STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

CONSTRUCTION PERMIT

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

Kerry Dickemann
The Estates of Woodlake Homeowners Association, Inc.
PO Box 892
Linn Creek, MO 65052

for the construction of (described facilities):

See attached.

Permit Conditions:

See attached.

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

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

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

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

November 3, 2021
Effective Date

November 1, 2023
Modification Date

May 3, 2024
Expiration Date

John Hoke, Director, Water Protection Program

CONSTRUCTION PERMIT

I. CONSTRUCTION DESCRIPTION

The construction of this wastewater treatment facility (WWTF) will include the addition of septic tanks for each residential lot, forcemains, a preanoxic tank, recirculating media filter with a recirculation tank, three Advantex AX-20 textile filters piped in parallel with a recirculation tank, Norweco 2000 chlorinator, chlorine contact chamber, Norweco 2000 dechlorinator, V notch weir in a sampling port, and an outfall. This WWTF is designed for a single residential subdivision with 13 residential lots, a population equivalent (PE) of 48.1, a design average flow of 3,608 gallons per day (gpd), and a peak flow of 14,430 gpd.

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

II. COST ANALYSIS FOR COMPLIANCE

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

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

III. CONSTRUCTION PERMIT CONDITIONS

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

1. This construction permit does not authorize discharge.

2. All construction shall be consistent with plans and specifications signed and sealed by James Jackson, Jr., P.E. with Lake Professional Engineering Services, Inc. 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 Southeast 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. 10 CSR 20-8.140(2)(C)2.

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

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

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

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

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

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

- Enclose the facility site with a fence designed to discourage the entrance of unauthorized persons and animals. 10 CSR 20-8.140 (8) (A)

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

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

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

- 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.

- 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)

- Effluent twenty-four (24) hour composite automatic sampling equipment shall be provided at all mechanical wastewater treatment facilities and at other facilities where necessary under provisions of the operating permit. 10 CSR 20-8.140 (7) (F)

- 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)

- 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)

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

11. Upon completion of construction:

    A. The Estates of Woodlake Homeowners Association, 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; and

    C. Submit the enclosed Wastewater Construction Statement of Work Completed, Form MO 780-2155, to the Department in accordance with 10 CSR 20-6.010(5)(N). Form B - Application for an Operating Permit for Domestic or Municipal Wastewater (≤ 100,000 gallons per day) and operating permit application fee of $150 has already been submitted to MDNR with the construction permit application.

IV. REVIEW SUMMARY

1. CONSTRUCTION PURPOSE

The permitted WWTF will treat domestic wastewater from a residential subdivision consisting of 13 lots. The permitted WWTF will discharge to the Lake of the Ozarks in Camden County.

2. FACILITY DESCRIPTION

The Estates at Woodlake WWTF is located at Matson Lane, Linn Creek, in Camden County, Missouri. The facility has a design average flow of 3,608 gpd and serves a organic population equivalent of approximately 48.1 people. The new permitted WWTF will be constructed for a single residential subdivision with 13 residential lots. This facility has been previously permitted for construction and has been partially constructed along with a residential development. The WWTF will be built with septic tanks for each lot with grinder pumps and forcemains, preanoxic tank, recirculation tank, recirculating

media filters, recirculation tank, recirculating textile filters, tablet chlorination, tablet dechlorination, V-notch weir in a sampling port, and outfall.

The service connections for each lot will transfer domestic wastewater to septic tanks by gravity. The preliminary treated wastewater from the septic tanks will be conveyed by forcemain to a preanoxic tank. Wastewater flows from the preanoxic tank to the first recirculation tank (RT) by gravity. The first RT recirculates to two recirculating media filters in parallel. Effluent from the recirculating media filter will either be recirculated to the first RT or flow to the second RT. The second RT feeds three Orenco AdvanTex AX-20 units in parallel. The Advantex AX-20 discharges through a two way valve either to the second RT or to a tablet chlorinator. Chlorinated effluent flows through a chlorine contact chamber before it is dechlorinated in a tablet dechlorinator. The disinfected wastewater flows by gravity through the weir in a sampling port and discharges through Outfall No. 001.

3. COMPLIANCE PARAMETERS

The permitted facility can meet Ammonia as N of 2.9 mg/L during quarters 4 and 1 and 1.4 mg/L during quarters 2 and 3. The proposed project is required to meet the effluent limits established in the Water Quality and Antidegradation Review dated August 2021 for the permitted facility.

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

Effluent Parameter	Units	Daily Maximum	Weekly Average	Monthly Average	Monitoring Frequency
Flow	MGD	*		*	Once/Quarter
Biochemical Oxygen Demand$_5$	mg/L		15	10	Once/Quarter
Total Suspended Solids	mg/L		20	15	Once/Quarter
Ammonia as N (Jan 1 – Mar 31)	mg/L	2.9		2.9	Once/Quarter
Ammonia as N (Apr 1 – Jun 30)	mg/L	1.4		1.4	Once/Quarter
Ammonia as N (Jul 1 – Sep 30)	mg/L	1.4		1.4	Once/Quarter
Ammonia as N (Oct 1 – Dec 31)	mg/L	2.9		2.9	Once/Quarter
Phosphorus	mg/L	*		0.5	Once/Quarter
Escherichia coliform (*E. coli*)	Note 1	630**		126**	Once/Quarter
Chlorine, Total Residual	µg/L	<130		<130	Once/Quarter
Effluent Parameters	**Units**	**Daily Minimum**		**Monthly Average Minimum**	**Monitoring Frequency**
Dissolved Oxygen	mg/L	*		*	Once/Quarter
Effluent Parameters	**Units**	**Minimum**		**Maximum**	**Monitoring Frequency**
pH	SU	6.0		9.0	Once/Quarter

Note 1 – Colony Forming Units/100 mL
Note 2– Water Quality-based Effluent Limitation – WQBEL; or Minimally Degrading Effluent Limit –MDEL; or Preferred Alternative Effluent Limit – PEL; or Technology-based Effluent Limit – TBEL; or No Degradation effluent Limit – NDEL; or Federal/State Regulation – FSR; or Not Applicable – N/A. Also, please see the **General Assumptions of the WQAR #4 & #5.**

* Monitoring requirements only.

** The Monthly and Weekly Average for *E. coli* shall be reported 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).

4. ANTIDEGRADATION

The Department has reviewed the antidegradation report for this facility and issued the Water Quality and Antidegradation Review dated August 2021, due to the new WWTF being commissioned. See **Appendix – Antidegradation**.

5. REVIEW of MAJOR TREATMENT DESIGN CRITERIA

Existing major components that will remain in use include the following:

- This facililty was partially constructed under CP0001463 with no statement of work completed. This Antidegradation review and Construction Permit were requested to evaluate how the construction plans and specifications will meet current water quality standards.

Construction will cover the following items:

- Components are designed for a Population Equivalent of 48.1 based on organic loading to the system.

- Preanoxic Tank – Construction of one preanoxic tank to store primary treated wastewater. The preanoxic tank is 10 ft x 8 ft x 7 ft deep with a water level depth of 6 ft for a wastewater volume of approximately 3,591 gallons. This tank volume achieves a 1 day detention time at design average flow. The preanoxic tank will transfer wastewater to the Stage I Recirculating Tank (RT) by gravity via a 4 inch SDR 35 PVC pipe.

- Stage I Recirculating Tank – Construction of one RT to pump primary treated wastewater to the Recirculating Media Filter (RMF). The Stage I RT is 10 ft x 10 ft x 6 ft deep with a water level depth of 2 ft for a wastewater volume of approximately 3,740 gallons. There is an effective flow equalization volume of 1,964 gallons between the low water level and the high water "on" level. The Stage I RT has 1 – 0.5 HP submersible pump –capable of 19.5 gpm at 43.5 ft TDH. The pump transfers wastewater to two separate RMF beds by means of a 1.5-inch PVC distribution manifold which splits the flow into 18 x 1-inch PVC laterals. A 10 gpm return pump is installed to recycle wastewater from the Stage I RT back to the Preanoxic Tank by a 1-inch SCH 40 PVC pipe.

