

STATE OF MISSOURI
DEPARTMENT OF NATURAL RESOURCES
MISSOURI CLEAN WATER COMMISSION



CONSTRUCTION PERMIT

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

Duckett Creek Sanitary District
Keith Arbuckle
Executive Director
3550 Highway K
O' Fallon, MO 63368

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.

February 16, 2023
Effective Date

January 21, 2025
Modification Date

August 31, 2025
Expiration Date


John Hoke, Director, Water Protection Program

CONSTRUCTION PERMIT

I. CONSTRUCTION DESCRIPTION

This project is for construction of Phase I of a three-phase development. Phase I includes constructing a new wastewater treatment facility (WWTF) with design flow of 2.5 million gallons (MGD) consisting of influent pumping station, influent screening and grit removal, oxidation ditch, secondary clarification, ultraviolet (UV) disinfection, returned and wasted activated sludge pumping, aerobic digestion, biosolids thickening, and biosolids dewatering. The approved facility plan dated October 7, 2022 indicates Phase 2 will be for an expansion of additional 2.5 MGD design flow and Phase 3 will be for another 2.5 MGD design flow.

A closure plan for DCSD Wyndgate Subdivision WWTF, MO-0131300 will need to be submitted to the St. Louis Regional Office for review and approval prior to any closure activities.

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 Adrienne P. Eilers, P.E. with Crawford Murphy & Tilly, Inc., on July 13, 2022, with revisions received on January 19, 2023, and February 7, 2023 and as described the revised Summary of Design submitted on February 7, 2023 and 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 St. Louis Regional Office per 10 CSR 20-7.015(9)(G).
5. The wastewater treatment facility shall be located at least 50 feet from any dwelling or establishment.
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 <https://dnr.mo.gov/water/business-industry-other-entities/permits-certification-engineering-fees/section-401-water-quality> for more information.
9. In accordance with 10 CSR 20-6.010(12), a full closure plan shall be submitted to the Department's St. Louis Regional Office for review and approval of any permitted wastewater treatment system being replaced. The closure plan must meet the requirements outlined in Standard Conditions Part III of the Missouri State Operating Permit No. MO-0131300. Closure shall not commence until the submitted closure plan is

approved by the Department. Form J – *Request for Termination of a State Operating Permit*, shall be submitted to the Water Protection Program for termination of any existing Missouri state operating permit, once closure is completed in accordance with the approved closure plan.

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

10 CSR 20-8.120 Gravity Sewers

- 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.

10 CSR 20-8.130 Pumping Stations

- The distance between wastewater pumping stations and all potable water sources shall be at least 50 feet in accordance with 10 CSR 23-3.010(1)(B). 10 CSR 20-8.130(2)(D)
- Water level controls must be accessible without entering the wet well. 10 CSR 20-8.130(3)(C)
- Valves shall not be located in the wet well unless integral to a pump or its housing. 10 CSR 20-8.130(3)(D)
- Covered wet wells shall have provisions for air displacement to the atmosphere, such as an inverted and screened “j” tube or other means. 10 CSR 20-8.130(3)(E)
- There shall be no physical connection between any potable water supply and a wastewater pumping station, which under any conditions, might cause contamination of the potable water supply. If a potable water supply is brought to the station, 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 20-8.130(3)(G)
 - 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.

- 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.
- Submersible pump stations shall meet the applicable requirements under section (3) of this rule, except as modified in this section. 10 CSR 20-8.130(5)
 - Pump Removal. Submersible pumps shall be readily removable and replaceable without personnel entering, dewatering, or disconnecting any piping in the wet well.
- Alarm systems with an uninterrupted power source shall be provided for pumping stations. 10 CSR 20-8.130(6)
- Where independent substations are used for emergency power, each separate substation and its associated distribution lines shall be capable of starting and operating the pump station at its rated capacity. 10 CSR 20-8.130(7)(B)

