

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION



CONSTRUCTION PERMIT

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

Anthony A. Butt
General Manager
CAMDEN COUNTY PUBLIC WATER SUPPLY DISTRICT NUMBER FOUR
62 Bittersweet Road
Village of Four Seasons, MO 65049

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 28, 2023
Effective Date

November 27, 2025
Expiration Date



John Hoke, Director, Water Protection Program

CONSTRUCTION PERMIT

I. CONSTRUCTION DESCRIPTION

This project includes an expansion to the wastewater treatment facility (WWTF) from the design flow of 100,000 gallons per day (gpd) to 300,000 gallons per day, replacement of the existing chlorination and dechlorination systems with a new ultraviolet (UV) disinfection, and an addition of a sludge dewatering structure.

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 required to determine “findings of affordability” because the permit applies to a combined or separate sanitary sewer system for a publically-owned treatment works.

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

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 Darren Krehbiel, P.E., with Darren Krehbiel Consultants on August 30, 2023 with addendums received on November 6, 2023 and as described in this permit.
3. The department must be contacted in writing prior to making any changes to the plans and specifications that would directly or indirectly have an impact on the capacity, flow, system layout, or reliability of the proposed wastewater treatment facilities or any design parameter that is addressed by 10 CSR 20-8, in accordance with 10 CSR 20-8.110(11).
4. State and federal law does not permit bypassing of raw wastewater, therefore steps must be taken to ensure that raw wastewater does not discharge during construction. If a sanitary sewer overflow or bypass occurs, report the appropriate information to the department's Central Field Operations per 10 CSR 20-7.015(9)(G).
5. The wastewater facility structures, electrical equipment, and mechanical equipment shall be protected from physical damage by not less than the 100 year flood elevation per 10 CSR 20-8.140(2)(B). The minimum distance between wastewater treatment facilities and all potable water sources shall be at least 300 feet per 10 CSR 20-8.140(2)(C)1.
6. In addition to the requirements for a construction permit, 10 CSR 20-6.200 requires land disturbance activities of one acre or more to obtain a Missouri state operating permit to discharge stormwater. The permit requires best management practices sufficient to control runoff and sedimentation to protect waters of the state. Land disturbance permits will only be obtained by means of the department's ePermitting system available online at <https://dnr.mo.gov/data-e-services/missouri-gateway-environmental-management-mogem>. See <https://dnr.mo.gov/data-e-services/water/electronic-permitting-epermitting> for more information.
7. 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.

8. All construction must adhere to applicable 10 CSR 20-8 (Chapter 8) requirements listed below.
 - The outfall shall be so constructed and protected against the effects of flood water, ice, or other hazards as to reasonably ensure its structural stability and freedom from stoppage. 10 CSR 20-8.140(6)(A)
 - All sampling points shall be designed so that a representative and discrete 24 hour automatic composite sample or grab sample of the effluent discharge can be obtained at a point after the final treatment process and before discharge to or mixing with the receiving waters. 10 CSR 20-8.140(6)(B)
 - Effluent 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 outfalls shall be posted with a permanent sign indicating the outfall number (i.e., Outfall #001). 10 CSR 20-8.140(6)(C)
 - All wastewater treatment facilities shall be provided with an alternate source of electric power or pumping capability to allow continuity of operation during power failures. 10 CSR 20-8.140(7)(A)1.
 - Electrical systems and components in raw wastewater or in enclosed or partially enclosed spaces where hazardous concentrations of flammable gases or vapors that are normally present, shall comply with the NFPA 70 *National Electric Code (NEC)* (2017 Edition), as approved and published August 24, 2016, requirements for Class I, Division 1, Group D locations. 10 CSR 20-8.140(7)(B)
 - An audiovisual alarm or a more advanced alert system, with a self-contained power supply, capable of monitoring the condition of equipment whose failure could result in a violation of the operating permit, shall be provided for all wastewater treatment facilities. 10 CSR 20-8.140(7)(C)
 - No piping or other connections shall exist in any part of the wastewater treatment facility that might cause the contamination of a potable water supply. 10 CSR 20-8.140(7)(D)1.
 - Where a potable water supply is to be used for any purpose in a wastewater treatment facility other than direct connections, a break tank, pressure pump, and pressure tank or a reduced pressure backflow preventer consistent with the department's Public Drinking Water Branch shall be provided. 10 CSR 20-8.140(7)(D)3.A.

- For indirect connections, a sign shall be permanently posted at every hose bib, faucet, hydrant, or sill cock located on the water system beyond the break tank or backflow preventer to indicate that the water is not safe for drinking. 10 CSR 20-8.140(7)(D)3.B.
- Where a separate non-potable water supply is to be provided, a break tank will not be necessary, but all system outlets shall be posted with a permanent sign indicating the water is not safe for drinking. 10 CSR 20-8.140(7)(D)4.
- A means of flow measurement shall be provided at all wastewater treatment facilities. 10 CSR 20-8.140(7)(E)
- Adequate provisions shall be made to effectively protect facility personnel and visitors from hazards. The following shall be provided to fulfill the particular needs of each wastewater treatment facility:
 - Fencing. Enclose the facility site with a fence designed to discourage the entrance of unauthorized persons and animals; 10 CSR 20-8.140(8)(A)
 - Gratings over appropriate areas of treatment units where access for maintenance is necessary; 10 CSR 20-8.140(8)(B)
 - First aid equipment; 10 CSR 20-8.140(8)(C)
 - Posted “No Smoking” signs in hazardous areas; 10 CSR 20-8.140(8)(D)
 - Appropriate personal protective equipment (PPE); 10 CSR 20-8.140(8)(E)
 - Portable blower and hose sufficient to ventilate accessed confined spaces; 10 CSR 20-8.140(8)(F)
 - 10 CSR 20-8.140(8)(G) Portable lighting equipment complying with NEC requirements. See subsection (7)(B) of this rule;
 - 10 CSR 20-8.140(8)(H) Gas detectors listed and labeled for use in NEC Class I, Division 1, Group D locations. See subsection (7)(B) of this rule;
 - Appropriately-placed warning signs for slippery areas, non-potable water fixtures (see subparagraph (7)(D)3.B. of this rule), low head clearance areas, open service manholes, hazardous chemical storage areas, flammable fuel storage areas, high noise areas, etc.; 10 CSR 20-8.140(8)(I)
 - Ventilation shall include the following:
 - Isolate all pumping stations and wastewater treatment components installed in a building where other equipment or offices are located from the rest of the building by an air-tight partition, provide separate outside entrances, and provide separate and independent fresh air supply; 10 CSR 20-8.140(8)(J)1.
 - Force fresh air into enclosed screening device areas or open pits more than four feet deep. 10 CSR 20-8.140(8)(J)2.
 - Dampers are not to be used on exhaust or fresh air ducts. Avoid the use of fine screens or other obstructions on exhaust or fresh air ducts to prevent clogging; 10 CSR 20-8.140(8)(J)3.
 - Where continuous ventilation is needed (e.g., housed facilities), provide at least 12 complete air changes per hour. Where continuous ventilation would cause excessive heat loss, provide intermittent ventilation of at least

- 30 complete air changes per hour when facility personnel enter the area. Base air change demands on 100 percent fresh air; 10 CSR 20-8.140(8)(J)4.
 - Electrical controls. Mark and conveniently locate switches for operation of ventilation equipment outside of the wet well or building. Interconnect all intermittently operated ventilation equipment with the respective wet well, dry well, or building lighting system. The manual lighting/ventilation switch is expected to override the automatic controls. For a two speed ventilation system with automatic switch over where gas detection equipment is installed, increase the ventilation rate automatically in response to the detection of hazardous concentrations of gases or vapors; 10 CSR 20-8.140(8)(J)5.
 - Fabricate the fan wheel from non-sparking material. Provide automatic heating and dehumidification equipment in all dry wells and buildings. 10 CSR 20-8.140(8)(J)6.
 - Explosion-proof electrical equipment, non-sparking tools, gas detectors, and similar devices, in work areas where hazardous conditions may exist, such as digester vaults and other locations where potentially explosive atmospheres of flammable gas or vapor with air may accumulate. 10 CSR 20-8.140(8)(K)
 - Provisions for local lockout/tagout on stop motor controls and other devices; 10 CSR 20-8.140(8)(L)
 - Provisions for an arc flash hazard analysis and determination of the flash protection boundary distance and type of PPE to reduce exposure to major electrical hazards shall be in accordance with NFPA 70E *Standard for Electrical Safety in the Workplace* (2018 Edition), as approved and published August 21, 2017. 10 CSR 20-8.140(8)(M)
- The materials utilized for storage, piping, valves, pumping, metering, and splash guards, etc., for chemical handling, shall be specially selected considering the physical and chemical characteristics of each hazardous or corrosive chemical. 10 CSR 20-8.140(9)(A)1.
- All pumps or feeders for hazardous or corrosive chemicals shall have guards that will effectively prevent spray of chemicals into space occupied by facility personnel. 10 CSR 20-8.140(9)(A)3.
- All piping containing or transporting corrosive or hazardous chemicals shall be identified with labels every 10 feet and with at least 2 labels in each room, closet, or pipe chase. 10 CSR 20-8.140(9)(A)4.A.
- All connections (flanged or other type), except those adjacent to storage or feeder areas, shall have guards that will direct any chemical leakage away from space occupied by facility personnel. 10 CSR 20-8.140(9)(A)4.B.
- Facilities shall be provided for automatic shutdown of pumps and sounding of alarms when failure occurs in a pressurized chemical discharge line. 10 CSR 20-8.140(9)(A)5.

- Dust collection equipment shall be provided to protect facility personnel from dusts injurious to the lungs or skin and to prevent polymer dust from settling on walkways that become slick when wet. 10 CSR 20-8.140(9)(A)6.
- The identification and hazard warning data included on chemical shipping containers, when received, shall appear on all containers (regardless of size or type) used to store, carry, or use a hazardous substance. 10 CSR 20-8.140(9)(E)
- All wastewater treatment facilities must have a screening device, comminutor, or septic tank for the purpose of removing debris and nuisance materials from the influent wastewater. 10 CSR 20-8.150(2)
- All screening devices and screening storage areas shall be protected from freezing. 10 CSR 20-8.150(4)(A)1.
- Provisions shall be made for isolating or removing screening devices from their location for servicing. 10 CSR 20-8.150(4)(A)2.
- Manually cleaned screen channels shall be protected by guard railings and deck gratings with adequate provisions for removal or opening to facilitate raking. 10 CSR 20-8.150(4)(A)3.A.(I)
- Effective flow splitting devices and control appurtenances (*e.g.* gates and splitter boxes) shall be provided to permit proper proportioning of flow and solids loading to each settling unit, throughout the expected range of flows. 10 CSR 20-8.160(2)(B)
- Overflow weirs shall be readily adjustable over the life of the structure to correct for differential settlement of the tank. 10 CSR 20-8.160(3)(C)1.
- Walls of settling tanks shall extend at least 6 inches above the surrounding ground surface and shall provide not less than 12 inches of freeboard. 10 CSR 20-8.160(3)(E)
- Safety features shall appropriately include machinery covers, life lines, handrails on all stairways and walkways, and slip resistant surfaces. For additional safety follow the provisions listed in 10 CSR 20-8.140(8). 10 CSR 20-8.160(5)(A)
- The design shall provide for convenient and safe access to routine maintenance items such as gear boxes, scum removal mechanism, baffles, weirs, inlet stilling baffle areas, and effluent channels. 10 CSR 20-8.160(5)(B)
- Emergency Power. Disinfection and dechlorination processes, when used, shall be provided during all power outages. 10 CSR 20-8.190(2)(A)
- The UV dosage shall be based on the design peak hourly flow, maximum rate of pumpage, or peak batch flow. 10 CSR 20-8.190(5)(A)1.

- The UV system shall deliver the target dosage based on equipment derating factors and, if needed, have the UV equipment manufacturer verify that the scale up or scale down factor utilized in the design is appropriate for the specific application under consideration. 10 CSR 20-8.190(5)(A)3.
- The UV system shall deliver a minimum UV dosage of 30,000 microwatt seconds per centimeters squared ($30,000 \mu\text{W} \cdot \text{s}/\text{cm}^2$). 10 CSR 20-8.190(5)(A)4.
- Open channel UV systems. The combination of the total number of banks shall be capable of treating the design peak hourly flow, maximum rate of pumpage, or peak batch flow. 10 CSR 20-8.190(5)(B)1.
- The UV system must continuously monitor and display at the UV system control panel the following minimum conditions:
 - The relative intensity of each bank or closed vessel system; 10 CSR 20-8.190(5)(C)1.A.
 - The operational status and condition of each bank or closed vessel system; 10 CSR 20-8.190(5)(C)1.B.
 - The ON/OFF status of each lamp in the system; 10 CSR 20-8.190(5)(C)1.C. and
 - The total number of operating hours of each bank or each closed vessel system. 10 CSR 20-8.190(5)(C)1.D.
- The UV system shall include an alarm system. Alarm systems shall comply with 10 CSR 20-8.140(7)(C). 10 CSR 20-8.190(5)(C)2.

9. Upon completion of construction:

- A. The Camden County PWSD #4 will become the continuing authority for operation and maintenance of these facilities;
- B. Submit an electronic copy of the as-built plans if the project was not constructed in accordance with previously submitted plans and specifications; and
- C. Submit the enclosed form Statement of Work Completed to the Department in accordance with 10 CSR 20-6.010(5)(N) and a request for the operating permit modification. The operating permit modification fee has been paid.

IV. REVIEW SUMMARY

1. CONSTRUCTION PURPOSE

Construction of additional two 100,000 gallon extended aeration plants to increase the treatment capacity of the facility from 100,000 gallons per day to 300,000 gallons per day for future growth.

2. FACILITY DESCRIPTION

The existing WWTF has a design flow of 100,000 gpd. It consists of a flow equalization basin, influent pump station, extended aeration, secondary clarification, chlorination, dechlorination, and a sludge holding basin. Sludge is land applied by contract hauler.

This expanded WWTF consists of three treatment trains each with a design flow of 100,000 and includes an equalization basin, influent pump station, extended aeration, secondary clarification, and sludge holding basin; ultraviolet light disinfection; sludge dewater containment pads; and biosolids land applied by contract hauler.

The Shawnee Bend WWTF is located near southwest corner of Highway MM & Grand Point Boulevard intersection, Sunrise Beach, in Camden County, Missouri. The facility has a design average flow of 300,000 gpd and serves a hydraulic population equivalent of 3,000 people.

3. COMPLIANCE PARAMETERS

The proposed project is required to meet final effluent limits proposed in the modified operating permit, MO-0123722, public noticed on July 7, 2023.

4. ANTIDegradation

The department has reviewed the antidegradation report for this facility and issued the Water Quality and Antidegradation Review dated on August 29, 2022, due to the expansion of the WWTF. See **APPENDIX – ANTIDegradation**.

5. REVIEW of MAJOR TREATMENT DESIGN CRITERIA

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

- The existing 100,000 gpd extended aeration package plant and its associated equipment will remain in place.

Construction will cover the following items:

- Components are designed for a Population Equivalent of 3,000 people based on the hydraulic loading to the system.
- Influent Piping, Flow Splitter, and Control – Construction of influent piping, flow splitter, and control to ensure each of the three treatment trains only receives a maximum flow of 100,000 gpd. Each pipe is equipped with a pinch valve and a badger electromagnetic flow meter to automatic control the flow to each of the treatment train.

