Permit No. CP0002358

STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

CONSTRUCTION PERMIT

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

Joe Tousignant
President
Cape Girardeau County Reorganized Common Sewer District
3054 State Hwy FF
Jackson, MO 63755

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.

August 10, 2023
Effective Date

August 9, 2025
Expiration Date

John Hoke, Director, Water Protection Program

CONSTRUCTION PERMIT

I. CONSTRUCTION DESCRIPTION

Kinder Farms is a proposed subdivision located in the vicinity of 760 State Highway 34 in Jackson, Cape Girardeau County, Missouri. The subdivision will include about 500 residential lots at full buildout. In order to utilize existing infrastructure and minimize unnecessary expenses, the CGCRCSD proposes to relocate the CGCRCSD, Arbor Trails WWTF package plant to serve as a temporary treatment facility for the new Kinder Farms subdivision. The temporary facility will accommodate a development totaling 84 residential lots. In addition to relocating the plant, the engineer proposes installing a UV disinfection system, and constructing approximately 8,380 linear feet of gravity pipe, 133 linear feet of force main, 29 manholes, and a duplex pump station. The collection system was permitted separately under the sewer extension general permit, MOGSE0542 issued April 20, 2023 and with an expiration date of January 2, 2025. The new collection system and treatment facility will provide temporary wastewater treatment capacity for the subdivision until the proposed regional facility, the Starlight WWTF, can be constructed and permitted. The design flow of the Kinder Farms WWTF is 36,000 gpd. This permit incorporates variance CWC-V-3-23 from 10 CSR 20-8.160(3)(A) Table 160-1, which requires a minimum side water depth of 12 feet for secondary clarifiers following an activated sludge process. This variance was approved by the Clean Water Commission on July 12, 2023. The signed variance order is included in Appendix D.

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.

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 **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 Marc Manhnke, P.E., with Strickland Engineering, LC on drawing numbers 1, 2, 3, 6, 7, 8, 9, and 10, and Brian Strickland, P.E. with Strickland Engineering, LLC on drawing numbers 4 and 5, 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 Southeast Regional Office per 10 CSR 20-7.015(9)(G).

5. The wastewater facility structures, electrical equipment, and mechanical equipment shall be protected from physical damage by not less than the one hundred- (100-) year flood elevation per 10 CSR 20-8.140(2)(B).The minimum distance between wastewater treatment facilities and all potable water sources shall be at least three hundred feet (300') per 10 CSR 20-8.140(2)(C)1.

6. In addition to the requirements for a construction permit, 10 CSR 20-6.200 requires land disturbance activities of 1 acre or more to obtain a Missouri state operating permit to discharge stormwater. The permit requires best management practices sufficient to control runoff and sedimentation to protect waters of the state. Land disturbance permits

will only be obtained by means of the Department's ePermitting system available online at https://dnr.mo.gov/data-e-services/missouri-gateway-environmental-management-mogem. See https://dnr.mo.gov/data-e-services/water/electronic-permitting-epermitting for more information.

7. 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.

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

- Facilities shall be readily accessible by authorized personnel from a public right–of-way at all times. 10 CSR 20-8.140(2)(D)
- The outfall shall be so constructed and protected against the effects of flood water, ice, or other hazards as to reasonably ensure its structural stability and freedom from stoppage. 10 CSR 20-8.140(6)(A)
- All sampling points shall be designed so that a representative and discrete twenty-four (24) hour automatic composite sample or grab sample of the effluent discharge can be obtained at a point after the final treatment process and before discharge to or mixing with the receiving waters. 10 CSR 20-8.140(6)(B)
- All outfalls shall be posted with a permanent sign indicating the outfall number (i.e., Outfall #001). 10 CSR 20-8.140(6)(C)
- All wastewater treatment facilities shall be provided with an alternate source of electric power or pumping capability to allow continuity of operation during power failures. 10 CSR 20-8.140(7)(A)1.
- Disinfection and dechlorination, when used, shall be provided during all power outages. 10 CSR 20-8.140(7)(A)2.
- Electrical systems and components in raw wastewater or in enclosed or partially enclosed spaces where hazardous concentrations of flammable gases or vapors that are normally present, shall comply with the NFPA 70 *National Electric Code (NEC)* (2017 Edition), as approved and published August 24, 2016, requirements for Class I, Division 1, Group D locations. 10 CSR 20-8.140(7)(B)
- An audiovisual alarm or a more advanced alert system, with a self-contained power supply, capable of monitoring the condition of equipment whose failure could result in a violation of the operating permit, shall be provided for all wastewater treatment facilities. 10 CSR 20-8.140(7)(C)

- No piping or other connections shall exist in any part of the wastewater treatment facility that might cause the contamination of a potable water supply. 10 CSR 20-8.140(7)(D)1.
- A means of flow measurement shall be provided at all wastewater treatment facilities. 10 CSR 20-8.140(7)(E)
- Effluent twenty-four (24) hour composite automatic sampling equipment shall be provided at all mechanical wastewater treatment facilities and at other facilities where necessary under provisions of the operating permit. 10 CSR 20-8.140(7)(F)
- Adequate provisions shall be made to effectively protect facility personnel and visitors from hazards. The following shall be provided to fulfill the particular needs of each wastewater treatment facility:
    - Fencing. The facility site will be enclosed with a fence designed to discourage the entrance of unauthorized persons and animals; 10 CSR 20-8.140(8)(A)
- All wastewater treatment facilities must have a screening device, comminutor, or septic tank for the purpose of removing debris and nuisance materials from the influent wastewater. 10 CSR 20-8.150(2)
- 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)
- Effective flow splitting devices and control appurtenances (*e.g.*, gates and splitter boxes) shall be provided to permit proper proportioning of flow and solids loading to each settling unit, throughout the expected range of flows. 10 CSR 20-8.160(2)(B)
- Overflow weirs shall be readily adjustable over the life of the structure to correct for differential settlement of the tank. 10 CSR 20-8.160(3)(C)1.
- Walls of settling tanks shall extend at least six inches (6") above the surrounding ground surface and shall provide not less than twelve inches (12") of freeboard. 10 CSR 20-8.160(3)(E)
- Safety features shall appropriately include machinery covers, life lines, handrails on all stairways and walkways, and slip resistant surfaces. For additional safety follow the provisions listed in 10 CSR 20-8.140(8). 10 CSR 20-8.160(5)(A)
- The design shall provide for convenient and safe access to routine maintenance items such as gear boxes, scum removal mechanism, baffles, weirs, inlet stilling baffle areas, and effluent channels. 10 CSR 20-8.160(5)(B)
- 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.
- 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 thirty thousand microwatt seconds per centimeters squared (30,000 $\mu W \cdot s/cm^2$). 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.

9. Upon completion of construction:

    A. The Cape Girardeau County Reorganized Common Sewer District will become the continuing authority for operation and maintenance of these facilities;

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

    C. Submit the Statement of Work Completed to the Department in accordance with 10 CSR 20-6.010(5)(N) and request the operating permit be issued.

IV. REVIEW SUMMARY

1. CONSTRUCTION PURPOSE

The Cape Girardeau County Reorganized Common Sewer District (CGCRCSD) recently completed the construction of the Fruitland WWTF, which is now treating wastewater flows from the Arbor Trails subdivision previously served by the CGCRCSD, Arbor Trails WWTF, a prefabricated steel extended aeration package plant. The purpose of construction is to provide a temporary source of wastewater treatment capacity for the proposed Kinder Farms subdivision until the District can construct a regional treatment facility to replace the relocated treatment plant and serve the full-buildout of the subdivision. The temporary Kinder Farms WWTF will serve 84 lots of this development.

2. FACILITY DESCRIPTION

The CGCRCSD proposes to relocate the CGCRCSD, Arbor Trails WWTF to serve as a temporary treatment facility for the new Kinder Farms subdivision. The CGCRCSD, Arbor Trails WWTF is a prefabricated steel extended aeration package

plant consisting of a bar screen, aeration chamber, sludge hoppers, a sludge holding tank, and chlorination/dechlorination disinfection system. In addition to the relocation, the project will replace the current chlorination system with a UV disinfection system. Due to the desire to make use of existing infrastructure, this permit incorporates variance CWC-V-3-23 from 10 CSR 20-8.160(3)(A) Table 160-1, which requires a minimum side water depth of 12 feet for secondary clarifiers following an activated sludge process. The former CGCRCSD, Arbor Trails WWTF design provided a 3-foot side water depth in the secondary clarifier. The side water depth regulations in the Minimum Design Standards are mainly oriented towards larger facilities utilizing traditional, circular clarifiers. The dual hopper clarifier configuration is often utilized in package plants for applications with relatively low flows, and the design of these systems is not equivalent to the design of circular clarifiers. At the time the facility was permitted for construction, the 10 CSR 20 Chapter 8 regulations included a section "10 CSR 20-8.020 Design of Small Sewage Works". This section contained rules pertaining to small treatment plants and allowed for the use of dual hopper configurations in final settling tanks. The Department has approved a number of small extended aeration plants utilizing the dual hopper clarifier configuration under the previous regulations. The former CGCRCSD, Arbor Trails WWTF consistently met effluent limitations since its installation. Discharge monitoring data for this facility shows only one effluent limit exceedance for TSS was recorded in the past 20 years of operation. On average, the facility is removing about ninety-three percent of the incoming TSS, yielding an average effluent concentration of about 9 mg/L. This data shows that the facility consistently achieves good suspended solids removal, indicating that the settling process is working appropriately.

