would have the responsibility to maintain the sewer connection line? Owner of the Townhome Complex
- E. What is the estimated cost for piping and pumps to regionalize? \$750,000
- F. Explain any engineering challenges with the regionalization connection – topography, rivers, highways, or other issues.  
Very undulating terrain. The sewage lines will remain privately owned and have to have easements from 25 private property owners
- G. Does a regional facility have the capacity to treat the additional effluent from this project? Yes
- H. Were land owners contacted for rights to an easement?  Yes  No
- I. Describe the easement issues:  
Easements from 25 different property owners would have to be obtained. Missouri State Highway Y will have to be crossed.

**2.2 Summarize why regionalization was not a practicable or economically efficient alternative**

The City of Linn Creek does not accept ownership of pressure sewer lines. Therefore the sewer lines will remain privately owned. Because of this, the sewer lines cannot be located in the right of way of Missouri State Highway Y. Twenty-five property owners would have to give easement permission for the sewer line to reach the existing sewer line of Linn Creek. If any one of these property owners said no, then the project would not move forward. Also, Missouri State Highway Y will have to be crossed. In addition, it would cost approximately \$660,000 just to lay the lines to reach the force main. This does not include the cost of any lift stations and pumps.

**3. EVALUATION OF NO-DISCHARGE LAND APPLICATION**

Check all applicable reasons why no-discharge land application was not pursued.

**3.1 Land Availability and Cost:**

- A. Is land available for land application?  Yes  No  
 If not, explain: The available area is very steep and not suitable for land application  
 If yes, answer the following:
- B. How many acres are required for land application of the effluent? Approximately 3 acres.
- C. Provide a breakdown of the capital cost for any necessary additional land, piping, pumps, and irrigation equipment?
- D. Were long-term costs evaluated and compared for upgrading to a mechanical plant with future Water Quality Standards changes (i.e. mussel ammonia, bacteria, TP, TN) versus cost for a land application system?  yes  No
- E. Were land owners contacted for rights to an easement?  yes  No
- F. Describe the easement issues:

**3.2 Zoning or Suitability of Site in Proximity to Neighboring Sites or Waterbodies:**

- A. Was drip or subsurface irrigation evaluated as opposed to surface application?  Yes  No
- B. Does the county ordinance specifically restrict land application, surface and subsurface?  Yes  No
- C. Can a vegetated buffer be installed to reduce necessary buffer distances?  Yes  No
- D. Are there other steps or considerations that can be made?

**3.3 Unsuitability of Geology or Soils**

- A. Is a geohydrologic evaluation, county soils survey map, or other resource showing suitability and application rates included with this application?  Yes  No
- B. Is it cost-effective to bring in additional soils?  Yes  No
- C. Can the application rate be decreased to a suitable rate?  Yes  No
- D. Were subsurface application alternatives (e.g. low pressure pipe, drip) considered?  Yes  No
- E. If collapse potential is a concern, was using a liner or alternative site evaluated?  Yes  No

**3.4 Summarize why no-discharge land application was not a practicable or economically efficient alternative**

The available area is very steep. Any application of the effluent would likely become runoff into the Lake of the Ozarks. In addition, there isn't 3 acres of available suitable land for a non discharging system.

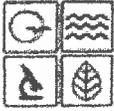
#### 4. DOCUMENTATION

4.1 Is any other written correspondence or documentation included with this application to provide further justification for not pursuing a no-discharge option or regionalization?

No

Yes:

- A letter from an existing higher preference continuing authority waiving preferential status where service is not available in accordance with 10 CSR 20-6.0 10 (2) or if capacity is not available.
- A letter from the existing higher preference continuing authority stating that the regional facility has no interest in taking flow from the new or expanded facility.
- A letter from the regional municipality stating that the project area is outside city limits and annexation would be required.
- Council meeting minutes.
- Correspondence with land owners regarding easement rights.
- Correspondence with land owners regarding land for sale or lease.
- Letters from the community or a consulting engineer regarding availability, proximity, and location of suitable land and the reasonable cost of such land.
- Documentation of recent land sales or appraisals.
- Calculations for sizing a land application system.
- Detailed cost estimates for a land application system or regionalization including lift stations, piping, easements, liners, and/or connection costs.
- Geohydrologic evaluation or other soils report.
- Copy of a county or city ordinance.
- Verification of funding from State Revolving Fund, which does not fund projects outside city limits.
- Other:



