

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
Douglas S. Bjornstad, P.E.
District Manager
3880 Carol Park Rd
Hillsboro, MO 63050

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.

August 5, 2024

Effective Date

August 4, 2026

Expiration Date

John Hoke, Director, Water Protection Program

CONSTRUCTION PERMIT

I. CONSTRUCTION DESCRIPTION

The proposed construction includes the installation of a second sequencing batch reactor (SBR), conversion of the existing flow equalization basin to a second aerobic digester with the installation of a digester decanter, modifications to the fencing around the plant, and modification to the two existing downstream disc filters units by adding two additional disc filters to each unit. The existing SBR, aerobic digester, UV disinfection system, flow meter, and outfall will remain unchanged. The facility is proposing an increase in design average flow to 300,000 gallons per day (gpd).

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

II. COST ANALYSIS FOR COMPLIANCE

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

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

Cost Analysis for Compliance - The department has made a reasonable search for empirical data indicating the permit is affordable. The search consisted of a review of department records that might contain economic data on the community, a review of information provided by the applicant as part of the application, and public comments received in response to public notices of this draft permit. If the empirical cost data was used by the permit writer, this data may consist of median household income, any other ongoing projects that the department has knowledge, and other demographic financial information that the community provided as contemplated by Section 644. 145.3. See **APPENDIX 3 – COST ANALYSIS FOR COMPLIANCE**.

III. CONSTRUCTION PERMIT CONDITIONS

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

1. This construction permit does not authorize discharge.
2. All construction shall be consistent with plans and specifications signed and sealed by Douglas S. Bjornstad, P.E. with Jefferson County Public Sewer District (JCPSD) 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. 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.
6. 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.
7. 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)

- 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.
- Facilities shall be readily accessible by authorized personnel from a public right-of-way at all times. 10 CSR 20-8.140 (2) (D)
- All sampling points shall be designed so that a representative and discrete 24-hour automatic composite sample or grab sample of the effluent discharge can be obtained at a point after the final treatment process and before discharge to or mixing with the receiving waters. 10 CSR 20-8.140 (6) (B)
- All wastewater treatment facilities shall be provided with an alternate source of electric power or pumping capability to allow continuity of operation during power failures. 10 CSR 20-8.140 (7) (A) 1.
- Electrical systems and components in raw wastewater or in enclosed or partially enclosed spaces where hazardous concentrations of flammable gases or vapors that are normally present, shall comply with the NFPA 70 *National Electric Code (NEC)* (2017 Edition), as approved and published August 24, 2016, requirements for Class I, Division 1, Group D locations. 10 CSR 20-8.140 (7) (B)
- An audiovisual alarm or a more advanced alert system, with a self-contained power supply, capable of monitoring the condition of equipment whose failure could result in a violation of the operating permit, shall be provided for all wastewater treatment facilities. 10 CSR 20-8.140 (7) (C)
- No piping or other connections shall exist in any part of the wastewater treatment facility that might cause the contamination of a potable water supply. 10 CSR 20-8.140 (7) (D) 1.
- Hot water for any direct connections shall not be taken directly from a boiler used for supplying hot water to a digester heating unit or heat exchanger. 10 CSR 20-8.140 (7) (D) 2.
- 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.

- Isolate all wastewater treatment components installed in a building where other equipment or offices are located from the rest of the building by an air-tight partition, provide separate outside entrances, and provide separate and independent fresh air supply. 10 CSR 20-8.140 (7) (G)
- Adequate provisions shall be made to effectively protect facility personnel and visitors from hazards. The following shall be provided to fulfill the particular needs of each wastewater treatment facility:
 - Fencing. Enclose the facility site with a fence designed to discourage the entrance of unauthorized persons and animals; 10 CSR 20-8.140 (8) (A)
 - Gratings over appropriate areas of treatment units where access for maintenance is necessary; 10 CSR 20-8.140 (8) (B)
 - First aid equipment; 10 CSR 20-8.140 (8) (C)
 - Posted “No Smoking” signs in hazardous areas; 10 CSR 20-8.140 (8) (D)
 - Appropriate personal protective equipment (PPE); 10 CSR 20-8.140 (8) (E)
 - Portable blower and hose sufficient to ventilate accessed confined spaces; 10 CSR 20-8.140 (8) (F)
 - 10 CSR 20-8.140 (8) (G) Portable lighting equipment complying with NEC requirements. See subsection (7)(B) of this rule;
 - 10 CSR 20-8.140 (8) (H) Gas detectors listed and labeled for use in NEC Class I, Division 1, Group D locations. See subsection (7)(B) of this rule;
 - Appropriately-placed warning signs for slippery areas, non-potable water fixtures (see subparagraph (7)(D)3.B. of this rule), low head clearance areas, open service manholes, hazardous chemical storage areas, flammable fuel storage areas, high noise areas, etc.; 10 CSR 20-8.140 (8) (I)
 - Ventilation shall include the following:
 - Isolate all pumping stations and wastewater treatment components installed in a building where other equipment or offices are located from the rest of the building by an air-tight partition, provide separate outside entrances, and provide separate and independent fresh air supply; 10 CSR 20-8.140 (8) (J) 1.
 - Force fresh air into enclosed screening device areas or open pits more than four feet deep. 10 CSR 20-8.140 (8) (J) 2.
 - Dampers are not to be used on exhaust or fresh air ducts. Avoid the use of fine screens or other obstructions on exhaust or fresh air ducts to prevent clogging; 10 CSR 20-8.140 (8) (J) 3.
 - Where continuous ventilation is needed (e.g., housed facilities), provide at least 12 complete air changes per hour. Where continuous ventilation would cause excessive heat loss, provide intermittent ventilation of at least 30 complete air changes per hour when facility personnel enter the area. Base air change demands on 100 percent fresh air; 10 CSR 20-8.140 (8) (J) 4.
 - Electrical controls. Mark and conveniently locate switches for operation of ventilation equipment outside of the wet well or building. Interconnect all intermittently operated ventilation equipment with the respective wet well, dry well, or building lighting system. The manual lighting/ventilation switch is expected to override the automatic controls. For a two speed

- ventilation system with automatic switch over where gas detection equipment is installed, increase the ventilation rate automatically in response to the detection of hazardous concentrations of gases or vapors; 10 CSR 20-8.140 (8) (J) 5.
 - Fabricate the fan wheel from non-sparking material. Provide automatic heating and dehumidification equipment in all dry wells and buildings. 10 CSR 20-8.140 (8) (J) 6.
 - Explosion-proof electrical equipment, non-sparking tools, gas detectors, and similar devices, in work areas where hazardous conditions may exist, such as digester vaults and other locations where potentially explosive atmospheres of flammable gas or vapor with air may accumulate. 10 CSR 20-8.140 (8) (K)
 - Provisions for local lockout/tagout on stop motor controls and other devices; 10 CSR 20-8.140 (8) (L)
 - Provisions for an arc flash hazard analysis and determination of the flash protection boundary distance and type of PPE to reduce exposure to major electrical hazards shall be in accordance with NFPA 70E *Standard for Electrical Safety in the Workplace* (2018 Edition), as approved and published August 21, 2017. 10 CSR 20-8.140 (8) (M)
- 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 minimum total Sequencing Batch Reactor (SBR) basin volume shall be equal to the design daily influent flow volume and either upstream in-line or off-line storage is necessary to minimize influent flow during settling and decanting. 10 CSR 20-8.180 (6) (A)
- Filtration systems shall have:
 - Convenient access to all components and the media surface for inspection and maintenance without taking other units out of service; 10 CSR 20-8.210 (3) (B) 1. A.
 - Enclosed controls and heating and ventilation equipment to control humidity; 10 CSR 20-8.210 (3) (B) 1. B. and
 - The capacity to process the design average flow to the filters with the largest unit out of service utilizing a minimum of two units. 10 CSR 20-8.210 (3) (B) 1. C.
- A minimum of two Sequencing Batch Reactor (SBR) basins shall be installed. 10 CSR 20-8.180 (6) (B)

- The media for cloth/disc filters shall:
 - Follow the manufacturer's recommendations; 10 CSR 20-8.210 (3) (E) 1. B. and
 - Be chemical-resistant if the filter will be exposed to chemicals, such as chlorine or disinfectants. 10 CSR 20-8.210 (3) (E) 1. C.
 - Filtration Rates and Hydraulics for cloth/disc filters shall be able to treat the design flow rate with one filter unit in backwash mode. 10 CSR 20-8.210 (3) (E) 2. B.
 - The microfabric used for microscreening shall be a material demonstrated to be durable through long-term performance data. 10 CSR 20-8.210 (4) (A)
 - All backwash used for microscreening shall be recycled for treatment. 10 CSR 20-8.210 (4) (B)
8. Upon completion of construction:
- A. 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 Statement of Work Completed form (<https://dnr.mo.gov/document-search/wastewater-construction-statement-work-completed-mo-780-2155>) to the department in accordance with 10 CSR 20-6.010(5)(N) and request the operating permit modification public noticed on June 21, 2024 be issued. The operating permit modification fee has already been paid.

IV. REVIEW SUMMARY

1. CONSTRUCTION PURPOSE

JCPSD, Yorktown WWTP was constructed with the intent of phased expansions in the future and to be established as a regional treatment facility. The Phase II expansion expands the design flow of the facility from 150,000 gpd to 300,000 gpd, which will allow for the additional consolidation of Timber Ridge Mobile Home Park (MOGD00294) as well as unallocated future expansion capacity. A closure plan will need to be submitted to the St. Louis Regional Office for review and approval prior to any closure activities conducted by the owner/responsible party of Timber Ridge Mobile Home Park when consolidation does occur.

2. FACILITY DESCRIPTION

The existing facility consists of an influent lift station, screening, equalization basin, sequencing batch reactor, two Kruger Hydrotech disk filter units, UV disinfection, and aerobic digester.

The JCPSD, Yorktown WWTP is located at 3880 Carol Park Rd., Hillboro, in Jefferson County, Missouri. The facility has a design average flow of 150,000 gpd and serves a hydraulic population equivalent of approximately 1,500 people.

Construction will add a second SBR, conversion of the flow equalization basin to a second aerobic digester with the addition of a digester decanter, modifications to the fencing around the plant, and modification to the two existing downstream disc filters units by adding two additional disc filters to each unit.

3. COMPLIANCE PARAMETERS

The proposed project is required to meet final effluent limits established in the antidegradation review dated February 1, 2023.

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

Parameter	Units	Monthly average limit
Biochemical Oxygen Demand ₅	mg/L	10
Total Suspended Solids	mg/L	15
Ammonia as N - January	mg/L	2.1
Ammonia as N - February	mg/L	2.1
Ammonia as N - March	mg/L	2.1
Ammonia as N - April	mg/L	0.6
Ammonia as N - May	mg/L	0.6
Ammonia as N - June	mg/L	0.6
Ammonia as N - July	mg/L	0.6
Ammonia as N - August	mg/L	0.6
Ammonia as N - September	mg/L	0.6
Ammonia as N - October	mg/L	2.1
Ammonia as N - November	mg/L	2.1
Ammonia as N - December	mg/L	2.1
pH	SU	6.5-9.0
<i>E. coli</i>	#/100mL	206

4. ANTIDEGRADATION

The department has reviewed the antidegradation report for this facility and issued the Water Quality and Antidegradation Review dated February 1, 2023, due to increasing design flow from 150,000 gpd to 300,000 gpd. See **APPENDIX 2 – ANTIDEGRADATION**.