The Kinder Farms WWTF is to be located in the vicinity of 760 Hwy 34, Jackson, in Cape Girardeau County, Missouri. The facility has a design average flow of 36,000 gpd and serves a hydraulic population equivalent of approximately 360 people.

3. COMPLIANCE PARAMETERS

The proposed project is required to meet final effluent limits as established in the Antidegradation review dated October 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	10
Ammonia as N (Jan 1 – Mar 31)	mg/L	3.1
Ammonia as N (Apr 1 – Jun 30)	mg/L	1.5
Ammonia as N (Jun 1 – Sep 30)	mg/L	1.0
Ammonia as N (Oct 1 – Dec 31)	mg/L	2.2
Oil & Grease	mg/L	10
pH	SU	6.5-9.0
E. coli	#/100mL	206

4. ANTIDEGRADATION

The Department has reviewed the antidegradation report for this facility and issued the Water Quality and Antidegradation Review dated October 2022, due to the proposed relocation of the CGCRCSD, Arbor Trails WWTF. See **APPENDIX – ANTIDEGRADATION**.

5. REVIEW of MAJOR TREATMENT DESIGN CRITERIA

Construction will cover the following items:

- Flow Measurement – Installation of accurate flow measurement devices will give the treatment facility a means of improved data analysis.
  - Electromagnetic Meter – An effluent electromagnetic 4-inch flow meter shall measure the secondary treated wastewater prior to the UV disinfection system and discharge at Outfall No. 001.
- Screening – Installation of screening devices removes nuisance inorganic materials from raw wastewater. A manual bar screen is provided prior to the aeration chamber.
- Extended Aeration Package Plant – Installation of extended aeration package plant capable of treating a design average flow of 36,000 gpd. The following components are integrated into the prefabricated steel package plant:
  - Aeration Chamber – Aeration chamber is approximately 43 ft by 10.5 ft with a side water depth of approximately 9.5 feet. Aeration by means of duplex

blowers with fine bubble diffusers. The aeration chambers are designed for an average daily loading of approximately 79 lbs BOD_5.

- Clarifiers – The clarifiers have a dual hopper configuration that will have a total volume of approximately 19,700 gallons, with approximately 1,900 gallons reserved for sludge storage yielding an effective volume of approximately 17,800 gallons and a detention time of 0.5 hours. The surface overflow rate is about 125 gpd/ft^2 and the weir loading rate is about 3,000 gpd/lf. An air lift supernatant decanter is provided to remove grease and floatables and return to the aeration chamber. The clarified effluent will flow by gravity to the disinfection system. Two feet of freeboard is provided in the hoppers. Settled sludge from the dual square hopper bottoms is pumped to the sludge holding chamber or returned to the aeration chamber as return activated sludge.
- Sludge Holding Chamber – The sludge holding chamber will have a volume of approximately 1,090 gallons. The aeration chamber blowers will supply air to the fine bubble diffusers. Supernatant will be decanted by means of an airlift supernatant decanter to the aeration chamber. Sludge removal shall be by contract hauler.

- Disinfection – Disinfection is the process of removal, deactivation, or killing of pathogenic microorganisms.
  - Open Channel Ultraviolet (UV) – An open channel, gravity flow UV disinfection system. The dual open channel UV system consists of two banks in parallel, utilizing the Aqua Azul AZHO-400 or equivalent. The disinfected effluent will flow by gravity through flow measurement equipment and to Outfall No. 001.
- Emergency Power – Operators are notified of power outages through the control panel and SCADA system, which allows for real-time readings (i.e., flow, number of pumps running). A standby portable generator will be provided to operate the treatment facility or influent pump station in the event of power failure.

6. OPERATING PERMIT

The draft Operating Permit MO-0140023 was successfully public noticed from March 17, 2023, to April 17, 2023, with no comments received. Once construction is complete, 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. As a new public sewer system, there is no fee for the operating permit issuance.

V. NOTICE OF RIGHT TO APPEAL

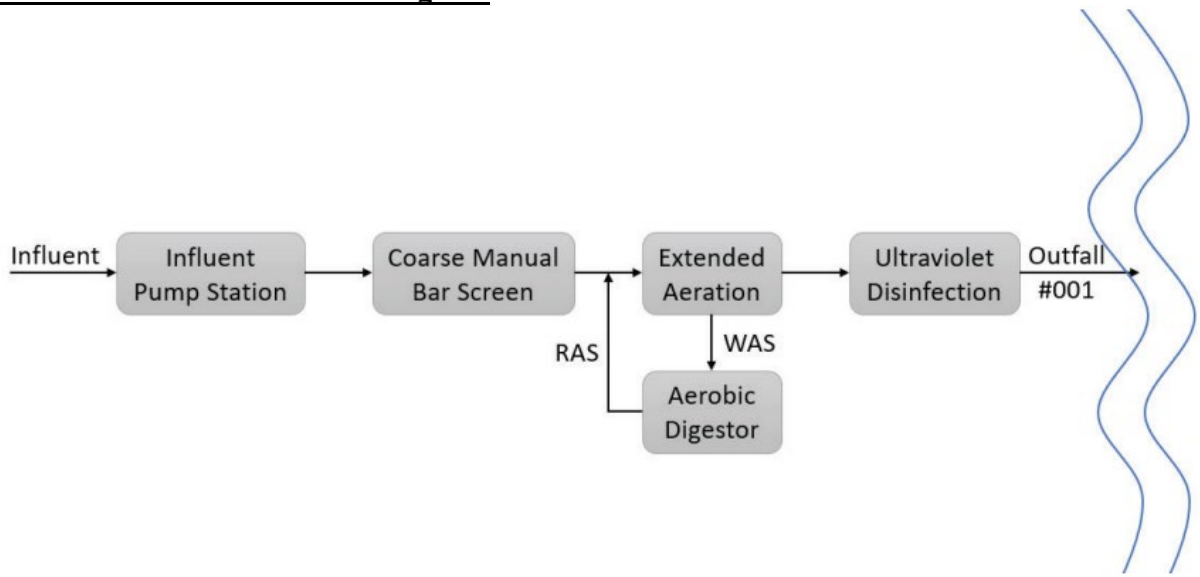
If you were adversely affected by this decision, you may be entitled to an appeal before the Administrative Hearing Commission (AHC) pursuant to Section 621.250 RSMo. To appeal, you must file a petition with the AHC within 30 days after the date this decision was mailed or the date it was delivered, 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

Thomas Silkwood
Engineering Section
thomas.silkwood@dnr.mo.gov

Chia-Wei Young, P.E.
Engineering Section
chia-wei.young@dnr.mo.gov

APPENDIX A: Process Flow Diagram



APPENDIX B: CAFCOM

Missouri Department of Natural Resources
Water Protection Program
Cost Analysis for Compliance
(In accordance with RSMo 644.145)

CGCRCSD, Kinder Farms WWTF
Cape Girardeau County Reorganized Common Sewer District
Missouri State Operating Permit #MO-0140023

Section 644.145 RSMo requires the Department of Natural Resources (Department) to make a "finding of affordability" when "issuing permits under" or "enforcing provisions of" state or federal clean water laws "pertaining to any portion of a combined or separate sanitary sewer system for publicly-owned treatment works." This cost analysis does not dictate how the permittee will comply with new permit requirements.

New Permit Requirements

The permit requires compliance with new monitoring requirements for BOD, TSS, ammonia, Oil and Grease, and *E. Coli* as the result of constructing a new facility.

Connections
The number of connections was reported by the permittee on the Financial Questionnaire. As this is a new facility, there are no connections yet.

Connection Type	Number
Residential	965
Commercial	20
Industrial	0
Facility Total	
Sewer District Total	**985**

Data Collection for this Analysis
This cost analysis is based on data available to the Department as provided by the permittee and data obtained from readily available sources. For the most accurate analysis, it is essential that the permittee provides the Department with current information about the District's financial and socioeconomic situation. The financial questionnaire available to permittees on the Department's website (https://dnr.mo.gov/document-search/financial-questionnaire-mo-780-2511) is a required attachment to the permit renewal application. If the financial questionnaire is not submitted with the renewal application, the Department sends a request to complete the form with the welcome correspondence. If certain data was not provided by the permittee to the Department and the data is not obtainable through readily available sources, this analysis will state that the information is "unknown".

Eight Criteria of 644.145 RSMo
The Department must consider the eight (8) criteria presented in subsection 644.145 RSMo to evaluate the cost associated with new permit requirements.

(1) A community's financial capability and ability to raise or secure necessary funding;

Criterion 1 Table. Current Financial Information for Cape Girardeau County Reorganized Common Sewer District	
Current Monthly User Rates per 5,000 gallons*	$80.00
Median Household Income (MHI)[1]	$56,302
Current Annual Operating Costs (excludes depreciation)	$

*User Rates were reported by the permittee on the Financial Questionnaire.

