Permit No. CP0002269

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

CONSTRUCTION PERMIT

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

Robert Brake
CLR Holdings LLC
Paradise Estates MHP WWTF
3514 Gratiot St.
St. Louis, MO 63103

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.

April 8, 2022 — Effective Date
April 17, 2024 — Modification Date

April 7, 2026 — Expiration Date

John Hoke, Director, Water Protection Program

CONSTRUCTION PERMIT

I. CONSTRUCTION DESCRIPTION

Installation of an extended aeration wastewater treatment facility to replace two single cell lagoons serving a mobile home park with 45 trailer pads. Replacement of the wastewater collection system with approximately 1,351 lf of 8-inch PVC SDR-35, gravity sewer lines with 7 manholes. Extended aeration package plant to include flow equalization, aeration chamber, clarifier with dual hopper bottom, sock filters, ultraviolet disinfection, and an aerated sludge holding tank together with all the necessary appurtenances to make a complete and usable wastewater system to treat the waste from a population equivalent of 135 with an average daily discharge of 12,000 gallons. Discharge will be to a tributary of Skullbones Creek in Landgrant 897, Jefferson County.

The two existing lagoon cells must be closed in accordance with an approved closure plan. All excess sludge will be removed and disposed of off-site. A closure/sludge disposal plan will need to be submitted to the St. Louis Regional Office for review and approval prior to closure activities.

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.

Outfall location:
UTM zone 15: X=265537, Y=4080922;

II. COST ANALYSIS FOR COMPLIANCE

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

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

III. CONSTRUCTION PERMIT CONDITIONS

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

1. This construction permit does not authorize discharge.

2. All construction shall be consistent with plans and specifications signed and sealed by Kirby Scheer, P.E., with Sheer Design Group, LLC, and as described in this permit.

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

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

5. The completed project shall be field tested to verify actual pumped volume of each dose. The timer controls shall be set to ensure a dosing rate not to exceed the allowable rate of 0.15 gallons per square foot per day.

6. The wastewater treatment facility shall be located at least 50 feet from any dwelling or establishment

7. The wastewater treatment facility shall be located above the 25-year flood level.

8. The wastewater facility structures, electrical equipment, and mechanical equipment shall be protected from physical damage by not less than the 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 300 feet per 10 CSR 20-8.140(2)(C)1.

9. 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.

10. 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.

11. In accordance with 10 CSR 20-6.010(12), a full closure plan shall be submitted to the Department's St. Louis Regional Office for review and approval of any permitted wastewater treatment system being replaced. The closure plan must meet the requirements outlined in Standard Conditions Part III of the Missouri State Operating Permit No. MO-G823138. Closure shall not commence until the submitted closure plan is approved by the Department. Form J – *Request for Termination of a State Operating Permit*, shall be submitted to the Water Protection Program for termination of any existing Missouri state operating permit, once closure is completed in accordance with the approved closure plan.

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

10 CSR 20-8.140 Wastewater Treatment Facilities

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

- 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 300 feet. 10 CSR 20-8.140 (2) (C) 1.

- No treatment unit with a capacity of 22,500 gallons per day (gpd) or less shall be located closer than the minimum distance of 200 feet to a neighboring residence and 50 feet to property line for lagoons; 200 feet to a neighboring residence for open recirculating media filters following primary treatment; and 50 feet to a neighboring residence for all other discharging facilities. See 10 CSR 20-2.010(68) for the definition of a residence. 10 CSR 20-8.140 (2) (C) 2

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

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

- All sampling points shall be designed so that a representative and discrete 24-hour automatic composite sample or grab sample of the effluent discharge can be obtained at a point after the final treatment process and before discharge to or mixing with the receiving waters. 10 CSR 20-8.140 (6) (B)

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

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

- Disinfection and dechlorination, when used, shall be provided during all power outages. 10 CSR 20-8.140 (7) (A) 2.

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

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

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

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

- 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)

- Adequate provisions shall be made to effectively protect facility personnel and visitors from hazards. The following shall be provided to fulfill the particular needs of each wastewater treatment facility:

- Fencing. Enclose the facility site with a fence designed to discourage the entrance of unauthorized persons and animals; 10 CSR 20-8.140 (8) (A)
- Gratings over appropriate areas of treatment units where access for maintenance is necessary; 10 CSR 20-8.140 (8) (B)
- First aid equipment; 10 CSR 20-8.140 (8) (C)
- Posted "No Smoking" signs in hazardous areas; 10 CSR 20-8.140 (8) (D)
- Appropriate personal protective equipment (PPE); 10 CSR 20-8.140 (8) (E)
- Portable blower and hose sufficient to ventilate accessed confined spaces; 10 CSR 20-8.140 (8) (F)
- 10 CSR 20-8.140 (8) (G) Portable lighting equipment complying with NEC requirements. See subsection (7)(B) of this rule;
- 10 CSR 20-8.140 (8) (H) Gas detectors listed and labeled for use in NEC Class I, Division 1, Group D locations. See subsection (7)(B) of this rule;
- Appropriately-placed warning signs for slippery areas, non-potable water fixtures (see subparagraph (7)(D)3.B. of this rule), low head clearance areas, open service manholes, hazardous chemical storage areas, flammable fuel storage areas, high noise areas, etc.; 10 CSR 20-8.140 (8) (I)
- Provisions for local lockout/tagout on stop motor controls and other devices; 10 CSR 20-8.140 (8) (L)
- Provisions for an arc flash hazard analysis and determination of the flash protection boundary distance and type of PPE to reduce exposure to major electrical hazards shall be in accordance with NFPA 70E *Standard for Electrical Safety in the Workplace* (2018 Edition), as approved and published August 21, 2017. 10 CSR 20-8.140 (8) (M)

10 CSR 20-8.150 Preliminary Treatment.

- 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)

10 CSR 20-8.160 Settling.

- Overflow weirs shall be readily adjustable over the life of the structure to correct for differential settlement of the tank. 10 CSR 20-8.160 (3) (C) 1.

