STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

CONSTRUCTION PERMIT

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

Floyd Lewis
Manager
Eliot Wrenn Properties LLC
15165 Country Road 8050
Rolla, MO 65401

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 8, 2022
Effective Date

March 7, 2024
Expiration Date

Chris Wieberg
Chris Wieberg, Director, Water Protection Program

CONSTRUCTION PERMIT

I. CONSTRUCTION DESCRIPTION

Elliot Wrenn Recreational Vehicle (RV) Park is being developed on a 4 acre parcel located at 15165 County Road 8050, Dolittle, MO 65401 in Phelps County. This development will consist of a 36 campsite RV park with 31 campsites with sewer hookups and 5 primitive campsites without sewer hookups. The wastewater systems will include a gravity collection system, a 3,000 gallon septic tank, three 1,500 gpd Jet Aeration Treatment Units, a 4,000 gallon pump tank and four drip subsurface dispersal fields totaling 31,920 ft^2. The facility has a design average flow of 3,745 gpd and serves a hydraulic population equivalent of approximately 106 people. Components of the treatment and dispersal system are sized for peak flows of 4,800 gpd.

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

II. COST ANALYSIS FOR COMPLIANCE

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

The Department is 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 Terris Lee Cates, P.E., with Integrity Engineering, 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 Central Field Operations Regional Office per 10 CSR 20-7.015(9)(G).

5. The completed project shall be field tested to verify actual pumped volume of each dose. The timer controls shall be set to ensure a dosing rate not to exceed the allowable rate of 0.15 gallons per square foot per day.

6. The wastewater treatment facility shall be located above the twenty-five (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 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.

8. 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.

9. 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.

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

- Rain water from roofs, streets, and other areas and groundwater from foundation drains shall be excluded from all new sewers. 10 CSR 20-8.120(2)

- Service connections to the gravity sewer main shall be watertight and cannot protrude into the sewer. 10 CSR 20-8.120(3)(C)1.

- Leakage tests shall be specified for gravity sewers except polyvinyl chloride (PVC) pipe with a diameter of twenty-seven inches (27") or less. 10 CSR 20-8.120(3)(C)2.
    - The leakage exfiltration or infiltration for gravity sewers shall not exceed one hundred (100) gallons per inch of pipe diameter per mile per day for any section between manholes of the system. An exfiltration or infiltration test shall be performed with a minimum positive head of two feet (2'). The exfiltration or infiltration test shall conform to the test procedure described in ASTM C969 – 17 *Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines*, as approved and published April 1, 2017, for precast concrete pipe. 10 CSR 20-8.120(3)(C)2.A.
    - The air test for sewers shall, conform to the test procedure described in ASTM C1103 – 14 *Standard Practice for Joint Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines*, as approved and published November 1, 2014, for concrete pipe twenty-seven inches (27") or greater in diameter, and ASTM F1417 – 11a(2015) *Standard Practice for Installation Acceptance of Plastic Non-pressure Sewer Lines Using Low-Pressure Air*, as approved and published August 1, 2015, for plastic, composite, and ductile iron pipe. 10 CSR 20-8.120(3)(C)2.B.

- Location. Manholes shall be installed—10 CSR 20-8.120(4)(A)
    - At the end of each line;
    - At all changes in grade, size, or alignment;
    - At all sewer pipe intersections; and
    - At distances appropriate to allow for sufficient cleaning and maintenance of sewer lines.

- Vacuum testing, if specified for concrete sewer manholes, shall conform to the test procedures in ASTM C1244 – 11(2017) *Standard Test Method for Concrete Sewer Manholes by the Negative Air Pressure (Vacuum) Test Prior to Backfill*, as approved and published April 1, 2017, or the manufacturer's recommendation. 10 CSR 20-8.120(4)(F)1.

- Exfiltration testing, if specified for concrete sewer manholes, shall conform to the test procedures in ASTM C969 – 17 *Standard Practice for Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines*, as approved and published April 1, 2017. 10 CSR 20-8.120(4)(F)2.

- There shall be no physical connections between a public or private potable water supply system and a sewer or appurtenance that would permit the passage of any wastewater or polluted water into the potable supply. 10 CSR 20-8.120(5)(A)

- Sewers shall be laid at least fifty feet (50') in a horizontal direction from any existing or proposed public water supply well or other water supply sources or structures. Sewers must also comply with 10 CSR 23-3.010. 10 CSR 20-8.120(5)(B)

- 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)

- 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.