- Recirculating Media Filter – The concrete lined RMF is split into two filter beds with a common wall and a total of six zones (three zones for each filter bed). Each filter bed is approximately 18 ft x 30 ft x 5 ft deep each for a total surface area of 1,080 ft^2 which gives a total hydraulic loading of 3.3 gpd/ft^2 at design average flow. The PVC laterals are spaced 2-ft apart with 15 x 1/8-inch shielded orifices per lateral. The laterals are located in the center of the top 10-inch layer of 1/2-inch pea gravel. 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 pea gravel on top of an 3-inch layer of 5/8-inch pea gravel on top of a 3-inch layer of 1-inch pea gravel rock. Each filter bed contains 3 underdrains comprised of 4-inch slotted PVC piping with approximate 5-ft spacing. In each filter bed, All underdrains flow by gravity to a recirculation valve in the Stage I RT. The recirculation valve will transfer treated wastewater to either the Stage I RT for recirculation or the Stage II RT, which achieves a 4:1 recirculation ratio.

- Stage II Recirculating Tank – Construction of one Stage II RT to pump primary treated wastewater to the Advantex AX 20 Textile Filter. The Stage II RT is approximately 5 ft x 5 ft x 5 ft deep for a wastewater volume of approximately 900 gallons. The Stage II RT has a single – 0.5 HP submersible pump – capable of 19.5 gpm at 43.5 ft TDH. The pump transfers wastewater to 3 Advantex AX 20 textile filters piped in parallel through a 3 outlet series 6000 hydrotek valve by means of 1.5-inch SCH 40 PVC.

- Advantex AX 20 Textile Filter – Installation of three Orenco Advantex AX 20 Textile Filters piped in parallel. Each textile filter has approximately 20 ft^2 of surface area which gives a total hydraulic loading of 60.1 gpd/ft^2. Effluent from the Advantex AX 20 Textile Filters will flow to a recirculation valve which will either recirculate secondary treated wastewater to the Stage II RT or flow to the Tablet Chlorinator, which achieves a 4:1 recirculation ratio.

- Tablet Chlorinator – Disinfection is the process of removal, deactivation, or killing of pathogenic microorganisms. Installation of a tablet Norweco 2000 chlorination chamber receiving secondary treated effluent and prior to the chlorine contact tank. The tablet chlorinator shall have a design flow of 3,608 gpd and a maximum flow of 18,638 gpd. The system will dispense hypochlorite as the wastewater comes into contact with the tablets.

- Chlorine Contact Chamber – Installation of a pre-cast concrete tank approximately 5 ft x 4 ft x 3.92 ft with 6 end-around baffles allowing for a 40:1 length to width ratio. This tank will allow for a 38.6 minute contact time during a peak flow of 18,638 gpd.

- Tablet Dechlorinator – Installation of a tablet Norweco 2000 dechlorinator receiving the chlorinated effluent and prior to Outfall No. 001. The tablet dechlorinator shall have a design flow of 3,608 gpd and a maximum flow of 18,638 gpd. The system will dispense sodium sulfite as the wastewater comes into contact with the tablets. There will be a dechlorination contact chamber installed immediately following the dechlorination tablet feeder to accomplish 30 seconds of contact time.

- V-notch Weir Flow Measurement – Installation of accurate flow measurement devices will give the treatment facility a means of improved data analysis. A v-notch weir with a 90 degree notch will be installed in the effluent sampling port. This measurement device does not include flow totalizing or recording.

6. OPERATING PERMIT

Since the facility was partially constructed under a previous construction permit and a neighboring residence was constructed between the time of initial construction and issuance of CP0002248, a neighbor notification letter was requested for the neighboring residence that is within 200 feet of the recirculating sand filter (10 CSR 20-8.140(2)(C)2.). A neighbor notification letter was provided by Ronald A Kohser of 1694 Matson on October 10, 2021.

The operating permit application Form B has already been submitted to the Department along with the application fee of $150. The site specific operating permit for Estates of Woodlake WWTF, MO-0139742, was public noticed from September 24, 2021 to October 25, 2021 with no comments received.

This facility does not meet the requirements of the MOGD, issued on July 1, 2019 for the following reason: site specific effluent limits established in the Antidegradation Review dated August 2021. This facility is not being converted to a general operating permit at this time; however, it will be evaluated at operating permit renewal to determine if it qualifies for the general operating permit MOGD.

Upon the completion of construction, please submit the following:

- Wastewater Construction Statement of Work Completed, Form MO 780-2155, to the Department in accordance with 10 CSR 20-6.010(5)(N) and request the operating permit be issued. https://dnr.mo.gov/document-search/wastewater-construction-statement-work-completed-mo-780-2155
- As builts if the project was not constructed in accordance with previously submitted plans and specifications.

Missouri State Operating Permit, MO-0139742 will be issued after the 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:

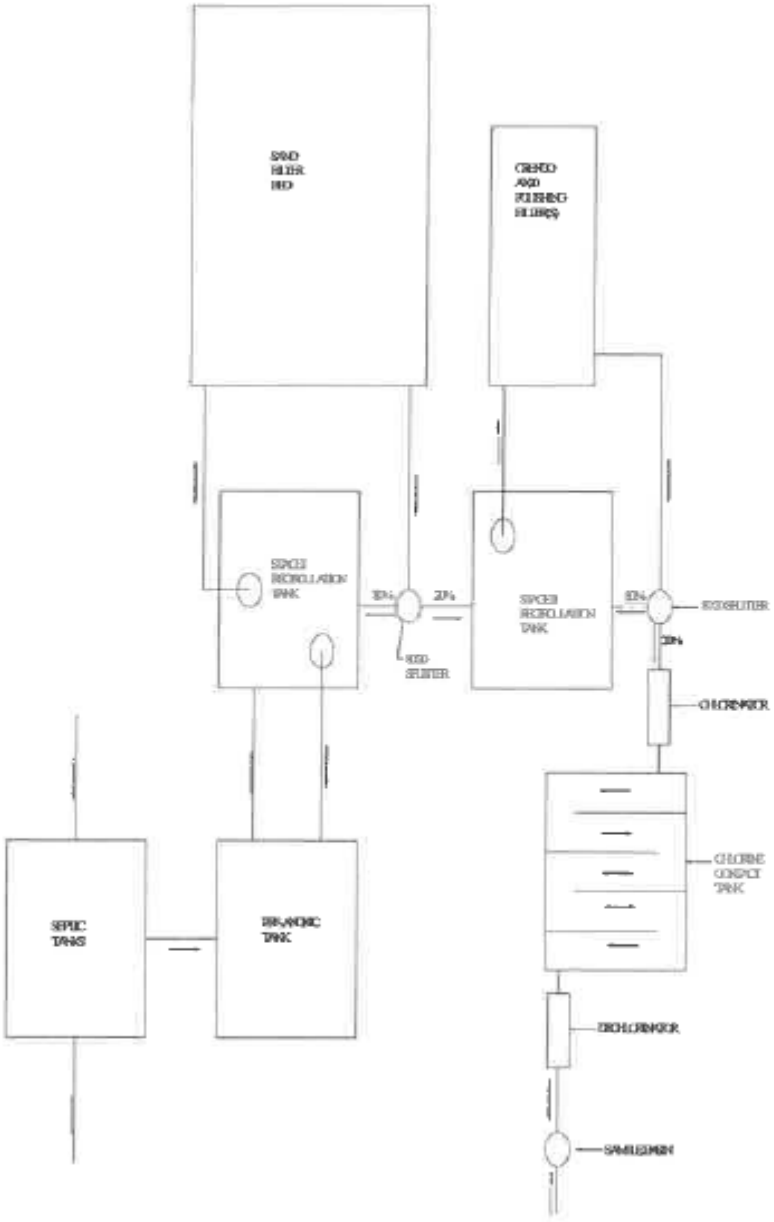
Administrative Hearing Commission
U.S. Post Office Building, Third Floor
131 West High Street, P.O. Box 1557
Jefferson City, MO 65102-1557
Phone: 573-751-2422
Fax: 573-751-5018
Website: https://ahc.mo.gov

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

APPENDICIES

- **Antidegradation**
- **Process Flow Diagram**

Process Flow Diagram



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

Water Quality and Antidegradation Review

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

by

Estates of Woodlake Wastewater Treatment Facility

August 2021

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1. FACILITY INFORMATION

FACILITY NAME: Estates of Woodlake WWTF NPDES #: MO-0134881

FACILITY TYPE: Non-POTW - Residential Subdivision
FACILITY DESCRIPTION: As a result of the submitted alternatives analysis, the applicant's preferred alternative is a recirculating sand filter with chlorination and dechlorination. The design flow for Estates of Woodlake Wastewater Treatment Facility (WWTF) will be 0.003608 MGD.