- Walls of settling tanks shall extend at least 6 inches above the surrounding ground surface and shall provide not less than 12 inches of freeboard. 10 CSR 20-8.160 (3) (E)

- The design shall provide for convenient and safe access to routine maintenance items such as gear boxes, scum removal mechanism, baffles, weirs, inlet stilling baffle areas, and effluent channels. 10 CSR 20-8.160 (5) (B)

10 CSR 20-8.190 Disinfection.

- Emergency Power. Disinfection and dechlorination processes, when used, shall be provided during all power outages. 10 CSR 20-8.190 (2) (A).

- The UV dosage shall be based on the design peak hourly flow, maximum rate of pumpage, or peak batch flow. 10 CSR 20-8.190 (5) (A) 1.

- The UV system shall deliver the target dosage based on equipment derating factors and, if needed, have the UV equipment manufacturer verify that the scale up or scale down factor utilized in the design is appropriate for the specific application under consideration. 10 CSR 20-8.190 (5) (A) 3.

- The UV system shall deliver a minimum UV dosage of 30,000 $\mu W \cdot s/cm^2$ (microwatt seconds per centimeters squared). 10 CSR 20-8.190 (5) (A) 4.

- Open channel UV systems. The combination of the total number of banks shall be capable of treating the design peak hourly flow, maximum rate of pumpage, or peak batch flow. 10 CSR 20-8.190 (5) (B) 1.

- The UV system must continuously monitor and display at the UV system control panel the following minimum conditions:
  - The relative intensity of each bank or closed vessel system; 10 CSR 20-8.190 (5) (C) 1. A.
  - The operational status and condition of each bank or closed vessel system; 10 CSR 20-8.190 (5) (C) 1. B.
  - The ON/OFF status of each lamp in the system; 10 CSR 20-8.190 (5) (C) 1. C. and
  - The total number of operating hours of each bank or each closed vessel system. 10 CSR 20-8.190 (5) (C) 1. D.

- The UV system shall include an alarm system. Alarm systems shall comply with 10 CSR 20-8.140(7)(C). 10 CSR 20-8.190 (5) (C) 2.

10 CSR 20-8.210 Supplemental Treatment

- Filtration systems shall have:
  - Convenient access to all components and the media surface for inspection and maintenance without taking other units out of service; 10 CSR 20-8.210 (3) (B) 1. A.
  - The capacity to process the design average flow to the filters with the largest unit out of service utilizing a minimum of two units. 10 CSR 20-8.210 (3) (B) 1. C.

- The media for cloth/disc filters shall:
  - Follow the manufacturer's recommendations; 10 CSR 20-8.210 (3) (E) 1. B. and
  - Be chemical-resistant if the filter will be exposed to chemicals, such as chlorine or disinfectants. 10 CSR 20-8.210 (3) (E) 1. C.

13. Upon completion of construction:

    A. CLR Holdings LLC will be the continuing authority for operation and maintenance of these facilities;

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

    C. Submit the enclosed form Statement of Work Completed to the Department in accordance with 10 CSR 20-6.010(5)(N).

IV. REVIEW SUMMARY

1. CONSTRUCTION PURPOSE

Replace existing treatment facility with a modern facility with ability to meet current discharge limits.

2. FACILITY DESCRIPTION

The existing facility serving the Mobile Home Park consists of a collection system and two separate single cell lagoons. Currently the park has minimal occupancy and the lagoons are operated as a no-discharge pump and haul facility under Operating Permit MO-G823138.

The proposed extended aeration plant will replace the two lagoons and have a discharge. The plant will consist of flow equalization, extended aeration, final clarifier, ultraviolet disinfection, sock filters, and an aerated sludge holding tank.

The Paradise Estates MHP WWTF is located at 1A Paradise Estates Drive, Cedar Hill, in Jefferson County, Missouri. The facility has a design average flow of 12,000 gpd and serves a organic population equivalent of approximately 135 people.

3. COMPLIANCE PARAMETERS

The proposed project is required to meet the requirements of MOGD00613 Table F, 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 Demand$_5$	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	µg/L	8 (130 ML)
E. coli	#/100mL	126

4. ANTIDEGRADATION

The Department has reviewed the antidegradation report for this facility and issued the Water Quality and Antidegradation Review dated October 18, 2021, due to the initiation of a new discharge. See **APPENDIX – ANTIDEGRADATION**.

5. REVIEW of MAJOR TREATMENT DESIGN CRITERIA

Construction will cover the following items:

- Components are designed for a Population Equivalent of 135 based on organic loading to the system and a hydraulic flow of 12,000 gpd. Facility will serve 45 mobile homes. Treatment plant is located above the 100-year flood elevation. All mobile homes are more than 50 feet from the treatment facility.

- The existing collection system is to be replaced. Approximately 1351 lf of 8-inch PVC SDR-35, gravity sewer lines with 7 manholes to be installed.

- Extended Aeration Package Plant – Installation of one extended aeration package plant capable of treating a design average flow of 12,000 gpd. The following components are integrated into the concrete package plant:
  - Trash Rack – A coarse manual trash rack with 1-inch clear openings will be located at the plant influent.
  - Flow Equalization – A flow equalization chamber with a volume of approximately 3770 gallons will be provided. Aeration by blowers and course bubble diffusers. Flow will be metered out of the tank with a time dosed pump. The flow equalization chamber has a gravity emergency overflow to the aeration chamber.
  - Aeration Chambers – 15 ft by 12.5 ft by x 12.5 feet depth aeration chamber with a total volume of 17,500 gallons will be provided. Aeration by means of duplex 3.0 hp blowers capable of supplying 100 scfm each to the facility. The design amount of air to the aeration chamber is 69 cfm through course bubble diffusers. The aeration chambers are designed for an average daily loading of up to 28.35 lbs of BOD_5 and up to 2.3 lbs of ammonia. A transfer pipe allows wastewater to move by gravity to the clarifier.
  - Final Clarifier – The final clarifier will have a total surface area of 74 ft^2, an effective surface area of 67 ft^2; a settling volume of approximately 74 x 12 = 6,822 gallons and a detention time of 13.6 hours with a settling rate of approx. 179 gpd/ft^2. An air lift surface skimmer is provided to remove grease and floatables to the aeration chamber. An adjustable v-notch weir provides 12 lf

of overflow length. The sidewater depth will be 12 ft. The weir loading rate is 1000 gpd. The clarified effluent will flow by gravity to the disinfection system. A 0.4 HP pump will be provided to move settled sludge from the dual square hopper bottoms to the sludge holding chamber or return to the aeration chamber as return activated sludge.

