

MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

Mike Kehoe
Governor

Kurt U. Schaefer
Director

OFFICIAL COPY VIA EMAIL: tbaretich@alliancewater.com

Date: March 25, 2026

Tony Baretich
PUBLIC WATER SUPPLY DISTRICT NO. 3 OF FRANKLIN COUNTY, MISSOURI
150 Old Highway 100
Villa Ridge, MO 63089

RE: Facility Expansion - FCPWSD #3, Red Barn Wastewater Treatment Plant, MO-0043362,
Construction Permit No. CP0002540, Franklin County

Dear Tony Baretich:

The Missouri Department of Natural Resources' Water Protection Program has reviewed the plans and specifications submitted by Cochran Engineering for PUBLIC WATER SUPPLY DISTRICT NO. 3 OF FRANKLIN COUNTY, MISSOURI. Please find enclosed Construction Permit No. CP0000002540. Upon completing construction covered under this permit submit a 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) with a request to issue the operating permit. The operating permit modification fee of \$ needs to be paid.

This permit will expire 24 months from the date of issuance. In accordance with 10 CSR 20-6.010(5)(J), the department may grant an extension. If you believe that an extension is necessary, you must submit a request and a justification in writing for the extension at least 30 days prior to the permit expiration date. Expired construction permits require submittal of a new application and fee.

This construction permit does not supersede any requirements of the operating permit or enforcement actions. You must continue to submit any reports required in your existing operating permit, including reporting progress made in attaining compliance with final effluent limits for a schedule of compliance to the St. Louis Regional Office. Nothing in this permit removes any obligations to comply with county or other local ordinances or restrictions.



If you have any questions concerning this matter, please contact Andy Appelbaum, of the Water Protection Program by phone at 314-416-2062 or by email at andy.appelbaum@dnr.mo.gov. You may also submit questions or comments in writing to the Department of Natural Resources, P.O. Box 176, Jefferson City, MO 65102.

Thank you for your efforts to help ensure clean water in Missouri.

Sincerely,

WATER PROTECTION PROGRAM

A handwritten signature in black ink that reads "Cindy LePage". The signature is written in a cursive, flowing style.

Cindy LePage, P.E., Chief
Engineering Section

CL:aac

Enclosures

c: William R. Johanning, P.E., Cochran Engineering, rjohanning@cochraneng.com

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION



CONSTRUCTION PERMIT

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

PUBLIC WATER SUPPLY DISTRICT NO. 3 OF FRANKLIN COUNTY, MISSOURI
FCPWSD #3, Red Barn WWTP
Hwy O & Arborview Drive
Villa Ridge, MO 63089

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.

March 25, 2026

Effective Date

March 24, 2028

Expiration Date

A handwritten signature in black ink, appearing to read 'Heather Peters', is written over a horizontal line.

Heather Peters, Director, Water Protection Program

CONSTRUCTION PERMIT

I. CONSTRUCTION DESCRIPTION

Replace existing treatment facility with a new activated sludge wastewater treatment facility to increase capacity in order to establish a regional treatment facility. Facility will be an activated sludge, SEQUOX BNR, process reactor. The plant will have a new influent lift station, mechanically cleaned screen, an anoxic-selector tank followed by two aeration tanks in series, then two clarifiers in parallel; also an aerobic digestion/holding tank for the sludge. New UV disinfection is provided after the clarifiers. The aeration tank from the existing plant will be used as emergency storage for the new influent lift station.

A closure plan will need to be submitted to the St. Louis Regional Office for review and approval prior to any closure activities.

This project will also include general site work appropriate to the scope and purpose of the project. Design flow of facility will increase to 150,000 GPD, the existing discharge pipe will be used with same outfall location. Discharge is to Bourbeuse River in Section 34, 43N, R1E, Franklin County.

II. COST ANALYSIS FOR COMPLIANCE

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

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

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

III. CONSTRUCTION PERMIT CONDITIONS

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

1. This construction permit does not authorize discharge.
2. All construction shall be consistent with plans and specifications signed and sealed by William R. Johanning, P.E. with Cochran Engineering and as described in this permit.
3. The department must be contacted in writing prior to making any changes to the plans and specifications that would directly or indirectly have an impact on the capacity, flow, system layout, or reliability of the proposed wastewater treatment facilities or any design parameter that is addressed by 10 CSR 20-8, in accordance with 10 CSR 20-8.110(11).
4. State and federal law does not permit bypassing of raw wastewater, therefore steps must be taken to ensure that raw wastewater does not discharge during construction. If a sanitary sewer overflow or bypass occurs, report the appropriate information to the department's 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 1 acre or more to obtain a Missouri state operating permit to discharge stormwater. The permit requires best management practices sufficient to control runoff and sedimentation to protect waters of the state. Land disturbance permits will only be obtained by means of the department's ePermitting system available online at <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. In accordance with 10 CSR 20-6.010(12), a full closure plan shall be submitted to the department's St. Louis Regional Office for review and approval of any permitted wastewater treatment system being replaced. The closure plan must meet the requirements outlined in Standard Conditions Part III of the Missouri State Operating Permit No. MO-0043362. Closure shall not commence until the submitted closure plan is approved by the department.
8. All construction must adhere to applicable 10 CSR 20-8 (Chapter 8) requirements listed below.

- Flood protection shall apply to new construction and to existing facilities undergoing major modification. The wastewater facility structures, electrical equipment, and mechanical equipment shall be protected from physical damage by not less than the one hundred- (100-) year flood elevation. 10 CSR 20-8.140(2)(B)
- Unless another distance is determined by the Missouri Geological Survey or by the department's Public Drinking Water Branch, the minimum distance between wastewater treatment facilities and all potable water sources shall be at least three hundred feet (300'). 10 CSR 20-8.140(2)(C)1.
- No treatment unit with a capacity of twenty-two thousand five hundred gallons per day (22,500 gpd) or less shall be located closer than the minimum distance of 200' to a neighboring residence and 50' to property line for lagoons; 200' to a neighboring residence for open recirculating media filters following primary treatment; and 50' to a neighboring residence for all other discharging facilities. See 10 CSR 20-2.010(68) for the definition of a residence. 10 CSR 20-8.140(2)(C)2
- 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 twenty-four (24) hour automatic composite sample or grab sample of the effluent discharge can be obtained at a point after the final treatment process and before discharge to or mixing with the receiving waters. 10 CSR 20-8.140(6)(B)
- All wastewater treatment facilities shall be provided with an alternate source of electric power or pumping capability to allow continuity of operation during power failures. 10 CSR 20-8.140(7)(A)1.
- Electrical systems and components in raw wastewater or in enclosed or partially enclosed spaces where hazardous concentrations of flammable gases or vapors that are normally present, shall comply with the NFPA 70 *National Electric Code (NEC)* (2017 Edition), as approved and published August 24, 2016, requirements for Class I, Division 1, Group D locations. 10 CSR 20-8.140(7)(B)
- An audiovisual alarm or a more advanced alert system, with a self-contained power supply, capable of monitoring the condition of equipment whose failure could result in a violation of the operating permit, shall be provided for all wastewater treatment facilities. 10 CSR 20-8.140(7)(C)
- No piping or other connections shall exist in any part of the wastewater treatment facility that might cause the contamination of a potable water supply. 10 CSR 20-8.140(7)(D)1.
- Where a potable water supply is to be used for any purpose in a wastewater treatment facility other than direct connections, a break tank, pressure pump, and pressure tank or a reduced pressure backflow preventer consistent with the

department's Public Drinking Water Branch shall be provided. 10 CSR 20-8.140(7)(D)3.A.