COUNTY:	Camden	UTM COORDINATES:	X= 523877 Y= 4212818
12- DIGIT HUC:	10290109-0401	LEGAL DESCRIPTION:	Section 6, T38N, R16W
EDU*:	Ozark/Osage	ECOREGION:	Ozark Highland

* - Ecological Drainage Unit

2. 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 which documents that the use of a water body's available assimilative capacity is justified. Effective August 30, 2008, and revised July 13, 2016, a facility is required to use *Missouri's Antidegradation Implementation Procedure (AIP)* for new and expanded wastewater discharges.

2.1. WATER QUALITY HISTORY:

There is no discharge monitoring data available as this is a new facility. No existing water quality data was submitted with the application. Lake of the Ozarks has a Total Maximum Daily Load (TMDL) established for Fish Trauma (Category 4C). It is not expected that Estates of Woodlake will contribute to this TMDL. Lake of the Ozarks is not a 2020 Section 303(d) Listed water.

OUTFALL	DESIGN FLOW (CFS)	TREATMENT LEVEL	RECEIVING WATERBODY	DISTANCE TO CLASSIFIED SEGMENT (MI)
001	0.0055916	Secondary	Tributary to Lake of the Ozarks	0.1
			Lake of the Ozarks	

3. RECEIVING WATERBODY INFORMATION

WATERBODY NAME	CLASS	WBID	LOW-FLOW VALUES (CFS)			DESIGNATED USES**
			1Q10	7Q10	30Q10	
Tributary to Lake of the Ozarks	-	-				General Criteria
Lake of the Ozarks	L2	7205			1.736	AQL, HHP, IRR, LWW, SCR, WBC(A)

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

RECEIVING WATER BODY SEGMENT #1: Tributary to Lake of the Ozarks
Upper end segment* UTM coordinates: X= 523877 / Y= 4212818 (Outfall)
Lower end segment* UTM coordinates: X= 523857 / Y= 4212826 (meets classified)

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

4. General Comments

Lake Professional Engineering Services prepared, on behalf of The Estates of Woodlake Homeowners Association, the *Antidegradation Report for Estates of Woodlake* dated March 2021. Applicant elected to assume that all pollutants of concern (POC) are significantly degrading the receiving stream in the absence of existing water quality. An alternatives analysis was conducted to fulfill the requirements of the AIP. Dissolved oxygen modeling analysis was not submitted for review. Information that was provided by the applicant in the submitted report and summary forms in Appendix D was used to develop this review document.

A Geohydrological Evaluation was submitted with the request. Although the area exhibits losing characteristics, based on the close proximity of Lake of the Ozarks, the receiving stream will be considered gaining for discharge purposes (Appendix C).

A Missouri Department of Conservation Natural Heritage Review was obtained by the applicant. Indiana Bats, Northern Long-Eared Bats, Gray Myotis, and Bald Eagles were species identified in the Natural Heritage Review. For itemized requirements, please refer to the Natural Heritage Review (Appendix B).

5. Antidegradation Review Information

The following is a review of the *Antidegradation Report for Estates of Woodlake* dated March 2021.

5.1. Tier Determination

Below is a list of pollutants of concern reasonably expected to be in the discharge (see Appendix D). 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). Tier 2 was assumed for all POCs (see Appendix D).

Table 1. Pollutants of Concern and Tier Determination

Pollutants of Concern	Tier*	Degradation	Comment
BOD_5/DO	2	Significant	
Total Suspended Solids (TSS)	**	Significant	
Ammonia	2	Significant	
Phosphorus	2	Significant	
pH	***	Significant	Permit Limits Applied
Escherichia coli (*E. coli*)	2	Significant	
Total Residual Chlorine	2	Significant	Permit Limits Applied

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

The following Antidegradation Review Summary attachments in Appendix D were used by the applicant:

For pollutants of concern, the attachments are:
☒ Attachment A, Tier 2 with significant degradation.

5.2. EXISTING WATER QUALITY

No existing water quality data was submitted. All POCs were considered to be Tier 2 and significantly degrading in the absence of existing water quality.

5.3. NO DISCHARGE EVALUATION

According to 10 CSR 20-6.010 (4)(A)5.B., reports for the purpose of constructing a wastewater treatment facility shall consider the feasibility of constructing and operating a no discharge facility. Because Missouri's antidegradation implementation procedures 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. Part of that analysis as shown below is the non-degrading or no discharge evaluation. See Section 5.4.1 discussion for the regionalization alternative.

This facility was previously permitted for construction under CP0001463. Since there is a recirculating sand filter partially constructed at this site, it is most economical and practical for the owner to evaluate and retrofit the existing WWTF. The existing WWTF was evaluated in this Antidegradation review as the base case technology as a result. The Antidegradation Report for the project discusses the practicability of Land Application and Subsurface Irrigation and concludes that no discharge alternatives are unsuitable due to the insufficient land areas available.

5.4. DEMONSTRATION OF NECESSITY AND SOCIAL AND ECONOMIC IMPORTANCE

Missouri's antidegradation implementation procedures specify that if the proposed activity does result in significant degradation then a demonstration of necessity (i.e., alternatives analysis) and a determination of social and economic importance are required. Five alternatives from non-degrading to less degrading to degrading alternatives were evaluated. Only those alternatives that were considered practicable were included in the economic efficiency analysis. This analysis showed that the return on environmental benefits with increasing cost of treatment did not justify more expenditure beyond the base case treatment alternative (see Appendix D). The Recirculating Sand Filter was the preferred alternative based on this analysis. The affordability analysis further argued the value of constructing the recirculating sand filter.

TABLE 2: ALTERNATIVES ANALYSIS COMPARISON

	ALTERNATIVE 1: RECIRCULATING SAND FILTER	ALTERNATIVE 2: ORENCO ADVANTEX RECIRCULATING FABRIC FILTER	ALTERNATIVE 3: ZABEL SCAT RECIRCULATING FABRIC FILTER	ALTERNATIVE 4: EXTENDED AERATION TREATMENT PLANT	ALTERNATIVE 5: MEMBRANE BIOREACTOR
BOD_5 (AML)	10 mg/L	10 mg/L	10 mg/L	20 mg/L	5 mg/L
TSS (AML)	15 mg/L	15 mg/L	15 mg/L	20 mg/L	5 mg/L
Ammonia-Summer (AML)	1.4 mg/L	1.4 mg/L	1.4 mg/L	1.4 mg/L	1.4 mg/L
Ammonia Winter (AML)	2.9 mg/L	2.9 mg/L	2.9 mg/L	2.9 mg/L	2.9 mg/L
Total Phosphorus (AML)	0.5 mg/L	0.5 mg/L	0.5 mg/L	0.5 mg/L	0.5 mg/L
E. coli (AML)	126 CFU/100mL	126 CFU/100mL	126 CFU/100mL	126 CFU/100mL	126 CFU/100mL
Practical	Yes	No	No	No	No
Economical	Yes	No	No	No	No
Life Cycle Cost*	$ 73,676.00	$ 181,344	$ 151,344	$ 181,344	$ 440,040
Ratio	1:1	1:2.5	1:2.1	1:2.5	1:6.0

* Life cycle cost at 20 year design life and 6% interest

5.4.1. 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 provided discussion of this alternative. The alternative analysis mentions the City of Linn Creek as the regional authority. The alternatives analysis states that the development is located 6 miles outside of the Linn Creek City Limits.

NEEDS A WAIVER TO PREVENT CONFLICT WITH AREA WIDE MANAGEMENT PLAN APPROVED UNDER SECTION 208 OF THE CLEAN WATER ACT AND/OR UNDER 10 CSR 20-6.010(2)(C) CONTINUING AUTHORITIES? (Y OR N) No

5.3.2 LOSING STREAM ALTERATIVE DISCHARGE LOCATION

Under 10 CSR 20-7.015(4) (A), *discharges to losing stream shall be permitted only after other alternatives including land application, discharge to gaining stream and connection to a regional facility have been evaluated and determined to be unacceptable for environmental and/or economic reasons*.

