

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION



CONSTRUCTION PERMIT

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

Jefferson County Public Sewer District
JCPSD Lower Big River WWTF
4197 Lower Byrnes Mills Road
Byrnes Mills, MO 63051

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.

February 27, 2024
Effective Date

February 26, 2026
Expiration Date



John Hoke, Director, Water Protection Program

CONSTRUCTION PERMIT

I. CONSTRUCTION DESCRIPTION

Construction of new headworks structure with a screw pump for automatic screening and a manual bar screen bypass, a multi-ring oxidation ditch, secondary clarifiers, and UV disinfection. There will also be a new septate receiving station, and the old extended air blowers are to be used for the aerobic digesters. Sludge will be held and aerated until land application is possible. The new design flow once stage one of expansion is complete will be 642,000 gpd.

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

II. COST ANALYSIS FOR COMPLIANCE

The Department is not required to determine Cost Analysis for Compliance because the permit contains no new conditions or requirements that convey a new cost to the facility.

III. CONSTRUCTION PERMIT CONDITIONS

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

1. This construction permit does not authorize discharge.
2. All construction shall be consistent with plans and specifications signed and sealed by James McCleish, P.E., with Horner & Shifrin and as described in this permit.
3. The Department must be contacted in writing prior to making any changes to the plans and specifications that would directly or indirectly have an impact on the capacity, flow, system layout, or reliability of the proposed wastewater treatment facilities or any design parameter that is addressed by 10 CSR 20-8, in accordance with 10 CSR 20-8.110(11).
4. State and federal law does not permit bypassing of raw wastewater, therefore steps must be taken to ensure that raw wastewater does not discharge during construction. If a sanitary sewer overflow or bypass occurs, report the appropriate information to the Department's St. Louis Regional Office per 10 CSR 20-7.015(9)(G).
5. The 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. In accordance with 10 CSR 20-6.010(12), a full closure plan shall be submitted to the Department's St. Louis Regional Office for review and approval of any permitted wastewater treatment system being replaced. The closure plan must meet the requirements outlined in Standard Conditions Part III of the Missouri State Operating Permit No. MO- 0115428. Closure shall not commence until the submitted closure plan is approved by the Department.
9. All construction must adhere to applicable 10 CSR 20-8 (Chapter 8) requirements listed below.
 - Flood protection shall apply to new construction and to existing facilities undergoing major modification. The wastewater facility structures, electrical equipment, and mechanical equipment shall be protected from physical damage by not less than the 100-year flood elevation. 10 CSR 20-8.140(2)(B).
 - Facilities shall be readily accessible by authorized personnel from a public right-of-way at all times. 10 CSR 20-8.140 (2) (D).
 - 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: 10 CSR 20-8.140(8)
 - 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)
- 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)
- Electrical equipment. Electrical equipment shall be provided with the following requirements:
 - 10 CSR 20-8.130(3)(B)2.A. Electrical equipment must comply with 10 CSR 20-8.140(7)(B);
 - Utilize corrosive resistant equipment located in the wet well; 10 CSR 20-8.130(3)(B)2.B.
 - Provide a watertight seal and separate strain relief for all flexible cable; 10 CSR 20-8.130(3)(B)2.C.
 - Install a fused disconnect switch located above ground for the main power feed for all pumping stations. 10 CSR 20-8.130(3)(B)2.D.
 - When such equipment is exposed to weather, it shall comply with the requirements of weather proof equipment; enclosure NEMA 4; NEMA 4X where necessary; and *NEMA Standard 250-2014*, published December 15, 2014. 10 CSR 20-8.130(3)(B)2.E.
 - Install lightning and surge protection systems; 10 CSR 20-8.130(3)(B)2.F.
 - Install a 110 V (volt) power receptacle inside the control panel located outdoors to facilitate maintenance; 10 CSR 20-8.130(3)(B)2.G.
 - Provide Ground Fault Circuit Interruption (GFCI) protection for all outdoor receptacles. 10 CSR 20-8.130(3)(B)2.H.
- Water level controls must be accessible without entering the wet well. 10 CSR 20-8.130(3)(C)

- Valves shall not be located in the wet well unless integral to a pump or its housing. 10 CSR 20-8.130(3)(D)
- Covered wet wells shall have provisions for air displacement to the atmosphere, such as an inverted and screened “j” tube or other means. 10 CSR 20-8.130(3)(E)
- There shall be no physical connection between any potable water supply and a wastewater pumping station, which under any conditions, might cause contamination of the potable water supply. If a potable water supply is brought to the station, 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 20-8.130(3)(G)
 - 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.
- Unless another distance is determined by the Missouri Geological Survey or by the department’s Public Drinking Water Branch, the minimum distance between wastewater treatment facilities and all potable water sources shall be at least 300 feet. 10 CSR 20-8.140(2)(C)1.
- All wastewater treatment facilities shall be provided with an alternate source of electric power or pumping capability to allow continuity of operation during power failures. 10 CSR 20-8.140(7)(A)1.
- Disinfection and dechlorination, when used, shall be provided during all power outages. 10 CSR 20-8.140(7)(A)2.
- Electrical systems and components in raw wastewater or in enclosed or partially enclosed spaces where hazardous concentrations of flammable gases or vapors that are normally present, shall comply with the NFPA 70 *National Electric Code (NEC)* (2017 Edition), as approved and published August 24, 2016, requirements for Class I, Division 1, Group D locations. 10 CSR 20-8.140(7)(B)
- An audiovisual alarm or a more advanced alert system, with a self-contained power supply, capable of monitoring the condition of equipment whose failure could result in a violation of the operating permit, shall be provided for all wastewater treatment facilities. 10 CSR 20-8.140(7)(C)

- A means of flow measurement shall be provided at all wastewater treatment facilities. 10 CSR 20-8.140(7)(E)
- 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 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)
- Mechanical screening equipment shall have adequate removal enclosures to protect facility personnel against accidental contact with moving parts and to prevent dripping in multi-level installations. 10 CSR 20-8.150(4)(A)3.B.(I)
- A positive means of locking out each mechanical screening device shall be provided. 10 CSR 20-8.150(4)(A)3.B.(II)
- An emergency stop button with an automatic reverse function shall be located in close proximity to the mechanical screening device. 10 CSR 20-8.150(4)(A)3.B.(III)
- 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)

- Aerobic Solids Digestion High Level Emergency Overflow. An unvalved emergency overflow shall be provided that will convey digester overflow to the treatment plant headworks, the aeration process, or to another liquid sludge storage facility and that has an alarm for high level conditions. 10 CSR 20-8.170(5)
- For solids pumping systems, audio-visual alarms shall be provided in accordance with 10 CSR 20-8.140(7)(C) for:
 - Pump failure; 10 CSR 20-8.170(6)(A)
 - Pressure loss; 10 CSR 20-8.170(6)(B) and
 - High pressure. 10 CSR 20-8.170(6)(C)
- 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.
- If no flow equalization is provided for a batch discharger, the UV dosage shall be based on the peak batch flow. 10 CSR 20-8.190(5)(A)2.
- 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 ($\mu\text{W} \cdot \text{s}/\text{cm}^2$). 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.

10. Upon completion of construction:

- A. The Jefferson County Public Sewer District will become the continuing authority for operation and maintenance of these facilities;

- B. Submit an electronic copy of the as built 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)
- D. The operating permit modification for MO-0115428 will be issued. The modification fee of \$200 has already been submitted.

IV. REVIEW SUMMARY

1. CONSTRUCTION PURPOSE

This is the first phase in a series of construction projects aimed at regionalizing a total of 12 treatment facilities around Jefferson County. The plants to be regionalized in this first phase of expansion are the Northwest Valley Middle School WWTF (MO-0044580), Byrnes Mill Mobile Home Park WWTF (MO-0105856), House Springs Intermediate School WWTF (MO-0100374), and Woodridge Estates WWTF (MO-0103438)

2. FACILITY DESCRIPTION

The existing treatment facility consists of a bar screen, two extended aeration treatment units, and UV disinfection with a design flow of 500,000 gpd. The expansion will add a new headworks structure containing a screw pump on one side of a flow gate and a manual bar screen on the other. An electromagnetic flow meter is planned for before the influent gate. The previous aeration basins will become aerobic digesters and a new multi-ring oxidation basin will be constructed. The old headworks will be converted to a sludge/septage receiving station. During this phase only two rings of the oxidation ditch are to be built, but in the future a third ring is planned. A larger UV system will be built, and 2 secondary clarifiers will also be added to the system post oxidation. The new design flow will be 642,000 gpd. Sludge will be land applied on adjacent property.

The Lower Big River WWTF is located at 4629 Yaeger Road, Hillsboro, in Jefferson County, Missouri. The facility has a design average flow of 500,000 gpd and serves a hydraulic population equivalent of approximately 2,996 people. After this expansion, the design flow will be 642,000 gpd and the population served is expected to be 6,200.

3. ANTIDEGRADATION

The Department has reviewed the antidegradation report for this facility and issued the Water Quality and Antidegradation Review dated November 16, 2022, due to expansion and regionalization. See **APPENDIX – ANTIDEGRADATION**.

4. REVIEW of MAJOR TREATMENT DESIGN CRITERIA

Flow Measurement – Installation of accurate flow measurement devices will give the treatment facility a means of improved data analysis.

- Electromagnetic Meter – An influent electromagnetic 12-inch flow meter shall measure the raw influent wastewater following screening.
- Parshall Flume – A 6-inch throat effluent Parshall flume with ultrasonic flow sensor shall measure the secondary treated and disinfected wastewater prior to discharge at Outfall No. 001.

Influent Screening – Installation of screening devices removes nuisance inorganic materials from raw wastewater.

- Automatic Screw Augur – A 7.68 in. diameter spiral augur positioned at an angle of 45 degrees from the horizontal will carry solids from the influent stream up into a receptacle for disposal. The discharge of wetted solids into the screening storage is rated for 9 gpm at 40 psi. The screw will be fitted with a brush for automatic cleaning and is sized at 3 MGD, with overflow going to the manual bar screen.
- Manual Coarse Bar Screen – The manual coarse bar screen will have clear bar spacings of 0.5-inch and be positioned at an angle of 45 degrees from the horizontal to allow for manual raking of the screen. The coarse bar screen is followed by influent flow measurement.

Oxidation Ditch –The design SRT is 13.5 days with a design MLSS of 3,300 mg/L. The hydraulic retention time is 20.91 hours at design flow of 0.642 MGD and 6.7 hours at 2.02 MGD max daily flow. The side water depth of the treatment train is 13 ft. The volume of the anoxic zone is 0.042 MG, while the volume of aerobic zone is 0.516 MG. The F/M ratio in the anoxic zone was designed to be 0.075. Process design calculations were provided for an organic load of 255 mg/L. Total peak oxygen required is 1600 lb/day, with a standard oxygen transfer rate design of 2.55 lb O₂ /hr-hp. The peak SOR is 107.76 lb/hr and the ratio between AOR/SOR is 0.79 (Metcalf &Eddy).

Secondary Clarifier – Two secondary clarifiers will be constructed with a total surface area of 3,180 sf at the 2.46 MGD peak or 1,590 sf per clarifier. The clarifiers will have a 45 ft diameter. The sidewater depth will be 13.3 ft. The peak weir loading rate is 3,482 gpd/ft which meets the requirements of 10 CSR 20-8.160(3)(C)2 of being less than 20,000 gpd/ft. The peak solids loading rate is 23.1 lbs/ft²/day which meets the requirements of 10 CSR 20-8.160(3)(B)3 of less than 35 lbs/ft²/day at peak flow.

Waste Activated Sludge (WAS) Pump Station – Construction of a parallel duplex WAS pump station and associated valves. The RAS MLSS is expected to be 7,500 mg/L. The WAS centrifugal pump will be capable of pumping 112 gpm at 16.4 ft of TDH with a 5 HP motor. The WAS pumps are utilized to pump WAS from the secondary clarifiers to the aerobic digesters. 161,280 gpd is the design

basis of the WAS going to the digester. WAS pumps will be one operational and one standby, with two operational and one standby planned for the future phase of expansion.