- For indirect connections, a sign shall be permanently posted at every hose bib, faucet, hydrant, or sill cock located on the water system beyond the break tank or backflow preventer to indicate that the water is not safe for drinking. 10 CSR 20-8.140(7)(D)3.B.
- A means of flow measurement shall be provided at all wastewater treatment facilities. 10 CSR 20-8.140(7)(E)
- Effluent twenty-four (24) hour composite automatic sampling equipment shall be provided at all mechanical wastewater treatment facilities and at other facilities where necessary under provisions of the operating permit. 10 CSR 20-8.140(7)(F)
- Adequate provisions shall be made to effectively protect facility personnel and visitors from hazards. The following shall be provided to fulfill the particular needs of each wastewater treatment facility:
 - Fencing. Enclose the facility site with a fence designed to discourage the entrance of unauthorized persons and animals; 10 CSR 20-8.140 (8) (A)
 - Gratings over appropriate areas of treatment units where access for maintenance is necessary; 10 CSR 20-8.140(8)(B)
 - First aid equipment; 10 CSR 20-8.140(8)(C)
 - Posted "No Smoking" signs in hazardous areas; 10 CSR 20-8.140(8)(D)
 - Appropriate personal protective equipment (PPE); 10 CSR 20-8.140(8)(E)
 - Portable blower and hose sufficient to ventilate accessed confined spaces; 10 CSR 20-8.140(8)(F)
 - 10 CSR 20-8.140(8)(G) Portable lighting equipment complying with NEC requirements. See subsection (7)(B) of this rule;
 - 10 CSR 20-8.140(8)(H) Gas detectors listed and labeled for use in NEC Class I, Division 1, Group D locations. See subsection (7)(B) of this rule;
 - Appropriately-placed warning signs for slippery areas, non-potable water fixtures (see subparagraph (7)(D)3.B. of this rule), low head clearance areas, open service manholes, hazardous chemical storage areas, flammable fuel storage areas, high noise areas, etc.; 10 CSR 20-8.140(8)(I)
 - Ventilation shall include the following:
 - Isolate all pumping stations and wastewater treatment components installed in a building where other equipment or offices are located from the rest of the building by an air-tight partition, provide separate outside entrances, and provide separate and independent fresh air supply; 10 CSR 20-8.140(8)(J)1.
 - Force fresh air into enclosed screening device areas or open pits more than four feet (4') deep. 10 CSR 20-8.140(8)(J)2.
 - Dampers are not to be used on exhaust or fresh air ducts. Avoid the use of fine screens or other obstructions on exhaust or fresh air ducts to prevent clogging; 10 CSR 20-8.140(8)(J)3.
 - Where continuous ventilation is needed (e.g., housed facilities), provide at least twelve (12) complete air changes per hour. Where continuous

- ventilation would cause excessive heat loss, provide intermittent ventilation of at least thirty (30) complete air changes per hour when facility personnel enter the area. Base air change demands on one hundred percent (100%) fresh air; 10 CSR 20-8.140(8)(J)4.
- Electrical controls. Mark and conveniently locate switches for operation of ventilation equipment outside of the wet well or building. Interconnect all intermittently operated ventilation equipment with the respective wet well, dry well, or building lighting system. The manual lighting/ventilation switch is expected to override the automatic controls. For a two (2) speed ventilation system with automatic switch over where gas detection equipment is installed, increase the ventilation rate automatically in response to the detection of hazardous concentrations of gases or vapors; 10 CSR 20-8.140(8)(J)5.
 - Fabricate the fan wheel from non-sparking material. Provide automatic heating and dehumidification equipment in all dry wells and buildings. 10 CSR 20-8.140(8)(J)6.
 - Explosion-proof electrical equipment, non-sparking tools, gas detectors, and similar devices, in work areas where hazardous conditions may exist, such as digester vaults and other locations where potentially explosive atmospheres of flammable gas or vapor with air may accumulate. 10 CSR 20-8.140(8)(K)
 - Provisions for local lockout/tagout on stop motor controls and other devices; 10 CSR 20-8.140(8)(L)
 - Provisions for an arc flash hazard analysis and determination of the flash protection boundary distance and type of PPE to reduce exposure to major electrical hazards shall be in accordance with NFPA 70E *Standard for Electrical Safety in the Workplace* (2018 Edition), as approved and published August 21, 2017. 10 CSR 20-8.140(8)(M)
- All wastewater treatment facilities must have a screening device, comminutor, or septic tank for the purpose of removing debris and nuisance materials from the influent wastewater. 10 CSR 20-8.150(2)
 - All screening devices and screening storage areas shall be protected from freezing. 10 CSR 20-8.150(4)(A)1.
 - Provisions shall be made for isolating or removing screening devices from their location for servicing. 10 CSR 20-8.150(4)(A)2.
 - Manually cleaned screen channels shall be protected by guard railings and deck gratings with adequate provisions for removal or opening to facilitate raking. 10 CSR 20-8.150(4) (A)3.A.(I)
 - Mechanically cleaned screen channels shall be protected by guard railings and deck gratings. 10 CSR 20-8.150(4)(A)3.A.(II)
 - Mechanical screening equipment shall have adequate removal enclosures to protect facility personnel against accidental contact with moving parts and to prevent dripping in multi-level installations. 10 CSR 20-8.150(4)(A)3.B.(I)

- A positive means of locking out each mechanical screening device shall be provided. 10 CSR 20-8.150(4)(A)3.B.(II)
- An emergency stop button with an automatic reverse function shall be located in close proximity to the mechanical screening device. 10 CSR 20-8.150(4)(A)3.B.(III)
- Where two (2) or more mechanically cleaned bar screens are used, the design shall provide for taking the largest unit out-of-service without sacrificing the capability to handle the average design flow. Where only one mechanically cleaned screen is used, it shall be sized to handle the design peak instantaneous flow. 10 CSR 20-8.150(4)(B)
- Effective flow splitting devices and control appurtenances (*e.g.* gates and splitter boxes) shall be provided to permit proper proportioning of flow and solids loading to each settling unit, throughout the expected range of flows. 10 CSR 20-8.160(2)(B)
- Overflow weirs shall be readily adjustable over the life of the structure to correct for differential settlement of the tank. 10 CSR 20-8.160(3)(C)1.
- Walls of settling tanks shall extend at least six inches (6") above the surrounding ground surface and shall provide not less than twelve inches (12") of freeboard. 10 CSR 20-8.160(3)(E)
- Safety features shall appropriately include machinery covers, life lines, handrails on all stairways and walkways, and slip resistant surfaces. For additional safety follow the provisions listed in 10 CSR 20-8.140(8). 10 CSR 20-8.160(5)(A)
- The design shall provide for convenient and safe access to routine maintenance items such as gear boxes, scum removal mechanism, baffles, weirs, inlet stilling baffle areas, and effluent channels. 10 CSR 20-8.160(5)(B)
- For electrical equipment, fixtures, and controls in enclosed settling basins and scum tanks, where hazardous concentrations of flammable gases or vapors may accumulate, follow the provisions in 10 CSR 20-8.140(7)(B). The fixtures and controls shall be conveniently located and safely accessible for operation and maintenance. 10 CSR 20-8.160(5)(C)
- 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)

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

The UV system shall include an alarm system. Alarm systems shall comply with 10 CSR 20-8.140(7)(C). 10 CSR 20-8.190(5)(C)2.

9. Upon completion of construction:

- A. A.PUBLIC WATER SUPPLY DISTRICT NO. 3 OF FRANKLIN COUNTY, MISSOURI will remain 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 to the department in accordance with 10 CSR 20-6.010(5)(N) (<https://dnr.mo.gov/document-search/wastewater-construction-statement-work-completed-mo-780-2155>) and request the operating permit modification public noticed on December 5, 2025, be issued. The operating permit modification fee if \$200.00 has been paid.

IV. REVIEW SUMMARY

1. CONSTRUCTION PURPOSE

Create a regional wastewater treatment facility to serve a portion of Franklin County and allow the consolidation and elimination of several existing wastewater treatment facilities. New treatment plant to be constructed at the site of an existing treatment plant.

2. FACILITY DESCRIPTION

The existing facility is an extended aeration treatment facility; including lift station, bar screen, secondary clarifiers and ultraviolet disinfection; sludge is held in an aerated holding basin. The existing facility has a design average flow of 50,000 gpd.

FCPWSD#3, Red Barn WWTP is located 250 feet south of Hwy O & Arborview Drive intersection, Villa Ridge, Franklin County, Missouri. The expanded facility will consist of an influent lift station, mechanically cleaned screen, activated sludge SEQUOX BNR process reactor, secondary clarifiers, and UV disinfection; sludge to be processed with aerobic digestion and holding tank. Facility will have a design average flow of 150,000 gpd and a hydraulic population equivalent of 1500. The existing outfall to remain in use, with discharge to the Bourbeuse River.

3. COMPLIANCE PARAMETERS

An antidegradation review was conducted as part of the planned expansion. The upgraded treatment plant is required to meet the following effluent limitations.

Parameter	Units	Monthly average limit
Biochemical Oxygen Demand ₅	mg/L	30
Total Suspended Solids	mg/L	30
Ammonia as N		
January	mg/L	6.4
February	mg/L	5.6
March	mg/L	6.4
April	mg/L	5.6
May	mg/L	4.6
June	mg/L	3.5
July	mg/L	3.1
August	mg/L	2.7
September	mg/L	3.7
October	mg/L	5.2
November	mg/L	6.4
December	mg/L	6.4
pH	SU	6.5-9.0
Oil and Grease	mg/L	10
<i>E. coli</i>	#/100mL	126

4. ANTIDegradation

The department has reviewed the antidegradation report for this facility and issued the Water Quality and Antidegradation Review dated October 11, 2022, due to increase in design flow. See **APPENDIX – ANTIDegradation**.

