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 Republic
Republic Wastewater Treatment Plant
915 North West Avenue
Republic, MO 65738

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.

June 25, 2024
Effective Date

July 24, 2024
Modification Date

July 1, 2027
Expiration Date

John Hoke, Director, Water Protection Program

CONSTRUCTION PERMIT

I. CONSTRUCTION DESCRIPTION

Construction is to expand treatment capacity to five million gallons per day (MGD) with a new treatment plant. The City of Republic has experienced significant growth over the last few years and the new treatment plant will provide room for expansion with high level treatment. Construction will include converting the existing oxidation ditches into wastewater basins to help handle peak wet weather flows, rehabilitation of the existing aerated digestors. Construction of the new treatment plant will include installation of new pumps, grit removal, rotary drum fine screens, chemical phosphorus removal, three biological nutrient removal process basins with anaerobic, anoxic, and aerated zones, three membrane bioreactors, new waste activated sludge and return activated sludge lines, new aeration in the digestors along with a new centrifuge and solids loading conveyors.

A closure plan will need to be submitted to the Southwest Regional Office for review and approval prior to any closure activities of existing equipment.

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 required to determine "findings of affordability" because the permit applies to a combined or separate sanitary sewer system for a publicly-owned treatment works.

Cost Analysis for Compliance - The department has made a reasonable search for empirical data indicating the permit is affordable. The search consisted of a review of department records that might contain economic data on the community, a review of information provided by the applicant as part of the application, and public comments received in response to public notices of this draft permit. If the empirical cost data was used by the permit writer, this data may consist of median household income, any other ongoing projects
that the department has knowledge, and other demographic financial information that the community provided as contemplated by Section 644. 145.3. See operating permit modification for **APPENDIX – COST ANALYSIS FOR COMPLIANCE**.

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 Caitlin Prim, P.E., with Burns and McDonnell 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 Southwest Regional Office per 10 CSR 20-7.015(9)(G).

5. 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.

6. 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.

7. In accordance with 10 CSR 20-6.010(12), a full closure plan shall be submitted to the department's Southwest 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-0022098. Closure shall not commence until the submitted closure plan is approved by the department.

8. 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 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)
- Isolate all 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 (7) (G)
- 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 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 10 feet 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 3 inches per 10 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 four tenths gallons per minute per square foot (0.4 gpm/ft^2) 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 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 two 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 degrees Fahrenheit (°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 gallons per minute (gpm) of water of moderate temperature, 50-90 °F and at pressures of 30 to 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)
- 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)
- 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.
- 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)
- 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)
- 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)
- 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)
- 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)
- 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)