- Sludge Holding Chamber – The sludge holding chamber will have a volume of 504 cubic feet. The facility blowers will supply air to course bubble diffusers. Supernatant will be decanted by means of an adjustable surface skimming airlift to the flow aeration chamber. Sludge removal shall be by contract hauler.

- Cloth Socks Tertiary Filtration – Installation of four Brooks Hydro Sock filters. Each unit has 25 socks and is capable of treating an average design flow of 16,200 gpd. With one unit out-of-service the filters are capable of treating a peak flow of 48,600 gpd. Each sock is 50 inches long and 4 inches in diameter for a surface area of approximately 4.3 $ft^{2.}$. Each unit has a hopper bottom for collection of sludge. Sludge is sent to the aeration chamber through air lifts.

- Disinfection – Disinfection is the process of removal, deactivation, or killing of pathogenic microorganisms.

  - Open Channel Ultraviolet (UV) – An open channel, gravity flow, low pressure high intensity UV disinfection system capable of treating a peak flow of 72,000 gpd while delivering a minimum UV intensity of 30 mJ/cm^2 with an expected ultraviolet transmissivity of 65 percent or greater. The single open channel UV system consists of three modules and two lamps per module. The disinfected effluent will flow by gravity through flow measurement equipment and to Outfall No. 001. A portable generator will be stored on-site to operate the UV unit in case of power failure

6. OPERATING PERMIT

After completion of construction project submit: statement of work completed, as-builts if the project was not constructed in accordance with previously submitted plans and specifications. Application Form B, and fee has been submitted; received with the Application for Construction Permit, 10/31/21. Missouri State Operating Permit, General Permit MO-GD00613, 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

Andrew Appelbaum, P.E.
Engineering Section
andy.appelbaum@dnr.mo.gov

APPENDIX

- **Antidegradation**

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

Water Quality and Antidegradation Review

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

For Protection of Water Quality
and Determination of Effluent Limits at

Paradise Estates Mobile Home Park WWTF

October, 2021

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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_5)/DO	2	Significant	
Total Suspended Solids (TSS)	**	Significant	
Ammonia	2	Significant	
pH	***	Significant	Permit limits applied
Escherichia coli (*E. coli*)	2	Significant	
Total Phosphorus (TP)	2	Significant	

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

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

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

4. DEMONSTRATION OF NECESSITY AND SOCIAL AND ECONOMIC IMPORTANCE

Missouri's Antidegradation Implementation Procedures (AIP) specify that if the proposed activity results in significant degradation then a demonstration of necessity (i.e., alternatives analysis) and a determination of social and economic importance are required. The applicant must submit the Antidegradation Review Submittal: Voluntary Tier 2 – Significant Degradation for Domestic Wastewater Facilities with Design Flow Less Than 50,000 Gallons per Day form. This analysis will serve as the applicant's alternatives analysis to fulfill the requirements of the AIP.

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

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

4.1. NO DISCHARGE EVALUATION

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

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

4.2. DEMONSTRATION OF NECESSITY

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

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

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

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

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

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

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

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

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

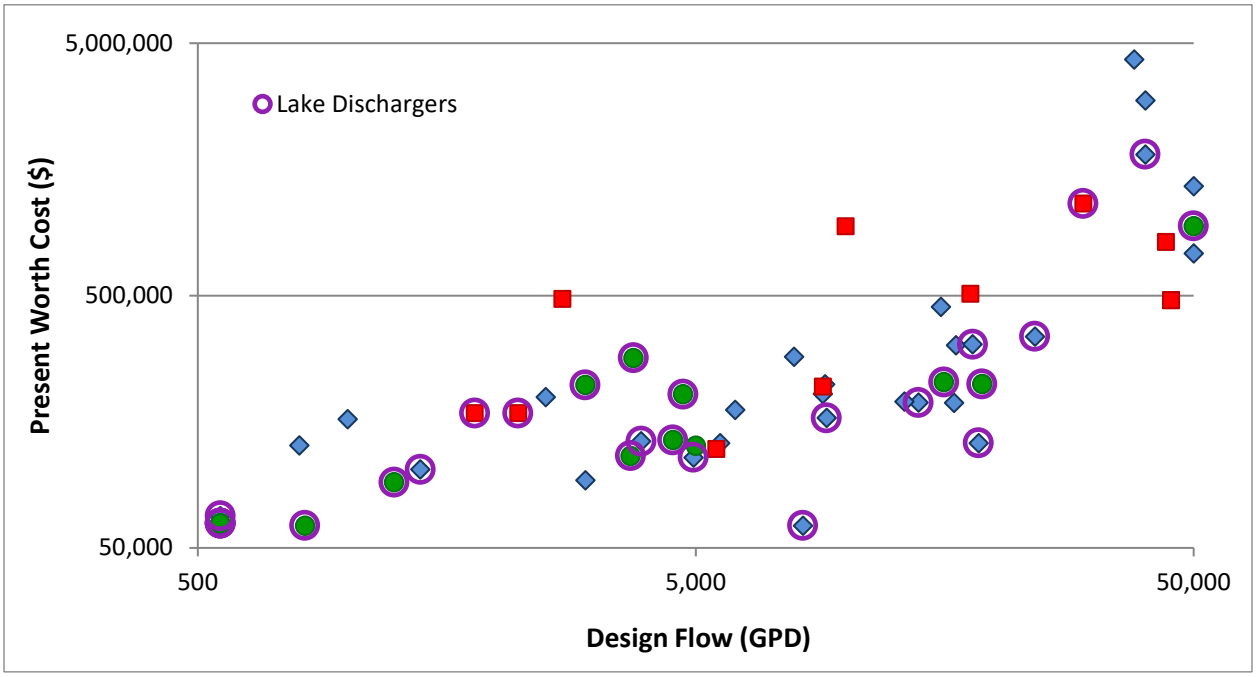
Recirculating sand filters (RSF) remove contaminants in wastewater through physical, chemical, and, most importantly, biological processes. The three common components are a pretreatment unit (generally a septic tank), a recirculation tank, and a sand filter. In the recirculation tank, raw effluent from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

