

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



**CONSTRUCTION PERMIT**

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

Diamond Crest Estates Homeowners Association  
Bing Lane  
Climax Springs, MO

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.

December 3, 2021      October 31, 2023  
Effective Date      Modification Date

June 3, 2024  
Expiration Date

  
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John Hoke, Director, Water Protection Program

## **CONSTRUCTION PERMIT**

### **I. CONSTRUCTION DESCRIPTION**

Diamond Crest Estates will construct a STEP collection system with each house served by its own septic tank. From there, flows will go through the pressure collection system to the pre-anoxic tank, the recirculation tank, the recirculating media filter, the second stage recirculation tank, the Advantex AX100 polishing reactor, chlorine disinfection system and dechlorination. The facility has a design average flow of 12,487 gpd and serves a hydraulic population equivalent of approximately 166 people on 45 lots.

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 James Jackson, Jr., P.E. with Lake Professional Engineering Services, 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 Office per 10 CSR 20-7.015(9)(G).
5. The wastewater treatment facility shall be located at least two hundred feet (200') from any dwelling or establishment per 10 CSR 20-8.140(C)(2)
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 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 [dnr.mo.gov/env/wpp/epermit/help.htm](http://dnr.mo.gov/env/wpp/epermit/help.htm). See [dnr.mo.gov/env/wpp/stormwater/sw-land-disturb-permits.htm](http://dnr.mo.gov/env/wpp/stormwater/sw-land-disturb-permits.htm) 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 [dnr.mo.gov/env/wpp/401/](http://dnr.mo.gov/env/wpp/401/) for more information.
10. 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)
- The outfall shall be so constructed and protected against the effects of flood water, ice, or other hazards as to reasonably ensure its structural stability and freedom from stoppage. 10 CSR 20-8.140 (6) (A)
- 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 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.
- 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.
- Where a separate non-potable water supply is to be provided, a break tank will not be necessary, but all system outlets shall be posted with a permanent sign indicating the water is not safe for drinking. 10 CSR 20-8.140 (7) (D) 4.

- 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)
  - 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)
- The materials utilized for storage, piping, valves, pumping, metering, and splash guards, etc., for chemical handling, shall be specially selected considering the physical and chemical characteristics of each hazardous or corrosive chemical. 10 CSR 20-8.140 (9) (A) 1.
- Secondary containment storage areas contain the stored volume of chemical until it can be safely transferred to alternate storage or released to the wastewater treatment plant at controlled rates that will not damage the facilities, inhibit the treatment

processes, or contribute to stream pollution. Secondary containment shall be designed as follows:

- A minimum volume of one hundred twenty-five percent (125%) of the volume of the largest storage container located within the containment area plus the space occupied by any other tanks located within the containment area when not protected from precipitation; 10 CSR 20-8.140 (9) (A) 2. A.
  - A minimum volume of one hundred ten percent (110%) of the volume of the largest storage container located within the containment area plus the space occupied by any other tanks located within the containment area when protected from precipitation; 10 CSR 20-8.140 (9) (A) 2. B.
  - Walls and floors of the secondary containment structure constructed of suitable material that is compatible with the specifications of the product being stored. 10 CSR 20-8.140 (9) (A) 2. C.
- All pumps or feeders for hazardous or corrosive chemicals shall have guards that will effectively prevent spray of chemicals into space occupied by facility personnel. 10 CSR 20-8.140 (9) (A) 3.
- All piping containing or transporting corrosive or hazardous chemicals shall be identified with labels every ten feet (10') and with at least two (2) labels in each room, closet, or pipe chase. 10 CSR 20-8.140 (9) (A) 4. A.
- Dust collection equipment shall be provided to protect facility personnel from dusts injurious to the lungs or skin and to prevent polymer dust from settling on walkways that become slick when wet. 10 CSR 20-8.140 (9) (A) 6.
- The following shall be provided to fulfill the particular needs of each chemical housing facility:
  - Provide storage for a minimum of thirty (30) days' supply, unless local suppliers and conditions indicate that such storage can be reduced without limiting the supply; 10 CSR 20-8.140 (9) (B) 1.
  - Provide adequate lighting; 10 CSR 20-8.140 (9) (B) 7.
  - Comply with the NEC recommendation for lighting and electrical equipment based on the chemicals stored. 10 CSR 20-8.140 (9) (B) 8.
  - Store chemical containers in a cool, dry, and well-ventilated area; 10 CSR 20-8.140 (9) (B) 9.
  - Locate storage area for chemical containers out of direct sunlight; 10 CSR 20-8.140 (9) (B) 11.
  - Maintain storage temperatures in accordance with relevant Material Safety Data Sheets (MSDS). 10 CSR 20-8.140 (9) (B) 12.
  - Control humidity as necessary when storing dry chemicals; 10 CSR 20-8.140 (9) (B) 13.
  - Store incompatible chemicals separately to ensure the safety of facility personnel and the wastewater treatment system. Store any two (2) chemicals that can react to form a toxic gas in separate housing facilities; 10 CSR 20-8.140 (9) (B) 16.
  - Design and isolate areas intended for storage and handling of chlorine and sulfur dioxide and other hazardous gases. 10 CSR 20-8.140 (9) (B) 17.
  - Keep concentrated acid solutions or dry powder in closed, acid-resistant shipping containers or storage units; 10 CSR 20-8.140 (9) (B) 20.

