Permit No. CP0002174

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

CONSTRUCTION PERMIT

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

Elm Hills Utility Operating Company, Inc.
Elm Hills – Private Gardens WWTF
1650 Des Peres Rd., Ste, 303
St. Louis, MO 63131

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.

October 15, 2020
Effective Date

Otober 17, 2022
Modification Date

October 14, 2023
Expiration Date

Chris Wieberg
Chris Wieberg, Director, Water Protection Program

CONSTRUCTION PERMIT

I. CONSTRUCTION DESCRIPTION

Modification to an existing recirculating sand filter treatment facility by the addition of a septic tank, a Moving Bed Bioreactor (MBBR) between the septic tank and recirculating tank; a new recirculating tank to supplement the existing one; and an ultraviolet disinfection system, together with existing equipment and the necessary appurtenances to make the facilities complete and usable.

This project will also include general site work appropriate to the scope and purpose of the project. Design flow of facility will remain at 18,037 GPD and the outfall will remain at the existing location. Discharge is to a Tributary to Fishing River in Section 19, T52N, R31W, Clay 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 not required to complete a cost analysis for compliance because the facility is not a combined or separate sanitary sewer system for a publically-owned treatment works.

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 Benjamin Kuenzel, P.E., 21 Design Group, Inc. 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 Kansas City Regional Office per 10 CSR 20-7.015(9)(G).

5. The wastewater facility structures, electrical equipment, and mechanical equipment shall be protected from physical damage by not less than the one hundred- (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 three hundred feet (300') per 10 CSR 20-8.140(2)(C)1.

6. In addition to the requirements for a construction permit, 10 CSR 20-6.200 requires land disturbance activities of 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 dnr.mo.gov/env/wpp/epermit/help.htm. See dnr.mo.gov/env/wpp/stormwater/sw-land-disturb-permits.htm for more information.

7. A United States (U.S.) Army Corps of Engineers (COE) permit (404) and a Water Quality Certification (401) issued by the Department or permit waiver may be required for the activities described in this permit. This permit is not valid until these requirements are satisfied. If construction activity will disturb any land below the ordinary high water mark of jurisdictional waters of the U.S. then a 404/401 will be required. Since the COE makes determinations on what is jurisdictional, you must contact the COE to determine permitting requirements. You may call the Department's Water Protection Program at 573-751-1300 for more information. See dnr.mo.gov/env/wpp/401/ for more information.

8. All construction must adhere to applicable 10 CSR 20-8 (Chapter 8) requirements listed below.

10 CSR 20-8.140 Wastewater Treatment Facilities

- 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.
- 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)
- 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)
    - Appropriate personal protective equipment (PPE); 10 CSR 20-8.140 (8) (E)
    - Portable blower and hose sufficient to ventilate accessed confined spaces; 10 CSR 20-8.140 (8) (F)
    - 10 CSR 20-8.140 (8) (G) Portable lighting equipment complying with NEC requirements. See subsection (7)(B) of this rule;
    - 10 CSR 20-8.140 (8) (H) Gas detectors listed and labeled for use in NEC Class I, Division 1, Group D locations. See subsection (7)(B) of this rule;
    - Appropriately-placed warning signs for slippery areas, non-potable water fixtures (see subparagraph (7)(D)3.B. of this rule), low head clearance areas, open service manholes, hazardous chemical storage areas, flammable fuel storage areas, high noise areas, etc.; 10 CSR 20-8.140 (8) (I)
    - Explosion-proof electrical equipment, non-sparking tools, gas detectors, and similar devices, in work areas where hazardous conditions may exist, such as digester vaults and other locations where potentially explosive atmospheres of

flammable gas or vapor with air may accumulate. 10 CSR 20-8.140 (8) (K)
    - Provisions for local lockout/tagout on stop motor controls and other devices; 10 CSR 20-8.140 (8) (L)
    - Provisions for an arc flash hazard analysis and determination of the flash protection boundary distance and type of PPE to reduce exposure to major electrical hazards shall be in accordance with NFPA 70E *Standard for Electrical Safety in the Workplace* (2018 Edition), as approved and published August 21, 2017. 10 CSR 20-8.140 (8) (M)
- All connections (flanged or other type), except those adjacent to storage or feeder areas, shall have guards that will direct any leakage away from space occupied by facility personnel. 10 CSR 20-8.140 (9) (A) 4. B.

10 CSR 20-8.180 Biological Treatment

- Moving Bed Bioreactor (MBBR). A MBBR secondary treatment system shall provide upstream preliminary treatment units capable of—
    - Screening to reduce pass-through and suspended solids; 10 CSR 20-8.180 (8)(A)
    - Grit removal; 10 CSR 20-8.180 (8)(B) and
    - Oil and grease removal. 10 CSR 20-8.180 (8)(C)

10 CSR 20-8.190 Disinfection

- Emergency Power. Disinfection and dechlorination processes, when used, shall be provided during all power outages. 10 CSR 20-8.190 (2) (A)
- The UV dosage shall be based on the design peak hourly flow, maximum rate of pumpage, or peak batch flow. 10 CSR 20-8.190 (5) (A) 1.
- If no flow equalization is provided for a batch discharger, the UV dosage shall be based on the peak batch flow. 10 CSR 20-8.190 (5) (A) 2.
- The UV system shall deliver the target dosage based on equipment derating factors and, if needed, have the UV equipment manufacturer verify that the scale up or scale down factor utilized in the design is appropriate for the specific application under consideration. 10 CSR 20-8.190 (5) (A) 3.
- 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.
- 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. Submit an electronic copy of the as builts if the project was not constructed in accordance with previously submitted plans and specifications; and

   B. Submit the enclosed form Statement of Work Completed to the Department in accordance with 10 CSR 20-6.010(5)(N). When the facility applies for their next operating permit renewal, they will be expected to include an updated facility description on their application.

