STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

CONSTRUCTION PERMIT

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

William Patterson
Owner
Sippican LLC
P.O. Box 2047
Cashiers, NC 28717

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.

September 29, 2020
Effective Date

Edward B. Galbraith

Edward B. Galbraith, Director, Division of Environmental Quality

September 28, 2022
Expiration Date

Chris Wieberg

Chris Wieberg, Director, Water Protection Program

CONSTRUCTION PERMIT

I. CONSTRUCTION DESCRIPTION

The scope of work comprises the construction of septic tanks, a preanoxic tank, a recirculation tank, one recirculating sand filter, a polishing filter with recirculation tank, chlorinator, chlorine contact tank, dechlorinator, sampling port, and outfall, and refurbishing two recirculating sand filters.

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

II. COST ANALYSIS FOR COMPLIANCE

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

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

Cost Analysis for Compliance - The Department has made a reasonable search for empirical data indicating the permit is affordable. The search consisted of a review of Department records that might contain economic data on the community, a review of information provided by the applicant as part of the application, and public comments received in response to public notices of this draft permit. If the empirical cost data was used by the permit writer, this data may consist of median household income, any other ongoing projects that the Department has knowledge, and other demographic financial information that the community provided as contemplated by Section 644. 145.3.

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 Lake Professional Engineering and as described in this permit.

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

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

5. The wastewater treatment facility shall be located at least two hundred feet (200') from any dwelling or establishment.

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

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

8. In addition to the requirements for a construction permit, 10 CSR 20-6.200 requires land disturbance activities of 1 acre or more to obtain a Missouri state operating permit to discharge stormwater. The permit requires best management practices sufficient to control runoff and sedimentation to protect waters of the state. Land disturbance permits will only be obtained by means of the Department's ePermitting system available online at dnr.mo.gov/env/wpp/epermit/help.htm. See dnr.mo.gov/env/wpp/stormwater/sw-land-disturb-permits.htm for more information.

9. A United States (U.S.) Army Corps of Engineers (COE) permit (404) and a Water Quality Certification (401) issued by the Department or permit waiver may be required for the activities described in this permit. This permit is not valid until these requirements are satisfied. If construction activity will disturb any land below the ordinary high water mark of jurisdictional waters of the U.S. then a 404/401 will be required. Since the COE makes determinations on what is jurisdictional, you must contact the COE to determine permitting requirements. You may call the Department's Water Protection Program at 573-751-1300 for more information. See dnr.mo.gov/env/wpp/401/ for more information.

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

    - Flood protection shall apply to new construction and to existing facilities undergoing major modification. The wastewater facility structures, electrical equipment, and

mechanical equipment shall be protected from physical damage by not less than the one hundred- (100-) year flood elevation. 10 CSR 20-8.140 (2) (B)

- The minimum distance between wastewater treatment facilities and all potable water sources shall be at least three hundred feet (300'). 10 CSR 20-8.140 (2) (C) 1.

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

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

- The alarm shall be activated in cases of high water levels. Follow the provisions in subsection (7)(C) of this rule for alarm systems. 10 CSR 20-8.140 (4) (D)

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

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

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

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

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

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

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

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

- Adequate provisions shall be made to effectively protect facility personnel and visitors from hazards. The following shall be provided to fulfill the particular needs of each wastewater treatment facility:
  - Fencing. Enclose the facility site with a fence designed to discourage the entrance of unauthorized persons and animals; 10 CSR 20-8.140 (8) (A)
  - Gratings over appropriate areas of treatment units where access for maintenance is necessary; 10 CSR 20-8.140 (8) (B)
  - First aid equipment; 10 CSR 20-8.140 (8) (C)
  - Posted "No Smoking" signs in hazardous areas; 10 CSR 20-8.140 (8) (D)
  - Appropriate personal protective equipment (PPE); 10 CSR 20-8.140 (8) (E)
  - 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)
  - Ventilation shall include the following:
    - Isolate all pumping stations and wastewater treatment components installed in a building where other equipment or offices are located from the rest of the building by an air-tight partition, provide separate outside entrances, and provide separate and independent fresh air supply; 10 CSR 20-8.140 (8) (J) 1.
    - Force fresh air into enclosed screening device areas or open pits more than four feet (4') deep. 10 CSR 20-8.140 (8) (J) 2.
    - Dampers are not to be used on exhaust or fresh air ducts. Avoid the use of fine screens or other obstructions on exhaust or fresh air ducts to prevent clogging; 10 CSR 20-8.140 (8) (J) 3.
    - Where continuous ventilation is needed (e.g., housed facilities), provide at least twelve (12) complete air changes per hour. Where continuous ventilation would cause excessive heat loss, provide intermittent ventilation of at least thirty (30) complete air changes per hour when facility personnel enter the area. Base air change demands on one hundred percent (100%) fresh air; 10 CSR 20-8.140 (8) (J) 4.
    - Electrical controls. Mark and conveniently locate switches for operation of ventilation equipment outside of the wet well or building. Interconnect all intermittently operated ventilation equipment with the respective wet well, dry well, or building lighting system. The manual lighting/ventilation switch is expected to override the automatic controls. For a two (2) speed ventilation system with automatic switch over where gas detection equipment is installed, increase the ventilation rate automatically in

response to the detection of hazardous concentrations of gases or vapors; 10 CSR 20-8.140 (8) (J) 5.
        - Fabricate the fan wheel from non-sparking material. Provide automatic heating and dehumidification equipment in all dry wells and buildings. 10 CSR 20-8.140 (8) (J) 6.
    - Explosion-proof electrical equipment, non-sparking tools, gas detectors, and similar devices, in work areas where hazardous conditions may exist, such as digester vaults and other locations where potentially explosive atmospheres of flammable gas or vapor with air may accumulate. 10 CSR 20-8.140 (8) (K)
    - 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)

- The materials utilized for storage, piping, valves, pumping, metering, and splash guards, etc., for chemical handling, shall be specially selected considering the physical and chemical characteristics of each hazardous or corrosive chemical. 10 CSR 20-8.140 (9) (A) 1.

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

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

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

- Recirculating media filters with a capacity of twenty-two thousand five hundred gallons per day (22,500 gpd) or less shall be located closer than the minimum distance of 200' to a neighboring residence and 50' to property line for lagoons; 200' to a neighboring residence for open recirculating media filters following primary treatment; and 50' to a neighboring residence for all other discharging facilities. See 10 CSR 20-2.010(68) for the definition of a residence. 10 CSR 20-8.180 (3) (A)

- A minimum of two (2) recirculating media filter beds and a diversion box are required for all design flows. 10 CSR 20-8.180 (3) (B)

- Dosing. Both timer and float switch controls are required; timers are the primary method of operation and the float switch control is a back-up. 10 CSR 20-8.180 (3) (C)

- The media is any of a number of physical structures whose sole purpose is to provide a surface to support biological growth. Commonly used media includes rock, gravel, and sand of various sizes, textile media, and peat. Finely crushed limestone, dolomite, slag,

any clay, limestone, or appreciable amounts of organic material is not acceptable. 10 CSR 20-8.180 (3) (E)

- Manufactured and synthetic trickling filter media material shall—
  - Be used in accordance with all manufacturer's recommendations; 10 CSR 20-8.180 (4) (B) 3. A.
  - Be insoluble in wastewater and resistant to flaking, spalling, ultraviolet degradation, disintegration, erosion, aging, common acids and alkalis, organic compounds, and biological attack; 10 CSR 20-8.180 (4) (B) 3. B.
  - Be evaluated to determine the suitability based on experience with an installation treating wastewater under similar hydraulic and organic loading conditions (include a relevant case history involving the use of the synthetic media); 10 CSR 20-8.180 (4) (B) 3. C.
  - Have a structure able to support the synthetic media, water flowing through or trapped in voids, and the maximum anticipated thickness of the wetted biofilm; 10 CSR 20-8.180 (4) (B) 3. D.
  - Support the maintenance activities, unless a separate provision is made for maintenance access to the entire top of the trickling filter media and to the distributor; 10 CSR 20-8.180 (4) (B) 3. E. and
  - Be placed with the edges matched as nearly as possible to provide consistent hydraulic conditions within the trickling filter. 10 CSR 20-8.180 (4) (B) 3. F.