5. REVIEW of MAJOR TREATMENT DESIGN CRITERIA

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

- Influent Screening and Lift Station – The existing screening and influent lift station were designed to handle to design flow at full expansion of 300,000 gpd and peak flow of 1,030,000 gpd.
- UV disinfection – The existing UV disinfection system was designed to be capable of treating the peak flow from this expansion of 1,030,000 gpd.
- Flow Meter – The existing flow meter was appropriately sized for this facility.

Construction will cover the following items:

- Sequencing Batch Reactor (SBR) –1 new sequencing batch reactor basin to go along with the existing SBR basin to provide a hydraulic retention time of 1 day. The average design flow of the two basins is 300,000 gpd with a maximum design flow of 1,030,000 gpd (1.03 MGD). The basins are designed with two feet of freeboard, a minimum water depth of 10.5 ft and a maximum water depth of 14 ft. The basins will operate on 4 cycles per day per basin, with each cycle duration being 6 hours. Aeration is provided by a jet aeration system with each basin having 1 header with 8 jets per header providing up to 486 scfm per basin (972 scfm for aeration for both basins). The actual oxygen requirement for the SBR is 1,147 lbs of O₂ per day and a standard oxygen requirement of 1,808 lbs of O₂ perday. The decant system will have a flow rate at maximum design flow of 718 gpm. The decant duration is 52 minutes with 8 decants per day (4 decants per basin per day).
- Cloth Disk Tertiary Filtration – Installation of two additional disk filters to each of the existing two Kruger Hydrotech disc filter units. Each unit is capable of treating an average design flow of 300.000 gpd. With one unit out-of-service the disk filters are capable of treating a peak flow of 1,030,000 gpd. Each unit will have 6 cloth disk assemblies. The disk filtration will follow the SBR prior to disinfection. The backwash from the filters returns to the influent pump station.
- Aerobic Digester – Conversion of the existing equalization basin to a second aerobic digester as was part of the original 2006 design for the phased construction of the plant. The existing aeration equipment will remain in use with the addition of a DynaCanter Model FLD6-325 floating decanter.

6. OPERATING PERMIT

Operating permit MO-0131024 will require a modification to reflect the construction activities. The modified JCPSD, Yorktown WWTP, MO-0131024, was successfully public noticed from June 21, 2024 to July 22, 2024 with no comments received. Submit the Statement of Work Completed to the department in accordance with 10 CSR 20-6.010(5)(N) and request the operating permit modification be issued. The operating permit modification fee has been paid.

V. NOTICE OF RIGHT TO APPEAL

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

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

Conrad (Joe) Blume, P.E.,
Engineering Section
conrad.blume@dnr.mo.gov

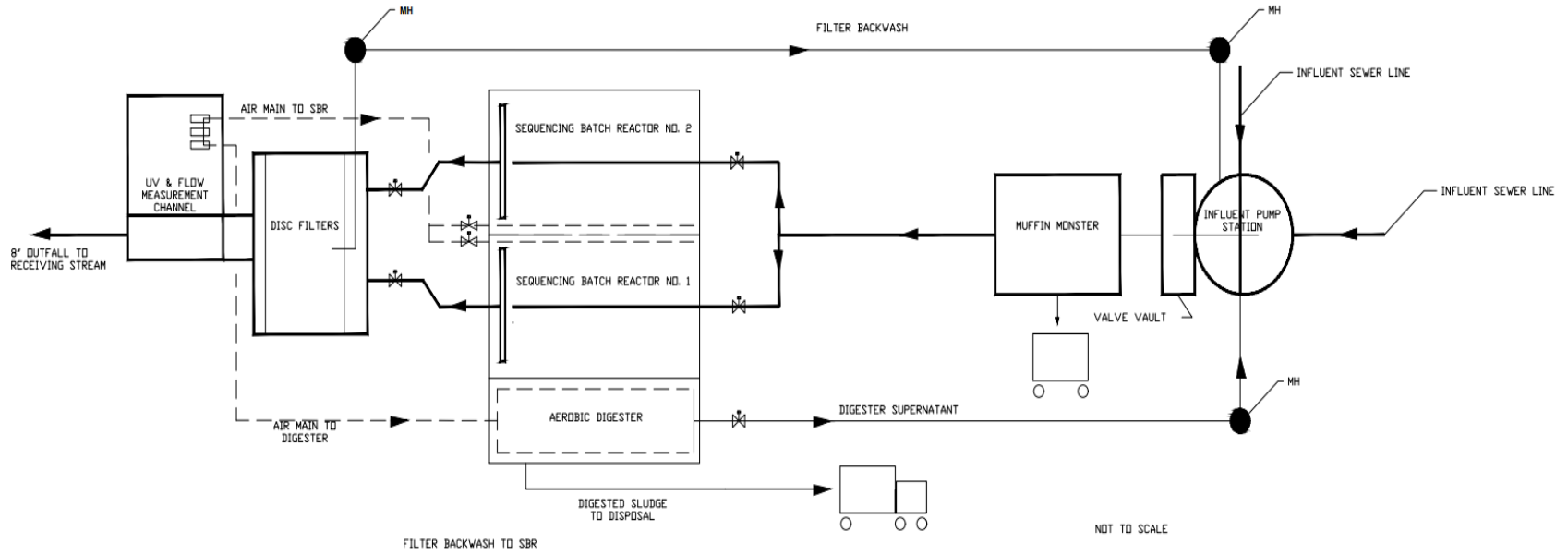
APPENDICES

APPENDIX 1 – PROCESS FLOW DIAGRAM/SITE MAP

APPENDIX 2 – ANTIDEGRADATION

APPENDIX 3 – COST ANALYSIS FOR COMPLIANCE

APPENDIX 1- PROCESS FLOW DIAGRAM/SITE MAP



APPENDIX 2 – ANTIDegradation



Michael L. Parson
Governor

Dru Buntin
Director

February 1, 2023

Douglas Bjornstad, P.E.
Jefferson County Public Sewer District
P.O. Box 632
Hillsboro, MO 63050

RE: Jefferson County Public Sewer District – JCPD, Yorktown Wastewater Treatment Facility, MO-0131024 Water Quality and Antidegradation Review Preliminary Determination, ACT1268, Jefferson County

Dear Douglas Bjornstad, P.E.:

Enclosed please find the finalized Water Quality and Antidegradation Review (WQAR) for the *Antidegradation Review Report* received on August 25, 2022. The WQAR contains pertinent antidegradation review information for the facility discharge. It was developed in accordance with 10 CSR 20-7.031, the Clean Water Commission approved *Missouri Antidegradation Implementation Procedure (AIP)* dated July 13, 2016, U.S. Environmental Protection Agency (US EPA) guidance, the applicant-supplied antidegradation review documentation, and the State of Missouri's effluent regulations (10 CSR 20-7.015). Please refer to the *General Assumptions of the Water Quality and Antidegradation Review* section of the enclosed WQAR. The WQAR is preliminary and subject to change as new information becomes available during future permit application processing.

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

The WQAR identifies an Expansion of the Existing Wastewater Treatment Facility (WWTF) with a Second Sequencing Batch Reactor Basin and Digester Decanter for the preferred alternative; however, you may pursue construction of a different alternative evaluated during the review that will meet the effluent limits established in Table 1. Table 1 limits are applicable to the proposed facility, with the receiving stream is classified as losing based on the 2022 Geohydrologic Evaluation. The proposed discharge will have a design average flow of 300,000 gallons per day.

You may proceed with submittal of an engineering report/facility plan for this project. Upon completion of that review, the next step will be to submit a complete construction permit application and operating permit modification application. These submittals must reflect the



Jefferson County Public Sewer District
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design flow, facility description, and general treatment components of this WQAR or this preliminary determination may have to be revisited. In addition to one set of paper copies, all materials are to be submitted electronically as well. This is typically done via compact disc or other removable electronic media. If space allows materials may be emailed to DNR_WPPEngineerSection@dnr.mo.gov.

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

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

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

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

Sincerely,

WATER PROTECTION PROGRAM



Cindy LePage, P.E., Chief
Engineering Section

CL:shaj

c: Rachel Dixon, P.E., Horner & Shifrin, Inc.

**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

Bear Creek
By

JCPSD, Yorktown WWTF
Yorktown WWTF Improvements



December, 2022

JCPSD, Yorktown WWTF
December 2022
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JCPSD, Yorktown WWTF
 December 2022
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1. TABLE 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	Reporting Frequency	Sample Type **
Flow	MGD	1	*		*	*/*	1/weekday	monthly	T
BOD ₅	mg/L	1,4,5		15	10	15/10	1/month	monthly	C
TSS	mg/L	1,4,5		20	15	20/15	1/month	monthly	C
<i>Escherichia coli</i> -Note 1	#/100mL	1,3	126		*	126/*	1/month	monthly	G
Ammonia as N									
(January)			5.6		2.1	10.4/2.7	1/month	monthly	G
(February)			5.6		2.1	10.4/2.7	1/month	monthly	G
(March)			5.6		2.1	10.4/2.7	1/month	monthly	G
(April)			1.7		0.6	5.9/1.1	1/month	monthly	G
(May)			1.7		0.6	5.9/1.1	1/month	monthly	G
(June)	mg/L	4,5	1.7		0.6	5.9/1.1	1/month	monthly	G
(July)			1.7		0.6	5.9/1.1	1/month	monthly	G
(August)			1.7		0.6	5.9/1.1	1/month	monthly	G
(September)			1.7		0.6	5.9/1.1	1/month	monthly	G
(October)			5.6		2.1	10.4/2.7	1/month	monthly	G
(November)			5.6		2.1	10.4/2.7	1/month	monthly	G
(December)			5.6		2.1	10.4/2.7	1/month	monthly	G
Total Phosphorus	mg/L	1	*		*	*/*	1/quarter	quarterly	C
Total Kjeldahl Nitrogen	mg/L	1	*		*	*/*	1/quarter	quarterly	C
Nitrite + Nitrate	mg/L	1	*		*	*/*	1/quarter	quarterly	C
Acute WET	TU ₂	1,9	*			*	1/ permit cycle	1/ permit cycle	C
PARAMETER	Unit	Basis for Limits	Minimum		Maximum	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type
pH	SU	1	6.5		9.0	6.5-9.0	1/month	monthly	G
PARAMETER	Unit	Basis for Limits	Daily Minimum		Monthly Avg. Min	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type
BOD ₅ Percent Removal	%	1			85	85	1/month	monthly	M
TSS Percent Removal	%	1			85	85	1/month	monthly	M

* - Monitoring requirement only

** C = 24-hour composite
 G = Grab
 T = 24 hr. Total
 E = 24 hr. estimate
 M = Measured/calculated

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 | |

Note 1 - Effluent limits of 126 #/100 mL daily maximum and monitoring only for monthly average for *E. coli* are applicable year round due to losing stream designation. No more than 10% of samples over the course of a calendar year shall exceed the 126 #/100 mL daily maximum.

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2. PURPOSE OF ANTIDegradation REVIEW REPORT

Jefferson County Public Sewer District (JCPSD), Yorktown Wastewater Treatment Facility (WWTF), MO-0131024, is currently permitted with a design flow of 150,000 gpd. JCPSD recently connected the Bear Creek Mobile Home Park WWTF to the Yorktown WWTF via a sewer extension completed in September 2018. After the sewer extension, the current average daily flow of JCPSD Yorktown WWTF is around 47,000 gpd. JCPSD Yorktown WWTF is currently constructed with a lift station, screening, equalization basin, sequencing batch reactor, two Kruger Hydrotech Disc Filters, UV disinfection, and aerobic digestion.