Return Activated Sludge (RAS). The RAS rate is 100 percent of the design average flow, 0.642 MGD. The RAS MLSS is expected to be 7,500 mg/L. The RAS 5 HP pumps with VFDs are designed for 669 gpm at 14 ft TDH. There will be 2 pumps in parallel, one operational and one standby, with two operational and one standby planned for the future phase of expansion.

Aerobic Digester – Adaptation of two extended aeration basins to two aerobic digesters with a 60 ft diameter, a 15 ft sidewater depth, and a volume of 317,000 gallons, and the adaptation of a secondary clarifier to a third digester with a diameter of 42 ft, a sidewater depth of 15 ft, and a volume of 161,450 gallons. The design basis of the digesters is an influent concentration of 7,500 mg/L with a flow rate of 18,000 gpd split between for 1 and 2, and a variable flow rate for 3 depending on how often the sludge dump station is used. Installation of coarse bubble diffusers will provide aeration and mixing of the sludge to prevent anaerobic conditions. Three blowers with 75 HP motors are capable of providing a maximum air rate of 1,275 standard cubic feet per minute (scfm) at 7 psig for digester 1 and 2, and two 40 HP motors are capable of providing 650 scfm of air at 7 psig to digester 3 to treat 1,853 lbs of solids per day total.

The facility must ensure compliance with any applicable 503(b) requirements for vector attraction reduction and pathogen reduction depending on the proposed use(s) of the biosolids. 3 blowers will provide 425 scfm of oxygen each for a total of 1275 scfm to digesters 1 and 2, and 2 blowers will provide 325 scfm of oxygen each for a total of 650 scfm to digester 3. There will be 2 15-HP mixers each for digester 1 and 2, and 2 10-HP mixers for digester 3. 2 pumps bring WAS from the secondary clarifiers to the digesters. Each pump has a design flow of 160 gpm at 22 ft TDH normal operations.

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

- Ultraviolet (UV) – An open channel, gravity flow, low pressure high intensity UV non-contact disinfection system capable of treating a peak flow of 2,600,000 gpd while delivering a minimum UV intensity of 40 mJ/cm² with an expected ultraviolet transmissivity of 65 percent or greater. The enclosed UV system consists of 64 lamps per reactor. One non-contact UV reactor is to be built now, with room for more to be arranged in series. The disinfected effluent will flow by gravity through flow measurement equipment and to Outfall No. 001.
- Sludge Receiving Station – Construction of a duplex-pump sludge receiving station with Sulzer XFP 3 HP sludge pumps capable of operating at 250 GMP

and 18.5 feet of TDH. Sludge is received from other domestic plants in the JCPSD region.

5. OPERATING PERMIT

Operating permit MO-0115428 will require a modification to reflect the construction activities. The modified Lower Big River WWTF, MO-0115428, will be public noticed to address changes to ammonia, BOD₅, and TSS limits. The draft operating permit was public noticed between December 15, 2023 and January 15, 2024 and received no comments. 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 fee of \$200 was received on August 21, 2023.

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:

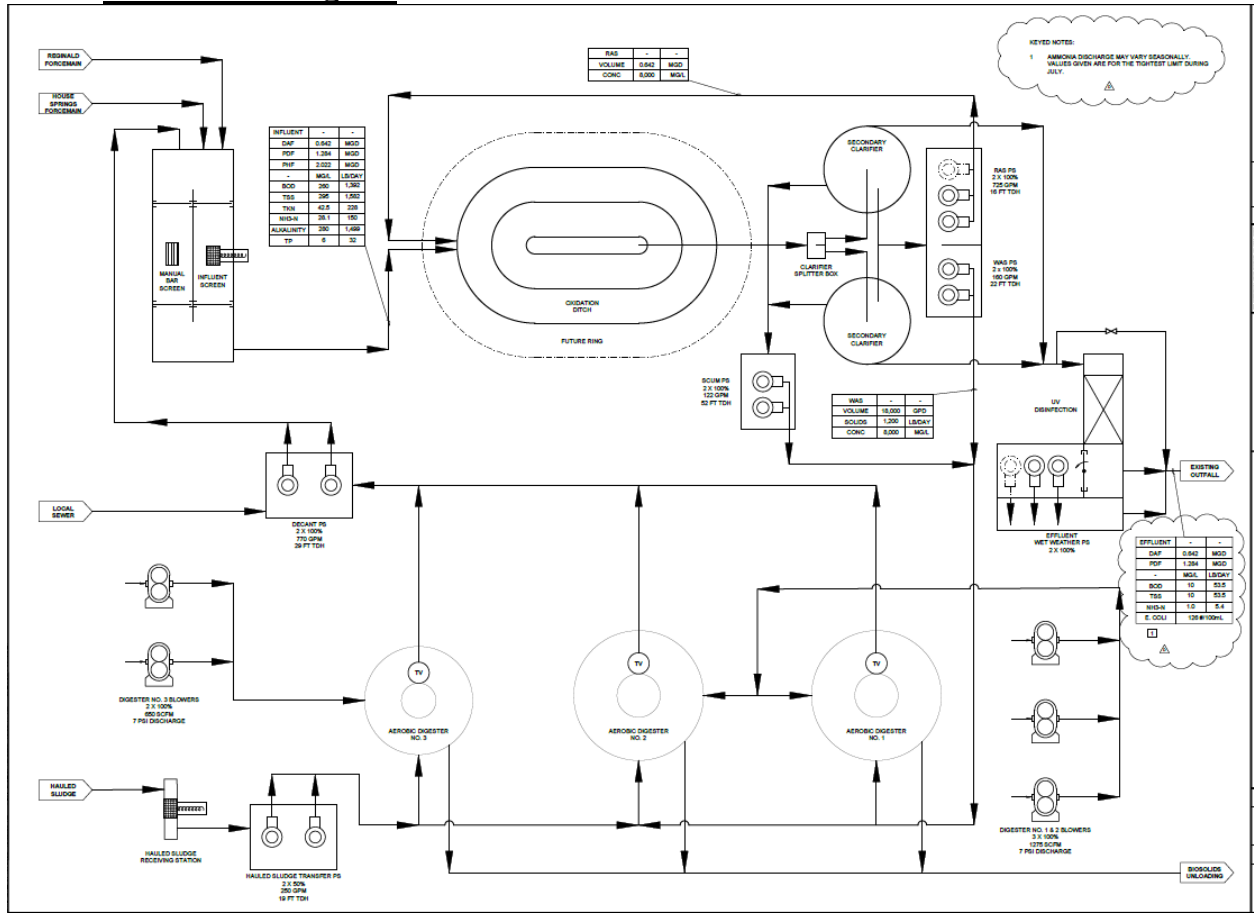
Administrative Hearing Commission
U.S. Post Office Building, Third Floor
131 West High Street, P.O. Box 1557
Jefferson City, MO 65102-1557
Phone: 573-751-2422
Fax: 573-751-5018
Website: <https://ahc.mo.gov>

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APPENDIX

• **Process flow diagram**



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

Water Quality and Antidegradation Review

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

Big River
by

Jefferson County Public Sewer District
Lower Big River Wastewater Treatment Facility



November, 2022
Revised: November 7, 2023

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1. 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 | Sample Type **** |
|----------------------------------|---------|------------------|---------------|----------------|------------------|-----------------------|--------------------|------------------|
| Flow | MGD | 1 | * | | * | */* | 1/weekday | 24 hour total |
| BOD ₅ | mg/L | 4, 5 | | 15 | 10 | 45/30 | 1/month | composite |
| TSS | mg/L | 4, 5 | | 15 | 10 | 45/30 | 1/month | composite |
| <i>Escherichia coli</i> ** | #/100mL | 1, 3 | | 630 | 126 | 630/126 | 1/week | grab |
| Ammonia as N | | | | | | | | |
| (January) | | | 13.1 | | 2.5 | */* | 1/month | grab |
| (February) | | | 11.5 | | 2.2 | */* | 1/month | grab |
| (March) | | | 9.0 | | 1.8 | */* | 1/month | grab |
| (April) | | | 7.3 | | 1.4 | 38.1/7.3 | 1/month | grab |
| (May) | | | 6.3 | | 1.2 | 38.1/7.3 | 1/month | grab |
| (June) | mg/L | 4, 5 | 5.5 | | 1.1 | 38.1/7.3 | 1/month | grab |
| (July) | | | 5.3 | | 1.0 | 38.1/7.3 | 1/month | grab |
| (August) | | | 5.4 | | 1.1 | 38.1/7.3 | 1/month | grab |
| (September) | | | 6.0 | | 1.2 | 38.1/7.3 | 1/month | grab |
| (October) | | | 7.1 | | 1.4 | */* | 1/month | grab |
| (November) | | | 9.1 | | 1.8 | */* | 1/month | grab |
| (December) | | | 11.5 | | 2.3 | */* | 1/month | grab |
| Oil & Grease | mg/L | 1, 3 | 15 | | 10 | 15/10 | 1/quarter | grab |
| Total Phosphorus | mg/L | 1 | * | | * | */* | 1/quarter | grab |
| Total Nitrogen | mg/L | 1 | * | | * | *** | 1/quarter | grab |
| PARAMETER | Unit | Basis for Limits | Minimum | | Maximum | Previous Permit Limit | Sampling Frequency | Sample Type |
| pH | SU | 1 | 6.0 | | 9.0 | 6.0-9.0 | 1/month | grab |
| PARAMETER | Unit | Basis for Limits | Daily Minimum | | Monthly Avg. Min | Previous Permit Limit | Sampling Frequency | Sample Type |
| BOD ₅ Percent Removal | % | 1 | | | 85 | 85 | 1/month | calculated |
| TSS Percent Removal | % | 1 | | | 85 | 85 | 1/month | calculated |

* - 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:

- | | | |
|--|-----------------------------------|---|
| 1. State or Federal Regulation/Law | 5. Antidegradation Policy | 9. WET Test Policy |
| 2. Water Quality Standard (includes RPA) | 6. Water Quality Model | 10. Multiple Discharger Variance |
| 3. Water Quality Based Effluent Limits | 7. Best Professional Judgment | 11. Nutrient Criteria Implementation Plan |
| 4. Antidegradation Review | 8. TMDL or Permit in lieu of TMDL | |

2. PURPOSE OF ANTIDegradation REVIEW REPORT

The expansion of the Jefferson County Public Sewer District (JCPSD) Lower Big River Wastewater Treatment Facility (WWTF) is proposed to increase the design flow to 642,000 gpd. This review was originally conducted for a design flow of 650,000 GPD, but was revised upon determination that the final design flow would be lower. The expansion of the wastewater collection and treatment system has been proposed to consolidate 12 nearby wastewater treatment systems as well as 31 individual on-site septic

systems. The expansion of JCPSD Lower Big River WWTF is designed in two phases, Phase I and Phase II, with the collection system regionalization separated into 4 phases. This Antidegradation Review Report primarily evaluates the Phase I expansion of the JCPSD Lower Big River WWTF.