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

- The materials utilized for storage, piping, valves, pumping, metering, and splash guards, etc., for chemical handling, shall be specially selected considering the physical and chemical characteristics of each hazardous or corrosive chemical. 10 CSR 20-8.140 (9) (A) 1.

- Alarm System for chlorination and dechlorination systems. The applicant shall conform to 10 CSR 20-8.140(7)(C) and be responsible for specifying what the alarm requirements are necessary to assure consistent disinfection in compliance with the applicable bacteria limits and the disinfection residual limit in the effluent. 10 CSR 20-8.190 (3) (C)

- Effluent twenty-four (24) hour composite automatic sampling equipment shall be provided at all mechanical wastewater treatment facilities and at other facilities where necessary under provisions of the operating permit. 10 CSR 20-8.190 (3) (D)

- Solid dechlorination systems shall not be located in the chlorine contact tank. 10 CSR 20-8.190 (4) (B) 1.

- Contact time. A minimum of thirty (30) seconds for mixing and contact time of dechlorination systems shall be provided at the design peak hourly flow or maximum rate of pumpage. 10 CSR 20-8.190 (4) (B) 2.

- 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.

- Filtration Rates and Hydraulics for cloth/disc filters shall be able to treat the design flow rate with one (1) filter unit in backwash mode. 10 CSR 20-8.210 (3) (E) 2. B.

11. Upon completion of construction:

A. L. Horizons Homeowners, Inc. will become the continuing authority for operation and maintenance of these facilities;

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

C. Submit the eDMR permit Holder and Certifier Registration, Form--MO 780-2204 to comply with your operating permit; and

D. Submit the enclosed form Statement of Work Completed to the Department in accordance with 10 CSR 20-6.010(5)(N) and submit a Form B - Application for an Operating Permit for Domestic or Municipal Wastewater (≤100,000 gallons per day) and fee of $300 to the Engineering Section of the Water Protection Program 60 days prior to operation. Identify that the application is for a General Permit for Discharging Less Than or Equal to 50,000 GPD of Domestic Wastewater, MO-GD00000.

IV. REVIEW SUMMARY

1. CONSTRUCTION PURPOSE

The Lake Horizons WWTF is being constructed to treat domestic wastewater from a residential subdivision in Gravois Mills, MO. The Lake Horizons WWTF will treat approximately 6,600 gpd and a 89 PE and will discharge to the Lake of the Ozarks.

2. FACILITY DESCRIPTION

The Lake Horizons WWTF is located at Lake Horizons Road, Gravois Mills, in Camden County, Missouri. The facility has a design average flow of 6,600 gpd and serves an organic population equivalent of approximately 89 people. The scope of work comprises the construction of septic tanks, a preanoxic tank, a recirculation tank, one recirculating sand filter, a polishing filter with recirculation tank, chlorinator, chlorine contact tank, dechlorinator, sampling port, and outfall. Two existing recirculating sand filters at the site will be refurbished for the Lake Horizons WWTF.

3. COMPLIANCE PARAMETERS

The proposed project is required to meet the requirements of MOGD - New Table E-1 with an expiration date of June 30, 2024. The facility will be required to meet the effluent limits identified in the following table.

Lake Horizons MOGD - New Effluent Limits Table E-1 – Outfalls to Lakes

PARAMETER	UNITS	DAILY MAXIMUM	WEEKLY AVERAGE	MONTHLY AVERAGE	BASIS FOR LIMIT (NOTE 1)	MONITORING FREQUENCY
FLOW	GPD	*		*	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 RESIDUAL CHLORINE (NOTE 3)	µG/L	17 (<130)		8 (<130)	FSR	ONCE/QUARTER
DISSOLVED OXYGEN (NOTE 3)	MG/L	*		*	FSR	ONCE/QUARTER
TOTAL PHOSPHORUS (NOTE 2)	MG/L	*		0.5	FSR	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 – Disinfection. Total Residual Chlorine (TRC) and Dissolved Oxygen (DO).
The calculated effluent limits for TRC are below th Minimum Quantification Level (ML) of the most common and practical U.S. Environmental Protection Agency (EPA) approved CLTRC methods. The Department has determined the current acceptable ML for TRC to be 130 µg/L when using the DPD Colorimetric Method #4500 – CL G, from Standard Methods for the Examination of Waters and Wastewater. The facility will conduct analyses in accordance with this method, or equivalent, and report actual analytical values. Measured values greater than or equal to the ML of 130 µg/L will be considered violations of the permit

and values less than the ML of 130 µg/L will be considered to be in compliance with the permit limitation. The ML does not authorize the discharge of chlorine in excess of the effluent limits stated in the permit.

4. ANTIDEGRADATION

The Department has reviewed the antidegradation report for this facility and issued the Water Quality and Antidegradation Review dated February 3, 2020, due to the permitted new construction of a wastewater treatment facility. See **APPENDIX – ANTIDEGRADATION**.

5. REVIEW of MAJOR TREATMENT DESIGN CRITERIA

Construction will cover the following items:

- Components are designed for a Population Equivalent of 89 based on organic loading to the system.

- Septic Tank – A septic tank provides passive primary treatment as the settleable solids in raw wastewater settle onto the bottom of the tank. Raw wastewater will flow by gravity to a minimum 1,000 gallon septic tank for each lot. The septic tanks provide approximately 2.7 days of detention at design average flow. The pumped wastewater shall discharge into the pre-anoxic tank. Settled solids in the septic tank shall be removed by a contract hauler.
  - Pre-Anoxic Tank – Construction of one anoxic tank to receive primary treated wastewater from the septic tanks before the recirculating media filter recirculation tank. The anoxic tank is 10 ft x 20 ft x 7 ft deep with a water level depth of 6 ft for a wastewater volume of approximately 8,976 gallons. Gravity transfers wastewater from the anoxic tank to the first zone of the recirculating media filter by means of a 4-inch SDR 35 PVC pipe.
  - Recirculation Tank – Construction of one recirculation tank to pump primary treated wastewater to the recirculating media filter. The recirculation tank is 10 ft x 20 ft x 6 ft deep with a minimum water level depth of 22 inches for a total wastewater volume of approximately 8,976 gallons and a mimimum water level volume of 2,743 gallons. Effective flow equalization volume of 4,114 gallons between the low water level and the high water "on" level. The recirculation tank has 3 – 1 HP submersible pumps – each capable of 25 gpm at 48.9 ft TDH. Each pump transfers wastewater to one of three separate zones of the recirculating media filter by means of a 1.5-inch PVC distribution manifold which splits the flow into 12, 1.5-inch PVC laterals per zone.