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.
- 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 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.
- Hot water for any direct connections shall not be taken directly from a boiler used for supplying hot water to a digester heating unit or heat exchanger. 10 CSR 20-8.140(7)(D)2.
- 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.
- 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 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)
- Ventilation shall include the following:
 - Isolate all pumping stations and wastewater treatment components installed in a building where other equipment or offices are located from the rest of the building by an air-tight partition, provide separate outside entrances, and provide separate and independent fresh air supply; 10 CSR 20-8.140(8)(J)1.
 - Force fresh air into enclosed screening device areas or open pits more than four feet deep. 10 CSR 20-8.140(8)(J)2.
 - Dampers are not to be used on exhaust or fresh air ducts. Avoid the use of fine screens or other obstructions on exhaust or fresh air ducts to prevent clogging; 10 CSR 20-8.140(8)(J)3.
 - Where continuous ventilation is needed (e.g., housed facilities), provide at least 12 complete air changes per hour. Where continuous ventilation would cause excessive heat loss, provide intermittent ventilation of at least 30 complete air changes per hour when facility personnel enter the area. Base air change demands on one 100 percent fresh air; 10 CSR 20-8.140(8)(J)4.
 - Electrical controls. Mark and conveniently locate switches for operation of ventilation equipment outside of the wet well or building. Interconnect all intermittently operated ventilation equipment with the respective wet well, dry well, or building lighting system. The manual lighting/ventilation switch is expected to override the automatic controls. For a two speed ventilation system with automatic switch over where gas detection equipment is installed, increase the ventilation rate automatically in response to the detection of hazardous concentrations of gases or vapors; 10 CSR 20-8.140(8)(J)5.
 - Fabricate the fan wheel from non-sparking material. Provide automatic heating and dehumidification equipment in all dry wells and buildings. 10 CSR 20-8.140(8)(J)6.
- 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 125 percent 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 110 percent 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 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 chemical 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.
- The following shall be provided to fulfill the particular needs of each chemical housing facility:
 - Provide storage for a minimum of 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.
 - Construct the chemical storage room of fire and corrosion resistant material; 10 CSR 20-8.140(9)(B)2.
 - Equip doors with panic hardware. To prevent unauthorized access, doors lock but do not need a key to exit the locked room using the panic hardware; 10 CSR 20-8.140(9)(B)3.
 - Provide chemical storage areas with drains, sumps, finished water plumbing, and the hose bibs and hoses necessary to clean up spills and to wash equipment; 10 CSR 20-8.140(9)(B)4.
 - Construct chemical storage area floors and walls of material that is suitable to the chemicals being stored and that is capable of being cleaned; 10 CSR 20-8.140(9)(B)5.
 - Install floor surfaces to be smooth, chemical resistant, slip resistant, and well drained with three inches per ten feet minimum slope; 10 CSR 20-8.140(9)(B)6.
 - 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.
 - Design vents from feeders, storage facilities, and equipment exhaust to discharge to the outside atmosphere above grade and remote from air intakes; 10 CSR 20-8.140(9)(B)10.
 - 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.
 - Design the storage area with designated areas for "full" and "empty" chemical containers; 10 CSR 20-8.140(9)(B)14.
 - Provide storage rooms housing flammable chemicals with an automatic sprinkler system designed for 0.4 gpm/ft² and a minimum duration of 20 minutes; 10 CSR 20-8.140(9)(B)15.
 - Store incompatible chemicals separately to ensure the safety of facility personnel and the wastewater treatment system. Store any two 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.