MISSOURI DEPARTMENT OF NATURAL RESOURCES  
 WATER PROTECTION PROGRAM  
**APPLICATION FOR CONSTRUCTION PERMIT**  
**WASTEWATER TREATMENT FACILITY**

**RECEIVED**  
 OCT-19 2022  
 Water Protection Program

FOR DEPARTMENT USE ONLY	
APP NO.	CP NO.
FEE RECEIVED 1,000.00	CHECK NO. 3369
DATE RECEIVED Oct 19, 2022	

**APPLICATION OVERVIEW**

The Application for Construction Permit – Wastewater Treatment Facility form has been developed in a modular format and consists of Part A and B. **All applicants must complete Part A.** Part B should be completed for applicants who currently land-apply wastewater or propose land application for wastewater treatment. **Please read the accompanying instructions before completing this form. Submittal of an incomplete application may result in the application being returned.**

**PART A – BASIC INFORMATION**

**1.0 APPLICATION INFORMATION** (Note – If any of the questions in this section are answered NO, this application may be considered incomplete and returned.)

- 1.1 Is this a Federal/State funded project?  YES  N/A Funding Agency: \_\_\_\_\_ Project #: \_\_\_\_\_
- 1.2 Has the Missouri Department of Natural Resources approved the proposed project's antidegradation review?  
 YES Date of Approval: \_\_\_\_\_  N/A
- 1.3 Has the department approved the proposed project's facility plan\*?  
 YES Date of Approval: \_\_\_\_\_  NO (If No, complete No. 1.4.)
- 1.4 [Complete only if answered No on No. 1.3.] Is a copy of the facility plan\* for wastewater treatment facilities included with this application?  
 YES  NO  Exempt because \_\_\_\_\_
- 1.5 Is a copy of the appropriate plans\* and specifications\* included with this application?  
 YES Denote which form is submitted:  Hard copy  Electronic copy (See instructions.)  NO
- 1.6 Is a summary of design\* included with this application?  YES  NO
- 1.7 Has the appropriate operating permit application (A, B, or B2) been submitted to the department?  
 YES Date of submittal: \_\_\_\_\_  
 Enclosed is the appropriate operating permit application and fee submittal. Denote which form:  A  B  B2  
 N/A: However, in the event the department believes that my operating permit requires revision to permit limitation such as changing equivalent to secondary limits to secondary limits or adding total residual chlorine limits, please share a draft copy prior to public notice?  YES  NO
- 1.8 Is the facility currently under enforcement with the department or the Environmental Protection Agency?  YES  NO
- 1.9 Is the appropriate fee or JetPay confirmation included with this application?  YES  NO  
 See Section 7.0

\* Must be affixed with a Missouri registered professional engineer's seal, signature and date.

**2.0 PROJECT INFORMATION**

2.1 NAME OF PROJECT Cool Water Townhomes	2.2 ESTIMATED PROJECT CONSTRUCTION COST \$ 250,000
---	---

2.3 PROJECT DESCRIPTION  
 Membrane Bio Reactor to treat sewage from a residential apartment complex

2.4 SLUDGE HANDLING, USE AND DISPOSAL DESCRIPTION  
 A septic tank

2.5 DESIGN INFORMATION  
 A. Current population: 103.6; Design population: 103.6  
 B. Actual Flow: 7,770 gpd; Design Average Flow: 7,770 gpd;  
 Actual Peak Daily Flow: 31,08 gpd; Design Maximum Daily Flow: 31,08 gpd; Design Wet Weather Event: \_\_\_\_\_

2.6 ADDITIONAL INFORMATION  
 A. Is a topographic map attached?  YES  NO  
 B. Is a process flow diagram attached?  YES  NO