(2) Affordability of pollution control options for the individuals or households at or below the median household income level of the community;

The following tables outline the estimated costs of the new permit requirements:

Criterion 2A Table. Estimated Cost Breakdown of New Permit Requirements			
New Requirement	Frequency	Estimated Cost	Estimated Annual Cost
Total BOD – Influent	Monthly	$44	$528
Total TSS - Influent	Monthly	$12	$204
Total BOD – Effluent	Monthly	$44	$528
Total TSS - Effluent	Monthly	$12	$204
Ammonia - Effluent	Monthly	$22	$264
Oil & Grease- Effluent	Monthly	$24	$96
E. Coli - Effluent	Monthly	$31	$217
pH- Effluent	Monthly	$9.00	$108
Acute WET test	Once per permit cycle	$660	$132
Total Estimated Annual Cost of New Permit Requirements			$2,281

Criterion 2B Table. Estimated Costs for New Permit Requirements		
(1)	Estimated Annual Cost	$2,281
(2)	Estimated Monthly User Cost for New Requirements [2]	$0.19
	Estimated Monthly User Cost for New Requirements as a Percent of MHI [3]	0.004%
(3)	Total Monthly User Cost*	$80.19
	Total Monthly User Cost as a Percent of MHI [4]	1.71%

* Current User Rate + Estimated Monthly Costs of New Sampling Requirements

Due to the minimal cost associated with new permit requirements, the Department anticipates an extremely low to no rate increase will be necessary, which could impact individuals or households of this community.

(3) An evaluation of the overall costs and environmental benefits of the control technologies;

This analysis is being conducted based on new requirements in the permit, which will not require the addition of new control technologies at the facility. However, the new sampling requirements are being established in order to provide data regarding the health of the receiving stream's aquatic life and to ensure that the existing permit limits are providing adequate protection of aquatic life. Improved wastewater provides benefits such as avoided health costs due to water-related illness, enhanced environmental ecosystem quality, and improved natural resources. The preservation of natural resources has been proven to increase the economic value and sustainability of the surrounding communities. Maintaining Missouri's water quality standards fulfills the goal of restoring and maintaining the chemical, physical, and biological integrity of the receiving stream; and, where attainable, it achieves a level of water quality that provides for the protection and propagation of fish, shellfish, wildlife, and recreation in and on the water.

(4) Inclusion of ongoing costs of operating and maintaining the existing wastewater collection and treatment system, including payments on outstanding debts for wastewater collection and treatment systems when calculating projected rates:

The Sewer District reported that their outstanding debt for their current wastewater collection and treatment systems is $19,269,000. The Sewer District reported that each user pays $80.00 monthly, of which, $26.44 is used toward payments on the current outstanding debt. The District has a single rate structure for all customers, so the costs are divided across the entire sewer district.

(5) An inclusion of ways to reduce economic impacts on distressed populations in the community, including but not limited to low and fixed income populations. This requirement includes but is not limited to:

(a) Allowing adequate time in implementation schedules to mitigate potential adverse impacts on distressed populations resulting from the costs of the improvements and taking into consideration local community economic considerations.
(b) Allowing for reasonable accommodations for regulated entities when inflexible standards and fines would impose a disproportionate financial hardship in light of the environmental benefits to be gained.

The following table characterizes the current overall socioeconomic condition of the community as compared to the overall socioeconomic condition of Missouri. The following information was compiled using the latest U.S. Census data.

Criterion 5 Table. Socioeconomic Data [1-6] for Cape Girardeau County

No.	Administrative Unit	Cape Girardeau County	Missouri State	United States
1	Population (2020)	78,834	6,124,160	326,569,308
2	Percent Change in Population (2000-2020)	14.8%	9.5%	16.0%
3	2020 Median Household Income (in 2021 Dollars)	$56,302	$59,981	$68,047
4	Percent Change in Median Household Income (2000-2020)	-5.1%	-2.8%	-0.4%
5	Median Age (2020)	36.7	38.7	38.2
6	Change in Median Age in Years (2000-2020)	1.5	2.6	2.9
7	Unemployment Rate (2020)	4.4%	4.5%	5.4%
8	Percent of Population Below Poverty Level (2020)	15.8%	13.0%	12.8%
9	Percent of Household Received Food Stamps (2020)	10.1%	10.5%	11.4%

(6) An assessment of other community investments and operating costs relating to environmental improvements and public health protection;

The Fruitland WWTF was completed in 2022and collection system will be completed in 2023; with closure of existing 18 WWTFs to occur thereafter, at a cost of approximately $750,000. The Sewer District is planning a phased regionalization project to consolidate additional treatment plants, the frist phase will be the Starlight WWTF. Additional projects will be undertaken as required by these new permits with Schedules of Compliance. The regionalization project in Starlight will require low-interest financing and grants to be affordable, and is an important and necessary step in providing affordable service while eliminating non-complying facilities.

(7) An assessment of factors set forth in the United States Environmental Protection Agency's guidance, including but not limited to the "Combined Sewer Overflow Guidance for Financial Capability Assessment and Schedule Development" that may ease the cost burdens of implementing wet weather control plans, including but not limited to small system considerations, the attainability of water quality standards, and the development of wet weather standards;

The new requirements associated with this permit will not impose a financial burden on the community, nor will they require the Cape Girardeau County Reorganized Common Sewer District to seek funding from an outside source.

(8) An assessment of any other relevant local community economic conditions.

The sewer district did not report any other relevant local economic conditions.

Conclusion and Finding

As a result of new regulations, the Department is proposing modifications to the current operating permit that may require the permittee to increase monitoring. The Department has considered the eight (8) criteria presented in subsection 644.145 RSMo to evaluate the cost associated with the new permit requirements.

This analysis examined whether the new sampling requirements affect the ability of an individual customer or household to pay a utility bill without undue hardship or unreasonable sacrifice in the essential lifestyle or spending patterns of the individual or household. After reviewing the above criteria, the Department finds that the new sampling requirements may result in a low burden

with regard to the community's overall financial capability and a low financial impact for most individual customers/households; therefore, the new permit requirements are affordable.

References

1. 2020 MHI in 2020 Dollar: United States Census Bureau. 2016-2020 American Community Survey 5-Year Estimates, Table B19013: Median Household Income in the Past 12 Months (in 2020 Inflation-Adjusted Dollars). https://data.census.gov/cedsci/table?q=B19013&tid=ACSDT5Y2020.B19013.
   (B) 2000 MHI in 1999 Dollar: (1) For United States, United States Census Bureau (2003) 2000 Census of Population and Housing, Summary Social, Economic, and Housing Characteristics, PHC-2-1 Part 1. United States Summary, Table 5. Work Status and Income in 1999: 2000, Washington, DC. https://www.census.gov/content/dam/Census/library/publications/2003/dec/phc-2-1-pt1.pdf.
   (2) For Missouri State, United States Census Bureau (2003) 2000 Census of Population and Housing, Summary Social, Economic, and Housing Characteristics, PHC-2-27, Missouri, Table 10. Work Status and Income in 1999: 2000, Washington, DC. https://www.census.gov/content/dam/Census/library/publications/2003/dec/phc-2-1-pt1.pdf.
   (C) (C) 2021 CPI, 2020 CPI and 1999 CPI: U.S. Department of Labor Bureau of Labor Statistics (2021) Consumer Price Index - All Urban Consumers, U.S. City Average. All Items. 1982-84=100 (unadjusted) - CUUR0000SAO. https://data.bls.gov/cgi-bin/surveymost?bls.
   (D) 2020 MHI in 2021 Dollar = 2020 MHI in 2020 Dollar x 2021 CPI /2020 CPI; 2000 MHI in 2020 Dollar = 2000 MHI in 1999 Dollar x 2021 CPI /1999 CPI.
   (E) Percent Change in Median Household Income (2000-2020) = (2020 MHI in 2021 Dollar - 2000 MHI in 2021 Dollar) / (2000 MHI in 2021 Dollar).
2. ($2,291/985)/12 = $0.19 (Estimated Monthly User Cost for New Requirements)
3. ($0.19/($56,302/12))100% = 0.004% (New Sampling Only)
4. ($80.19/($56,302/12))100% = 1.71% (Total User Cost)
5. Total Population in 2020: United States Census Bureau. 2016-2020 American Community Survey 5-Year Estimates, Table B01003: Total Population - Universe: Total Population. https://data.census.gov/cedsci/table?q=B01003&tid=ACSDT5Y2020.B01003.
   (B) For United States, United States Census Bureau (2002) 2000 Census of Population and Housing, Summary Social, Economic, and Housing Characteristics, PHC-1-1 Part 1. United States Summary, Table 1. Age and Sex: 2000, Washington, DC. https://www.census.gov/content/dam/Census/library/publications/2003/dec/phc-2-1-pt1.pdf.
   (2) For Missouri State, United States Census Bureau (2002) 2000 Census of Population and Housing, Summary Population and Housing Characteristics, PHC-1-27, Missouri, Table 2. Age and Sex: 2000, Washington, DC. https://www2.census.gov/library/publications/2003/dec/phc-2-1-pt2.pdf.
   (C) Percent Change in Population (2000-2020) = (Total Population in 2020 - Total Population in 2000) / (Total Population in 2000).
6. Median Age in 2020: United States Census Bureau. 2016-2020 American Community Survey 5-Year Estimates, Table B01002: Median Age by Sex - Universe: Total population. https://data.census.gov/cedsci/table?q=B01002&tid=ACSDT5Y2020.B01002.
   (B) For United States, United States Census Bureau (2002) 2000 Census of Population and Housing, Summary Social, Economic, and Housing Characteristics, PHC-1-1 Part 1. United States Summary, Table 1. Age and Sex: 2000, Washington, DC., Page 2. https://www.census.gov/content/dam/Census/library/publications/2003/dec/phc-2-1-pt1.pdf.
   (2) For Missouri State, United States Census Bureau (2002) 2000 Census of Population and Housing, Summary Population and Housing Characteristics, PHC-1-27, Missouri, Table 2. Age and Sex: 2000, Washington, DC., Pages 64-92. https://www2.census.gov/library/publications/2003/dec/phc-2-1-pt2.pdf.
   (C) Change in Median Age in Years (2000-2020) = (Median Age in 2020 - Median Age in 2000).
7. United States Census Bureau. 2016-2020 American Community Survey 5-Year Estimates, S2301: Employment Status for the Population 16 Years and Over - Universe: Population 16 years and Over. https://data.census.gov/cedsci/table?q=unemployment&tid=ACSST5Y2020.S2301.
8. United States Census Bureau. 2016-2020 American Community Survey 5-Year Estimates, Table S1701: Poverty Status in the Past 12 Months. https://data.census.gov/cedsci/table?q=S1701&tid=ACSST5Y2020.S1701.
9. United States Census Bureau. 2016-2020 American Community Survey 5-Year Estimates, Table S2201: Food Stamps/Supplemental Nutrition Assistance Program (SNAP) - Universe: Households. https://data.census.gov/cedsci/table?q=S2201&tid=ACSST5Y2020.S2201.