- 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)

- A septic tank must have a minimum capacity of at least one thousand (1,000) gallons. 10 CSR 20-8.180(2)(A)

- The septic tank shall be baffled. 10 CSR 20-8.180(2)(B)

- Subsurface systems shall—
    - Exclude unstabilized fill and soils that have been highly compacted and/or disturbed, such as old road beds, foundations, or similar things; 10 CSR 20-8.200(7)(A)1.A.
    - Provide adequate surface drainage where slopes are less than two percent (2%); 10 CSR 20-8.200(7)(A)1.B.
    - Provide surface and subsurface water diversion where necessary, such as a curtain or perimeter drain; 10 CSR 20-8.200(7)(A)1.C. and
    - Have a ten foot (10') buffer from the property line. 10 CSR 20-8.200(7)(A)1.D.

- The vertical separation between the bottom of the drip lines and/or the trench and a limiting layer, including but not limited to, bedrock; restrictive horizon; or seasonal high water table, shall be no less than:
    - Twenty-four inches (24"); 10 CSR 20-8.200(7)(A)2.A. or

- Twelve inches (12") for systems dispersing secondary or higher quality effluent; 10 CSR 20-8.200(7)(A)2.B. or
- Forty-eight inches (48") where karst features are present unless the site can be reclassified. 10 CSR 20-8.200(7)(A)2.C.

- Subsurface systems shall be, at a minimum, preceded by preliminary treatment. 10 CSR 20-8.200(7)(B)

- Loading rates shall not exceed the values assigned by the site and soil evaluation. 10 CSR 20-8.200(7)(C)

- All network piping and low pressure distribution piping and fittings with polyvinyl chloride (PVC) shall meet ASTM Standard D 1785 *Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Pipe, Schedules 40, 80, or 120* as approved and published August 1, 2015, or equivalent rated to meet or exceed ASTM D2466 *Standard Specification for Poly(Vinyl Chloride) (PVC) Plastic Drain, Waste, and Vent Pipe and Fittings* as approved and published August 1, 2017. These standards shall hereby be incorporated by reference into this rule, as published by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959. This rule does not incorporate any subsequent amendments or additions. 10 CSR 20-8.200(8)(A)2.

- The location and size of the drains and buffers must be factored into the total area required for the drip dispersal system. 10 CSR 20-8.200(9)(A)1.

- The drip dispersal lines shall be placed at a minimum depth of six inches (6") below the surface. 10 CSR 20-8.200(9)(B)1.

- Emitters and drip dispersal lines shall be placed at a minimum on a two foot (2') spacing to achieve even distribution of the wastewater and maximum utilization of the soil. 10 CSR 20-8.200(9)(B)2.

11. Upon completion of construction:

    A. Eliot Wrenn Properties LLC will become the continuing authority for operation and maintenance of these facilities;

    B. Submit an electronic copy of the as builts if the project was not constructed in accordance with previously submitted plans and specifications;

    C. Submit the enclosed Form MO 780-2155, Wastewater Construction Statement of Work Completed to the Department in accordance with 10 CSR 20-6.010(5)(N); and

    D. Operating Permit Application fee of $150 to the Engineering Section of the Water Protection Program 60 days prior to operation. Identify that the application is for a General permit for land application of domestic wastewater, MO-G823188.

       MO Form 780-1512, Form B - Application for Operating Permit for Facilities that Receive Primarily Domestic Waste and have Design Flow $\leq$ 100,000 gallons per day has already been submitted to the Department. MO Form 780-0795, Form E

Application for General Permit Under Missouri Clean Water Law has already been submitted to the Department.

IV. REVIEW SUMMARY

1. CONSTRUCTION PURPOSE

This facility is being constructed to provide wastewater treatment for a RV Park facility. There are existing structures in place that will remain after construction including an antique mall, house, shed, cottage, and maintenance shop. The new subsurface wastewater drip dispersal system will service the 36 new RV sites and the shower/bath/laundry house. Of the 36 new RV sites, 31 campsites will have sewer hookups, while the remaining 5 sites will be primitive camping sites with no sewer hookup. A shower/bath house with laundry will be constructed for the RV Park area.

