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 Bunceton Justin Hein, Mayor 103 Main St., P.O. Box 46 Bunceton, MO 65237

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.

May 16, 2022 Effective Date

May 6, 2024 Modification Date

May 15, 2026 **Expiration Date**

John Hoke, Director, Water Protection Program

CONSTRUCTION PERMIT

I. CONSTRUCTION DESCRIPTION

Conversion of a three cell lagoon to a moving bed bioreactor (MBBR) wastewater treatment facility. Construction of: a manually cleaned fine (1/4-inch) screen and a lift station, primary settling, MBBR treatment tanks, two hopper bottom clarifiers; the three lagoon cells will be modified to serve as wet weather flow equalization, the tertiary lagoon cell will also be used to digest and hold sludge from the secondary clarifiers, the existing UV disinfection will remain on-line. The design flow will remain the same and the existing outfall will remain. Together with all the necessary appurtenances to make a complete and usable wastewater system to treat the waste from a population equivalent of 500 with an average daily discharge of 48,500 gallons. Discharge is to Stephens Branch in Landgrant 2559, Cooper County.

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 determine Cost Analysis for Compliance because the permit contains no new conditions or requirements that convey a new cost to the facility.

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 Byron F. Shaw, Jr., P.E. with MECO Engineering Co. 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 above the 25-year flood level.
- 6. 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.
- 7. 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.
- 8. 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 <u>https://dnr.mo.gov/water/businessindustry-other-entities/permits-certification-engineering-fees/section-401-water-quality</u> for more information.
- 9. 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 100- year flood elevation. 10 CSR 20-8.140 (2) (B)

- Unless another distance is determined by the Missouri Geological Survey or by the department's Public Drinking Water Branch, the minimum distance between wastewater treatment facilities and all potable water sources shall be at least 300 feet. 10 CSR 20-8.140 (2) (C) 1.
- No treatment unit with a capacity of 22,500 gallons per day (gpd) or less shall be located closer than the minimum distance of 200 feet to a neighboring residence and 50 feet to property line for lagoons; 200 feet to a neighboring residence for open recirculating media filters following primary treatment; and 50 feet 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–ofway at all times. 10 CSR 20-8.140 (2) (D)
- All sampling points shall be designed so that a representative and discrete 24 hour automatic composite sample or grab sample of the effluent discharge can be obtained at a point after the final treatment process and before discharge to or mixing with the receiving waters. 10 CSR 20-8.140 (6) (B)
- All outfalls shall be posted with a permanent sign indicating the outfall number (i.e., Outfall #001). 10 CSR 20-8.140 (6) (C)
- 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.
- Disinfection and dechlorination, when used, shall be provided during all power outages. 10 CSR 20-8.140 (7) (A) 2.
- 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)
 - 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)
 - 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)

10 CSR 20-8.150 Preliminary Treatment.

• 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)

10 CSR 20-8.160 Settling.

- 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 6 inches above the surrounding ground surface and shall provide not less than 12 inches of freeboard. 10 CSR 20-8.160 (3) (E)
- 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)

10 CSR 20-8.200 Wastewater Treatment Lagoons and Wastewater Irrigation Alternatives.

- Minimum freeboard shall be two feet. 10 CSR 20-8.200(4)(A)3.
- An emergency spillway shall be provided that—
 - Prevents the overtopping and cutting of berms; 10 CSR 20-8.200(4)(A)4.A.
 - Is compacted and vegetated or otherwise constructed to prevent erosion; 10 CSR 20-8.200(4)(A)4.B. and
 - Has the ability for a representative sample to be collected, if discharging. 10 CSR 20-8.200(4)(A)4.C.
- Seep collars shall be provided on drainpipes where they pass through the lagoon seal. 10 CSR 20-8.200(4)(C)4.
- 10. Upon completion of construction:
 - A. The City of Bunceton will remain 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; and
 - C. Submit the enclosed form Statement of Work Completed to the Department in accordance with 10 CSR 20-6.010(5)(N)

IV. REVIEW SUMMARY

1. CONSTRUCTION PURPOSE

Treatment facility is being modified and upgraded in order to consistently meet discharge limitations for ammonia.

2. FACILITY DESCRIPTION

The existing facility is a three cell lagoon followed by UV disinfection.