5. REVIEW of MAJOR TREATMENT DESIGN CRITERIA

The design flow of the existing facility is 0.05 MGD, with a design population equivalent of 800. The design flow of the new facility will be 0.15 MGD. The design of the treatment plant is such that expansion can take place by adding a similar treatment train utilizing common walls. The design sustainable peak, flow through, capacity of the plant is 0.45 MGD. The design peak hourly capacity is 0.55 MGD.

The plant lift station will pump all current flows and flows in the plant vicinity. A future regional pump station will pump flows from offsite directly to the headworks. The future regional pump station will service flows from the north side of Hwy I-44 and allow elimination of several existing treatment facilities. The existing outfall will be used and will remain in the same location.

New Construction

Project adds a new treatment facility with an average daily design flow capacity of 0.15 MGD. New treatment facility includes a lift station, headworks, pre-aeration selector basin, first and second aeration basins, final clarifiers, ultraviolet disinfection, aerated sludge digester and aeration blowers.

- Influent Lift Station – Construction of an influent lift station with two 5 HP submersible pumps, each capable of operating at 267 gpm at 37 feet of TDH. Wet well is a 10 ft. x 10 ft poured concrete structure. Discharge piping is 6-inch ductile iron pipe. The common force main header pipe is approximately 32 feet of 10 inch ductile iron pipe into the headworks screening structure.
- Emergency storage structure converted from existing aeration basin. Converted basin to have a capacity of approximately 74,300 gallons.
- Screening – Installation of screening devices removes nuisance inorganic materials from raw wastewater.
 - Mechanical Screen – One mechanically cleaned screen with a perforated rotary basket with 0.25 inch openings. The screening device is capable of treating a design average flow of 0.3 MGD and a peak hourly flow of 1.3 MGD.-A washer/compactor and screenings conveyor will mitigate the screenings captured by washing, dewatering, and compacting the screenings prior to disposal.
 - Coarse bar screen - A manually cleaned coarse bar screen in the dual channel with clear bar spacings of 0.75-inch and positioned at an angle of 45 degrees from the horizontal to allow for manual raking of the screen. The addition of a

manually cleaned coarse bar screen provides redundancy and a means of unit isolation for the mechanically cleaned screen.

- Activated Sludge Treatment. A two stage sequencing aeration, extended aeration arrangement with nitrification and denitrification. Process is an Aeromod, Sequox-Biological Nutrient Removal Process System Design. Three separate basins with aeration strategically sequenced on and off to achieve optimal treatment. Flow follows in order through the three basins then into clarifiers.
- Anaerobic tank (aka selector tank). Flow enters from the headworks, approximate volume of 21,150 gallons, 3.4 hrs. of detention at design flow. This tank is sized to be paired with the future Phase 2 treatment train. This tank also receives return activated sludge from clarifiers. Minimal aeration provided.
- First stage aeration tank. Approximate volume of 69,300 gallons, 11.1 hours of detention at design flow. Aeration to be sequentially applied in approximate 2 hour intervals in a manner that maximizes treatment, particularly nitrification.
- Second stage aeration tank. Approximate volume of 66,500 gallons, 10.6 hours of detention at design flow. Aeration to be sequentially applied in approximate 2 hour intervals in a manner that maximizes treatment.
- Secondary Clarifiers. Two clarifiers each with a rectangular dimension of 20 ft. by 12 ft. for a total combined surface area of 480 sq. ft. Provides a settling rate of 313 gal/sq. ft. at design flow and a settling rate of 1000 gal/sq. ft. at a peak flow of 0.48 MGD. The outlet is configured with a flow box to only allow a maximum flow of 0.48 MGD. Instantaneous flows in excess of this is stored and equalized within 5 inches of depth equivalent to approximately 5600 gallons. The overflow weir length is equivalent to 72 feet; the peak overflow rate is approximately 6,667 gpd/lf at a peak flow of 0.48 MGD. The solids loading rate is approximately 34 lbs/day/sq. ft. at peak flow. The design rates are within the values approved for innovative technology.
- Aeration Equipment. Three 25 H.P blowers, each with a capacity of 451 icfm, will supply air to the treatment facility and sludge digester. Coarse bubble diffusers to be used throughout the treatment plant.
- Aerobic Digester. Aerobic sludge digester with an approximate capacity of 6900 cu. ft. Capacity to treat and hold sludge for a minimum of 30 days
- Flow that is discharged will pass through ultraviolet disinfection during the recreational season.

- Closed Channel Ultraviolet (UV) – A closed channel, gravity flow, low pressure high intensity UV, non-contact, disinfection system capable of treating a peak flow of 0.615 MGD while delivering a minimum UV intensity of 30 mJ/cm² with an expected ultraviolet transmittance of 65%. One closed channel UV reactor will be provided, the reactor will have two banks, each bank contains five racks, each rack has 8 lamps, for a total of 80 lamps. The effluent flows by gravity through ultraviolet disinfection, disinfected flow goes by gravity to Outfall No. 001. Enaqua Model D2t.06042-U or equal.
- Flow Measurement - A 6-inch parshall flow flume and ultrasonic reader and recorder will also be installed downstream of the UV reactor.
- Emergency Power – A standby diesel generator and automatic transfer switch will be provided to operate the treatment facility in event of power failure. Generator is sized at 230 kW; sufficient capacity to fully operate facility.

6. OPERATING PERMIT

Operating permit MO-0043362 will require a modification to reflect the construction activities. The modified FCPWSD #3, Red Barn WWTP, MO-0043362, was successfully public noticed from December 5, 2025 to January 6, 2026, 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.

With your CP application, an operating permit modification was submitted for public notice to reflect the change in your operating permit. Your operating permit application for a renewal will be due before your CP is expired. The modification action does not fulfill the renewal application obligation. A renewal application must be filed before May 30, 2027. If you have questions on completing the renewal application, please contact the Operating permits section at 573-522-4502.

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:

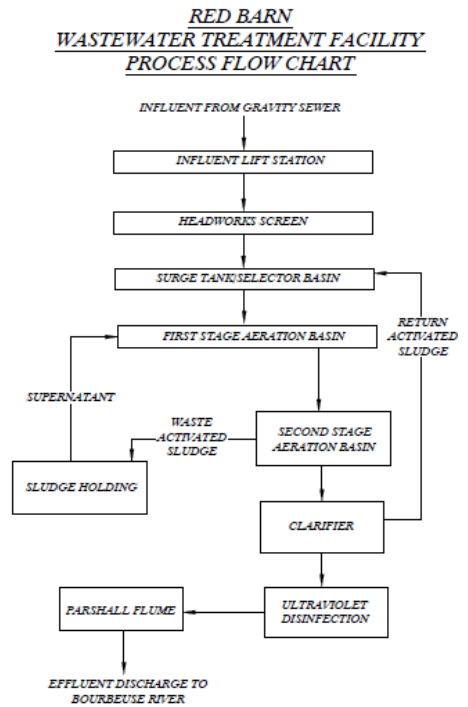
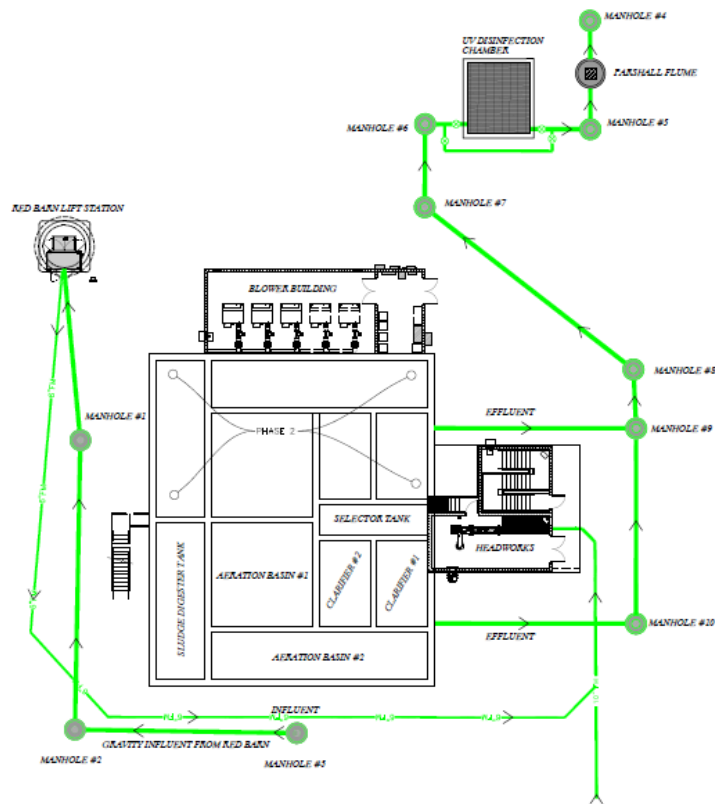
Administrative Hearing Commission
U.S. Post Office Building, Third Floor
131 West High Street, P.O. Box 1557
Jefferson City, MO 65102-1557
Phone: 573-751-2422
Fax: 573-751-5018
Website: <https://ahc.mo.gov>