- Belt presses and conveyors shall be provided with emergency shutoff controls along the entire length of the belt presses and conveyors that will:
  - Stop the press in an emergency; 10 CSR 20-8.170 (7) (A) 1. and
  - Trigger an audible alarm. 10 CSR 20-8.170 (7) (A) 2.
- 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)
- For wastewater treatment one hundred thousand gallons per day 100,000 gpd, the MBR process must be designed with a minimum of 2 membrane trains capable of treating the daily average flow with 1 membrane cassette out of service; 10 CSR 20-8.180 (7) (A) 1.
- Membrane Bioreactor design flux criteria must be satisfied with one membrane module out-of-service (e.g., for external clean in place, recovery cleaning, repair). For purposes of these criteria, a membrane module is the smallest membrane unit capable of separate removal from the tank while maintaining operation of other membrane units in the same tank. 10 CSR 20-8.180 (7) (A) 2.
- Membranes placed in the aeration basin(s) rather than a separate membrane tank shall have—
  - Individual modules and individual diffusers that can be removed separately for maintenance and repair; 10 CSR 20-8.180 (7) (A) 3. A. and
  - Aeration basin(s) volume sized for complete nitrification; 10 CSR 20-8.180 (7) (A) 3. B.
- Membrane Bioreactor preliminary treatment systems shall be consistent with the membrane manufacturer recommendations; 10 CSR 20-8.180 (7) (B) 1.
- Grit removal facilities are required for wastewater treatment facilities that utilize membrane bioreactors for secondary treatment. 10 CSR 20-8.150 (6) and 10 CSR 20-8.180 (7) (B) 2.
- Membrane Bioreactors shall provide oil and grease removal when the levels in the influent may cause damage to the membranes; 10 CSR 20-8.180 (7) (B) 3.
- Membrane Bioreactors shall provide a fine screen and high water alarm, designed to treat peak hourly flow. Coarse screens followed by fine screens may be used in larger facilities to minimize the complications of fine screening; and10 CSR 20-8.180 (7) (B) 4.
- Membrane Bioreactor preliminary treatment shall comply with 10 CSR 20-8.150(4)(B) for reliability. 10 CSR 20-8.180 (7) (B) 5.
- The Membrane Bioreactor's aeration blowers must provide adequate air for membrane scour and process demands. 10 CSR 20-8.180 (7) (C)
- Redundancy. The Membrane Bioreactor shall have at least one (1) of the following:
  - The ability to run in full programmable logic control (PLC) or standby power mode in case of an automatic control failure; 10 CSR 20-8.180 (7) (D) 1.
  - An operational battery backup PLC if manual control is not possible; or 10 CSR 20-8.180 (7) (D) 2.
  - Sufficient standby power generating capabilities to provide continuous flow through the membranes during a power outage (e.g., preliminary screening, process aeration, recycle/RAS/permeate pumps, air scour, vacuum pumps) or an adequate method to handle flow for an indefinite period (e.g., private control of influent combined with contingency methods). 10 CSR 20-8.180 (7) (D) 3.
- Operations and Maintenance. The MBR design shall—

- Include provisions to monitor membrane integrity; 10 CSR 20-8.180 (7) (E) 1.

- Provide on-line continuous turbidity monitoring of filtrate or an equivalent for operational control and indirect membrane integrity monitoring for a treatment plant with design average flow greater than or equal to 100,000 gpd; 10 CSR 20-8.180 (7) (E) 2. and
- Include provisions to remove membrane cassette for cleaning considering the membrane cassette wet weight plus additional weight of the solids accumulated on the membranes. 10 CSR 20-8.180 (7) (E) 3.

9. Upon completion of construction:

A. The City of Republic will become the continuing authority for operation and maintenance of these facilities;

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

C. Submit the Statement of Work Completed form to the department in accordance with 10 CSR 20-6.010(5)(N) (https://dnr.mo.gov/document-search/wastewater-construction-statement-work-completed-mo-780-2155) with a request for the Operating Permit modification to be issued.

IV. REVIEW SUMMARY

1. CONSTRUCTION PURPOSE

Construction is to expand treatment capacity with a new treatment plant expansion to five MGD. The City of Republic has experienced significant growth over the last few years and the new treatment plant will provide room for expansion with high level treatment. This project is part of multiple projects going on in the City of Republic to help reduce inflow and infiltration within the collection system and removing wet weather discharges.

2. FACILITY DESCRIPTION

The Republic WWTF is located at 915 North West Avenue, Republic, in Greene County, Missouri. The facility currently has a design average flow of 3.2 MGD and as part of this construction will be expanding to 5.0 MGD. The current treatment system includes oxidation ditch, which is being replaced with biological nutrient removal system and membrane bioreactors.

During high flow events the facility is currently constructing a wet weather train after being split at the screening. The wet weather train will include peak flow pumps, existing peak flow clarifier, transfer pump station, disc filtration, and chlorine disinfection. Following the wet weather train, flows will be blended back with

secondary treated flows prior to discharge. The peak flow wet weather treatment train will have the capacity to treat up to 4 MGD. Thus, after the construction of the new MBR system, the facility will have the capacity to discharge 9 MGD.