- Flow Measurement – Installation of accurate flow measurement devices will give the treatment facility a means of improved data analysis.
 - Electromagnetic Meter – An influent electromagnetic 10-inch flow meter shall measure the raw influent wastewater from each of the influent pipe to each of the treatment train.
 - Parshall Flume – A 2-inch throat effluent Parshall flume with ultrasonic flow sensor shall measure the secondary treated and disinfected wastewater prior to discharge at Outfall No. 007.
- Screening – Installation of screening devices removes nuisance inorganic materials from raw wastewater.
 - Trash Rack – A coarse manual trash rack with 1.5-inch clear openings will be located at the inlet of the flow equalization basin of each of the 3 treatment trains.
- Extended Aeration Package Plant – Installation of 2 extended aeration package plants each capable of treating a design average flow of 100,000 gpd. The following components are integrated into each of the poured-in-place concrete package plants:
 - Flow Equalization – A flow equalization chamber with a volume of 30,720 gallons will be provided. Aeration by means of 3 blowers compatible and interchangeable with the existing WWTF blowers and capable of supplying 250 scfm each to 4 fine bubble diffusers with a capacity of 8.92 scfm per diffuser. Four flow equalization pumps that are controlled by a float system to transfer wastewater to the aeration chamber. The flow equalization chamber has a gravity emergency overflow to the aeration chamber.
 - Aeration Chambers – Two – 13.5 ft by 36 ft by 14.6 ft sidewater depth aeration chambers operating in parallel by means of a transfer pipe with a total volume of 6,755.5 ft³ will be provided. Aeration by means of 3 blowers capable of supplying 250 scfm each to 8 fine bubble diffusers per chamber with a capacity of 8.92 scfm per diffuser. The aeration chambers are designed for an average daily loading of 170 lbs BOD₅. A transfer pipe and elbow allows wastewater from the aeration chambers to move by gravity to the clarifier.
 - Sludge Holding Chambers – Two sludge holding chambers will have a total volume of 29,930 gallons. The aeration chamber blowers will supply air to the 2 fine bubble diffusers per chamber with a capacity of 8.92 scfm per diffuser. Supernatant will be decanted by means of an adjustable surface skimming airlift to the flow equalization chamber/aeration chamber. Sludge removal shall be by contract hauler.

- Secondary Clarifier – two secondary clarifiers will be constructed each with a total surface area of 314 sf. At the 0.3 MGD peak, this provides a surface loading rate of 955 gpd/sf. Each clarifier will have a 20 ft diameter. The sidewater depth will be 12 ft. The weir loading rate is 5,760 gpd which meets the requirements of 10 CSR 20-8.160(3)(C)2 of being less than 20,000 gpd/sf. The solids loading rate is 23.9 lbs/day/sf which meets the requirements of 10 CSR 20-8.160(3)(B)3 of less than 35 lbs/day/sf at peak flow.
- Disinfection – Disinfection is the process of removal, deactivation, or killing of pathogenic microorganisms.
 - Open Channel Ultraviolet (UV) – An open channel, low pressure high intensity UV disinfection system capable of treating a peak flow of 620,000 gpd while delivering a minimum UV intensity of 30 mJ/cm² with an expected ultraviolet transmissivity of 65 percent or greater. The single open channel UV system consists of two banks in series with 2 modules per bank and 2 lamps per module. The disinfected effluent will flow by gravity through flow measurement equipment to Outfall No. 007 and discharge into a tributary to Lake of the Ozarks.
- Emergency Power – An 80 kW portable generator and automatic transfer switch will be provided to operate the treatment facility in event of power failure.
- Sludge Return Pump Station – Construction of a duplex pump station and associated valves. Each of the pumps will be capable of pumping 130 gpm at 28 ft of TDH with a 3 HP motor. The pumps are utilized to pump sludge from the secondary clarifier to the sludge holding basin.
- Sludge Dewatering Concrete Pads – Installation of concrete pads for dewatering sludge, containment, and sludge roll-off bags.

6. OPERATING PERMIT

Operating permit MO-0123722 will require a modification to reflect the construction activities. The modified Shawnee Bend WWTF, MO-0123722, was successfully public noticed from July 7, 2023 to August 7, 2023 with no comments received. Submit the Statement of Work Completed to the Department in accordance with 10 CSR 20-6.010(5)(N) and request the operating permit modification be issued. The operating permit modification has been paid.

V. NOTICE OF RIGHT TO APPEAL

If you were adversely affected by this decision, you may be entitled to an appeal before the Administrative Hearing Commission (AHC) pursuant to Section 621.250 RSMo. To appeal, you must file a petition with the AHC within 30 days after the date this decision was mailed or the date it was delivered, whichever date was earlier. If any such petition is sent by registered mail or certified mail, it will be deemed filed on the date it is mailed; if it is sent by any method other than registered mail or certified mail, it will be deemed filed on the date it is received by the AHC. Any appeal should be directed to:

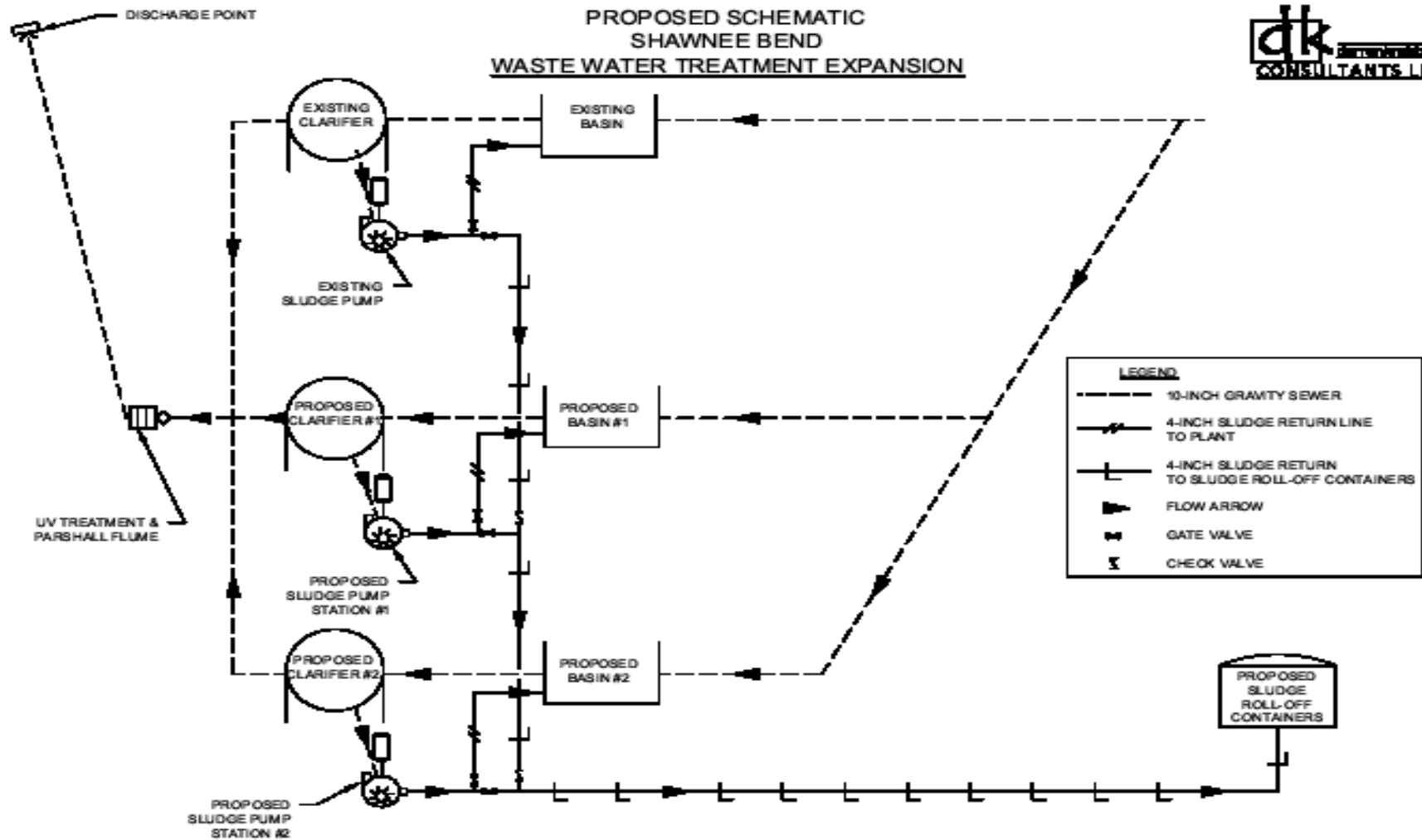
Administrative Hearing Commission
U.S. Post Office Building, Third Floor
131 West High Street, P.O. Box 1557
Jefferson City, MO 65102-1557
Phone: 573-751-2422
Fax: 573-751-5018
Website: <https://ahc.mo.gov>

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

APPENDICES

- **Process Flow Diagram**
- **Antidegradation**
- **Cost Analysis for Compliance**

Appendix 1



Appendix 2

Water Quality and Antidegradation Review

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

Tributary to Lake of the Ozarks
by
Camden County PWSD #4
Shawnee Bend WWTF



August 2022

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1. PURPOSE OF ANTIDegradation REVIEW REPORT

The Shawnee Bend WWTF is currently operating well and has sufficient capacity for its average daily flow. However, being located at the Lake of the Ozarks, it must accommodate drastic increases in peak flows during summer weekends. This project is to expand the facility to ensure it is capable of accepting and treating these peak flows. Current design flow is 100,000 gpd; the increase will be to 300,000 gpd. Chlorination and dechlorination will be replaced by UV disinfection.

Darren Krehbiel, P.E., of submitted the application and facility plan, which included the alternatives analysis, on behalf of Camden County PWSD #4.

The applicant elected to assume that all pollutants of concern (POC) significantly degrade the receiving stream in the absence of existing water quality. An alternatives analysis was conducted to fulfill the requirements of the Antidegradation Implementation Procedure (AIP).

2. FACILITY INFORMATION

Facility Name:	Shawnee Bend WWTP
Address:	SW corner of Hwy MM & Grand Point Blvd. intersection, Sunrise Beach, MO 65079
Permit #:	MO-0123722
County:	Camden
Facility Type:	POTW
Owner:	CAMDEN COUNTY PUBLIC WATER SUPPLY DISTRICT NUMBER FOUR
Continuing Authority:	CAMDEN COUNTY PUBLIC WATER SUPPLY DISTRICT NUMBER FOUR
UTM Coordinates:	X=528891, Y=4224282
Legal Description:	Sec. 3, T39N, R16W, Camden County
Ecological Drainage Unit:	Ozark Highlands

3. FACILITY HISTORY

This project is intended to address temporary peak flows associated with holiday weekends during the summer months as a result of the second home ownership and the tourist nature of the connections served. Currently these flows are absorbed by the treatment plant with managed operation and do not result in conditions or discharges outside the limits of the District's permit. The projected increase is for 200,000 gpd.

A. FACILITY PERFORMANCE HISTORY:

A review of the past 5 years of Discharge Monitoring Report data show sporadic exceedances for ammonia and TSS. The facility is not under any enforcement action.

B. RECEIVING WATERBODY INFORMATION

OUTFALL(S) TABLE:

OUTFALL	DESIGN FLOW (CFS)	TREATMENT LEVEL	EFFLUENT TYPE
#007	0.46	Secondary	Domestic

RECEIVING STREAM(S) TABLE:

WATER-BODY NAME	CLASS	WBID	DESIGNATED USES*	12-DIGIT HUC	DISTANCE TO CLASSIFIED SEGMENT (MI)
Tributary to Lake of the Ozarks (losing)	--	--	General Criteria	10290109-0406	0 (losing)
Lake of the Ozarks	L2	7205	AQL, IRR, LWW, SCR, WBC(A), HHP		0.37 (to lake)

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

RECEIVING STREAM(S) LOW-FLOW VALUES:

RECEIVING STREAM	LOW-FLOW VALUES (CFS)		
	1Q10	7Q10	30Q10
Tributary to Lake of the Ozarks (losing)	0.0	0.0	0.0

Receiving Water Body Segment Outfall #1:		
Upper end segment* UTM coordinates:	X = 528891 ; Y = 4224282	outfall
Lower end segment* UTM coordinates:	X = 528496 ; Y = 4224678	discharge to lake

*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.

A Geohydrologic Evaluation was not submitted with the request and the receiving stream is losing for discharge purposes, according to the 2021 operating permit renewal.

C. EXISTING WATER QUALITY

No existing water quality data was submitted. The facility discharges to an unnamed creek that drains into the Lake of the Ozarks at Fork Hollow Cove.

D. MIXING CONSIDERATIONS

MIXING CONSIDERATIONS

Mixing Zone: Not Allowed [10 CSR 20-7.031(5)(A)4.B.(I)(a)].

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

4. PERMIT LIMITS AND MONITORING INFORMATION
Proposed Monitoring Parameters and Effluent Limits

PARAMETER	Unit	Basis for Limits	Daily Maximum	Weekly Average	Monthly Average	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type *****
Flow	MGD		*		*				
BOD ₅	mg/L			15	10				
TSS	mg/L			20	15				
<i>Escherichia coli</i> **	#/100mL			126**	126**				
Ammonia as N									
January				12.1	3.1	*			
February				10.1	2.7	*			
March				12.1	3.1	*			
April				12.1	2.7	1.4			
May				12.1	2.2	1.4			
June				12.1	1.7	1.4			
July				12.1	1.5	1.4			
August				10.1	1.3	1.4			
September				12.1	1.8	1.4			
October				12.1	2.5	*			
November				12.1	3.1	*			
December				12.1	3.1	*			
Oil & Grease	mg/L		15		10				
Total Phosphorus	mg/L		*		*				
Total Kjeldahl Nitrogen	mg/L		*		*				
PARAMETER	Unit	Basis for Limits	Minimum		Maximum	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type
pH	SU		6.5		9.0				
PARAMETER	Unit	Basis for Limits	Daily Minimum		Monthly Avg. Min	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type
BOD ₅ Percent Removal	%				85				
TSS Percent Removal	%				85				

* - Monitoring requirement only

** - #/100mL; the Monthly Average for *E. coli* is a geometric mean.

*** - Parameter not previously established in previous state operating permit.

Basis for Limitations Codes:

MDEL – Minimally Degrading Effluent Limit

NDEL – Non-Degrading Effluent Limit

PEL – Preferred Effluent Limit

TBEL – Technology-Based Effluent Limit

WQBEL – Water Quality-Based Effluent Limit

5. RECEIVING WATER MONITORING REQUIREMENTS

No receiving water monitoring requirements recommended at this time.

6. ANTIDEGRADATION REVIEW 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 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 follow Missouri's AIP for new and expanded wastewater discharges.

The AIP specifies that if the proposed activity results in significant degradation then a demonstration of necessity (i.e., alternatives analysis) and a determination of social and economic importance are required.

The following is a review of the alternatives analysis in the *Facility Plan for Shawnee Bend Treatment Plant* dated March 2022.