Andrew Appelbaum, P.E.
Engineering Section

APPENDICES

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

APPENDIX A: PROCESS FLOW DIAGRAM



APPENDIX B: COST OF COMPLIANCE

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

**FCPWSD #3, Red Barn WWTP, Permit Modification
PUBLIC WATER SUPPLY DISTRICT NO. 3 OF FRANKLIN COUNTY, MISSOURI
Missouri State Operating Permit #MO-0043362**

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

New Permit Requirements

The permit requires compliance with new monitoring requirements for BOD, TSS, *E. coli*, Ammonia as N, Total Kjeldahl Nitrogen, Nitrate + Nitrite, and Total Phosphorus.

Connections

The number of connections was reported by the permittee on the permit renewal application.

Connection Type	Number
Residential	230
Commercial	
Industrial	
Facility Total	230
Sewer District Total	NA

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 sewer district’s financial and socioeconomic situation. The financial questionnaire available to permittees on the department’s website (<https://dnr.mo.gov/document-search/financial-questionnaire-mo-780-2511>) is a required attachment to the permit renewal application. If the financial questionnaire is not submitted with the renewal application, the department sends a request to complete the form with the welcome correspondence. Though the department has made attempts to gather financial information from the PUBLIC WATER SUPPLY DISTRICT NO. 3 OF FRANKLIN COUNTY; no information has been provided. The department has relied heavily on readily available data to complete this analysis. 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 Franklin County	
Current Monthly User Rates per 5,000 gallons*	NA
Median Household Income (MHI) ¹	\$74,096
Current Annual Operating Costs (excludes depreciation)	NA

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

This facility operates as part of a sewer district. A sewer district provides public utilities to residents of that district; therefore, it may structure rates in ways that fund: (1) the facility in which the user is connected to and (2) all facilities contained in the sewer district. As a result, without detailed information about the sewer district's rate structure, the department is unable to determine how the costs associated with the operation, maintenance, sampling, and compliance of permit requirements are divided amongst all users within the sewer district. Therefore, the department cannot determine the future rates for the members of the sewer district based on the estimated costs to upgrade the FCPWSD #3, Red Barn WWTP. Also, because the service jurisdiction of the geographical area of which the sewer district serves can vary, the correct MHI of users within this sewer district's service area cannot be determined using the data from the U.S. Census Bureau. This is because the MHI of a sewer district's service area is not based on data from a single city, village, or town.

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

Criterion 2A Table. Estimated Cost Breakdown of New Permit Requirements			
New Requirement	Frequency	Estimated Cost	Estimated Annual Cost
Total Phosphorus – Influent	Quarterly	\$27.5 x 4	\$110.00
Total Kjeldahl Nitrogen - Influent	Quarterly	\$45 x 4	\$180.00
Nitrate + Nitrite - Influent	Quarterly	\$47 x 4	\$188.00
Ammonia - Influent	Quarterly	\$47 x 4	\$188.00
BOD - Effluent	Monthly§	\$46.50 x 8	\$372.00
TSS – Effluent	Monthly§	\$17 x 8	\$136.00
<i>E. coli</i>	Weekly§	\$33 x 28	\$924.00
Ammonia – Effluent	Monthly§	\$47 x 8	\$376.00
Total Phosphorus – Effluent	Quarterly	\$27.50 x 4	\$110.00
Total Kjeldahl Nitrogen - Effluent	Quarterly	\$47 x 4	\$180.00
Nitrate + Nitrite - Effluent	Quarterly	\$44 x 4	\$188.00
Total Estimated Annual Cost of New Permit Requirements			\$2,952

§ - previously sampled quarterly

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

This analysis is being conducted based on new requirements in the permit, which will not require the addition of new control technologies at the facility. However, the new sampling requirements are being established in order to provide data regarding the health of the receiving stream's aquatic life and to ensure that the existing permit limits are providing adequate protection of aquatic life. Improved wastewater provides benefits such as avoided health costs due to water-related illness, enhanced environmental ecosystem quality, and improved natural resources. The preservation of natural resources has been proven to increase the economic value and sustainability of the

surrounding communities. Maintaining Missouri's water quality standards fulfills the goal of restoring and maintaining the chemical, physical, and biological integrity of the receiving stream; and, where attainable, it achieves a level of water quality that provides for the protection and propagation of fish, shellfish, wildlife, and recreation in and on the water.

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

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

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

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

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

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

No.	Administrative Unit	Franklin County	Missouri State	United States
1	Population (2023)	105,316	6,168,181	332,387,540
2	Percent Change in Population (2000-2023)	12.3%	10.2%	18.1%
3	2023 Median Household Income (in 2024 Dollars)	\$74,096	\$70,567	\$80,011
4	Percent Change in Median Household Income (2000-2023)	-8.2%	-1.1%	1.9%
5	Median Age (2023)	41.4	38.9	38.7
6	Change in Median Age in Years (2000-2023)	5.1	2.7	3.5
7	Unemployment Rate (2023)	4.4%	4.1%	5.2%
8	Percent of Population Below Poverty Level (2023)	8.2%	12.6%	12.4%
9	Percent of Household Received Food Stamps (2023)	7.6%	9.9%	11.8%

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

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

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

The new requirements associated with this permit will not impose a financial burden on the community, nor will they require the PUBLIC WATER SUPPLY DISTRICT NO. 3 OF FRANKLIN COUNTY to seek funding from an outside source.

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

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

Conclusion and Finding

As a result of new regulations, the department is proposing modifications to the current operating permit that may require the permittee to increase monitoring. The department has considered the eight (8) criteria presented in subsection 644.145 RSMo to evaluate the cost associated with the new permit requirements.

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

References

1. (A) 2023 MHI in 2023 Dollar: United States Census Bureau. 2019-2023 American Community Survey 5-Year Estimates, Table B19013: Median Household Income in the Past 12 Months (in 2023 Inflation-Adjusted Dollars). <https://data.census.gov/cedsci/table?q=B19013&tid=ACSDT5Y2023.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) 2024 CPI and 1999 CPI: U.S. Department of Labor Bureau of Labor Statistics (2024) 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) 2023 MHI in 2024 Dollar = 2023 MHI in 2023 Dollar x 2024 CPI / 2024 CPI; 2000 MHI in 2024 Dollar = 2000 MHI in 1999 Dollar x 2024 CPI / 1999 CPI.
(E) Percent Change in Median Household Income (2000-2023) = (2023 MHI in 2024 Dollar - 2000 MHI in 2024 Dollar) / (2000 MHI in 2024 Dollar).
2. (A) Total Population in 2023: United States Census Bureau. 2019-2023 American Community Survey 5-Year Estimates, Table B01003: Total Population - Universe: Total Population. <https://data.census.gov/cedsci/table?q=B01003&tid=ACSDT5Y2023.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 (2000-2023) = (Total Population in 2023 - Total Population in 2000) / (Total Population in 2000).
3. Median Age in 2023: United States Census Bureau. 2019-2023 American Community Survey 5-Year Estimates, Table B01002: Median Age by Sex - Universe: Total population. <https://data.census.gov/cedsci/table?q=B01002&tid=ACSDT5Y2023.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 (2000-2023) = (Median Age in 2023 - Median Age in 2000).
4. United States Census Bureau. 2019-2023 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=ACSST5Y2023.S2301>.
5. United States Census Bureau. 2019-2023 American Community Survey 5-Year Estimates, Table S1701: Poverty Status in the Past 12 Months. <https://data.census.gov/cedsci/table?q=S1701&tid=ACSST5Y2023.S1701>.
6. United States Census Bureau. 2019-2023 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=ACSST5Y2023.S2201>.