3. COMPLIANCE PARAMETERS

The proposed project is required to meet final effluent limits as established in Antidegradation review dated September 14, 2023. The limits following the completion of construction will be applicable to the facility:

PARAMETER	Unit	Monthly Average
Flow	MGD	*
BOD_5	mg/L	10
TSS	mg/L	15
*Escherichia coli***	#/100mL	126/*
Ammonia as N (January) (February) (March) (April) (May) (June) (July) (August) (September) (October) (November) (December)	mg/L	 3.1 2.7 3.1 2.7 2.2 1.7 1.5 1.5 1.8 2.6 3.1 3.1
Oil & Grease	mg/L	10
Cyanide, Amenable to Chlorination	µg/L	3.9 (<10)
Copper, Total Recoverable	µg/L	9.2
Selenium, Total Recoverable	µg/L	*
Thallium, Total Recoverable	µg/L	*
Zinc, Total Recoverable	µg/L	*
Total Phosphorus	mg/L	1.0
Total Kjeldahl Nitrogen	mg/L	*
Nitrite + Nitrate	mg/L	*
Total Nitrogen		*
pH	SU	6.5-9.0
PARAMETER	Unit	Monthly Avg. Min
BOD_5 Percent Removal	%	85
TSS Percent Removal	%	85

4. ANTIDEGRADATION

The department has reviewed the antidegradation report for this facility and issued the Water Quality and Antidegradation Review dated August 2023, due to the increase in design average flow to 5.0 MGD from 3.2 MGD.

5. REVIEW of MAJOR TREATMENT DESIGN CRITERIA

Construction will cover the following items:

- Submersible pumps- installation of 4 submersible pumps to direct flows to the grit removal or to the peak flow clarifier. Three will be duty pumps with 1 standby pump. There will be the installation of 2 large pumps, each capable of pumping 4,170 gpm (6.0 MGD) and 2 small pumps, each capable of pumping 2,780 gpm (4.0 MGD) at 57 ft of head. The large pumps will be 115 hp pumps, while the smaller pumps will be 60 hp.
    - During dry weather flows, the three pumps will have the capability to pump up to 12.6 MGD to the grit removal system
    - During wet weather flows, the three pumps will still have the ability to pump 12.6 MGD to the grit removal system and the 4.0 MGD to the wet weather treatment train.

- Conversion of the existing oxidation ditches into wastewater holding basins.
    - The former Orbal oxidation ditch with its 3 rings, with a sidewater depth of 9.5 ft
    - The former Krueger oxidation ditch with its sidewater depth of 12.66 ft.
    - Installation of a complete large bubble mixing system to mix raw wastewater during peak wet weather events in the wastewater holding basins. The mixing system will provide intermittently and sequentially inject compressed air through fixed nozzles located on the bason bottom to create large bubble to completely mix the basin wastewater.
    - Air distribution to the peak wet weather basins will maintain suspended solids in the basin between 100 mg/L and 500 mg/L.

- 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.
    - The Grit Removal unit shall be placed in a concrete tank and receive the incoming screened flow.
        - A stacked tray mechanical grit removal system is proposed to remove 95 percent of 106 microns and larger grit (SG 2.65) at specified peak hourly flow (12.6 MGD) and greater than or equal to 75 micron at the average flow (5 MGD).
        - The tray diameter is 12 ft and provides 113 sf per tray, thus requiring 7 trays or 791 sf of surface area.
        - Grit Classifier – Installation of one grit classifier with a design flow of 200 gpm (288,000 gpd) with 27 inches of headloss and a maximum flow of 400 gpm (576,000 gpd) with 106 inches of headloss. The grit classifier will have a 32-inch diameter.

- Grit Conveyor unit- Installation of one grit conveyor unit operating a 1 cycle per hour with a belt width of 6 inches.
  - The Grit Dewatering Conveyor unit clarifier is designed based on a settling rate not to exceed 1.0 gpm/sq ft.
  - The de-gritted effluent from the Grit Removal unit shall be discharged over an integral weir, which is 16 ft long.