A. TIER DETERMINATION

Waterbodies are assigned Tier 1, 2, or 3 protection levels.

Tier 1 protection is applied to a waterbody on a pollutant by pollutant basis for pollutants may cause or contribute to the impairment of a beneficial use or violation of Water Quality Criteria (WQC); and prohibit further degradation of Existing Water Quality (EWQ) where additional pollutants of concern (POCs) would result in the water being included on the 303(d) List.

Tier 2 level protection is assigned to the waterbody on a pollutant by pollutant basis that prohibits the degradation of water quality of a surface water unless a review of reasonable alternatives and social and economic considerations justifies the degradation in accordance with the methods presented in the AIP.

Tier 3 protection prohibits any degradation of water quality of Outstanding National Resource Waters and Outstanding State Resource Waters as identified in Tables D and E of the Water Quality Standards (WQS). Temporary degradation of water receiving Tier 3 protection may be allowed by the Department on a case-by-case basis as explained in Section VI of the AIP.

Below is a list of POCs reasonably expected and identified by the permittee in their application to be in the discharge. Pollutants of concern are defined as those pollutants "proposed for discharge that affect beneficial use(s) in waters of the state." They include pollutants that "create conditions unfavorable to beneficial uses in the water body receiving the discharge or proposed to receive the discharge" (AIP, Page 6).

The applicant elected to assume that all pollutants of concern (POC) significantly degrade the receiving stream in the absence of existing water quality.

Pollutants of Concern and Tier Determination

Pollutants of Concern	Tier	Degradation	Comment
Biological Oxygen Demand (BOD ₅)/DO	2*	Significant	
Total Suspended Solids (TSS)	2*	Significant	
Ammonia as N	2*	Significant	
<i>Escherichia coli</i> (<i>E. coli</i>)	2*	Significant	Permit Limits Applied
Oil & Grease	2*	Significant	Permit Limits Applied
Phosphorus, Total	2*	Significant	Permit Limits Applied
pH	***	Significant	Permit Limits Applied

* Tier assumed.

** Tier determination not possible: No in-stream standards for these parameters.

*** Standards for these parameters are ranges.

B. NECESSITY OF DEGRADATION

The AIP specifies 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.

Part of that analysis as shown below is the evaluation of non-degrading alternatives, such as regionalization or no discharge systems.

The applicant has the option of assuming discharge will be significant and proceeding directly to the alternatives analysis, thereby avoiding the determination of the assimilative capacity of the receiving water. The applicant has elected this option.

i. Regionalization

Regionalization was eliminated as an option as there is only one other treatment facility within a five mile radius of the existing treatment plant. This facility is located across the Lake of the Ozarks, on the opposite side of a developed community, and across a major highway. Connecting to this facility would be cost prohibitive and it is unclear if permission to cross the Lake of the Ozarks with a pressure sewer line could be obtained. The next nearest treatment facility is over seven miles away and does not have the operational capacity to accept the flow.

ii. No Discharge Evaluation

Land application is not an option as the District does not have sufficient property to accommodate application of the anticipated flow. There does not appear to be land of sufficient size, soil type, and slope available for acquisition to provide land application.

iii. Alternatives to No discharge

Alternative No. 1

A single, new, and larger oxidation or aeration type treatment plant was considered. This facility could be constructed on the existing site or at an entirely new location with a new discharge point. Because the existing facility is in good condition and in good working order, abandoning a facility that currently meets regulatory requirements and the needs of the District was dismissed as inconsistent with the fiduciary and management responsibilities of the Board.

Alternative No. 2

Similar to the discussion considering a new single treatment facility of similar construction, discussion was held exploring alternate types of discharging systems and alternate discharge locations, possibly relocating a new discharge point further from Lake of the Ozarks. As the issue at hand is not a compliance concern and there are no physical or operational issues with the existing facility, again it was determined that abandoning a facility that currently meets regulatory requirements and the needs of the District was dismissed as inconsistent with the fiduciary and management responsibilities of the Board. Further, a new facility (Alternates 1 or 2) would likely have to be located to a new, separate location as the existing facility would be required to be maintained operational to serve the District needs until the new facility was completed and on line.

Alternative No. 3

The Board of Directors of Camden County Public Water Supply District No. 4 chose to investigate the practical considerations and design capabilities of expanding the existing wastewater treatment facility to increase capacity.

Alternatives Analysis Comparison

Pollutant	Alternative 1 Single, New Expanded Oxidation Ditch	Alternative 2 Expanded Oxidation Ditch at new location	Alternative 3 (Base Case) Expanding current facility
BOD ₅	≤ 10 mg/l	≤ 10 mg/l	≤ 10 mg/l
TSS	≤ 15 mg/l	≤ 15 mg/l	≤ 15 mg/l
Ammonia as N	≤ 1.11 mg/l	≤ 1.11 mg/l	≤ 1.11 mg/l
Escherichia coli (E. coli)	≤ 126 CFU/100ml	≤ 126 CFU/100ml	≤ 126 CFU/100ml
Phosphorus, Total	≤ 1.0 mg/l	≤ 1.0 mg/l	≤ 1.0 mg/l
Life Cycle Cost	not practical	not practical	not provided
Ratio	NA	NA	NA

C. LOSING STREAM ALTERNATIVE 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 current outfall discharges to a small unnamed stream that empties into Fork Hollow Cove on Lake of the Ozarks. As discussed in B. above, land application and regionalization are not practical alternatives.

D. SOCIAL AND ECONOMIC IMPORTANCE

The affected community consists of the rural and unincorporated areas between the City of Lake Ozark and the Village of Sunrise Beach currently in the permitted service area of the District and currently being served by the existing Shawnee Bend Treatment Facility. The affected area is mostly rural with a largely tourist-based economy. Protecting the waters of the Lake of the Ozarks is the foundation of the entire Lake area economy.

E. NATURAL HERITAGE REVIEW

A Missouri Department of Conservation Natural Heritage Review was not obtained by the applicant. However, reviews obtained for other facilities in the Lake area indicate there are two species of bats, Indiana and Northern Long-Eared, may be present in the project area. The following recommendations were made for construction activities:

- Manage construction to minimize sedimentation and run-off to nearby streams.
- At stream and drainage crossings, avoid erosion, silt introduction, petroleum or chemical pollution, and disruption or realignment of stream banks and beds.
- If any trees need to be removed for the project, contact the U.S. Fish and Wildlife Service for coordination under the Endangered Species Act.

7. DERIVATION AND DISCUSSION OF PARAMETERS AND LIMITS

Wasteload allocations and limits were calculated using two methods:

- A. **Water quality-based** – Using water quality criteria or water quality model results and the dilution equation below:

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

Where C = downstream concentration
 C_u = upstream concentration
 Q_u = 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).

- B. **Alternative Analysis-based** – Using the preferred alternative's treatment capacity for conventional pollutants such as BOD₅ 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).

Note: Significantly-degrading effluent limits have been based on the authority included in Section I.A. 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 BOD₅ 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 BOD₅ and TSS effluent values could be achievable through proper operation and maintenance of the treatment works, considering the design capability of the treatment process.

Outfall #001 – Main Facility Outfall

- **Flow.** Though not limited itself, the volume of effluent discharged from each outfall is needed to assure compliance with permitted effluent limitations [40 CFR Part 122.44(i)(1)(ii)]. 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. Influent monitoring has been and will be required for this facility in its Missouri State Operating Permit.
- **Biochemical Oxygen Demand (BOD₅).** Operating permit retains 15 mg/L as a Weekly Average and 10 mg/L as a Monthly Average from the previous permit. Effluent limits were established in accordance with 10 CSR 20-7.015(4) for discharges to Losing Streams.
- **Total Suspended Solids (TSS).** Operating permit retains 20 mg/L as a Weekly Average and 15 mg/L as a Monthly Average from the previous permit. Effluent limits were established in accordance with 10 CSR 20-7.015(4) for discharges to Losing Streams.
- ***Escherichia coli (E. coli).*** Discharges to losing streams shall not exceed 126 per 100 mL as a Daily Maximum at any time, as per 10 CSR 20-7.031(5)(C). Monitoring only for a monthly average. No more than 10% of samples over the course of the calendar year shall exceed 126 #/100 mL daily maximum as per 10 CSR 20-7.015(9)(B)1.G.

- **Total Ammonia Nitrogen.** Early Life Stages Present Total Ammonia Nitrogen criteria apply [10 CSR 20-7.031(5)(B)7.C. & Table B3]. Background total ammonia nitrogen = 0.01 mg/L

Month	Temp (°C)*	pH (SU)*	Total Ammonia Nitrogen CCC (mg N/L)	Total Ammonia Nitrogen CMC (mg N/L)
January	8.1	7.8	3.1	12.1
February	9.3	7.9	2.7	10.1
March	13.0	7.8	3.1	12.1
April	16.7	7.8	2.7	12.1
May	20.0	7.8	2.2	12.1
June	24.0	7.8	1.7	12.1
July	26.6	7.8	1.5	12.1
August	26.5	7.9	1.3	10.1
September	23.5	7.8	1.8	12.1
October	18.0	7.8	2.5	12.1
November	14.0	7.8	3.1	12.1
December	10.0	7.8	3.1	12.1

* Ecoregion Data (Ozark Highlands)

WBQEL equation

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

January

Chronic WLA: $C_e = ((0.46 + 0.0)3.1 - (0.0 * 0.01)) / 0.46$ $C_e = 3.1$
 Acute WLA: $C_e = ((0.46 + 0.0)12.1 - (0.0 * 0.01)) / 0.46$ $C_e = 12.1$
 AML = WLA_c = 3.1 mg/L
 MDL = WLA_a = 12.1 mg/L

February

Chronic WLA: $C_e = ((0.46 + 0.0)2.7 - (0.0 * 0.01)) / 0.46$ $C_e = 2.7$
 Acute WLA: $C_e = ((0.46 + 0.0)10.1 - (0.0 * 0.01)) / 0.46$ $C_e = 10.1$
 AML = WLA_c = 2.7 mg/L
 MDL = WLA_a = 10.1 mg/L

March

Chronic WLA: $C_e = ((0.46 + 0.0)3.1 - (0.0 * 0.01)) / 0.46$ $C_e = 3.1$
 Acute WLA: $C_e = ((0.46 + 0.0)12.1 - (0.0 * 0.01)) / 0.46$ $C_e = 12.1$
 AML = WLA_c = 3.1 mg/L
 MDL = WLA_a = 12.1 mg/L

April

Chronic WLA: $C_e = ((0.46 + 0.0)2.7 - (0.0 * 0.01)) / 0.46$ $C_e = 2.7$
 Acute WLA: $C_e = ((0.46 + 0.0)12.1 - (0.0 * 0.01)) / 0.46$ $C_e = 12.1$
 AML = WLA_c = 2.7 mg/L
 MDL = WLA_a = 12.1 mg/L

May

Chronic WLA: $C_e = ((0.46 + 0.0)2.2 - (0.0 * 0.01)) / 0.46$ $C_e = 2.2$
 Acute WLA: $C_e = ((0.46 + 0.0)12.1 - (0.0 * 0.01)) / 0.46$ $C_e = 12.1$
 AML = WLA_c = 2.2 mg/L
 MDL = WLA_a = 12.1 mg/L

June

Chronic WLA: $C_e = ((0.46 + 0.0)1.7 - (0.0 * 0.01)) / 0.46$ $C_e = 1.7$
 Acute WLA: $C_e = ((0.46 + 0.0)12.1 - (0.0 * 0.01)) / 0.46$ $C_e = 12.1$
 AML = WLA_c = 1.7 mg/L
 MDL = WLA_a = 12.1 mg/L

July

Chronic WLA: $C_e = ((0.46 + 0.0)1.5 - (0.0 * 0.01)) / 0.46$ $C_e = 1.5$
 Acute WLA: $C_e = ((0.46 + 0.0)12.1 - (0.0 * 0.01)) / 0.46$ $C_e = 12.1$
 AML = WLA_c = 1.5 mg/L
 MDL = WLA_a = 12.1 mg/L

August

Chronic WLA: $C_e = ((0.46 + 0.0)1.3 - (0.0 * 0.01)) / 0.46$ $C_e = 1.3$
 Acute WLA: $C_e = ((0.46 + 0.0)10.1 - (0.0 * 0.01)) / 0.46$ $C_e = 10.1$
 AML = WLA_c = 1.3 mg/L
 MDL = WLA_a = 10.1 mg/L

September

Chronic WLA: $C_e = ((0.46 + 0.0)1.8 - (0.0 * 0.01)) / 0.46$ $C_e = 1.8$
 Acute WLA: $C_e = ((0.46 + 0.0)12.1 - (0.0 * 0.01)) / 0.46$ $C_e = 12.1$
 AML = WLA_c = 1.8 mg/L
 MDL = WLA_a = 12.1 mg/L

October

Chronic WLA: $C_e = ((0.46 + 0.0)2.5 - (0.0 * 0.01)) / 0.46$ $C_e = 2.5$
 Acute WLA: $C_e = ((0.46 + 0.0)12.1 - (0.0 * 0.01)) / 0.46$ $C_e = 12.1$
 AML = WLA_c = 2.5 mg/L
 MDL = WLA_a = 12.1 mg/L

November

Chronic WLA: $C_e = ((0.46 + 0.0)3.1 - (0.0 * 0.01)) / 0.46$ $C_e = 3.1$
 Acute WLA: $C_e = ((0.46 + 0.0)12.1 - (0.0 * 0.01)) / 0.46$ $C_e = 12.1$
 AML = WLA_c = 3.1 mg/L
 MDL = WLA_a = 12.1 mg/L

December

Chronic WLA: $C_e = ((0.46 + 0.0)3.1 - (0.0 * 0.01)) / 0.46$ $C_e = 3.1$
 Acute WLA: $C_e = ((0.46 + 0.0)12.1 - (0.0 * 0.01)) / 0.46$ $C_e = 12.1$
 AML = WLA_c = 3.1 mg/L
 MDL = WLA_a = 12.1 mg/L

- **Oil & Grease.** Conventional pollutant, effluent limitation for protection of aquatic life; 10 mg/L monthly average, 15 mg/L daily maximum. Per 10 CSR 20-7.031(4)(B), Waters shall be free from oil, scum, and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses.
- **Total Phosphorus and Total Nitrogen.** Monitoring required for facilities greater than 100,000 gpd design flow per 10 CSR 20-7.015(9)(D)7. Once per quarter sampling for one permit cycle or up to 5 years if permit cycle is less than 5 years.
- **pH.** The preferred alternative selected for ammonia treatment serves as the base case for pH with effluent limit range of 6.5-9.0 SU. Technology based effluent limitations of 6.0-9.0 SU [10 CSR 20-7.015] are not protective of the Water Quality Standard, which states that water contaminants shall not cause pH to be outside the range of 6.5-9.0 SU. No mixing zone is allowed due to the classification of the receiving stream, therefore the water quality standard must be met at the outfall.

- **Biochemical Oxygen Demand (BOD₅) Percent Removal.** In accordance with 40 CFR Part 133, removal efficiency is a method by which the Federal Regulations define Secondary Treatment and Equivalent to Secondary Treatment, which applies to BOD₅ and TSS for Publicly Owned Treatment Works (POTWs)/municipals. This facility is required to meet 85% removal efficiency for BOD₅.
- **Total Suspended Solids (TSS) Percent Removal.** In accordance with 40 CFR Part 133, removal efficiency is a method by which the Federal Regulations define Secondary Treatment and Equivalent to Secondary Treatment, which applies to BOD₅ and TSS for Publicly Owned Treatment Works (POTWs)/municipals. This facility is required to meet 85% removal efficiency for TSS.