The facility does not discharge to a losing stream segment or will not discharge within 2 miles of a losing stream segment.

5.3.3 SOCIAL AND ECONOMIC IMPORTANCE EVALUATION

The applicant first identified the community that will be affected by the proposed degradation of water quality. The affected community is likely within an 8-mile radius from the discharge site. Secondly, a number of relevant factors were identified including affordable housing, needed growth, increased land value and tax base, and environmental factors. Within a Social and Economic Benefits section each factor was evaluated. The applicant identifies that the construction of the treatment plant and subdivision will improve the tax base for the region, establish a treatment facility for 13 houses that would otherwise have individual septic systems, and increase tourism capacity of the region,

6. 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., consideration for 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.

7. Mixing Considerations

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

Mixing Zone:
Mixing Zone (MZ) Parameters: According to the USGS 1:24,000K Quadrangle, the mainstem lake width near the new facility outfall location is approximately 1,100 feet (ft.). Using "normal" water levels of 1,100 ft. wide and one-quarter of this width equals 275 ft. Therefore, because 100 ft. is less than 275 ft., MZ = 100 feet [10 CSR 20-7.031(5)(A)4.B.(IV)(a)].

Mixing Zone Volume: The flow volume approximates a triangular prism because of the slope of the lake bottom, where the formula is Volume = L*W*(D*0.5). Assuming that the width will be either side of the discharge (MZ) length (100 feet) to form the plume effect, the box dimensions are length (L) = 100 ft., width (W) = 100 ft., and depth (D) = 30 ft. Depth was obtained using mixing zone length projected 100 ft.

Volume = L*W*(D*(0.5)) = (100')*(100')*(30'*(0.5)) = 150,000 ft^3.

The flow volume of 150,000 ft^3 is assumed as the daily mixing zone. Therefore;
30Q10 = (150,000 ft^3/day)*(1 day/86,400 sec) = 1.736 ft^3/sec.

8. Permit Limits and Monitoring Information

Wasteload Allocation Study Conducted (Y or N):	N	Use Attainability Analysis Conducted (Y or N):	N	Whole Body Contact Use Retained (Y or N):	Y

Table 3. Effluent Limits For Outfall 001

Effluent Parameter	Units	Daily Maximum	Weekly Average	Monthly Average	Basis for Limit (Note 2)	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
Ammonia as N (Jan 1 – Mar 31)	mg/L	2.9		2.9	PEL	Once/Quarter
Ammonia as N (Apr 1 – Jun 30)	mg/L	1.4		1.4	PEL	Once/Quarter
Ammonia as N (Jul 1 – Sep 30)	mg/L	1.4		1.4	PEL	Once/Quarter
Ammonia as N (Oct 1 – Dec 31)	mg/L	2.9		2.9	PEL	Once/Quarter
Phosphorus	mg/L	*		0.5	WQBEL	Once/Quarter
Escherichia coliform (*E. coli*)	Note 1	630**		126**	FSR	Once/Quarter
Chlorine, Total Residual	µg/L	<130		<130	WQBEL	Once/Quarter
Effluent Parameters	**Units**	**Daily Minimum**		**Monthly Average Minimum**	**Basis for Limit (Note 2)**	**Monitoring Frequency**
Dissolved Oxygen	mg/L	*		*	WQBEL	Once/Quarter
Effluent Parameters	**Units**	**Minimum**		**Maximum**	**Basis for Limit (Note 2)**	**Monitoring Frequency**
pH	SU	6.0		9.0	FSR	Once/Quarter

Note 1 – Colony Forming Units/100 mL
Note 2– Water Quality-Based Effluent Limitation – WQBEL; or Minimally Degrading Effluent Limit – MDEL; or Preferred Alternative Effluent Limit – PEL; or Technology-Based Effluent Limit – TBEL; or No Degradation effluent Limit – NDEL; or Federal/State Regulation – FSR; or Not Applicable – N/A. Also, please see the **General Assumptions of the WQAR #4 & #5.**

* Monitoring requirements only.

** The Monthly and Weekly Average for *E. coli* shall be reported 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).

9. Receiving Water Monitoring Requirements

No receiving water monitoring requirements recommended at this time.

10. Derivation and Discussion of Limits

Wasteload allocations and limits were calculated using two methods:

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

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

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

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

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

2) Alternative Analysis-based – Using the preferred alternative's treatment capacity for conventional pollutants such as BOD_5 and TSS that are provided by the consultant as the WLA, the significantly-degrading effluent average monthly and average weekly limits are determined by applying the WLA as the average monthly (AML) and multiplying the AML by 1.5 to derive the average weekly limit (AWL). For toxic and nonconventional pollutant such as ammonia, the treatment capacity is applied as the significantly-degrading effluent monthly average (AML). A maximum daily can be derived by dividing the AML by 1.19 to determine the long-term average (LTA). The LTA is then multiplied by 3.11 to obtain the maximum daily limitation. This is an accepted procedure that is defined in USEPA's "Technical Support Document For Water Quality-based Toxics Control" (EPA/505/2-90-001).

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

10.1. OUTFALL #001 – MAIN FACILITY OUTFALL

10.2. 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 effluent limits equal to or less than 10 mg/L monthly average and 15 mg/L weekly average were determined by the Department to be achievable and protective of beneficial uses and existing water quality. No Dissolved Oxygen Modeling was submitted with the application.

  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.

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

- **pH.** – 6.0-9.0 SU. Technology based limits [10 CSR 20-7.015] are protective of the water quality standard [10 CSR 20-7.031(5)(E)], due to the buffering capacity of the mixing zone.

- **Total Ammonia Nitrogen.** The applicant stated in a comment letter that the WWTF can meet 2.9 mg/L winter and 1.4 mg/L summer as a Preferred Alternative Effluent Limit (PEL). The Water Quality Based Effluent Limit (WQBEL) derived below are not as protective as the applicant suppled PEL.

  Early Life Stages Present Total Ammonia Nitrogen criteria applies a default of pH 7.8 SU [10 CSR 20-7.031(5)(B)7.C. and 10 CSR 20-7.031(5) Table B3]. Because of mixing allowable in lakes, the acute ammonia criteria drive the WLA for ammonia. The WLA calculation below assumes a maximum flow of 50,000 gpd or 0.08 cfs.

  The Department previously followed the 2007 Ammonia Guidance method for derivation of ammonia limits. However, the EPA's Technical Support Document for Water Quality-based Toxic Controls (TSD) establishes other alternatives to limit derivation. The Department has determined that the approach established in Section 5.4.2 of the TSD, which allows for direct application of both the acute and chronic wasteload allocations (WLA) as permit limits for toxic pollutants, is more appropriate limit derivation approach. Using this method for a discharge to a waterbody where mixing is not allowed, the criterion continuous concentration (CCC) and the criterion maximum concentration (CMC) will equal the chronic and acute WLA respectively. The WLAs are then applied as effluent limits, per Section 5.4.2 of the TSD, where the CMC is the Daily Maximum and the CCC is the Monthly Average. The direct application of both acute and chronic criteria as WLA is also applicable for facilities that discharge into receiving waterbodies with mixing considerations. The CCC and CMC will need to be calculated into WLA with mixing considerations using the mass-balance equation:

  $$Ce = \frac{(Qe + Qs)C - (Qs \times Cs)}{(Qe)}$$

  Where C = downstream concentration Ce = effluent concentration
  Cs = upstream concentration Qe = effluent flow
  Qs = upstream flow

  In the event that mixing considerations derive an AML less stringent than the MDL, the AML and MDL will be equal and based on the MDL.