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

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

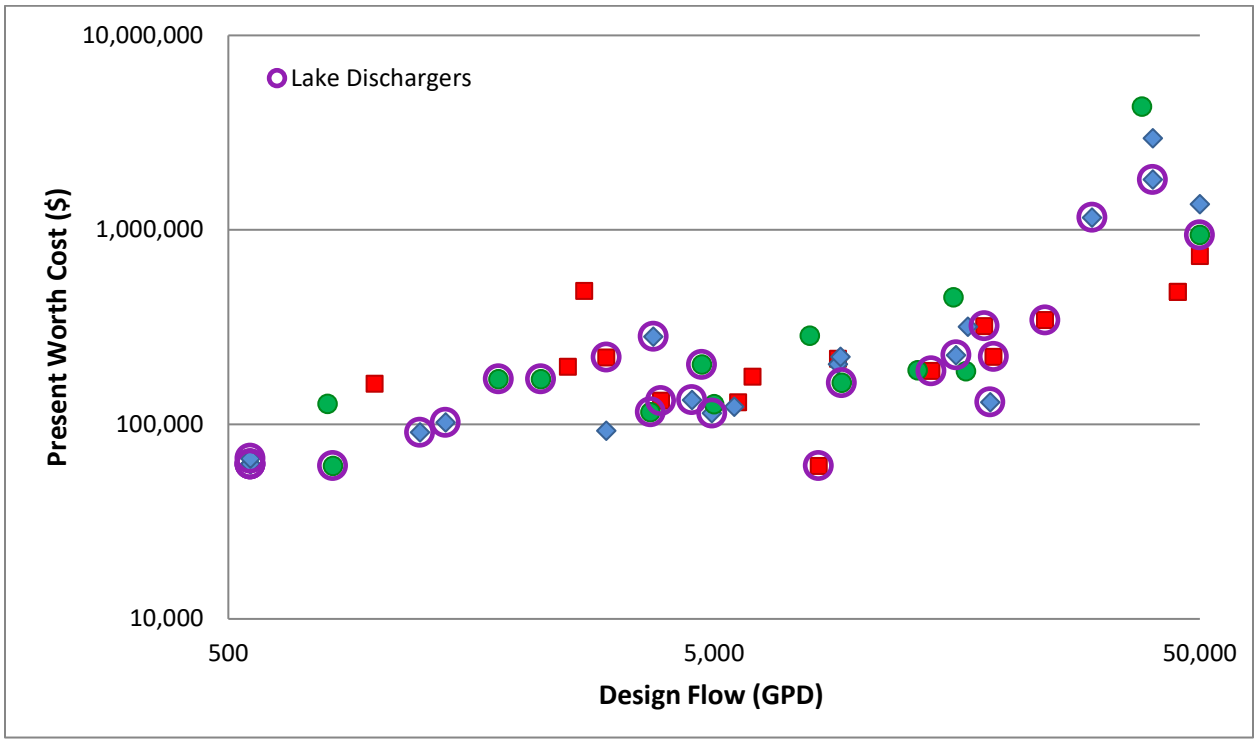
The above treatment system descriptions were adapted from EPA technology fact sheets and *Design of Municipal Wastewater Treatment Plants: WEF Manual of Practice No. 8 ASCE Manuals and Reports on Engineering Practice No. 76; Fifth Edition*, as well as other readily available sources and previous Water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

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



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

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



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

TABLE 2. DESIGN FLOW VS. PRESENT WORTH COST

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

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

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

* Lake Dischargers

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

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

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

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

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

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

4.5. LOSING STREAM ALTERATIVE DISCHARGE LOCATION

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

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

4.6. SOCIAL AND ECONOMIC IMPORTANCE EVALUATION

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

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

5. GENERAL ASSUMPTIONS OF THE WATER QUALITY AND ANTIDEGRADATION REVIEW

1. A Water Quality and Antidegradation Review (WQAR) assumes that [10 CSR 20-6.010(2) Continuing Authorities and 10 CSR 20-6.010(4)(A)5.B., evaluation of no discharge] has been or will be addressed in a Missouri State Operating Permit or Construction Permit Application.

2. A WQAR does not indicate approval or disapproval of alternative analysis as per [10 CSR 20-7.015(4) Losing Streams], and/or any section of the effluent regulations.

3. Changes to Federal and State Regulations made after the drafting of this WQAR may alter Water Quality Based Effluent Limits (WQBEL).

4. Effluent limitations derived from Federal or Missouri State Regulations (FSR) may be WQBEL or Effluent Limit Guidelines (ELG).

5. WQBEL supersede ELG only when they are more stringent. Mass limits derived from technology based limits are still appropriate.

6. A WQAR does not allow discharges to waters of the state, and shall not be construed as a National Pollution Discharge Elimination System or Missouri State Operating Permit to discharge or a permit to construct, modify, or upgrade.

7. Limitations and other requirements in a WQAR may change as Water Quality Standards, Methodology, and Implementation procedures change.