- Screening – Installation of screening devices removes nuisance inorganic materials from raw wastewater.
  - Rotary drum screen- Installation of 3 (2 duty/1 standby) fully automatic, self-cleaning, channel mounted rotating perforated plate drum-style screens and

  - one screenings conveyor for removing floating, particulate, and fibrous materials for wastewater applications. This follows the six mm bar screening and grit removal. 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.
    - Each screen is designed for an average daily flow of 2.5 MGD (5 MGD with 2 screens in service) and a peak flow of 6.3 MGD (12.6 MGD with 2 screens operating)
    - Screen perforation opening size is 2 mm (0.079 inches).
    - The screens will be at a 35° angle.
    - Screen channel is 6 ft deep and 3 ft wide.
    - The average perforation flow through velocity will be 3.3 ft/sec.
    - The rotating basket shall remove solids from the flow and deposit them into the concentric screw conveyor hopper using a spray bar providing positive cleaning of the screen basket surface. The screenings shall be transported up the screw conveyor, through an integrated screening washing system, a compaction and dewatering zone and then shall be discharged onto a conveyor.
      - The conveyor trough will be 25 feet with a minimum inlet solids capacity of 177 cubic ft/ hour.
    - All open spaces of the screen shall be positively cleaned via a dual alternating spray bar system or single spray bar and cleaning brush system.

- Aluminum Sulfate bulk tank- One High Density Cross-linked Polyethylene (HDXPE). tank for indoor chemical storage and double walled containment, with a minimum capacity of 5,000 gallons. The design feed rate is between 4.1gph and 6.0 gph of 50 percent aluminum sulfate.

- Process Basins – Construction of 3 process basins with each basin having an anaerobic, anoxic, and aerated zone.
  - Overall aeration supplied to each treatment train is 2,500 scfm (7,500 scfm for all 3 process basins).
  - Anaerobic volume within the 3 basins is 400,000 gallons (133,333 gallons per basin), providing a retention time of 0.64 hours per basin at design average flow of 5 MGD (1.92 hours with all 3 basins) and at a peak flow of 8.1 MGD, a retention time of 0.4 hours per basin (1.19 hours with all 3 basins).
    - Anaerobic zone is 20 ft deep.
    - Solids residence time is 2.0 days.

- Anoxic volume within the 3 basins is 900,000 gallons (300,000 gallons per basin), providing a retention time of 1.44 hours per basin at design average flow of 5 MGD (4.32 hours with all 3 basins) and at a peak flow of 8.1 MGD, a retention time of 0.88 hours per basin (2.66 hours with all 3 basins).
    - Anoxic zone is 20 ft deep.
    - Solids residence time is 4.3 days.
    - In the anoxic zone, there shall be 3 duty submersible propeller pumps, one for each basin and a standby pump. The pump and its appurtenances must be capable of continuous submergence underwater without loss of watertight integrity to a depth of at least 22 ft. Pumps are designed for continuous or intermittent duty.
        - The maximum operating condition is 1,875 gpm (2.7 MGD) at 2.1 ft TDH for each pump. Total pump capacity in all 3 basins is 5,625 gpm (8.1 MGD)
        - The minimum operating condition is 1,157 gpm at 0.8 ft TDH for each pump.
        - The pumps will be controlled with integral VFD and be 3 phase 2 hp.
- In the anaerobic and anoxic zones, installation of large bubble mixing system to mix screened and degritted wastewater.
    - The mixing system will provide intermittently and sequentially inject compressed air through fixed nozzles located on the bason bottom to create large bubble to completely mix the basin wastewater.
    - Air distribution will maintain suspended solids in the basin between 4,000 mg/L and 12,000 mg/L.
    - Installation of 2 compressor systems (1 duty/1 standby)
    - Installation of 4 aeration blowers (3 duty and 1 standby), each capable of providing 3,300 scfm and operating at a discharge pressure of 9 psig with VFDs included.
- Each Aerobic zone has two cells. Influent flow to each train will typically be split equally, with each basin cell having a 1 MG volume (6 MG total with 3 trains and 2 cells per zone) and sidewater depth of 18.2 ft
    - Installation of fine bubble diffusers in the aerobic zones of the process basins.
    - Air distribution will maintain suspended solids in the aerobic zone between 5,000 mg/L and 14,000 mg/L.
    - Maximum allowable airflow per diffuser is 4scfm.
    - Solids residence time is 11 days.
- Wastewater shall flow by gravity to a pipe which will convey mixed liquor to each concrete membrane tank by the use of gates.