APPENDIX C: ANTIDEGRADATION REVIEW

Water Quality and Antidegradation Review

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

Bourbeuse River

By

FCPWDS #3 – Red Barn WWTF
Red Barn WWTF Improvements



October, 2022

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PERMIT LIMITS AND MONITORING INFORMATION

Proposed Monitoring Parameters and Effluent Limits – Outfall 001

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		45	30	45/30	1/month	monthly	C
TSS	mg/L	1,4,5		45	30	45/30	1/month	monthly	C
<i>Escherichia coli</i> **	#/100mL	1,3		630	126	630/126	1/month	monthly	G
Ammonia as N (January)	mg/L	4,5	12.2		6.4	*/	1/month	monthly	C
(February)			10.2		5.6	*/	1/month	monthly	C
(March)			12.1		6.4	*/	1/month	monthly	C
(April)			12.2		5.6	*/	1/month	monthly	C
(May)			12.2		4.6	*/	1/month	monthly	C
(June)			12.2		3.5	*/	1/month	monthly	C
(July)			12.2		3.1	*/	1/month	monthly	C
(August)			10.2		2.7	*/	1/month	monthly	C
(September)			12.2		3.7	*/	1/month	monthly	C
(October)			12.2		5.2	*/	1/month	monthly	C
(November)			12.2		6.4	*/	1/month	monthly	C
(December)			12.2		6.4	*/	1/month	monthly	C
Oil & Grease	mg/L	1,3	15		10	15/10	1/quarter	quarterly	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
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

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

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

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 | |

PERMITTED FEATURE – INF - INFLUENT MONITORING

PARAMETER	Unit	Basis for Limits	Daily Maximum	Weekly Average	Monthly Average	Previous Permit Limit	Sampling Frequency	Reporting Frequency	Sample Type**
Ammonia as N	mg/L	1	*		*	***	1/quarter	quarterly	C
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
BOD ₅ Percent Removal	mg/L	1			*	*	1/quarter	quarterly	C
TSS Percent Removal	mg/L	1			*	*	1/quarter	quarterly	C

* - Monitoring requirement only

** - C - Composite

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

PURPOSE OF ANTIDEGRADATION REVIEW REPORT

The existing Franklin County Public Water Supply District (FCPWSD) #3, Red Barn Wastewater Treatment Plant (WWTP) is constructed as an extended aeration treatment plant with clarification, ultraviolet (UV) disinfection, and an aerated sludge holding basin with a design flow of 50,000 gpd and actual flow of 14,700 gpd. The current system is capable of meeting operating permit conditions.

The proposed expansion to FCPWSD #3, Red Barn WWTP is intended to establish a regional facility for FCPWSD. The expanded FCPWSD #3, Red Barn WWTP will have a design flow of 150,000 gpd and will provide the capacity to consolidate Charing Cross, Golden Pond, and Woodridge Farms into the new Red Barn WWTP. The existing Red Barn WWTP will be closed as a result of the new plant construction.

Facility Name	Permit #	Design Flow (gpd)	Actual Flow (gpd)
Charing Cross	MO-0114987	68,800	16,000
Golden Pond	MO-0108251	16,700	5,300
Woodridge Farms	MO-0105589	14,400	2,700
Red Barn	MO-0043362	50,000	14,700
Red Barn (Expanded)	MO-0043362	150,000	NA

With the selection of the regionalization alternative, four treatment plant alternatives were evaluated for the chosen site of the Red Barn Plant including spray surface irrigation, recirculating sand filter, extended aeration plant, and Schreiber continuously sequencing reactor. The extended aeration plant is recommended as the preferred alternative due to the land area constraints at the site.

During the 2022 operating permit renewal, the receiving stream classification changed from 100K Extent-Remaining Streams to a direct discharge to the Bourbeuse River. Previous operating permits did not have the discharge location conveyed correctly. A map of the appropriate discharge location can be viewed in Appendix A. The Bourbeuse River low flow values can be viewed in Appendix E.

Cochran prepared and submitted the *Antidegradation Review* dated September 2022 on behalf of Public Water Supply District No. 3 of Franklin County. 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).

FACILITY INFORMATION

Facility Name:	FCPWDS #3, Red Barn WWTP
Address:	0.5 miles south of Hwy O & Arborview Drive Intersection, Villa Ridge MO 63089
Permit #:	MO-0043362
County:	Franklin
Facility Type:	POTW
Owner:	PUBLIC WATER SUPPLY DISTRICT NO. 3 OF FRANKLIN COUNTY, MISSOURI
Continuing Authority:	Same as Owner
UTM Coordinates:	X = 683080 ; Y = 4256164
Legal Description:	Sec 27, T43N, R01E
Ecological Drainage Unit:	Ozark Meramec

FACILITY HISTORY

The facility is permitted as a POTW constructed with a lift station, bar screen, extended aeration, clarification, UV disinfection, and aerated sludge holding basin with the sludge disposed by a contract hauler. The current design flow is 50,000 gpd, and the actual flow is 14,770 gpd. Red Barn is located at Highway O, Villa Ridge, MO 63089. Red Barn treatment plant operates under Permit No. MO-0043362. The permit's expiration date is September 30, 2022. The recently issued permit for this facility adds ammonia requirements effective September 1, 2020. The existing facility is designed to serve a population of 1,026 people. The design sludge production is 18.5 dry tons/year. Although this facility is old and in poor condition, it has met its permit requirements. However, the facility would not have met its ammonia requirement during one instance in the past two years. The treatment plant is operated by Franklin County Public Water Supply District #3.

FACILITY PERFORMANCE HISTORY:

A review of the past 5 years of Discharge Monitoring Report data shows no exceedances in the permitted effluent limit parameters.

RECEIVING WATERBODY INFORMATION

OUTFALL(S) TABLE:

OUTFALL	DESIGN FLOW (CFS)	TREATMENT LEVEL	EFFLUENT TYPE
001	0.2325	Secondary	Domestic

RECEIVING STREAM(S) TABLE:

WATER-BODY NAME	CLASS	WBID	DESIGNATED USES*	12-DIGIT HUC	DISTANCE TO CLASSIFIED SEGMENT (MI)
Bourbeuse River 303(d)	P	2034	AQL, CLF, DWS, WBC-A, SCR, HHP, IRR, LWW	07140103-0405	0.0

* 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
Bourbeuse River	11.3	13	16.5

*Low flow values obtained from USGS StreamStats. <https://streamstats.usgs.gov/ss/>. See **APPENDIX E: STREAMSTATS REPORT**.

Receiving Water Body Segment Outfall #1:		
Upper end segment* UTM coordinates:	X = 683080 ; Y = 4256164	outfall
Lower end segment* UTM coordinates:	X = 683864 ; Y = 4255830	downstream 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 has been requested and is not completed at the time of this review. This review assumes gaining stream characteristics for the receiving stream, Bourbeuse River. If the geohydrologic evaluation identifies losing characteristics, then this WQAR will be revised to incorporate any changes in effluent limit derivation.

EXISTING WATER QUALITY

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

MIXING CONSIDERATIONS

MIXING CONSIDERATIONS TABLE:

MIXING ZONE (CFS) [10 CSR 20-7.031(5)(A)4.B.(II)(a)]			ZONE OF INITIAL DILUTION (CFS) [10 CSR 20-7.031(5)(A)4.B.(II)(b)]		
1Q10	7Q10	30Q10	1Q10	7Q10	30Q10
2.825	3.25	4.125	0.2825	0.325	N/A

RECEIVING WATER MONITORING REQUIREMENTS

No receiving water monitoring requirements recommended at this time.

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* dated September, 2022.

A. TIER DETERMINATION

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

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

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

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

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

Pollutants of Concern and Tier Determination

Pollutants of Concern	Tier	Degradation	Comment
Biological Oxygen Demand (BOD ₅)/DO	2*	Significant	
Total Suspended Solids (TSS)	**	Significant	
Ammonia as N	2*	Significant	
<i>Escherichia coli</i> (<i>E. coli</i>)	2*	N/A	Permit Limits Applied
Phosphorus, Total	2*	Significant	Permit Limits Applied
Nitrogen, Total	2*	Significant	Permit Limits Applied
pH	***	N/A	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 stream, Bourbeuse River (P), is listed on the 2020 303(d) list for atmospheric deposition of mercury in fish tissue. There is no TMDL for this listing. The FCPWSD #3 - Red Barn is not considered to be a source of the above listed pollutant or considered to contribute to the impairment of the Bourbeuse River.

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

B. NECESSITY OF DEGRADATION

The AIP specifies that if the proposed activity does result in 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.