<b>3.0 WASTEWATER TREATMENT FACILITY</b>				
NAME <b>Cool Water Townhomes</b>		TELEPHONE NUMBER WITH AREA CODE <b>573-434-3548</b>	E-MAIL ADDRESS <b>kristinjdoran@gmail.com</b>	
ADDRESS (PHYSICAL) <b>Chrystal Spring Road</b>	CITY <b>Linn Creek</b>	STATE <b>MO</b>	ZIP CODE <b>65052</b>	COUNTY <b>Camden</b>
Wastewater Treatment Facility: Mo- (Outfall 1 Of 1 )				
3.1 Legal Description: <u>NE</u> ¼, <u>SW</u> ¼, <u>SE</u> ¼, Sec. <u>30</u> , T <u>39N</u> , R <u>16W</u> (Use additional pages if construction of more than one outfall is proposed.)				
3.2 UTM Coordinates Easting (X): _____ Northing (Y): _____ For Universal Transverse Mercator (UTM), Zone 15 North referenced to North American Datum 1983 (NAD83)				
3.3 Name of receiving streams: <u>Unnamed tributary to the Lake of the Ozarks</u>				
<b>4.0 PROJECT OWNER</b>				
NAME <b>Kristin Doran</b>		TELEPHONE NUMBER WITH AREA CODE <b>573-434-6948</b>	E-MAIL ADDRESS <b>kristinjdoran@gmail.com</b>	
ADDRESS <b>529 Storm Cove Drive</b>	CITY <b>Linn Creek</b>	STATE <b>MO</b>	ZIP CODE <b>65052</b>	
<b>5.0 CONTINUING AUTHORITY:</b> A continuing authority is a company, business, entity or person(s) that will be operating the facility and/or ensuring compliance with the permit requirements.				
NAME <b>Doran Apartments, LLC</b>		TELEPHONE NUMBER WITH AREA CODE <b>573-434-6948</b>	E-MAIL ADDRESS <b>kristinjdoran@gmail.com</b>	
ADDRESS <b>529 Storm Cove Drive</b>	CITY <b>Linn Creek</b>	STATE <b>MO</b>	ZIP CODE <b>65052</b>	
5.1 A letter from the continuing authority, if different than the owner, is included with this application. <input type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> N/A				
5.2 COMPLETE THE FOLLOWING IF THE CONTINUING AUTHORITY IS A MISSOURI PUBLIC SERVICE COMMISSION REGULATED ENTITY.				
A. <del>Is a copy of the certificate of convenience and necessity included with this application?</del> <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO				
5.3 COMPLETE THE FOLLOWING IF THE CONTINUING AUTHORITY IS A PROPERTY OWNERS ASSOCIATION.				
A. Is a copy of the as-filed restrictions and covenants included with this application? <input type="checkbox"/> YES <input type="checkbox"/> NO				
B. Is a copy of the as-filed warranty deed, quitclaim deed or other legal instrument which transfers ownership of the land for the wastewater treatment facility to the association included with this application? <input type="checkbox"/> YES <input type="checkbox"/> NO				
C. Is a copy of the as-filed legal instrument (typically the plat) that provides the association with valid easements for all sewers included with this application? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO				
D. Is a copy of the Missouri Secretary of State's nonprofit corporation certificate included with this application? <input type="checkbox"/> YES <input type="checkbox"/> NO				
<b>6.0 ENGINEER</b>				
ENGINEER NAME / COMPANY NAME <b>James Jackson, Jr., PE/Lake Professional Engineering</b>		TELEPHONE NUMBER WITH AREA CODE <b>573-873-3898</b>	E-MAIL ADDRESS <b>jimjacksonjr@charter.net</b>	
ADDRESS <b>83 Oak Tree Road</b>	CITY <b>Camdenton</b>	STATE <b>MO</b>	ZIP CODE <b>65020</b>	
<b>7.0 APPLICATION FEE</b>				
<input checked="" type="checkbox"/> CHECK NUMBER <input type="checkbox"/> NETPAY CONFIRMATION NUMBER				
<b>8.0 PROJECT OWNER:</b> I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.				
PROJECT OWNER SIGNATURE 				
PRINTED NAME <b>Kristin Doran</b>		DATE <b>10/17/2022</b>		
TITLE OR CORPORATE POSITION <b>Owner</b>		TELEPHONE NUMBER WITH AREA CODE <b>573-434-6948</b>	E-MAIL ADDRESS <b>kristinjdoran@gmail.com</b>	
Mail completed copy to: MISSOURI DEPARTMENT OF NATURAL RESOURCES WATER PROTECTION PROGRAM P.O. BOX 176 JEFFERSON CITY, MO 65102-0176				
<b>END OF PART A.</b>				
<b>REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHETHER PART B NEEDS TO BE COMPLETE.</b>				