- Membrane Bioreactor (MBR) – The membrane bioreactor system includes the MBR influent trough, tanks, tank covers, and filtrate tanks. Each membrane train in the MBR System shall be capable of operating independently of all other trains including influent water flow, filtrate water flow, backwash cycles, cleaning cycles, and membrane integrity testing. The trains will be synchronized to prevent backwash or cleaning cycles from simultaneously occurring in more than one train. Construction will include 3 membrane reactors in parallel trains, designed to treat the maximum monthly design average flow of 8.1 MGD with one train out of service.

- MBR air scour blowers will be outdoors and all other ancillaries for the MBR system will be housed within the MBR Building. The Membrane tanks will be located exterior to the MBR Building and will be equipped with covers.
- The biological system shall be designed to remove phosphorus, biological oxygen demand, and total nitrogen at a design average flow of 5.0 MGD, maximum month average daily flow of 8.1 MGD, and a peak hourly flow of 12.6 MGD.
    - The membrane is a hollow fiber membrane with a maximum nomial pore size of 0.4µm (microns).
    - The surface area of the membranes is 790,400 ft^2
    - The design MLSS is 8,000 mg/L
    - The net flux rate at the maximum monthly flow of 8.1 MGD is 15 gpd/ sq ft at 20 °C.
        - The net flux at the peak daily flow of 12.0 MGD is 18.75 gpd/ sq ft at 20 °C.
        - The net flux at peak hourly flow of 12.6 MGD is 22.5 gpd/ sq ft at 20 °C.
    - The minimum design SRT is 11 days
    - The relaxation/backwash interval is designed for a maxim rate of 12 minutes for a maximum duration of 1 minute.
    - Disinfection is not proposed for this system because it utilizes ultrafiltration, with an opening of less than 0.4 microns.

- Filtrate Pumps – Installation of 1 filtrate/permeate rotary lobe positive displacement pump per membrane train for filtrate and backwash for the MBR system (total of 3 pumps). Each pump will be speed controlled with VFDs, each capable of operating at 2,100 gpm (3 MGD).

- Scum Pump Station- Scum shall be conveyed to an adjacent scum pump station. Scum skimming equipment shall be rotating cylindrical trough type, designed to continuously and intermittently remove surface scum and other floating materials from the bioreactor water surface.
    - Installation of 3 scum skimming units with a diameter of 12 inches and a skimmer length of 15 ft
    - Installation of two scum pumps (1 duty/1 standby), capable of operating at 350 gpm at 16 ft of head.

- Waste Activated Sludge (WAS) Pump Station – Construction of a WAS pump station and associated valves. The two WAS pumps will be rotary lobe positive displacement pumps, capable of transferring wasted activated sludge from the process basins to the aerobic digesters (1 duty/1 standby pump).
    - The WAS pump will be speed-controlled with VFDs, but the max operating speed on the pump is 355 rpm with a maximum flow of 320 gpm.

- Return Activated Sludge (RAS). Installation of 4 RAS pumps, with 3 duty and 1 standby, with an overall capacity of 22,500 gpm. Design conditions are 3 pumps operating with VFDs at 7, 500 gpm at 28 ft of head.

- Aerobic Digester – Four aerobic digesters with a normal sidewater operating depth of 13 ft and an 82 ft diameter, receiving waste activated sludge from the biological nutrient removal, membrane bioreactor process. Rehabilitation of the existing 3 digesters and construction of 1 new digester. WAS will typically be split equally between the 4 digesters.