APPENDIX C: Antidegradation Review

MISSOURI DEPARTMENT OF NATURAL RESOURCES

Michael L. Parson
Governor

Dru Buntin
Director

October 20, 2022

Brian Strickland, P.E.
Strickland Engineering on behalf of
Cape Girardeau County Reorganized Common Sewer District
113 West Main Street, Suite 6
Jackson, MO 63755

RE: Kinder Farms Wastewater Treatment Facility, MO-NEW, Water Quality and Antidegradation Review Preliminary Determination, ACT1258, Cape Girardeau County

Dear Mr. Strickland:

Enclosed please find the finalized Water Quality and Antidegradation Review (WQAR) for the *Antidegradation Report* received on July 29, 2022. The WQAR contains pertinent antidegradation review information for the facility discharge. It was developed in accordance with 10 CSR 20-7.031, the Clean Water Commission approved *Missouri Antidegradation Implementation Procedure* (AIP) dated July 13, 2016, U.S. Environmental Protection Agency (US EPA) guidance, the applicant-supplied antidegradation review documentation, and the State of Missouri's effluent regulations (10 CSR 20-7.015). Please refer to the *General Assumptions of the Water Quality and Antidegradation Review* section of the enclosed WQAR. The WQAR is preliminary and subject to change as new information becomes available during future permit application processing.

Based on the Missouri Department of Natural Resources' (department's) initial review, preliminary determination is that the applicant-supplied antidegradation review documentation satisfies the requirements of the AIP. This WQAR/preliminary determination may be appealed within 30 days of this letter in accordance with the AIP Section II.F.4.

The WQAR identifies a specific treatment technology for the preferred alternative; however, you may pursue construction of a different alternative evaluated during the review that will meet the effluent limits established in the WQAR.

Upon completion of the review of the already submitted facility plan, the next step will be to submit a complete application for a construction permit. An operating permit application will also be required 180 days prior to expected discharge. These submittals must reflect the design flow, facility description, and general treatment components of this WQAR or this preliminary determination may have to be revisited. In addition to one set of paper copies, all materials are to be submitted electronically as well. This is typically done via compact disc or other removable electronic media. If space allows materials may be emailed to DNR.WPPEngineeringSection@dnr.mo.gov.

The Department of Natural Resources' Clean Water State Revolving Funds provide low-interest loans to municipalities, counties, public water and public sewer districts and political subdivisions for wastewater infrastructure projects.

The State Revolving Fund is a federally capitalized, low-interest loan program that may fund new construction or the improvement or renovation of existing facilities. There are several programs offered through State Revolving Fund. For more information, please contact the department's Financial Assistance Center at (573) 751-1192 or visit their website https://dnr.mo.gov/water/business-industry-other-entities/financial-opportunities/financial-assistance-center/wastewater.

Following the department's public notice of a draft Missouri State Operating Permit including the antidegradation review findings and preliminary determination, the department will review any public notice comments received. If significant comments are made, the project may require another public notice and potentially another antidegradation review. If no comments are received or comments are resolved without another public notice, these findings and determinations will be considered final.

Following issuance of the construction permit and completion of the actual facility construction, the department will proceed with the issuance of the operating permit.

If you should have questions regarding the enclosed WQAR, please contact Bern Johnson by phone at 573-751-1714, by email at bern.johnson@dnr.mo.gov , or by mail at the Missouri Department of Natural Resources, Water Protection Program, P.O. Box 176, Jefferson City, Missouri 65102-0176.

Sincerely,

WATER PROTECTION PROGRAM

Cindy LePage

Cindy LePage, P.E., Chief
Engineering Section

CL:bjt

Missouri Department of Natural Resources Water
Protection Program
Water Pollution Control Branch
Engineering Section

Water Quality and Antidegradation Review

For the Protection of Water Quality
and Determination of Effluent Limits for Discharge to

Tributary to Byrd Creek
by
Cape Girardeau County Reorganized Common Sewer District
Kinder Farms WWTF

October 2022

Table of Contents

1. PERMIT LIMITS AND MONITORING INFORMATION

Proposed Monitoring Parameters and Effluent Limits

PARAMETER	Unit	Basis for Limits	Daily Maximum	Weekly Average	Monthly Average	Previous Permit Limit	Sampling Frequency	Sample Type ****
Flow	MGD	FSR	*		*	***	once/quarter	24 hr estimate
BOD_5	mg/L	PEL		15	10	***	once/quarter	grab
TSS	mg/L	PEL		15	10	***	once/quarter	grab
*Escherichia coli***	#/100mL	FSR		1,030	206**	***	once/quarter	grab
Ammonia as N								
(Jan 1 – Mar 31)	mg/L	WQBEL	12.1		3.1	***	once/quarter	grab
(Apr 1 – Jun 30)		WQBEL	10.1		1.5	***	once/quarter	grab
(Jul 1 – Sep 30)		WQBEL	8.4		1.0	***	once/quarter	grab
(Oct 1 – Dec 31)		WQBEL	8.4		2.2	***	once/quarter	grab

PARAMETER	Unit	Basis for Limits	Minimum		Maximum	Previous Permit Limit	Sampling Frequency	Sample Type
pH	SU	FSR	6.5		9.0	***	once/quarter	grab

PARAMETER	Unit	Basis for Limits	Daily Minimum		Monthly Avg. Min	Previous Permit Limit	Sampling Frequency	Sample Type
BOD_5 Percent Removal	%	FSR			85	***	once/quarter	calculated
TSS Percent Removal	%	FSR			85	***	once/quarter	calculated

* - Monitoring requirement only
** - #/100mL; the Monthly Average for *E. coli* is a geometric mean.
*** - Parameter not previously established in previous state operating permit.

Basis for Limitations Codes:

MDEL – Minimally Degrading Effluent Limit
NDEL – Non-Degrading Effluent Limit
PEL – Preferred Effluent Limit
TBEL – Technology-Based Effluent Limit
WQBEL – Water Quality-Based Effluent Limit
FSR-Federal and State Regulation

2. PURPOSE OF ANTIDEGRADATION REVIEW REPORT

A new 300 acre undeveloped and unsewered subdivision, Kinder Farms, is proposed in Cape Girardeau County, Missouri. The Kinder Farms subdivision is slated for a total of 500 residential single-family lots. Phase 1 will include a collection system for 87 lots and a wastewater treatment facility limited to Phase 1. The proposed Outfall #001 location will discharge to a tributary to Byrd Creek in Cape Girardeau County. The design flow for the proposed discharge at Kinder Farms WWTF will be 32,190 gpd.

The Cape Girardeau County Reorganized Common Sewer District (CGCRCSD) is currently planning to construct a large regional wastewater treatment facility to serve the unincorporated area west of the City of Jackson. As the CGCRCSD is actively in the planning phase of this regional wastewater treatment facility, the Kinder Farms subdivision has decided to move forward with Phase 1 of the development. Therefore, a temporary and cost-effective wastewater treatment facility is needed to serve the limited Kinder Farms Subdivision Phase 1 development.

After the regional facility is constructed, the Kinder Farms WWTF will be closed and the development connected to the new facility.

Brian Strickland, P.E., of Strickland Engineering, LLC, prepared this report on behalf of CGCRCSD.

The applicant elected to assume that all pollutants of concern (POC) significantly degrade the receiving stream in the absence of existing water quality. An alternatives analysis was conducted to fulfill the requirements of the Antidegradation Implementation Policy (AIP).