Yorktown was constructed with the intent of phased expansion in the future. The Phase I expansion includes the regionalization of Bear Creek Estates MHP WWTP and Weber Hill/Warren Woods SSIA. The Phase II expansion will include the consolidation of Crest Manor MHP/ Timber Ridge MHP WWTP.

Since the proposed Phase II expansion will increase the design flow of JCPSD, Yorktown WWTF from 150,000 gpd to 300,000 gpd, an Antidegradation Review is required. Although the existing JCPSD Yorktown WWTF is operating within its capacity, the expansion is planned to establish a regional treatment facility for the future consolidation of Crest Manor Mobile Home Park/Timber Ridge Mobile Home Park as well as unallocated future expansion capacity.

The preferred alternative was selected as the Expansion of the Existing WWTF with a Second Sequencing Batch Reactor Basin and Digester Decanter, Alternative 2. The preferred alternative provides a suitable treatment unit to facilitate the expansion and meet future water quality goals while minimizing the economic impact.

Horner & Shifrin, Inc. prepared the application on behalf of Jefferson County Public Sewer District.

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

3. FACILITY INFORMATION

Facility Name:	JCPSD, Yorktown Wastewater Treatment Facility
Address:	Carol Park Road and Kingsgate Parkway, House Springs, MO 63051
Permit #:	MO-0131024
County:	Jefferson
Facility Type:	POTW
Owner:	Jefferson County Public Sewer District
Continuing Authority:	Same as Owner
UTM Coordinates:	X = 714321 ; Y = 4256672
Legal Description:	Sec. 26, T43N, R4E
Ecological Drainage Unit:	Ozark/Meramec

4. FACILITY HISTORY

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The existing JCPSD Yorktown WWTF was constructed in 2005. The current treatment system includes a lift station, screening, equalization basin, sequencing batch reactor, two Kruger Hydrotech disc filters, ultraviolet disinfection, and aerobic digester. The existing facility is operating at approximately 28% of the 150,000 gpd current design flow.

A. FACILITY PERFORMANCE HISTORY:

A review of the past 5 years of Discharge Monitoring Report data show exceedances in the following parameters: BOD₅ (4/30/21, 9/30/19, 8/31/19, 7/31/19, 1/31/19), Ammonia (7/31/22, 6/30/22, 4/30/21, 9/30/19, 8/31/19, 7/31/19, 6/30/19, 2/28/19, 1/31/19, 10/31/18, 9/30/18), *E. coli* (6/30/20, 9/30/19, 8/31/19, 7/31/19), BOD₅ % Removal (9/30/19), and TSS % Removal (8/31/19, 6/30/19, 5/31/19, 11/30/18, 10/31/18). DMR Non-Receipts occurred on 11/30/20, 6/30/22, 3/31/21, and 12/31/20.

B. RECEIVING WATERBODY INFORMATION

OUTFALL(S) TABLE:

OUTFALL	DESIGN FLOW (CFS)	TREATMENT LEVEL	EFFLUENT TYPE
001	0.46	Secondary	Domestic

RECEIVING STREAM(S) TABLE:

WATER-BODY NAME	CLASS	WBID	DESIGNATED USES*	12-DIGIT HUC	DISTANCE TO CLASSIFIED SEGMENT (MI)
100K Extent Remaining Streams (losing)	C	3960	AQL, WBC-B, SCR, HHP, IRR, LWW	07140104-0406	Direct Discharge
Bear Creek (losing)	P	3421	AQL, WBC-B, SCR, HHP, IRR, LWW		1.06

* 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
100K Extent Remaining Streams (losing)	0.0	0.0	0.0

Receiving Water Body Segment Outfall #1:		
Upper end segment* UTM coordinates:	X = 714321 ; Y = 4256672	outfall
Lower end segment* UTM coordinates:	X = 713484 ; Y = 4255498	Bear Creek confluence

*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 losing for discharge purposes (see Appendix E).

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C. EXISTING WATER QUALITY

The applicant submitted a Tier 2 Antidegradation Review request. No existing water quality data was submitted.

D. MIXING CONSIDERATIONS

MIXING CONSIDERATIONS

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

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

	Flow (cfs)	MZ (cfs)	ZID (cfs)
7Q10	0.0	0.0	0.0
1Q10	0.0	0.0	0.0
30Q10	0.0	0.0	N/A

5. RECEIVING WATER MONITORING REQUIREMENTS

No receiving water monitoring requirements recommended at this time.

6. ANTIDegradation REVIEW INFORMATION

In accordance with Missouri's Water Quality Standard [10 CSR 20-7.031(3)] and federal antidegradation policy at Title 40 Code of Federal Regulation (CFR) Section 131.12 (a), the department developed a statewide antidegradation policy and corresponding procedures to implement the policy. A proposed discharge to a water body will be required to undergo a level of Antidegradation Review, which documents that the use of a water body's available assimilative capacity is justified. Effective August 30, 2008, and revised July 13, 2016, a facility is required to use Missouri's AIP for new and expanded wastewater discharges.

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

The following is a review of the *Antidegradation Review Report* dated August, 2022.

A. TIER DETERMINATION

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

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

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

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

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

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

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

Tier 1 Review

The receiving streams, Bear Creek and Heads Creek, are not listed on the 303(d) list as impaired with no TMDL. The downstream Big River (P) (2074) has an EPA approved TMDL for 53 miles for Lead from Old Lead Belt Abandoned Mine Lands. The TMDL states, "treated domestic discharge is not considered to cause or contribute to the impairment of the waterbodies addressed by this document." Thus, the Wasteload allocation for domestic facilities remains unchanged.

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 ELCs) 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 significant degradation then a demonstration of necessity (i.e., alternatives analysis) and a determination of social and economic importance are required. Part of that analysis as shown below is the evaluation of non-degrading alternatives, such as regionalization or no discharge systems.

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

i. Regionalization

Alternatives 1 through 3 were developed as regionalization alternatives with JCPSD Yorktown WWTF as the destination facility. The desirable regional facility is presented as the preferred Alternative 2, Expansion of the Existing WWTF with Second SBR Basin and Digester Decanter.

Connecting Regional Sewer Collection to Existing Regional Treatment System

This regionalization alternative was presented by evaluating the consolidation of JCPSD Yorktown WWTF into either Fisher Road WWTF (MO-0126926) or Pine Grove Manor Apartments WWTP (MO-0105201). Neither of the two facilities has sufficient design flow to accept JCPSD Yorktown WWTF.

ii. No Discharge Evaluations

Construction of a Non-Discharge Retention Basin with Land Application

Land application was considered as a non-degrading alternative. The storage basin in this alternative would need to be approximately 50 acres. Sizing of the storage basin is based on an average daily flow of 300,000 gallons with a storage capacity of 120 days for dry weather flows (36 MG). The

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land area for spray application of the wastewater would be 178 acres at 2 ft/acre/year. Due to the limited availability of land that is suitable for land application within a one mile radius of Yorktown WWTF this alternative was determined to not be feasible.

Alternative Discharge Point

This alternative was evaluated and determined to be impracticable since a practicable alternative discharge point did not exist. All other streams within the area discharge into Tributary to Bear Creek, which is designated as a losing stream. Shallow bedrock in the area would make the collection system construction expensive and logistically infeasible if the outfall were to be relocated to Heads Creek, a gaining stream about 2.5 miles away.

iii. Alternatives to No Discharge

Alternative 1: Expansion of Existing WWTF with Second SBR Basin – Base Case

Alternative 1 is the Expansion of the Existing WWTF with Second SBR Basin, the base case alternative. This alternative includes the expansion of the existing Sequencing Batch reactor with the construction of a second SBR basin.

Alternative 2: Expansion of Existing WWTF with Second SBR Basin and Digester Decanter

Alternative 2 is the Expansion of Existing WWTF with Second SBR Basin and Digester Decanter. This is alternative 1 with the addition of floating decanters in the SBR basins. This will help facilitate improved SBR operations and improve sludge thickening within the aerobic digesters.

Alternative 3: Expansion of Existing Facility with Nutrient Removal with Bio-P and Alum Feed

Alternative 3 is the Expansion of Existing Facility with Nutrient Removal with Bio-P and Alum Feed. This alternative is the same as alternative 2, only with a chemical feed system to facilitate phosphorus removal.

iv. Preferred Alternative

Alternative 2, Expansion of the Existing WWTF with Second SBR Basin and Digester Decanter was selected as the preferred alternative due to the cost-effectiveness and suitable treatment capability.

Alternatives Analysis Comparison

Pollutant	Alternative 1 (Base Case) Expansion of Existing WWTF with Second SBR Basin – Base Case	Alternative 2 Expansion of Existing WWTF with Second SBR Basin and Digester Decanter	Alternative 3 Expansion of Existing Facility with Nutrient Removal with Bio-P and Alum Feed
BOD ₅	≤ 10 mg/l	≤ 10 mg/l	≤ 10 mg/l
TSS	≤ 15 mg/l	≤ 15 mg/l	≤ 15 mg/l
Ammonia as N (summer)	≤ 0.6 mg/l	≤ 0.6 mg/l	≤ 0.6 mg/l
Ammonia as N (winter)	≤ 2.1 mg/l	≤ 2.1 mg/l	≤ 2.1 mg/l
Total Phosphorus	≤ 2 mg/l	≤ 2 mg/l	≤ 0.5 mg/l
Total Nitrogen	≤ 15 mg/l	≤ 15 mg/l	≤ 10 mg/l
Base Case	Yes	Yes	Yes
Practicable	Yes	Yes	Yes
Affordable	Yes	Yes	No
Preferred	No	Yes	No
Total Present Worth	\$3,248,900	\$3,256,700	\$4,146,700
Ratio	100%	100.2%	128%

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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.

A losing stream alternative discharge location was presented since the receiving stream is considered losing for discharge purposes. These alternatives were presented as Connecting Regional Sewer Collection to Existing Regional Treatment System and Alternative Discharge Point. Both of these alternatives were determined to be impracticable.

D. SOCIAL AND ECONOMIC IMPORTANCE

The affected community for this project is Jefferson County. The driving force behind the proposed regionalization and expansion project has been the health and safety of Jefferson County residents. Residents in the area have had to rely on their own sanitary collection and treatment systems with a combination of private on-site systems and subdivision package plants. As a result of not having a central collection and treatment system, there are multiple effluent discharge points throughout the area as well as on-site septic systems. It is not known how many of these systems are maintained properly and, as a result, it is unknown how many systems are functioning as designed. Inadequately treated sewage poses a significant threat to drinking water and human health because diseases and infections may be transferred to people and animals directly and immediately. Dysentery, hepatitis, typhoid fever, and acute gastrointestinal illness are some of the more serious examples. Additionally, inadequately treated sewage is the most frequently reported cause of groundwater contamination. The proposed regionalization project will centralize wastewater treatment, eliminate satellite facilities and their discharges, and result in an overall improvement in water quality. The proposed project serves the environmental and economic interests of both the State of Missouri and the local communities.

E. NATURAL HERITAGE REVIEW

A Missouri Department of Conservation Natural Heritage Review was obtained by the applicant. Three species of bats, Gray, Indiana, and Northern Long-Eared, may be present in the project area. The following recommendations were made for construction activities:

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

7. DERIVATION AND DISCUSSION OF PARAMETERS AND LIMITS

Wasteload allocations and limits were calculated using two methods:

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

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

Where
C = downstream concentration
C_u = upstream concentration
Q_u = upstream flow
C_e = effluent concentration
Q_e = effluent flow

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

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

- B. Alternative Analysis-based** – Using the preferred alternative's treatment capacity for conventional pollutants such as BOD₅ and TSS that are provided by the consultant as the WLA, the significantly-degrading effluent average monthly and average weekly limits are determined by applying the WLA as the average monthly (AML) and multiplying the AML by 1.5 to derive the average weekly limit (AWL).