The new facility will be a Moving Bed Bioreactor followed by UV disinfection. The existing lagoon cells will be converted to flow equalization; the tertiary lagoon cell will also be used for sludge digestion and holding. Design flow and outfall location remains the same.

The Bunceton WWTF is located at N. Speed Rd. and College Ave, Bunceton, in Cooper County, Missouri. The facility has a design average flow of 48,500 gpd and serves an organic population equivalent of approximately 500 people.

3. <u>COMPLIANCE PARAMETERS</u>

The proposed project is required to meet final effluent limits as established in Operating Permit MO-0055981.

Parameter	Units	Monthly average
		limit
Biochemical Oxygen	mg/L	30
Demand ₅	_	
Total Suspended Solids	mg/L	30
Ammonia as N (Jan – Mar)	mg/L	3.1
Ammonia as N (Apr – Jun)	mg/L	2.0
Ammonia as N (Jul – Sep)	mg/L	1.5
Ammonia as N (Oct – Dec)	mg/L	2.9
pH	SU	6.5-9.0
Oil & Grease	mg/L	10
E. coli	#/100mL	206

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

4. <u>REVIEW of MAJOR TREATMENT DESIGN CRITERIA</u>

• Components are designed for a Population Equivalent of 500 based on organic loading to the system and a hydraulic flow of 48,500 gpd. Facility serves the City of Bunceton. The existing UV disinfection and outfall will remain in service without modification. Maximum peak flow allowed through the treatment process is 200,000 gpd.

Construction will cover the following items:

• Screening – Installation of screening devices removes nuisance inorganic materials from raw wastewater.

- Dual Manual Bar Screen The manual bar screen will have one fine screen with clear bar spacing of 0.25-inch and be positioned at an angle of 50 degrees from the horizontal to allow for manual raking of the screen; and one course screen with clear bar spacing of 0.75-inch for use when needed.
- Wet Weather Flow Equalization Wet weather flow equalization is utilized during wet weather events where the peak flow is greater than the design peak capacity of the treatment facility. Once the wet weather event subsides, the flow will be returned to the head of the treatment facility for full secondary treatment. The existing lagoon cells are to be modified and will be able to provide approximately 4.4 million gallons of flow equalization volume. Flow to MBBR treatment will be limited to 95,000 gpd during the recreation season and limited to 200,000 gpd the rest of the year.
 - Basin Cell #1 has a surface area of approximately 118,140 ft² at elevation 756; with a fluctuating capacity of 4 ft. between elevations 753 and 757, it can provide an equalization volume of approximately 3,400,000 gallons.
 - Basin Cell #2 has a surface area of approximately 35,930 ft² at elevation 756; with a fluctuating capacity of 4 ft. between elevations 753 and 757, it can provide an equalization volume of approximately 1,000,000 gallons.
 - Basin Cell #3 has a surface area of approximately 13,760 ft² at elevation 756; with a fluctuating capacity of 0.33 ft. between elevations 756.67 and 757, it can provide an equalization volume of approximately 35,000 gallons.
- Intermediate Pump Station Construction of a duplex pump station with each 10 HP submersible pump capable of operating at 65 gpm at 11.6 feet of TDH; Flygt Model N6020 or equal.
- Primary Settling Tank A settling tank provides passive primary treatment as the settleable solids in raw wastewater settle onto the bottom of the tank. Raw wastewater will be pumped into the 20,820 gallon closed top tank. A baffle will trap floating debris in the first third of the tank. The basin has a detention time of approximately 10 hours at design flow. Settled solids in the settling tank will be removed by a contract hauler. Water flows to a small 6,300 gallon chamber with an overflow pipe to allow for maintenance and operational flexibility. Any overflow will be piped to the tertiary lagoon cell. Normal flow continues to the MBBR.
- Moving Bed Biofilm Reactor (MBBR) The MBBR is a three stage treatment unit with 3 distinct basins, each 11 ft. wide, 15 ft. long and a sidewall of 14 ft.; water depth is 11 ft. in the first basin and 4 inches less in each subsequent basin, effective volumes are considered to be 12,343 gal, 11,931 gal, and 11,520 gal. The total hydraulic retention time at design flow is approximately 17.7 hours. The MBBR will be filled approximately 60 percent with high surface area media. Aeration is by means of two positive displacement rotary lobe type blowers each capable of supplying a minimum of 350 scfm with 20 HP motors to the medium bubble, drop diffusers. The effluent from the MBBR secondary clarifiers will flow by gravity to the UV disinfection system.