- Design an isolated fireproof storage area and explosion proof electrical outlets, lights, and motors for all powdered activated carbon storage and handling areas in accordance with federal, state, and local requirements; 10 CSR 20-8.140(9)(B)18.
- Vent acid storage tanks to the outside atmosphere, but not through vents in common with day tanks; 10 CSR 20-8.140(9)(B)19.
- Keep concentrated acid solutions or dry powder in closed, acid-resistant shipping containers or storage units; 10 CSR 20-8.140(9)(B)20.
- Pump concentrated liquid acids in undiluted form from the original container to the point of treatment or to a covered storage tank. Do not handle in open vessels. 10 CSR 20-8.140(9)(B)21.
- 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.
 - Select storage tanks, piping, and equipment for liquid chemicals specific to the chemicals; 10 CSR 20-8.140(9)(C)2.
 - Install all liquid chemical mixing and feed installations on corrosion resistant pedestals; 10 CSR 20-8.140(9)(C)3.
 - Provide sufficient capacity of solution storage or day tanks feeding directly for twenty-four- (24-) hour operation at design average flow; 10 CSR 20-8.140(9)(C)4.
 - Provide a minimum of two chemical feeders for continuous operability. Provide a standby unit or combination of units of sufficient capacity to replace the largest unit out-of-service; 10 CSR 20-8.140(9)(C)5.
 - 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 minutes at the maximum feed rate; 10 CSR 20-8.140(9)(C)7.A.
 - Be equipped with two 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.
- Provide for uniform strength of solution consistent with the nature of the chemical solution for solution tank dosing; 10 CSR 20-8.140(9)(C)8.
- Use solution feed pumps to feed chemical slurries that are not diaphragm or piston type positive displacement types; 10 CSR 20-8.140(9)(C)9.
- Provide continuous agitation to maintain slurries in suspension; 10 CSR 20-8.140(9)(C)10.
- Provide a minimum of 2 flocculation tanks or channels having a combined detention period of 20 – 30 minutes. Provide independent controls for each tank or channel; 10 CSR 20-8.140(9)(C)11.
- Insulate pipelines carrying soda ash at concentrations greater than 20 percent solution to prevent crystallization; 10 CSR 20-8.140(9)(C)12.
- Prohibit bagging soda ash in a damp or humid place. 10 CSR 20-8.140(9)(C)13.
- The following chemical safety items shall be provided in addition to the safety provisions in section (8) of this rule:
 - Appropriate personal protective equipment (PPE). 10 CSR 20-8.140(9)(D)1.
 - Eye wash fountains and safety showers utilizing potable water shall be provided in the laboratory and on each level or work location involving hazardous or corrosive chemical storage, mixing (or slaking), pumping, metering, or transportation unloading. The design of eye wash fountains and safety showers shall include the following:
 - Eye wash fountains with water of moderate temperature, 50°–90°F, suitable to provide 15–30 minutes of continuous irrigation of the eyes; 10 CSR 20-8.140(9)(D)2.A.
 - Emergency showers capable of discharging 20 gpm of water of moderate temperature, 50°–90°F, and at pressures of 30–50 pounds per square inch (psi); 10 CSR 20-8.140(9)(D)2.B.
 - Eye wash fountains and emergency showers located no more than 25 feet from points of hazardous chemical exposure; CSR 20-8.140(9)(D)2.C.
 - Eye wash fountains and showers that are to be fully operable during all weather conditions; 10 CSR 20-8.140(9)(D)2.D.
 - Warning signs requiring use of goggles shall be located near chemical stations, pumps, and other points of frequent hazard. 10 CSR 20-8.140(9)(D)3.

- The identification and hazard warning data included on chemical shipping containers, when received, shall appear on all containers (regardless of size or type) used to store, carry, or use a hazardous substance. 10 CSR 20-8.140(9)(E)

10 CSR 20-8.150 Preliminary Treatment

- All screening devices and screening storage areas shall be protected from freezing. 10 CSR 20-8.150(4)(A)1.
- Provisions shall be made for isolating or removing screening devices from their location for servicing. 10 CSR 20-8.150(4)(A)2.
- Manually cleaned screen channels shall be protected by guard railings and deck gratings with adequate provisions for removal or opening to facilitate raking. 10 CSR 20-8.150(4)(A)3.A.(I)
- Mechanically cleaned screen channels shall be protected by guard railings and deck gratings. 10 CSR 20-8.150(4)(A)3.A.(II)
- Mechanical screening equipment shall have adequate removal enclosures to protect facility personnel against accidental contact with moving parts and to prevent dripping in multi-level installations. 10 CSR 20-8.150(4)(A)3.B.(I)
- A positive means of locking out each mechanical screening device shall be provided. 10 CSR 20-8.150(4)(A)3.B.(II)
- An emergency stop button with an automatic reverse function shall be located in close proximity to the mechanical screening device. 10 CSR 20-8.150(4)(A)3.B.(III)
- Where two or more mechanically cleaned bar screens are used, the design shall provide for taking the largest unit out-of-service without sacrificing the capability to handle the average design flow. Where only one mechanically cleaned screen is used, it shall be sized to handle the design peak instantaneous flow. 10 CSR 20-8.150(4)(B)
- Grit removal facilities are required for wastewater treatment facilities that utilize membrane bioreactors for secondary treatment; utilize anaerobic digestion; receive wastewater from combined sewers; or receive wastewater from collection systems that receive substantial amounts of grit. 10 CSR 20-8.150(6)