Regionalization

The preferred alternative is a regionalization project where FCPWSD #3 – Red Barn WWTF is the destination facility for consolidation. This regionalization alternative was evaluated and determined to be practicable and preferred. Alternative 3, Extended Aeration, was selected as the preferred treatment system to be constructed at the Red Barn Site.

No Discharge Evaluation

Alternative 1 – Spray Surface Irrigation Land Dispersal

The total area required for surface irrigation for all four plants is approximately 83.97 acres. Some sites exist to the northeast of the Red Barn site. Additional storage would need to be constructed to meet the required storage for a 90 day period. A 9.85 acre retention pond would need to be constructed to hold the anticipated 150,000 gpd. The added maintenance and lack of experience with land application of district staff excludes this as this as the recommended option.

Alternatives to No discharge

Alternative 2: Recirculating Sand Filter – Base Case

Alternative 2 is a recirculating sand filter constructed at the Red Barn site. The recirculating sand filter will have a difficult time meeting more stringent ammonia limits in the future and may require tertiary treatment. The smaller land area available at Red Barn makes this alternative undesirable for the district.

Alternative 3: Extended Aeration

Alternative 3 is an extended aeration plant constructed at the Red Barn site. The extended aeration plant will be able to meet more stringent ammonia limits easier if they are imposed in the future. For this alternative, the existing plant structures could be utilized for flow equalization. With the lower construction cost and higher treatment capability, this alternative is a practicable alternative for the district.

Alternative 4: Schreiber Continuously Sequencing Reactor

Alternative 4 is a Schreiber Continuously Sequencing Reactor constructed at the Red Barn site. This treatment system is a biological nutrient removal system contained in a single basin, conducting 3 process phases in one basin. This system's unique design allows for complete separation of aeration and mixing. Due to the topographic layout of the Red Barn WWTF site, the placement of the CSR treatment plant configuration would be difficult for the site and less than ideal. The different basins of the extended aeration plant can be elongated or stretched to work

with the topography of the site. The CSR plant is a viable option of treatment for the district, but not recommended due to site constraints.

Preferred Alternative

Alternative 3, Extended Aeration, was selected as the preferred alternative due to its affordability, lower construction footprint, and capability to treat ammonia and nitrogen.

Alternatives Analysis Comparison

Pollutant	Alternative 2 (Base Case) Recirculating Sand Filter	Alternative 3 Extended Aeration	Alternative 4 Schreiber Continuously Sequencing Reactor
BOD ₅	≤ 30 mg/l	≤ 30 mg/l	≤ 30 mg/l
TSS	≤ 30 mg/l	≤ 30 mg/l	≤ 30 mg/l
Ammonia as N	≤ 2.7 mg/l	≤ 2.7 mg/l	≤ 2.7 mg/l
Total Present Value**	\$7,757,539	\$8,081,918	\$8,368,915
Ratio	100%	104%	108%
Practicable	Yes	Yes	Yes
Affordable	Yes	Yes	Yes
Preferred	No	Yes	No

* monitoring requirement

** Total Present Value at 20 year design life and 5% interest

C. SOCIAL AND ECONOMIC IMPORTANCE

The affected community consists of Union, Villa Ridge, and Franklin. The newly established regional facility will establish a reliable treatment system for the FCPWSO #3 and will help facilitate residential and commercial expansions of the region. This growth could create job opportunities and increase the tax base. The improved treatment system will have better capability to treat for ammonia and total nitrogen. The facility serves the environmental and economic interests of both the State of Missouri and the local communities.

D. NATURAL HERITAGE REVIEW

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

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

DERIVATION AND DISCUSSION OF PARAMETERS AND LIMITS

Wasteload allocations and limits were calculated using two methods:

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

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

Where

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

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

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

B. **Alternative Analysis-based** – Using the preferred alternative's treatment capacity for conventional pollutants such as BOD₅ and TSS that are provided by the consultant as the WLA, the 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).** Effluent limits of 30 mg/L average monthly and 45 mg/L average weekly were established as a result of a discharging technology alternatives analysis conducted by the applicant. These limits are at least as stringent as the minimum effluent regulations established in 10 CSR 20-7.015(8).

Dissolved Oxygen Modeling

MDNR developed a Streeter-Phelps DO model using site-specific water quality parameters for the Bourbeuse River. The model included in Appendix D used inputs of temperature at 26 °C, initial DO of 7.5 mg/L in the receiving stream, effluent CBOD₅ of 50 mg/L, and effluent NBOD₅ of 119 mg/L. Staff also assumed 2.5 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 QBEL 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 a critical DO concentration of 7.39 mg/L, which was the lowest DO concentration resulting from BOD decay. Staff considers the BOD₅ effluent limitations of 45 mg/L as the average weekly and 30 mg/L as the monthly average protective of aquatic life.

- **Total Suspended Solids (TSS)**. Effluent limits of 30 mg/L average monthly and 45 mg/L average weekly maximum were established as a result of a discharging technology alternatives analysis conducted by the applicant. These limits are at least as stringent as the minimum effluent regulations established in 10 CSR 20-7.015(8).
- **Escherichia coli (E. coli)**. Monthly average of 126 per 100 mL as a geometric mean and Weekly Average of 630 per 100 mL as a geometric mean during the recreational season (April 1 – October 31), for discharges within two miles upstream of segments or lakes with Whole Body Contact Recreation (A) designated use of the receiving stream, as per 10 CSR 20-7.015(9)(B). An effluent limit for both monthly average and weekly average is required by 40 CFR 122.45(d). The Geometric Mean is calculated by multiplying all of the data points and then taking the nth root of this product, where n = # of samples collected. For example: Five *E. coli* samples were collected with results of 1, 4, 6, 10, and 5 (#/100mL). Geometric Mean = 5th root of (1)(4)(6)(10)(5) = 5th root of 1,200 = 4.1 #/100mL.
- **Total Ammonia Nitrogen**. Total Ammonia Nitrogen (TAN) effluent limits for the expanded facility are presented below. The selected limits will be implemented as Preferred Alternative Effluent Limits.

TAN Water Quality Model Effluent Limits for the Expanded FCPWSD #3 – Red Barn WWTF at the Design Flow of 150,000 gpd

Month	Daily Maximum Limit mg/L	Monthly Average Limit mg/L	Basis of Effluent Limit
January	12.2	6.4	PEL
February	10.2	5.6	PEL
March	12.1	6.4	PEL
April	12.2	5.6	PEL
May	12.2	4.6	PEL
June	12.2	3.5	PEL
July	12.2	3.1	PEL
August	10.2	2.7	PEL
September	12.2	3.7	PEL
October	12.2	5.2	PEL
November	12.2	6.4	PEL
December	12.2	6.4	PEL

PEL – Preferred Alternative Effluent Limit

Comparison of Total Ammonia as Nitrogen Water Quality Based and Preferred Alternative Effluent Limits for the Expanded FCPWSD #3 – Red Barn WWTF at a Design Flow of 150,000 gpd

Month	MDNR QBEL		PEL	
	MDL mg/L	AML mg/L	MDL mg/L	AML mg/L
January	26.9	26.9	12.2	6.4
February	22.4	22.4	10.2	5.6
March	26.9	26.9	12.1	6.4
April	26.9	26.9	12.2	5.6
May	26.9	26.9	12.2	4.6
June	26.9	26.9	12.2	3.5
July	26.9	26.9	12.2	3.1

August	22.4	22.4	10.2	2.7
September	26.9	26.9	12.2	3.7
October	26.9	26.9	12.2	5.2
November	26.9	26.9	12.2	6.4
December	26.9	26.9	12.2	6.4

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.