TABLE 4: ECOREGIONAL MONTHLY AVERAGE PH, TEMPERATURE, CRITERIA CONTINUOUS CONCENTRATION, CRITERIA MAXIMUM CONCENTRATION FOR THE OZARK HIGHLANDS ECOREGION

Quarter	Temp (°C)	pH (SU)	Total Ammonia Nitrogen CCC (mg N/L)	Total Ammonia Nitrogen CMC (mg N/L)
1st	11.0	7.8	3.1	12.1
2nd	21.2	7.8	2.0	12.1
3rd	26.0	7.8	1.5	12.1
4th	15.5	7.8	2.9	12.1

Ecoregion: Ozark Highlands

1st Quarter

Chronic WLA:

Ce = ((0.0055955 + 1.7361)3.1 – (1.7361 * 0.01)) / 0.0055955

Ce = 969.4 mg/L

Acute WLA:

Ce = ((0.0055955 + 0)12.1 – (0 * 0.01)) / 0.0055955

Ce = 12.1 mg/L

AML = WLAc = 12.1 mg/L

MDL = WLAa = 12.1 mg/L

2nd Quarter

Chronic WLA:

Ce = ((0.0055955 + 1.7361)2.0 – (1.7361 * 0.01)) / 0.0055955

Ce = 632.6 mg/L

Acute WLA:

Ce = ((0.0055955 + 0)12.1 – (0 * 0.01)) / 0.0055955

Ce = 12.1 mg/L

AML = WLAc = 12.1 mg/L

MDL = WLAa = 12.1 mg/L

3rd Quarter

Chronic WLA:

Ce = ((0.0055955 + 1.7361)1.5 – (1.7361 * 0.01)) / 0.0055955

Ce = 466.1 mg/L

Acute WLA:

Ce = ((0.0055955 + 0)12.1 – (0 * 0.01)) / 0.0055955

Ce = 12.1 mg/L

AML = WLAc = 12.1 mg/L

MDL = WLAa = 12.1 mg/L

4th Quarter

Chronic WLA:

Ce = ((0.0055955 + 1.7361)2.9 – (1.7361 * 0.01)) / 0.0055955

Ce = 910.4 mg/L

Acute WLA:

Ce = ((0.0055955 + 0)12.1 – (0 * 0.01)) / 0.0055955

Ce = 12.1 mg/L

AML = WLAc = 12.1 mg/L

MDL = WLAa = 12.1 mg/L

TABLE 5: COMPARISON OF WATER QUALITY BASED EFFLUENT LIMITS TO PREFERRED ALTERNATIVE EFFLUENT LIMITS

Effluent Limit Type	Quarter	Maximum Daily Limit (mg/l)	Average Monthly Limit (mg/l)
WQBEL	1st	12.1	12.1
WQBEL	2nd	12.1	12.1
WQBEL	3rd	12.1	12.1
WQBEL	4th	12.1	12.1
PEL	Summer	**1.4**	**1.4**
PEL	Winter	**2.9**	**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).*** Monthly average of 126 colony forming units per 100 mL as a geometric mean and Daily Maximum of 630 colony forming units per 100 mL during the recreational season (April 1 – October 31), to protect Whole Body Contact Recreation (A) designated use of the receiving stream, as per 10 CSR 20-7.031(5)(C). An effluent limit for both monthly average and daily maximum is required by 40 CFR 122.45(d).

  For systems that have a design capacity of one hundred thousand (100,000) gpd or less, the sampling frequency for *E. coil* analysis shall be in accordance with the wastewater and sludge sampling program based on the design flow which is dependent upon the receiving water category as listed in 10 CSR 20-7.015(1)(B). Compliance with the *E. coil* water quality standard established in subsection (5)(C) of 10 CSR 20-7.031 shall be determined each calendar month by calculating the geometric mean of all of the samples collected each calendar month. Compliance with the short-term *E. coli* limits established in subparagraph (9)(B)1.E. of this rule shall also be determined. The daily maximum requirement is consistent with EPA federal regulation 40 CFR 122.45(d). Please see **GENERAL ASSUMPTIONS OF THE WQAR #7**

- **Total Residual Chlorine (TRC).** Warm-water Protection of Aquatic Life CCC = 11 µg/L, CMC = 19 µg/L [10 CSR 20-7.031, Table A1]. Background TRC = 0.0 µg/L.

  Water quality based effluent limits:
  $C_e = (((Q_e+Q_s)*C) - (Q_s*C_s))/Q_e$

  Chronic WLA: $C_e = ((0.0055916 + 1.7361)11 – (1.7361 * 0.0))/ 0.0055916$
  $C_e = 3{,}426$ µg/L
  Acute WLA: $C_e = ((0.0055916 + 0.0)19 – (0.0 * 0.0))/ 0.0055916$
  $C_e = 19$ µg/L

  $LTA_c = 3426$ µg/L (0.527) = 1805 µg/L [CV = 0.6, 99th Percentile]
  $LTA_a = 19$ µg/L (0.321) = **6.1 µg/L** [CV = 0.6, 99th Percentile]

  Use the most protective number of LTA_c or LTA_a

  MDL = **6.1 µg/L** (3.11) = 19 µg/L [CV = 0.6, 99th Percentile]
  AML = **6.1 µg/L** (1.55) = 9.5 µg/L [CV = 0.6, 95th Percentile, n = 4]

  The Water Quality Based Effluent Limit for Total Residual Chlorine was calculated to be 19 µg/L (daily maximum limit) and 9.5 µg/L (monthly average limit). These limits are below the minimum quantification level (ML) of the most common and practical EPA approved CLTRC methods. The Department has determined the current acceptable ML for total residual chlorine 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 permittee will conduct analyses in accordance with this method, or equivalent, and report actual analytical values. Measured values greater than or equal to the minimum

quantification level of 130 µg/L will be considered violations of the permit and values less than the minimum quantification level of 130 µg/L will be considered to be in compliance with the permit limitation.

- **Dissolved Oxygen**. This facility utilizes dechlorination chemicals in order to reduce the amount of total residual chlorine that is discharged in the effluent. Dechlorination chemicals are known to exhibit an oxygen demand on the effluent and if not properly managed the effects on the effluent DO concentrations can be significant. Monitoring only requirements have been included in this permit in order to determine if a future effluent limitation is necessary to protect water quality.

11. Antidegradation Review Preliminary Determination

The proposed new discharging facility, Estates of Woodlake WWTF, 0.003608 MGD will result in significant degradation of the segment identified in Lake of the Ozarks. Recirculating Sand Filter was determined to be the base case technology (lowest cost alternative that meets technology and water quality based effluent limitations). The cost effectiveness of the other technologies were evaluated, and Recirculating Sand Filter was found to be cost effective and was determined to be the preferred alternative.

It has also been determined that the other treatment options presented (Orenco Advantex Recirculating Filter, Zabel SCAT Recirculating Fabric Filter, Extended Aeration Treatment Plant, and Membrane Bioreactor) may also be considered reasonable alternatives provided they are designed to be capable of meeting the effluent limitations developed based on the preferred alternative. If any of these options are selected, you may proceed with the appropriate facility plan, construction permit application, or other future submittals without the need to modify this Antidegradation review document.

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

Reviewer: Steve Hamm, P.E.
Date: August 2021
Unit Chief: John Rustige, P.E.

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August 2021
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APPENDIX A: MAP OF DISCHARGE LOCATION

(A USGS topographic map can be obtained on the web at http://www.dnr.mo.gov/internetmapviewer/.)

APPENDIX B: NATURAL HERITAGE REVIEW

(Applicant must check for rare and endangered aquatic species that may be affected by the discharge by using the following web link: http://mdcgis.mdc.mo.gov/heritage/. 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.

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Water Protection Program

Natural Heritage Review Level Two Report: State Listed Endangered Species and/or Missouri Species/Natural Communities of Conservation Concern

There are records for state-listed Endangered Species, or Missouri Species or Natural Communities of Conservation Concern within or near the defined Project Area. Please contact Missouri Department of Conservation for further coordination.