- The following shall be provided, where applicable, for the design of chemical handling:
  - Make provisions for measuring quantities of chemicals used for treatment or to prepare feed solutions over the range of design application rates; 10 CSR 20-8.140 (9) (C) 1.
  - Chemical feeders shall—
    - Be designed with chemical feed equipment to meet the maximum dosage requirements for the design average flow conditions; 10 CSR 20-8.140 (9) (C) 6. A.
    - Be able to supply, at all times, the necessary amounts of chemicals at an accurate rate throughout the range of feed; 10 CSR 20-8.140 (9) (C) 6. B.
    - Provide proportioning of chemical feed to the rate of flow where the flow rate is not constant; 10 CSR 20-8.140 (9) (C) 6. C.
    - Be designed to be readily accessible for servicing, repair, and observation; 10 CSR 20-8.140 (9) (C) 6. D.
    - Protect the entire feeder system against freezing; 10 CSR 20-8.140 (9) (C) 6. E.
    - Be located adjacent to points of application to minimize length of feed lines; 10 CSR 20-8.140 (9) (C) 6. F.
    - Provide for both automatic and manual operation for chemical feed control systems; 10 CSR 20-8.140 (9) (C) 6. G.
    - Utilize automatic chemical dose or residual analyzers, and where provided, include alarms for critical values and recording charts; 10 CSR 20-8.140 (9) (C) 6. H.
    - Provide screens and valves on the chemical feed pump suction lines; 10 CSR 20-8.140 (9) (C) 6. I.
    - Provide an air break or anti-siphon device where the chemical solution enters the water stream; 10 CSR 20-8.140 (9) (C) 6. J.
    - Dry chemical feed system shall—
      - Be equipped with a dissolver capable of providing a minimum retention period of five (5) minutes at the maximum feed rate; 10 CSR 20-8.140 (9) (C) 7. A.
      - Be equipped with two (2) solution vessels and transfer piping for polyelectrolyte feed installations; 10 CSR 20-8.140 (9) (C) 7. B.
      - Have an eductor funnel or other appropriate arrangement for wetting the polymer during the preparation of the stock feed solution on the makeup tanks; 10 CSR 20-8.140 (9) (C) 7. C.
      - Provide adequate mixing by means of a large diameter, low-speed mixer; 10 CSR 20-8.140 (9) (C) 7. D.
      - Make provisions to measure the dry chemical volumetrically or gravimetrically; 10 CSR 20-8.140 (9) (C) 7. E.
      - Completely enclose chemicals and prevent emission of dust; 10 CSR 20-8.140 (9) (C) 7. F.