Note: Significantly-degrading effluent limits have been based on the authority included in Section I.A. of the AIP. Also under 40 CFR 133.105, permitting authorities shall require more stringent limitations than equivalent to secondary treatment limitations for 1) existing facilities if the permitting authority determines that the 30-day average and 7-day average BOD₅ and TSS effluent values could be achievable through proper operation and maintenance of the treatment works, and 2) new facilities if the permitting authority determines that the 30-day average and 7-day average BOD₅ and TSS effluent values could be achievable through proper operation and maintenance of the treatment works, considering the design capability of the treatment process.

Outfall #001 – Main Facility Outfall

- **Flow.** Though not limited itself, the volume of effluent discharged from each outfall is needed to assure compliance with permitted effluent limitations [40 CFR Part 122.44(i)(1)(ii)]. If the permittee is unable to obtain effluent flow, then it is the responsibility of the permittee to inform the department, which may require the submittal of an operating permit modification. Influent monitoring has been and will be required for this facility in its Missouri State Operating Permit.
- **Biochemical Oxygen Demand (BOD₅).** Antidegradation Review establishes 15 mg/L as a Weekly Average and 10 mg/L as a Monthly Average. Effluent limits were established in accordance with 10 CSR 20-7.015(4) for discharges to Losing Streams.

Dissolved Oxygen Modeling

Horner & Shifrin, Inc. submitted dissolved oxygen (DO) modeling with BOD₅ loading of 25 lb/day and no critical DO concentration as a result of the discharge. The effluent dominant discharge scenario was also reaeration dominant. The applicant submitted modeling incorporated the following conservative assumptions:

- Stream Flow of 0 cfs, no upstream flow during dry conditions.
- DO Effluent of 2 mg/L.
- BOD₅ Effluent of 10 mg/L.

MDNR developed a Streeter-Phelps DO model using site-specific water quality parameters for the Mississippi River. The model included in Appendix D used inputs of temperature at 26 °C, and no upstream flow, effluent BOD₅ of 10 mg/L, and effluent NBOD₅ of 55.3 mg/L. Staff also assumed 5 mg/L of DO in the effluent. No input parameter scenario resulted in an instream DO concentration less than or equal to 5 mg/L. Due to the results of this model, a WQBEL BOD₅ effluent limitation will not be imposed.

Modeling provided in Appendix D demonstrated that BOD effluent is protective of water quality standards for DO. Streeter Phelps modeling indicated that conservative inputs outlined in Appendix D resulted in no critical DO concentration downstream. Staff considers the BOD₅ effluent limitations of 10 mg/L as the average weekly and 15 mg/L as the monthly average protective of aquatic life.

- **Total Suspended Solids (TSS).** Antidegradation Review establishes 20 mg/L as a Weekly Average and 15 mg/L as a Monthly Average. Effluent limits were established in accordance with 10 CSR 20-7.015(4) for discharges to Losing Streams.

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- **Escherichia coli (E. coli)**. Discharges to losing streams shall not exceed 126 per 100 mL as a Daily Maximum at any time, as per 10 CSR 20-7.031(5)(C). Monitoring only for a monthly average. No more than 10% of samples over the course of the calendar year shall exceed 126 #/100 mL daily maximum as per 10 CSR 20-7.015(9)(B)1.G.
- **Total Ammonia Nitrogen**. Total Ammonia Nitrogen (TAN) effluent limits for the expanded facility are presented below. The selected limits will be implemented as Preferred Alternative Effluent Limits.

Preferred Alternative Effluent Limits – Ammonia

The applicant proposed effluent limits for total ammonia as nitrogen were proposed as Preferred Alternative Effluent Limits (PEL). The following values were presented as the level of treatment that is reliably achievable for the preferred alternative.

TAN Preferred Alternative Effluent Limits for the Expanded JCPSD, Yorktown WWTF at the Design Flow of 300,000 gpd

Month	Daily Maximum Limit mg/L	Monthly Average Limit mg/L	Basis of Effluent Limit
January	5.6	2.1	PEL
February	5.6	2.1	PEL
March	5.6	2.1	PEL
April	1.7	0.6	PEL
May	1.7	0.6	PEL
June	1.7	0.6	PEL
July	1.7	0.6	PEL
August	1.7	0.6	PEL
September	1.7	0.6	PEL
October	5.6	2.1	PEL
November	5.6	2.1	PEL
December	5.6	2.1	PEL

PEL – Preferred Alternative Effluent Limit

Comparison of Total Ammonia as Nitrogen Water Quality Based and Preferred Alternative Effluent Limits for the Expanded JCPSD, Yorktown WWTF at a Design Flow of 300,000 gpd

Month	MDNR WOBEL		PEL	
	MDL mg/L	AML mg/L	MDL mg/L	AML mg/L
January	12.1	3.1	5.6	2.1
February	10.1	2.7	5.6	2.1
March	12.1	3.1	5.6	2.1
April	12.1	2.7	1.7	0.6
May	12.1	2.2	1.7	0.6
June	12.1	1.7	1.7	0.6
July	12.1	1.5	1.7	0.6
August	10.1	1.3	1.7	0.6
September	12.1	1.8	1.7	0.6
October	12.1	2.5	5.6	2.1
November	12.1	3.1	5.6	2.1
December	12.1	3.1	5.6	2.1

Total Ammonia as Nitrogen – 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.

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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

$$C_w = (((Q_s + Q_r) * C) - (Q_s * C_s)) / Q_w$$

January

Chronic WLA: $C_e = ((0.4644963 + 0.0)3.1 - (0.0 * 0.01)) / 0.4644963$ Ce = 3.1
 Acute WLA: $C_e = ((0.4644963 + 0.0)12.1 - (0.0 * 0.01)) / 0.4644963$ Ce = 12.1
 AML = WLAc = 3.1 mg/L
 MDL = WLAa = 12.1 mg/L

February

Chronic WLA: $C_e = ((0.4644963 + 0.0)2.7 - (0.0 * 0.01)) / 0.4644963$ Ce = 2.7
 Acute WLA: $C_e = ((0.4644963 + 0.0)10.1 - (0.0 * 0.01)) / 0.4644963$ Ce = 10.1
 AML = WLAc = 2.7 mg/L
 MDL = WLAa = 10.1 mg/L

March

Chronic WLA: $C_e = ((0.4644963 + 0.0)3.1 - (0.0 * 0.01)) / 0.4644963$ Ce = 3.1
 Acute WLA: $C_e = ((0.4644963 + 0.0)12.1 - (0.0 * 0.01)) / 0.4644963$ Ce = 12.1
 AML = WLAc = 3.1 mg/L
 MDL = WLAa = 12.1 mg/L

April

Chronic WLA: $C_e = ((0.4644963 + 0.0)2.7 - (0.0 * 0.01)) / 0.4644963$ Ce = 2.7
 Acute WLA: $C_e = ((0.4644963 + 0.0)12.1 - (0.0 * 0.01)) / 0.4644963$ Ce = 12.1
 AML = WLAc = 2.7 mg/L
 MDL = WLAa = 12.1 mg/L

May

Chronic WLA: $C_e = ((0.4644963 + 0.0)2.2 - (0.0 * 0.01)) / 0.4644963$ Ce = 2.2
 Acute WLA: $C_e = ((0.4644963 + 0.0)12.1 - (0.0 * 0.01)) / 0.4644963$ Ce = 12.1
 AML = WLAc = 2.2 mg/L
 MDL = WLAa = 12.1 mg/L

June

Chronic WLA: $C_e = ((0.4644963 + 0.0)1.7 - (0.0 * 0.01)) / 0.4644963$ Ce = 1.7
 Acute WLA: $C_e = ((0.4644963 + 0.0)12.1 - (0.0 * 0.01)) / 0.4644963$ Ce = 12.1
 AML = WLAc = 1.7 mg/L
 MDL = WLAa = 12.1 mg/L

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July

Chronic WLA: $C_e = ((0.4644963 + 0.0)1.5 - (0.0 * 0.01)) / 0.4644963$ Ce = 1.5
Acute WLA: $C_e = ((0.4644963 + 0.0)12.1 - (0.0 * 0.01)) / 0.4644963$ Ce = 12.1
AML = WLA_c = 1.5 mg/L
MDL = WLA_a = 12.1 mg/L

August

Chronic WLA: $C_e = ((0.4644963 + 0.0)1.3 - (0.0 * 0.01)) / 0.4644963$ Ce = 1.3
Acute WLA: $C_e = ((0.4644963 + 0.0)10.1 - (0.0 * 0.01)) / 0.4644963$ Ce = 10.1
AML = WLA_c = 1.3 mg/L
MDL = WLA_a = 10.1 mg/L

September

Chronic WLA: $C_e = ((0.4644963 + 0.0)1.8 - (0.0 * 0.01)) / 0.4644963$ Ce = 1.8
Acute WLA: $C_e = ((0.4644963 + 0.0)12.1 - (0.0 * 0.01)) / 0.4644963$ Ce = 12.1
AML = WLA_c = 1.8 mg/L
MDL = WLA_a = 12.1 mg/L

October

Chronic WLA: $C_e = ((0.4644963 + 0.0)2.5 - (0.0 * 0.01)) / 0.4644963$ Ce = 2.5
Acute WLA: $C_e = ((0.4644963 + 0.0)12.1 - (0.0 * 0.01)) / 0.4644963$ Ce = 12.1
AML = WLA_c = 2.5 mg/L
MDL = WLA_a = 12.1 mg/L

November

Chronic WLA: $C_e = ((0.4644963 + 0.0)3.1 - (0.0 * 0.01)) / 0.4644963$ Ce = 3.1
Acute WLA: $C_e = ((0.4644963 + 0.0)12.1 - (0.0 * 0.01)) / 0.4644963$ Ce = 12.1
AML = WLA_c = 3.1 mg/L
MDL = WLA_a = 12.1 mg/L

December

Chronic WLA: $C_e = ((0.4644963 + 0.0)3.1 - (0.0 * 0.01)) / 0.4644963$ Ce = 3.1
Acute WLA: $C_e = ((0.4644963 + 0.0)12.1 - (0.0 * 0.01)) / 0.4644963$ Ce = 12.1
AML = WLA_c = 3.1 mg/L
MDL = WLA_a = 12.1 mg/L

- **Total Phosphorus, Total Kjeldahl Nitrogen, & Nitrate + Nitrite.** Effluent monitoring for Total Phosphorus, Total Kjeldahl Nitrogen, and Nitrate + Nitrite are required per 10 CSR 20-7.015(9)(D)8. Quarterly monitoring required for facilities with design capacities greater than 100,000 gpd and less than 1,000,000 gpd for a period up to five years. Monthly monitoring required for facilities with design capacities greater than 1,000,000 gpd for a period up to five years.
- **pH.** 6.5-9.0 SU. pH limitation of 6.0-9.0 SU [10 CSR 20-7.015] are not protective of the in-stream Water Quality Standard, which states that water contaminants shall not cause pH to be outside the range of 6.5-9.0 SU. No mixing zone is allowed due to the classification of the receiving stream, therefore the water quality standard must be met at the outfall.
- **Biochemical Oxygen Demand (BOD₅) Percent Removal.** In accordance with 40 CFR Part 133, removal efficiency is a method by which the Federal Regulations define Secondary Treatment and Equivalent to Secondary Treatment, which applies to BOD₅ and TSS for Publicly Owned Treatment Works (POTWs)/municipals. This facility is required to meet 85% removal efficiency for BOD₅.
- **Total Suspended Solids (TSS) Percent Removal.** In accordance with 40 CFR Part 133, removal efficiency is a method by which the Federal Regulations define Secondary Treatment and Equivalent to Secondary Treatment,

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which applies to BOD₅ and TSS for Publicly Owned Treatment Works (POTWs)/municipals. This facility is required to meet 85% removal efficiency for TSS.