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

PROJECT INFORMATION

Project Name and ID Number: The Estates of Woodlake #8959
Project Description: N38D 3' 44" W092D 43' 28", Lake of the Ozarks, Camden County
Project Type: Waste Transfer, Treatment, and Disposal, Liquid waste/Effluent, Wastewater treatment plant, Construction or expansion
Contact Person: Jim Jackson
Contact Information: jimjacksonjr@charter.net or 573-873-3898

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

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

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

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

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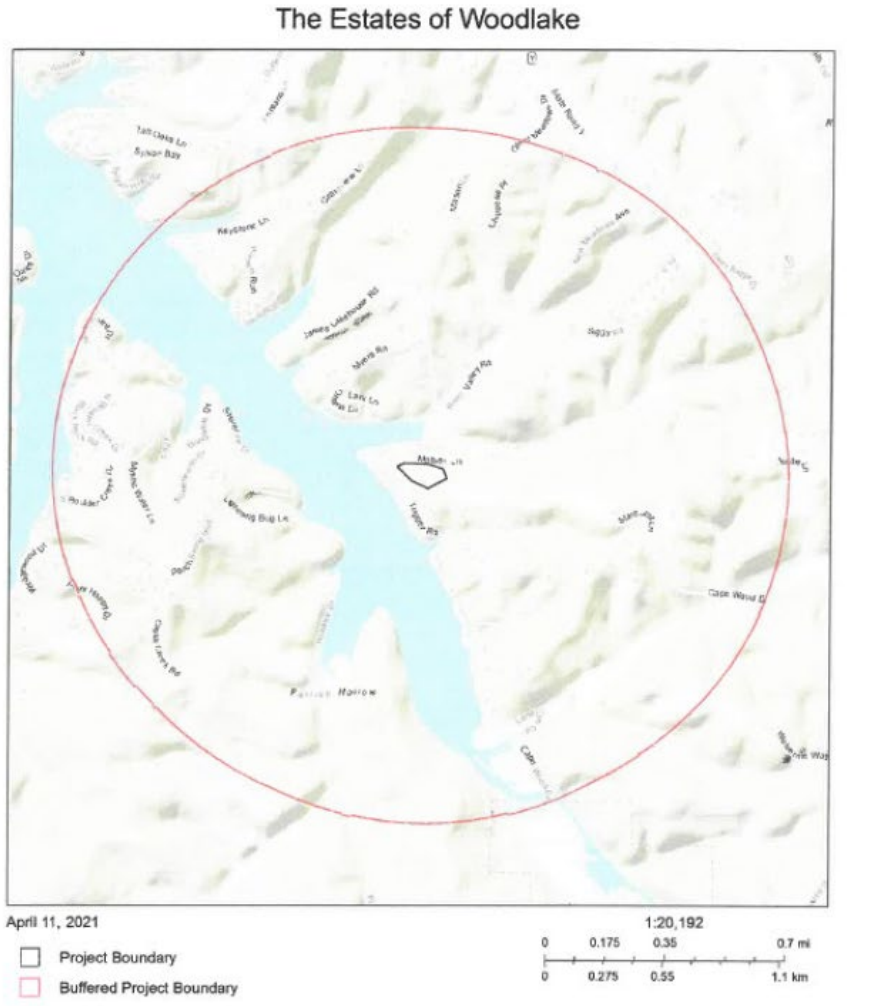

Species or Communities of Conservation Concern within the Area:

There are records for state-listed Endangered Species, or Missouri Species or Natural Communities of Conservation Concern within or near the defined Project Area. Please contact the Missouri Department of Conservation for further coordination.

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

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: GEOHYDROLOGICAL EVALUATION

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

LWE21089
Camden County

June 08, 2021

Jim Jackson, Jr
Lake Professional Engineering Services
PO Box 27
Camdenton, MO 65020

RE: The Estates at Wood Lake WWTP

Dear Jim Jackson, Jr:

On April 30, 2021, the Missouri Geological Survey received a request to perform a geohydrologic evaluation for the above referenced project located in Camden County. Included with this letter is a report that details the geologic and hydrologic conditions at the site and the potential for groundwater contamination in the event of wastewater treatment failure.

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

Sincerely,

MISSOURI GEOLOGICAL SURVEY

Molly A. Starkey

Molly Starkey
Geologist
Environmental Geology Section

STATE OF MISSOURI
MOLLY A STARKEY
REGISTERED GEOLOGIST

06/08/2021

c: Kerry Dickemann
WPP
Southwest Regional Office

Estates of Woodlake WWTF
August 2021
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Missouri Department Of Natural Resources
Missouri Geological Survey
Geological Survey Program
Environmental Geology Section

Project ID Number
LWE21089
County
Camden

Request Details

Project: The Estates at Wood Lake WWTP

Legal Description: 06 T38N R16W

Quadrangle: CAMDENTON
Latitude: 38 3 44.4
Longitude: -92 43 28.29

Organization Official
Name: Kerry Dickemann
Address: P.O. Box 892
City: Linn Creek
State: MO Zip: 65052
Phone: 573-873-0055
Email:

Preparer
Name: Jim Jackson, Jr
Address: PO Box 27
City: Camdenton
State: MO Zip: 65020
Phone: 573-873-3898
Email: jimjacksonjr@charter.net

Project Details

Report Date: 06/08/2021
Date of Field Visit: 06/03/2021

Previous Reports: LWE08103

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%
- [X] 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 gravelly red to reddish brown silty clay and residuum

Estates of Woodlake WWTF
August 2021
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Missouri Department Of Natural Resources
Missouri Geological Survey
Geological Survey Program
Environmental Geology Section

Project ID Number
LWE21089
County
Camden

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

Remarks:

On June 3rd, 2021 a geologist with the Missouri Geological Survey conducted a geohydrologic evaluation for an existing recirculating filter bed constructed with reinforced concrete in Camden County for the Estates at Wood Lake housing development. The site is located adjacent to the Linn Creek arm of the Lake of the Ozarks on a wooded hillslope.

Surficial materials could not be sampled with a handheld auger due to the high gravel and cobble content of the surficial materials. Surficial materials were observed in cutbanks from construction and in a roadside ditch. The surficial materials at the site are very gravelly red to reddish brown silty clay with moderate to high permeability. There are also large residual blocks of chert breccia in the residuum. Local well records are variable, but observed surficial material thickness at the site was approximately 3 to 4 feet.

Weathered bedrock was observed at the site and is a gray to tan dolomite composed of many tiny rhombohedral crystals that initially appear to be sand grains. This uppermost bedrock unit is identified as the Ordovician-age Gasconade Dolomite which is consistent with geologic mapping and local well logs. The Gasconade Dolomite has a moderate to high permeability. There are no known sinkholes or springs within one mile of the site.

The RFB discharges down a hillslope into a road ditch that runs east along the road and discharges into a small unnamed tributary to the Lake of the Ozarks. Although the road ditch will be formally classified as a losing stream, the overall discharge setting is considered gaining due to the proximity to the lake. The overall geologic limitations rating for a recirculating filter bed constructed with reinforced concrete at this location is low. In the event of treatment failure, the local and shallow groundwater and the surface water of the unnamed tributary and the Lake of the Ozarks may be adversely impacted.

APPENDIX D: ANTIDEGRADATION REVIEW SUMMARY ATTACHMENTS

RECEIVED

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH
WATER QUALITY REVIEW ASSISTANCE/ANTIDEGRADATION REVIEW REQUEST
PRE-CONSTRUCTION REVIEW FOR PROTECTION OF BENEFICIAL USES AND DEVELOPING EFFLUENT LIMITS

TYPE OF PROJECT ☐ Grant ☐ SRF Loan ☑ All Other Projects

REQUESTER	TELEPHONE NUMBER WITH AREA CODE
James O. Jackson, Jr., PE - Lake Professional Engineering Services, Inc,	(573) 873-3898
PERMITTEE / FACILITY NAME: The Estates of Woodlake WWTP	MSOP NUMBER (IF APPLICABLE):
COUNTY: Camden	SIC / NAICS CODE: 4952

REASON FOR REQUEST

☑ New Discharge (See Instruction #9) ☐ Upgrade (No expansion) (See AIP) ☐ Expansion ☐ QAPP or Study Review

DESCRIPTION OF PROPOSED ACTIVITY:
Finish a new sand filter treatment plant with chlorination

FACILITY INFORMATION

METHOD OF BACTERIA COMPLIANCE
☑ Chlorine Disinfection ☐ Ultraviolet Disinfection ☐ Ozone ☐ Not Applicable

WATER QUALITY ISSUES*
None

*Water quality issues include: effluent limit compliance issues, notices of violation, water body beneficial uses not attained or supported, etc.

OUTFALL	LOCATION (UTM OR LAT/LONG OR LEGAL DESCRIPTION)	MAPPED[1] (CHECK)	RECEIVING WATER BODY[2]
1	N38D03'44" W092D43'28"	✔	Lake of the Ozarks

[1] Please attach topographic map (See: www.dnr.mo.gov/internetmapviewer/) with outfall locations clearly marked. For additional outfalls, attach a separate form.
[2] Please see general instructions for discharges to streams.

OUTFALL	NEW DESIGN FLOW ** (MGD)	TREATMENT TYPE	EFFLUENT TYPES*
1	.0036075	Sand Filter	Domestic Wastewater

* Describe predominating character of effluent. Example: Domestic Wastewater, Municipal Wastewater, Industrial Wastewater, Storm water, Mining Leachate, etc.
** If expansion, indicate new design flow.