- 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)
- 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)
- 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)
- Recirculating media filters 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 20-8.180 (3) (A)
- A minimum of two (2) recirculating media filter beds and a diversion box are required for all design flows. 10 CSR 20-8.180 (3) (B)
- Dosing. Both timer and float switch controls are required; timers are the primary method of operation and the float switch control is a back-up. 10 CSR 20-8.180 (3) (C)
- The media is any of a number of physical structures whose sole purpose is to provide a surface to support biological growth. Commonly used media includes rock, gravel, and sand of various sizes, textile media, and peat. Finely crushed limestone, dolomite, slag, any clay, limestone, or appreciable amounts of organic material is not acceptable. 10 CSR 20-8.180 (3) (E)
- The materials utilized for storage, piping, valves, pumping, metering, and splash guards, etc., for chemical handling, shall be specially selected considering the physical and chemical characteristics of each hazardous or corrosive chemical. 10 CSR 20-8.140 (9) (A) 1.



- Secondary containment storage areas contain the stored volume of chemical until it can be safely transferred to alternate storage or released to the wastewater treatment plant at controlled rates that will not damage the facilities, inhibit the treatment processes, or contribute to stream pollution. Secondary containment shall be designed as follows:
  - A minimum volume of one hundred twenty-five percent (125%) of the volume of the largest storage container located within the containment area plus the space occupied by any other tanks located within the containment area when not protected from precipitation; 10 CSR 20-8.140 (9) (A) 2. A.
  - A minimum volume of one hundred ten percent (110%) of the volume of the largest storage container located within the containment area plus the space occupied by any other tanks located within the containment area when protected from precipitation; 10 CSR 20-8.140 (9) (A) 2. B.
  - Walls and floors of the secondary containment structure constructed of suitable material that is compatible with the specifications of the product being stored. 10 CSR 20-8.140 (9) (A) 2. C.
- All pumps or feeders for hazardous or corrosive chemicals shall have guards that will effectively prevent spray of chemicals into space occupied by facility personnel. 10 CSR 20-8.140 (9) (A) 3.
- Piping, labeling, and coupling guard locations. 10 CSR 20-8.140 (9) (A) 4.
- All piping containing or transporting corrosive or hazardous chemicals shall be identified with labels every ten feet (10') and with at least two (2) labels in each room, closet, or pipe chase. 10 CSR 20-8.140 (9) (A) 4. A.
- 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.
- Facilities shall be provided for automatic shutdown of pumps and sounding of alarms when failure occurs in a pressurized chemical discharge line. 10 CSR 20-8.140 (9) (A) 5.
- Dust collection equipment shall be provided to protect facility personnel from dusts injurious to the lungs or skin and to prevent polymer dust from settling on walkways that become slick when wet. 10 CSR 20-8.140 (9) (A) 6.
- Contact period for Chlorine Disinfection. A minimum contact period of fifteen (15) minutes at design peak hourly flow or maximum rate of pumpage shall be provided after thorough mixing. 10 CSR 20-8.190 (3) (A)
- Alarm System for chlorination and dechlorination systems. The applicant shall conform to 10 CSR 20-8.140(7)(C) and be responsible for specifying what the alarm requirements are necessary to assure consistent disinfection in compliance with the applicable bacteria limits and the disinfection residual limit in the effluent. 10 CSR 20-8.190 (3) (C)
- 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 20-8.190 (3) (D)
- Dilution tanks and mixing tanks are required when using dry compounds and may be necessary when using liquid compounds to deliver the proper dosage. 10 CSR 20-8.190 (4) (A)

- Solid dechlorination systems shall not be located in the chlorine contact tank. 10 CSR 20-8.190 (4) (B) 1.
- Contact time. A minimum of thirty (30) seconds for mixing and contact time of dechlorination systems shall be provided at the design peak hourly flow or maximum rate of pumpage. 10 CSR 20-8.190 (4) (B) 2.
- Polishing Reactors. The process shall—
  - Provide a minimum hydraulic retention time of three (3) hours; 10 CSR 20-8.210 (2) (A) 1.
  - Be based on actual reactor influent characteristics; 10 CSR 20-8.210 (2) (A) 2.
  - Include cold weather provisions, such as heaters, insulated covers, installation of temperature controlled enclosures for above-ground components to prevent freezing and to ensure ammonia removal; 10 CSR 20-8.210 (2) (A) 6. and
  - Provide a blower malfunction alarm able to notify the operator of alarm activations through audio-visual means. 10 CSR 20-8.210 (2) (A) 7.