8. GENERAL ASSUMPTIONS OF THE WATER QUALITY AND ANTIDegradation REVIEW

- A. A Water Quality and Antidegradation Review (WQAR) assumes that [10 CSR 20-6.010(2) Continuing Authorities and 10 CSR 20-6.010(5)(A)4.B., consideration for no discharge] has been or will be addressed in a Missouri State Operating Permit or Construction Permit Application.
- B. 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.
- C. Changes to Federal and State Regulations (FSR) made after the drafting of this WQAR may alter Water Quality Based Effluent Limits (WQBEL).
- D. Effluent limitations derived from FSR may be WQBEL or Effluent Limit Guidelines (ELG).
- E. WQBEL supersede ELG only when they are more stringent. Mass limits derived from technology based limits are still appropriate.
- F. A WQAR does not allow discharges to waters of the State, and shall not be construed as a National Pollution Discharge Elimination System (NPDES) or Missouri State Operating Permit to discharge or a permit to construct, modify, or upgrade.
- G. Limitations and other requirements in a WQAR may change as Water Quality Standards (WQS), Methodology, and Implementation procedures change.
- H. Nothing in this WQAR removes any obligations to comply with county or other local ordinances or restrictions.
- I. 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.

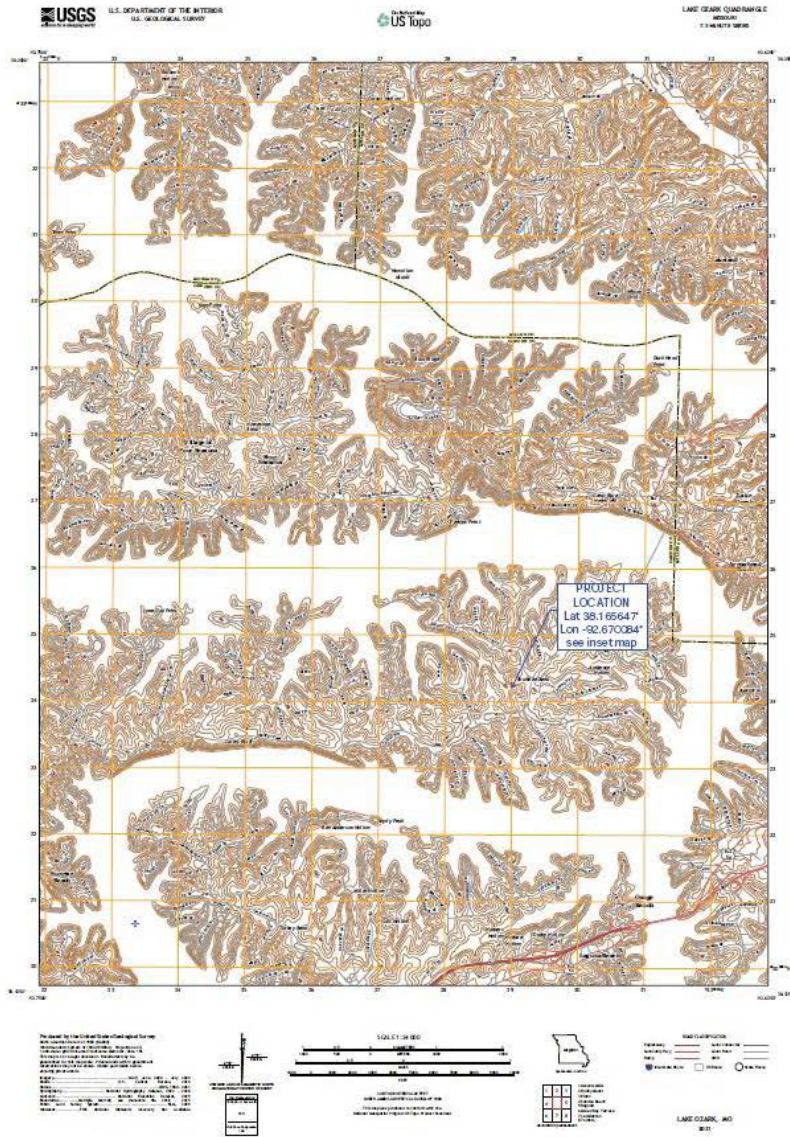
9. ANTIDegradation REVIEW PRELIMINARY DETERMINATION

The proposed expansion will allow the district to safely accommodate the considerably higher flows on weekends during the tourist season.

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: Bern Johnson
Date: August 2022
Reviewer: Steve Hamm, P.E.

Appendix A: Map of Discharge Location



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MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH
ANTIDegradation REVIEW SUMMARY
PATH C: TIER 2 – SIGNIFICANT DEGRADATION

1. FACILITY

NAME
Shawnee Bend WWTF MO-0123722

COUNTY
Camden

2. SUMMARY OF THE POLLUTANTS OF CONCERN

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:

[illegible]

* Place an X in appropriate box for the concentration units for each Pollutant of Concern

** Provide the Basis for the Base Case Limit: WQS – Water Quality Standard, WLA – Wasteload Allocation, ELG – Effluent Limit Guideline, or describe other.

3. IDENTIFYING ALTERNATIVES

Supply a summary of the non-discharging alternatives considered. "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. These alternatives include no-discharge. Attach all supportive documentation in the Antidegradation Review report.

Feasibility of non-discharging alternatives (regionalization, land application, subsurface irrigation, and recycling or reuse):
Regionalization is not an option as there is only one other treatment facility within a five mile radius of the existing treatment facility. This facility is located across the Lake of the Ozarks, on the opposite side of a developed community, and across a major highway.

The next nearest treatment facility is over seven miles away and does not have the operational capacity to accept the flow.

Land application is not an option as District does not have sufficient property to accommodate the anticipated flow. There is not accessible land of sufficient size, soil type, and gentle enough slope available for acquisition to provide land application.

Recycling / Reuse of the volume of discharge, and the transportation of the same from the site, would be impractical and cost prohibitive.

Minimum of three (preferably five or more) discharging alternatives* ranging from less-degrading to degrading including Preferred Alternative (All treatment levels for POCs must at a minimum meet water quality standards):		
Discharging Alternative #	Treatment Type	Description
1	New Single Larger WWTP	construct an entirely new wastewater treatment plant
2	Alternate Treatment & Discharge	alternate types of systems discharging to Lake of the Ozarks
3	Expanding Existing WWTP	increase capacity by expanding existing treatment
4		
5		
6		
* Same technology may be multiple alternatives as you have the base unit and add to it with more capacity to provide additional treatment.		
4. 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.		
<p>Practicability Summary:</p> <p>"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.</p> <p>The most reasonable alternative is to expand the existing plant and replace current tablet chlorination with the addition of UV disinfection. Sludge dewatering is also being considered. As the existing facility sufficiently treats the incoming wastewater, and the proposed improvements are simply to address temporary peaks in inflow, utilizing the existing plant and expanding it to incorporate the current operation is the most practical and effective alternative for addressing the flow concerns. Since the District has sufficient property at the existing site to accommodate plant expansion and a proven record for operating the existing facility, plant expansion is the most feasible alternative. Expanding the existing plant and adding UV disinfection of the most economically efficient, affordable, and cost effective alternative for the District.</p>		
<p>Economic Efficiency Basis:</p> <p>What is the design life cycle for the comparison? 10 to 20 years for mechanical equipment and 50 years for static improvements.</p> <p>What interest rate was used in the present worth calculations? N/A</p>		
<p>Economic Efficiency Summary:</p> <p>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.</p> <p>No alternatives have been deemed practicable.</p>		

TABLE OF THE ALTERNATIVES EVALUATION (Attach additional page if necessary)						
PARAMETERS	Alternatives #					
	1	2	3	4	5	6
BODs – mg/L	10	10	10			
TSS – mg/L	15	15	15			
Ammonia (Summer) – mg/L	1.11	1.11	1.11			
Ammonia (Winter) – mg/L	2.41	2.41	2.41			
E. Coli – #/100 mL						
Total Nitrogen – mg/L						
Total Phosphorus – mg/L						
no change in treatment plant parameters is anticipated						
Construction Cost – \$	N/A	N/A	N/A			
Operating Cost – \$	N/A	N/A	N/A			
Present Worth – \$	N/A	N/A	N/A			
Ratio present worth to base case	N/A	N/A	N/A			
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." See Facility Plan. No affordability has been calculated as no alternatives have been deemed practical of being implemented. Essentially there are no alternatives.						
Justification for Preferred Alternative: The primary reason for the selection of the recommended alternative is that it provides a reasonable solution to the current concerns and requires a minimum amount of operational changes to maintain a high quality effluent. All alternatives identified have been deemed impractical in addition to their substantial increased costs of implementation.						
Reasons for Rejecting the other Evaluated Alternatives: Incapable of being implemented, either at all from a technical standpoint, or in an economically efficient, affordable, and cost effective manner.						
Comments/Discussion: None.						

5. 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."

Rural and unincorporated areas between the City of Lake Ozark and the Village of Sunrise Beach currently in the permitted service area of the District and currently being served by the existing Shawnee Bend Treatment Facility.

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.

The affected area is mostly rural with a largely tourist-based economy. Protecting the waters of the Lake of the Ozarks is the foundation of the entire Lake.

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.

Protecting the waters of the Lake of the Ozarks is paramount to the existing service area of the Shawnee Bend treatment plant and the expansion it will serve. No expansion of the existing service area is being considered. As a tourist area and a part of the entire Lake community, this project is expected to improve water quality, promote employment, increase housing opportunities, benefit fishing, recreation, and tourism. By protecting the waters of the Lake of the Ozarks, this work should benefit both the residents and wildlife in and around the service area.

PROPOSED PROJECT SUMMARY:

Expand the existing wastewater treatment plant and replace current tablet chlorination / dechlorination with the addition of UV disinfection. Add sludge dewatering system.

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.

Appendix 3: Cost Analysis for Compliance (CAFCom)

**Missouri Department of Natural Resources
Water Protection Program
Cost Analysis for Compliance
(In accordance with RSMo 644.145)**

**Shawnee Bend WWTP, Permit Modification
Camden County Public Water Supply District #4
Missouri State Operating Permit #MO-0123722**

Section 644.145 RSMo requires the Department of Natural Resources (Department) to make a “finding of affordability” when “issuing permits under” or “enforcing provisions of” state or federal clean water laws “pertaining to any portion of a combined or separate sanitary sewer system for publicly-owned treatment works.” This cost analysis does not dictate how the permittee will comply with new permit requirements.

New Permit Requirements

The permit requires compliance with new monitoring requirements for Total Kjeldahl Nitrogen, Nitrate + Nitrite, Ammonia and Total Phosphorus.

Connections

The number of connections was reported by the permittee on the Financial Questionnaire.

Connection Type	Number
Residential	773
Commercial	37
Industrial	0
Facility Total	810
Sewer District Total	1147

Data Collection for this Analysis

This cost analysis is based on data available to the Department as provided by the permittee and data obtained from readily available sources. For the most accurate analysis, it is essential that the permittee provides the Department with current information about the District’s financial and socioeconomic situation. The financial questionnaire available to permittees on the Department’s website (<https://dnr.mo.gov/document-search/financial-questionnaire-mo-780-2511>) is a required attachment to the permit renewal application. If the financial questionnaire is not submitted with the renewal application, the Department sends a request to complete the form with the welcome correspondence. If certain data was not provided by the permittee to the Department and the data is not obtainable through readily available sources, this analysis will state that the information is “unknown”.

Eight Criteria of 644.145 RSMo

The Department must consider the eight (8) criteria presented in subsection 644.145 RSMo to evaluate the cost associated with new permit requirements.

(1) A community's financial capability and ability to raise or secure necessary funding;

Criterion 1 Table. Current Financial Information for Camden County	
Current Monthly User Rates per 5,000 gallons*	\$39.74
Median Household Income (MHI) ¹	\$55,717
Current Annual Operating Costs (excludes depreciation)	\$32,663.52

*User Rates were reported by the permittee on the Financial Questionnaire.

(2) Affordability of pollution control options for the individuals or households at or below the median household income level of the community;

The following tables outline the estimated costs of the new permit requirements:

Criterion 2A Table. Estimated Cost Breakdown of New Permit Requirements			
New Requirement	Frequency	Estimated Cost	Estimated Annual Cost
Total Phosphorus – Influent	Quarterly	\$26 x 4	\$104
Total Kjeldahl Nitrogen - Influent	Quarterly	\$35 x 4	\$140
Nitrate + Nitrite - Influent	Quarterly	\$44 x 4	\$176
Ammonia - Influent	Quarterly	\$22 x 4	\$88
Total Phosphorus – Effluent	Quarterly	\$26 x 4	\$104
Total Kjeldahl Nitrogen - Effluent	Quarterly	\$35 x 4	\$140
Nitrate + Nitrite - Effluent	Quarterly	\$44 x 4	\$176
E. coli	Weekly	\$31*52-\$31*12	\$1,240
Total Estimated Annual Cost of New Permit Requirements			\$2,168

§ - E. coli was previously sampled monthly.

(3) An evaluation of the overall costs and environmental benefits of the control technologies;

This analysis is being conducted based on new requirements in the permit, which will not require the addition of new control technologies at the facility. However, the new sampling requirements are being established in order to provide data regarding the health of the receiving stream's aquatic life and to ensure that the existing permit limits are providing adequate protection of aquatic life. Improved wastewater provides benefits such as avoided health costs due to water-related illness, enhanced environmental ecosystem quality, and improved natural resources. The preservation of natural resources has been proven to increase the economic value and sustainability of the surrounding communities. Maintaining Missouri's water quality standards fulfills the goal of restoring and maintaining the chemical, physical, and biological integrity of the receiving stream; and, where attainable, it achieves a level of water quality that provides for the protection and propagation of fish, shellfish, wildlife, and recreation in and on the water.

(4) Inclusion of ongoing costs of operating and maintaining the existing wastewater collection and treatment system, including payments on outstanding debts for wastewater collection and treatment systems when calculating projected rates:

The Sewer District did not provide the Department with this information, nor could it be found through readily available data.

(5) An inclusion of ways to reduce economic impacts on distressed populations in the community, including but not limited to low and fixed income populations. This requirement includes but is not limited to:

- (a) Allowing adequate time in implementation schedules to mitigate potential adverse impacts on distressed populations resulting from the costs of the improvements and taking into consideration local community economic considerations.
- (b) Allowing for reasonable accommodations for regulated entities when inflexible standards and fines would impose a disproportionate financial hardship in light of the environmental benefits to be gained.

The following table characterizes the current overall socioeconomic condition of the community as compared to the overall socioeconomic condition of Missouri. The following information was compiled using the latest U.S. Census data.