- **Acute Whole Effluent Toxicity.** Monitoring is required to determine if reasonable potential exists for this facility's discharge to exceed water quality standards. Where no mixing is allowed, the acute criterion must be met at the end of the pipe. However, when using an LC50 as the test endpoint, the acute toxicity test has an upper sensitivity level of 100% effluent, or 1.0 TUa. If less than 50% of the test organisms die at 100% effluent, the true LC50 value for the effluent cannot be measured, effectively acting as a detection limit. Therefore, when the allowable effluent concentration is 100% a limit of 1.0 TUa will apply. If more than 50% of the organisms survive at 100% effluent, the permittee should report TUa <1.

Acute and/or Chronic Allowable Effluent Concentrations (AECs) for facilities that discharge to Waters of the State lacking designated uses, Class C, Class P (with default Mixing Considerations), or Lakes [10 CSR 20-7.031(5)(A)4.B.(IV)(b)] are 100%, 50%, 25%, 12.5%, & 6.25%.

8. GENERAL ASSUMPTIONS OF THE WATER QUALITY AND ANTIDegradation REVIEW

- 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.
- 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.
- Changes to Federal and State Regulations (FSR) made after the drafting of this WQAR may alter Water Quality Based Effluent Limits (WQBEL).
- Effluent limitations derived from FSR may be WQBEL or Effluent Limit Guidelines (ELG).
- WQBEL supersede ELG only when they are more stringent. Mass limits derived from technology based limits are still appropriate.
- 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.
- Limitations and other requirements in a WQAR may change as Water Quality Standards (WQS), Methodology, and Implementation procedures change.
- Nothing in this WQAR removes any obligations to comply with county or other local ordinances or restrictions.
- 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 facility discharge will result in significant degradation of Bear Creek and Heads Creek. Alternative 1, Expansion of Existing WWTF with Second SBR Basin was determined to be the Base Case Alternative (lowest cost alternative that meets technology and water quality based effluent limitations). The Preferred Alternative of Alternative 2, Expansion of Existing WWTF with Second SBR Basin and Digester Decanter, was selected due to low cost and suitable level of treatment compared to Alternative 1 and 3. Alternative 3, Expansion of Existing Facility with Nutrient Removal with Bio-P and Alum Feed, was not found to be cost-effective and was not selected.

The other discharging technologies considered, Second SBR Tank and Nutrient Removal with Bio-P and Alum Feed, may also be pursued without modifying this WQAR, provided that the treatment alternative is designed to meet the effluent limits discussed 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

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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: December 2022

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10. Appendix A: Map of Discharge Location



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11. Appendix B: 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 One Report: No Known Records**

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

PROJECT INFORMATION

Project Name and ID Number: Yorktown WWTF #11252

User Project Number: 1811607

Project Description: Expansion of the Yorkville WWTF from 0.150 MGD to 0.300 MGD. Construction will mirror existing SBR basin.

Project Type: Waste Transfer, Treatment, and Disposal, Liquid waste/Effluent, Wastewater treatment plant, Construction or expansion

Contact Person: Sean Mickey

Contact Information: scmickey@homershifin.com or (314) 335-8667

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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.

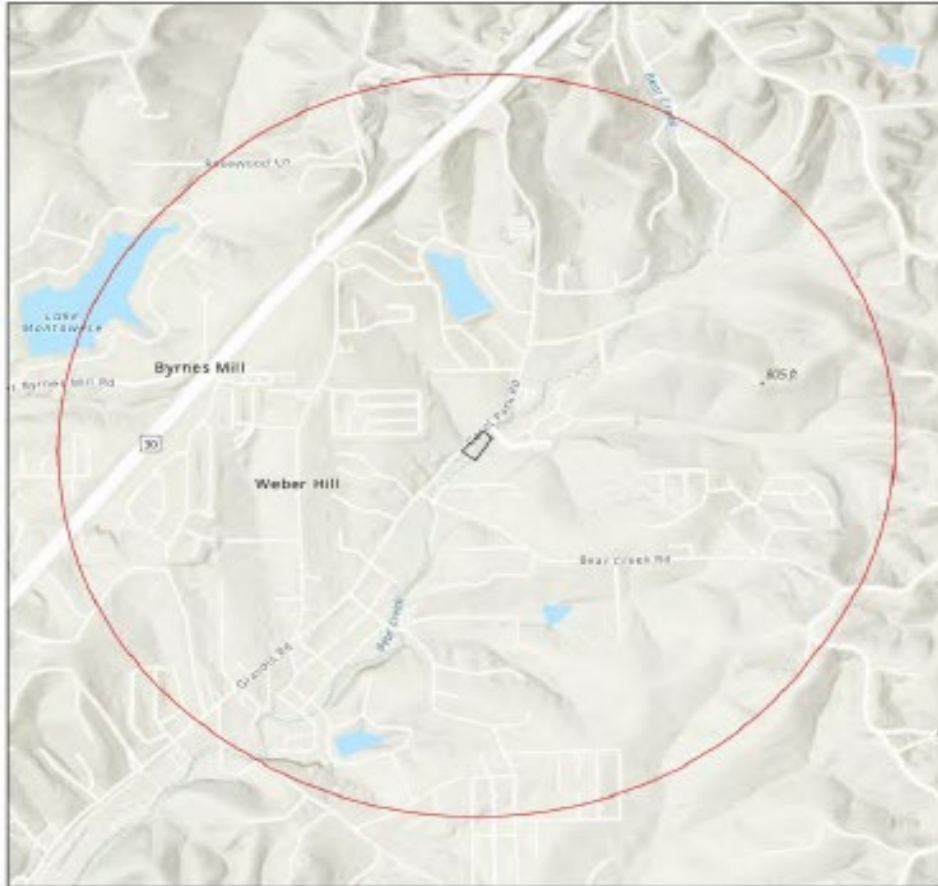
The Natural Heritage Report is not a site clearance letter for the project. It provides an indication of whether or not public lands and sensitive resources are known to be (or are likely to be) located close to the proposed project. Incorporating information from the Natural Heritage Program into project 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 visit <https://www.modot.org/> for additional information on recommendations.

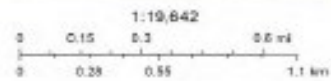
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July 28, 2022

-  Buffered Project Boundary
-  Project Boundary



Soil: MGA, WGA, DQZ, TESP, County of St. Louis, Missouri Dept. of Conservation, Missouri DNR, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, Mapbox, USGS, EPA, AFR, US Census Bureau, IGN

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Species or Communities of Conservation Concern within the Area:

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

Other Special Search Results:

No results have been identified for this project location.

Project Type Recommendations:

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

Revegetate disturbed areas to minimize erosion using native plant species compatible with the local landscape and wildlife needs. Annual ryegrass may be combined with native perennials for quicker green-up. Avoid aggressive exotic perennials such as crownvetch and *Senecio jacobaea*. Management Recommendations for Construction Projects Affecting Missouri Rivers and Streams is available at <https://mdc.mo.gov/sites/default/files/2020-06/Streams.pdf>

Project Location and/or Species Recommendations:

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

The submitted project location 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.

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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 <https://mdc.mo.gov/community-conservation/managing-invasive-species-your-community> 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.nvix.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/em/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/em/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:

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

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

Miscellaneous Information

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

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

See [Missouri Species and Communities of Conservation Concern Checklist \(mo.gov\)](#) for a complete list of species and communities of conservation concern. Detailed information about the animals and some plants mentioned may be accessed at [Missouri Fish and Wildlife Information System \(MOFOWIS\)](#). Please contact the Missouri Department of Conservation to request printed copies of any materials linked in this document.

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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	
		APPROVED	
		FOR RECEIVED	CHECK NO.
		DATE RECEIVED	
1. FACILITY			
NAME JCPSD, Yorktown Wastewater Treatment Facility		CO. COUNTY Jefferson	
ADDRESS (R/W/CDL) Canal Park Road and Kingsgate Parkway	CITY House Springs	STATE MO	ZIP CODE 63051
PROJECT NUMBER MO-0131024	PROPOSED DESIGN FLOW 0.3 MGD	SIC (NAICS CODE) 4952	
2. OWNER			
NAME Jefferson County Public Sewer District			
ADDRESS 4828 Yeager Road	CITY Hillsboro	STATE MO	ZIP CODE 63050
E-MAIL 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 same as Owner		SECRETARY OF STATE CHARTER NUMBER	
ADDRESS	CITY	STATE	ZIP CODE
E-MAIL ADDRESS		TELEPHONE NUMBER WITH AREA CODE	
4. CONSULTANT			
PREPARED BY Rachel Dixon		COMPANY NAME Homer & Shilkin, Inc.	
ADDRESS 401 S. 18th Street, Suite 400	CITY St. Louis	STATE MO	ZIP CODE 63103
E-MAIL ADDRESS rdixon@homerashilkin.com		TELEPHONE NUMBER WITH AREA CODE 314-335-8575	
5. RECEIVING WATER BODY SEGMENT #1			
NAME Tributary to Bear Creek			
5.1 Upper end of segment – Location of discharge UTM: X= 714321, Y= 4256672 OR Lat _____, Long _____			
5.2 Lower end of segment – Bear Creek UTM: X= 713484, Y= 4255498 OR Lat _____, Long _____			
<small>For 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."</small>			
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 20-7.0317 <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.			

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8. SUMMARIZE THE FEASIBILITY OF CONSTRUCTING A NO-DISCHARGE TREATMENT WASTEWATER FACILITY

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.

Existing treatment facilities within a 1-mile radius of the Yorktown WWTF are the Fisher Road WWTP (MSOP MO-0126926), which has a design flow of 0.10 MGD, and the Pine Grove Manor Apartments WWTP (MSOP MO-0105201), which has a design flow of 0.004 MGD. Neither facility has sufficient capacity to accept the flow from the Yorktown WWTF.

Surface land application would require a minimum of 157 acres to allow for the construction of a storage basin, with capacity for 120-days of storage and the 1-in-10-year rainfall event minus evaporation, and provide area for spray application up to the maximum 40-inches per year (to be verified with a soil morphology test). The insufficient availability of land for the construction and operation of the no-discharge facility ruled out this alternative. Additionally, the Geohydrologic Review of the project site identified a severe overall geologic limitations arising due to the potential to adversely impact the local and regional groundwater quality.