11. Upon completion of construction:

- A. The Diamond Crest Estates Homeowners Association will become 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 enclosed form Statement of Work Completed to the Department in accordance with 10 CSR 20-6.010(5)(N), with a request to issue the operating permit.

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

##### **1. FACILITY DESCRIPTION**

The Diamond Crest Estates WWTF is located along Bing Lane, Climax Springs, in Camden County, Missouri. The facility received a construction permit in 2007, but never submitted a statement of work completed or received their initial operating permit. The facility applied for a construction permit to finish construction to meet final effluent limits, including ammonia, which was established in the Antidegradation Review. The facility has a design average flow of 12,487 gpd and serves a hydraulic population equivalent of approximately 166 people.

##### **2. COMPLIANCE PARAMETERS**

The proposed project is required to meet final effluent limits established in the Antidegradation review dated August 5, 2021 and public noticed from September 18 to October 18, 2021.

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

Parameter	Units	Monthly average limit
Biochemical Oxygen Demand <sub>5</sub>	mg/L	10
Total Suspended Solids	mg/L	15
Ammonia as N-summer	mg/L	1.4
Ammonia as N-winter	mg/L	2.9
Total Phosphorus	mg/L	0.5
pH	SU	6.0-9.0
Total Residual Chlorine	µg/L	9.5 (130 ML)
<i>E. coli</i>	#/100mL	126

### 3. ANTIDegradation

The Department has reviewed the antidegradation report for this facility and issued the Water Quality and Antidegradation Review dated August 2021, to allow the facility to construct the treatment plant. See the Appendix in the Draft Operating Permit for the Antidegradation Review.

### 4. REVIEW of MAJOR TREATMENT DESIGN CRITERIA

**Construction will cover the following items:**

- STEP system- Septic Tank – A septic tank provides passive primary treatment as the settleable solids in raw wastewater settle onto the bottom of the tank. Each house will be served by a minimum 1,000 gallon septic tank.
  - Each septic tank provides approximately 2.7 days of detention at design average flow (370 gallons per house per day)
    - Each septic tank will have a OSI P200511-5 stage pump or equivalent to pump to the collection system.
  - Settled solids in the septic tank shall be removed by a contract hauler.
  - There will be audiovisual alarms on the septic tanks and pumps to notify the homeowners that service is needed.
- Construction of approximately 3358 lf of 1 1/4-inch to 3 inch Schedule 40 pressure system with 3 air release valves.
- PreAnoxic Tank- A 10 ft by 20 ft by 7 ft tank with one foot of freeboard, providing 8,976 gallons of retention (17.25 hours) .
  - From the preanoxic tank, flows will go through a 4 inch PVC SDR-35 pipe to the recirculation tank.
  - The pre-anoxic tank also receives flow from recirculation tank pumps at 10 gpm through a 1 inch Schedule 40 PVC pipe that is dosed with soda ash alkalinity pump, as needed.
- Recirculation Tank – Construction of one recirculation tank to pump primary treated wastewater to the recirculating media filter. The recirculation tank is 14 ft x 28 ft x 6 ft deep with a water level depth of 5 ft for a wastewater volume of approximately 14,662 gallons (1 day of detention).
  - Effective flow equalization volume of 6,598 gallons between the low water level and the high water “on” level. The recirculation tank has 2