Criterion 5 Table. Socioeconomic Data ¹⁻⁶ for Camden County

No.	Administrative Unit	Camden County	Missouri State	United States
1	Population (2021)	43,053	6,141,534	329,725,481
2	Percent Change in Population (2000-2021)	16.2%	9.8%	17.2%
3	2021 Median Household Income (in 2022 Dollars)	\$55,717	\$65,928	\$74,545
4	Percent Change in Median Household Income (2000-2021)	-11.5%	-1.1%	1.1%
5	Median Age (2021)	52.1	38.8	38.4
6	Change in Median Age in Years (2000-2021)	6.9	2.7	3.1
7	Unemployment Rate (2021)	5.1%	4.5%	5.5%
8	Percent of Population Below Poverty Level (2021)	13.3%	12.8%	12.6%
9	Percent of Household Received Food Stamps (2021)	8.6%	10.1%	11.4%

(6) An assessment of other community investments and operating costs relating to environmental improvements and public health protection;

The sewer district did not report any other investments relating to environmental improvements.

(7) An assessment of factors set forth in the United States Environmental Protection Agency's guidance, including but not limited to the "Combined Sewer Overflow Guidance for Financial Capability Assessment and Schedule Development" that may ease the cost burdens of implementing wet weather control plans, including but not limited to small system considerations, the attainability of water quality standards, and the development of wet weather standards;

The new requirements associated with this permit will not impose a financial burden on the community, nor will they require the Camden County Public Water Supply District #4 to seek funding from an outside source.

(8) An assessment of any other relevant local community economic conditions.

The sewer district did not report any other relevant local economic conditions.

Conclusion and Finding

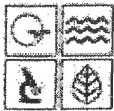
As a result of new regulations, the Department is proposing modifications to the current operating permit that may require the permittee to increase monitoring. The Department has considered the eight criteria presented in subsection 644.145 RSMo to evaluate the cost associated with the new permit requirements.

This analysis examined whether the new sampling requirements affect the ability of an individual customer or household to pay a utility bill without undue hardship or unreasonable sacrifice in the essential lifestyle or spending patterns of the individual or household. After reviewing the above criteria, the Department finds that the new

sampling requirements may result in a low burden with regard to the community's overall financial capability and a low financial impact for most individual customers/households; therefore, the new permit requirements are affordable.

References

1. (A) 2021 MHI in 2021 Dollar: United States Census Bureau. 2017-2021 American Community Survey 5-Year Estimates, Table B19013: Median Household Income in the Past 12 Months (in 2021 Inflation-Adjusted Dollars). <https://data.census.gov/cedsci/table?q=B19013&tid=ACSDT5Y2021.B19013>.
(B) 2000 MHI in 1999 Dollar: (1) For United States, United States Census Bureau (2003) 2000 Census of Population and Housing, Summary Social, Economic, and Housing Characteristics, PHC-2-1 Part 1. United States Summary, Table 5. Work Status and Income in 1999: 2000, Washington, DC. <https://www.census.gov/content/dam/Census/library/publications/2003/dec/phc-2-1-pt1.pdf>.
(2) For Missouri State, United States Census Bureau (2003) 2000 Census of Population and Housing, Summary Social, Economic, and Housing Characteristics, PHC-2-27, Missouri, Table 10. Work Status and Income in 1999: 2000, Washington, DC. <https://www.census.gov/content/dam/Census/library/publications/2003/dec/phc-2-1-pt1.pdf>.
(C) 2022 CPI, 2021 CPI and 1999 CPI: U.S. Department of Labor Bureau of Labor Statistics (2022) Consumer Price Index - All Urban Consumers, U.S. City Average. All Items. 1982-84=100 (unadjusted) - CUUR0000SAO. <https://data.bls.gov/cgi-bin/surveymost?bls>.
(D) 2021 MHI in 2022 Dollar = 2021 MHI in 2021 Dollar x 2022 CPI / 2021 CPI; 2000 MHI in 2021 Dollar = 2000 MHI in 1999 Dollar x 2022 CPI / 1999 CPI.
(E) Percent Change in Median Household Income (2000-2021) = (2021 MHI in 2022 Dollar - 2000 MHI in 2022 Dollar) / (2000 MHI in 2022 Dollar).
2. (A) Total Population in 2021: United States Census Bureau. 2017-2021 American Community Survey 5-Year Estimates, Table B01003: Total Population - Universe: Total Population. <https://data.census.gov/cedsci/table?q=B01003&tid=ACSDT5Y2021.B01003>.
(B) For United States, United States Census Bureau (2002) 2000 Census of Population and Housing, Summary Social, Economic, and Housing Characteristics, PHC-1-1 Part 1. United States Summary, Table 1. Age and Sex: 2000, Washington, DC. <https://www.census.gov/content/dam/Census/library/publications/2003/dec/phc-2-1-pt1.pdf>.
(2) For Missouri State, United States Census Bureau (2002) 2000 Census of Population and Housing, Summary Population and Housing Characteristics, PHC-1-27, Missouri, Table 2. Age and Sex: 2000, Washington, DC. <https://www2.census.gov/library/publications/2003/dec/phc-2-1-pt2.pdf>.
(C) Percent Change in Population (2000-2021) = (Total Population in 2021 - Total Population in 2000) / (Total Population in 2000).
3. Median Age in 2021: United States Census Bureau. 2017-2021 American Community Survey 5-Year Estimates, Table B01002: Median Age by Sex - Universe: Total population. <https://data.census.gov/cedsci/table?q=B01002&tid=ACSDT5Y2021.B01002>.
(B) For United States, United States Census Bureau (2002) 2000 Census of Population and Housing, Summary Social, Economic, and Housing Characteristics, PHC-1-1 Part 1. United States Summary, Table 1. Age and Sex: 2000, Washington, DC., Page 2. <https://www.census.gov/content/dam/Census/library/publications/2003/dec/phc-2-1-pt1.pdf>.
(2) For Missouri State, United States Census Bureau (2002) 2000 Census of Population and Housing, Summary Population and Housing Characteristics, PHC-1-27, Missouri, Table 2. Age and Sex: 2000, Washington, DC., Pages 64-92. <https://www2.census.gov/library/publications/2003/dec/phc-2-1-pt2.pdf>.
(C) Change in Median Age in Years (2000-2021) = (Median Age in 2021 - Median Age in 2000).
4. United States Census Bureau. 2017-2021 American Community Survey 5-Year Estimates, S2301: Employment Status for the Population 16 Years and Over - Universe: Population 16 years and Over. <https://data.census.gov/cedsci/table?q=unemployment&tid=ACSST5Y2021.S2301>.
5. United States Census Bureau. 2017-2021 American Community Survey 5-Year Estimates, Table S1701: Poverty Status in the Past 12 Months. <https://data.census.gov/cedsci/table?q=S1701&tid=ACSST5Y2021.S1701>.
6. United States Census Bureau. 2017-2021 American Community Survey 5-Year Estimates, Table S2201: Food Stamps/Supplemental Nutrition Assistance Program (SNAP) - Universe: Households. <https://data.census.gov/cedsci/table?q=S2201&tid=ACSST5Y2021.S2201>.



MISSOURI DEPARTMENT OF NATURAL RESOURCES

WATER PROTECTION PROGRAM

APPLICATION FOR CONSTRUCTION PERMIT -

WASTEWATER TREATMENT FACILITY

RECEIVED

NOV 18 2022

Water Protection Program

FOR DEPARTMENT USE ONLY

APP NO.

CP NO.

FEE RECEIVED

CHECK NO.

DATE RECEIVED

11-18-22

JB

APPLICATION OVERVIEW

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

PART A - BASIC INFORMATION

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

- 1.1 Is this a Federal/State funded project? ☐ YES ☐ N/A Funding Agency: _____ Project #: _____
- 1.2 Has the Missouri Department of Natural Resources approved the proposed project's antidegradation review?
☒ YES Date of Approval: 8/29/22 ☐ N/A
- 1.3 Has the department approved the proposed project's facility plan*?
☒ YES Date of Approval: 9/9/22 ☐ NO (If No, complete No. 1.4.)
- 1.4 [Complete only if answered No on No. 1.3.] Is a copy of the facility plan* for wastewater treatment facilities included with this application?
☐ YES ☐ NO ☐ Exempt because _____
- 1.5 Is a copy of the appropriate plans* and specifications* included with this application?
☒ YES Denote which form is submitted: ☒ Hard copy ☒ Electronic copy (See instructions.) ☐ NO
- 1.6 Is a summary of design* included with this application? ☒ YES ☐ NO
- 1.7 Has the appropriate operating permit application (A, B, or B2) been submitted to the department?
☐ YES Date of submittal: _____
☐ Enclosed is the appropriate operating permit application and fee submittal. Denote which form: ☐ A ☐ B ☐ B2
☐ N/A: However, In the event the department believes that my operating permit requires revision to permit limitation such as changing equivalent to secondary limits to secondary limits or adding total residual chlorine limits, please share a draft copy prior to public notice? ☐ YES ☐ NO
- 1.8 Is the facility currently under enforcement with the department or the Environmental Protection Agency? ☐ YES ☒ NO
- 1.9 Is the appropriate fee or JetPay confirmation included with this application? ☒ YES ☐ NO
See Section 7.0

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

2.0 PROJECT INFORMATION

2.1 NAME OF PROJECT

Shawnee Bend Wastewater Treatment Facility Expansion

2.2 ESTIMATED PROJECT CONSTRUCTION COST

\$ 2,000,000.00

2.3 PROJECT DESCRIPTION

Expansion of Wastewater Treatment Plant.

2.4 SLUDGE HANDLING, USE AND DISPOSAL DESCRIPTION

Dewatering System with Flocculant Mixing and Containment Bag in 30 yard Containers.

2.5 DESIGN INFORMATION

A. Current population: 730; Design population: 1,180B. Actual Flow: 66k gpd; Design Average Flow: 300k gpd;Actual Peak Daily Flow: _____ gpd; Design Maximum Daily Flow: 300k gpd; Design Wet Weather Event: x

2.6 ADDITIONAL INFORMATION

A. Is a topographic map attached? ☒ YES ☐ NOB. Is a process flow diagram attached? ☒ YES ☐ NO

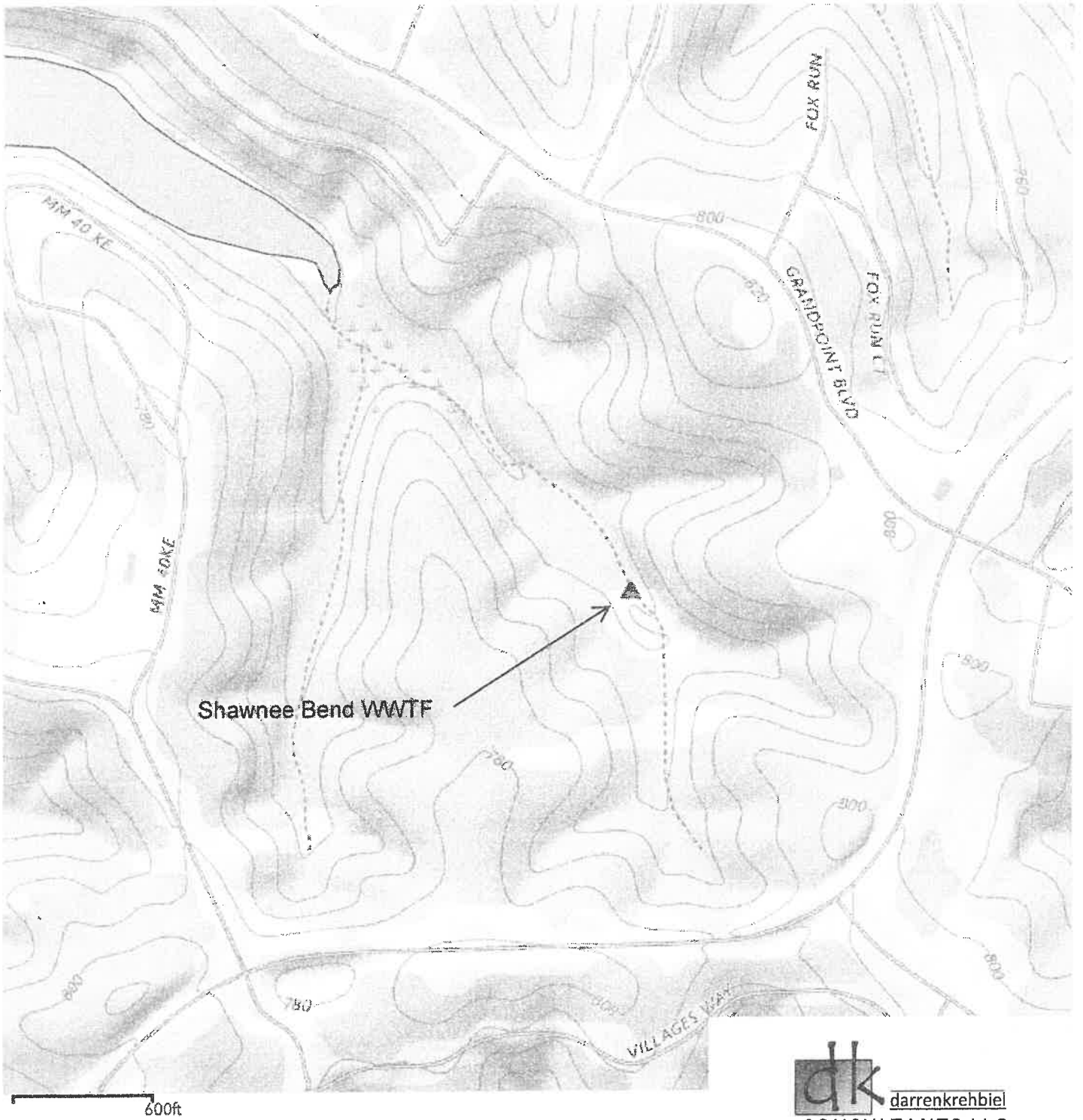
3.0 WASTEWATER TREATMENT FACILITY				
NAME Shawnee Bend WWTF		TELEPHONE NUMBER WITH AREA CODE 573-365-6792		E-MAIL ADDRESS
ADDRESS (PHYSICAL) SW Corner of MM & Grand Point Blvd	CITY Sunrise Beach	STATE MO	ZIP CODE 65079	COUNTY Camden
Wastewater Treatment Facility: Mo- 0123722 (Outfall 007 Of xxxx)				
3.1 Legal Description: <u>1/4, NE 1/4, NW 1/4, Sec. 03, T 39 N, R 16 W</u> (Use additional pages if construction of more than one outfall is proposed.)				
3.2 UTM Coordinates Easting (X): <u>528891</u> Northing (Y): <u>4224282</u> For Universal Transverse Mercator (UTM), Zone 15 North referenced to North American Datum 1983 (NAD83)				
3.3 Name of receiving streams: <u>Tributary to Lake of the Ozarks (losing)</u>				
4.0 PROJECT OWNER				
NAME Camden County Public Water Supply District #4		TELEPHONE NUMBER WITH AREA CODE 573-365-6792		E-MAIL ADDRESS
ADDRESS 62 Bittersweet Rd	CITY Village of Four Seasons	STATE MO	ZIP CODE 65049	
5.0 CONTINUING AUTHORITY: A continuing authority is a company, business, entity or person(s) that will be operating the facility and/or ensuring compliance with the permit requirements.				
NAME Camden County Public Water Supply District #4		TELEPHONE NUMBER WITH AREA CODE 573-365-6792		E-MAIL ADDRESS <u>abuttpwsd4@gmail.com</u>
ADDRESS 62 Bittersweet Rd	CITY Village of Four Seasons	STATE MO	ZIP CODE 65049	
5.1 A letter from the continuing authority, if different than the owner, is included with this application. <input type="checkbox"/> YES <input type="checkbox"/> NO <input checked="" type="checkbox"/> N/A				
5.2 COMPLETE THE FOLLOWING IF THE CONTINUING AUTHORITY IS A MISSOURI PUBLIC SERVICE COMMISSION REGULATED ENTITY.				
A. Is a copy of the certificate of convenience and necessity included with this application? <input type="checkbox"/> YES <input type="checkbox"/> NO				
5.3 COMPLETE THE FOLLOWING IF THE CONTINUING AUTHORITY IS A PROPERTY OWNERS ASSOCIATION.				
A. Is a copy of the as-filed restrictions and covenants included with this application? <input type="checkbox"/> YES <input type="checkbox"/> NO				
B. Is a copy of the as-filed warranty deed, quitclaim deed or other legal instrument which transfers ownership of the land for the wastewater treatment facility to the association included with this application? <input type="checkbox"/> YES <input type="checkbox"/> NO				
C. Is a copy of the as-filed legal instrument (typically the plat) that provides the association with valid easements for all sewers included with this application? <input type="checkbox"/> YES <input type="checkbox"/> NO				
D. Is a copy of the Missouri Secretary of State's nonprofit corporation certificate included with this application? <input type="checkbox"/> YES <input type="checkbox"/> NO				
6.0 ENGINEER				
ENGINEER NAME / COMPANY NAME Darren Krehbiel Consultants LLC		TELEPHONE NUMBER WITH AREA CODE 573-346-5316		E-MAIL ADDRESS krehbiel.darren@gmail.com
ADDRESS PO Box 587	CITY Camdenton	STATE MO	ZIP CODE 65020	
7.0 APPLICATION FEE				
<input type="checkbox"/> CHECK NUMBER <input type="checkbox"/> JETPAY CONFIRMATION NUMBER				
8.0 PROJECT OWNER: I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.				
PROJECT OWNER SIGNATURE <u>Anthony A. Butt</u>				
PRINTED NAME <u>Anthony A. Butt</u>			DATE <u>11-7-22</u>	
TITLE OR CORPORATE POSITION <u>General Manager</u>		TELEPHONE NUMBER WITH AREA CODE <u>573-365-6792</u>		E-MAIL ADDRESS <u>abuttpwsd4@gmail.com</u>
Mail completed copy to: MISSOURI DEPARTMENT OF NATURAL RESOURCES WATER PROTECTION PROGRAM P.O. BOX 176 JEFFERSON CITY, MO 65102-0176				
END OF PART A.				
REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHETHER PART B NEEDS TO BE COMPLETE.				