The Phase I expansion includes the construction of a new treatment system, the conversion of the existing steel tank aeration units into aerobic digesters, the construction of a septage receiving station, and upgrades to the facility headworks and UV disinfection system. The Phase I expansion will have a design flow of 642,000 gpd and allow for the consolidation through the short-term regionalization phase allowing for capacity through the next 10 years of facility planning. The Phase II expansion will likely take place in approximately 10 years and expand the plant to 0.986 MGD while incorporating the remaining facilities to be regionalized. The tentative regionalization stages are described in the tables below.

| Immediate Regionalization Phase | Permit # |
|--|-----------------|
| Northwest Valley Middle School | MO-0044580 |
| Byrnes Mill Mobile Home Park WWTF | MO-0105865 |
| JCPSD Lower Big River WWTF | MO-0115428 |

| Short-Term Regionalization | Permit # |
|-----------------------------------|-----------------|
| House Springs Intermediate School | MO-0100374 |
| Woodridge Estates WWTF | MO-0103438 |

| Intermediate-Term Regionalization | Permit # |
|--|-----------------|
| Sycamore Spring Mobile Home Park | MO-0108642 |
| Miller Crossing WWTF | MO-0124788 |
| Pine Grove Manor Apartments WWTF | MO-0105201 |
| Fisher Road WWTF | MO-0126926 |
| Our Lady Queen of Peace WWTP | MO-0053163 |

| Long Term Regionalization | Permit # |
|----------------------------------|-----------------|
| Yorktown WWTF | MO-0131024 |
| Cedar Springs Elementary School | MO-0109304 |
| Pembroke Heights | MO-0090948 |

Horner Shifrin prepared the *Antidegradation Review Report* dated May 2022 on behalf of Jefferson County Public Sewer District.

The applicant elected to determine that all pollutants of concern (POC) require a demonstration of necessity (i.e., alternatives analysis) and a determination of social and economic importance in the absence of existing water quality data for the receiving lake/stream. An alternatives analysis was conducted to fulfill the requirements of the Antidegradation Implementation Policy (AIP).

3. FACILITY INFORMATION

| | |
|----------------|---|
| Facility Name: | JCPSD Lower Big River Wastewater Treatment Facility |
| Address: | 4197 Lower Byrnes Mill Road, Byrnes Mill, MO 63051 |
| Permit #: | MO-0115428 |
| County: | Jefferson County |
| Facility Type: | POTW |

| | |
|---------------------------|--|
| Owner: | Jefferson County Public Sewer District |
| Continuing Authority: | Jefferson County Public Sewer District |
| UTM Coordinates: | X = 710091 ; Y = 4255658 |
| Legal Description: | Landgrant 3205, Jefferson County |
| Ecological Drainage Unit: | Ozark/Meramec |

4. FACILITY HISTORY

The current WWTF is permitted as a facility with a bar screen, extended aeration plant, UV disinfection, sludge aerobic digester, and land applied sludge.

A. FACILITY PERFORMANCE HISTORY:

This facility has a fair performance history. A review of the past 5 years of Discharge Monitoring Report data show exceedances in the following parameters: BOD₅ percent removal (8/31/19, 2/28/19, 11/30/18, 9/30/18), pH (2/29/20, 11/30/17), E. coli (7/31/20, 5/31/20, 4/30/19), Suspended Solids percent removal (12/31/19, 8/31/19, 2/28/19).

B. RECEIVING WATERBODY INFORMATION

OUTFALL(S) TABLE:

| OUTFALL | DESIGN FLOW (CFS) | TREATMENT LEVEL | EFFLUENT TYPE |
|---------|-------------------|-----------------|---------------|
| 002 | 0.993 | Secondary | Domestic |

RECEIVING STREAM(S) TABLE:

| WATER-BODY NAME | CLASS | WBID | DESIGNATED USES* | 12-DIGIT HUC | DISTANCE TO CLASSIFIED SEGMENT (MI) |
|-----------------|-------|------|--|---------------|-------------------------------------|
| Big River | P | 2704 | AQL, CLF, HHP, IND, IRR, LWW, SCR, WBC-A | 07140104-0407 | Direct Discharge |

* 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 |
| Big River | 66.6 | 70.4 | 82.7 |

* Data from USGS Gauge Station 07018500 at Bynesville, MO

| Receiving Water Body Segment Outfall #1: | | |
|--|-------------------------|----------------------------|
| Upper end segment* UTM coordinates: | X = 710091; Y = 4255658 | Outfall - Direct Discharge |

*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 submitted with the request and the receiving stream is gaining for discharge purposes (see Appendix B).

C. EXISTING WATER QUALITY

All POCs considered in this review were assumed to reduce the assimilative capacity the receiving stream by at least ten percent. Existing water quality data was submitted for TSS. The receiving stream, Big River, is not currently 303(d) listed; however, this facility directly discharges to a stream with an EPA approved TMDL. Big River (P)(2074) has a TMDL for lead from Old Lead Belt Abandoned Mine Lands for 53 miles. Section 4.1.2 of the TMDL states treated domestic discharge is not considered to cause or contribute to the impairment of the waterbodies addressed by the TMDL. Thus, the WLA for domestic facilities remains unchanged. The TMDL does not preclude the establishment of future domestic point sources in the watershed.

D. MIXING CONSIDERATIONS

Mixing Zone: 10 CSR 20-7.031(5)(A)4.B.(III)(a) - one-quarter (1/4) of stream width, cross-sectional area, or volume of flow; length of one-quarter (1/4) mile. If the discharger can document that rapid and complete mixing of the effluent occurs in the receiving stream, the mixing zone may be up to one-half (1/2) of the stream width, cross-sectional area, or volume of flow.

Zone of Initial Dilution: 10 CSR 20-7.031(5)(A)4.B.(III)(b) - one tenth (0.1) of the mixing zone width, cross sectional area, or volume of flow and no more than ten (10) times the effluent design flow volume unless the use of diffusers or specific mixing zone studies can justify more dilution.

MIXING CONSIDERATIONS TABLE:

| MIXING ZONE (CFS) [10 CSR 20-7.031(5)(A)4.B.(III)(a)] | | | ZONE OF INITIAL DILUTION (CFS) [10 CSR 20-7.031(5)(A)4.B.(III)(b)] | | |
|--|------|--------|---|------|--------|
| 1Q10 | 7Q10 | 30Q10 | 1Q10 | 7Q10 | 30Q10 |
| 16.65 | 17.6 | 20.675 | 1.665 | 1.76 | 2.0675 |

| | Flow (cfs) | MZ (cfs) | ZID (cfs) |
|--------------|------------|----------|-----------|
| 1Q10 | 66.6 | 16.65 | 1.665 |
| 7Q10 | 70.4 | 17.6 | 1.76 |
| 30Q10 | 82.7 | 20.675 | 2.0675 |

5. RECEIVING WATER MONITORING REQUIREMENTS

An upstream instream monitoring location has been established as Permitted Feature SM1 to monitor for Total Phosphorus and Total Nitrogen. This location is currently located approximately 600 ft. downstream from the confluence of Big River and Heads Creek. If the scope of construction modifies the facility to include a sampling point for influent wastewater at the headworks, this permitted feature may be removed.

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 use Missouri’s AIP for new and expanded wastewater discharges.

The AIP specifies that if the proposed activity results in a reduction by ten percent or more of the 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 *Antidegradation Review Report for Jefferson County Public Sewer District Lower Big River WWTP*, dated May 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 that 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).

Pollutants of Concern and Tier Determination

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

* Tier assumed.

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

*** Standards for these parameters are ranges.

Tier 1 Review

The receiving stream, Big River, is not currently 303(d) listed; however, this facility directly discharges to a stream with an EPA approved TMDL. Big River (P)(2074) has a TMDL for lead from Old Lead Belt Abandoned Mine Lands for 53 miles. Section 4.1.2 of the TMDL states treated domestic discharge is not considered to cause or contribute to the impairment of the waterbodies addressed by the TMDL. Thus, the WLA for domestic facilities remains unchanged. The TMDL does not preclude the establishment of future domestic point sources in the watershed.

According to the AIP, the waters may receive the POCs that are causing impairments if 1) the discharge would not cause or contribute to a violation of the WQS, 2) all other conditions of the state permitting requirements are met (i.e., no discharge options are explored and technology based requirements (including ELGs) are met); and 3) the permit is issued with the highest statutory and regulatory requirements.

B. NECESSITY OF DEGRADATION

The AIP specifies that if the proposed activity does result in a reduction by ten percent or more of the assimilative capacity 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 result in a reduction by ten percent or more of the assimilative capacity 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 and Consolidation

Consolidation at JCPSD Lower Big River WWTF: The preferred alternative is a consolidation alternative where JCPSD Lower Big River WWTF is the new and expanded regional facility. Four phases of collection system consolidation is presented with two phases for the WWTF expansion. A summary of the consolidation phases is presented in the Purpose of The Less Degrading Alternatives Section below.

Connecting Regional Sewer Collection to Existing Regional Treatment System: The facilities closest to the Lower Big River WWTF are the Fox Run Golf Club WWTP and Meadowbrook Valley Estates WWTP. The design flow of these facilities is far below the capacity of the JCPSD Lower Big River WWTF. As a result, this scenario is impracticable.

ii. No Discharge Evaluation

Construction of a Non-Discharge Retention Basin with Land Application: Land Application was considered as a non-degrading alternative. A storage basin of 50 acres would be required for the flow of 642,000 gpd design flow. The spray application of the wastewater would be 364 acres at the application rate of 2 feet per acre per year. This alternative was determined to be not practicable due to the quantity of land required for land application.

iii. Alternatives to No discharge

Non-Degrading Alternatives

Optimizing the Current Facilities: This alternative evaluated the optimization of the various decentralized treatment systems which currently exist within the district. The first and immediate regionalization phase proposes the connection of the Byrnes Mill Mobile Home Park WWTF and the Northwest Valley Middle School WWTF. Upgrades at Byrnes Mill MHP were evaluated as LemTec Systems or a Nitrox System with the projects costing \$2,859,000 and \$3,169,000. A new mechanical plant at Byrnes Mill MHP was evaluated at \$4,261,000. Northwest Valley Middle School is permitted with a design flow of 75,000 gpd and is beyond its design life with some exceedances in BOD₅ and *E. coli*. The proposed upgrade or construction of facilities at the Byrnes Mill MHP and Northwest Valley Middle addresses the facilities considered for immediate regionalization, but does

not include the connection of other facilities proposed under the short-term regionalization phase. The logistics of operating multiple treatment facilities versus a single central solution creates a significantly larger operational cost. Additionally, individually upgrading each facility can be a long and drawn out process and does nothing to address the issue of the existing on-site septic systems which are of major concern. The alternative of optimizing current facilities is considered impracticable, undesirable, and uneconomical.

Alternative Discharge Point: The potential of an alternative discharge location was studied to confirm that another preferable location does not exist. Discharge into Heads Creek (P) (2181) and the Meramec River (P) (2185) was investigated. The Meramec River is over ten miles downstream of the existing outfall and was therefore determined not to be feasible. Downstream water quality data is not available for the Heads Creek option to show minimal degradation, and the stream classifications are identical to those in the Big River. Because no data exists to prove that this option does result in a reduction by ten percent or more of the assimilative capacity, and the costs associated with discharging to a further location would not be beneficial, this alternative was not explored further.

Less Degrading Alternatives

Alternative 1, New Regional Wastewater Treatment Facility: The construction of a new regional wastewater treatment facility with a regional biosolids handling facility to accommodate the proposed regionalization and growth in the planning area was considered as a less degrading alternative. This alternative considered the construction of a new wastewater treatment facility at a new location selected by JCPSD. The new facility was proposed about 2 miles downstream of the JCPSD Lower Big River WWTF. This alternative is not considered economical since the cost is forty-seven percent (47%) higher than the preferred alternative.

Alternative 2, Expand Existing Wastewater Treatment Facility: The current JCPSD Lower Big River WWTF does not have sufficient capacity to accept the hydraulic and organic design loading beyond the proposed immediate regionalization phase. Expansion of the facility will be necessary to accommodate the proposed service area and allow for growth within the existing service area. A portion of land currently used for the land application of biosolids will be converted over for the plant expansion. The construction of a 642,000 gpd single-stage oxidation ditch treatment system and two 45- foot diameter clarifiers would accommodate the increase in loading from the early stages of the proposed regionalization. Each of the existing individual activated sludge treatment units would be taken out of service and retrofitted to operate as aerobic digesters for a regional biosolids facility. In addition to the new treatment units, the headworks and UV disinfection systems would require upgrades to handle the increased capacity. Given the condition of the existing headworks, a new influent screen and splitter box structure can be constructed next to the existing one. The new structure would be constructed with one new automatic fine screen and a manual bar screen bypass channel. The screened influent would then pass into an elevated splitter box structure that can utilize telescoping valves to balance hydraulic flow to all of the treatment units. This alternative is practicable and preferred.