- sets of duplex OSI P501512- 5 stage submersible pumps or equivalent – each capable of 48.5 gpm at 62.5 ft TDH.
- The pumps transfer wastewater to 8 separate zones of the recirculating media filter by means of a 2-inch PVC distribution manifold which splits the flow into 32(8 zones x 4 lines per zone)-1-inch PVC laterals
- Recirculating Media Filter – The concrete lined recirculating media filter is split into two filter beds with a common wall. Each filter bed is approximately 32 ft x 56 ft x 4ft deep each for a total surface area of 3,584 ft<sup>2</sup> which gives a total hydraulic loading of 3.48 gpd/ft<sup>2</sup> at design average flow.
  - The PVC laterals spaced 2-ft apart with 28- 4 -inch shielded orifices per lateral.
  - The laterals are located in the center of the top 10-inch layer of
  - 1/2-inch washed creek rock. The filter media layer is 3.166 ft deep containing media 3/8 inch to 1 inch washed creek. The drain line will have 3 inches of 1/2 inch rock over the drain line. The drain line will be on a 8-inch layer of 2-inch washed creek rock.
  - Each filter bed contains 4 underdrains comprised of 4-inch slotted PVC piping with approximate 2-ft spacing.
- Recirculation Tank Stage II- A 3,500 gallon recirculation tank with 50 gpm pump will dose the Advantex AX100 polishing filter.
  - At 3,500 gallons, the stage 2 recirculation tank provides 6.72 hours of retention time.
- Polishing Filter-2 AX100 treatment packages will provide ammonia treatment to the system. Using the Second Stage Advantex sizing criteria for ammonia removal, the surface area required is 28 sq ft, with 25% of the design average flow recirculated.
- Disinfection – Disinfection is the process of removal, deactivation, or killing of pathogenic microorganisms.
  - Tablet Chlorinator – Installation of a Norweco 2000 Chlorinator tablet chamber receiving clarified effluent and prior to the chlorine contact tank. The tablet chlorinator shall have a design flow of 200 gpd and a maximum flow of 100,000 gpd. The system will dispense hypochlorite as the wastewater comes into contact with the tablets.
  - Chlorine Contact Tank – Installation of a pre-cast concrete tank approximately 7.16 ft x 6.16 ft x 4.33 ft with 7 end-around baffles allowing for a 40:1 length to width ratio. This tank will allow for a 39-minute contact time during a peak flow of 49,950 gpd.
  - Tablet Dechlorinator – Installation of a Norweco 2000 De-chlorinator tablet dechlorination chamber receiving the chlorinated effluent and prior to Outfall No. 001. The tablet dechlorinator shall have a design flow of 200 gpd and a maximum flow of 100,000 gpd. The system will dispense sodium sulfite as the wastewater comes into contact with the tablets.
- A V-notch weir will be installed after the disinfection system at the sampling port to allow for flow measurement. This measurement device does not include flow totalizing or recording.

## **5. OPERATING PERMIT**

The Diamond Crest Estates WWTF, MO-0137341, was successfully public noticed from September 17 to October 18, 2021 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 be issued. The facility has paid their initial operating permit fee.

## **6. CONSTRUCTION PERMIT MODIFICATION**

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 June 3, 2024.

## **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>

Leasue Meyers, EI  
Engineering Section  
[leasue.meyers@dnr.mo.gov](mailto:leasue.meyers@dnr.mo.gov)

Cailie Carlile, P.E.  
Engineering Section  
[cailie.carlile@dnr.mo.gov](mailto:cailie.carlile@dnr.mo.gov)

The diagram illustrates the wastewater treatment process. It begins with an **INFLUENT** line entering a **SEPTIC TANK**. The effluent from the septic tank flows into a **REGULATING TANK**. From there, the wastewater moves to a **SND RECYCLATION TANK**, which is connected to a large **SND REACTOR**. The output of the reactor goes to a **SND RECYCLATION TANK**, which is also connected to a **SND REACTOR**. The effluent from the reactor is then sent to a **CLARIFIER**. The bottom sludge from the clarifier is recycled back to the **SND RECYCLATION TANK**. The top effluent from the clarifier goes to a **DISCHARGE TANK**, which is connected to a **DISCHARGE** line. The **DISCHARGE TANK** also has a **DISCHARGE** line leading to a **DISCHARGE** line.