2. FACILITY DESCRIPTION

The existing site includes a wooded area that will be cleared for the RV park area. There are existing structures in place that will remain after construction including an antique mall, house, shed, and maintenance shop. The owner plans to develop the RV park into 36 spaces with 31 sewer hookups. The RV park will have 5 primitive spots that will not have sewer hookups. The wastewater treatment and dispersal system will include a gravity collection system, 1-3,000 gallon septic tank, 3-1,500 gpd JET Aeration Treatment Units piped in parallel (4,500 gpd together), 1-4,000 gallon pump tank and three LPP subsurface dispersal areas totaling 31,920 sq.ft.

The Eliot Wrenn RV Park WWTF is located at 15165 County Road 8050, Doolittle City, in Phelps County, Missouri. The facility has a design average flow of 3,745 gpd and serves a hydraulic population equivalent of approximately 106 people. Components of the treatment and dispersal system are sized for peak flows of 4,800 gpd.

3. COMPLIANCE PARAMETERS

The permitted project shall meet the requirements of MO-G823000, Land Application of Domestic Wastewater with an expiration date of August 24, 2022. The facility shall follow the Subsurface Dispersal Operational Requirements of MO-G823000. Please reference the Department's website for itemized requirements.

MO-G823000 Land Application of Domestic Wastewater:
https://dnr.mo.gov/water/business-industry-other-entities/permits-certification-engineering-fees/wastewater/land-application-domestic-wastewater-mo-g823000

4. REVIEW of MAJOR TREATMENT DESIGN CRITERIA

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

- There are no major wastewater treatment components that will remain in use from previous systems.

Construction will cover the following items:

- Components are designed for a Population Equivalent of 106 based on organic loading to the system.

- Septic Tank – A septic tank provides passive primary treatment as the settleable solids in raw wastewater settle onto the bottom of the tank. Raw wastewater will flow by gravity to the 3,000 gallon two-compartment septic tank. The first septic tank compartment is 9'8.5" x 6'1" x 6'8" with a water level depth of approximately 72 inches. When the water level reaches a depth of approximately 72 inches, the wastewater flows into the second compartment by one tee-drop pipe. The second septic tank compartment is 2'0" x 6'1" x 6'8" with a water level depth of approximately 70 inches. The septic tank provides approximately 0.80 days of detention at design average flow before it is filtered through a Polylok PL-250 filter cartridge. The filtered and preliminary treated wastewater flows by gravity through the Tuf Tite Distribution Box to the Jet 1500 Series Aeration Treatment Units for secondary treatment. Settled solids in the Septic Tank shall be removed by a contract hauler.

- Tuf Tite Distribution Box 1 – A 4 hole Tuf-Tite Distribution Box will be installed to distribute flow from the Septic Tank to the 3-Jet 1500 Aeration Treatment Units. The distribution box will be 11" x 11" x 15.5" deep. The bottom of the outlet holes will be 2" deeper than the inlet hole so that flow from the Septic Tank is evenly distributed to the 3 treatment units piped in parallel.

- Jet 1500 Series Aeration Treatment Units (3 in parallel) – The wastewater secondary treatment system will be 3-Jet 1500 Series Aeration Treatment Units (ATU) piped in parallel. Each unit is rated to treat a design flow of 1,500 gpd individually with 3 units piped in parallel capable of treating 4,500 gpd (755 gpd above design flow). The Septic Tank will facilitate pretreatment prior to the 3-two chamber ATUs. Each Jet 1500 Series ATU will have two chambers in series, with the first chamber sized at 456 gallons and the second chamber sized at 582 gallons. Each ATU has two Jet 700 Septic Aerators, one in each chamber. The first chamber will have Jet Biologically Accelerated Treatment (BAT) Media Set D and the second chamber will have Set B for biological treatment. Each of the ATUs is sized for a BOD_5 loading of 3.75 lb/day totaling 11.25 lb/day for all three units. Secondary treated effluent flowing from the 3 ATUs will combine in the Tuf Tite Distribution Box 2 before it flows to the Pump Tank.

- Tuf Tite Distribution Box 2 – A 4 hole Tuf-Tite Distribution Box will be installed to distribute flow from the Septic Tank to the 3 Jet 1500 Aeration Treatment Units. The distribution box will be 11" x 11" x 15.5" deep. The bottom of the outlet hole will be 2" deeper than the 3 inlet holes so that flow is distributed to the single outlet.