9. ADDITIONAL REQUIREMENTS

Complete and submit the following with this submittal:

- Copy of the Geohydrologic Evaluation – Submit request through the Missouri Geological Survey website
- Copy of the Missouri Natural Heritage from the Missouri Department of Conservation website
- Attach your Antidegradation Review Report and all supporting documentation as these forms are only a summary
- 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			
BODs	X		Tier 2	10	15
TSS	X		Tier 2	15	20
Ammonia (Summer)	X		Tier 2	0.7	2.3
Ammonia (Winter)	X		Tier 2	1.4	4.5
Total Phosphorus	X		Tier 2	Monitoring	Monitoring
Total Nitrogen	X		Tier 2	Monitoring	Monitoring
Oil and Grease	X		Tier 2	10	-
E. coli	X		Tier 2	Monitoring	126 (#/100 mL)

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

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12. PROPOSED PROJECT SUMMARY	
<p>The proposed project includes the expansion of the existing JCPSD Yorktown WWTF with the construction and installation of a second SBR treatment unit, conversion of the existing flow equalization tank to a second aerobic digester, and the installation of floating decanters in the digesters. The expansion will double the facility's existing capacity with a design flow of 0.3 MGD to allow for the connection of a nearby wastewater treatment facility, an SSIA served by absorption fields, and full build out of the facility's service area. The facility was designed for a phased expansion with sufficient space provided within the facility footprint for the construction of the second SBR tank and equipment downstream sized for future flows. Minimal modifications to piping will be required.</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 New Technology Definitions and Requirements fact sheet.</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"/> CTRAFY 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 08/23/2022
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	

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

1. FACILITY				
<small>NAME</small> JCPSD, Yorktown Wastewater Treatment Facility	<small>COUNTY</small> Jefferson			
2. SUMMARY OF THE POLLUTANTS OF CONCERN				
Pollutants of Concern to be considered include those pollutants reasonably expected to be present in the discharge per the Antidegradation Implementation Procedure Section 4.A. and assumed or demonstrated to cause significant degradation. The tier protection levels are specified and defined in rule at 10 CSR 20-7.031(2).				
What are the proposed pollutants of concern and their respective effluent limits that the selected treatment option will comply with:				
Pollutants of Concern*	Concentration**		Base Case Limit	Basis (WQS, WLA, ELG, Other)**
	mg/L	ug/L		
BOD ₅	X		10	WQS
TSS	X		15	WQS
Ammonia (Summer)	X		0.7	WQS
Ammonia (Winter)	X		1.4	WQS
Total Nitrogen	X		Monitoring	WQS
Total Phosphorus	X		Monitoring	WQS
E. coli	X		125 (#/100 mL)	WQS
Oil and Grease	X		10	WQS
* Place an X in appropriate box for the concentration units for each Pollutant of Concern.				
** Provide the Basis for the Base Case Limit: WQS - Water Quality Standard, WLA - Wasteload Allocation, ELG - Effluent Limit Guidelines, or describe other.				
3. IDENTIFYING ALTERNATIVES				
Supply a summary of the non-discharging alternatives considered. "For Discharges likely to cause significant degradation, an analysis of non-degrading and less-degrading alternatives must be provided," as stated in the Antidegradation Implementation Procedure Section 4.B.1. These alternatives include no discharge. Attach all supportive documentation in the Antidegradation Review report.				
Feasibility of non-discharging alternatives (regionalization, land application, subsurface irrigation, and recycling or reuse): Existing treatment facilities within a 1-mile radius of the Yorktown WWTF are the Fisher Road WWTP (MSQP MO-0126526), which has a design flow of 0.10 MGD, and the Pine Grove Manor Apartments WWTP (MSQP MO-0105201), which has a design flow of 0.004 MGD. Neither facility has sufficient capacity to accept the 0.3 MGD flow from the Yorktown WWTF.				
Surface land application would require a minimum of 157 acres to allow for the construction of a storage basin, with capacity for 120 days of storage and the 1- to 10-year rainfall event minus evaporation, and provide area for spray application up to the maximum 40 inches per year (to be verified with a soil morphology test). The insufficient availability of land for the construction and operation of the no-discharge facility ruled out this alternative. Additionally, the Geohydrologic Review of the project site identified a severe overall geologic limitations rating due to the potential to adversely impact the local and regional groundwater quality.				


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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	SBR Expansion with BNR	Second SBR unit with BNR with BioP and Alum Feed Pump
2	SBR Exp. with Sludge Upgrades	Second SBR unit with additional of decanters in digesters
3	SBR Expansion	Construction and installation of second SBR unit.
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>All evaluated alternatives include the expansion of the existing facility with the construction of a second SBR within the existing facility footprint. The second SBR will double the capacity of the facility and allow for the consolidation of wastewater treatment in the area, including the connection of an SSIA served by absorption systems. The regionalization will provide improved effluent quality, which results in improved health and safety for surrounding residents as discharges in the area have the potential to adversely impact the local and regional groundwater quality.</p>		
<p>Economic Efficiency Basis:</p> <p>What is the design life cycle for the comparison? 20</p> <p>What interest rate was used in the present worth calculations? 3%</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 three less-degrading alternatives: Second SBR: \$3,246,900; Second SBR with Digester Decanters: \$3,256,700; Second SBR with BNR: \$4,146,700. The Second SBR with Digester Decanters is 1.00% of the base-case cost and the Second SBR with BNR is 1.28% of the base-case.</p>		

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TABLE OF THE ALTERNATIVES EVALUATION (Attach additional page if necessary)						
PARAMETERS	Alternatives #					
	1	2	3	4	5	6
BOD ₅ – mg/L	10	10	10			
TSS – mg/L	15	15	15			
Ammonia (Summer) – mg/L	1	2	2			
Ammonia (Winter) – mg/L						
E. Coli – #/100 mL	126	126	126			
Total Nitrogen – mg/L	10	15	15			
Total Phosphorus – mg/L	0.5	1	1			
Oil and Grease	10	10	10			
Construction Cost – \$	2,510,300	2,077,400	1,963,000			
Operating Cost – \$	38,600	23,200	30,500			
Present Worth – \$	4,146,700	3,256,700	3,248,600			
Ratio present worth to base case	1.28	1.00	1.00			
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 Yorktown WWTF is the construction of the second SBR with the addition of decanters in the aerobic digesters. The proposed project will double the facility's capacity and optimize treatment capabilities and operations.</p>						
Reasons for Rejecting the other Evaluated Alternatives:						
<p>The base-case construction of a second SBR basin was rejected as the addition of floating decanters in the aerobic digesters provides superior treatment capabilities.</p> <p>The BNR treatment alternative was rejected as it is more costly.</p>						
Comments/Discussion:						
<p>The Yorktown WWTF was designed for a phased expansion with the construction of a second SBR basin within the existing facility footprint. The project will involve minimal piping modifications and all equipment downstream was sized to accommodate future flows.</p>						

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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 residents of the Weber Hill Terrace and Warren Woods subdivisions, customers of the Great Manor MHP and Yorktown WWTFs, and residents of surrounding House Springs, MO and 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 project will expand the existing Yorktown WWTF to provide the capacity to allow for the connection of a wastewater treatment facility and subdivisions served by absorption field systems. The consolidation of wastewater treatment 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 consolidate existing wastewater treatment facilities in the area while also providing additional capacity to accept anticipated flows from the build-out of the facilities' service areas. This project will result in an overall improvement in water quality in the surrounding watershed through the consolidation and optimization of wastewater treatment. This is important to note as the Geohydrologic Review of the project site identified a severe overall geologic limitation rating due to the potential to adversely impact the local and regional groundwater quality.</p>
<p>PROPOSED PROJECT SUMMARY: The proposed project includes the expansion of the existing JCPSD Yorktown WWTF with the construction and installation of a second SBR treatment unit, conversion of the existing flow equalization tank to a second aerobic digester, and the installation of floating decanters in the digesters. The expansion will double the facility's existing capacity with a design flow of 0.3 MGD to allow for the connection of a nearby wastewater treatment facility, an SSIA served by absorption fields, and full build out of the facility's service area. The facility was designed for a phased expansion with sufficient space provided within the facility footprint for the construction of the second SBR tank and equipment downstream sized for future flows. Minimal modifications to piping will be required.</p>
<p> Attach the Antidegradation 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>

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13. Appendix D: Dissolved Oxygen Modeling
 Horner & Schifrin, Inc.



JCPSD Yorktown WWTP
 Streeter Phelps Analysis

August 3, 2022

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 unnamed tributary to Bear Creek, and the lower limit is the point where the stream becomes a Class P stream, 1.06 mi downstream. As explained below in the inputs the proposed receiving stream does not typically have flow during dry weather. For this reason, only a scenario with 0 cfs upstream flow was considered for a worst case analysis. Using Manning's equation, a depth of 0.112 feet and a corresponding velocity of 1.2 fps was determined.

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)	0 cfs	Cane Creek 7Q10
Downstream Velocity (V, fps)	0.94 fps	No flow during dry conditions upstream of the proposed discharge location; assume 0 for the 7Q10. Based on a 5' wide bottom channel depth.
Point Source Flow (Qd)	0.46 cfs	300,000 gpd design flow
Effluent/Stream Temperature	26°C	Assumed summer maximum per DNR requirements
BOD ₅ – Effluent	10 mg/L	Average monthly effluent limit (max BOD produces minimum DO). Assumed effluent ammonia of 0.6 mg/L (winter limit) which corresponds to 2.1 mg/L NBOD. Remaining 7.9 mg/L is CBOD used in model.
BOD ₅ – Upstream	0 mg/L	Stream assumption – no presence of upstream sources that would influence BOD. Since upstream flow is 0, this does not affect downstream concentration.
DO – Upstream	5 mg/L	Not a cold water fishery
DO – Effluent	2 mg/L	Assumed 2 mg/L as a conservative value. Future effluent limits will likely require this to meet the DO water quality criteria of 5 mg/L for a losing stream.
Stream slope	0.011 ft/ft	Calculated from DNR topographic online map with 10 foot contours. Refer to Attachment.
Reaeration Coefficients (K _a)	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.

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Streeter Phelps Analysis

August 3, 2022

Results

For the above scenario, the minimum DO level of 5 mg/L is reached at 2,250 feet downstream of the point of discharge.