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

9. If the proposed treatment technology is not covered in 10 CSR 20-8 Minimum Design Standards, the treatment process may be considered a new technology. As a new technology, the permittee will need to work with the review engineer to ensure equipment is sized properly. The operating permit may contain additional requirements to evaluate the effectiveness of the technology once the facility is in operation. This Antidegradation Review is based on the information provided by the facility and is not a comprehensive review of the proposed treatment technology. If the review engineer determines the proposed technology will not consistently meet proposed effluent limits, the permittee will be required to revise their Antidegradation Report.

6. PERMIT LIMITS AND MONITORING INFORMATION

TABLE 3. EFFLUENT LIMITS – ALL OUTFALLS

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

TABLE 4. EFFLUENT LIMITS – OUTFALLS TO LAKES

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

* Monitoring requirements only.

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

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

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

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

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

NOTE 4 – Effluent limits and monitoring requirements for *E. coli* are applicable year round for designated losing streams. No more than 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:

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

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

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

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

Note: Under 40 CFR 133.105, permitting authorities shall require more stringent limitations than equivalent to secondary treatment limitations for 1) existing facilities if the permitting authority determines that the 30-day average and 7-day average BOD_5 and TSS effluent values that could be achievable through proper operation and maintenance of the treatment works, and 2) new facilities if the permitting authority determines that the 30-day average and 7-day average BOD_5 and TSS effluent values that could be achievable through proper operation and maintenance of the treatment works, considering the design capability of the treatment process.

9. LIMIT DERIVATION

- **Flow**. In accordance with [40 CFR Part 122.44(i)(1)(ii)] the volume of effluent discharged from each outfall is needed to assure compliance with permitted effluent limitations. If the permittee is unable to obtain effluent flow, then it is the responsibility of the permittee to inform the Department, which may require the submittal of an operating permit modification.

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

As per the *DO Modeling & BOD Effluent Limit Development Administrative Guidance for the Purpose of Conducting Water Quality Assistance Reviews*, facilities less than 100,000 gallons per day, and proposing BOD treatment less than or equal to an average monthly of 10 mg/L and average weekly of 15 mg/L as demonstrated by performance specifications from a manufacturer or effluent sampling of an existing facility with the same treatment facility are exempt from the DO modeling requirement.

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

- **Total Suspended Solids (TSS).**

  Table 3: TSS limits of 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: $C_e = ((Q_e + 0.0)1.5 – (0.0 * 0.01))/Q_e = 1.5$ mg/L

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

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

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

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

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

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

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

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

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

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

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

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

LTA_a = 12.1 mg/L (0.321) = **3.88 mg/L** [CV = 0.6, 99th Percentile]

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

	Maximum Daily Limit (mg/l)		Average Monthly Limit (mg/l)	
	Summer	Winter	Summer	Winter
WQBEL	12.1	12.1	4.6	4.6
Alternatives Analysis Limits	3.6	7.5	1.4	2.9

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

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

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

  Losing Stream: Discharges to losing streams shall not exceed 126 per 100 mL as a Daily Maximum at any time, as per 10 CSR 20-7.031(5)(C). Monitoring only for a monthly average. No more than 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: $C_e = ((Q_e + 0.0)10 – (0.0 * 0.0))/ Q_e = 10$ µg/L

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

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

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

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

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

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

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

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

10. 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 *New Technology Definitions and Requirements* 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.

Reviewer: Steve Hamm, P.E.
Date: October 2021
Supervisor: John Rustige, P.E.

APPENDIX A: MAP OF DISCHARGE LOCATION

APPENDIX B: GEOHYDROLOGIC EVALUATION LOCATION

Missouri Department of NATURAL RESOURCES
dnr.mo.gov
Michael L. Parson, Governor
Carol S. Comer, Director

LWE21051
Jefferson County

March 03, 2021

kirby scheer
8584 hwy yy
new haven, MO 63068

RE: paradise estates

Dear kirby scheer:

On January 18, 2021, the Missouri Geological Survey received a request to perform a geohydrologic evaluation for the above referenced project located in Jefferson County. Included with this letter is a report that details the geologic and hydrologic conditions at the site and the potential for groundwater contamination in the event of wastewater treatment failure.

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

Sincerely,

MISSOURI GEOLOGICAL SURVEY

Fletcher N. Bone
Geologist
Environmental Geology Section

STATE OF MISSOURI
FLETCHER N BONE
RG
2019001287
REGISTERED GEOLOGIST

03/03/2021

c: Kirby Scheer
WPP
St. Louis Regional Office

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

Project ID Number
LWE21051
County
Jefferson

Request Details

Project: paradise estates

Legal Description: Land Grant 00897
Quadrangle: CEDAR HILL
Latitude: 38 20 17.35
Longitude: -90 38 39.39

Organization Official

Name: Kirby Scheer
Address: 8584 Hwy YY
City: New Haven
State: MO Zip: 63068
Phone: 573-459-2611
Email: kirbs@fidnet.com

Preparer

Name: kirby scheer
Address: 8584 hwy yy
City: new haven
State: MO Zip: 63068
Phone: 573-459-2611
Email: kirbs@fidnet.com

Project Details

Report Date: 03/03/2021
Date of Field Visit: 02/25/2021

Previous Reports: Not Applicable

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

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

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

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

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

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

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

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

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

Bedrock: The uppermost bedrock is Ordovician-age Jefferson City and Cotter Dolomites.

Surficial Materials: The surficial materials are silty, gravelly, clayey alluvium and colluvium

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

Project ID Number
LWE21051
County
Jefferson

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

Remarks:

On February 25, 2021, a site visit was conducted by a geologist from the Missouri Geological Survey (MGS) to perform a geohydrologic evaluation for Paradise Estates proposed improvements to the existing wastewater treatment facility (WWTF). The existing facility is a discharging lagoon that will be converted to a discharging mechanical treatment plant (MTP). The purpose of the site visit is to observe the geologic and hydrologic elements of the site and determine the potential for groundwater contamination in the event of treatment failure.