    - Surface area for each digester is 5280 sq ft (21,120 sq ft for 4 digesters), with a total digester volume of 2,395,000 gallons.
    - The aerobic digesters will provide approximately 56 days of storage at 2 percent solids, meeting the processes to significantly reduce pathogens identified in 40 CFR 503.
    - Installation of medium bubble membrane diffusers and mixing of the sludge to prevent anaerobic conditions. Diffuse is non-clog suitable for intermittent or constant operating in sludge up to 2 percent solids.
        - Maximum allowable airflow per diffuser is 3.5 scfm per sq ft membrane area.
        - Rotary Helical Screw Blowers- Installation of 5 blowers, 4 duty and 1 standby. Each blower is designed to provide 4,100 scfm, with a discharge pressure of 7.5 psig and a max 250 hp on the blower. Each blower will be controlled by VFDs.
    - The aerobic digester follows the waste activated sludge pump station, but prior to the centrifuge.

- Centrifuge – The centrifuge shall intermittently receive, condition, and dewater the feed solids, and discharge the dewatered solids into a conveyor system, capable of dewatering solids intermittently or continuously.
    - Two centrifuge pumps will be rotary lobe positive displacement pumps, capable of transferring aerobically digested sludge to the centrifuge (1 duty/1 standby pump). The digested solids volatile solids content will be between 40-70 percent.
        - The centrifuge pump will be speed-controlled with VFDs, but the max operating speed on the pump is 240 rpm with a maximum flow of 185 gpm.
    - The maximum feed solids hydraulic loading rate into the centrifuge is 185 gpm (266,400 gpd) with a maximum solid loading rate of 1,830 dry lbs/hr (43,920 dry lbs/day or approximately 21.9 dry tons/day).
    - One (1) automatic polymer feed/dilution system used to activate emulsion type polyelectrolyte and feed the activated polymer solutions into the centrifuge, with a dilution water range between 320 and 3200 gph with a polymer feed range between 0.5 gph and 10 gph.
        - The mixer blending device shall be a mechanical mixing device that includes a motor driven impeller.
            - The impeller shall be driven by a 1,750 rpm (minimum), 0.5 HP, 120Vac, washdown duty motor.
        - The polymer metering pump is progressive cavity-type with an output range between 0.5 gph and 15 gph, capable of pumping a 0.1 to 2.0 percent solution of a diluted emulsion polymer with a viscosity range of 200 to 6,000 cps.

- With polymer addition, solids capture expected to be greater than 95 percent TSS.
- Maximum polymer consumption rate is 25 lbs polymer per dry ton solids.

- Inclined sludge screw conveyor and horizontal screw loading conveyor- Installation of 1 inclined and 1 horizontal screw loading conveyor.
  - Conveyor capacity is 1,300 lbs per hour and 200 cubic feet per hour.
  - Cake density is 60-70 lbs/ ft3 with a solids percentage between 15-25 percent by weight. Inclined conveyor will be at a 25 angel with a minimum 11-inch diameter screw. Horizontal loading conveyor will have a minimum 12-inch diameter screw.

The City of Republic also has active construction permit CP0002370, which is expected to be finished prior to the MBR being finished; however, the wet weather treatment train will work in conjunction with the new MBR system and the MBR treatment train and the wet weather treatment train will be blended together as necessary. Below is a summary of the construction covered under CP0002370 that will be used with the new treatment plant being constructed.

Construction covered under CP0002370

- Screening – Installation of screening devices removes nuisance inorganic materials from raw wastewater. Influent screening is provided upstream of the existing peak flow pump station. Three mechanical bar screens are installed in the three existing channels (2 new, 1 existing).
  - Mechanical Coarse Screen – Multi-rake mechanically cleaned coarse screen, with a maximum spacing of ¼ -inch, positioned at an angle of 70 degrees from the horizontal to allow for raking of the screen. Each screening device shall be capable of treating a design flow of 8 MGD, for a total of 24 MGD potential capacity
- Peak Flow Pumps – Two existing 6 MGD peak flows pump deliver to the peak flow clarifier. As part of this construction project, the impellers on each peak flow pump will be replaced to facilitate the ability to pump 12 MGD