- Recirculating Media Filter – The concrete lined recirculating media filter is split into three filter beds with common walls. Two existing filters will be refurbished and one new filter will be constructed. Each filter bed is approximately 36 ft x 24 ft x 4.8 ft deep each for a total surface area of 2,592 ft^2 which gives a total hydraulic loading of 2.57 gpd/ft^2 at design average flow. The PVC laterals spaced 2-ft apart with 18, 1/8-inch shielded orifices per lateral. The laterals are located in the bottom 2 inches of the top 10-inch layer of 1/2-inch washed creek rock. The

filter media layer is 2.5 ft deep containing media with an effective size of 1.5 mm to 3 mm and a uniformity coefficient less than 3.0. The underdrain layer has a | 2-inch layer of 3/8-inch washed creek rock on top of a 3-inch layer of 5/8-inch washed creek rock on top of a 3-inch layer of 1-inch washed creek rock on top of an 8-inch layer of 2-inch washed creek rock to cover the drain lines. Each filter bed contains 2 underdrains comprised of 4-inch slotted PVC piping with approximately 4 inch spacing. In each filter bed, 2 underdrains flow by gravity to the recirculation valve with 80% of the flow returning to the recirculation tank and 20% flows by gravity to the Stage II Recirculation Tank achieving a 4:1 recirculation ratio.

- Stage II Recirculation Tank – Construction of one recirculation tank to pump secondary treated wastewater to the Orenco Advantex AX100 Polishing Filter. The recirculation tank is 2,000 gallons. The recirculation tank has a submersible pump capable of 50 gpm. The pump transfers wastewater to the Orenco AdvanTex AX100 Polishing Filter by means of a 1.5-inch PVC schedule 40 pipng.

- Orenco AdvanTex AX100 Polishing Filter – Installation of a Orenco AdvanTex AX100 Polishing Filter. The unit is capable of treating an average design flow of 6,600 gpd. The unit has a textile filter assembly with a total filtration area of 100 ft^2. Polishing filtration shall follow clarification prior to disinfection.

- Disinfection – Disinfection is the process of removal, deactivation, or killing of pathogenic microorganisms.
  - Tablet Chlorinator – Installation of a tablet Norweco 2000 Chlorinator chamber receiving clarified effluent and prior to the chlorine contact tank. The tablet chlorinator shall have a design flow of 6,660 gpd and a maximum flow of 26,640 gpd. The system will dispense hypochlorite as the wastewater comes into contact with the tablets.
  - Chlorine Contact Tank – Installation of a pre-cast concrete tank approximately 7.4 ft x 7.4 ft x 6.1 ft with 7 end-around baffles allowing for a 40:1 length to width ratio. This tank will allow for a 15 minute contact time during a peak flow of 26,640 gpd.
  - Tablet Dechlorinator – Installation of a tablet Norweco 2000 dechlorination chamber receiving the chlorinated effluent and prior to Outfall No. 001. The tablet dechlorinator shall have a design flow of 6,660 gpd and a maximum flow of 26,640 gpd. The system will dispense sodium sulfite as the wastewater comes into contact with the tablets.

6. OPERATING PERMIT

After completion of construction project submit: statement of work completed, as-builts if the project was not constructed in accordance with previously submitted plans and specifications, and ensure that Application Form B, and fee of $300 has

been submitted. Missouri State Operating Permit, General Permit MOGD - New, 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

Steven Hamm, P.E.
Engineering Section
steven.hamm@dnr.mo.gov

Cindy LePage, P.E., Chief
Engineering Section
cindy.lepage@dnr.mo.gov

APPENDIX

ANTIDEGRADATION

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

FEB 0 3 2020

James O. Jackson, Jr., P.E.
Lake Professional Engineering Services, Inc.
PO Box 27
Camdenton, MO 65020

RE: Water Quality and Antidegradation Review Preliminary Determination for Lake Horizons Wastewater Treatment Facility

Dear James Jackson, Jr., P.E.:

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

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

The WQAR does not specify a specific treatment technology, but instead, allows you to pursue construction of a treatment option that will meet the effluent limits provided in the review. If you choose to install a treatment system that is considered a new technology, your construction permit must address the approvability of the design in accordance with the factsheet Approval Process for Innovative Technology available at http://dnr.mo.gov/pubs/pub2453.htm. With a new technology you will need to work with the construction permit review engineer to ensure equipment is sized properly and that the technology will consistently achieve the proposed effluent limits. The Department encourages the use of new methods and treatment innovations. If you have any questions regarding the new technology factsheet, please contact the engineering section of the Water Protection Program.

You may proceed with submittal of an engineering report/facility plan for this project. Upon completion of that review the next step will be to submit a complete application for a construction permit. An operating permit application will also be required 180 days prior to expected discharge. These submittals must reflect the design flow, facility description, and general treatment components of this WQAR or this preliminary determination may have to be revisited. In addition to one set of paper copies (two sets of paper copies for projects seeking Department funding under 10 CSR 20-4), the regulation now requires all

materials to be submitted electronically as well. This is typically done via compact disc or other removable electronic media.

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

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

If you should have questions regarding the enclosed WQAR, please contact Steve Hamm by telephone at (573) 526-1002 by e-mail at steven.hamm@dnr.mo.gov, or by mail at the Missouri Department of Natural Resources, Water Protection Program, P.O. Box 176, Jefferson City, Missouri 65102-0176.

Sincerely,

WATER PROTECTION PROGRAM

Refaat Mefrakis

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RM:sht

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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 Lake Horizons Wastewater Treatment Facility in Gravois Mills, Missouri

January, 2020

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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% 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.

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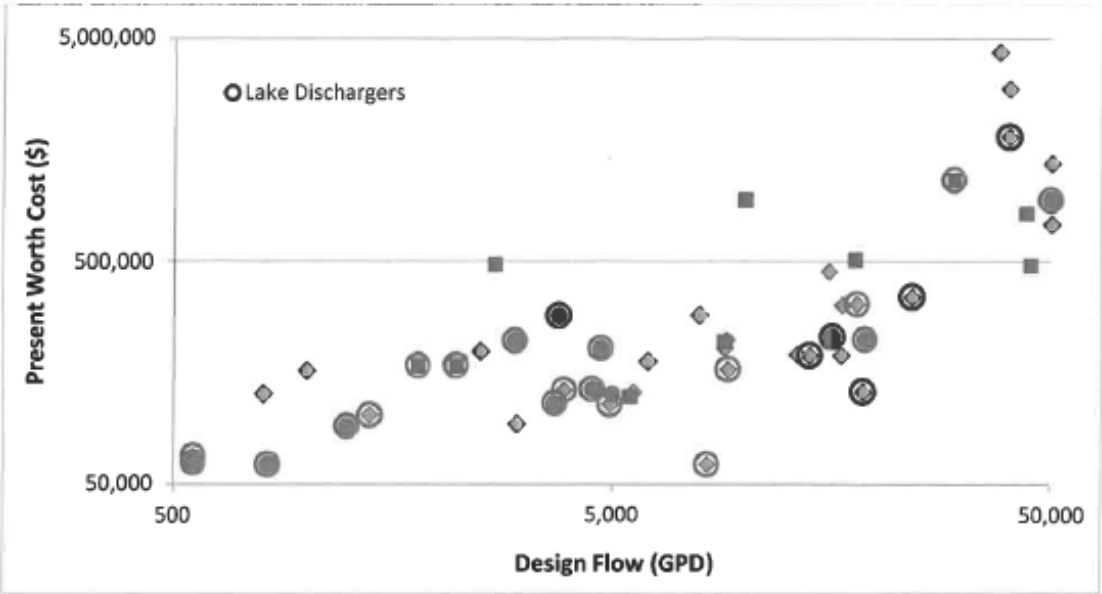
FIGURE 1. DESIGN FLOW VS. PRESENT WORTH COST VS. AMMONIA LIMITS