10 CSR 20-8.160 Settling

- 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 6 inches above the surrounding ground surface and shall provide not less than 12 inches 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)

10 CSR 20-8.170 Solids Handling and Disposal

- Aerobic Solids Digestion High Level Emergency Overflow. An unvalved emergency overflow shall be provided that will convey digester overflow to the treatment plant headworks, the aeration process, or to another liquid sludge storage facility and that has an alarm for high level conditions. 10 CSR 20-8.170(5)
- For solids pumping systems, audio-visual alarms shall be provided in accordance with 10 CSR 20-8.140(7)(C) for:
 - Pump failure; 10 CSR 20-8.170(6)(A)
 - Pressure loss; 10 CSR 20-8.170(6)(B) and
 - High pressure. 10 CSR 20-8.170(6)(C)
- Alarm systems shall be provided for sludge dewatering processes to notify the operator(s) of conditions that could result in process equipment failure or damage, threaten operator safety, or a solids spill or overflow condition. 10 CSR 20-8.170(7)(B)

10 CSR 20-8.190 Disinfection

- 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.

- The UV system shall deliver a minimum UV dosage of 30,000 microwatt seconds per centimeters squared ($\mu\text{W} \cdot \text{s}/\text{cm}^2$). 10 CSR 20-8.190(5)(A)4.
- Open channel UV systems. The combination of the total number of banks 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)1.
- 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.

11. Upon completion of construction:

- A. The Duckett Creek Sanitary District 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) and request the operation permit be issued.

IV. REVIEW SUMMARY

1. CONSTRUCTION PURPOSE

The construction of the new WWTF is to provide wastewater service in the western portion of Duckett Creek Sanitary District's existing service area that is anticipated to develop in the near future and will also allow decommissioning of the DCSD Wyndgate Subdivision WWTF.

2. FACILITY DESCRIPTION

The new WWTF named DCSD WWTF #4 will consist of influent pumping station, influent screening and grit removal, oxidation ditch, secondary clarification, ultraviolet (UV) disinfection, returned and wasted activated sludge pumping, aerobic digestion, biosolids thickening, and biosolids dewatering.

The DCSD WWTF #4 is located near Hopewell Road and Tanis Lee Lane, O' Fallon, in St. Charles County, Missouri. The facility has a design average flow of 2.5 MGD and serves a hydraulic population equivalent of approximately 25,000 people.

3. COMPLIANCE PARAMETERS

The proposed DCSD WWTF #4 is required to meet final effluent limits established in the Water Quality and Antidegradation Review Preliminary Determination on November 5, 2021. The new limits from the antidegradation review are reflected in the draft Missouri State Operating Permit placed on public notice April 1, 2022.

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

Parameter	Units	Monthly average limit
Biochemical Oxygen Demand ₅	mg/L	10
Total Suspended Solids	mg/L	15
Ammonia as N – Jan and Feb	mg/L	3.1
Ammonia as N – Mar	mg/L	2.7
Ammonia as N – Apr and May	mg/L	2.1
Ammonia as N – June	mg/L	1.3
Ammonia as N – Jul and Aug	mg/L	0.9
Ammonia as N – Sept and Oct	mg/L	1.8
Ammonia as N – Nov and Dec	mg/L	2.7
pH	SU	6.0-9.0
Oil & Grease	mg/L	10
<i>E. coli</i>	#/100mL	206

4. ANTIDEGRADATION

The Department has reviewed the antidegradation report for this facility and issued the Water Quality and Antidegradation Review dated November 5, 2021, due to construction of a new WWTF. See **APPENDIX – ANTIDEGRADATION**.