See General Instructions. Additional information may be needed to complete your request. Your request may be returned if items are missing. The water quality review assistance is a process to determine effluent limits for new facilities or existing facilities seeking to increase loading into the receiving stream.

SIGNATURE: [signature] DATE: 9-15-21

PRINT NAME: Kerry Dickemann
EMAIL ADDRESS: kdickemann@camdentonschools.org
PHONE NUMBER: (573) 836-0740

Applicant supplied (check all that apply):
- ☑ Attachment A – Significant Degradation
- ☐ Attachment B – Minimal Degradation
- ☐ Attachment C – Temporary degradation
- ☐ Attachment D – Tier 1 Review
- ☐ No Degradation Evaluation
- ☑ Heritage Review Determination. See Instruction #8.
- ☑ Geohydrologic Evaluation. See Instruction #9.
- ☐ Tier Analysis for minimal degradation (see Page 3, Tier 2 Reviews).
- ☐ Quality Assurance Project Plan.
- ☐ Time of travel study (see Instruction #3) or model (see Instruction #2).

Submit request to:
Missouri Department of Natural Resources,
Water Protection Program,
ATTN: WPCB Engineering Section
P.O. Box 176
Jefferson City, MO 65102-0176
Phone: 573-751-1300
Fax: 573-522-9920

MO 780-1893 (4/13)

GENERAL INSTRUCTIONS

1. Please attach maps clearly showing the location of each outfall. A U.S. Geological Survey topographic map is available at www.dnr.mo.gov/internetmapviewer/. Additional water quality information is available at www.dnr.mo.gov/env/wpp/wpp-map-gallery.htm.
2. **Discharges to all gaining streams**: Applicant must submit dissolved oxygen analysis (using Missouri Department of Natural Resources approved models such as Streeter Phelps (www.ecy.wa.gov/programs/eap/pwspread/pwspread.html, use PWSPREAD.XLS and the dosag2 sheet only) or Qual2K/Qual2E (Q2K/Q2E) stream water quality study (www.epa.gov/athens/wwqtsc/index.html) indicating the proposed BOD_5 effluent limitations are protective of Missouri's water quality standard for dissolved oxygen. DO modeling and BOD effluent limit development guidance can be found at www.dnr.mo.gov/env/wpp/permits/DO_Modeling_Administrative_Guidance_Dec_09.pdf. The department may provide more specific procedures upon request. **Note:** If Q2K/Q2E is used, wasteload allocation for ammonia must be assumed. All Q2K/Q2E studies must have department-approved Quality Assurance Project Plans
3. **Discharges to unclassified gaining stream**: Applicant may provide the time of travel to the confluence with the classified stream segment for modeling pollutant decay (See *Total Ammonia Nitrogen Criteria Implementation Guidance Policy* at www.dnr.mo.gov/env/wpp/permits/antideg-implementation.htm). Otherwise, the applicant may determine limits based on no decay of discharge pollutants. The department uses a Manning's N method for time of travel determination (see *Technical Addendum #3* at www.dnr.mo.gov/env/wpp/permits/antideg-guidance.htm). Please include items requested in the Technical Addendum and a map, schematic or description of flow segments with your calculations. A worksheet with instructions is available at the above web link.
4. For all discharges, the chronic water quality criteria point of compliance is the classified stream or the confluence with the classified stream. No mixing is allowed for streams with seven-day Q10 low flow less than 0.1 cfs (10 CSR 20-7.031(A)4.B.(I)), while mixing is allowed for streams with seven-day Q10 low flow greater than 0.1 cfs (10 CSR 20-7.031(A) 4.B.(II)) and (III).
5. For industrial facilities, a list of all chemicals, compounds, elements, etc. found in the discharge must be submitted with the request. Proprietary names of chemicals are not sufficient, as these chemicals may contain several pollutants for which the department must evaluate separate effluent limits. A pre-construction review meeting is highly recommended.
6. Do not submit water quality review assistance requests for renewals. All water quality based effluent limits will be determined during the renewal process.
7. 10 CSR 20-7.015(8)(A)3 allows alternative limitations (i.e., lagoon or trickling filters) if a water quality impact study is conducted. This impact study should indicate that equivalents to secondary treatment for lagoons or trickling filters are protective of Missouri Water Quality standards for dissolved oxygen and ammonia.
8. Applicant must check for rare and endangered aquatic species that may be affected by the discharge at http://mdcgis.mdc.mo.gov/heritage/newheritage/heritage.htm. Send information to provided address or select the Heritage Review Link. Register and supply requested information.
9. Additional requirements for new facilities:
   A. Division of Geology and Land Survey Geohydrologic Evaluations must be submitted with the request.
   B. Coordinates of outfalls in UTMs and in the public land survey system must be provided.
   C. Please submit a letter with project timeframe.

Note: Lack of response for additional informational within a reasonable timeframe will result in return of request.

MO 780-1893 (4/13)

ANTIDEGRADATION INSTRUCTIONS:

For more detailed instructions, the applicant should refer to *Missouri's Antidegradation Rule and Implementation Procedure* (AIP), which is available at www.dnr.mo.gov/env/wpp/permits/antideg-implementation.htm. All **waters of the state** (except groundwater) are subject to the AIP. All applicants must submit a determination of assigned tiers of protection to water quality for all **waters of the state** on a pollutant-by-pollutant basis. The applicant should consult AIP, Section 1.B. for the process of assigning tier protection levels. Both Tier 1 and 2 reviews are conducted on a pollutant-by-pollutant basis. Outstanding national and state water resources listed on Table D and E in the Water Quality Standards at 10 CSR 20-7.031 automatically are assigned Tier 3 reviews that are conducted on a water body-by-water body basis.

As an overview, AIP requires the new or expanded discharge either:

1. Demonstrate that the loading is below the allowed facility assimilative capacity and segment assimilative capacity.
2. Demonstrate that loading will be maintained or decreased.
3. Demonstrate degradation or assume degradation with alternative analysis and Social and Economic Importance (SEI) evaluation.

For minimally degrading activities as defined in AIP, no alternative analysis or socio-economic importance demonstration is required. If the activity is degrading or assumed to be degrading, then in order to complete the Administrative Record of Decision the applicant must submit both:

1. An alternative analysis that demonstrates non-degrading and minimally degrading discharging options are either impracticable, non-cost efficient, or unaffordable.
2. An evaluation of SEI of the proposed degrading discharging activity for social and economic development of the community. Applicants must summarize the review using the attached summary sheets (See below).

Tier 1 Reviews: Pollutants of concern (POC) that qualify for Tier 1 reviews may be discharged in accordance with Water Quality Standards without performing the alternative analysis or SEI demonstration. However, for a POC with Tier 1 designation, the applicant must provide existing receiving water quality data[1], or an appropriate water quality model[1], or department Section 303(d) listings (facilities with water bodies having 305(b) listed POCs should contact the department). Appendix 2 of the AIP demonstrates the statistical process (90 percentile value is significantly more than 95 percent of the Water Quality Standards for the POC) that applicants must use to designate POC as Tier 1 (below, at or near Water Quality Standard), if POC is not department Section 303(d) listed for that water body. Finally, for Tier 1 POCs, the total maximum daily load process must be followed to maintain or improve water quality. The applicant must demonstrate the discharge will not violate the water quality criterion for that pollutant (see Attachment D). For a list of activities that are considered not to result in significant degradation, see AIP, Section II.A.

Tier 2 Reviews: By default, and in the absence of existing water quality data, all **waters of the state** must have a Tier 2 review before an application for a permit to discharge is filed. If an applicant is assuming some or all POCs cause degradation, alternative analysis and SEI demonstration is required. Worksheets for evaluating alternative to discharge (see AIP, Section II.B) and SEI to the community (See AIP, Section II.E), as provided in 10 CSR 20-7.031, must be provided for review (see Attachment A). For POCs with Tier 2 designation, applicant must provide the basis for determination by providing existing water quality[1] or an appropriate water quality model[1]. The applicant must consider the current existing water quality value in the administrative record from previous sampling events (see AIP, Water Quality Assessment Procedures). If degradation is minimal or temporary, no alternative analysis and socio-economic demonstration is required (Tier 2 review is not required) but applicant must provide basis for minimal determination. Degradation is considered minimal if the proposed new or expanded loading is less than 10 percent of the facility assimilative capacity and the cumulative degradation is less than 10 percent of the segment assimilative capacity as a result of all discharges combined. Minimal degradation as defined by AIP must be supported by summary worksheet in Attachment B for facility assimilative capacity or segment assimilative capacity demonstrating assimilative capacity of POC. A tier analysis must be provided with the review to ensure all pollutants have the Tier 2 designation.