3. FACILITY INFORMATION

Facility Name:	Kinder Farms WWTF
Address:	TBD
Permit #:	MO-0140023
County:	Cape Girardeau
Facility Type:	POTW
Owner:	Cape Girardeau County Reorganized Common Sewer District
Continuing Authority:	Cape Girardeau County Reorganized Common Sewer District
UTM Coordinates:	X = 788061 ; Y = 4143018
Legal Description:	Sec. 5, T31N, R12E
Ecological Drainage Unit:	Ozark/Upper St. Francis/Castor

4. FACILITY HISTORY

This is a new, temporary facility to serve the initial construction phase of a large development west of Jackson, MO. The facility will be closed after a new, larger regional facility is built.

A. FACILITY PERFORMANCE HISTORY:

There is no performance history for this facility since it is a new and proposed discharging facility.

B. RECEIVING WATERBODY INFORMATION

OUTFALL(S) TABLE:

OUTFALL	DESIGN FLOW (CFS)	TREATMENT LEVEL	EFFLUENT TYPE
001	0.05	Secondary	Domestic

Receiving Stream(s) Table:

WATER-BODY NAME	CLASS	WBID	DESIGNATED USES*	12-DIGIT HUC	DISTANCE TO CLASSIFIED SEGMENT (MI)
Tributary to Byrd Creek	NA	NA	General Criteria	07140107-0509	Direct Discharge
Byrd Creek	P	2210	AQL, WBC-B, SCR, HP, IRR, LWW	07140107-0509	0.64

* Protection of Warm Water Aquatic Life (AQL), Cold Water Fishery (CDF), Cool Water Fishery (CLF), Whole Body Contact Recreation – Category A (WBC-A), Whole Body Contact Recreation – Category B (WBC-B), Secondary Contact Recreation (SCR), Human Health Protection (HHP), Irrigation (IRR), Livestock & Wildlife Watering (LWW), Drinking Water Supply (DWS), Industrial (IND), Groundwater (GRW).

RECEIVING STREAM(S) LOW-FLOW VALUES:

RECEIVING STREAM	LOW-FLOW VALUES (CFS)		
	1Q10	7Q10	30Q10
Tributary to Byrd Creek	0.0	0.0	0.0

Receiving Water Body Segment Outfall #1:		
Upper end segment* UTM coordinates:	X = 788041 ; Y = 4143005	outfall
Lower end segment* UTM coordinates:	X = 787186 ; Y = 4142704	downstream confluence

*Segment is the portion of the stream where discharge occurs. Segment is used to track changes in assimilative capacity and is bound at a minimum by existing sources and confluences with other significant water bodies.

A Geohydrologic Evaluation was submitted with the request and the receiving stream is gaining for discharge purposes (see Appendix B).

A. EXISTING WATER QUALITY

No existing water quality data was submitted.

B. MIXING CONSIDERATIONS

MIXING CONSIDERATIONS
Mixing Zone: Not Allowed [10 CSR 20-7.031(5)(A)4.B.(I)(a)].
Zone of Initial Dilution: Not Allowed [10 CSR 20-7.031(5)(A)4.B.(I)(b)].

5. RECEIVING WATER MONITORING REQUIREMENTS

No receiving water monitoring requirements recommended at this time.

6. ANTIDEGRADATION REVIEW INFORMATION

In accordance with Missouri's Water Quality Standard [10 CSR 20-7.031(3)] and federal antidegradation policy at Title 40 Code of Federal Regulation (CFR) Section 131.12 (a), the department developed a statewide antidegradation policy and corresponding procedures to implement the policy. A proposed discharge to a water body will be required to undergo a level of Antidegradation Review, which documents that the use of a water body's available assimilative capacity is justified. Effective August 30, 2008, and revised July 13, 2016, a facility is required to use Missouri's AIP for new and expanded wastewater discharges.

The AIP specifies that if the proposed activity results in significant degradation then a demonstration of necessity (i.e., alternatives analysis) and a determination of social and economic importance are required.

The following is a review of the Antidegradation Report for Kinder Farms WWTF dated July 25, 2022.

A. TIER DETERMINATION

Waterbodies are assigned Tier 1, 2, or 3 protection levels.

Tier 1 protection is applied to a waterbody on a pollutant by pollutant basis for pollutants which may cause or contribute to the impairment of a beneficial use or violation of Water Quality Criteria (WQC); and prohibit further degradation of Existing Water Quality (EWQ) where additional pollutants of concern (POCs) would result in the water being included on the 303(d) List.

Tier 2 level protection is assigned to the waterbody on a pollutant by pollutant basis that prohibits the degradation of water quality of a surface water unless a review of reasonable alternatives and social and economic considerations justifies the degradation in accordance with the methods presented in the AIP.

Tier 3 protection prohibits any degradation of water quality of Outstanding National Resource Waters and Outstanding State Resource Waters as identified in Tables D and E of the Water Quality Standards (WQS). Temporary degradation of water receiving Tier 3 protection may be allowed by the Department on a case-by-case basis as explained in Section VI of the AIP.

Below is a list of POCs reasonably expected and identified by the permittee in their application to be in the discharge. Pollutants of concern are defined as those pollutants "proposed for discharge that affect beneficial use(s) in waters of the state." They include pollutants that "create conditions unfavorable to beneficial uses in the water body receiving the discharge or proposed to receive the discharge" (AIP, Page 6).

All pollutants were assumed to be Tier 2.

Pollutants of Concern and Tier Determination

Pollutants of Concern	Tier	Degradation	Comment
Biological Oxygen Demand (BOD5)/DO	2*	Significant	
Total Suspended Solids (TSS)	2*	Significant	
Ammonia as N	2*	Significant	
Escherichia coli (E. coli)	2*	Significant	Permit Limits Apply
pH	**	Significant	Permit Limits Apply

* Tier assumed.
** Parameter is a range

B. NECESSITY OF DEGRADATION

The AIP specifies that if the proposed activity does result in significant degradation then a demonstration of necessity (i.e., alternatives analysis) and a determination of social and economic importance are required. Part of that analysis as shown below is the evaluation of non-degrading alternatives, such as regionalization or no discharge systems.

The applicant has the option of assuming discharge will be significant and proceeding directly to the alternatives analysis, thereby avoiding the determination of the assimilative capacity of the receiving water. The applicant has elected this option.

i. Regionalization
The Cape Girardeau County Reorganized Common Sewer District (CGCRCSD) is currently planning to construct a large regional wastewater treatment facility to serve the unincorporated area west of the City of Jackson. When the Cape Girardeau County Reorganized Common Sewer District (CGCRCSD) regional facility is built, this facility will be closed and its flow directed to the regional facility. Many other small WWTFs in the area will also be closed and their flow sent to the new plant.

ii. No Discharge Evaluation
No Discharge was considered, but rejected due to lack of affordable land for this temporary system.

iii. Alternatives to No discharge
This will be a temporary facility, therefore alternatives considered were limited to two disinfection options for the aeration package plant to be moved here from the Arbor Trails WWTF (MO-0128279). The two disinfection options are the current chlorination/dechlorination equipment at Arbor Trails and a UV unit transferred from Major Custom Cable WWTF (MO-0119491).

Alternatives Analysis Comparison

Parameter	Alternative 1 (Base Case) Relocated aeration package plant with chlorination / dechlorination	Alternative 2 Relocated aeration package plant with UV disinfection
BOD_5	≤ 10 mg/l	≤ 10 mg/l
TSS	≤ 10 mg/l	≤ 10 mg/l
Ammonia as N	≤ 1.0 mg/l	≤ 1.0 mg/l
Escherichia coli (E. coli)	≤ 126 CFU/100ml	≤ 126 CFU/100ml
Construction Cost*	$163,000	$163,000
Ratio	100%	100%

*Because this facility is temporary, life cycle cost is not calculated

C. SOCIAL AND ECONOMIC IMPORTANCE

The Kinder Farms WWTF will serve approximately 100 new single-family homes in Phase 1 of the Kinder Farms subdivision. Surrounding the Kinder Farms Phase 1 development are unsewered homes which abut tributaries to Byrd Creek. The development of the Kinder Farms subdivision will provide improved housing for Cape Girardeau County and increase the tax base for the county. The Kinder Farms Phase 1 development will have a beneficial impact on Cape Girardeau County by increasing the number of quality homes in the area. Housing is in a limited supply currently and the ability for people to find quality homes is a necessity for growth.

D. NATURAL HERITAGE REVIEW

A Missouri Department of Conservation Natural Heritage Review was obtained by the applicant. Three species of bats, Indiana, Gay, and Northern Long-Eared, may be present in the project area. The following recommendations were made for construction activities:

- Manage construction to minimize sedimentation and run-off to nearby streams.
- At stream and drainage crossings, avoid erosion, silt introduction, petroleum or chemical pollution, and disruption or realignment of stream banks and beds.
- If any trees need to be removed for the project, contact the U.S. Fish and Wildlife Service for coordination under the Endangered Species Act.

7. DERIVATION AND DISCUSSION OF PARAMETERS AND LIMITS

Wasteload allocations and limits were calculated using two methods:

A. **Water quality-based** – Using water quality criteria or water quality model results and the dilution equation below:

$$C = \frac{(C_s \times Q_s) + (C_e \times Q_e)}{(Q_e + Q_s)}$$ (EPA/505/2-90-001, Section 4.5.5)

Where C = downstream concentration
C_s = upstream concentration
Q_s = upstream flow
C_e = effluent concentration
Q_e = effluent flow

Chronic wasteload allocations were determined using applicable chronic water quality criteria (CCC: criteria continuous concentration) and stream volume of flow at the edge of the mixing zone (MZ). Acute wasteload allocations were determined using applicable water quality criteria (CMC: criteria maximum concentration) and stream volume of flow at the edge of the zone of initial dilution (ZID).