- Existing Peak Flow Clarifier – 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. The existing peak flow clarifier has an approximate design volume of 557,328 gallons.
  - The equalization basin is 90.33 ft x 13.77 ft sidewater depth deep, with a 83 ft weir diameter.
  - The detention time in the peak flow clarifier is approximately 3.3 hours at peak flow of 4 MGD.
  - Surface overflow rate is approximately 739 gpd/sq ft, meeting the requirements of 10 CSR 20-8.160(2)(B), Table 160-2.
  - Weir overflow rate is approximately 15,340 gal/day/ft, which meets the requirements of 10 CSR 20-8.160(2)(C)2, Table 160-4.
- Transfer Pump Station – To return flow from the wet weather peak flow clarifier to the treatment plant or on through the wet weather treatment train. Three submersible pumps, each with a design capacity of 1,388 gpm (total: 5.99 MGD). The acceptable pump is the Flygt N3171 series.
  - At low wet well level with 2 pumps operating, maximum flow is 2,776 gpm (4.0 MGD) at 40 ft of head.

  - At high wet well level with 2 pumps operating, maximum flow is 2,776 gpm at 33 ft of head.

- Cloth Disk Tertiary Filtration – Installation of one Aqua Aerobics – Aquastorm Cloth Media Filter and backwash pump.
  - Disc filter is capable of peak daily flow of 6 MGD, with a maximum hydraulic loading rate of 6.45 gpm/sq ft and a maximum solids loading rate of 7.75 lbs/day-sq ft.
- Disinfection – Disinfection is the process of removal, deactivation, or killing of pathogenic microorganisms.
  - Liquid Chlorine – Bulk storage of the sodium hypochlorite chlorine disinfection system is proposed to be in two 3,000-gallon high-density polyethylene (HDXPE) bulk tanks within concrete chemical containment.
    - Designed for 12.5 percent sodium hypochlorite concentration.
    - The tanks are proposed to be stored outdoors under canopy cover to protect the hypochlorite from UV light.
  - Dechlorination –1,500-gallon high density polyethylene (HDXPE) sodium bisulfite bulk tank is proposed to be stored in totes indoors to prevent chemical freezing at cool temperatures. Design minimum feed rate is 0.15 gallons per hour, design average feed rate of 1.75 gallons per hour, and design max feed rate is 2.6 gallons per hour.
  - Chlorine Contact Tank – The existing chlorine contact basin will be rehabilitated and put back into service. The basin is bifurcated and serpentine, creating two 234-ft long by 5-foot-wide channels.
- Relocated Outfall- a new outfall structure will be constructed to handle the blended flows, approximately 50 feet downstream from the existing outfall structure. The new outfall structure will still discharge to Dry Branch. New 24-inch and 42-inch lines will be installed to convey the water.

6. OPERATING PERMIT

Operating permit MO-0022098 will require a modification to reflect the construction activities. The modified operating permit was successfully public noticed from May 10, 2024 to June 10, 2024, with one comment received on the setting of total phosphorus limits as part of the operating permit modification. While 10 CSR 20-7.015(9)(B)2.D is set for treatment facilities less than 15 MGD to achieve compliance with the total phosphorus rule by 2033, the Antidegradation Process allows the department to set effluent limits for pollutants of concern that are protective of Water Quality Standards and designated uses. The 2023 Antidegradation Review set the total phosphorus limit as part of the review in part based on the 2018 Nutrient Implementation Plan for dischargers in lake watersheds. In the alternatives analysis as part of the Antidegradation Review, all four alternatives evaluated included the ability to meet a 1.0 mg/L or better total phosphorus effluent limit and it was considered cost effective to meet the 1.0 mg/L. During the Antidegradation Review, the facility expressed interest in the permit reflecting the annual mass loading, rather than the concentration-based limit to provide flexibility as the city continues to grow, work on the collection system to reduce inflow and infiltration, and to operate a new treatment plant. The mass loading rate remains for the facility after construction of the MBR system is complete, which includes phosphorus removal technologies as part of the design.

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. This project is partially funded by ARPA funds and no modification fee is due.

7. CONSTRUCTION PERMIT MODIFICATION

This construction permit is being modified upon request to extend the construction permit schedule. The construction permit will now expire on July 1, 2027.