Tier 3 Reviews: Tier 3 water bodies shall receive no degradation of water quality. If hydrologic connection to Tier 3 water bodies has been or is demonstrated, then the applicant must demonstrate that water quality in the Tier 3 segment will not be lowered. Applicants in watersheds with significant losing segments should contact the department's Division of Geology and Land Survey for a geohydrological evaluation and available dye tracings information. Temporary degradation of water receiving with Tier 3 protection may be allowed by the department on a case-by-case basis as explained in Section II.A of AIP document. Applicant must provide information stated below for evaluation of temporary degradation (see Attachment C).

[1] Quality Assurance Project Plan, or QAPP, must be provided to the department's Water Protection Program for review in advance (i.e., at least six months) of the proposed data collection activity and before submittal of the Antidegradation Review. A pre-applicant conference is highly recommended. **Important:** Applicant must follow the U.S. Environmental Protection Agency's requirements for Quality Assurance Project Plan document, available at www.epa.gov/QUALITY/qs-docs/r5-final.pdf. **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 by all appropriate POCs.

MO 780-1893 (4/13)

ANTIDEGRADATION INSTRUCTIONS (CONTINUED)

Applicants choosing to use new wastewater technology that is considered, "unproven technology" in their Tier 2 Reviews with alternative analysis must comply with the requirements set forth in the *New Technology Definitions and Requirements Factsheet* found at: www.dnr.mo.gov/pubs/pub2453.pdf.

Temporary degradation is defined in the Antidegradation Implementation Procedure on pages 8 and 23. If degradation is temporary, describe the nature of the temporary impact by providing:

1. Length of time during which water quality will be lowered (time frame is typically less than a year).
2. Percent change in ambient conditions.
3. Parameters affected.
4. Likelihood for long-term water quality benefits to the segment.
5 Degree to which achieving the applicable water quality standards during the proposed activity may be at risk.
6. Potential for any residual long-term influences on existing uses.

Summary Documentation for Public Notice: Please attach the entire antidegradation review report. In addition, the department requests antidegradation review summaries for public notice of the major findings for each analysis. Please do not use the phrase "See Report" to complete these forms. Attached to this request form are outlines of the requested information:

Attachment A – Form used for pollutants of concern that are Tier 2 with significant degradation. Significant degradation requires an alternative analysis, preferred alternative outline, social and economic importance of discharge, and if necessary, facility and segment assimilative capacity.

Attachment B – Form used for pollutants of concern that are Tier 2 with minimal degradation or maintenance or reduction of loading demonstrations. For reduction or maintenance of loading demonstrations, 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. Minimal degradation requires a summary of facility and segment assimilative capacity. ***Tier determination analysis must be submitted with this review.***

Attachment C – Submit this form if the discharge will result in temporary degradation. Temporary degradation requires description of the nature of the impact and Tier 1 Review.

Attachment D – Form used for pollutants of concern that are Tier 1. Tier 1 Review requires determination of Tier 1 and may require facility assimilative capacity and segment assimilative capacity for discharge water body or downstream water body segment.

No Degradation Evaluation – Conclusion of Antidegradation Review – Submit this form with the appropriate Construction Permit Application if the project is determined to be non-degrading. Do not submit water quality review assistance request to the central office as no antidegradation review is required. Note: During consultation with Water Protection Staff under the "Other" option of no degradation, a Water Quality Review Assistance Request may be required.

Outstanding National Resource Waters – Outstanding National Resource Waters and Outstanding State Resource Water are listed in Tables D and E of 10 CSR 20-7.031. If the discharge's proposed receiving water body is an Outstanding National Resource Water, an Outstanding State Resource Water, or drainage thereto, per Section I.B.3 of the AIP, "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.

MO 780-1893 (4/13)

RECEIVED
AUG 03 2021
Water Protection Program

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM

ANTIDEGRADATION REVIEW SUMMARY
TIER DETERMINATION AND EFFLUENT LIMIT SUMMARY

1. FACILITY

NAME: The Estates at Woodlake WWTP

TELEPHONE NUMBER WITH AREA CODE: 573-836-0740

ADDRESS (PHYSICAL): Matson Lane

CITY: Linn Creek

STATE: MO

ZIP CODE: 65052

2. RECEIVING WATER BODY SEGMENT #1

NAME: Linn Creek Arm of The Lake of the Ozarks

2.1 UPPER END OF SEGMENT (Location of discharge)
UTM _____ OR Lat N38 , Long W92

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 780-2025 (05-08)

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

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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: [signature] DATE: 4/28/2021

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

COMPANY NAME: Lake Professional Engineering Services

ADDRESS	CITY	STATE	ZIP CODE
83 Oak Tree Road	Camdenton	MO	65020

TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
573-873-3898	jimjacksonjr@charter.net

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

SIGNATURE: [signature] DATE: 4-15-21

NAME AND OFFICIAL TITLES: Kerry Dickemann - Owner

ADDRESS	CITY	STATE	ZIP CODE
PO Box 892	Linn Creek	MO	65052

TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
573-836-0740	

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.

SIGNATURE: [signature] DATE: 4-15-21

NAME AND OFFICIAL TITLES: Dickemann - President The Estates of Woodlake Homeowners Association

ADDRESS	CITY	STATE	ZIP CODE
PO Box 892	Linn Creek	MO	65052

TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
573-836-0740	kdickemann@camdenton.k12.mo.us

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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

Water Protection Program

1. FACILITY

NAME		TELEPHONE NUMBER WITH AREA CODE	
The Estates of Woodlake WWTP		(573) 836-0740	
ADDRESS (PHYSICAL)	CITY	STATE	ZIP CODE
Matson Road	Linn Creek	MO	65052

2. OWNER

NAME AND OFFICIAL TITLES			
Kerry Dickemann - Owner			
ADDRESS	CITY	STATE	ZIP CODE
PO Box 892	Linn Creek	MO	65052
TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS		
(573) 836-0740	kdickemann@camdentonschools.org		

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			
Kerry Dickemann - Owner			
ADDRESS	CITY	STATE	ZIP CODE
PO Box 892	Linn Creek	MO	65052
TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS		
(573) 836-0740	kdickemann@camdentonschools.org		

4. RECEIVING WATER BODY SEGMENT #1

NAME
Linn Creek Arm to The Lake of the Ozarks N38D03'44" W092D43'28"

4.1 UPPER END OF SEGMENT (Location of discharge)
UTM _____ OR Lat _____, Long _____
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

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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.

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

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
	4/28/2021

NAME AND OFFICIAL TITLES / LICENSE #	COMPANY NAME
James O. Jackson, Jr., PE PE-2003014984	Lake Professional Engineering Services, Inc.

ADDRESS	CITY	STATE	ZIP CODE
83 Oak Tree Road	Camdenton	MO	65020

TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
(573) 873-3898	jimjacksonjr@charter.net

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

SIGNATURE	DATE
	4-26-21

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

SIGNATURE	DATE

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

ANTIDEGRADATION: REGIONALIZATION AND NO-DISCHARGE EVALUATION

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MAY 03 2021
Water Protection Pro

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
The Estates at Woodlake WWTP	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? 4.75 miles

B. List facilities contacted about possible regionalization. None since it was 4.75 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? Estates of Woodlake HOA

E. What is the estimated cost for piping and pumps to regionalize? $800,000

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 51 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 Linn Creek won't accept 4.75 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 51 different property owners would have to be acquired. If any of them refuse to grant an easement then the thirteen 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 Linn Creek 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 Linn Creek 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 Highway Y and Highway 54. Because of this, the developer would need to receive easements from approximately 51 land owners. Of these 51 land owners, if any one of them refuses to grant an easement, the thirteen residential lots will not be able to connect to the City of Linn Creek 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? 3 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. 3 Acres needed could cost $130,000 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 $130,000 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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