5. REVIEW of MAJOR TREATMENT DESIGN CRITERIA

Construction will cover the following items:

- Components are designed for a Population Equivalent of 25,000 based on hydraulic loading to the system.
- West influent sewer – Construction of 1,232 feet of 36 inch pipe with 3 manholes.

- Influent Pump Station – Construction of an influent pump station with a total of six pumps capable of delivering 6.67 MGD at 54 feet of TDH with the largest pump on standby.
- Flow Measurement – Installation of accurate flow measurement devices will give the treatment facility a means of improved data analysis.
 - Parshall Flume – An 18-inch throat influent parshall flume with ultrasonic flow sensor shall measure the raw influent wastewater from the influent pump station and discharges to the influent screening system.
- Screening – Installation of screening devices removes nuisance inorganic materials from raw wastewater.
 - Mechanical Fine Screen – One mechanically cleaned fine screens with a maximum perforated plate spacing of .25-inch. The screening devices shall be capable of treating a design average flow of 2.5 MGD and a peak hourly flow of 6.80 MGD. The addition of a washer/compactor and screenings conveyor will mitigate the increased volume of screenings captured by washing, dewatering, and compacting the screenings prior to disposal. A manual screen is provided in a second channel to allow the influent flow to be screened when the mechanically cleaned fine screen is out of service. The manual coarse bar screen will have clear bar spacing of 0.75-inch and be positioned at an angle of 60 degrees from the horizontal to allow for manual raking of the screen.
- Grit Removal – Installation of grit removal facilities removes grit and inert inorganics from raw wastewater. Grit removal prevents downstream abrasion and wear on mechanical components and accumulation at the bottom of basins or channels.
 - Multi-Tray Vortex Flow Grit Removal – A stacked tray mechanical grit removal system is proposed to handle 6.65 MGD peak flow. The tray diameter is 9 ft and provides 63.5 sf per tray, thus requiring 7 trays or 445 sf of surface area. The grit separation unit will have a capacity of 200 gpm with a diameter of 24”.
- Oxidation Ditch – The design SRT is 14.8 days with a design MLSS of 4,200 mg/L. The hydraulic retention time is 15.49 hrs at design flow of 2.5 MGD. The side water depth of the treatment train is 14.43 ft. Process design calculations were provided for an organic load of 19.34 lb BOD per 1,000 cf, the total SOR is 285.32 lb/hr, and the ratio between AOR/SOR is 0.85. The oxidation ditch includes an anaerobic reactor, 20 feet wide, 77.67 feet long, and 14.43 feet deep, to provide anaerobic conditions for biological phosphorus removal.
- Secondary Clarifier – 2 secondary clarifiers will be constructed with a total surface area of 7,696 sf (3,848 sf per clarifier). At 6.65 MGD peak, this provides a surface loading rate of 864 gpd/sf. The clarifiers will have a 70 ft diameter with a sidewater depth of 16 ft. The weir loading rate is 16,626 gpd/ft which meets the requirements of 10 CSR 20-8.160(3)(C)2 of being less than 30,000 gpd/lf. The solids loading rate is 34.7 lbs/day/sf which meets the requirements of 10 CSR 20-8.160(3)(B)3 of less than 35 lbs/day/sf at peak flow.