Alternative 3, BNR upgrade to Expansion of Existing Facility: Upgrading the existing facility for nutrient removal was also considered. This alternative would involve the installation of the same 642,000 gpd oxidation ditch unit, headworks, and UV disinfection systems upgrades discussed in Alternative 2 with control upgrades, anaerobic and anoxic tankage with mixers, and a chemical feed system to aid in the removal of Total Phosphorus. This is a practicable alternative to meet water quality goals; however, Alternative 3 is undesirable due to Alternative 2 being selected as the preferred alternative.

iv. Preferred Alternative

The applicant selected the Expansion of the Existing WWTF as the preferred alternative. Expanding the existing WWTF with a new oxidation ditch system was the most cost-effective solution to meet the regionalized flow demand.

Alternatives Analysis Comparison

| Pollutant | Alternative 1 New Regional WWTF | Alternative 2 Expand Existing WWTF (Base Case) | Alternative 3 BNR Upgrade to Expansion of Existing WWTF |
|---------------------------|------------------------------------|--|---|
| BOD ₅ | ≤ 10 mg/l | ≤ 10 mg/l | ≤ 10 mg/l |
| TSS | ≤ 10 mg/l | ≤ 10 mg/l | ≤ 10 mg/l |
| Ammonia as N | ≤ 1.0 mg/l | ≤ 1.0 mg/l | ≤ 1.0 mg/l |
| Practicable | Yes | Yes | Yes |
| Preferred | No | Yes | No |
| Total Present Worth Cost* | \$27,979,700 | \$19,004,900 | \$19,628,000 |
| Ratio | 147% | 100% | 103% |

* Total Present Worth cost at 20 year design life and 2.375% interest

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 expanded discharge will discharge to Big River, which is considered gaining for discharge purposes.

D. SOCIAL AND ECONOMIC IMPORTANCE

The proposed expansion is a regionalization project where JCPSD Lower Big River WWTF is the destination facility. This project will improve the health and safety of the Jefferson County residents by reducing the quantity of operating wastewater facilities discharging to smaller streams and improving the reliability of the existing JCPSD Lower Big River WWTF. This preferred alternative intends to regionalize 12 smaller discharging systems and 31 septic systems into the single JCPSD Lower Big River WWTF. The proposed regionalization project will centralize wastewater treatment, eliminate satellite facilities and their discharges, and result in an overall improvement of water quality.

E. NATURAL HERITAGE REVIEW

A Missouri Department of Conservation Natural Heritage Review was obtained by the applicant. 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:

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

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 the performance based 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: Performance based 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).** Preferred Alternative Effluent Limits of 10 mg/L average monthly and 15 mg/L average weekly were established as a result of a discharging technology alternatives analysis conducted by the applicant. These limits are at least as stringent as the minimum effluent regulations established in 10 CSR 20-7.015(8).

Streeter-Phelps Dissolved Oxygen Modeling

The applicant submitted DO modeling with a critical DO concentration of 7.91 mg/L, upstream DO concentration of 7.99 mg/L and BOD₅ loading of 30 mg/L at 0.642 MGD. Using a more conservative

expansion effluent limitations for BOD₅ stated above, modeling provided in the Antidegradation Application demonstrated that BOD₅ effluent limits are protective of water quality standards for DO. Staff considers the BOD₅ effluent limitations of 15 mg/L as the average weekly and 10 mg/L as the monthly average protective of aquatic life.

- **Total Suspended Solids (TSS).** Preferred Alternative Effluent Limits of 10 mg/L average monthly and 15 mg/L average weekly were established as a result of a discharging technology alternatives analysis conducted by the applicant. These limits are at least as stringent as the minimum effluent regulations established in 10 CSR 20-7.015(8).
- **Escherichia coli (E. coli).** Monthly average of 126 per 100 mL as a geometric mean and Weekly Average of 630 per 100 mL as a geometric mean during the recreational season (April 1 – October 31), for discharges within two miles upstream of segments or lakes with Whole Body Contact Recreation (A) designated use of the receiving stream, as per 10 CSR 20-7.015(9)(B). An effluent limit for both monthly average and weekly average is required by 40 CFR 122.45(d). The Geometric Mean is calculated by multiplying all of the data points and then taking the nth root of this product, where n = # of samples collected. For example: Five *E. coli* samples were collected with results of 1, 4, 6, 10, and 5 (#/100mL). Geometric Mean = 5th root of (1)(4)(6)(10)(5) = 5th root of 1,200 = 4.1 #/100mL.
- **Total Ammonia Nitrogen.** The following effluent limits will be included in the operating permit modification as Preferred Alternative Effluent Limits. Effluent limits may be changed to monitoring requirements during future operating permit renewals after the new facility is constructed and reasonable potential is assessed.

Selected Effluent Limits for Total Ammonia as Nitrogen for the Proposed Expansion to 0.642 MGD

| Month | Maximum Daily Limits – mg/L | Average Monthly Limits – mg/L | Basis for Limit |
|-----------|-----------------------------|-------------------------------|-----------------|
| January | 13.1 | 2.5 | PEL |
| February | 11.5 | 2.2 | PEL |
| March | 9.0 | 1.8 | PEL |
| April | 7.3 | 1.4 | PEL |
| May | 6.3 | 1.2 | PEL |
| June | 5.5 | 1.1 | PEL |
| July | 5.3 | 1.0 | PEL |
| August | 5.4 | 1.1 | PEL |
| September | 6.0 | 1.2 | PEL |
| October | 7.1 | 1.4 | PEL |
| November | 9.1 | 1.8 | PEL |
| December | 11.5 | 2.3 | PEL |

Comparison of Total Ammonia as Nitrogen Water Quality Based Effluent and Preferred Alternative Effluent Limits for the proposed expansion to 0.642 MGD

| Month | WQBEL MDL – mg/L | WQBEL AML – mg/L | PEL MDL – mg/L | PEL AML – mg/L |
|-----------|------------------|------------------|----------------|----------------|
| January | 32.4 | 32.4 | 13.1 | 2.5 |
| February | 27.1 | 27.1 | 11.5 | 2.2 |
| March | 32.4 | 32.4 | 9.0 | 1.8 |
| April | 32.4 | 32.4 | 7.3 | 1.4 |
| May | 32.4 | 32.4 | 6.3 | 1.2 |
| June | 32.4 | 32.4 | 5.5 | 1.1 |
| July | 31.4 | 32.4 | 5.3 | 1.0 |
| August | 27.1 | 27.1 | 5.4 | 1.1 |
| September | 32.4 | 32.4 | 6.0 | 1.2 |

| | | | | |
|----------|------|------|------|-----|
| October | 32.4 | 32.4 | 7.1 | 1.4 |
| November | 32.4 | 32.4 | 9.1 | 1.8 |
| December | 32.4 | 32.4 | 11.5 | 2.3 |

WQBEL – Water Quality Based Effluent Limits; PEL – Preferred Alternative Effluent Limits; MDL – maximum daily limit; AML – Average Monthly Limit

WQBEL – Water Quality Based Effluent Limits

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

| 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

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

| | | |
|--|--|---|
| <p>January AML = WLAc = 32.4 mg/L MDL = WLAA = 32.4 mg/L</p> | <p>May AML = WLAc = 32.4 mg/L MDL = WLAA = 32.4 mg/L</p> | <p>September AML = WLAc = 32.4 mg/L MDL = WLAA = 32.4 mg/L</p> |
| <p>February AML = WLAc = 27.1 mg/L MDL = WLAA = 27.1 mg/L</p> | <p>June AML = WLAc = 32.4 mg/L MDL = WLAA = 32.4 mg/L</p> | <p>October AML = WLAc = 32.4 mg/L MDL = WLAA = 32.4 mg/L</p> |
| <p>March AML = WLAc = 32.2 mg/L MDL = WLAA = 32.2 mg/L</p> | <p>July AML = WLAc = 31.4 mg/L MDL = WLAA = 32.4 mg/L</p> | <p>November AML = WLAc = 32.4 mg/L MDL = WLAA = 32.4 mg/L</p> |
| <p>April AML = WLAc = 32.4 mg/L MDL = WLAA = 32.4 mg/L</p> | <p>August AML = WLAc = 27.1 mg/L MDL = WLAA = 27.1 mg/L</p> | <p>December AML = WLAc = 32.4 mg/L MDL = WLAA = 32.4 mg/L</p> |

- **Oil & Grease.** Conventional pollutant, effluent limitation for protection of aquatic life; 10 mg/L monthly average, 15 mg/L daily maximum. [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 designated uses.

- **Total Phosphorus, Total Kjeldahl Nitrogen, & Nitrate + Nitrite**. Statewide Monitoring for Nutrients. Point sources that have the design capacity of greater than one hundred thousand (100,000) gpd that typically discharge nitrogen and phosphorus shall collect and analyze influent and effluent samples for total phosphorus, ammonia, total kjeldahl nitrogen and nitrate plus nitrite utilizing methods outlined in 10 CSR 20-7.015(D)2. of this section using the following frequencies.

10 CSR 20-7.015(9)(D)8.A. Quarterly for facilities with design capacities greater than 100,000 gpd and less than 1,000,000 gpd per day for a period up to 5 years. The department may require additional monitoring to ascertain a discharge's nutrient contribution and the efficacy of the treatment technology as it pertains to nutrient removal.

- **pH**. 6.0-9.0 SU. pH limitations [10 CSR 20-7.015] are protective of the water quality standard [10 CSR 20-7.031(5)(E)], due to the buffering capacity of the mixing zone.
- **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 eighty-five percent (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 eighty-five percent (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(4)(A)5.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

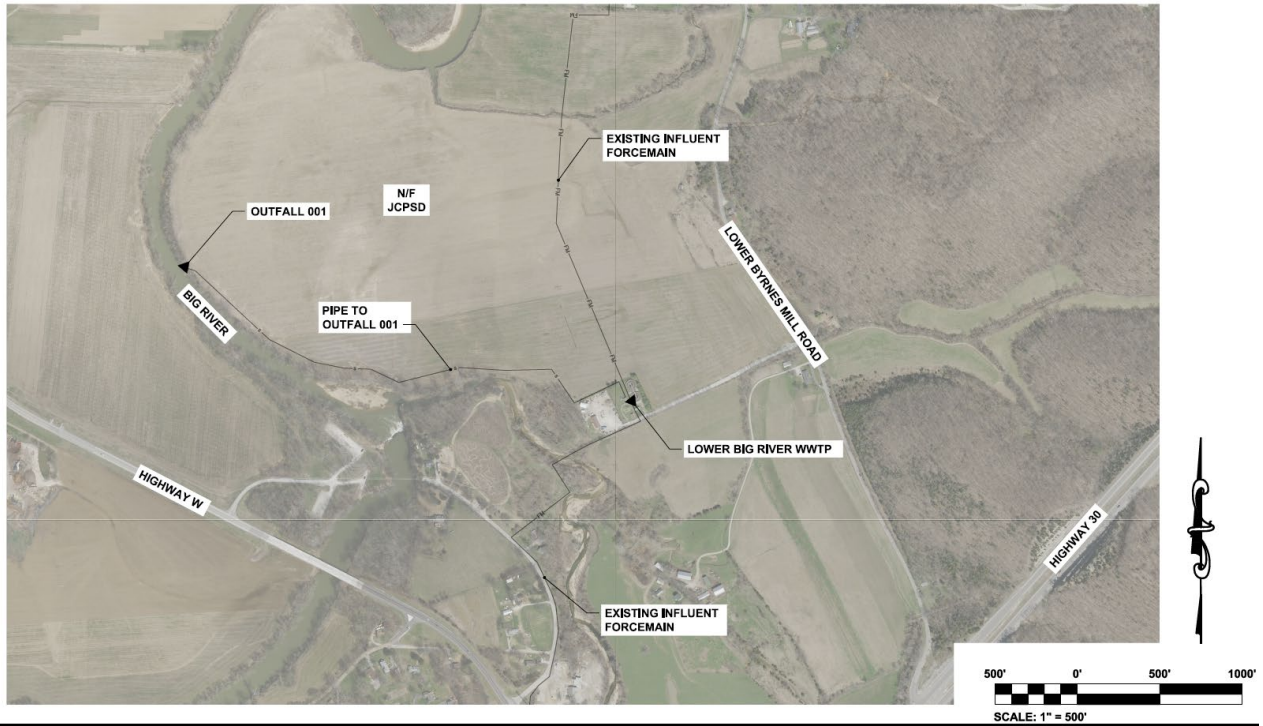
The proposed expanded discharge will result in a reduction by ten percent or more of the pollutant assimilative capacity of the Big River. Expanding the Existing WWTF was determined to be the preferred alternative and base case technology (lowest cost alternative that meets technology and water quality based effluent limitations). Alternative 3 BNR Upgrade to the Expansion of the Existing Facility may also be pursued for construction provided that the systems are designed to meet the effluent limits in this WQAR.