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

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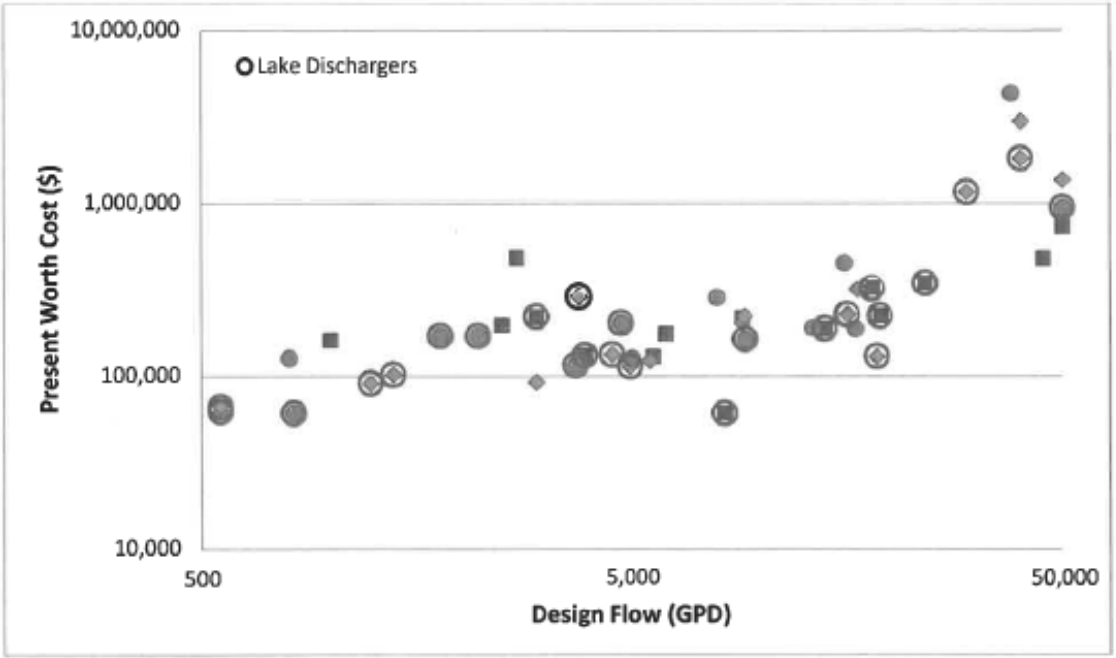
FIGURE 2. DESIGN FLOW VS. PRESENT WORTH COST VS. BOD & TSS LIMITS



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.

8.1. Limit Derivation

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

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

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

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

- **Total Suspended Solids (TSS).**
  Table 3: TSS limits of 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.

9. ANTIDEGRADATION REVIEW PRELIMINARY DETERMINATION

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

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

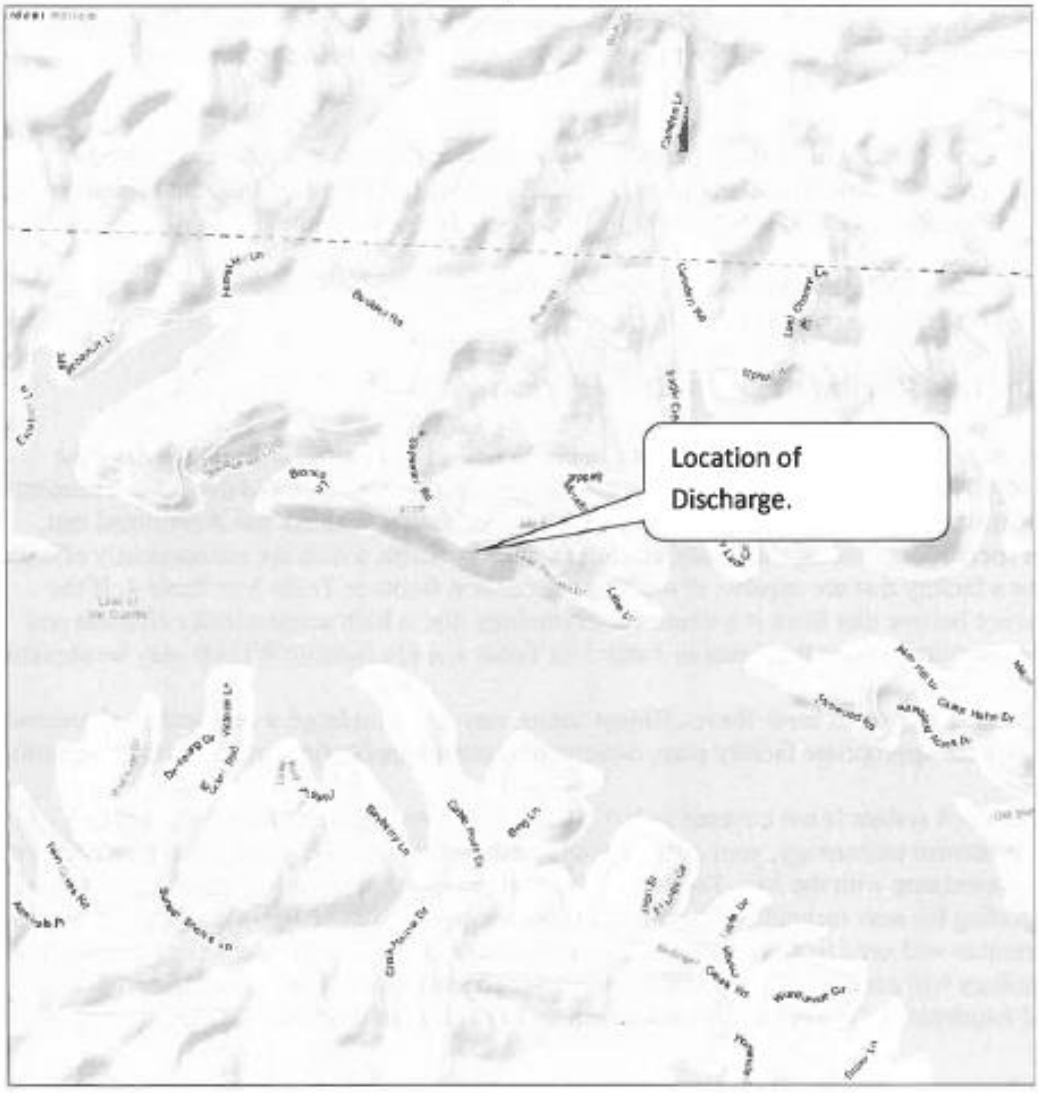
If the proposed treatment system is not covered in 10 CSR 20-8 Minimum Design Standards and is considered a new treatment technology, your construction permit application must address approvability of the technology in accordance with the *New Technology Definitions and Requirements* factsheet. If you 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.

Appendix A: Map of Discharge Location

(A USGS topographic map can be obtained on the web at the department's map viewer.)