SUMMARY OF DESIGN

The attached design is for the expansion of the existing Shawnee Bend wastewater treatment facility (Permit # MO-0123722) as owned and operated by Camden County Public Water Supply District Number 4. The Shawnee Bend wastewater treatment facility is located in the northeast quarter of the northwest quarter of Section 03, Township 39 North, Range 16 West, Camden County. The has a design population equivalent of 1,180. No additional connections or changes in the service area are anticipated as a part of this project. The current number of customers served by the existing facility is 716 residential sewer connections and 14 commercial sewer connections. There are no industrial or school connections on this system. The existing treatment plant is a package aeration basin type treatment facility consisting of equalization, extended air treatment, with a standalone clarifier, all with a permitted design flow of 100,000 gallons per day. Actual flow for the facility is 66,000 gallons per day.

The attached design is to expand the existing plant capacity by 200,000 gallons per day (triple current capacity). In addition to increasing the plant size, this design will replace the current tablet chlorination / dechlorination with the addition of UV disinfection. Sludge dewatering will also be included as part of this work.

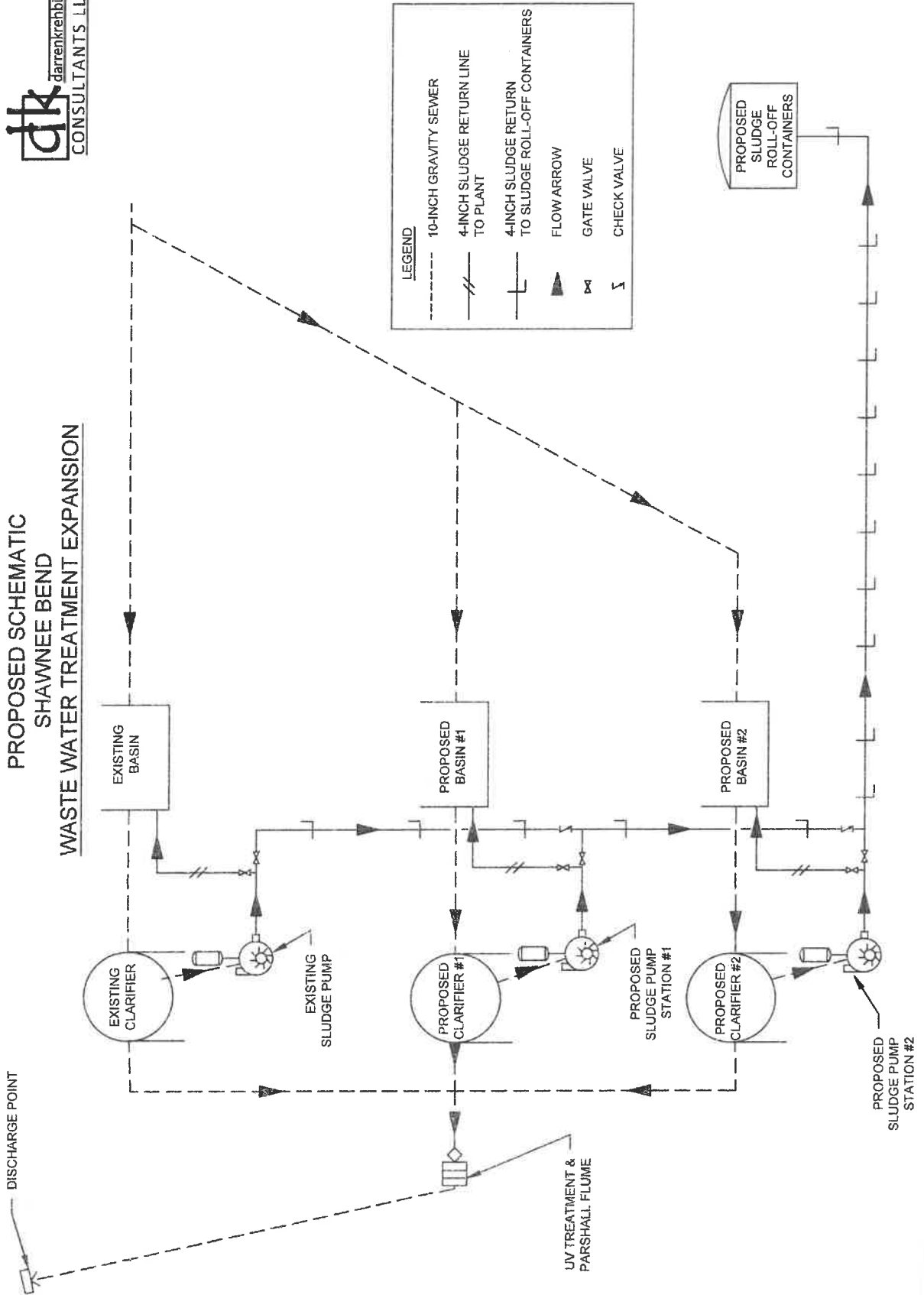
Camden County Public Water Supply District #4
Shawnee Bend Waste Water Treatment Facility
Topographic Map

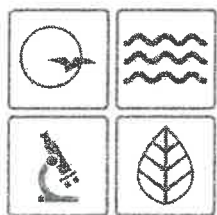


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**PROPOSED SCHEMATIC
SHAWNEE BEND
WASTE WATER TREATMENT EXPANSION**





MISSOURI
DEPARTMENT OF
NATURAL RESOURCES



Michael L. Parson
Governor

Dru Buntin
Director

August 29, 2022

Anthony Butt
General Manager
Camden County PWS#4
P.O. Box 9
Lake Ozark, MO 65049

RE: Shawnee Bend Wastewater Treatment Facility, MO-0123722, Water Quality and Antidegradation Review, ACT1238, Camden County

Dear Representative:

Enclosed please find the finalized Water Quality and Antidegradation Review (WQAR) for the Facility Plan for Shawnee Bend Treatment Plant received on March 14, 2022. The WQAR contains pertinent antidegradation review information for the facility discharge. It was developed in accordance with 10 CSR 20-7.031, the Clean Water Commission approved *Missouri Antidegradation Implementation Procedure* (AIP) dated July 13, 2016, U.S. Environmental Protection Agency (US EPA) guidance, the applicant-supplied antidegradation review documentation, and the State of Missouri's effluent regulations (10 CSR 20-7.015). Please refer to the *General Assumptions of the Water Quality and Antidegradation Review* section of the enclosed WQAR. The WQAR is preliminary and subject to change as new information becomes available during future permit application processing.

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

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

You may proceed with submittal of a complete application for a construction permit. An operating permit application will also be required 180 days prior to expected discharge. These submittals must reflect the design flow, facility description, and general treatment components of this WQAR. In addition to one set of paper copies, all materials are to be submitted electronically as well. This is typically done via compact disc or other removable electronic media. If space allows materials may be emailed to DNR.WPPEngineeringSection@dnr.mo.gov.

The Department of Natural Resources' Clean Water State Revolving Funds provide low-interest loans to municipalities, counties, public water and public sewer districts and political subdivisions for wastewater infrastructure projects. The State Revolving Fund is a federally capitalized, low-interest loan program that may fund new construction or the improvement or renovation of existing facilities. There are several programs offered through State Revolving Fund. For more information, please contact the department's Financial Assistance Center at 573-751-1192 or visit their website <https://dnr.mo.gov/water/business-industry-other-entities/financial-opportunities/financial-assistance-center/wastewater>.

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

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

If you should have questions regarding the enclosed WQAR, please contact Bern Johnson by phone at 573-751-1714 by email at bern.johnson@dnr.mo.gov, or by mail at the Missouri Department of Natural Resources, Water Protection Program, P.O. Box 176, Jefferson City, Missouri 65102-0176.

Sincerely,

WATER PROTECTION PROGRAM



Cindy LePage, P.E., Chief
Engineering Section

CL:bjt

c: Darren Krehbiel, P.E., Darren Krehbiel Consultants, LLC

Water Quality and Antidegradation Review

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

Tributary to Lake of the Ozarks

by

Camden County PWSD #4
Shawnee Bend WWTF



August 2022

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1. PURPOSE OF ANTIDEGRADATION REVIEW REPORT

The Shawnee Bend WWTF is currently operating well and has sufficient capacity for its average daily flow. However, being located at the Lake of the Ozarks, it must accommodate drastic increases in peak flows during summer weekends. This project is to expand the facility to ensure it is capable of accepting and treating these peak flows. Current design flow is 100,000 gpd; the increase will be to 300,000 gpd. Chlorination and dechlorination will be replaced by UV disinfection.

Darren Krehbiel, P.E., of submitted the application and facility plan, which included the alternatives analysis, on behalf of Camden County PWSD #4.

The applicant elected to assume that all pollutants of concern (POC) significantly degrade the receiving stream in the absence of existing water quality. An alternatives analysis was conducted to fulfill the requirements of the Antidegradation Implementation Procedure (AIP).

2. FACILITY INFORMATION

Facility Name:	Shawnee Bend WWTP
Address:	SW corner of Hwy MM & Grand Point Blvd. intersection, Sunrise Beach, MO 65079
Permit #:	MO-0123722
County:	Camden
Facility Type:	POTW
Owner:	CAMDEN COUNTY PUBLIC WATER SUPPLY DISTRICT NUMBER FOUR
Continuing Authority:	CAMDEN COUNTY PUBLIC WATER SUPPLY DISTRICT NUMBER FOUR
UTM Coordinates:	X=528891, Y=4224282
Legal Description:	Sec. 3, T39N, R16W, Camden County
Ecological Drainage Unit:	Ozark Highlands

3. FACILITY HISTORY

This project is intended to address temporary peak flows associated with holiday weekends during the summer months as a result of the second home ownership and the tourist nature of the connections served. Currently these flows are absorbed by the treatment plant with managed operation and do not result in conditions or discharges outside the limits of the District's permit. The projected increase is for 200,000 gpd.

A. FACILITY PERFORMANCE HISTORY:

A review of the past 5 years of Discharge Monitoring Report data show sporadic exceedances for ammonia and TSS. The facility is not under any enforcement action.

B. RECEIVING WATERBODY INFORMATION

OUTFALL(S) TABLE:

OUTFALL	DESIGN FLOW (CFS)	TREATMENT LEVEL	EFFLUENT TYPE
#007	0.46	Secondary	Domestic

RECEIVING STREAM(S) TABLE:

WATER-BODY NAME	CLASS	WBID	DESIGNATED USES*	12-DIGIT HUC	DISTANCE TO CLASSIFIED SEGMENT (MI)
Tributary to Lake of the Ozarks (losing)	--	--	General Criteria	10290109-0406	0 (losing)
Lake of the Ozarks	L2	7205	AQL, IRR, LWW, SCR, WBC(A), HHP		0.37 (to lake)

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

RECEIVING STREAM(S) LOW-FLOW VALUES:

RECEIVING STREAM	LOW-FLOW VALUES (CFS)		
	1Q10	7Q10	30Q10
Tributary to Lake of the Ozarks (losing)	0.0	0.0	0.0

Receiving Water Body Segment Outfall #1:		
Upper end segment* UTM coordinates:	X = 528891 ; Y = 4224282	outfall
Lower end segment* UTM coordinates:	X = 528496 ; Y = 4224678	discharge to lake

*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.

A Geohydrologic Evaluation was not submitted with the request and the receiving stream is losing for discharge purposes, according to the 2021 operating permit renewal.

C. EXISTING WATER QUALITY

No existing water quality data was submitted. The facility discharges to an unnamed creek that drains into the Lake of the Ozarks at Fork Hollow Cove.

D. MIXING CONSIDERATIONS

MIXING CONSIDERATIONS

Mixing Zone: Not Allowed [10 CSR 20-7.031(5)(A)4.B.(I)(a)].