- Secondary Clarifiers two hopper bottom secondary clarifiers arranged in parallel will be constructed with a total combined surface area of 242 sf.
 - Hopper Style Clarifiers- the two clarifiers will have an overflow of 826 gpd/square foot at a peak flow of 200,000 gpd. The clarifiers have a dimensions of 11 feet wide by 11 feet long with a sidewater depth of 4.6 feet. The combined detention capacity of the clarifiers, using only the top third of the hoppers is 10,317 gallons. The hydraulic retention time is 5.1 hours at design flow and 1.24 hours at peak flow. Weir overflow rate at peak flow is 9090 gpd/ft.
- Flow limiting device A flow limiting weir to be installed prior to UV disinfection for use during the disinfection season (April through October). The weir limits flow to 95,000 gpd; to be installed in a manhole following the clarifiers. Flow in excess will go to the sludge basin. Note that flow will already be equalized to this rate at the head of the plant.
- Aerated sludge digestion and holding Sludge from the secondary clarifiers will be wasted to the sludge basin (converted from the previous tertiary lagoon cell). Aeration to be provided by a floating 15 HP aspirating aerator, Toronado Surface Aspirating Aerator or equal.

5. **OPERATING PERMIT**

Operating permit MO-0055981 will require a modification to reflect the construction activities. The modified Bunceton WWTF, MO-0055981, was successfully public noticed from 4/8/2022 to 5/9/2022 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.

6. <u>CONSTRUCTION PERMIT MODIFICATION</u>

This construction permit is being modified upon the request of the facility owner to extend the construction permit schedule. The construction permit will now expire on May 15, 2026.

Operating permit MO-0055981 will be expiring on June 30, 2025. A renewal application must be filed before December 30, 2024 regardless of the status of these construction activities. If you have questions on completing the renewal application, please contact the NPDES permitting 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 andy.appelbaum@dnr.mo.gov MBBR treatment Bunceton WWTF, MO-0055981 Page 11

APPENDIX

• Process Flow Description from the Operating Permit Application

Form B

7.1 Process Flow Diagram or Schematic:

Brief Narrative Description of the Diagram. Wastewater from the collection system flows, from the existing influent manhole for the lagoon system, through the manual bar screen, to the influent duplex submersible pump station which is located adjacent to the manhole. The wet well has an overflow pipe to transfer flows, greater than 95,000 gpd (65 gpm) (setting of pumps during disinfection season), to the flow equalization basins (existing lagoon cells 1 and 2). When flows have returned to normal the operator will open the return valve and drain water from the basins back into the influent pump station for treatment. The pump station pumps into the primary settling basin, where preliminary treatment will be provided to remove grit and solids. An overflow pipe from the primary basin into the Sludge Holding Basin is provided in case the primary settling basin needs to be closed for maintenance or the transfer pipe would become plugged. Flow from the primary settling basin will enter the three moving bed bioreactor (MBBR) tanks that are in series. The first MBBR tank will provide BOD Removal, the second tank will complete BOD Removal and initiate Ammonia Removal. The third tank will compete Ammonia Removal. Flow from the third tank will enter the clarifier distribution structure to flow to either of the two clarifiers. The clarifiers can be operated independently or in parallel combination. Flow leaving the clarifiers will then be collected and flow into Special Manhole 2, which contains a flow limiting orifice for use during the disinfection season. Flow through the orifice will be limited to a maximum of 95,000 gallons per day, which is the design limit of the existing UV Disinfection System. All flows greater than 95,000 gallons per day will be transferred over a rectangular weir into the Sludge Holding Basin. During the Non-Disinfection Season, the orifice will be removed, and valves adjusted to allow the flows to go directly to the Parshall Flume for measurement and discharged. During Disinfection Season, the flow will leave through the orifice and enter the UV Disinfection System prior to entering the Parshall Flume and discharge. In addition, during the non-disinfection season, the influent pump station pumps will be set to pump up to 200,000 gpd (141 gpm) through the plant to handle peak flows.