There is no bedrock exposed at the site, however, areal geologic mapping and nearby geologic well logs indicate that the uppermost bedrock is Ordovician-age Jefferson City-Cotter Dolomite. This bedrock typically exhibits moderate permeability. The surficial materials consist of approximately 30 feet of silty, gravelly, clayey alluvium and colluvium that exhibit moderate permeability.

Discharge from the proposed MTP is north into a tributary of Skullbones Creek. The tributary and Skullbones Creek to Big River have been previously classified as gaining. These were field verified during this evaluation as gaining and also a portion of Big River was evaluated and classified as gaining for approximately 2.0 miles downstream of the discharge point.

There are no known sinkholes located within 1 mile of the facility. However, the Isum Creek faults and a spring are located within 1 mile of the facility. The spring is located at -90.643757 West, 38.341605 North.

Based on the geologic and hydrologic characteristics observed, the site receives a slight geologic limitations rating. In the event of treatment failure, the local, shallow groundwater aquifer and nearby spring may be adversely impacted and the surface waters of the tributary of Skullbones Creek, Skullbones Creek and Big River.

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 for 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: Paradise Estates #8797
Project Description: Replace existing lagoon wastewater treatment with new package aeration treatment discharging into a tributary of Skullbones Creek, in Jefferson County, Missouri
Project Type: Waste Transfer, Treatment, and Disposal, Liquid waste/Effluent, Wastewater treatment plant, Construction or expansion
Contact Person: kirby scheer
Contact Information: kirbs@fidnet.com or 5734592611

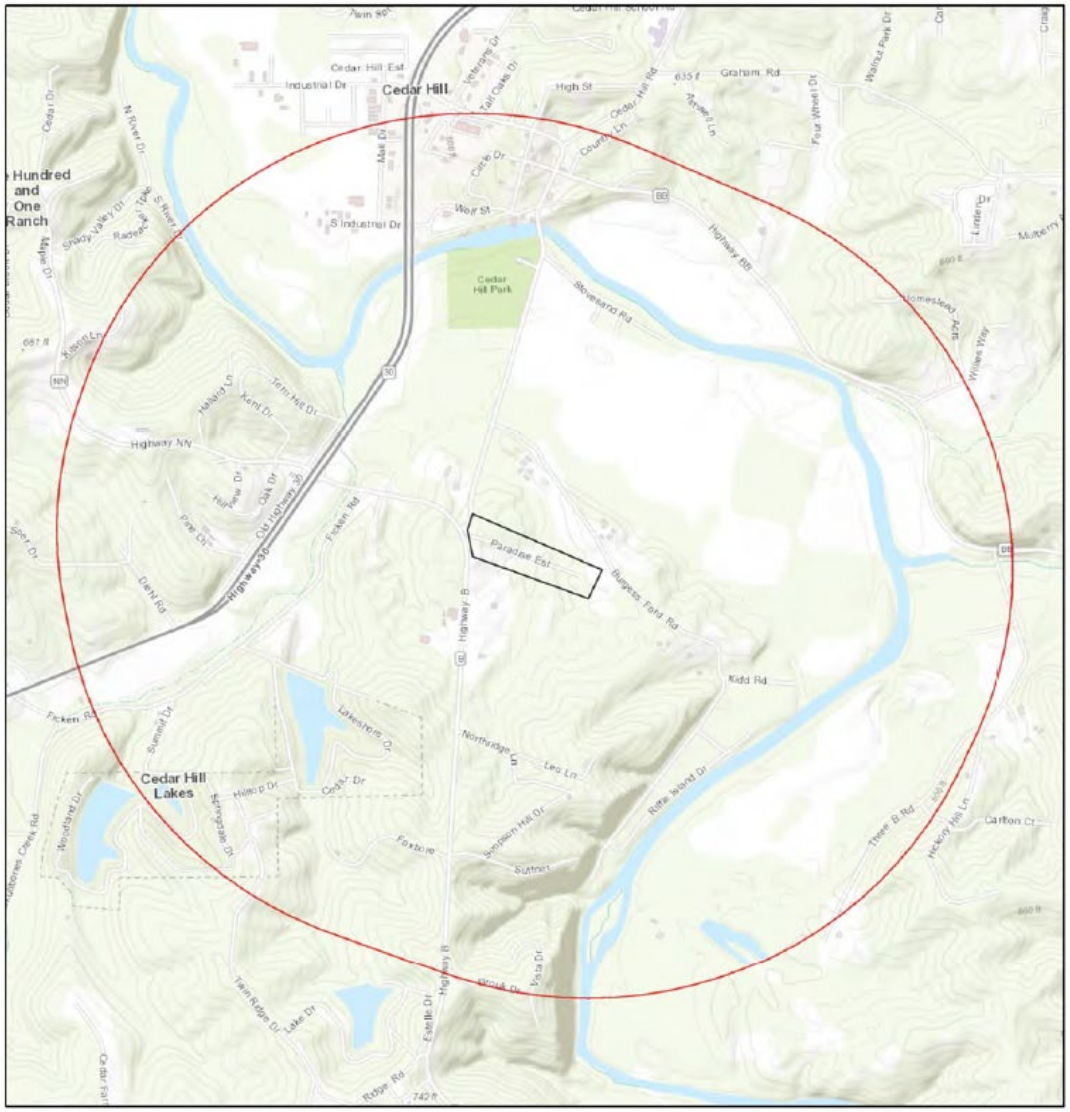
Disclaimer: The NATURAL HERITAGE REVIEW REPORT produced by this website identifies if a species tracked by the Natural Heritage Program is known to occur within or near the area submitted for your project, and shares suggested recommendations on ways to avoid or minimize project impacts to sensitive 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 www.modot.mo.gov/ehp/index.htm for additional information on recommendations.

Paradise Estates



March 9, 2021

Project Boundary

Buffered Project Boundary

1:21,765

0 0.175 0.35 0.7 mi

0 0.275 0.55 1.1 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Species or Communities of Conservation Concern within the Area:

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

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

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

Other Special Search Results:

No results have been identified for this project location.