The National Map Advanced Viewer



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

LWE19097
Camden County

August 01, 2019

Jim Jackson, Jr
PO Box 27
Camdenton, MO 65020

RE: Lake Horizons WWTP

Dear Jim Jackson, Jr:

On June 28, 2019, the Missouri Geological Survey received a request to perform a geohydrologic evaluation for the above referenced project located in Camden County. Included with this letter is a report that details the geologic and hydrologic conditions at the site and the potential for groundwater contamination in the event of wastewater treatment failure.

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

Sincerely,

MISSOURI GEOLOGICAL SURVEY

Molly A. Starkey

Molly Starkey
Geologist
Environmental Geology Section

STATE OF MISSOURI
MOLLY A. STARKEY
REGISTERED GEOLOGIST

08/01/2019

c: Sippican , LLC
WPP
Southwest Regional Office

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

Project ID Number
LWE19097
County
Camden

Request Details

Project: Lake Horizons WWTP

Legal Description: 34 T40N R18W
Quadrangle: Bollinger Creek
Latitude: 38 11 4.43
Longitude: -92 54 28.01

Organization Official
Name: Sippican , LLC
Address: PO Box 2047
City: Cashiers
State: NC Zip: 28717
Phone: 999-999-9999
Email:

Proponer
Name: Jim Jackson, Jr
Address: PO Box 27
City: Camdenton
State: MO Zip: 65020
Phone: 573-873-3898
Email:

Project Details

Report Date: 08/01/2019
Date of Field Visit: 07/11/2019

Previous Reports: Not Applicable

Facility Type
- [ ] Mechanical treatment plant
- [x] 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
- [ ] <4%
- [ ] 4% to 8%
- [ ] 8% to 15%
- [x] >15%

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

Bedrock: Ordovician-age Gasconade Dolomite

Surficial Materials: Very stony residual silt loam

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

Project ID Number
LWE19097
County
Camden

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

Remarks:

On July 11, 2019 a geologist with the Missouri Geological Survey (MGS) performed a geohydrologic evaluation for a proposed recirculating filter bed system in Camden County at Lake of the Ozarks. The proposed wastewater treatment facility will reportedly discharge into an unnamed tributary which flows southwest immediately into Lake of the Ozarks. The purpose of the evaluation was to determine the groundwater contamination potential in the event of treatment failure.

Uppermost bedrock at the site was identified as Ordovician-age Gasconade Dolomite, including chert replaced 'crypt reef' algal structures, which serve as a local marker bed approximately 6 feet above the Gunter Sandstone Member. The Gasconade Dolomite in this area has moderate to high permeability.

Surficial materials were a thin layer of very gravelly residuum derived from the dolomite bedrock with high permeability. The observed thickness of surficial materials at the site ranged from 6 inches to approximately 1 foot.

Lake of the Ozarks is considered gaining for discharge purposes. There are no known sinkholes or springs within one mile of the proposed facility.

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 the surface waters of the Lake of the Ozarks may be adversely impacted.

Appendix B: Natural Heritage Review

(Applicant must check for rare and endangered aquatic species that may be affected by the discharge. The Department of Conservation maintains a "Missouri Natural Heritage Review Website" where you can request the necessary information. The results of the survey must indicate whether there are known endangered species on the site.)

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 One Report: No Known Records

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: Lake Horizons Waste Water Treatment Facility #6764
User Project Number: ACT671
Project Description: , 38 11 4.43/-92 54 28.01, Tributary to Lake of the Ozarks, Camden
Project Type: Waste Transfer, Treatment, and Disposal, Liquid waste/Effluent, Wastewater treatment plant, Construction or expansion
Contact Person: Steven Hamm
Contact Information: steven.hamm@dnr.mo.gov or 573-526-1002

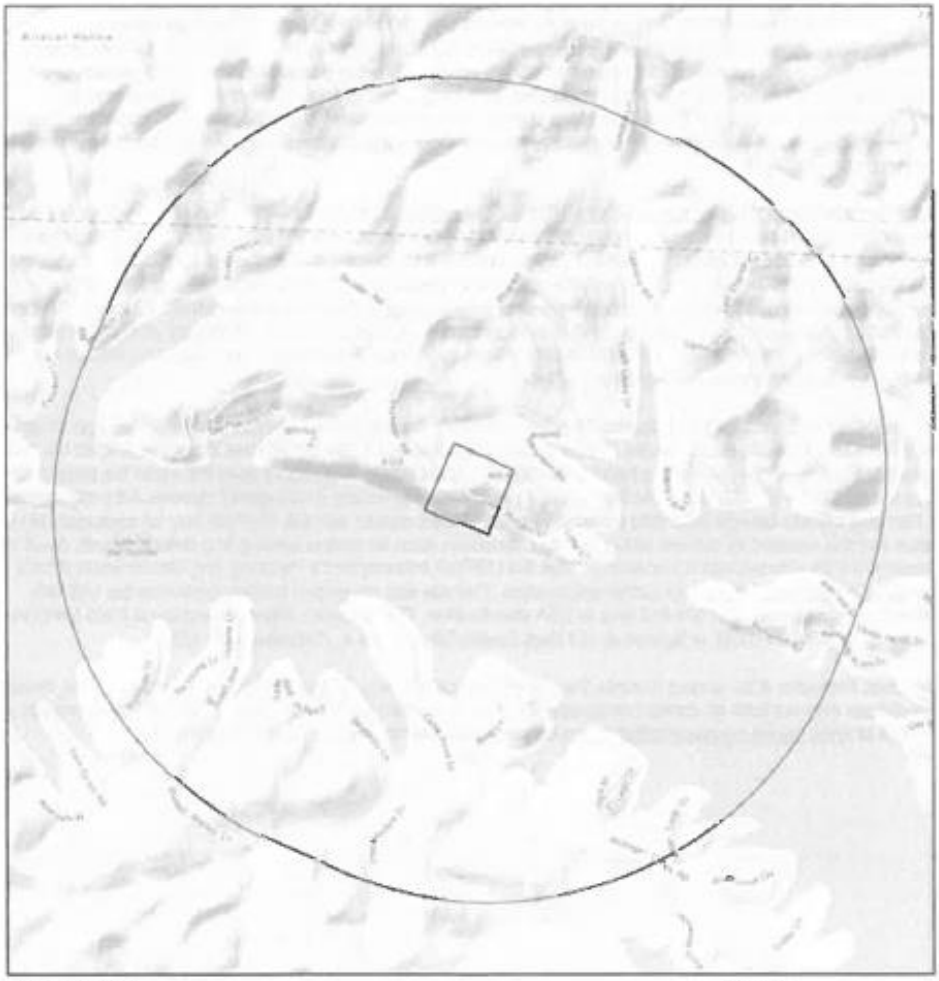
Disclaimer: The NATURAL HERITAGE REVIEW REPORT produced by this website identifies if a species tracked by the Natural Heritage Program is known to occur within or near the area submitted for your project, and shares suggested recommendations on ways to avoid or minimize project impacts to sensitive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

Lake Horizons Waste Water Treatment Facility



January 9, 2020

1:21,025

0 0.175 0.35 0.7 mi

0 0.275 0.55 1.1 km

Project Boundary

Buffered Project Boundary

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 no known records for Species or Natural Communities of Conservation Concern within the defined Project Area.

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

The project location submitted and evaluated is within the range of the Gray Myotis (i.e., Gray Bat) in Missouri. Depending on habitat conditions of your project's location, Gray Myotis (*Myotis grisescens*, federal and state-listed endangered) could occur within the project area, as they forage over streams, rivers, lakes, and reservoirs. Avoid entry or disturbance of any cave inhabited by Gray Myotis and when possible retain forest vegetation along the stream and from the cave opening to the stream. See http://mdc.mo.gov/104 for best management recommendations.