Water quality-based maximum daily and average monthly effluent limitations were calculated using methods and procedures outlined in USEPA's "Technical Support Document For Water Quality-based Toxics Control" (EPA/505/2-90-001).

B. **Alternative Analysis-based** – Using the preferred alternative's treatment capacity for conventional pollutants such as BOD_5 and TSS that are provided by the consultant as the WLA, the significantly-degrading effluent average monthly and average weekly limits are determined by applying the WLA as the average monthly (AML) and multiplying the AML by 1.5 to derive the average weekly limit (AWL).

Note: Significantly-degrading effluent limits have been based on the authority included in Section I.A. of the AIP. Also under 40 CFR 133.105, permitting authorities shall require more stringent limitations than equivalent to secondary treatment limitations for 1) existing facilities if the permitting authority determines that the 30-day average and 7-day average BOD_5 and TSS effluent values could be achievable through proper operation and maintenance of the treatment works, and 2) new facilities if the permitting authority determines that the 30-day average and 7-day average BOD_5 and TSS effluent values could be achievable through proper operation and maintenance of the treatment works, considering the design capability of the treatment process.

Outfall #001 – **Main Facility Outfall**

- **Flow.** Though not limited itself, the volume of effluent discharged from each outfall is needed to assure compliance with permitted effluent limitations [40 CFR Part 122.44(i)(1)(ii)]. If the permittee is unable to obtain effluent flow, then it is the responsibility of the permittee to inform the department, which may require the submittal of an operating permit modification. Influent monitoring has been and will be required for this facility in its Missouri State Operating Permit.

- **Biochemical Oxygen Demand (BOD_5).** Effluent limits of 10 mg/L average monthly and 15 mg/L average weekly maximum were established as a result of a discharging technology alternatives analysis conducted by the applicant. These limits are at least as stringent as the minimum effluent regulations established in 10 CSR 20-7.015(8).

- **Total Suspended Solids (TSS).** Effluent limits of 10 mg/L average monthly and 15 mg/L average weekly maximum were established as a result of a discharging technology alternatives analysis conducted by the applicant. These limits are at least as stringent as the minimum effluent regulations established in 10 CSR 20-7.015(8).

- ***Escherichia coli (E. coli)***. Effluent limits of 206 CFU per 100 mL monthly average and 1,030 CFU per 100 mL as a weekly average of geometric mean during the recreation season (April 1 – October 31) were established as a result of a discharging technology alternatives analysis conducted by the applicant. Kinder Farms will utilize UV irradiation for disinfection and therefore will not contribute to impairment of the WBC (B) designated use of the receiving stream, as per 10 CSR 20-7.031(5)(C). An effluent limit for both monthly average and weekly maximum is required by 40 CFR 122.45(d) for POTWs.

- **Total Ammonia Nitrogen.** Early Life Stages Present Total Ammonia Nitrogen criteria apply [10 CSR 20-7.031(5)(B)7.C. & Table B3]. Background total ammonia nitrogen = 0.01 mg/L

Quarter	Temp (°C)*	pH (SU)*	Total Ammonia Nitrogen CCC (mg/L)	Total Ammonia Nitrogen CMC (mg/L)
1st	7.4	7.8	3.1	12.1
2nd	24.0	7.9	1.5	10.1
3rd	28.6	8.0	1.0	8.4
4th	15.9	8.0	2.2	8.4

* Ecoregion Data (Interior River Valleys and Hills)

1st Quarter
Chronic WLA: Ce=((0.0498945 + 0) * 3.1 - (0 * 0.1) / 0.0498945 = 3.1
Acute WLA: Ce=((0.0498945 + 0) * 12.1 - (0 * 0.1)) / 0.0498945 = 12.1
AML = WLAc = 3.1 mg/L
MDL = WLAa = 12.1 mg/L

2nd Quarter
Chronic WLA: Ce=((0.0498945 + 0) * 1.5 - (0 * 0.1)) / 0.0498945 = 1.5
Acute WLA: Ce=((0.0498945 + 0) * 10.1 - (0 * 0.1)) / 0.0498945 = 10.1
AML = WLAc = 1.5 mg/L
MDL = WLAa = 10.1 mg/L

3rd Quarter
Chronic WLA: Ce=((0.0498945 + 0) * 1.0 - (0 * 0.1)) / 0.0498945 = 1.0
Acute WLA: Ce=((0.0498945 + 0) * 8.4 - (0 * 0.1)) / 0.0498945 = 8.4
AML = WLAc = 1.0 mg/L
MDL = WLAa = 8.4 mg/L

4th Quarter
Chronic WLA: Ce=((0.0498945 + 0) * 2.2 - (0 * 0.1)) / 0.0498945 = 2.2
Acute WLA: Ce=((0.0498945 + 0) * 8.4 - (0 * 0.1)) / 0.0498945 = 8.4
AML = WLAc = 2.2 mg/L
MDL = WLAa = 8.4 mg/L

- **pH.** The preferred alternative selected for ammonia treatment serves as the base case for pH with effluent limit range of 6.5-9.0 SU. Technology based effluent limitations of 6.0-9.0 SU [10 CSR 20-7.015] are not protective of the Water Quality Standard, which states that water contaminants shall not cause pH to be outside the range of 6.5-9.0 SU. No mixing zone is allowed due to the classification of the receiving stream, therefore the water quality standard must be met at the outfall.

- **Biochemical Oxygen Demand (BODs) Percent Removal.** In accordance with 40 CFR Part 133, removal efficiency is a method by which the Federal Regulations define Secondary Treatment and Equivalent to Secondary Treatment, which applies to BOD5 and TSS for Publicly Owned Treatment Works (POTWs)/municipals. This facility is required to meet 85% removal efficiency for BOD5.

- **Total Suspended Solids (TSS) Percent Removal.** In accordance with 40 CFR Part 133, removal efficiency is a method by which the Federal Regulations define Secondary Treatment and Equivalent to Secondary Treatment, which applies to BOD5 and TSS for Publicly Owned Treatment Works (POTWs)/municipals. This facility is required to meet 85% removal efficiency for TSS.

8. GENERAL ASSUMPTIONS OF THE WATER QUALITY AND ANTIDEGRADATION REVIEW

a. A Water Quality and Antidegradation Review (WQAR) assumes that [10 CSR 20-6.010(2) Continuing Authorities and 10 CSR 20-6.010(4)(A)5.B., consideration for no discharge] has been or will be addressed in a Missouri State Operating Permit or Construction Permit Application.
b. A WQAR does not indicate approval or disapproval of alternative analysis as per [10 CSR 20-7.015(4) Losing Streams], and/or any section of the effluent regulations.
c. Changes to Federal and State Regulations (FSR) made after the drafting of this WQAR may alter Water Quality Based Effluent Limits (WQBEL).
d. Effluent limitations derived from FSR may be WQBEL or Effluent Limit Guidelines (ELG).
e. WQBEL supersede ELG only when they are more stringent. Mass limits derived from technology based limits are still appropriate.
f. A WQAR does not allow discharges to waters of the State, and shall not be construed as a National Pollution Discharge Elimination System (NPDES) or Missouri State Operating Permit to discharge or a permit to construct, modify, or upgrade.
g. Limitations and other requirements in a WQAR may change as Water Quality Standards (WQS), Methodology, and Implementation procedures change.
h. Nothing in this WQAR removes any obligations to comply with county or other local ordinances or restrictions.

i. The operating permit may contain additional requirements to evaluate the effectiveness of the technology once the facility is in operation. This Antidegradation Review is based on the information provided by the facility and is not a comprehensive review of the proposed treatment technology. If the review engineer determines the proposed technology will not consistently meet proposed effluent limits, the permittee will be required to revise their Antidegradation Report.