Preferred Alternative Effluent Limits for Total Ammonia
 as Nitrogen for the FCPWSD #3 – Red Barn WWTF
 Expansion to 150,000 gpd

Month	TAN MDL (mg/L)	TAN AML (mg/L)
January	12.2	6.4
February	10.2	5.6
March	12.1	6.4
April	12.2	5.6
May	12.2	4.6
June	12.2	3.5
July	12.2	3.1
August	10.2	2.7
September	12.2	3.7
October	12.2	5.2
November	12.2	6.4
December	12.2	6.4

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

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)

January AML = 26.9 mg/L MDL = 26.9 mg/L	February AML = 22.4 mg/L MDL = 22.4 mg/L	March AML = 26.9 mg/L MDL = 26.9 mg/L
April AML = 26.9 mg/L	May AML = 26.9 mg/L	June AML = 26.9 mg/L

MDL = 26.9 mg/L	MDL = 26.9 mg/L	MDL = 26.9 mg/L
<u>July</u> AML = 26.9 mg/L MDL = 26.9 mg/L	<u>August</u> AML = 22.4 mg/L MDL = 22.4 mg/L	<u>September</u> AML = 26.9 mg/L MDL = 26.9 mg/L
<u>October</u> AML = 26.9 mg/L MDL = 26.9 mg/L	<u>November</u> AML = 26.9 mg/L MDL = 26.9 mg/L	<u>December</u> AML = 26.9 mg/L MDL = 26.9 mg/L

WBQEL equation

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

- **Oil & Grease.** Conventional pollutant, effluent limitation for protection of aquatic life; 10 mg/L monthly average, 15 mg/L daily maximum. According to 10 CSR 20-7.031(4)(B), waters shall be free from oil, scum, and floating debris in sufficient amounts to be unsightly or prevent full maintenance of designated uses.
- **Total Phosphorus, Total Kjeldahl Nitrogen, & Nitrate + Nitrite.** 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 limitations 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.
- **Biochemical Oxygen Demand (BOD₅) Percent Removal.** In accordance with 40 CFR Part 133, removal efficiency is a method by which the Federal Regulations define Secondary Treatment and Equivalent to Secondary Treatment, which applies to BOD₅ and TSS for Publicly Owned Treatment Works (POTWs)/municipals. This facility is required to meet 85% removal efficiency for BOD₅.
- **Total Suspended Solids (TSS) Percent Removal.** In accordance with 40 CFR Part 133, removal efficiency is a method by which the Federal Regulations define Secondary Treatment and Equivalent to Secondary Treatment, which applies to BOD₅ and TSS for Publicly Owned Treatment Works (POTWs)/municipals. This facility is required to meet 85% removal efficiency for TSS.

Influent Permitted Feature – INF

- **Biochemical Oxygen Demand (BOD₅) and Total Suspended Solids (TSS).** An influent sample is required to determine the removal efficiency. 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.
- **Total Phosphorus, Total Kjeldahl Nitrogen, Nitrite + Nitrate, and Ammonia.** Influent monitoring for Total Phosphorus, Total Kjeldahl Nitrogen, Nitrite + Nitrate, and Ammonia required per 10 CSR 20-7.015(9)(D)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.

- F. A WQAR does not allow discharges to waters of the State, and shall not be construed as a National Pollution Discharge Elimination System (NPDES) or Missouri State Operating Permit to discharge or a permit to construct, modify, or upgrade.
- G. Limitations and other requirements in a WQAR may change as Water Quality Standards (WQS), Methodology, and Implementation procedures change.
- H. Nothing in this WQAR removes any obligations to comply with county or other local ordinances or restrictions.
- I. The operating permit may contain additional requirements to evaluate the effectiveness of the technology once the facility is in operation. This Antidegradation Review is based on the information provided by the facility and is not a comprehensive review of the proposed treatment technology. If the review engineer determines the proposed technology will not consistently meet proposed effluent limits, the permittee will be required to revise their Antidegradation Report.

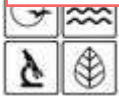
ANTIDEGRADATION REVIEW PRELIMINARY DETERMINATION

The proposed expanded facility discharge will result in significant degradation of the Bourbeuse River. Alternative 2, Recirculating Sand Filter, was determined to be the Base Case Alternative (lowest cost alternative that meets technology and water quality based effluent limitations). The Preferred Alternative of Extended Aeration, Alternative 3, was selected due to the affordability, treatment capability, and smaller area required for construction. The other technologies evaluated, Recirculating Sand Filter and Schreiber Continuously Sequencing Reactor were not selected due to size constraints at the site and elevated project cost. Alternatives 2, 3, and 4 may be selected by the district as long as they are designed to meet the effluent limits identified in this WQAR.

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

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

Rcvd 3/10/25



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

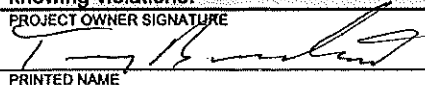
1.0 APPLICATION INFORMATION (Note – If any of the questions in this section are answered NO, this application may be considered incomplete and returned.)

- 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: 10/1/22 ☐ 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

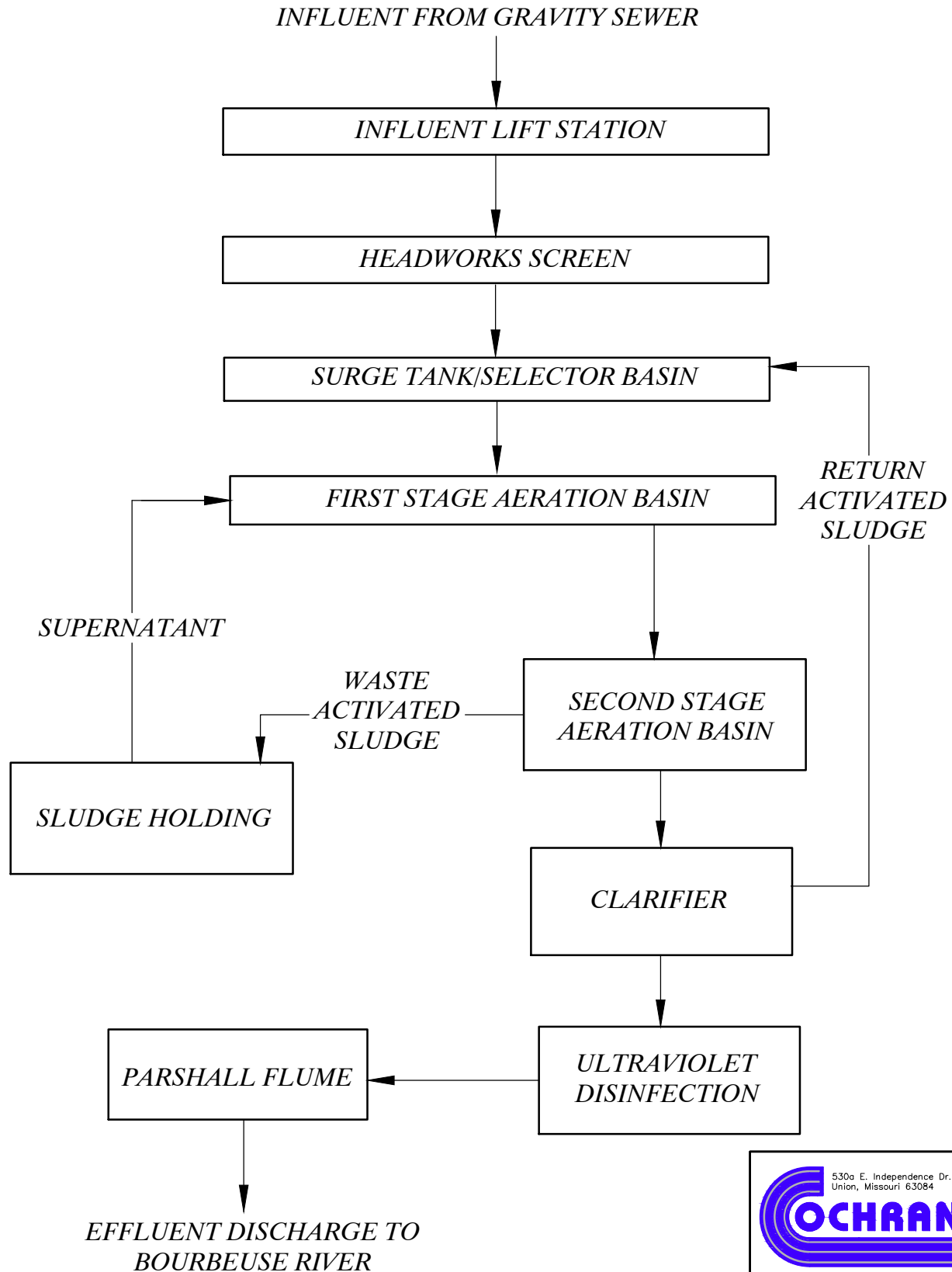
* Must be affixed with a Missouri registered professional engineer's seal, signature and date.