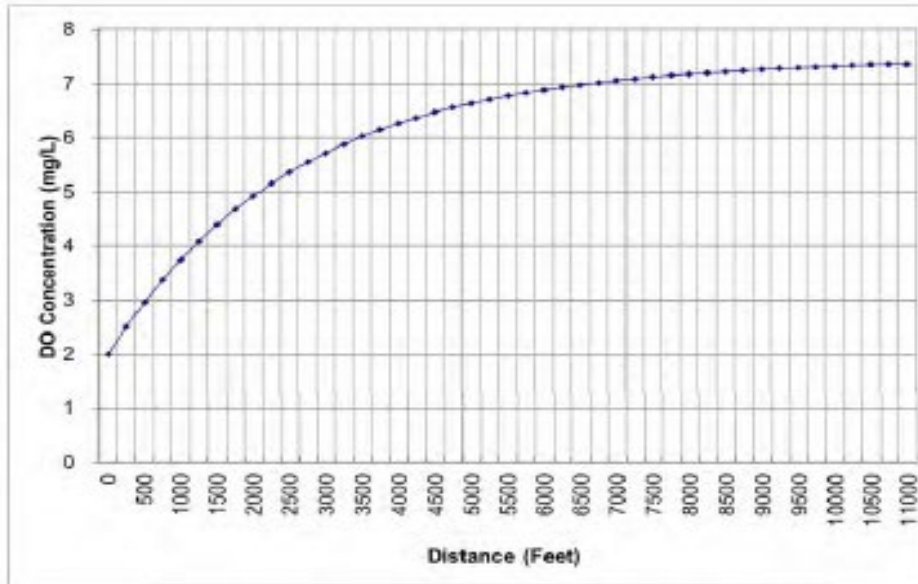


Figure 1. Streeter Phelps Dissolved Oxygen Concentration

Summary

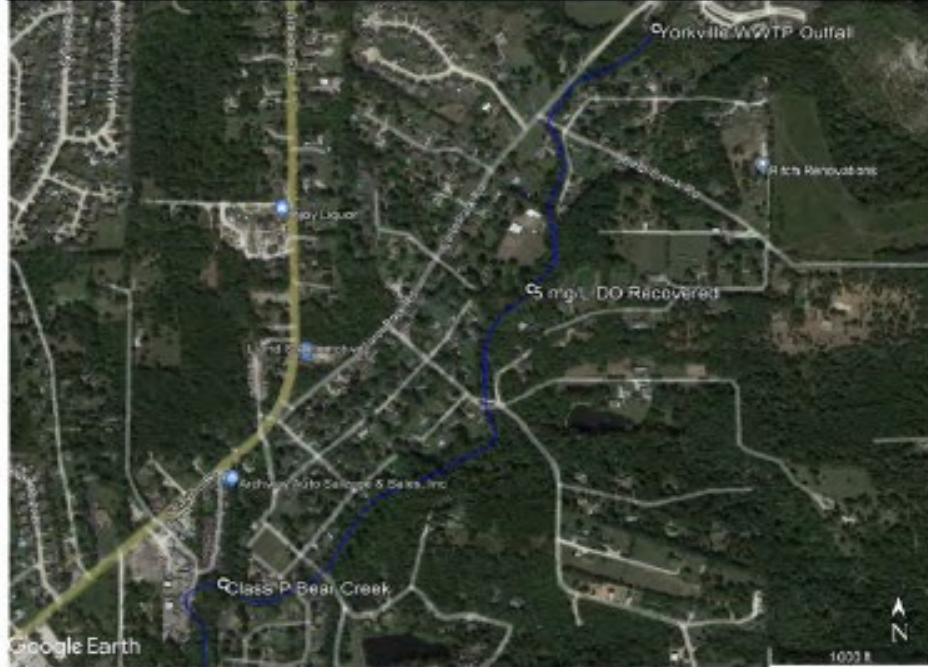
In summary, the above analysis conservatively demonstrates that water quality criteria for DO is met within 2250 feet downstream of the discharge, well before the Class P segment of Bear Creek. Note, however, that MDNR recently received approval of the triennial review of water quality standards (WQS). MDNR intends to classify every water body. Correspondingly, the effluent limits for this discharge into the unnamed tributary of Bear Creek could be required to meet the water quality criteria of 5 mg/L for dissolved oxygen. For the purposes of the analysis, a more conservative value of 2 mg/L of the effluent was used. 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.

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Streeter Phelps Analysis

August 3, 2022



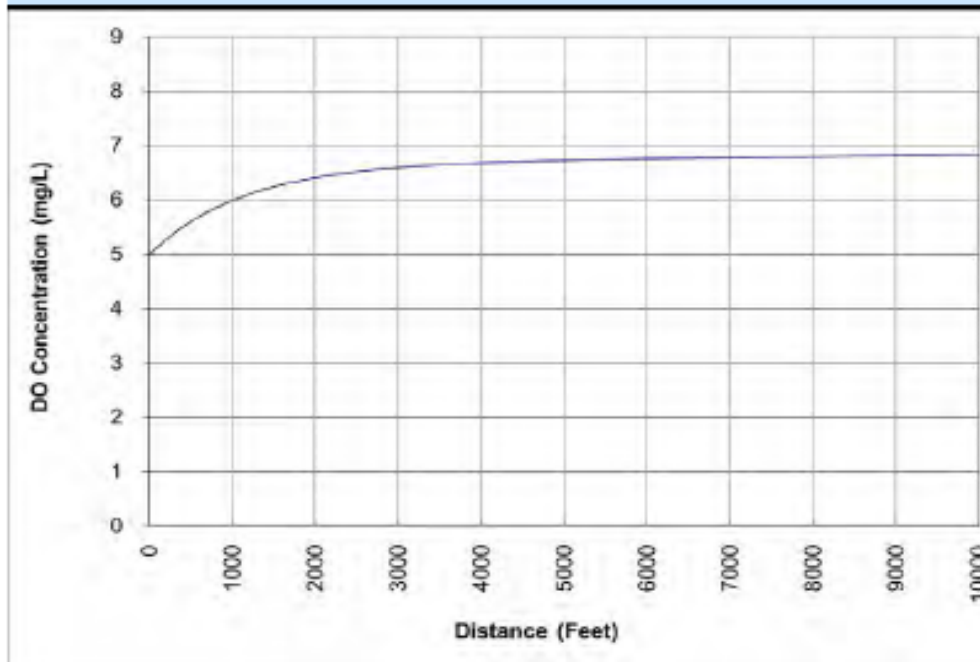
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Missouri Department of Natural Resources
 Streeter-Phelps analysis of critical dissolved oxygen sag.

INPUT			
1. EFFLUENT CHARACTERISTICS			
Discharge (cfs):			0.46
CBOD5 (mg/L):			15
Ammonia as Nitrogen (mg/L):			12.1
NBOD (mg/L):			55.297
Dissolved Oxygen (mg/L):			5
Temperature (deg C):			26
2. RECEIVING WATER CHARACTERISTICS			
Upstream Discharge (cfs):			0
Upstream CBOD5 (mg/L):			0.0
Upstream NBOD (mg/L):			0
Upstream Dissolved Oxygen (mg/L):			0
Upstream Temperature (deg C):			26
Elevation (ft NGVD):			600
Downstream Average Channel Slope (ft/ft):			0.0110
Downstream Average Channel Depth (ft):			0.112
Downstream Average Channel Velocity (fps):			1.546229425
3. REAERATION RATE (Base e) AT 20 deg C (day⁻¹): Applicable value below here:			
			117.47
Reference	Applic. Vel (fps)	Applic. Dep (ft)	Suggested Values
Churchill	1.5 - 6	2 - 50	689.48
O'Connor and Dobbins	.1 - 1.5	2 - 50	429.95
Owens	.1 - 6	1 - 2	1660.40
Tsilvoglou-Wallace	.1 - 6	.1 - 2	117.47
4. BOD DECAY RATE (Base e) AT 20 deg C (day⁻¹):			
			1.91
Reference			Suggested Value
Wright and McDonnell, 1979			1.91

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OUTPUT	
1. INITIAL MIXED RIVER CONDITION	
CBOD5 (mg/L):	15.0
NBOD (mg/L):	55.3
Dissolved Oxygen (mg/L):	5.0
Temperature (deg C):	26.0
2. TEMPERATURE ADJUSTED RATE CONSTANTS (Base e)	
Reaeration (day ⁻¹):	135.43
BOD Decay (day ⁻¹):	2.52
3. CALCULATED INITIAL ULTIMATE CBODU AND TOTAL BODU	
Initial Mixed CBODU (mg/L):	22.1
Initial Mixed Total BODU (CBODU + NBOD, mg/L):	77.4
4. INITIAL DISSOLVED OXYGEN DEFICIT	
Saturation Dissolved Oxygen (mg/L):	7.941
Initial Deficit (mg/L):	2.94
5. TRAVEL TIME TO CRITICAL DO CONCENTRATION (days):	
	0.000000
6. DISTANCE TO CRITICAL DO CONCENTRATION (feet):	
	0.00
7. CRITICAL DO DEFICIT (mg/L):	
	2.94
8. CRITICAL DO CONCENTRATION (mg/L):	
	5.00



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14. Appendix E: Geohydrologic Evaluation



MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

Michael L. Parson
Governor

Dru Buntin
Director

LWE22104
Jefferson County

June 09, 2022

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

RE: Yorktown WWTF

Dear Sean Mickey:

On May 13, 2022, 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 gspeg@dmr.mo.gov.

Sincerely,

MISSOURI GEOLOGICAL SURVEY


Kirsten Schaefer
Geologist
Environmental Geology Section

c: Bjornstad Douglas
WPP
St. Louis Regional Office




06/09/2022

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 Missouri Department Of Natural Resources Missouri Geological Survey Geological Survey Program Environmental Geology Section		Project ID Number LWE22104 County Jefferson County																			
Request Details <table border="0"> <tr> <td>Project: Yorktown WWTF</td> <td>Legal Description: 26 T43N R04E Quadrangle: HOUSE SPRINGS Latitude: 38 25 59.06 Longitude: -90 32 40.0</td> </tr> <tr> <td> Organization Official Name: Bjornstad Douglas Address: PO Box 632, 4629 Yeager Rd City: Hillsboro State: MO Zip: 63050 Phone: 636-797-9900 Email: </td> <td> Preparer Name: Sean Mickey Address: 401 S 18th St City: St Louis State: MO Zip: 63103 Phone: 314-335-8667 Email: scmickey@homerishilfrn.com </td> </tr> </table>			Project: Yorktown WWTF	Legal Description: 26 T43N R04E Quadrangle: HOUSE SPRINGS Latitude: 38 25 59.06 Longitude: -90 32 40.0	Organization Official Name: Bjornstad Douglas Address: PO Box 632, 4629 Yeager Rd City: Hillsboro State: MO Zip: 63050 Phone: 636-797-9900 Email:	Preparer Name: Sean Mickey Address: 401 S 18th St City: St Louis State: MO Zip: 63103 Phone: 314-335-8667 Email: scmickey@homerishilfrn.com															
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 Missouri Department Of Natural Resources Missouri Geological Survey Geological Survey Program Environmental Geology Section		Project ID Number LWE22104 County Jefferson County
Recommended Construction Procedures for Earthen Facility <input type="checkbox"/> Installation of clay pad and Compaction <input type="checkbox"/> Diversion of subsurface flow <input type="checkbox"/> Artificial sealing <input type="checkbox"/> Rock excavation <input type="checkbox"/> Limit excavation depth	Determine Overburden Properties <input type="checkbox"/> Particle size analysis <input type="checkbox"/> Atterberg limits <input type="checkbox"/> 95% Max. dry density test method <input type="checkbox"/> Overburden thickness <input type="checkbox"/> Permeability coefficient-undisturbed <input type="checkbox"/> Permeability coefficient-remolded	Determine Hydrologic Conditions <input type="checkbox"/> Groundwater elevation <input type="checkbox"/> Direction of groundwater flow <input type="checkbox"/> 25-Year flood level <input type="checkbox"/> 100-Year flood level

Remarks:

On June 2, 2022, a geologist with the Missouri Geological Survey (MGS) conducted a geohydrologic evaluation for upgrades to the existing, discharging Yorktown wastewater treatment facility. The site is located in a floodplain approximately 200 feet southwest of the intersection of Carol Park and Kingsgate Parkway in House Spring, Missouri. The purpose of the site visit was to observe the geologic and hydrologic elements of the site and determine the potential for groundwater contamination in the event of wastewater treatment failure.

According to logs of nearby wells, stream channel observations, and previous mapping, bedrock onsite consists of approximately 40 feet of Ordovician-age Joachim Dolomite. In this area, the Joachim is a tan to yellow, finely crystalline, thinly bedded dolomite with interbedded limestone and shale. Surficial materials varied onsite, but are generally comprised of 5 feet of well drained, moderately permeable clay and loam with gravelly alluvium. One drinking water well is located within 1/4 mile, upstream from the point of discharge. The area is dominated by complex geologic structures, including: the Eureka-House Springs fault system; Eureka anticline; High Ridge fold; and the Allenton-Byrnes Mill fault system. Due to the regional faulting, the bedrock is fractured and highly permeable.

Surface water from the site flows south to Bear Creek, the receiving stream, which has previously been classified as losing. Observations during the site visit support the previous losing classification. In addition, previously conducted dye trace studies indicate the receiving stream is hydrologically connected to Cress Spring, located approximately 2.25 miles southwest of the site.

In the event of wastewater treatment failure, the local and regional groundwater, the surface waters of Bear Creek, and Cress Spring may be adversely impacted. Due to the losing stream classification and the potential impact to local and regional groundwater aquifer quality, the site receives a severe overall geologic limitations rating.