IV. REVIEW SUMMARY

1. CONSTRUCTION PURPOSE

Existing treatment facility does not have disinfection and does not consistently meet ammonia limitations. Improvements will provide UV disinfection and additional ammonia treatment.

2. FACILITY DESCRIPTION

The existing treatment facility consists of a recirculating sand filter: septic tanks are located at individual residences, recirculating tank, sand filter with approximate area of 3,600 sq. ft.

The improved facilities will have a septic tank of approximately 30,000 gallons, a MBBR unit; an additional recirculating tank with a volume of approximately 20,000 gallons, existing sand filter, and UV disinfection. The permitted design flow will remain at 18,037 GPD. Discharge is to a Tributary to Fishing River in Section 19, T52N, R31W, Clay County.

The Elm Hills – Private Gardens WWTF is located at 12824 NE 118th St., City of Kearney, Clay County, Missouri. The facility has a design average flow of 18,037 gpd and a design organic population equivalent of approximately 240 people.

3. COMPLIANCE PARAMETERS

The proposed project is required to meet final effluent limits of 2.7 mg/l (October – March) and 1.3 mg/l (April – September) as established in Operating Permit MO-0129691.

Also, without disinfection, *E. coli* limits are not achieved. The seasonal *E. coli* limit is 206 colonies/100 ml.

The following limits are applicable to the facility:

Parameter	Units	Monthly average limit
Biochemical Oxygen Demand$_5$	mg/L	30
Total Suspended Solids	mg/L	30
Ammonia as N-summer	mg/L	1.3
Ammonia as N-winter	mg/L	2.7
pH	SU	6.5-9.0
E. coli	#/100mL	206

4. REVIEW of MAJOR TREATMENT DESIGN CRITERIA

Modification to an existing recirculating sand filter by the addition of a septic tank, a Moving Bed Bioreactor (MBBR) unit, a recirculation tank, and UV disinfection. The existing recirculation tank and sand filter will remain in use. The design flow will not change; work is being performed in order to consistently meet ammonia limitations and to provide disinfection to meet seasonal *E. coli* limitations.

Addition of a septic tank with a nominal volume of 30,000 gallons, existing connections have individual septic tanks at each residence, future connections will not typically have a septic tank at the residence.

Addition of a MBBR. A circular concrete chamber with an inside diameter of 8 ft., and liquid depth of 9 ft with a capacity of approximately 3,380 gallons. The tank will provide a detention time of approximately 4.5 hours at design flow.

Two, 2.0 HP blowers to supply aeration to the MBBR, each capable of providing full air requirements. Coarse bubble diffusers to be located near the bottom of the tank. Design is based on providing approximately 4.7 lb. of oxygen per pound of ammonia to be nitrified; 13.6 lbs. of oxygen per day. Air requirements are estimated at 47.8 cfm.

MBBR reactor media constructed of HDPE to provide a minimum protected surface area of 113 sq. ft./cubic ft.; and have a specific gravity between 0.93 and 1.05.

Following MBBR treatment, water will flow to a new recirculation tank with an approximate volume of 20,000 gallons. The flow then goes to the existing recirculation tank where it is pumped in doses onto the sand filter bed. The flow is split 4:1 after the filter bed, return flow (approximately 80%) goes to the existing recirculation tank. A pump and 2-inch force main will send flow back to the MBBR, return rate will be adjustable but initially set at approximately 15 gpm; two 0.5 HP, Blaster Model 8EB05 pumps to be installed.

The flow that is discharged will pass through ultraviolet disinfection during the recreational season.

Closed Vessel Ultraviolet (UV) – A closed vessel, gravity flow, low pressure high intensity UV, non-contact, disinfection system, Enaqua Model M4-P8M, capable of treating a peak flow of 172,800 gpd while delivering a minimum UV intensity of 30 mJ/cm2 with an expected ultraviolet transmittance of 65%. The closed vessel UV system consists of one lamp rack per reactor, each lamp rack has 8 lamps. One closed vessel UV reactor will be provided. The effluent flows by gravity through ultraviolet disinfection; disinfected flow goes by gravity to Outfall No. 001.
A V-notch weir and ultrasonic reader and recorder will also be installed as part of the project.

A portable emergency electrical generator will be available for power outages.

5. OPERATING PERMIT

These construction activities do not require a modification to the operating permit. Operating permit MO-0129691 will be expiring on March 31, 2024. It is expected that the facility owner will include a new facility description and process flow diagram in the next operating permit renewal application to reflect the installation of the MBBR and UV disinfection system.

This facility is not being converted to a general operating permit at this time, as the construction does not trigger a modification of the operating permit under 10 CSR 20-6.010 and as such it will be evaluated at operating permit renewal to determine if it qualifies for a general permit.

6. CONSTRUCTION PERMIT MODIFICATION

This construction permit is being modified upon the request of the facility owner to extend the permit expiration date. The construction permit will now expire on October 15, 2023.

V. NOTICE OF RIGHT TO APPEAL

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

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

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