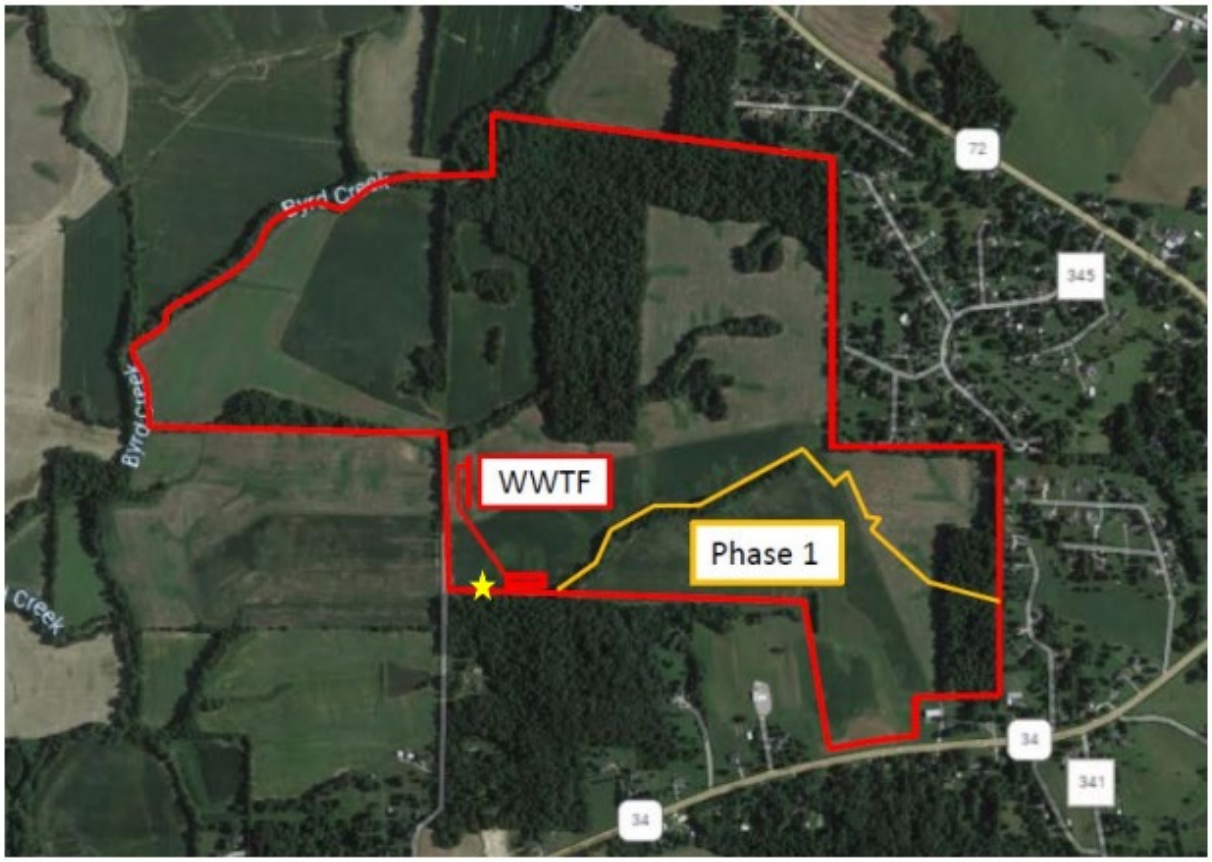
9. ANTIDEGRADATION REVIEW PRELIMINARY DETERMINATION

The proposed new facility will be temporary until a larger regional facility is built in the next few years. The aeration ditch and UV disinfection equipment will be transferred from other, to-be-closed, facilities.

Per the requirements of the AIP, the effluent limits in this review were developed to be protective of beneficial uses and to attain the highest statutory and regulatory requirements. The Department has determined that the submitted review is sufficient and meets the requirements of the AIP. No further analysis is needed for this discharge.

Reviewer: Bern Johnson
Date: October 2022
Unit Chief: Jill Wade, P.E.

Appendix A: Map of Discharge Location



Appendix B: Geohydrologic Evaluation

Missouri Department of NATURAL RESOURCES
dnr.mo.gov
Michael L. Parson, Governor
Dru Buntin, Director

LWE22093
Cape Girardeau County

May 02, 2022

Marc Mahnke
Strickland Engineering
Jackson, MO 63755

RE: Kinder Farms WWTP

Dear Marc Mahnke:

On April 13, 2022, the Missouri Geological Survey received a request to perform a geohydrologic evaluation for the above referenced project located in Cape Girardeau County. Included with this letter is a report that details the geologic and hydrologic conditions at the site and the potential for groundwater contamination in the event of wastewater treatment failure.

Thank you for the evaluation request. If you are in need of further assistance or have questions regarding the report, please contact our office at P.O Box 250, Rolla, Mo 65402-0250, by telephone at 573-368-2100 or gspeg@dnr.mo.gov.

Sincerely,

MISSOURI GEOLOGICAL SURVEY

Kirsten Schaefer

Kirsten Schaefer
Geologist
Environmental Geology Section

c: Brandon Williams
WPP
Southeast Regional Office

STATE OF MISSOURI
KIRSTEN N. SCHAEFER
RG
2021034025
REGISTERED GEOLOGIST

05/02/2022

Missouri Department Of Natural Resources
Missouri Geological Survey
Geological Survey Program
Environmental Geology Section

Project ID Number
LWE22093
County
Cape Girardeau

Request Details

Project: Kinder Farms WWTP

Legal Description: 05 T31N R12E
Quadrangle: JACKSON
Latitude: 37 23 33.76
Longitude: -83 44 40.15

Organization Official
Name: Brandon Williams
Address: 2985 Boutin Drive
City: Cape Girardeau
State: MO Zip: 63701
Phone: 573-335-3382
Email: bowconstruction@aol.com

Preparer
Name: Marc Mahnke
Address: Strickland Engineering
City: Jackson
State: MO Zip: 63755
Phone: 573-243-4080
Email: mmahnke@stricklandengineering.com

Project Details

Report Date: 05/02/2022
Date of Field Visit: 04/19/2022

Previous Reports: Not Applicable

Facility Type
- [X] Mechanical treatment plant
- [ ] Recirculating filter bed
- [ ] Land application
- [ ] Lagoon or storage basin
- [ ] Subsurface soil absorption system
- [ ] Lagoon or storage basin W/Land App
- [ ] Lagoon or storage basin W/SSAS
- [ ] Other type of facility

Type of Waste
- [ ] Animal
- [X] Human
- [ ] Process or industrial
- [ ] Leachate
- [ ] Other waste type

Funding Source
- [X] IWT
- [ ] WWL-SRF

Additional Information
- [ ] Plans were submitted
- [ ] Site was investigated by NRCS
- [ ] Soil or geotechnical data were submitted

Geologic Stream Classification: [X] Gaining [ ] Losing [ ] No discharge

Overall Geologic Limitations
- [X] Slight
- [ ] Moderate
- [ ] Severe

Collapse Potential
- [X] Not applicable
- [ ] Slight
- [ ] Moderate
- [ ] Severe

Topography
- [X] <4%
- [X] 4% to 8%
- [X] 8% to 15%
- [ ] >15%

Landscape Position
- [X] Broad uplands
- [ ] Ridgetop
- [X] Hillslope
- [ ] Narrow ravine
- [ ] Floodplain
- [ ] Alluvial plain
- [ ] Terrace
- [ ] Sinkhole

Bedrock: Uppermost bedrock consists of the Ordovician-age St. Peter Sandstone and Everton Formations

Surficial Materials: Approximately 30-40 feet of surficial material, which consists of loess, loam, clay, and clay loam

Missouri Department Of Natural Resources
Missouri Geological Survey
Geological Survey Program
Environmental Geology Section

Project ID Number
LWE22093
County
Cape Girardeau

Recommended Construction Procedures for Earthen Facility	Determine Overburden Properties	Determine Hydrologic Conditions
	☐ Particle size analysis	☐ Groundwater elevation
☐ Installation of clay pad and Compaction	☐ Atterberg limits	☐ Direction of groundwater flow
☐ Diversion of subsurface flow	☐ 95% Max. dry density test method	☐ 25-Year flood level
☐ Artificial sealing	☐ Overburden thickness	☐ 100-Year flood level
☐ Rock excavation	☐ Permeability coefficient-undisturbed	
☐ Limit excavation depth	☐ Permeability coefficient-remolded	

Remarks:

On April 19, 2022, a geologist with the Missouri Geological Survey (MGS) conducted a site visit and geohydrologic evaluation for the proposed discharging Kinder Farms mechanical treatment plant. The Cape Girardeau Sewer District plans to relocate an existing mechanical plant to the southern part of the property to treat wastewater while the permanent facility associated with Byrd Creek Holdings, LLC is constructed (LWE22056). The temporary facility will discharge to a different unnamed tributary of Byrd Creek, therefore, a secondary site visit and stream evaluation were conducted. The site is approximately 317 acres of broad uplands and hillslopes located 0.5 mile west of the intersection of Route 72 and Route 34 in Cape Girardeau County. The purpose of the site visit was to observe the geologic and hydrologic characteristics of the site and to determine groundwater contamination potential in the event of treatment failure.

Bedrock was not observed onsite, however, according to geologic maps, logs of nearby wells, and stream channel observations, the uppermost bedrock consists of the Ordovician-age St. Peter Sandstone and Everton formations beneath approximately 30-40 feet of surficial material, which consists of loess, loam, clay, and clay loam. Surficial material thickness varies throughout the site due to the undulating topography, with thicker successions to the north and east that thin to the west and south. Generally, the surficial material has moderate permeability, however, sporadic clay lenses create areas of low permeability onsite. There are no known karst features within one mile of the site, however, there is one drinking water well within 1/4 mile and several faults associated within the Jackson fault system within one mile.

The proposed discharge point for the temporary facility will be to an unnamed tributary of Byrd Creek, approximately 500 feet south of the terminus of Granite Lane. Due to recent heavy precipitation events, local stream discharges were high; the USGS Water Watch classified nearby stream gauges as 'Much Above Normal'. However, the characteristics of the unnamed tributary to Byrd Creek and Byrd Creek were adequately visible for stream classification. Both were classified as gaining. While there was flow on the day of the site visit, the unnamed tributary is ephemeral, as seen during previous site visits. Therefore, it is likely the majority of the unnamed tributary's flow will come from the discharging facility. Due to the geologic and hydrologic characteristics, this additional flow may change the channel morphology of the unnamed tributary.