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

Reviewer: Steve Hamm, P.E.
Date: November 2022

Revised by: Alex Bielefeldt E.I.
Revised Date: November 7, 2023

10. Appendix A: Map of Discharge Location



LOWER BIG RIVER WWTF LOCATION MAP

FIGURE No. 1

| | | | |
|-------|----------|-------------|---------|
| DATE: | 3/7/2022 | HS PROJECT# | 2105900 |
|-------|----------|-------------|---------|

11. Appendix B: Geohydrologic Evaluation



June 17, 2021

Sean Mickey
401 S 18th St
St Louis, MO 63103

RE: JCPSD Lower Big River WWTF Regionalization

Dear Sean Mickey:

On May 05, 2021, the Missouri Geological Survey received a request to perform a geohydrologic evaluation for the above referenced project located in Jefferson County. Included with this letter is a report that details the geologic and hydrologic conditions at the site and the potential for groundwater contamination in the event of wastewater treatment failure.

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

Sincerely,


MISSOURI GEOLOGICAL SURVEY


John Corley
Geologist
Environmental Geology Section

c: Douglas Bjornstad
WPP
St. Louis Regional Office



06/17/2021

| | | | |
|---|--|---|--|
|  | Missouri Department Of Natural Resources Missouri Geological Survey Geological Survey Program Environmental Geology Section | Project ID Number LWE21090 County Jefferson | |
| Request Details | | | |
| Project: JCPSD Lower Big River WWTF Regionalization | Legal Description: Land Grant 03059 Quadrangle: HOUSE SPRINGS Latitude: 38 25 21.21 Longitude: -90 35 2.01 | | |
| Organization Official Name: Douglas Bjornstad Address: PO Box 632, 4629 Yeager Road City: Hillsboro State: MO Zip: 63050 Phone: 636-797-9900 Email: dbjornstad@jeffcopsd.org | | Preparer Name: Sean Mickey Address: 401 S 18th St City: St Louis State: MO Zip: 63103 Phone: 314-335-8667 Email: scmickey@hornersshifrin.com | |
| Project Details | | | |
| Report Date: 06/17/2021 Date of Field Visit: 06/16/2021 | | Previous Reports: Not Applicable | |
| Facility Type <input checked="" type="checkbox"/> Mechanical treatment plant <input type="checkbox"/> Recirculating filter bed <input type="checkbox"/> Land application <input type="checkbox"/> Lagoon or storage basin <input type="checkbox"/> Subsurface soil absorption system <input type="checkbox"/> Lagoon or storage basin W/Land App <input type="checkbox"/> Lagoon or storage basin W/SSAS <input type="checkbox"/> Other type of facility | Type of Waste <input type="checkbox"/> Animal <input checked="" type="checkbox"/> Human <input type="checkbox"/> Process or industrial <input type="checkbox"/> Leachate <input type="checkbox"/> Other waste type | Funding Source <input checked="" type="checkbox"/> IWT <input type="checkbox"/> WWL-SRF Additional Information <input type="checkbox"/> Plans were submitted <input type="checkbox"/> Site was investigated by NRCS <input type="checkbox"/> Soil or geotechnical data were submitted | |
| Geologic Stream Classification: <input checked="" type="checkbox"/> Gaining <input type="checkbox"/> Losing <input type="checkbox"/> No discharge | | | |
| Overall Geologic Limitations <input checked="" type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Severe | Collapse Potential <input checked="" type="checkbox"/> Not applicable <input type="checkbox"/> Slight <input type="checkbox"/> Moderate <input type="checkbox"/> Severe | Topography <input checked="" type="checkbox"/> <4% <input type="checkbox"/> 4% to 8% <input type="checkbox"/> 8% to 15% <input type="checkbox"/> >15% | Landscape Position <input type="checkbox"/> Broad uplands <input type="checkbox"/> Floodplain <input type="checkbox"/> Ridgetop <input checked="" type="checkbox"/> Alluvial plain <input type="checkbox"/> Hillslope <input type="checkbox"/> Terrace <input type="checkbox"/> Narrow ravine <input type="checkbox"/> Sinkhole |
| Bedrock: | | | |
| Surficial Materials: Surficial materials consist of moderate to highly permeable silty and sandy alluvium. | | | |

| | | |
|---|---|--|
|  Missouri Department Of Natural Resources Missouri Geological Survey Geological Survey Program Environmental Geology Section | | Project ID Number LWE21090 County Jefferson |
| <u>Recommended Construction Procedures for Earthen Facility</u> | <u>Determine Overburden Properties</u> | <u>Determine Hydrologic Conditions</u> |
| <input type="checkbox"/> Installation of clay pad and Compaction | <input type="checkbox"/> Particle size analysis | <input type="checkbox"/> Groundwater elevation |
| <input type="checkbox"/> Diversion of subsurface flow | <input type="checkbox"/> Atterberg limits | <input type="checkbox"/> Direction of groundwater flow |
| <input type="checkbox"/> Artificial sealing | <input type="checkbox"/> 95% Max. dry density test method | <input type="checkbox"/> 25-Year flood level |
| <input type="checkbox"/> Rock excavation | <input type="checkbox"/> Overburden thickness | <input type="checkbox"/> 100-Year flood level |
| <input type="checkbox"/> Limit excavation depth | <input type="checkbox"/> Permeability coefficient-undisturbed | |
| | <input type="checkbox"/> Permeability coefficient-remolded | |


Remarks:

On June 16, 2021, a geologist with the Geological Survey Program (GSP) performed a geohydrologic evaluation for proposed upgrades to the Jefferson County Public Sewer District Lower Big River Wastewater Treatment Facility. The purpose of this evaluation is to evaluate the geologic and hydrologic characteristics of the site and to determine the potential impact to groundwater contamination to local and regional water resources in the event of treatment failure.

No bedrock was observed on site, but according to previous mapping, bedrock consists of Ordovician-age Joachim Dolomite. Surficial materials consist of moderate to highly permeable silty and sandy alluvium, with surficial material thickness of at least 30 feet. Clay and gravel lenses may be encountered during excavation activities.

Water from the facility discharges to Big River, which displayed gaining characteristics for at least 2 miles downstream of the outfall, and will be classified as such. Due to the thickness and extent of the alluvial material at the site, and since the Big River is the area's likely potentiometric surface, the site receives an overall slight geologic limitation rating, and in the event of treatment failure, impact to regional groundwater resources would be minimal. However, shallow and local groundwater resources, and surface waters of Big River, may be adversely impacted.

12. Appendix C: Antidegradation Review Summary Attachments

| | | | |
|---|---------------------------------|---|-------------------|
|  MISSOURI DEPARTMENT OF NATURAL RESOURCES WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH ANTIDEGRADATION REVIEW SUMMARY / REQUEST | | FOR DEPARTMENT USE ONLY APP NO. FEE RECEIVED CHECK NO. DATE RECEIVED | |
| 1. FACILITY | | | |
| NAME JCPSD Lower Big River Wastewater Treatment Facility | | COUNTY Jefferson | |
| ADDRESS (PHYSICAL) 4197 Lower Byrnes Mill Road | CITY Byrnes Mill | STATE MO | ZIP CODE 63051 |
| PERMIT NUMBER MO-0115428 | PROPOSED DESIGN FLOW 650,000 | SIC / NAICS CODE 4952 | |
| 2. OWNER | | | |
| NAME Jefferson County Public Sewer District (JCPSD) | | | |
| ADDRESS P.O. Box 632 | CITY Hillsboro | STATE MO | ZIP CODE 63050 |
| EMAIL ADDRESS jcpsd1@yahoo.com | | TELEPHONE NUMBER WITH AREA CODE (636) 797-9900 | |
| 3. CONTINUING AUTHORITY The regulatory requirement regarding continuing authority is found in 10 CSR 20-6.010(2). | | | |
| NAME JCPSD | | SECRETARY OF STATE CHARTER NUMBER | |
| ADDRESS P.O. Box 632 | CITY Hillsboro | STATE MO | ZIP CODE 63050 |
| EMAIL ADDRESS jcpsd1@yahoo.com | | TELEPHONE NUMBER WITH AREA CODE (636) 797-9900 | |
| 4. CONSULTANT | | | |
| PREPARER NAME Rachel Dixon | | COMPANY NAME Horner & Shifrin | |
| ADDRESS 401 S. 18th Street, Suite 400 | CITY St. Louis | STATE MO | ZIP CODE 63103 |
| EMAIL ADDRESS redixon@hornershifrin.com | | TELEPHONE NUMBER WITH AREA CODE (314) 335-8675 | |
| 5. RECEIVING WATER BODY SEGMENT #1 | | | |
| NAME Big River | | | |
| 5.1 Upper end of segment – Location of discharge UTM: X= 710091, Y= 4255658 OR Lat _____, Long _____ | | | |
| 5.2 Lower end of segment – Meramec River UTM: X= 707728, Y= 4260892 OR Lat _____, Long _____ | | | |
| Per the Missouri Antidegradation Implementation Procedure (AIP), the definition of a segment, "a segment is a section of water that is bound, at a minimum, by significant existing sources and confluences with other significant water bodies." | | | |
| 6. WATER BODY SEGMENT #2 (IF APPLICABLE, Use another form if a third segment is needed) | | | |
| NAME | | | |
| 6.1 Upper end of segment – End of Segment #1 UTM: X= _____, Y= _____ OR Lat _____, Long _____ | | | |
| 6.2 Lower end of segment – UTM: X= _____, Y= _____ OR Lat _____, Long _____ | | | |
| 7. DECHLORINATION | | | |
| If chlorination and dechlorination is the existing or proposed method of disinfection treatment, will the effluent discharged be equal to or less than the Water Quality Standards for Total Residual Chlorine stated in Table A1 of 10 CSR 20-7.031? <input type="checkbox"/> Yes <input type="checkbox"/> No – What is the proposed method of disinfection? | | | |
| Based on the disinfection treatment system being designed for total removal of Total Residual Chlorine, minimal degradation for Total Residual Chlorine is assumed and the facility will be required to meet the water quality based effluent limits. These compliance limits for Total Residual Chlorine are much less than the method detection limit of 0.13 mg/L. | | | |