- Pump Tank – A pump tank provides passive treatment as the secondary treated wastewater is detained before subsurface dispersal. Secondary treated wastewater will flow by gravity through the Tuf Tite Distribution Box from the Jet 1,500 Series ATU to the 4,000 gallon one-compartment pump tank. The pump tank compartment is 12 ft 1 in x 6 ft 1 in x 8 ft 3 in with a pump on water level depth of 98 inch and pump off depth of 9 inch. The pump tank provides approximately 1.06 days of detention at design average flow. One simplex Liberty FL 202A-2 Automatic Submersible Effluent Pump, 2 HP pump capable of 50.1 gpm at 80.4 ft of TDH is located in the pump tank. The pumped wastewater shall discharge to one of four fields of the Subsurface Soil Dispersal System. Settled solids in the pump tank shall be removed by a contract hauler.

- Subsurface Soil Dispersal System –The facility decided to use a design loading rate of 0.15 gpd/ft^2 for the entire system. Soil morphology review was conducted prior to the facility plan and construction permit application review. On site soils were determined to be provisionally suitable or unsuitable for this system. The soil investigation was completed by Dennis M. Meinert, Certified Soil Scientist with Home & Farm Soil Consulting on June 18, 2021.
  - Soils Report. In the soils investigation, there were 6 pits dug over the proposed site with all 6 sites being classified as Unsuitable. The construction plans specify the tilling of the first 18 inches of soil below ground surface, importing loamy soil and placing 3 x 4 inch lifts (totaling 12 inches with 3 lifts). After adding the 12 inches of imported soil, the contractor shall lightly compact the drip fields before installing the drip lines. Recall that the system will disperse secondary treated effluent. Curtain Drains are also specified for stormwater diversion at all 4 sites.
    - Soil test pit #1, located 60 feet east of Field 3, had a surface soil that was described as silt loam with an application rating of 0.15 gallons per square foot per day from 0-6 and 17-24 inches below ground surface (bgs).
    - Soil test pit #2, located between Field 3 and Field 4, can be considered representative of Field 3 and Field 4. Pit #2 had a surface soil that was described as loam and silt loam with an application rating of 0.15 gallons per square foot per day from 0-5 and 13-27 inches bgs.
    - Soil test pit #3, located just south of Field 4, had a surface soil that was described as loam and silt loam with an application rating of 0.15 gallons per square foot per day 16-34 inches bgs.
    - Soil test pit #4, located between Field 2 and Field 3 in the borrow area, had a surface soil that was described as loam and silt loam with an application rating of 0.15 gallons per square foot per day 0-4 and 8-24 inches bgs.
    - Soil test pit #5, located between Field 2 and Field 1, can be considered representative of Fields 1 and 2. had a surface soil that was described as silt loam and silty clay loam with an application rating of 0.15 gallons per square foot per day 0-4 and 8-20 bgs.
    - Soil test pit #6, located about 20 feet north of Field 1, had a surface soil that was described as silt loam with an application rating of 0.15 gallons per square foot per day 6-22 bgs.

- Drip Subsurface Dispersal System – The facility has selected the GEOFLOW subsurface drip dispersal system. The system will have 3 zones and 4 irrigation fields. Fields 1 and 2 will have one pumping zone each while Field 3 and 4 will share a pumping zone. The system will dose all 3 zones at 0.15 gpd/ft^2, providing 12 dosings per day per zone, 36 dosings per day for the entire system. Field 1 and 2 are 10,640 ft^2 each, Field 3 is 5,320 ft^2 and Field 4 is 5,320 ft^2 for a total of 31,920 ft^2. The system design calculations were conducted for the peak flow of 4,800 gpd. 2 combo air/vacuum release valves will be installed on each field, 8 total. The drip distributing valve will be a GEOFLOW SVLVB-150 - 1.5 inch. The drip fields contain a total of 15,960 linear feet of 1.5 inch tubing fitted with emitters every 2 ft and capable of a loading at peak flow of 0.15 gallons per sq. foot per day.

5. OPERATING PERMIT

After completion of construction project submit:

- MO Form 780-2155, Wastewater Construction Statement of Work Completed, https://dnr.mo.gov/document-search/wastewater-construction-statement-work-completed-mo-780-2155;
- As-builts if the project was not constructed in accordance with previously submitted plans and specifications; and
- 60 days prior to the start of operation, Operating Permit Application Fee of $150.

Operating Permit Application Forms B and E have already been submitted to the Department. Missouri State Operating Permit, General Permit MO-G823188, will be issued after receipt of the above documents.

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

Steve Hamm, PE
Engineering Section
Steven.hamm@dnr.mo.gov

APPENDIX A: Process Flow Diagram

Appendix A: Process Flow Diagram