Project Type Recommendations:
Waste Transfer, Treatment and Disposal -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.
Revegetation of disturbed areas is recommended to minimize erosion, as is restoration with of native plant species compatible with the local landscape and for wildlife needs. Annuals like ryegrass may be combined with native perennials for quicker green-up. Avoid aggressive exotic perennials such as crown vetch and sericea lespedeza.
Management Recommendations for Construction Projects Affecting Missouri Streams and Rivers is a Conservation Department publication available at http://mdc.mo.gov/sites/default/files/resources/2013/02/constprojnearstreams_2013.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 site submitted and evaluated is on or near Sensitive Aquatic Species Waters Big River, an important stream for freshwater mussel and amphibian populations. These streams were so designated because they have highly diverse mussel communities and mussel and amphibian species identified as Species of Conservation Concern. These streams are important to maintaining, restoring, or avoiding future listing of Species of Conservation Concern. Impacts to these aquatic species and habitats can be reduced by avoiding or minimizing activities that disturb the stream substrate, including rock placement, dredging, trenching, and wetted gravel bar disturbance; and avoid introducing heavy sediment loads, chemical or organic pollutants. These streams also are included as a Missouri Nationwide Permit Regional Condition (Number 7) that must be considered if working under if working under a Clean Water Act Section 404 Permit issued by the U.S. Army Corps of Engineers (http://www.nwk.usace.army.mil/Missions/RegulatoryBranch/NationWidePermit...). A list of all streams designated under this Condition is available at http://www.nwk.usace.army.mil/Portals/29/docs/regulatory/nationwidepermi....

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 http://mdc.mo.gov//9633 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.

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

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

Miscellaneous Information

FEDERAL Concerns are species/habitats protected under the Federal Endangered Species Act and that have been known near enough to the project site to warrant consideration. For these, project managers must contact the U.S. Fish and Wildlife Service Ecological Services (101 Park Deville Drive Suite A, Columbia, Missouri 65203-0007; Phone 573-234-2132; Fax 573-234-2181) for consultation.

STATE Concerns are species/habitats known to exist near enough to the project site to warrant concern and that are protected under the Wildlife Code of Missouri (RSMo 3 CSR 1 0). "State Endangered Status" is determined by the Missouri Conservation Commission under constitutional authority, with requirements expressed in the Missouri Wildlife Code, rule 3CSR 1 0-4.111. Species tracked by the Natural Heritage Program have a "State Rank" which is a numeric rank of relative rarity. Species tracked by this program and all native Missouri wildlife are protected under rule 3CSR 10-4.110 General Provisions of the Wildlife Code.

Additional information on Missouri's sensitive species may be found at http://mdc.mo.gov/discover-nature/field-guide/endangered-species . Detailed information about the animals and some plants mentioned may be accessed at http://mdc4.mdc.mo.gov/applications/mofwis/mofwis_search1.aspx . If you would like printed copies of best management practices cited as internet URLs, please contact the Missouri Department of Conservation.

APPENDIX D: ANTIDEGRADATION REVIEW SUMMARY FORMS

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

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

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

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

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

1. APPLICABILITY

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

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

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

1.1	Does the receiving waterbody or downstream waterbody have a Total Maximum Daily Load (TMDL)?	☐ Yes ☑ No
1.2	Is the receiving waterbody or downstream waterbody 303(d) or 305(b) listed as impaired or potentially impaired?	☐ Yes ☑ No
1.3	Is the facility currently under enforcement with the department or the U.S. Environmental Protection Agency?	☐ Yes ☑ No
1.4	Is the design flow 50,000 gallons per day or more?	☐ Yes ☑ No
1.5	Is a non-discharging system a viable option?	☐ Yes ☑ No

Submit the following with this form:

- ☒ Regionalization and No Discharge Evaluation Form – Available on the department's website
- ☒ Copy of the Geohydrologic Evaluation – Submit request through the Missouri Geological Survey website
- ☒ Copy of the Missouri Natural Heritage Review from the Missouri Department of Conservation website

2. FACILITY

NAME		COUNTY	
Paradise Estates Mobile Home Park		Jefferson	
ADDRESS (PHYSICAL)	CITY	STATE	ZIP CODE
1A Paradise Estates	Cedar Hill	MO	63016

3. OWNER

NAME			
CLR Holdings, LLC (contact Mr. Robert Brake)			
ADDRESS	CITY	STATE	ZIP CODE
3514 Gratiot St	St Louis	MO	63103
EMAIL ADDRESS	TELEPHONE NUMBER WITH AREA CODE		
rbrake@brakelandscaping.com	314 581-7933		

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

NAME	SECRETARY OF STATE CHARTER NUMBER		
See Above			
ADDRESS	CITY	STATE	ZIP CODE
EMAIL ADDRESS	TELEPHONE NUMBER WITH AREA CODE		

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5. RECEIVING WATER BODY SEGMENT #1

NAME
Unnamed tributary to Skullbones Creek (U)

5.1 Upper end of segment – Location of discharge
UTM: X= 705909.66624, Y= 4245995.84976 NAD 83 OR Lat ____, Long ____

5.2 Lower end of segment –
UTM: X= 705170.04736, Y= 4246522.7773 OR Lat ____, Long ____ Per the Missouri Antidegradation Implementation Procedure (AIP), the definition of a segment is: "A section of water that is bound, at a minimum, by significant existing sources and confluences with other significant water bodies."

6. WATER BODY SEGMENT #2 (If Necessary)

NAME

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

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

7. SOCIAL AND ECONOMIC IMPORTANCE OF THE PREFERRED ALTERNATIVE

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

Social and economic importance is defined as the social and economic benefits to the community that will occur from any activity involving a new or expanding discharge.