| 8. SUMMARIZE THE FEASIBILITY OF CONSTRUCTING A NO-DISCHARGE TREATMENT WASTEWATER FACILITY | | | | | |
|--|---|--|---|-----------------------|---|
| <p>According to the Antidegradation Implementation Procedure Sections I.B. and II.B.1., the feasibility of no-discharge alternatives must be considered. No-discharge alternatives may include connection to a regional treatment facility, surface land application, subsurface land application, and recycle or reuse.</p> <p>The construction of a no-discharge retention basin with land application was considered for. Approximately 364 acres of land would be required for spray application at the most restrictive rate of 2 feet per acre per year. No available land for purchase was identified within a 1-mile radius around the Lower Big River facility that would provide the required amount of land without requiring a stream crossing or potentially impacting wetlands.</p> <p>An upgraded design flow of 0.65 MGD is proposed for the Lower Big River WWTF. No facilities with adequate capacity were identified within a feasible connection radius.</p> | | | | | |
| 9. ADDITIONAL REQUIREMENTS | | | | | |
| <p>Complete and submit the following with this submittal:</p> <ul style="list-style-type: none"> <input checked="" type="checkbox"/> Copy of the Geohydrologic Evaluation – Submit request through the Missouri Geological Survey website <input checked="" type="checkbox"/> Copy of the Missouri Natural Heritage from the Missouri Department of Conservation website <input checked="" type="checkbox"/> Attach your Antidegradation Review Report and all supporting documentation as these forms are only a summary. <input checked="" type="checkbox"/> If applicable, submit a copy of any Existing Water Quality data used in this process. Include the date range of the data, source(s) of the data, and location of data collection relative to the outfall. If using your own collected water quality data, submit a copy of the Quality Assurance Project Plan (QAPP) approved by the department's Watershed Protection Section. For more detailed information, see the Missouri Antidegradation Implementation Procedure (AIP), Section II.A.1. | | | | | |
| 10. PATH / TIER REVIEW ATTACHMENTS ENCLOSED | | | | | |
| Path A: Tier 2 – Non-Degradation Mass Balance | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | | | |
| Path B: Tier 2 – Minimal Degradation | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | | | |
| Path C: Tier 2 – Significant Degradation | <input checked="" type="checkbox"/> Yes | <input type="checkbox"/> No | | | |
| Path D: Tier 1 – Preliminary Review Request | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | | | |
| Path E: Temporary Degradation | <input type="checkbox"/> Yes | <input checked="" type="checkbox"/> No | | | |
| 11. APPLICANT PROPOSED ANTIDEGRADATION REVIEW EFFLUENT LIMITS | | | | | |
| Preliminary effluent limits for the proposed project are dependent upon the path selected: | | | | | |
| Applicable Pollutants of Concern | Concentration* | | Path / Tier Review Attachment Used for POC Evaluation | Average Monthly Limit | Daily Maximum Limit or Average Weekly Limit |
| | mg/L | µg/L | | | |
| BOD ₅ | X | | 2 | 30 | 45 |
| TSS | X | | 1 | 30 | 45 |
| Ammonia (Summer) | X | | 2 | 7.3 | 38.1 |
| Ammonia (Winter) | X | | 2 | Monitoring | Monitoring |
| Total Phosphorus | X | | 2 | Monitoring | Monitoring |
| Total Nitrogen | X | | 2 | Monitoring | Monitoring |
| Oil and Grease | X | | 2 | 10 | 15 |
| E.coli | X | | 2 | 126 | 630 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| * Place an X in appropriate box for the concentration units for each Pollutant of Concern. | | | | | |

| | |
|---|---|
| 12. PROPOSED PROJECT SUMMARY | |
| <p>The Lower Big River WWTF is currently operating under its design loading and has hydraulic and organic capacity available. The expansion of the existing facility is proposed to allow for the connection of surrounding wastewater treatment facilities and eliminate nearby on-site septic systems. The expansion of the facility is proposed in two phases, the first of which is discussed in this report. Phase I is proposed to increase the design flow of the facility to 0.65 MGD with the construction and installation of a 650,000 gallon per day oxidation ditch, two 45-foot clarifiers, a septage receiving station, upgrade of the facility headworks and UV disinfection system, and the conversion of the existing treatment units at the facility to aerobic digesters. The increased design flow will allow for the connection of the Northwest Valley Middle School WWTF (MO-0044580), Byrnes Mill MHP WWTF (MO-0105856), House Springs Intermediate School WWTF (MO-0100374), and Woodridge Estates WWTF (MO-0103438).</p> | |
| <p>Applicants choosing to use a new wastewater technology that are considered an "unproven technology" in Missouri must comply with the requirements set forth in the <i>New Technology Definitions and Requirements fact sheet</i>.</p> | |
| 13. CONTINUING AUTHORITY WAIVER (For New Discharges) | |
| <p>In accordance with 10 CSR 20-6.010(2)(C), applicants proposing use of a lower preference continuing authority, when the higher level authority is available, must submit a waiver from the existing higher authority one or other documentation for the department's review, provided it does not conflict with any area-wide management plan approved under section 208 of the Federal Clean Water Act or by the Missouri Clean Water Commission. Is the waiver necessary? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, provide a copy.</p> | |
| 14. APPLICATION FEE | |
| <input type="checkbox"/> CHECK NUMBER | <input type="checkbox"/> JETPAY CONFIRMATION NUMBER |
| 15. SIGNATURE | |
| <p>I am authorized and hereby certify that I am familiar with the information contained in this document and to the best of my knowledge and belief such information is true, complete and accurate.</p> | |
| SIGNATURE <i>Rachel Dixon</i> | DATE 05/18/2022 |
| PRINT NAME Rachel Dixon | TITLE Project Engineer |
| PLEASE IDENTIFY YOUR STATUS FOR THIS PROJECT: <input type="checkbox"/> OWNER <input type="checkbox"/> CONTINUING AUTHORITY <input checked="" type="checkbox"/> CONSULTANT | |

| 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 | Oxidation Ditch | Phase I expansion of existing facility with 650,000 gpd unit |
| 2 | Oxidation Ditch with BNR | Phase I expansion with 650,000 gpd unit and BNR treatment |
| 3 | Extended Aeration | New regional WWTF |
| 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 expansion of the existing wastewater treatment facility with and without biologic nutrient removal (BNR) treatment would allow for the optimization of the existing WWTF with the construction of new tankage adjacent to the existing facility. The purchase of land or acquisition of easements would not be required.</p> <p>The construction of a new regional facility would require the purchase of land, signification modifications to the existing collection system to re-route flow, and coordination with State and Federal agencies for potential impacts to the floodway and floodplain of the Big River.</p> | | |
| <p>Economic Efficiency Basis:</p> <p>What is the design life cycle for the comparison? 35-years</p> <p>What interest rate was used in the present worth calculations? 2.375%</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>Present-worth cost estimates were prepared for the four less-degrading alternatives: Phase I Expansion of WWTF: \$19,004,900; Phase I Expansion of WWTF with BNR: \$19,628,000; New Regional WWTF: \$27,979,700, The Phase I Expansion with BNR is 103% of the base-case cost and the New Regional WWTF is 147% of the base-case.</p> | | |

| TABLE OF THE ALTERNATIVES EVALUATION (Attach additional page if necessary) | | | | | | |
|---|-----------------------|--------------|--------------|----------|----------|----------|
| PARAMETERS | Alternatives # | | | | | |
| | 1 | 2 | 3 | 4 | 5 | 6 |
| BOD ₅ – mg/L | 30 | 30 | 30 | | | |
| TSS – mg/L | 30 | 30 | 30 | | | |
| Ammonia (Summer) – mg/L | 1.0 | 1.0 | 1.0 | | | |
| Ammonia (Winter) – mg/L | | | | | | |
| E. Coli – #/100 mL | <126 | <126 | <126 | | | |
| Total Nitrogen – mg/L | 31 | 10 | 31 | | | |
| Total Phosphorus – mg/L | 4.7 | 1 | 4.7 | | | |
| Oil and Grease | <10 | <10 | <10 | | | |
| | | | | | | |
| Construction Cost – \$ | \$9,552,500 | \$10,006,700 | \$14,558,000 | | | |
| Operating Cost – \$ | \$181,800 | \$177,700 | \$205,500 | | | |
| Present Worth – \$ | \$19,004,900 | \$19,628,000 | \$27,979,700 | | | |
| Ratio present worth to base case | 1.0 | 1.03 | 1.47 | | | |
| Affordability Summary: | | | | | | |
| <p>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."</p> <p>The costs associated with the proposed alternatives were determined to not be economically prohibitive, so an affordability analysis was not performed.</p> | | | | | | |
| Justification for Preferred Alternative: | | | | | | |
| <p>The preferred alternative for the JCPSD Lower Big River WWTF is the Phase I expansion of the existing facility. This is the least expensive option and meets the effluent limits for all pollutants of concern. The alternative would provide the facility additional capacity to accept flows from satellite treatment facilities for regionalization without significant modifications to the collection system.</p> | | | | | | |
| Reasons for Rejecting the other Evaluated Alternatives: | | | | | | |
| <p>The New Regional WWTF alternative was rejected as it would require substantial modifications, including a change in flow direction, to route wastewater to the new facility as well as the construction of a completely new wastewater treatment facility, including preliminary treatment and disinfection. The majority of the field where the new facility would be located is within the designated floodway of the Big River, so coordination with the Army Corps of Engineers and Jefferson County would be required.</p> <p>The BNR treatment alternative is more costly.</p> | | | | | | |
| Comments/Discussion: | | | | | | |
| <p>In choosing the recommended alternative, it can be ensured that JCPSD will be able to operate the Lower Big River WWTF for the best benefit of its existing and proposed customers.</p> | | | | | | |

| 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." The affected community includes the Cities of Byrnes Mill and House Springs, Missouri as well as surrounding Jefferson County.</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. The proposed alternative will provide the Lower Big River WWTF the capacity to accept flows from surrounding wastewater treatment facilities at the lowest cost. The consolidation of wastewater treatment at the Lower Big River WWTF will optimize wastewater treatment and therefore improve water quality in the surrounding watershed.</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. The recommended alternative allows JCPSD additional capacity to convert the existing wastewater treatment units while also providing additional treatment capacity to accept flows from surrounding wastewater treatment facilities and septic tanks. This project will result in an overall improvement in water quality in the surrounding watershed through the consolidation and optimization of wastewater treatment.</p> |
| <p>PROPOSED PROJECT SUMMARY: The proposed project is the optimization and expansion of the JCPSD Lower Big River WWTF with a new 650,000 gallon per day oxidation ditch treatment unit. The expansion will provide the facility additional capacity to allow for the connection of several satellite wastewater treatment facilities and septic tanks in the area while continuing to provide superior wastewater treatment.</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> |

13. Dissolved Oxygen Modeling



The following summary of the DO analysis was performed following the Missouri Department of Natural Resources (MDNR) approved Streeter Phelps model. This analysis is performed to evaluate if the preferred alternative's BOD₅ effluent limitations from the alternatives analysis is protective of Missouri's water quality standard for DO. This method references EPA/600/6-85/002a.

Screening Level Model Analysis – The purpose of this model is to indicate if DO concentrations fall below the appropriate water quality standard at the downstream regulatory point of compliance.

This analysis is for the upper and lower limits of the stream segment considered for the anti-degradation report. The upper end of the stream segment is the location of the discharge to the Big River, and the lower limit is 1,500 ft downstream, just past the designated in stream monitoring permitted feature, SM1. The 7Q10 flow rate from the existing permit was used for in stream flow. Using existing bathymetry of the Big River, the river was determined to be 125 feet wide with a 2.5 ft water depth and a corresponding velocity of 0.41 fps was determined at 7Q10 flow with the new outfall.

It was assumed that the design flow of the treatment plant is a constant flow. Following is a list of inputs and assumptions used in the spreadsheet tool.