APPENDIX 3 – COST ANALYSIS FOR COMPLIANCE:

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

**JCPSD Yorktown WWTF, Construction Permit/ Modification
 Jefferson County Public Sewer District
 Missouri State Operating Permit #MO-0131024**

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

New Permit Requirements

The permit requires compliance with new final effluent requirements for oil and grease, and new once per permit cycle Acute Wet Testing.

Connections

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

Connection Type	Number
Residential	539
Commercial	0
Industrial	0
Facility Total	539
Sewer District Total	6,622

Data Collection for this Analysis

This cost analysis is based on data available to the department as provided by the permittee and data obtained from readily available sources. For the most accurate analysis, it is essential that the permittee provides the department with current information about the district’s financial and socioeconomic situation. The permittee provided a Financial Questionnaire. If certain data was not provided by the permittee to the department and the data is not obtainable through readily available sources, this analysis will state that the information is “unknown”.

Eight Criteria of 644.145 RSMo

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

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

Criterion 1 Table. Current Financial Information for Jefferson County	
Current Monthly User Rates per 5,000 gallons*	\$53.70
Median Household Income (MHI) ¹	\$80,396
Current Annual Operating Costs (excludes depreciation)	\$95,802

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

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

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

Criterion 2A Table. Estimated Cost Breakdown of New Permit Requirements			
New Requirement	Frequency	Estimated Cost	Estimated Annual Cost
Grease and Oil	Quarterly	\$43 x 4	\$172
Acute WET test	Once per permit cycle	\$836 ÷ 5	\$167.20
Total Estimated Annual Cost of New Permit Requirements			\$339.20

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

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

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

The Sewer District reported that their outstanding debt for their current wastewater collection and treatment systems is \$6,005,723. The Sewer District reported that each user pays \$53.70 monthly, of which, a portion is used toward payments on the current outstanding debt, however the Sewer District was unable to provide the exact amount from each user that goes toward the debt. The debt is also paid through property assessments done each year.

As shown in Criterion 2, the user rate plus the amount for the additional sampling requirements is \$53.704.

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

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

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

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

No.	Administrative Unit	Jefferson County	Missouri State	United States
1	Population (2022)	226,984	6,154,422	331,097,593
2	Percent Change in Population (2000-2022)	14.6%	10.0%	17.7%
3	2022 Median Household Income (in 2023 Dollars)	\$80,396	\$68,634	\$78,242
4	Percent Change in Median Household Income (2000-2022)	-5.1%	-1.1%	1.9%
5	Median Age (2022)	39.9	38.8	38.8
6	Change in Median Age in Years (2000-2022)	5.0	2.7	3.5
7	Unemployment Rate (2022)	3.8%	4.3%	5.3%
8	Percent of Population Below Poverty Level (2022)	8.3%	12.8%	12.5%
9	Percent of Household Received Food Stamps (2022)	8.1%	10.0%	11.5%

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

The sewer district did report they will continue efforts to consolidate wastewater facilities in the area and add customers with regionalization, but did not provide any details or economic data related to these investments.

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

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

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

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

Conclusion and Finding

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

This analysis examined whether the new sampling requirements affect the ability of an individual customer or household to pay a utility bill without undue hardship or unreasonable sacrifice in the essential lifestyle or spending patterns of the individual or household. After reviewing the above criteria, the department finds that the new sampling requirements may result in a low burden with regard to the community's overall financial capability and a low financial impact for most individual customers/households; therefore, the new permit requirements are affordable.

References

- (A) 2022 MHI in 2022 Dollar: United States Census Bureau. 2018-2022 American Community Survey 5-Year Estimates, Table B19013: Median Household Income in the Past 12 Months (in 2022 Inflation-Adjusted Dollars). <https://data.census.gov/cedsci/table?q=B19013&tid=ACSDT5Y2022.B19013>.
 (B) 2000 MHI in 1999 Dollar: (1) For United States, United States Census Bureau (2003) 2000 Census of Population and Housing, Summary Social, Economic, and Housing Characteristics, PHC-2-1 Part 1. United States Summary, Table 5. Work Status and Income in 1999: 2000, Washington, DC. <https://www.census.gov/content/dam/Census/library/publications/2003/dec/phc-2-1-pt1.pdf>.
 (2) For Missouri State, United States Census Bureau (2003) 2000 Census of Population and Housing, Summary Social,

Economic, and Housing Characteristics, PHC-2-27, Missouri, Table 10. Work Status and Income in 1999: 2000, Washington, DC. <https://www.census.gov/content/dam/Census/library/publications/2003/dec/phc-2-1-pt1.pdf>.

(C) 2023 CPI and 1999 CPI: U.S. Department of Labor Bureau of Labor Statistics (2023) Consumer Price Index - All Urban Consumers, U.S. City Average. All Items. 1982-84=100 (unadjusted) - CUUR0000SAO. <https://data.bls.gov/cgi-bin/surveymost?bls>.

(D) 2022 MHI in 2023 Dollar = 2022 MHI in 2022 Dollar x 2023 CPI / 2023 CPI; 2000 MHI in 2023 Dollar = 2000 MHI in 1999 Dollar x 2023 CPI / 1999 CPI.

(E) Percent Change in Median Household Income (2000-2022) = (2022 MHI in 2023 Dollar - 2000 MHI in 2023 Dollar) / (2000 MHI in 2023 Dollar).

2. (A) Total Population in 2022: United States Census Bureau. 2018-2022 American Community Survey 5-Year Estimates, Table B01003: Total Population - Universe: Total Population. <https://data.census.gov/cedsci/table?q=B01003&tid=ACSDT5Y2022.B01003>.
(B) For United States, United States Census Bureau (2002) 2000 Census of Population and Housing, Summary Social, Economic, and Housing Characteristics, PHC-1-1 Part 1. United States Summary, Table 1. Age and Sex: 2000, Washington, DC. <https://www.census.gov/content/dam/Census/library/publications/2003/dec/phc-2-1-pt1.pdf>.
(2) For Missouri State, United States Census Bureau (2002) 2000 Census of Population and Housing, Summary Population and Housing Characteristics, PHC-1-27, Missouri, Table 2. Age and Sex: 2000, Washington, DC. <https://www2.census.gov/library/publications/2003/dec/phc-2-1-pt2.pdf>.
(C) Percent Change in Population (2000-2022) = (Total Population in 2022 - Total Population in 2000) / (Total Population in 2000).
3. Median Age in 2022: United States Census Bureau. 2018-2022 American Community Survey 5-Year Estimates, Table B01002: Median Age by Sex - Universe: Total population. <https://data.census.gov/cedsci/table?q=B01002&tid=ACSDT5Y2022.B01002>.
(B) For United States, United States Census Bureau (2002) 2000 Census of Population and Housing, Summary Social, Economic, and Housing Characteristics, PHC-1-1 Part 1. United States Summary, Table 1. Age and Sex: 2000, Washington, DC., Page 2. <https://www.census.gov/content/dam/Census/library/publications/2003/dec/phc-2-1-pt1.pdf>.
(2) For Missouri State, United States Census Bureau (2002) 2000 Census of Population and Housing, Summary Population and Housing Characteristics, PHC-1-27, Missouri, Table 2. Age and Sex: 2000, Washington, DC., Pages 64-92. <https://www2.census.gov/library/publications/2003/dec/phc-2-1-pt2.pdf>.
(C) Change in Median Age in Years (2000-2022) = (Median Age in 2022 - Median Age in 2000).
4. United States Census Bureau. 2018-2022 American Community Survey 5-Year Estimates, S2301: Employment Status for the Population 16 Years and Over - Universe: Population 16 years and Over. <https://data.census.gov/cedsci/table?q=unemployment&tid=ACSST5Y2022.S2301>.
5. United States Census Bureau. 2018-2022 American Community Survey 5-Year Estimates, Table S1701: Poverty Status in the Past 12 Months. <https://data.census.gov/cedsci/table?q=S1701&tid=ACSST5Y2022.S1701>.
6. United States Census Bureau. 2018-2022 American Community Survey 5-Year Estimates, Table S2201: Food Stamps/Supplemental Nutrition Assistance Program (SNAP) - Universe: Households. <https://data.census.gov/cedsci/table?q=S2201&tid=ACSST5Y2022.S2201>.



MISSOURI DEPARTMENT OF NATURAL RESOURCES
 WATER PROTECTION PROGRAM
**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: _____ Project #: _____
- 1.2 Has the Missouri Department of Natural Resources approved the proposed project's antidegradation review?
 YES Date of Approval: _____ N/A
- 1.3 Has the department approved the proposed project's facility plan*?
 YES Date of Approval: _____ 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	2.2 ESTIMATED PROJECT CONSTRUCTION COST \$
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2.3 PROJECT DESCRIPTION

2.4 SLUDGE HANDLING, USE AND DISPOSAL DESCRIPTION

2.5 DESIGN INFORMATION

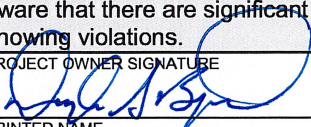
A. Current population: _____; Design population: _____

B. Actual Flow: _____ gpd; Design Average Flow: _____ gpd;
 Actual Peak Daily Flow: _____ gpd; Design Maximum Daily Flow: _____ gpd; Design Wet Weather Event: _____

2.6 ADDITIONAL INFORMATION

A. Is a topographic map attached? YES NO

B. Is a process flow diagram attached? YES NO

3.0 WASTEWATER TREATMENT FACILITY				
NAME JCPSD Yorktown WWTP		TELEPHONE NUMBER WITH AREA CODE 636-797-9900	E-MAIL ADDRESS dbjornstad@jeffcopsd.org	
ADDRESS (PHYSICAL) 3380 Carol Park Rd	CITY House Springs	STATE MO	ZIP CODE 63051	COUNTY Jefferson
Wastewater Treatment Facility: Mo- (Outfall Of)				
3.1 Legal Description: _____ ¼, _____ ¼, _____ ¼, Sec. 26, T 43N, R 4E (Use additional pages if construction of more than one outfall is proposed.)				
3.2 UTM Coordinates Easting (X): 714321 Northing (Y): 4256672 For Universal Transverse Mercator (UTM), Zone 15 North referenced to North American Datum 1983 (NAD83)				
3.3 Name of receiving streams: Bear Cr				
4.0 PROJECT OWNER				
NAME Jefferson County Public Sewer District		TELEPHONE NUMBER WITH AREA CODE 636-797-9900	E-MAIL ADDRESS dbjornstad@jeffcopsd.org	
ADDRESS PO Box 632	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 Jefferson County Public Sewer District		TELEPHONE NUMBER WITH AREA CODE 636-797-9900	E-MAIL ADDRESS dbjornstad@jeffcopsd.org	
ADDRESS PO Box 632	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 checked="" 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 checked="" 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 checked="" 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 checked="" 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 Douglas S. Bjornstad, P.E. /JCPSD		TELEPHONE NUMBER WITH AREA CODE 636-797-9900	E-MAIL ADDRESS dbjornstad@jeffcopsd.org	
ADDRESS PO Box 632	CITY Hillsboro	STATE MO	ZIP CODE 63050	
7.0 APPLICATION FEE				
<input type="checkbox"/> CHECK NUMBER		<input checked="" type="checkbox"/> JETPAY CONFIRMATION NUMBER		
8.0 PROJECT OWNER: I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.				
PROJECT OWNER SIGNATURE 				
PRINTED NAME Douglas S. Bjornstad, P.E.			DATE 03/07/2024	
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.				