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

4. PERMIT LIMITS AND MONITORING INFORMATION

Proposed Monitoring Parameters and Effluent Limits

PARAMETER	Unit	Basis for Limits	Daily Maximum	Weekly Average	Monthly Average	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type ****
Flow	MGD		*		*				
BOD ₅	mg/L			15	10				
TSS	mg/L			20	15				
<i>Escherichia coli</i> **	#/100mL			126**	126**				
Ammonia as N									
January				12.1	3.1	*			
February				10.1	2.7	*			
March				12.1	3.1	*			
April				12.1	2.7	1.4			
May				12.1	2.2	1.4			
June				12.1	1.7	1.4			
July				12.1	1.5	1.4			
August				10.1	1.3	1.4			
September				12.1	1.8	1.4			
October				12.1	2.5	*			
November				12.1	3.1	*			
December				12.1	3.1	*			
Oil & Grease	mg/L		15		10				
Total Phosphorus	mg/L		*		*				
Total Kjeldahl Nitrogen	mg/L		*		*				
PARAMETER	Unit	Basis for Limits	Minimum		Maximum	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type
pH	SU		6.5		9.0				
PARAMETER	Unit	Basis for Limits	Daily Minimum		Monthly Avg. Min	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type
BOD ₅ Percent Removal	%				85				
TSS Percent Removal	%				85				

* - Monitoring requirement only

** - #/100mL; the Monthly Average for *E. coli* is a geometric mean.

*** - Parameter not previously established in previous state operating permit.

Basis for Limitations Codes:

MDEL – Minimally Degrading Effluent Limit

TBEL – Technology-Based Effluent Limit

NDEL – Non-Degrading Effluent Limit

QBEL – Water Quality-Based Effluent Limit

PEL – Preferred Effluent Limit

5. RECEIVING WATER MONITORING REQUIREMENTS

No receiving water monitoring requirements recommended at this time.

6. ANTIDEGRADATION REVIEW 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 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 follow Missouri's AIP for new and expanded wastewater discharges.

The AIP specifies that if the proposed activity results in significant degradation then a demonstration of necessity (i.e., alternatives analysis) and a determination of social and economic importance are required.

The following is a review of the alternatives analysis in the *Facility Plan for Shawnee Bend Treatment Plant* dated March 2022.

A. TIER DETERMINATION

Waterbodies are assigned Tier 1, 2, or 3 protection levels.

Tier 1 protection is applied to a waterbody on a pollutant by pollutant basis for pollutants may cause or contribute to the impairment of a beneficial use or violation of Water Quality Criteria (WQC); and prohibit further degradation of Existing Water Quality (EWQ) where additional pollutants of concern (POCs) would result in the water being included on the 303(d) List.

Tier 2 level protection is assigned to the waterbody on a pollutant by pollutant basis that prohibits the degradation of water quality of a surface water unless a review of reasonable alternatives and social and economic considerations justifies the degradation in accordance with the methods presented in the AIP.

Tier 3 protection prohibits any degradation of water quality of Outstanding National Resource Waters and Outstanding State Resource Waters as identified in Tables D and E of the Water Quality Standards (WQS). Temporary degradation of water receiving Tier 3 protection may be allowed by the Department on a case-by-case basis as explained in Section VI of the AIP.

Below is a list of POCs reasonably expected and identified by the permittee in their application to be in the discharge. Pollutants of concern are defined as those pollutants "proposed for discharge that affect beneficial use(s) in waters of the state." They include pollutants that "create conditions unfavorable to beneficial uses in the water body receiving the discharge or proposed to receive the discharge" (AIP, Page 6).

The applicant elected to assume that all pollutants of concern (POC) significantly degrade the receiving stream in the absence of existing water quality.

Pollutants of Concern and Tier Determination

Pollutants of Concern	Tier	Degradation	Comment
Biological Oxygen Demand (BOD ₅)/DO	2*	Significant	
Total Suspended Solids (TSS)	2*	Significant	
Ammonia as N	2*	Significant	
<i>Escherichia coli</i> (<i>E. coli</i>)	2*	Significant	Permit Limits Applied
Oil & Grease	2*	Significant	Permit Limits Applied
Phosphorus, Total	2*	Significant	Permit Limits Applied
pH	***	Significant	Permit Limits Applied

* Tier assumed.

** Tier determination not possible: No in-stream standards for these parameters.

*** Standards for these parameters are ranges.

B. NECESSITY OF DEGRADATION

The AIP specifies 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.

Part of that analysis as shown below is the evaluation of non-degrading alternatives, such as regionalization or no discharge systems.

The applicant has the option of assuming discharge will be significant and proceeding directly to the alternatives analysis, thereby avoiding the determination of the assimilative capacity of the receiving water. The applicant has elected this option.

i. Regionalization

Regionalization was eliminated as an option as there is only one other treatment facility within a five mile radius of the existing treatment plant. This facility is located across the Lake of the Ozarks, on the opposite side of a developed community, and across a major highway. Connecting to this facility would be cost prohibitive and it is unclear if permission to cross the Lake of the Ozarks with a pressure sewer line could be obtained. The next nearest treatment facility is over seven miles away and does not have the operational capacity to accept the flow.

ii. No Discharge Evaluation

Land application is not an option as the District does not have sufficient property to accommodate application of the anticipated flow. There does not appear to be land of sufficient size, soil type, and slope available for acquisition to provide land application.

iii. Alternatives to No discharge

Alternative No. 1

A single, new, and larger oxidation or aeration type treatment plant was considered. This facility could be constructed on the existing site or at an entirely new location with a new discharge point. Because the existing facility is in good condition and in good working order, abandoning a facility that currently meets regulatory requirements and the needs of the District was dismissed as inconsistent with the fiduciary and management responsibilities of the Board.

Alternative No. 2

Similar to the discussion considering a new single treatment facility of similar construction, discussion was held exploring alternate types of discharging systems and alternate discharge locations, possibly relocating a new discharge point further from Lake of the Ozarks. As the issue at hand is not a compliance concern and there are no physical or operational issues with the existing facility, again it was determined that abandoning a facility that currently meets regulatory requirements and the needs of the District was dismissed as inconsistent with the fiduciary and management responsibilities of the Board. Further, a new facility (Alternates 1 or 2) would likely have to be located to a new, separate location as the existing facility would be required to be maintained operational to serve the District needs until the new facility was completed and on line.

Alternative No. 3

The Board of Directors of Camden County Public Water Supply District No. 4 chose to investigate the practical considerations and design capabilities of expanding the existing wastewater treatment facility to increase capacity.

Alternatives Analysis Comparison

Pollutant	Alternative 1 Single, New Expanded Oxidation Ditch	Alternative 2 Expanded Oxidation Ditch at new location	Alternative 3 (Base Case) Expanding current facility
BOD ₅	≤ 10 mg/l	≤ 10 mg/l	≤ 10 mg/l
TSS	≤ 15 mg/l	≤ 15 mg/l	≤ 15 mg/l
Ammonia as N	≤ 1.11 mg/l	≤ 1.11 mg/l	≤ 1.11 mg/l
Escherichia coli (E. coli)	≤ 126 CFU/100ml	≤ 126 CFU/100ml	≤ 126 CFU/100ml
Phosphorus, Total	≤ 1.0 mg/l	≤ 1.0 mg/l	≤ 1.0 mg/l
Life Cycle Cost	not practical	not practical	not provided
Ratio	NA	NA	NA

C. LOSING STREAM ALTERNATIVE 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 current outfall discharges to a small unnamed stream that empties into Fork Hollow Cove on Lake of the Ozarks. As discussed in B. above, land application and regionalization are not practical alternatives.

D. SOCIAL AND ECONOMIC IMPORTANCE

The affected community consists of the rural and unincorporated areas between the City of Lake Ozark and the Village of Sunrise Beach currently in the permitted service area of the District and currently being served by the existing Shawnee Bend Treatment Facility. The affected area is mostly rural with a largely tourist-based economy. Protecting the waters of the Lake of the Ozarks is the foundation of the entire Lake area economy.

E. NATURAL HERITAGE REVIEW

A Missouri Department of Conservation Natural Heritage Review was not obtained by the applicant. However, reviews obtained for other facilities in the Lake area indicate there are two species of bats, Indiana and Northern Long-Eared, may be present in the project area. The following recommendations were made for construction activities:

- Manage construction to minimize sedimentation and run-off to nearby streams.
- At stream and drainage crossings, avoid erosion, silt introduction, petroleum or chemical pollution, and disruption or realignment of stream banks and beds.
- If any trees need to be removed for the project, contact the U.S. Fish and Wildlife Service for coordination under the Endangered Species Act.

7. DERIVATION AND DISCUSSION OF PARAMETERS AND LIMITS

Wasteload allocations and limits were calculated using two methods:

- A. **Water quality-based** – Using water quality criteria or water quality model results and the dilution equation below:

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

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).

- B. **Alternative Analysis-based** – Using the preferred alternative's treatment capacity for conventional pollutants such as BOD₅ 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).

Note: Significantly-degrading effluent limits have been based on the authority included in Section I.A. 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 BOD₅ 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 BOD₅ and TSS effluent values could be achievable through proper operation and maintenance of the treatment works, considering the design capability of the treatment process.

Outfall #001 – Main Facility Outfall

- **Flow.** Though not limited itself, the volume of effluent discharged from each outfall is needed to assure compliance with permitted effluent limitations [40 CFR Part 122.44(i)(1)(ii)]. 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. Influent monitoring has been and will be required for this facility in its Missouri State Operating Permit.
- **Biochemical Oxygen Demand (BOD₅).** Operating permit retains 15 mg/L as a Weekly Average and 10 mg/L as a Monthly Average from the previous permit. Effluent limits were established in accordance with 10 CSR 20-7.015(4) for discharges to Losing Streams.
- **Total Suspended Solids (TSS).** Operating permit retains 20 mg/L as a Weekly Average and 15 mg/L as a Monthly Average from the previous permit. Effluent limits were established in accordance with 10 CSR 20-7.015(4) for discharges to Losing Streams.
- ***Escherichia coli (E. coli)*.** Discharges to losing streams shall not exceed 126 per 100 mL, as a Daily Maximum at any time, as per 10 CSR 20-7.031(5)(C). Monitoring only for a monthly average. No more than 10% of samples over the course of the calendar year shall exceed 126 #/100 mL daily maximum as per 10 CSR 20-7.015(9)(B)1.G.

- **Total Ammonia Nitrogen.** Early Life Stages Present Total Ammonia Nitrogen criteria apply [10 CSR 20-7.031(5)(B)7.C. & Table B3]. Background total ammonia nitrogen = 0.01 mg/L

Month	Temp (°C)*	pH (SU)*	Total Ammonia Nitrogen CCC (mg N/L)	Total Ammonia Nitrogen CMC (mg N/L)
January	8.1	7.8	3.1	12.1
February	9.3	7.9	2.7	10.1
March	13.0	7.8	3.1	12.1
April	16.7	7.8	2.7	12.1
May	20.0	7.8	2.2	12.1
June	24.0	7.8	1.7	12.1
July	26.6	7.8	1.5	12.1
August	26.5	7.9	1.3	10.1
September	23.5	7.8	1.8	12.1
October	18.0	7.8	2.5	12.1
November	14.0	7.8	3.1	12.1
December	10.0	7.8	3.1	12.1

* Ecoregion Data (Ozark Highlands)

WBOEL equation

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

January

Chronic WLA: $C_e = ((0.46 + 0.0)3.1 - (0.0 * 0.01)) / 0.46$

$C_e = 3.1$

Acute WLA: $C_e = ((0.46 + 0.0)12.1 - (0.0 * 0.01)) / 0.46$

$C_e = 12.1$

AML = WLA_c = 3.1 mg/L

MDL = WLA_a = 12.1 mg/L

February

Chronic WLA: $C_e = ((0.46 + 0.0)2.7 - (0.0 * 0.01)) / 0.46$

$C_e = 2.7$

Acute WLA: $C_e = ((0.46 + 0.0)10.1 - (0.0 * 0.01)) / 0.46$

$C_e = 10.1$

AML = WLA_c = 2.7 mg/L

MDL = WLA_a = 10.1 mg/L

March

Chronic WLA: $C_e = ((0.46 + 0.0)3.1 - (0.0 * 0.01)) / 0.46$

$C_e = 3.1$

Acute WLA: $C_e = ((0.46 + 0.0)12.1 - (0.0 * 0.01)) / 0.46$

$C_e = 12.1$

AML = WLA_c = 3.1 mg/L

MDL = WLA_a = 12.1 mg/L

April

Chronic WLA: $C_e = ((0.46 + 0.0)2.7 - (0.0 * 0.01)) / 0.46$

$C_e = 2.7$

Acute WLA: $C_e = ((0.46 + 0.0)12.1 - (0.0 * 0.01)) / 0.46$

$C_e = 12.1$

AML = WLA_c = 2.7 mg/L

MDL = WLA_a = 12.1 mg/L

May

Chronic WLA: $C_e = ((0.46 + 0.0)2.2 - (0.0 * 0.01)) / 0.46$

$C_e = 2.2$

Acute WLA: $C_e = ((0.46 + 0.0)12.1 - (0.0 * 0.01)) / 0.46$

$C_e = 12.1$

AML = WLA_c = 2.2 mg/L

MDL = WLA_a = 12.1 mg/L

JuneChronic WLA: $C_e = ((0.46 + 0.0)1.7 - (0.0 * 0.01)) / 0.46$

Ce = 1.7

Acute WLA: $C_e = ((0.46 + 0.0)12.1 - (0.0 * 0.01)) / 0.46$

Ce = 12.1

AML = WLA_c = 1.7 mg/LMDL = WLA_a = 12.1 mg/LJulyChronic WLA: $C_e = ((0.46 + 0.0)1.5 - (0.0 * 0.01)) / 0.46$

Ce = 1.5

Acute WLA: $C_e = ((0.46 + 0.0)12.1 - (0.0 * 0.01)) / 0.46$

Ce = 12.1

AML = WLA_c = 1.5 mg/LMDL = WLA_a = 12.1 mg/LAugustChronic WLA: $C_e = ((0.46 + 0.0)1.3 - (0.0 * 0.01)) / 0.46$

Ce = 1.3

Acute WLA: $C_e = ((0.46 + 0.0)10.1 - (0.0 * 0.01)) / 0.46$

Ce = 10.1

AML = WLA_c = 1.3 mg/LMDL = WLA_a = 10.1 mg/LSeptemberChronic WLA: $C_e = ((0.46 + 0.0)1.8 - (0.0 * 0.01)) / 0.46$

Ce = 1.8

Acute WLA: $C_e = ((0.46 + 0.0)12.1 - (0.0 * 0.01)) / 0.46$

Ce = 12.1

AML = WLA_c = 1.8 mg/LMDL = WLA_a = 12.1 mg/LOctoberChronic WLA: $C_e = ((0.46 + 0.0)2.5 - (0.0 * 0.01)) / 0.46$

Ce = 2.5

Acute WLA: $C_e = ((0.46 + 0.0)12.1 - (0.0 * 0.01)) / 0.46$

Ce = 12.1

AML = WLA_c = 2.5 mg/LMDL = WLA_a = 12.1 mg/LNovemberChronic WLA: $C_e = ((0.46 + 0.0)3.1 - (0.0 * 0.01)) / 0.46$

Ce = 3.1

Acute WLA: $C_e = ((0.46 + 0.0)12.1 - (0.0 * 0.01)) / 0.46$

Ce = 12.1

AML = WLA_c = 3.1 mg/LMDL = WLA_a = 12.1 mg/LDecemberChronic WLA: $C_e = ((0.46 + 0.0)3.1 - (0.0 * 0.01)) / 0.46$

Ce = 3.1

Acute WLA: $C_e = ((0.46 + 0.0)12.1 - (0.0 * 0.01)) / 0.46$

Ce = 12.1

AML = WLA_c = 3.1 mg/LMDL = WLA_a = 12.1 mg/L

- **Oil & Grease.** Conventional pollutant, effluent limitation for protection of aquatic life; 10 mg/L monthly average, 15 mg/L daily maximum. Per 10 CSR 20-7.031(4)(B), Waters shall be free from oil, scum, and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses.
- **Total Phosphorus and Total Nitrogen.** Monitoring required for facilities greater than 100,000 gpd design flow per 10 CSR 20-7.015(9)(D)7. Once per quarter sampling for one permit cycle or up to 5 years if permit cycle is less than 5 years.
- **pH.** The preferred alternative selected for ammonia treatment serves as the base case for pH with effluent limit range of 6.5-9.0 SU. Technology based effluent limitations of 6.0-9.0 SU [10 CSR 20-7.015] are not protective of the Water Quality Standard, which states that water contaminants shall not cause pH to be outside the range of 6.5-9.0 SU. No mixing zone is allowed due to the classification of the receiving stream, therefore the water quality standard must be met at the outfall.