Inputs for Screening Level Model

| Input | Value | Notes/Assumptions |
|---|-----------|--|
| Stream Flow (Q) | 70.4 cfs | Big River 7Q10 from existing NPDES permit |
| Downstream Velocity (V, fps) | 1.2 fps | 7Q10 flow plus WWTP discharge, flow area determined from nearby bathymetry data |
| Point Source Flow (Qd) | 1.0 cfs | 0.650 MGD Phase I design flow |
| Effluent/Stream Temperature | 26°C | Assumed summer maximum per DNR requirements |
| BOD ₅ - Effluent | 30 mg/L | Average monthly effluent limit (max BOD produces minimum DO). Assumed effluent ammonia of 7.3 mg/L (NPDES limit) which corresponds to 26 mg/L NBOD. Remaining is CBOD used in model. |
| BOD ₅ – Upstream | 0 mg/L | Stream assumption – no presence of upstream sources that would influence BOD. |
| DO – Upstream | 7.99 mg/L | Assumed at equilibrium with no oxygen demand |
| DO – Effluent | 2 mg/L | Assumed 2 mg/L as a conservative value for extended aeration plant. |
| Reaeration Coefficients (K _r) | 32 | EPA reference. Depth of creek is shallow; velocity is low; 40 is conservative. |
| Deoxygenation Coefficient (K _d) | 1.00 | Assumed value from Wright and McDonnell, 1979. |



Results

For the above scenario, the minimum DO level of 7.91 mg/L is reached immediately after point of discharge.

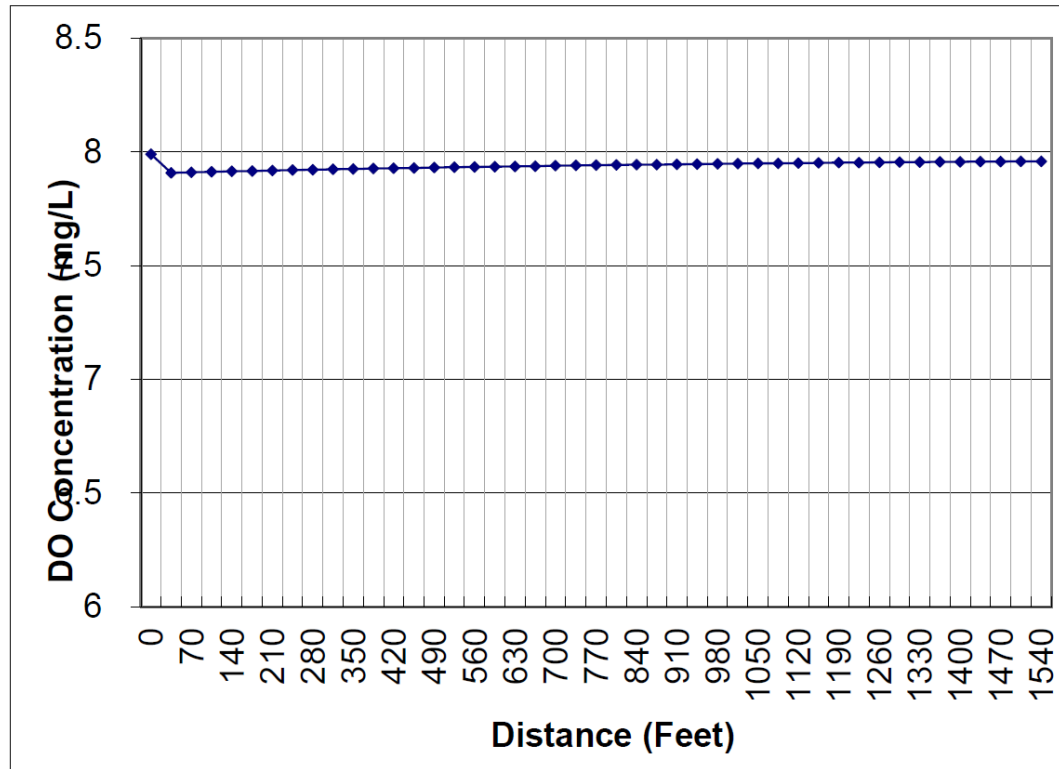


Figure 1. Streeter Phelps Dissolved Oxygen Concentration



Summary

In summary, the above analysis conservatively demonstrates that water quality criteria for DO is not a significant concern, due to the low oxygen demand and flow in comparison to the Big River flow. The attachment immediately following this analysis contains the Excel file used to provide this analysis as well as the background information used as a basis of the inputs.



14. Natural Heritage Review



Missouri Department of Conservation

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

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

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

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

PROJECT INFORMATION

Project Name and ID Number: JCPSD Lower Big River WWTF #6450

Project Description: Proposed expansion of Lower Big River WWTF service area with regionalization of JCPSD facilities

Project Type: Waste Transfer, Treatment, and Disposal, Liquid waste/Effluent, Sewer line, New - construction in new location

Contact Person: Rachel Schneider

Contact Information: reschneider@hornershifrin.com or 3143358675

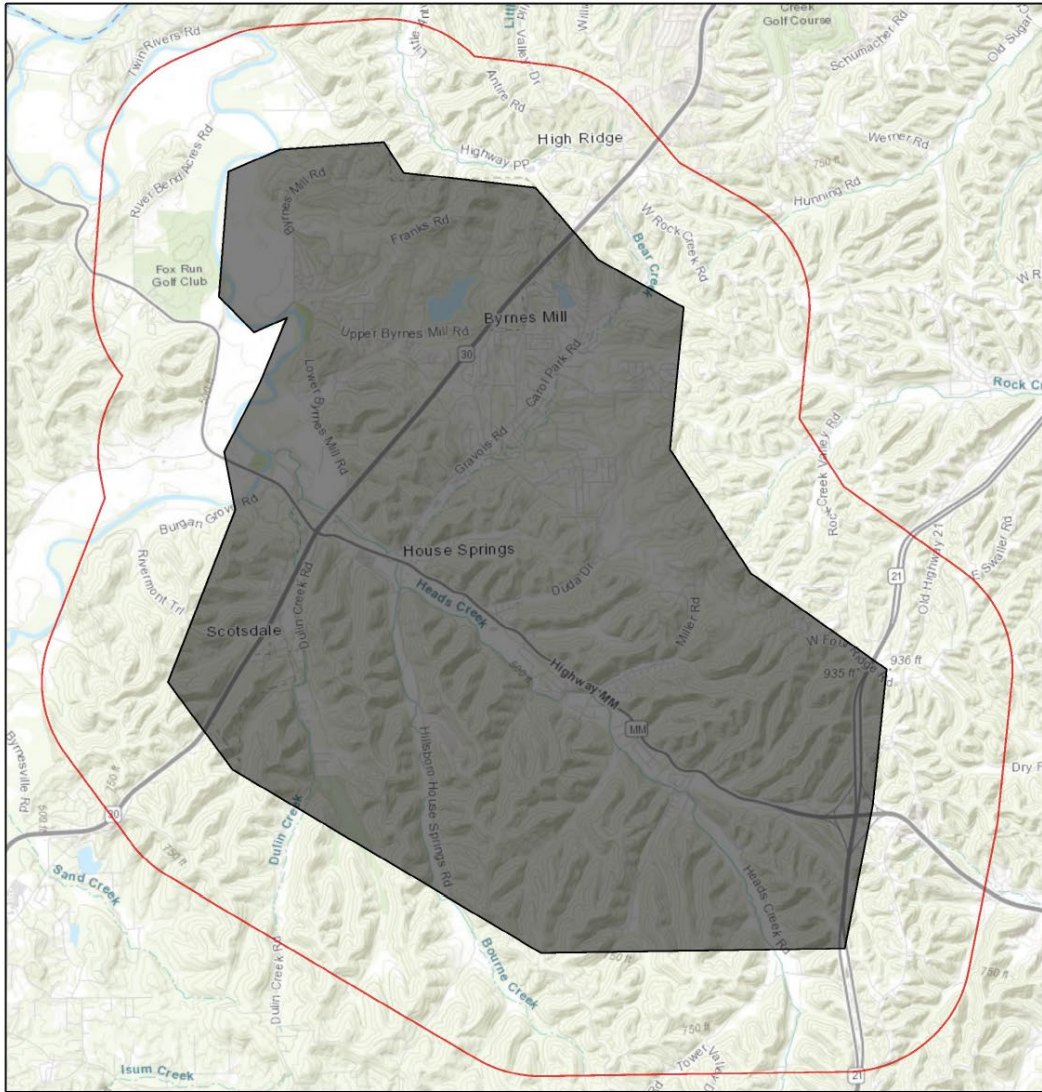
Disclaimer: The NATURAL HERITAGE REVIEW REPORT produced by this website identifies if a species tracked by the Natural Heritage Program is known to occur within or near the area submitted for your project, and shares suggested recommendations on ways to avoid or minimize project impacts to sensitive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

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

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

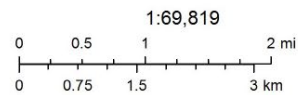
Transportation Projects: If the project involves the use of Federal Highway Administration transportation funds, these recommendations may not fulfill all contract requirements. Please contact the Missouri Department of Transportation at 573-526-4778 or www.modot.mo.gov/ehp/index.htm for additional information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

JCPSD Lower Big River WWTF



November 5, 2019

- Project Boundary
- Buffered Project Boundary



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

Species or Communities of Conservation Concern within the Area:

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

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

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

Other Special Search Results:

No results have been identified for this project location.

Project Type Recommendations:

Waste Transfer, Treatment, and Disposal - Sewer Line: New, Replacement, Maintenance; [Clean Water Act](#) permits issued by other agencies regulate both construction and operation of wastewater systems, and provide many important protections for fish and wildlife resources throughout the project area and at some distance downstream. Fish and wildlife almost always benefit when unnatural pollutants are removed from water, and concerns are minimal if construction is managed to minimize erosion and sedimentation/runoff to nearby streams and lakes, including adherence to any "Clean Water Permit" conditions.

Cross-country lines affect both plants and wildlife, as do activities necessary to their construction, maintenance and repair. Stream and drainage crossings are primary concerns, and every effort should be made to avoid erosion, silt introduction, petroleum or chemical pollution, and disruption or realignment of stream banks and beds. See <https://mdc.mo.gov/property/pond-stream-care/streams-construction-best-practices> for best management recommendations for in-stream work.

Revegetation of disturbed areas is recommended to minimize erosion, as is restoration with of native plant species compatible with the local landscape and for wildlife needs. Annuals like ryegrass may be combined with native perennials for quicker green-up. Avoid aggressive exotic perennials such as crown vetch and sericea lespedeza.

Project Location and/or Species Recommendations:

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

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

The project site submitted and evaluated is on or near Sensitive Aquatic Species Waters Big River, an important stream for freshwater mussel and amphibian populations. These streams were so designated because they have highly diverse mussel communities and mussel and amphibian species identified as Species of Conservation Concern. These streams are important to maintaining, restoring, or avoiding future listing of Species of Conservation Concern. Impacts to these aquatic species and habitats can be reduced by avoiding or minimizing activities that disturb the stream substrate, including rock placement, dredging, trenching, and wetted gravel bar disturbance; and avoid introducing heavy sediment loads, chemical or organic pollutants. These streams also are included as a Missouri Nationwide Permit Regional Condition (Number 7) that must be considered if working under a Clean Water Act Section 404 Permit issued by the U.S. Army Corps of Engineers (<http://www.nwk.usace.army.mil/Missions/RegulatoryBranch/NationWidePermit...>). A list of all streams designated under this Condition is available at <http://www.nwk.usace.army.mil/Portals/29/docs/regulatory/nationwidepermi...>

Invasive exotic species are a significant issue for fish, wildlife and agriculture in Missouri. Seeds, eggs, and larvae may be moved to new sites on boats or construction equipment. Please inspect and clean equipment thoroughly before moving between project sites. See <http://mdc.mo.gov/9633> for more information.