7.1 Identify the affected community:

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

The general geographic area includes the Big River drainage basin, and the lower end of the Meramec Drainage basin. The project is located approximately 1 mile from the City of Cedar Hill, Mo., and the site has easy access to Mo. Highway 30 which at the point of the project becomes a 4-lane divide highway. Using Map quest to determine travel times, the City of Fenton is approximately a 30-minute drive from the project site. The City of Arnold which is the southern part of St. Louis County is also a 30-min. drive from the project site, and the City of Bridgeton which is part of North St. Louis is only a 40-min. drive. Given this information, it can be reasonable to say that this project site location is easily a bedroom community of St. Louis County and St. Louis City. The cities mentioned are major employers and have a remarkably diverse economy. One of the primary needs of such a diverse economy is reasonably priced housing for workers.

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

Will the proposed discharging activity:

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

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

Please see accompanying engineering report.

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* (780-2806) 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.

After consulting with the owner and the owner's current wastewater treatment plant operator, it was determined that an extended package aeration treatment plant will be used to treat the waste stream. According to MO-DNR, a properly sized and operated extended aeration treatment plant using the chosen treatment system will meet the discharge limits as established under the Voluntary Tier 2 form. The owner's current treatment plant operator stated that he operates several similar facilities, and he does not have problems meeting the effluent levels required. At an estimated cost of $300,000, this type of facility is the least upfront construction costs

ENGINEERING CONSULTANT NAME		COMPANY NAME	
Kirby Scheer		Scheer Design Group LLC	
ADDRESS	STATE	ZIP CODE	TELEPHONE NUMBER WITH AREA CODE
8584 Hwy YY	MO	63068	573 459-2611
SIGNATURE		EMAIL ADDRESS	
		kirbs@fidnet.com	

10. SUMMARY OF THE POLLUTANTS OF CONCERN AND EFFLUENT LIMITS

Pollutants of concern to be considered include those pollutants reasonably expected to be present in the discharge per the Antidegradation Implementation Procedure Section II.A. and assumed or demonstrated to cause significant degradation. The tier protection levels are specified and defined in rule at 10 CSR 20-7.031(2). All POCs in this alternatives analysis were considered to be Tier 2 and significantly degrading in the absence of existing water quality.

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

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

EFFLUENT LIMITS – OUTFALLS TO LAKES

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

EFFLUENT LIMITS – ALL OTHER OUTFALLS

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

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

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

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

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

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

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

11. APPLICATION FEE

☐ CHECK NUMBER ☐ JETPAY CONFIRMATION NUMBER

12. SIGNATURE

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

SIGNATURE	DATE
Robert Brake	10/4/21
PRINT NAME	TITLE
Robert Brake	Managing Member

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

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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
Paradise Estates Mobile Home Park	Jefferson

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? 1 mile

B. List facilities contacted about possible regionalization. Jefferson County Public Sewer District

C. Is there any planning or zoning in the area regarding development and services? Unknown

D. Who would have the responsibility to maintain the sewer connection line? The City of Cedar Hill or the Public Sewer District

E. What is the estimated cost for piping and pumps to regionalize? $700,000

F. Explain any engineering challenges with the regionalization connection – topography, rivers, highways, or other issues.
Three Phase Electic Required, Crossing the Big River, Total Length of the force main, and Obtaining easements on private property.

G. Does a regional facility have the capacity to treat the additional effluent from this project? Not at this time

H. Were land owners contacted for rights to an easement? ☐ Yes ☑ No

I. Describe the easement issues:

Mobile home parks are generally not viewed in a positive light. Therefore, it would seam reasonable to assume that obtaining easements would be difficult or nearly impossible. It only takes one landowner to say no and the project is ended.

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

Mobile home parks are generally not viewed in a positive light. Therefore, it would seam reasonable to assume that obtaining easements would be difficult or nearly impossible. It only takes one landowner to say no and the project is ended. Also the initial rough cost estimate of $700,000 is excessive and makes the project cost prohibitive. Directional Boring under the Big River may cost significantly more than currently estimated, since no preliminary soils investigation were performed for this report. The availability of three phase electric and the cost associated with obtaining the electric will be prohibitive. Cost incurred from extending the electric was not included in the original project estimate. Also the time and expense of obtaining all of the required permits from the U.S. Army Corps of Engineers, Missouri Department of Conservation, and Missouri Department of Natural Resources.

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 existing site has no available area for an on-site system.

If yes, answer the following:

B. How many acres are required for land application of the effluent? 3.5 ac

C. Provide a breakdown of the capital cost for any necessary additional land, piping, pumps, and irrigation equipment?

It was assumed that a sub-surface absorption alternative would have a rough estimated installed cost of $420,000

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:

The existing site currently has no excess space available to install an on-site absorption or irrigation system. To be conservative any site using this type of system should have 2 areas capable of treating the waste stream. The second application site would be used in the event of a failure on the primary site. Using easements to provide an application area will require both land owners to be responsible to each other for the duration of the life of the facility. The unknown cost of the easement over time cannot be reasonable estimated. Also if the provider of the easement decides to sell his property,he has the encumbrance of this easement as part of the sale

☑ **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?

The owner is operating the system currently as a pump haul non-discharging system. This type of system is proving cost prohibitive. The average per home cost currently is $267 per month or a total estimated yearly cost of $144,180 if the entire mobile home park is occupied.

☑ **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

Information from USGS Web-Soil survey indicates that the area is provisionally suitable to unsuitable soils for on-site absorption. The site has no space available for a no-discharge land application system. This means that the owner of the project would need to purchase land from a neighbor or obtain an application easement from a neighbor. If an easement is used then the neighbors property becomes encumbered and blighted in future sales. An unknown cost of the long term easement cannot be estimated. Also most of the general area is located within the 100-year flood plain which is not an ideal place to install this type of system. If the neighbors understand that they can stop or close the mobile home park by refusing to sell or lease the property for an application area, then why would agree to sell? If the mobile home park is closed the property values in the general area would increase. This may benefit the neighboring owners. The last thing is the overall cost of installing this type of system which is 1/3 more expensive than installing a discharging facility.

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:

Please see accompanying engineering report.