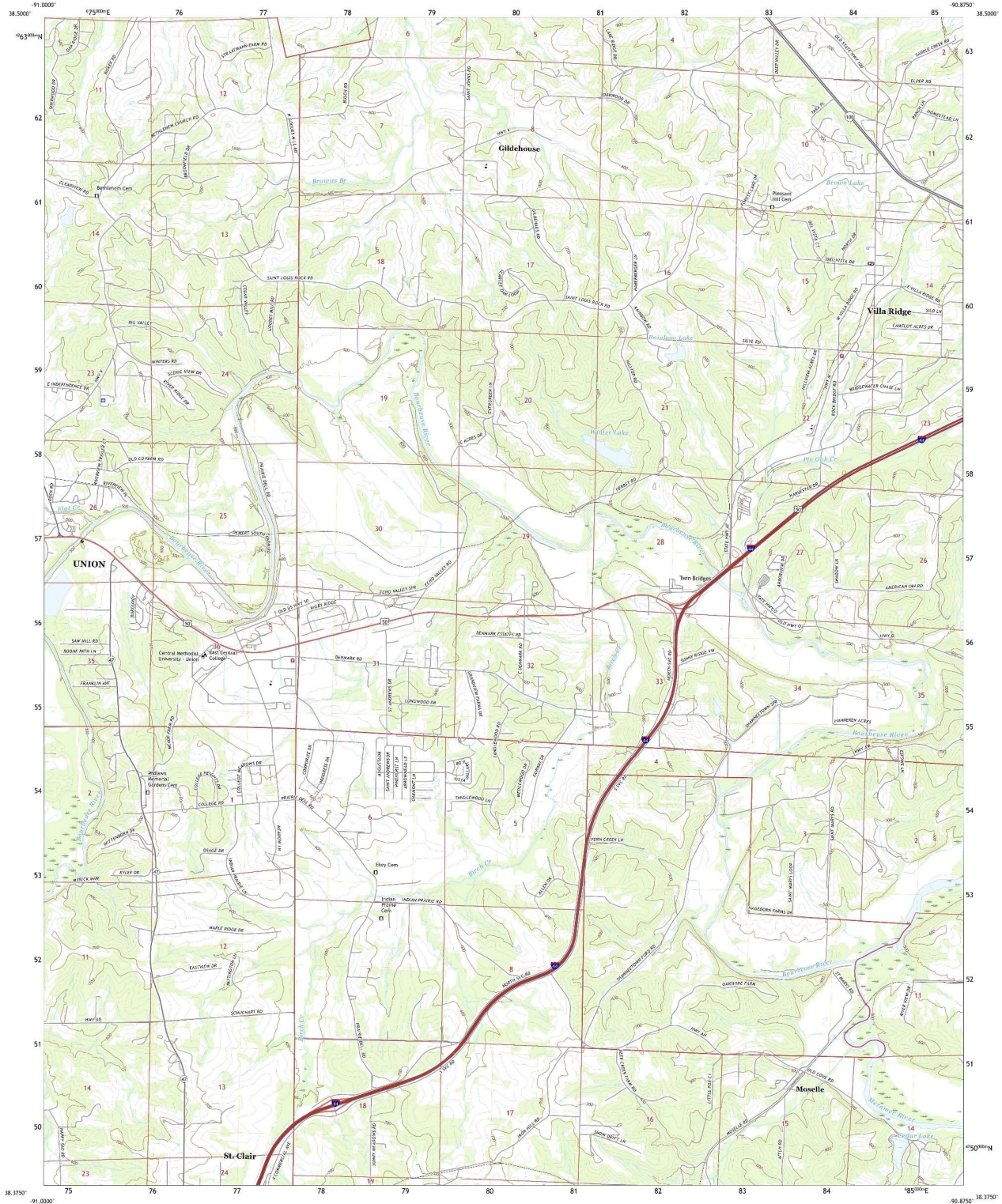
2.0 PROJECT INFORMATION

2.1 NAME OF PROJECT PWSD No. 3 of Franklin County - Red Barn WWTF	2.2 ESTIMATED PROJECT CONSTRUCTION COST \$ 6,995,000.00
2.3 PROJECT DESCRIPTION A new modified extended aeration WWTF will be constructed on the PWSD No. 3 owned property at the Red Barn site to continue serving the Red Barn Subdivision and have capacity to regionalize existing flows throughout the district to the Red Barn site.	
2.4 SLUDGE HANDLING, USE AND DISPOSAL DESCRIPTION The treatment plant will have sludge collected in a digester, the supernate pumped back into the process flow & remaining sludge will be hauled by a licensed hauler to an accepting facility. Existing sludge to remain onsite & used to seed new plant.	
2.5 DESIGN INFORMATION A. Current population: <u>1640</u> ; Design population: <u>2000</u> B. Actual Flow: <u>32,870</u> gpd; Design Average Flow: <u>150,000</u> gpd; Actual Peak Daily Flow: <u>130,000</u> gpd; Design Maximum Daily Flow: <u>200,000</u> gpd; Design Wet Weather Event: <u>260,000</u>	
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 PWSD No. 3 of Franklin Co. - Red Barn WWTF		TELEPHONE NUMBER WITH AREA CODE 636-742-5200		E-MAIL ADDRESS tbaretich@alliancewater.com
ADDRESS (PHYSICAL) 150 Old Highway 100, PO Box 160	CITY Villa Ridge	STATE MO	ZIP CODE 63089	COUNTY Franklin
Wastewater Treatment Facility: Mo- 0033847 (Outfall Of)				
3.1 Legal Description: SW ¼, SW ¼, SE ¼, Sec. 27, T 43N, R 1E (Use additional pages if construction of more than one outfall is proposed.)				
3.2 UTM Coordinates Easting (X): 683146 Northing (Y): 4256294 For Universal Transverse Mercator (UTM), Zone 15 North referenced to North American Datum 1983 (NAD83)				
3.3 Name of receiving streams: Bourbeuse River				
4.0 PROJECT OWNER				
NAME PWSD No. 3 of Franklin County		TELEPHONE NUMBER WITH AREA CODE 636-742-5200		E-MAIL ADDRESS tbaretich@alliancewater.com
ADDRESS 150 Old Highway 100, PO Box 160	CITY Villa Ridge	STATE MO	ZIP CODE 63089	
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 PWSD No. 3 of Franklin County		TELEPHONE NUMBER WITH AREA CODE 636-742-5200		E-MAIL ADDRESS tbaretich@alliancewater.com
ADDRESS 150 Old Highway 100, PO Box 160	CITY Villa Ridge	STATE MO	ZIP CODE 63089	
5.1 A letter from the continuing authority, if different than the owner, is included with this application. ☐ YES ☐ NO ☒ 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? ☐ YES ☐ 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? ☐ YES ☐ 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? ☐ YES ☐ 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? ☐ YES ☐ NO				
D. Is a copy of the Missouri Secretary of State's nonprofit corporation certificate included with this application? ☐ YES ☐ NO				
6.0 ENGINEER				
ENGINEER NAME / COMPANY NAME William R. Johanning/Cochran		TELEPHONE NUMBER WITH AREA CODE 636-584-0540		E-MAIL ADDRESS rjohanning@cochraneng.com
ADDRESS 530A East Independence Drive	CITY Union	STATE MO	ZIP CODE 63084	
7.0 APPLICATION FEE				
☐ CHECK NUMBER ☐ 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 Tony Baretich			DATE 2/17/2025	
TITLE OR CORPORATE POSITION District Manager		TELEPHONE NUMBER WITH AREA CODE 636-742-5200		E-MAIL ADDRESS tbaretich@alliancewater.com
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.				

RED BARN
WASTEWATER TREATMENT FACILITY
PROCESS FLOW CHART

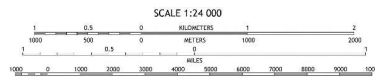




Produced by the United States Geological Survey

North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1:50,000 scale geodetic datum. Horizontal datum: Zone 15C.
This map is not a legal document. Boundaries may be
generalized for this map scale. Private lands with government
easements may not be shown. Obtain permission before
entering private lands.

Integrity: U.S. G.S. July 2020 - July 2020
Roads: U.S. Census Bureau 2010
Hydrography: National Hydrography Dataset, 2002, 2010
Contours: National Elevation Dataset, 2012
Boundaries: Multiple sources, see metadata file 2010, 2010
Public Land Survey System: BLM, 2000
Metadata: Fugate National Wetlands Inventory, Not Available



CONTOUR INTERVAL 20 FEET
NORTH AMERICAN DATUM OF 1983
This map was produced to conform with the
National Geospatial Program US Topo Product Standard.



1	2	3
4	5	6
7	8	9

ADJACENT QUADRANGLES

1 Washington West
2 Washington East
3 Larkspur
4 Union
5 Gray Summit
6 Station
7 Santa Clara
8 Linn

ROAD CLASSIFICATION	
Expressway	Local Connector
Secondary Hwy	Local Road
Ramp	4MS
Interstate Route	US Route
	State Route

MOSELLE, MO
2021