

**STATE OF MISSOURI**  
**DEPARTMENT OF NATURAL RESOURCES**  
**MISSOURI CLEAN WATER COMMISSION**



**CONSTRUCTION PERMIT**

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

City of Kirksville  
Adam Dorrell  
Director of Public Works  
102 S. Franklin  
Kirksville, MO 63501

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 10, 2022  
Effective Date

April 24, 2024  
Modification Date

August 31, 2025  
Expiration Date

  
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John Hoke, Director, Water Protection Program

## CONSTRUCTION PERMIT

### **I. CONSTRUCTION DESCRIPTION**

This project includes the addition of peak flow screening at headworks, addition of mixed liquor recycle pumps at the aeration basin (previously approved under CP0001609), and addition of a new ultraviolet light (UV) disinfection system.

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

### **II. COST ANALYSIS FOR COMPLIANCE**

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

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

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

### **III. CONSTRUCTION PERMIT CONDITIONS**

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

1. This construction permit does not authorize discharge.
2. All construction shall be consistent with plans and specifications signed and sealed by Derek Patrick, P.E. with HDR 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 Northeast Regional Office per 10 CSR 20-7.015(9)(G).
5. The wastewater treatment facility shall be located at least 50 feet from any dwelling or establishment. 10 CSR 20-8.140(C)(2)
6. The wastewater treatment facility shall be located above the 25-year flood level.
7. The wastewater facility structures, electrical equipment, and mechanical equipment shall be protected from physical damage by not less than the 100- year flood elevation per 10 CSR 20-8.140(2)(B). The minimum distance between wastewater treatment facilities and all potable water sources shall be at least 300 feet per 10 CSR 20-8.140(2)(C)1.
8. 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.
9. Disinfection and dechlorination, when used, shall be provided during all power outages. 10 CSR 20-8.140 (7) (A) 2.
10. 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.

11. 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.
12. All construction must adhere to applicable 10 CSR 20-8 (Chapter 8) requirements listed below.
  - Provisions for location and safety of comminutors shall be in accordance with screening devices,
    - Manually cleaned 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 channels shall be protected by guard railings and deck gratings. 10 CSR 20-8.150 (4) (A) 3. A. (II)
    - Mechanical 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 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 device. 10 CSR 20-8.150 (4) (A) 3. B. (III)
  - The UV dosage shall be based on the design peak hourly flow, maximum rate of pumpage, or peak batch flow. 10 CSR 20-8.190 (5) (A) 1.
  - The UV system shall deliver the target dosage based on equipment derating factors and, if needed, have the UV equipment manufacturer verify that the scale up or scale down factor utilized in the design is appropriate for the specific application under consideration. 10 CSR 20-8.190 (5) (A) 3.
  - The UV system shall deliver a minimum UV dosage of 30,000 microwatt seconds per centimeters squared ( $\mu\text{W} \cdot \text{s}/\text{cm}^2$ ). 10 CSR 20-8.190 (5) (A) 4.
  - Closed vessel UV systems. The combination of the total number of closed vessels 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) 2.
  - Closed vessel UV systems utilizing medium-pressure lamps shall be provided with an automatic cleaning system in order to prevent algae growth. 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.

13. Upon completion of construction:

- A. The City of Kirksville will become the continuing authority for operation and maintenance of these facilities;
- B. Submit an electronic copy of the as built's if the project was not constructed in accordance with previously submitted plans and specifications; and
- C. Submit the enclosed form Statement of Work Completed to the Department in accordance with 10 CSR 20-6.010(5)(N) and request the public noticed operating permit modification be issued.

#### **IV. REVIEW SUMMARY**

##### **1. CONSTRUCTION PURPOSE**

The objective of this WWTP improvement project is to implement peak flow screening at the Headworks Facility, add mixed liquor recycle pumping to the Aeration Basins, and to construct a new Ultraviolet Disinfection Facility.

##### **2. FACILITY DESCRIPTION**

The Kirksville Wastewater Treatment Plant has a rated capacity of 4.0 million gallons per day (MGD) average daily flow and a peak throughput of 12.0 MGD. The facility consists of the following unit processes:

- Influent Pump Station (PS)
- Headworks Building
  - Mechanical Bar Screen
  - Vortex Grit Removal
- Aeration Basin
- Secondary Clarifiers

- Effluent metering and Non-Potable Water (NPW) PS
- Return Activated Sludge (RAS)/Waste Activated Sludge (WAS) PS
- Scum PS
- Aerobic Sludge Digesters

### 3. **COMPLIANCE PARAMETERS**

The existing facility can meet all requirements of MO-0049506, including those resulting from the 2020 revision to the Bear Creek TMDL. The current construction is part of previously approved plan for overall improvements. The improvements will improve operating conditions at the plant and reduce problems during heavy storms or precipitation events.

### 4. **REVIEW of MAJOR TREATMENT DESIGN CRITERIA**

All existing components will remain functional and in place. Additions are:

Peak flow screening at headworks: one mechanically cleaned coarse screen with a maximum spacing of 4 millimeters and be positioned at an angle of 0 degrees from the horizontal. The screening device shall be capable of treating a peak daily flow of 12 MGD.

Installations of mixed liquor recycle pumps at the aeration basin (previously approved under CP0001609): In 2016, the city completed construction of a two-stage activated sludge basin. This project proposes to implement MLR pumping that converts the first zone into an anoxic zone. The 4.0 HP pumps are rated at 2,800 gpm at 3-foot TDH.

Installation of a new UV disinfection system: A closed channel, gravity flow UV disinfection system capable of treating a peak flow of 12.0 MGD while delivering a minimum UV intensity of 30 mJ/cm<sup>2</sup> with an expected ultraviolet transmissivity of 57 percent or greater. The enclosed UV system consists of 2 banks in one channel in sequence. The number of lamps varies per manufacture. The disinfected effluent will flow by gravity through flow measurement equipment and to Outfall No. 001.

### 5. **OPERATING PERMIT**

The operating permit MO-0049506 will be placed on public notice and modified upon completion and receipt of the Statement of Work Completed to the Department in accordance with 10 CSR 20-6.010(5)(N).

## **6. CONSTRUCTION PERMIT MODIFICATION**

This construction permit is being modified upon the request of the facility owner to extend the construction permit schedule due to material delays. The construction permit will now expire on August 31, 2025.

## **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 Sell, Assistant Engineer  
Engineering Section  
[andrew.sell@dnr.mo.gov](mailto:andrew.sell@dnr.mo.gov)

Chia-Wei Young, P.E.  
Engineering Section  
[chia-wei.young@dnr.mo.gov](mailto:chia-wei.young@dnr.mo.gov)

## APPENDIX 1 - Cost Analysis of Compliance

**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.

The following table summarizes the results of the cost analysis. See **Appendix – Cost Analysis for Compliance** from the operating permit for detailed information.

**Summary Table. Cost Analysis for Compliance Summary for the City of Kirksville**

Annual Median Household Income (MHI)	Estimated Monthly User Rate	Residential Indicator (User Rate as a Percent of MHI)	Financial Capability Indicator	Financial Burden	Schedule of Compliance Length
\$33,989	\$78.76	2.5%	1.875	High Burden	3 & 16 years
Pollution Control Option Selected for Analysis: Treatment plan retrofits, MLR & UV disinfection					
Estimated Present Worth: \$29,828,519					