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 C: 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 Summary / Request form: No changes.

2) Antidegradation Review Submittal: Voluntary Tier 2 – Significant Degradation for Domestic Wastewater Facilities with Design Flow Less Than 50,000 Gallons Per Day:
    a. Regionalization and No Discharge Form, Geohydrologic Evaluation, and Missouri Natural Heritage Review were used in this Antidegradation Review.

3) Antidegradation: Regionalization and No-Discharge Evaluation: No changes

RECEIVED
ACT671
Water Protection Program

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM
ANTIDEGRADATION REVIEW SUMMARY
TIER DETERMINATION AND EFFLUENT LIMIT SUMMARY

1. FACILITY

NAME		TELEPHONE NUMBER WITH AREA CODE
Lake Horizons WWTF		828-743-5225
ADDRESS (PHYSICAL)	CITY	STATE / ZIP CODE
Lake Horizons Drive	Gravois Mills	MO / 65037

2. RECEIVING WATER BODY SEGMENT #1

NAME
Lake of the Ozarks

2.1 UPPER END OF SEGMENT (Location of discharge)
UTM ____ OR Lat N38° 11.16 Long W92° 54.42'
2.2 LOWER END OF SEGMENT
UTM ____ OR Lat ____ Long ____

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

3. WATER BODY SEGMENT #2 (IF APPLICABLE)

NAME

3.1 UPPER END OF SEGMENT
UTM ____ OR Lat ____ Long ____
3.2 LOWER END OF SEGMENT
UTM ____ OR Lat ____ Long ____

4. WATER BODY SEGMENT #3 (IF APPLICABLE)

NAME

4.1 UPPER END OF SEGMENT
UTM ____ OR Lat ____ Long ____
4.2 LOWER END OF SEGMENT
UTM ____ OR Lat ____ Long ____

5. PROJECT INFORMATION

Is the receiving water body an Outstanding National Resource Water, an Outstanding State Resource Water, or drainage thereto?

☐ Yes ☒ No

In Tables D and E of 10 CSR 20-7.031, Outstanding National Resource Waters and Outstanding State Resource Water are listed. Per the Antidegradation Implementation Procedure Section 1.B.3., "any degradation of water quality is prohibited in these waters unless the discharge only results in temporary degradation." Therefore, if degradation is significant or minimal, the Antidegradation Review will be denied.

Will the proposed discharge of all pollutants of concern, or POCs, result in no net increase in the ambient water quality concentration of the receiving water after mixing?

☐ Yes ☑ No

If yes, submit a summary table showing the levels of each pollutant of concern before and after the proposed discharge in the receiving water and then complete Attachment B for the first downstream classified water body segment.

Will the discharge result in temporary degradation?

☐ Yes ☒ No

If yes, complete Attachment C.

Has the project been determined as non-degrading?

☐ Yes ☑ No

If yes, complete No Degradation Evaluation – Conclusion of Antidegradation Review form.
Submit with the appropriate Construction Permit Application as no antidegradation review is required

If yes to one of the above questions, skip to Section 8 - Wet Weather.

MO 780-2085 (05-09)

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6. EXISTING WATER QUALITY DATA OR MODEL SUMMARY

Obtaining Existing Water Quality is possible by three methods according to the Antidegradation Implementation Procedure Section II.A.1.: (1) using previously collected data with an appropriate Quality Assurance Project Plan, or QAPP (2) collecting water quality data by approved the Missouri Department of Natural Resources methodology or (3) using an appropriate water quality model. QAPPs must be submitted to the department for approval well in advance (six months) of the proposed activity. Provide all the appropriate corresponding data and reports which were approved by the department Water Quality Monitoring and Assessment Section.

Date existing water quality data was provided by the Water Quality Monitoring and Assessment Section:

Approval date of the QAPP by the Water Quality Monitoring and Assessment Section:

Approval date of the project sampling plan by the Water Quality Monitoring and Assessment Section:

Approval date of the data collected for all appropriate pollutants of concern by the Water Quality Monitoring and Assessment Section:

Comments/Discussion:

None

7. POLLUTANTS OF CONCERN AND TIER DETERMINATION(S)

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

Water Body Segment One
Pollutants of Concern and Tier Determination(s)

Tier 1	Tier 2 with Minimal Degradation	Tier 2 with Significant Degradation
		DO*
		Fecal*
		Ammonia*
		TSS*
		BOD-5*

Note: Add an asterisk to items that you only assume are Tier 2 with significant degradation.

Water Body Segment Two
Pollutants of Concern and Tier Determination(s)

Tier 1	Tier 2 with Minimal Degradation	Tier 2 with Significant Degradation

- For pollutants of concern that are Tier 2 with significant degradation, complete Attachment A.
- For pollutants of concern that are Tier 2 with minimal degradation, complete Attachment B.
- For pollutants of concern that are Tier 1, complete Attachment D. Additionally, a Tier 2 review must be conducted for each pollutant of concern on the appropriate water body segment.

8. WET WEATHER ANTICIPATIONS

If an applicant anticipates excessive inflow or infiltration and pursues approval from the department to bypass secondary treatment, a feasibility analysis is required. The feasibility analysis must comply with the criteria of all applicable state and federal regulations including 40 CFR 122.41(m)(4). Attach the feasibility analysis to this report.

What is the Wet Weather Flow Peaking Factor in relation to design flow?
1

Wet Weather Design Summary:
No infiltration

MO 780-2031 (06-08)

9. SUMMARY OF THE PROPOSED ANTIDEGRADATION REVIEW EFFLUENT LIMITS

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

Pollutant of Concern	Units	Wasteload Allocation	Average Monthly Limit	Daily Maximum Limit
BOD5	mg/L		10	
TSS	mg/L		15	
Dissolved Oxygen	mg/L		5	
Ammonia			4.6/4.6	
Bacteria (E. Coli)	#Col/100mg		126	
Fecal	#Col/100mg		400	

These proposed limits must not violate water quality standards, be protective of beneficial uses and achieve the highest statutory and regulatory requirements.

Attach the Antidegradation Review report and all supporting documentation.

CONSULTANT: I have prepared or reviewed this form and all attached reports and documentation. The conclusion proposed is consistent with the Antidegradation Implementation Procedure and current state and federal regulation.

SIGNATURE — DATE: 7/1/2019

NAME AND OFFICIAL TITLES: Jmes O. Jackson, Jr., PE

COMPANY NAME: Lake Professional Engineering Services

ADDRESS	CITY	STATE	ZIP CODE
PO Box 27	Camdenton	MO	65020

TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
573-873-3898	

OWNER: I have read and reviewed the prepared documents and agree with this submittal.

X SIGNATURE: W. O. Patterson, Mgr. Mem. Sippican, LLC — DATE: 6/12/2019

NAME AND OFFICIAL TITLES: Bill Patterson

ADDRESS	CITY	STATE	ZIP CODE
PO Box 2047	Cashiers	NC	28717

TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
828-743-5225	

CONTINUING AUTHORITY: Continuing Authority is the permanent organization that will be responsible for the operation, maintenance and modernization of the facility. The regulatory requirement regarding continuing authority is found in 10 CSR 20-6.010(3) available at www.sos.mo.gov/adrules/csr/current/10csr/10c20-6a.pdf

I have read and reviewed the prepared documents and agree with this submittal.