- Disinfection – Disinfection is the process of removal, deactivation, or killing of pathogenic microorganisms.
 - Open Channel Ultraviolet (UV) – An open channel, gravity flow, low pressure high intensity UV disinfection system capable of treating a peak flow of 6.80 MGD while delivering a minimum UV intensity of 30 mJ/cm² with an expected ultraviolet transmissivity of 65 percent or greater. The single open channel UV system consists of two banks in series with 10 lamps per bank. The disinfected effluent will flow by gravity through flow measurement equipment and to Effluent Flow Measurement Device.
- Effluent Flow Measurement – Installation of accurate flow measurement devices will give the treatment facility a means of improved data analysis.
 - Parshall Flume – An 18-inch throat effluent parshall flume with ultrasonic flow sensor shall measure the effluent from the WWTF.
- Cascade Post Aeration – To increase dissolved oxygen in the effluent, step cascade aeration will be provided downstream of the Effluent Flow Measurement Device in the effluent structure.
- Outfall No. 001 – The outfall location is at the junction structure downstream of the effluent structure. The outfall will be labeled with a permanent sign noting the outfall number.
- Emergency Power – A 1250 kW standby generator and automatic transfer switch will be provided to operate the treatment facility in event of power failure.
- Waste Activated Sludge (WAS)/Returned Active Sludge (RAS) Pump Station – Construction of five (5) WAS/RAS pumps controlled with variable frequency drives (VFDs) and associated valves. Each RAS pump has check valve and plug valve on the discharge side and pumps into a common 18 inch forcemain. The 18-inch forcemain discharges into the Oxidation Ditch. An 18 inch magnetic flow meter is located in a vault outside the pump station. A 4 inch WAS line splits from the 18 inch forcemain to allow a small portion of the sludge to flow to the Aerobic Digesters. WAS flow is controlled by a motor operated pinch valve and magnetic flow meter, both located inside the RAS/WAS Pump Station valve vault. The WAS/RAS pumps with VFDs designed for 1.15 MGD with a 28 ft TDH at normal operations. The pumps will be four (4) operational and one standby.
- Aerobic Digester – Construction of two sludge holding basins each with a 70 ft diameter, a 15 ft sidewater depth, and a volume of approximately 530,000 gallons. The design basis of the digester is a sludge concentration of 5,000 mg/L 0.5 percent with a flowrate of 90,000 gpd. Installation of fine bubble diffusers will provide aeration and mixing of the sludge to prevent anaerobic conditions. Three blowers each with a 100 HP motor is capable of providing a maximum air rate of 2130 standard cubic feet per minute (scfm) at 8.0 psig.

- Disc Thickener – Construction of one disc thickener. The disc thickener has a flocculation tank and polymer feed system. The disc thickener will have a capacity to thicken 80 gpm at 0.5 percent sludge to a solids content of between 5 to 6 percent.
- Biosolids Dewatering System – The biosolids dewatering system is sized to process a weeks' worth of sludge and consists of two feed pumps and a screw press. Biosolids are pumped from the aerobic digesters via a dewatering feed pump to the screw press which has a flocculation tank and polymer feed system. The screw press is capable of dewatering the biosolids to a dry solids content of approximately 18 percent. The dewatered biosolids are then dropped into a conveyor system and conveyed to a biosolids hauling truck. The biosolids are then hauled off-site to the DCSD's existing biosolids storage facility.
- Odor Control System – An odor control system is provided in the Headworks Building. The odor control system is a multi-stage chemical scrubber unit with the necessary recirculation pumps, chemical metering pumps, piping, and instrumentation. The system utilizes 25 percent Sodium Hydroxide and 12.5 percent Sodium Hypochlorite.
- Future Total Nitrogen (TN) Effluent Limit Considerations – Provisions have been considered in the ultimate design of the wastewater treatment plant to accommodate anticipated future effluent limits. The oxidation ditch is designed to achieve a TN limit of 8 mg/l with an internal mixed liquor recycle pump, sized at 2 times the design average flow. The recycle pump will transfer flows from the inner channel to the outer channel of the oxidation ditch. Provision have been made to provide future installation of the pump and piping required to provide the transfer of flows.
- Future Total Phosphorus (TP) Effluent Limit Considerations – Provisions have been considered in the ultimate design of the wastewater treatment plant to accommodate anticipated future effluent limits. The treatment plant is designed to provide the reduction of TP, both biologically and chemically. An anaerobic reactor will be constructed adjacent to the oxidation ditch to provide biological phosphorus removal. A recycle pump sized at 1 times the design average flow will transfer flows from the outer channel of the oxidation ditch to the anaerobic reactor to promote anaerobic conditions. The use of the anaerobic reactor will provide some biological phosphorus removal. Future construction of a chemical feed building has been considered in order to provide a backup system to biological phosphorus removal.

6. OPERATING PERMIT

The draft Missouri State Operating Permit for DCSD WWTF #4, MO-0136425, was successfully public noticed from April 1, 2022 to May 2, 2022 with no comments received. After successful completion of the project, 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.

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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APPENDIX

Antidegradation