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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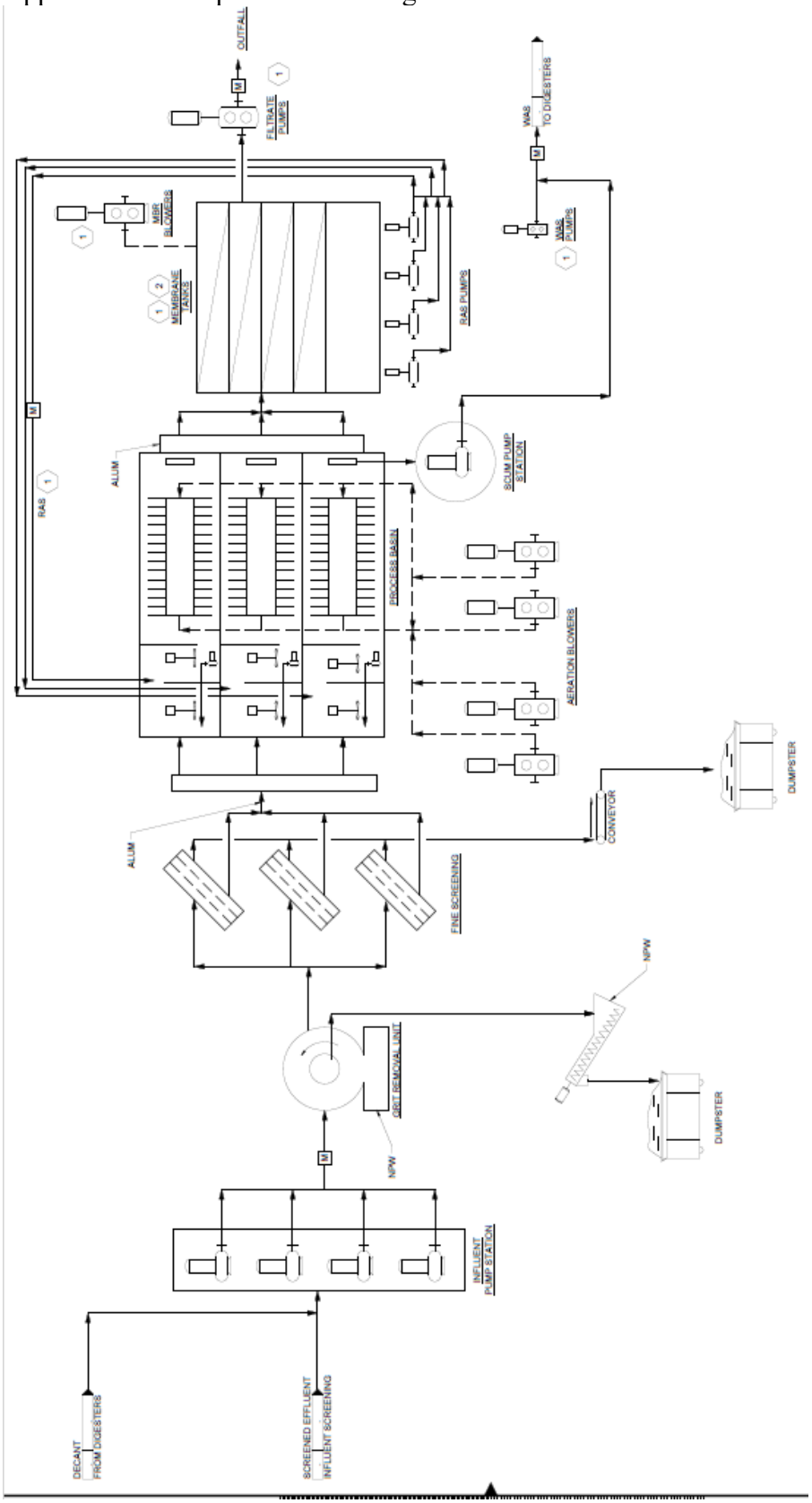
Appendix A: Process Diagrams

Appendix A-1: Liquid Process Diagram



Appendix A-2: Solids Process Diagram