X SIGNATURE: W. O. Patterson, Mgr. Mem. Sippican, LLC — DATE: 6/12/2019

NAME AND OFFICIAL TITLES: Bill Patterson

ADDRESS	CITY	STATE	ZIP CODE
PO Box 2047	Cashiers	NC	28717

TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
828-743-5225	

MO 780-2035 (06-09)

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MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH
ANTIDEGRADATION REVIEW SUMMARY FOR PUBLIC NOTICE
ATTACHMENT A: TIER 2 – SIGNIFICANT DEGRADATION

1. FACILITY

NAME		TELEPHONE NUMBER WITH AREA CODE	
Lake Horizons WWTP		(828) 743-5225	
ADDRESS (PHYSICAL)	CITY	STATE	ZIP CODE
Lake Horizons Road	Gravois Mills	MO	65037

2. OWNER

NAME AND OFFICIAL TITLES			
Sippican, LLC			
ADDRESS	CITY	STATE	ZIP CODE
PO Box 2047	Cashiers	NC	28717
TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS		
(828) 743-5225			

3. CONTINUING AUTHORITY The regulatory requirement regarding continuing authority is found in 10 CSR 20-6.010(3) available at www.sos.mo.gov/adrules/csr/current/10csr/10c20-6a.pdf.

NAME AND OFFICIAL TITLES			
Lake Horizons Homeowners Association			
ADDRESS	CITY	STATE	ZIP CODE
PO Box 2047	Cashiers	MO	28717
TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS		
(828) 743-5225			

4. RECEIVING WATER BODY SEGMENT #1

NAME
Unnamed Tributary to the Lake of the Ozarks 38D11.16 92D54.42

4.1 UPPER END OF SEGMENT (Location of discharge)
UTM ____ OR Lat N38° 11.16' Long W92° 54.42'

4.2 LOWER END OF SEGMENT
UTM ____ OR Lat ____, Long ____

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

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

NAME

5.1 UPPER END OF SEGMENT
UTM ____ OR Lat ____, Long ____

5.2 LOWER END OF SEGMENT
UTM ____ OR Lat ____, Long ____

6. WET WEATHER ANTICIPATIONS

If an applicant anticipates excessive inflow or infiltration and pursues approval from the department to bypass secondary treatment, a feasibility analysis is required. The feasibility analysis must comply with the criteria of all applicable state and federal regulations including 40 CFR 122.41(m)(4). Attach the feasibility analysis to the antidegradation review report.

What is the Wet Weather Flow Peaking Factor in relation to design flow? 1

Wet Weather Design Summary:
No Infiltration

MO 780-2321 (02/13) Page 1

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7. EXISTING WATER QUALITY DATA OR MODEL SUMMARY

Obtaining Existing Water Quality is possible by three methods according to the Antidegradation Implementation Procedure Section II.A.1.: (1) using previously collected data with an appropriate Quality Assurance Project Plan, or QAPP (2) collecting water quality data approved by the Missouri Department of Natural Resources methodology or (3) using an appropriate water quality model. QAPPs must be submitted to the department for approval well in advance (six months) of the proposed activity. Provide all the appropriate corresponding data and reports which were approved by the department Watershed Protection Section. Additional information needed with the EWQ data includes: 1) Date existing water quality data was provided by the Watershed Protection Section, 2) Approval date by the Watershed Protection Section of the QAPP, project sampling plan, and data collected for all appropriate POCs.

Comments/Discussion:

8. SUMMARY OF THE POLLUTANTS OF CONCERN AND THE PROPOSED 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).

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

Pollutants of Concern*	Units	Wasteload Allocation	Average Monthly Limit	Daily Maximum Limit
BOD5	MG/L		10	
TSS	MG/L		15	
DISSOLVED OXYGEN	MG/L		5	
AMMONIA	MG/L		4.6/4.6	
BACTERIA (E. COLI)	CFUS		126	

Proposed limits must not violate water quality standards, be protective of beneficial uses, and achieve the highest statutory and regulatory requirements.

*Assumed Tier 2.

9. IDENTIFYING ALTERNATIVES

Supply a summary of the alternatives considered and the level of treatment attainable with regards to the alternative. "For Discharges likely to cause significant degradation, an analysis of non-degrading and less-degrading alternatives must be provided," as stated in the Antidegradation Implementation Procedure Section II.B.1. Per 10 CSR 20-6.010(4)(D)1., the feasibility of a no-discharge system must be considered. Attach all supportive documentation in the Antidegradation Review report.

Applicants choosing to use a new wastewater technology that are considered an "unproven technology" in Missouri in their Tier 2 Reviews with alternative analysis must comply with the requirements set forth in the *New Technology Definitions and Requirements Factsheet* that can be found at. http://dnr.mo.gov/pubs/pub2463.pdf.

Non-degrading alternatives: Land Application; On-site Septic System

Alternatives ranging from less-degrading to degrading including Preferred Alternative
(All treatment levels for POCs must at a minimum meet water quality standards):

Alternatives	Level of Treatment Attainable for each Pollutant of Concern					
	BOD5	TSS	AMMONIA AS N	E Coli	DO	
	(MG/L)	MG/L	MG/L	#/100mL	mg/L	
Delta EcoPOD	20	20	4.6/4.6	126	5	
Bio-Microbics	20	20	4.6/4.6	126	5	
Extended Aeration	20	20	4.6/4.6	126	5	
Sand Filter	10	15	4.6/4.6	126	5	
Zabel SCAT	10	15	4.6/4.6	126	5	
Orenco Advantex	10	15	4.6/4.6	126	5	
Membrane Reactor	1	2	1.0/2.5	126	5	

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10. DETERMINATION OF THE REASONABLE ALTERNATIVE

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

Practicability Summary:

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

Land application, on-site treatment, subsurface irrigation, and subsurface treatment were found to be not technically feasible. EcoPOD and Microfast were also found to be not technically feasible. Fabric filter, sand filter, and extended aeration were all found to meet effective and reliability issues as well as environmental factors.

Economic Efficiency Summary:

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

Present worth economic analysis showed the cost effective alternative to be a Sand Filter.

Affordability Summary:

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

Not Performed

Preferred Chosen Alternative:

Sand filter

Reasons for Rejecting the other Evaluated Alternatives:

Infrastructure already installed from previous permit. Recirculation tank and sand filter bed structure already installed from previous permit.

Comments/Discussion:

All alternatives are capable of meeting water quality standards.

Department's Alternatives Analysis – Lake Horizons WWTF
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11. SOCIAL AND ECONOMIC IMPORTANCE OF THE PREFERRED ALTERNATIVE

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

Identify the affected community:

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

Vacationers and people who enjoy the Lake of the Ozarks as well as the landowners adjoining and surrounding the Lake of the Ozarks.

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

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

Maintaining and possibly increasing the tax base to the community

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

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

The lots being served by this proposed treatment facility are located on very steep lots with very shallow soils. The use of on-site septic systems under these conditions are likely to fail. Failure of an on-site septic system will more than likely discharge untreated sewage into the Lake of the Ozarks

PROPOSED PROJECT SUMMARY:

Provide treatment for 88 houses for working class families. Provide monitored sewage treatment at acceptable discharge levels utilizing a sand filter. 24

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

CONSULTANT: I have prepared or reviewed this form and all attached reports and documentation. The conclusion proposed is consistent with the Antidegradation Implementation Procedure and current state and federal regulations.