- **Biochemical Oxygen Demand (BOD₅) Percent Removal.** In accordance with 40 CFR Part 133, removal efficiency is a method by which the Federal Regulations define Secondary Treatment and Equivalent to Secondary Treatment, which applies to BOD₅ and TSS for Publicly Owned Treatment Works (POTWs)/municipals. This facility is required to meet 85% removal efficiency for BOD₅.
- **Total Suspended Solids (TSS) Percent Removal.** In accordance with 40 CFR Part 133, removal efficiency is a method by which the Federal Regulations define Secondary Treatment and Equivalent to Secondary Treatment, which applies to BOD₅ and TSS for Publicly Owned Treatment Works (POTWs)/municipals. This facility is required to meet 85% removal efficiency for TSS.

8. GENERAL ASSUMPTIONS OF THE WATER QUALITY AND ANTIDEGRADATION REVIEW

- A. A Water Quality and Antidegradation Review (WQAR) assumes that [10 CSR 20-6.010(2) Continuing Authorities and 10 CSR 20-6.010(5)(A)4.B., consideration for no discharge] has been or will be addressed in a Missouri State Operating Permit or Construction Permit Application.
- B. 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.
- C. Changes to Federal and State Regulations (FSR) made after the drafting of this WQAR may alter Water Quality Based Effluent Limits (WQBEL).
- D. Effluent limitations derived from FSR may be WQBEL or Effluent Limit Guidelines (ELG).
- E. WQBEL supersede ELG only when they are more stringent. Mass limits derived from technology based limits are still appropriate.
- F. A WQAR does not allow discharges to waters of the State, and shall not be construed as a National Pollution Discharge Elimination System (NPDES) or Missouri State Operating Permit to discharge or a permit to construct, modify, or upgrade.
- G. Limitations and other requirements in a WQAR may change as Water Quality Standards (WQS), Methodology, and Implementation procedures change.
- H. Nothing in this WQAR removes any obligations to comply with county or other local ordinances or restrictions.
- I. 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.

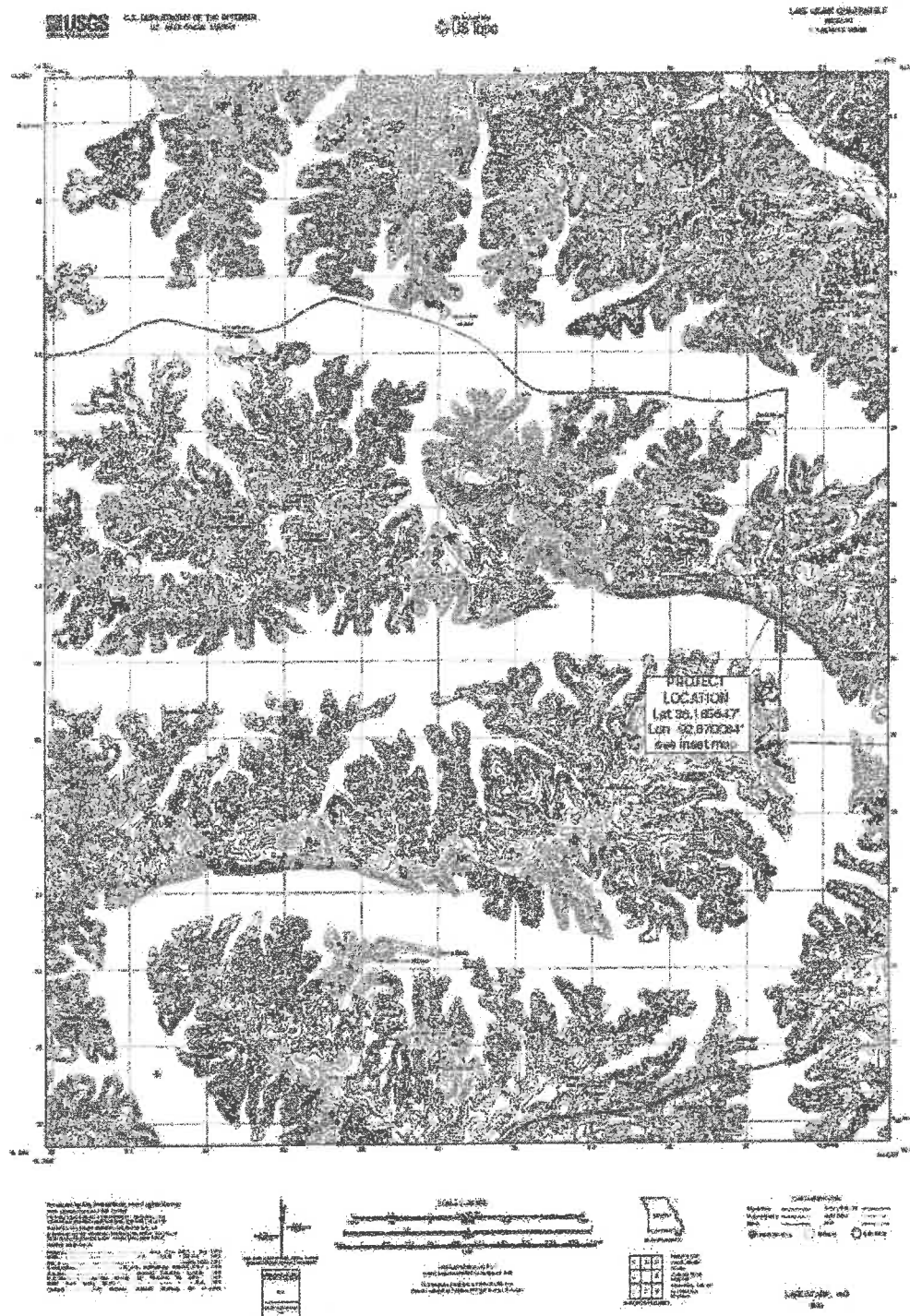
9. ANTIDEGRADATION REVIEW PRELIMINARY DETERMINATION

The proposed expansion will allow the district to safely accommodate the considerably higher flows on weekends during the tourist season.

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: Bern Johnson
Date: August 2022
Reviewer: Steve Hamm, P.E.

Appendix A: Map of Discharge Location



[illegible]

Discharging Alternative #	Treatment Type	Description
1	New Single Larger WWTP	construct an entirely new wastewater treatment plant
2	Alternate Treatment & Discharge	alternate types of systems discharging to Lake of the Ozarks
3	Expanding Existing WWTP	increase capacity by expanding existing treatment
4		
5		
6		

* Some technology may be multiple alternatives as you have the base unit and add to it with more capacity to provide additional treatment.

4. 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.

The most reasonable alternative is to expand the existing plant and replace current tablet chlorination with the addition of UV disinfection. Sludge dewatering is also being considered. As the existing facility sufficiently treats the incoming wastewater, and the proposed improvements are simply to address temporary peaks in inflow, utilizing the existing plant and expanding it to incorporate the current operation is the most practical and effective alternative for addressing the flow concerns. Since the District has sufficient property at the existing site to accommodate plant expansion and a proven record for operating the existing facility, plant expansion is the most feasible alternative. Expanding the existing plant and adding UV disinfection of the most economically efficient, affordable, and cost effective alternative for the District.

Economic Efficiency Basis:

What is the design life cycle for the comparison? 10 to 20 years for mechanical equipment and 50 years for static improvements.

What interest rate was used in the present worth calculations? N/A

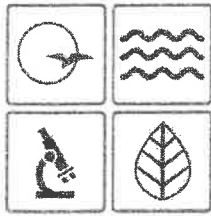
Economic Efficiency Summary:

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.

No alternatives have been deemed practicable.

TABLE OF THE ALTERNATIVES EVALUATION (Attach additional page if necessary)						
PARAMETERS	Alternatives #					
	1	2	3	4	5	6
BODs – mg/L	10	10	10			
TSS – mg/L	15	15	15			
Ammonia (Summer) – mg/L	1.11	1.11	1.11			
Ammonia (Winter) – mg/L	2.41	2.41	2.41			
E. Coli – #/100 mL						
Total Nitrogen – mg/L						
Total Phosphorus – mg/L						
no change in treatment plant parameters is anticipated						
Construction Cost – \$	N/A	N/A	N/A			
Operating Cost – \$	N/A	N/A	N/A			
Present Worth – \$	N/A	N/A	N/A			
Ratio present worth to base case	N/A	N/A	N/A			
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." See Facility Plan. No affordability has been calculated as no alternatives have been deemed practical of being implemented. Essentially there are no alternatives.						
Justification for Preferred Alternative: The primary reason for the selection of the recommended alternative is that it provides a reasonable solution to the current concerns and requires a minimum amount of operational changes to maintain a high quality effluent. All alternatives identified have been deemed impractical in addition to their substantial increased costs of implementation.						
Reasons for Rejecting the other Evaluated Alternatives: Incapable of being implemented, either at all from a technical standpoint, or in an economically efficient, affordable, and cost effective manner.						
Comments/Discussion: None.						

5. SOCIAL AND ECONOMIC IMPORTANCE OF THE PREFERRED ALTERNATIVE
<p>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.</p> <p>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."</p> <p>Rural and unincorporated areas between the City of Lake Ozark and the Village of Sunrise Beach currently in the permitted service area of the District and currently being served by the existing Shawnee Bend Treatment Facility.</p>
<p>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.</p> <p>The affected area is mostly rural with a largely tourist-based economy. Protecting the waters of the Lake of the Ozarks is the foundation of the entire Lake.</p>
<p>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.</p> <p>Protecting the waters of the Lake of the Ozarks is paramount to the existing service area of the Shawnee Bend treatment plant and the expansion it will serve. No expansion of the existing service area is being considered. As a tourist area and a part of the entire Lake community, this project is expected to improve water quality, promote employment, increase housing opportunities, benefit fishing, recreation, and tourism. By protecting the waters of the Lake of the Ozarks, this work should benefit both the residents and wildlife in and around the service area.</p>
<p>PROPOSED PROJECT SUMMARY: Expand the existing wastewater treatment plant and replace current tablet chlorination / dechlorination with the addition of UV disinfection. Add sludge dewatering system.</p>
<p>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.</p>



MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

Michael L. Parson
Governor

Dru Buntin
Director

September 9, 2022

Anthony Butt
General Manager
Camden County Public Water Supply District Number Four
P.O. Box 9, Lake Ozark, MO 65079

RE: Shawnee Bend Wastewater Treatment Facility, MO-0123722, Camden County, Facility
Plan Approval

Dear Representative:

The Missouri Department of Natural Resources reviews facility plans to ensure well-planned projects for wastewater sewer systems and treatment facilities that protect and preserve water quality and human health. The facility plan identified the need to expand the facility to ensure it is capable of accepting and treating peak flows during the summer tourist season.

The facility plan recommends Alternative No. 3 to expand capacity at the current facility to 300,000 gpd.

The facility plan proposed 3 alternatives to expand the facility by adding two new treatment basins and two clarifiers. Each new basin and clarifier will be identical to the 100,000 gpd basin and clarifier currently in use. Chlorination and dechlorination will be replaced by UV disinfection.

Alternative No. 1 is to construct a single, new, and larger oxidation or aeration type treatment plant, either at the current or a new location. Because the existing facility is in good condition and in good working order, abandoning a facility that currently meets regulatory requirements and the needs of the District was dismissed as inconsistent with the fiduciary and management responsibilities of the Board and was not chosen, although a new facility would meet water quality standards.

Alternative No. 2 explored alternate types of discharging systems and alternate discharge locations, possibly relocating a new discharge point further from Lake of the Ozarks. As with Alternative No.1, this alternative was not chosen because the current facility is operating well.

Alternative No. 3 is to expand the existing wastewater treatment facility to increase capacity. This alternative is the selected alternative and is a viable option to meet future flow needs and water quality requirements.

The Facility Plan for Shawnee Bend Treatment Plant, submitted by Darren Krehbiel Consultants, LLC, on behalf of the Camden County Public Water Supply District Number Four in March 2022, is hereby approved. Any changes to the scope of work as shown in this facility plan will require an addendum to the facility plan. Construction, installation, expansion or modification of any collection system or wastewater treatment facility is prohibited until a construction permit is issued by the Department, per 10 CSR 20-6.010(4)(A).

Please proceed with securing financial support for the proposed project. This project may be eligible for funding through the Department's Clean Water State Revolving Fund (CWSRF) Program. Applications for funding and guidance documents can be found at <https://dnr.mo.gov/water/business-industry-other-entities/financial-opportunities/financial-assistance-center/wastewater>. Project eligibility determinations are made, in accordance with 10 CSR 20-4.040. Projects that are eligible for funding are listed on the Intended Use Plan, provided additional CWSRF requirements are met, including but not limited to environmental review requirements, public hearing requirements, user charge requirements and approval of construction plans and specifications. For questions related to the CWSRF Program, please contact Joan Doerhoff, Financial Assistance Center Coordinator Unit Chief, at 573-526-0940.

Any changes to the scope of work as shown in the facility plan approved on March 2022 will require an addendum to the facility plan and may require additional environmental review.

Following the Department's public notice of draft Missouri State Operating Permit including the antidegradation review and preliminary determination, the Department will review any public notice comments received. Significant comments have the potential to require an antidegradation report and facility plan amendment submittal for Department approval and an additional public notice.


After receipt of this approval letter, please submit –

- Application for Construction Permit - Wastewater Treatment Facility, Form--MO 780-2189, <https://dnr.mo.gov/document-search/application-construction-permit-wastewater-treatment-facility-mo-780-2189> and an application fee of \$1,000 for < 500,000 gpd;
- Construction plans and specifications: one hard copy, one electronic copy;
- Summary of design: one hard copy, one electronic copy; and
- Form B2 - Application for Operating Permit for Domestic Wastewater (>100,000 gallons per day), Form --MO 780-1805, <https://dnr.mo.gov/document-search/form-b2-application-operating-permit-facilities-receive-primarily-domestic-waste-have-design-flow-more-100000-gallons-day-mo-780-1805> .

For questions related to technical issues such as the facility plan, construction permit, or plans and specifications, please contact Mr. Bern Johnson, review engineer, by phone at 573-751-1714, by email at bern.johnson@dnr.mo.gov or by mail at Department of Natural Resources, P.O. Box 176, Jefferson City, MO 65102. Thank you.

Sincerely,

WATER PROTECTION PROGRAM


Cindy LePage, P.E., Chief
Engineering Section

CL:bjt

c: Darren Krehbiel, P.E.