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

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

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

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

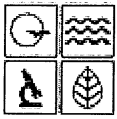
U.S. Fish and Wildlife Service
Ecological Service
101 Park Deville Drive
Suite A
Columbia, MO
65203-0007
Phone: 573-234-2132

Miscellaneous Information

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

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

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



**APPLICATION FOR CONSTRUCTION PERMIT –
WASTEWATER TREATMENT FACILITY**

| FOR DEPARTMENT USE ONLY | |
|-------------------------|-----------|
| APP NO. | CP NO. |
| FEE RECEIVED | CHECK NO. |
| DATE RECEIVED | |

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: Rural Dev. Project #: _____
- 1.2 Has the Missouri Department of Natural Resources approved the proposed project’s antidegradation review?
 YES Date of Approval: 11/16/2022 N/A
- 1.3 Has the department approved the proposed project’s facility plan*?
 YES Date of Approval: 09/11/2020 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

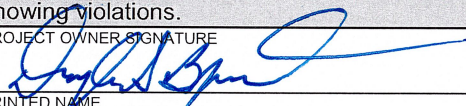
| | |
|--|---|
| 2.1 NAME OF PROJECT JCPSD Lower Big River Regionalization Project WWTF Improvements | 2.2 ESTIMATED PROJECT CONSTRUCTION COST \$ 12,674,769.00 |
|--|---|

2.3 PROJECT DESCRIPTION
Project includes the construction of new facility headworks, oxidation ditch, secondary clarifiers, UV disinfection, and a septage receiving station. Existing extended aeration treatment units will be reused for aerobic digestion.

2.4 SLUDGE HANDLING, USE AND DISPOSAL DESCRIPTION
Aerobic digestion and land application

2.5 DESIGN INFORMATION
A. Current population: 2299; Design population: 6327
B. Actual Flow: _____ gpd; Design Average Flow: 0.642 gpd;
Actual Peak Daily Flow: 1.28 gpd; Design Maximum Daily Flow: 2.02 gpd; Design Wet Weather Event: 2.02

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

| 3.0 WASTEWATER TREATMENT FACILITY | | | | |
|--|--|---|--------------------|---|
| NAME JCPSD Lower Big River WWTF | | TELEPHONE NUMBER WITH AREA CODE 636-797-9900 | | E-MAIL ADDRESS jcpsd1@jeffcopsd.org |
| ADDRESS (PHYSICAL) 4197 Lower Byrnes Mill Road | | CITY Byrnes Mill | STATE MO | ZIP CODE 63051 |
| COUNTY Jefferson | | | | |
| Wastewater Treatment Facility: Mo- 0115428 (Outfall 001 Of 001) | | | | |
| 3.1 Legal Description: _____ 1/4, _____ 1/4, _____ 1/4, Sec. 33, T 43, R 4 Landgrant 03059 (Use additional pages if construction of more than one outfall is proposed.) | | | | |
| 3.2 UTM Coordinates Easting (X): 710091 Northing (Y): 4255658 For Universal Transverse Mercator (UTM), Zone 15 North referenced to North American Datum 1983 (NAD83) | | | | |
| 3.3 Name of receiving streams: <u>Big River</u> | | | | |
| 4.0 PROJECT OWNER | | | | |
| NAME Jefferson County Public Sewer District (JCPSD) | | TELEPHONE NUMBER WITH AREA CODE 636-797-9900 | | E-MAIL ADDRESS jcpsd1@jeffcopsd.org |
| ADDRESS 4629 Yeager Road | | CITY Hillsboro | STATE MO | ZIP CODE 63050 |
| 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 JCPSD | | TELEPHONE NUMBER WITH AREA CODE 636-797-9900 | | E-MAIL ADDRESS jcpsd1@jeffcopsd.org |
| ADDRESS 4629 Yeager Road | | CITY Hillsboro | STATE MO | ZIP CODE 63050 |
| 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 James E. McCleish / Horner & Shifrin, Inc. | | TELEPHONE NUMBER WITH AREA CODE 314-335-8640 | | E-MAIL ADDRESS jemccleish@hornersshifrin.com |
| ADDRESS 401 S. 18th Street, Suite 400 | | CITY St. Louis | STATE MO | ZIP CODE 63103 |
| 7.0 APPLICATION FEE | | | | |
| <input type="checkbox"/> CHECK NUMBER <input checked="" type="checkbox"/> JETPAY CONFIRMATION NUMBER 20045944 | | | | |
| 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  | | | | |
| PRINTED NAME Douglas S. Bjornstad | | | DATE 08/18/2023 | |
| TITLE OR CORPORATE POSITION District Manager/Engineer | | TELEPHONE NUMBER WITH AREA CODE 636-797-9900 | | E-MAIL ADDRESS dbjornstad@jeffcopsd.org |
| 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. | | | | |

PART B – LAND APPLICATION ONLY

(Submit only if the proposed construction project includes land application of wastewater.)

8.0 FACILITY INFORMATION

8.1 Type of wastewater to be irrigated: Domestic State/National Park Seasonal business
 Municipal Municipal with a pretreatment program or significant industrial users
 Other (explain) _____

8.2 Months when the business or enterprise will operate or generate wastewater:
 12 months per year Part of the year (list months): _____

8.3 This system is designed for:
 No-discharge.
 Partial irrigation when feasible and discharge rest of time.
 Irrigation during recreational season, April – October, and discharge during November – March.
 Other (explain) _____.

9.0 STORAGE BASINS

9.1 Number of storage basins: _____ (Use additional pages if greater than three basins.)

9.2 Type of basins: Steel Concrete Fiberglass Earthen Earthen with membrane liner

9.3 Storage basin dimensions at inside top of berm (feet). Report freeboard as feet from top of berm to emergency spillway or overflow pipe.
Basin #1: Length _____ Width _____ Depth _____ Freeboard _____ Depth _____ Safety _____ % Slope _____
Basin #2: Length _____ Width _____ Depth _____ Freeboard _____ Depth _____ Safety _____ % Slope _____
Basin #3: Length _____ Width _____ Depth _____ Freeboard _____ Depth _____ Safety _____ % Slope _____

9.4 Storage Basin operating levels (report as feet below emergency overflow level).
Basin #1: Maximum operating water level _____ ft Minimum operating water level _____ ft
Basin #2: Maximum operating water level _____ ft Minimum operating water level _____ ft
Basin #3: Maximum operating water level _____ ft Minimum operating water level _____ ft

9.5 Design depth of sludge in storage basins.
Basin #1: _____ ft Basin #2: _____ ft Basin #3: _____ ft

9.6 Existing sludge depth, if the basins are currently in operation.
Basin #1: _____ ft Basin #2: _____ ft Basin #3: _____ ft

9.7 Total design sludge storage: _____ dry tons and _____ cubic feet

10.0 LAND APPLICATION SYSTEM

10.1 Number of irrigation sites _____ Total Acres _____ Maximum % field slopes _____
Location: _____ ¼, _____ ¼, _____ ¼, _____ Sec. _____ T _____ R _____ County _____ Acres
Location: _____ ¼, _____ ¼, _____ ¼, _____ Sec. _____ T _____ R _____ County _____ Acres
Location: _____ ¼, _____ ¼, _____ ¼, _____ Sec. _____ T _____ R _____ County _____ Acres
(Use additional pages if greater than three irrigation sites.)

10.2 Type of vegetation: Grass hay Pasture Timber Row crops
 Other (describe) _____

10.3 Wastewater flow (dry weather) gallons per day: Average annual _____ Seasonal _____ Off-season _____

10.4 Land application rate (design flow including 1-in-10 year storm water flows):
Design: _____ inches/year _____ inches/hour _____ inches/day _____ inches/week
Actual: _____ inches/year _____ inches/hour _____ inches/day _____ inches/week

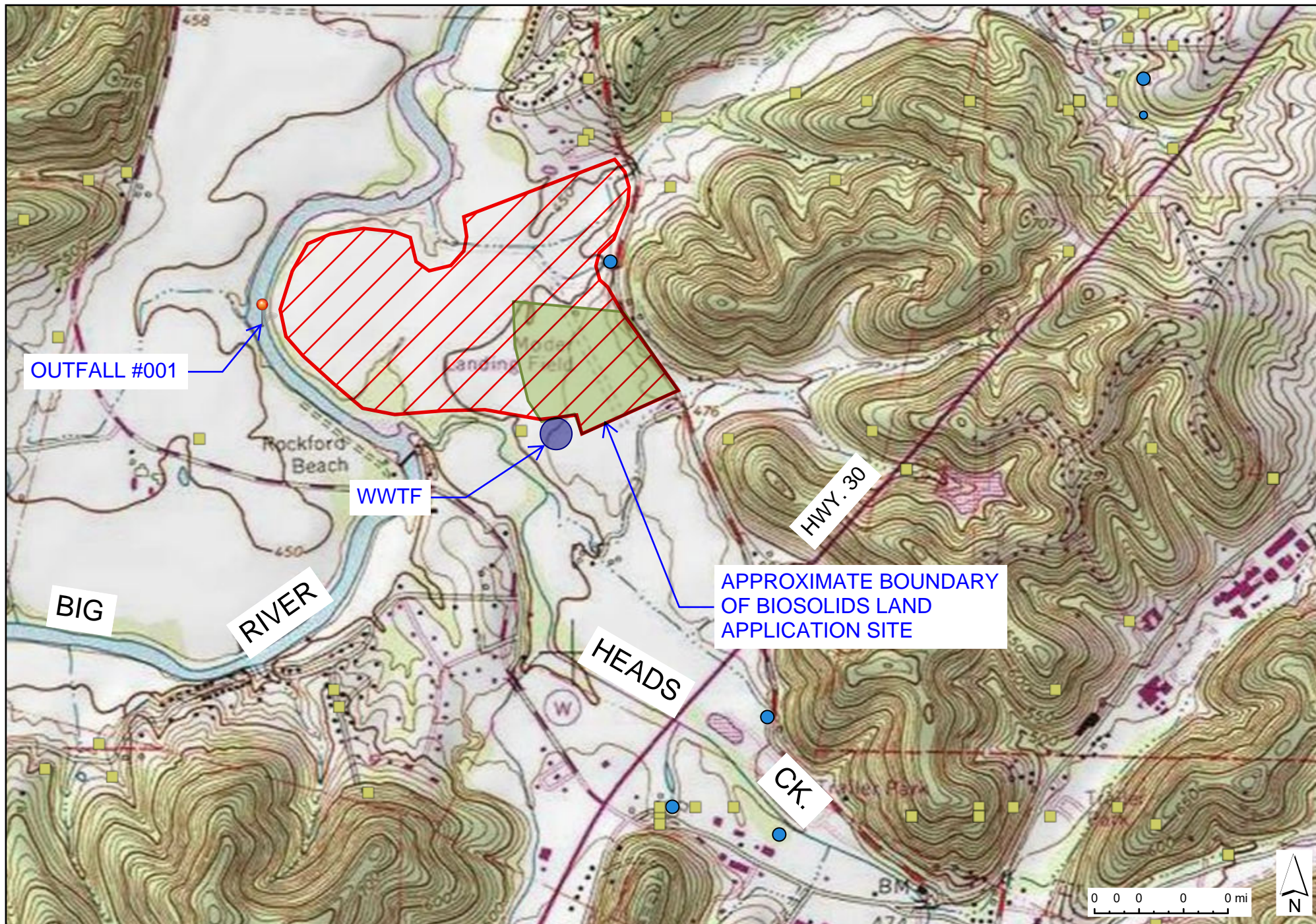
10.5 Total irrigation per year (gallons): Design: _____ gal Actual: _____ gal

10.6 Actual months used for irrigation (check all that apply):
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

10.7 Land application rate is based on:
 Hydraulic Loading Other (describe) _____
 Nutrient Management Plan (N&P) If N&P is selected, is the plan included? YES NO

■ WELLS

● SPRINGS



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■ WELLS

● SPRINGS

August 10, 2023 9:08 AM CDT



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