SIGNATURE		DATE
		7/2019

NAME AND OFFICIAL TITLE (LICENSE #)	COMPANY NAME		
James O. Jackson, Jr., PE PE-2003014984	Lake Professional Engineering Services, Inc.		
ADDRESS	CITY	STATE	ZIP CODE
PO Box 27	Camdenton	MO	65020
TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS		
(573) 873-3866			

OWNER: I have read and reviewed the prepared documents and agree with this submittal.

SIGNATURE	DATE
W. A. Patton, Mgr. Mem. Sunroad LLC	6/12/2019

CONTINUING AUTHORITY: I have read and reviewed the prepared documents and agree with this submittal.

SIGNATURE	DATE
W. A. Patton, Mgr. Mem. Sunroad, LLC	6/12/2019

MO 780-2037 (02-15) Page 1

Department's Alternatives Analysis – Lake Horizons WWTF
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RECEIVED

Water Protection Program

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH
ANTIDEGRADATION REVIEW SUBMITTAL
VOLUNTARY TIER 2 – SIGNIFICANT DEGRADATION FOR DOMESTIC WASTEWATER FACILITIES WITH DESIGN FLOW LESS THAN 50,000 GALLONS PER DAY

FOR DEPARTMENT USE ONLY	
APP NO.	
CHECK NO.	CHECK NO.
DATE RECEIVED	12-13-19

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	
Lake Horizons WWTP		Camden	
ADDRESS (PHYSICAL)	CITY	STATE	ZIP CODE
Lake Horizons Road	Gravois Mills	MO	65037

3. OWNER

NAME			
Sippican, LLC			
ADDRESS	CITY	STATE	ZIP CODE
PO Box 2047	Cashiers	NC	28717
EMAIL ADDRESS	TELEPHONE NUMBER WITH AREA CODE		

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

NAME	SECRETARY OF STATE CHARTER NUMBER		
Lake Horizons Homeowners Association			
ADDRESS	CITY	STATE	ZIP CODE
PO Box 2047	Cashiers	NC	28717
EMAIL ADDRESS	TELEPHONE NUMBER WITH AREA CODE		

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5. RECEIVING WATER BODY SEGMENT #1

NAME
Unnamed Tributary to the Lake of the Ozarks 38D11.16 92D54.42

5.1 Upper end of segment – Location of discharge
UTM: X= _____, Y= _____ OR Lat 38D11.16, Long 92D54.42

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

6. WATER BODY SEGMENT #2 (If Necessary)

NAME

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

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

7. SOCIAL AND ECONOMIC IMPORTANCE OF THE PREFERRED ALTERNATIVE

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

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

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

Vacationers and people who enjoy the Lake of the Ozarks as well as the landowners adjoining and surrounding the Lake of the Ozarks.

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	☐ Yes	☑ No	☐ Don't know	☐ N/A

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

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

The lots being served by this proposed treatment facility are located on very steep lots with very shallow soils. The use of on-site septic systems under these conditions are likely to fail. Failure of an on-site septic system will more than likely discharge untreated sewage into the Lake of the Ozarks.

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

☑ No

☐ Yes

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

8. NO DISCHARGE ALTERNATIVES EVALUATION

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

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

9. IDENTIFY PREFERRED TREATMENT ALTERNATIVE

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

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

Sand filter with an Advantex AX100 polishing filter

ENGINEERING CONSULTANT NAME:	COMPANY NAME
James O. Jackson, Jr.	Lake Professional Engineering Services

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18. 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 ☐ JEPPAY 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
D. A. Patterson Mgr. Sippican LLC	12/4/2019
PRINT NAME	TITLE
D.A. PATTERSON, MGR, SIPPICAN LLC	MANAGER OF LLC

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

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

ANTIDEGRADATION: 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
Lake Horizons WWTF	Camden

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

2.1 Regionalization Feasibility:

A. What is the distance to connect to the closest municipality's line or other facility's line? 8 miles

B. List facilities contacted about possible regionalization. None since it was 8 miles to the closest regionalization.

C. Is there any planning or zoning in the area regarding development and services? Camden County Planning and Zoning

D. Who would have the responsibility to maintain the sewer connection line? Lake Horizons HOA

E. What is the estimated cost for piping and pumps to regionalize? $1,337,200

F. Explain any engineering challenges with the regionalization connection – topography, rivers, highways, or other issues.
Topography would require pressure System. Having to get easements from 58 Land Owners.

G. Does a regional facility have the capacity to treat the additional effluent from this project? Yes

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

I. Describe the easement issues:
City of Laurie won't accept 8 miles of pressure sewer line ownership. Therefore the HOA would have to keep ownership. Because the sewer line is privately owned the Missouri Department of Transportation won't allow the sewer line to be placed in the easement. Therefore the sewer line will have to be place on private property. Easements from 58 different property owners would have to be acquired. If any of them refuse to grant an easement then the thirty-two residential lots will not be able to connect to the city.

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

In order for this development to use the existing regional treatment plant of the City of Laurie, it would first need the city to agree to accept the sewage of a development located approximately 8 miles out of the city limits. The city of Laurie will not annex the property so the sewer line will need to remain privately owned. Therefore, the sewage line cannot be placed in the right of way of the county roads serving the area and in the Missouri Department of Transportation's right of way of Highway135 and Highway 5. Because of this, the developer would need to receive easements from approximately 58 land owners. Of these 58 land owners, if any one of them refuses to grant an easement, the thirty-two residential lots will not be able to connect to the City of Laurie treatment plant. Due to this the regionalization is determined to be impracticable

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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: Limit available space all land is adjacent to the Lake of the Ozarks.

If yes, answer the following:

B. How many acres are required for land application of the effluent? 5 acres plus setbacks

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

Lake front lots sell for approx $1/sq ft. 5 Acres needed could cost $217,800 for the land plus soil to cover the bedrock

D. Were long-term costs evaluated and compared for upgrading to a mechanical plant with future Water Quality Standards changes (i.e. mussel ammonia, bacteria, TP, TN) versus cost for a land application system? ☑ Yes ☐ No

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

F. Describe the easement issues:

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

A. Was drip or subsurface irrigation evaluated as opposed to surface application? ☑ Yes ☐ No

B. Does the county ordinance specifically restrict land application, surface and subsurface? ☐ Yes ☑ No

C. Can a vegetated buffer be installed to reduce necessary buffer distances? ☐ Yes ☑ No

D. Are there other steps or considerations that can be made?

Most of the area has bedrock outcroppings. Any type of land application either surface or subsurface will require soil to be brought in to help

☐ **3.3 Unsuitability of Geology or Soils**

A. Is a geohydrologic evaluation, county soils survey map, or other resource showing suitability and application rates included with this application? ☐ Yes ☑ No

B. Is it cost-effective to bring in additional soils? ☐ Yes ☑ No

C. Can the application rate be decreased to a suitable rate? ☐ Yes ☑ No

D. Were subsurface application alternatives (e.g. low pressure pipe, drip) considered? ☑ Yes ☐ No

E. If collapse potential is a concern, was using a liner or alternative site evaluated? ☐ Yes ☐ No

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

The topography of the area is very steep with bedrock outcroppings. The site will have to have soil hauled in to the site and a land application bed or an irrigation bed would have to be constructed. In addition this is mostly lake front property. Lake lots are selling for approximately $1/sq ft. Because of the size of the land needed for land application, it would remove well over $217,000 from the bottom line of the project. This difference would cause the project to no longer be viable.

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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:

These items were included with the original application.

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