Based on the geologic and hydrologic conditions observed, the site receives a slight geological limitations rating. In the event of treatment failure, the surface waters of the unnamed tributary to Byrd Creek and Byrd Creek may be adversely impacted, in addition to local, shallow groundwater.

Appendix C: Antidegradation Review Summary Attachments

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH
ANTIDEGRADATION: REGIONALIZATION AND NO-DISCHARGE EVALUATION

REGIONALIZATION AND NO-DISCHARGE EVALUATION

According to the Antidegradation Implementation Procedure Sections I.B. and II.B.1., the feasibility of no-discharge alternatives must be considered. No-discharge alternatives may include connection to a regional treatment facility, surface land application, subsurface land application, and recycle or reuse.

Please refer to the *No-Discharge Alternative Evaluation* fact sheet for examples of information to provide to justify common reasons for not pursuing regionalization or no-discharge land application. If sufficient information is not provided on this form to demonstrate that these alternatives are not feasible, a more detailed evaluation of no-discharge options may have to be submitted.

Additional pages may be attached if more room is needed.

1. FACILITY:

NAME	COUNTY
Kinder Farms WWTF	Cape Girardeau

2. EVALUATION OF REGIONALIZATION (Complete all applicable reasons why regionalization was not pursued)

2.1 Regionalization Feasibility:

A. What is the distance to connect to the closest municipality's line or other facility's line?

B. List facilities contacted about possible regionalization.

C. Is there any planning or zoning in the area regarding development and services?

D. Who would have the responsibility to maintain the sewer connection line?

E. What is the estimated cost for piping and pumps to regionalize?

F. Explain any engineering challenges with the regionalization connection – topography, rivers, highways, or other issues.

G. Does a regional facility have the capacity to treat the additional effluent from this project?

H. Were land owners contacted for rights to an easement? ☐ Yes ☐ No

I. Describe the easement issues:

2.2 Summarize why regionalization was not a practicable or economically efficient alternative

The Cape Girardeau County Reorganized Common Sewer District is currently planning to construct a large regional wastewater treatment facility to serve the unincorporated area west of the City of Jackson. As the CGCRCSD is actively in the planning phase of this regional wastewater treatment facility, the Kinder Farms subdivision has decided to move forward with Phase 1 of the development. Therefore, a temporary and cost-effective wastewater treatment facility is needed to serve the limited Kinder Farms Subdivision Phase 1 development.

3. EVALUATION OF NO-DISCHARGE LAND APPLICATION

Check all applicable reasons why no-discharge land application was not pursued:

☐ **3.1 Land Availability and Cost:**

A. Is land available for land application? ☐ Yes ☑ No

If not, explain: Cost of aquiring sufficient acreage for a temporary facility is prohibitive.

If yes, answer the following:

B. How many acres are required for land application of the effluent?

C. Provide a breakdown of the capital cost for any necessary additional land, piping, pumps, and irrigation equipment?

D. Were long-term costs evaluated and compared for upgrading to a mechanical plant with future Water Quality Standards changes (i.e. mussel ammonia, bacteria, TP, TN) versus cost for a land application system? ☐ Yes ☐ No

E. Were land owners contacted for rights to an easement? ☐ Yes ☐ No

F. Describe the easement issues:

☐ **3.2 Zoning or Suitability of Site in Proximity to Neighboring Sites or Waterbodies:**

A. Was drip or subsurface irrigation evaluated as opposed to surface application? ☑ Yes ☐ No

B. Does the county ordinance specifically restrict land application, surface and subsurface? ☐ Yes ☑ No

C. Can a vegetated buffer be installed to reduce necessary buffer distances? ☐ Yes ☑ No

D. Are there other steps or considerations that can be made?

☐ **3.3 Unsuitability of Geology or Soils**

A. Is a geohydrologic evaluation, county soils survey map, or other resource showing suitability and application rates included with this application? ☑ Yes ☐ No

B. Is it cost-effective to bring in additional soils? ☐ Yes ☑ No

C. Can the application rate be decreased to a suitable rate? ☐ Yes ☑ No

D. Were subsurface application alternatives (e.g. low pressure pipe, drip) considered? ☑ Yes ☐ No

E. If collapse potential is a concern, was using a liner or alternative site evaluated? ☐ Yes ☐ No

3.4 Summarize why no-discharge land application was not a practicable or economically efficient alternative

A no-discharge land application alternative was considered. This alternative would eliminate a discharge to the receiving stream and provide an added nutrient benefit to the land application site. However, land was not available and is not economically efficient.

4. DOCUMENTATION

4.1 Is any other written correspondence or documentation included with this application to provide further justification for not pursuing a no-discharge option or regionalization?

- [x] No
- [ ] Yes:
  - [ ] A letter from an existing higher preference continuing authority waiving preferential status where service is not available in accordance with 10 CSR 20-6.0 10 (2) or if capacity is not available.
  - [ ] A letter from the existing higher preference continuing authority stating that the regional facility has no interest in taking flow from the new or expanded facility.
  - [ ] A letter from the regional municipality stating that the project area is outside city limits and annexation would be required.
  - [ ] Council meeting minutes.
  - [ ] Correspondence with land owners regarding easement rights.
  - [ ] Correspondence with land owners regarding land for sale or lease.
  - [ ] Letters from the community or a consulting engineer regarding availability, proximity, and location of suitable land and the reasonable cost of such land.
  - [ ] Documentation of recent land sales or appraisals.
  - [ ] Calculations for sizing a land application system.
  - [ ] Detailed cost estimates for a land application system or regionalization including lift stations, piping, easements, liners, and/or connection costs.
  - [ ] Geohydrologic evaluation or other soils report.
  - [ ] Copy of a county or city ordinance.
  - [ ] Verification of funding from State Revolving Fund, which does not fund projects outside city limits.
  - [ ] Other:

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH

ANTIDEGRADATION REVIEW SUMMARY/ REQUEST

FOR DEPARTMENT USE ONLY
APP NO.
FEE RECEIVED CHECK NO.
DATE RECEIVED

1. FACILITY

NAME		COUNTY
Kinder Farms WWTF		Cape Girardeau
ADDRESS (PHYSICAL)	CITY	STATE ZIP CODE
	Jackson	MO 63755
PERMIT NUMBER	PROPOSED DESIGN FLOW	SIC / NAICS CODE
	36,000 gpd	4952- POTW

2. OWNER

NAME ADDRESS	CITY	STATE ZIP CODE
Cape Girardeau County Reorganized Common Sewer District		
3054 State Highway FF	Jackson	MO 63755
EMAIL ADDRESS		TELEPHONE NUMBER WITH AREA CODE
president@capecountysewer.org		573-837-0588

3. CONTINUING AUTHORITY The regulatory requirement regarding continuing authority is found in 10 CSR 20-6.010(2).

NAME	SECRETARY OF STATE CHARTER NUMBER	
same as above	D001296674	
EMAIL ADDRESS		TELEPHONE NUMBER WITH AREA CODE

4. CONSULTANT

PREPARER NAME	COMPANY NAME	
Brian Strickland, P.E.	Strickland Engineering, LC	
113 West Main Street, Suite 1	Jackson	MO 63755
EMAIL ADDRESS		TELEPHONE NUMBER WITH AREA CODE
bstrick@stricklandengineering.com		573-243-4080

5. RECEIVING WATER BODY SEGMENT #1

NAME
Tributary to Byrd Creek

5.1 Upper end of segment - Location of discharge
UTM: X= 256887, Y= 4141554 OR Lat _____, Long _____

5.2 Lower end of segment - Diverts to Byrd Creek
UTM: X= 255994, Y= 4141302 OR Lat _____, Long _____

Per the Missouri Antidegradation Implementation Procedure (AIP), the definition of a segment, "a segment is a section of water that is bound, at a minimum, by significant existing sources and confluences with other significant water bodies."

6. WATER BODY SEGMENT #2 (IF APPLICABLE, Use another form if a third segment is needed)

NAME

6.1 Upper end of segment - End of Segment #1
UTM:X= _____, Y= _____ OR Lat _____, Long _____

6.2 Lower end of segment -
UTM:X= _____, Y= _____ OR Lat _____, Long _____

7. DECHLORINATION

If chlorination and dechlorination is the existing or proposed method of disinfection treatment, will the effluent discharged be equal to or less than the Water Quality Standards for Total Residual Chlorine stated in Table A1 of 10 CSR 20-7.031?

D Yes III No - What is the proposed method of disinfection? Ultraviolet

Based on the disinfection treatment system being designed for total removal of Total Residual Chlorine, minimal degradation for Total Residual Chlorine is assumed and the facility will be required to meet the water quality based effluent limits. These compliance limits for Total Residual Chlorine are much less than the method detection limit of 0.13 mg/L.

S. SUMMARIZE THE FEASIBILITY OF CONSTRUCTING A NO-DISCHARGE TREATMENT WASTEWATER FACILITY

According to the Antidegradation Implementation Procedure Sections I.B. and I1.B.1., the feasibility of no-discharge alternatives must be considered. No-discharge alternatives may include connection to a regional treatment facility, surface land application, subsurface land application, and recycle or reuse.

Currently, the CGCRCSD is planning a regional WWTF west of the city of Jackson. This regional WWTF would eliminate four existing WWTFs and connect a number of surrounding unsewered homes. The developer has provided CGCRCSD with the property for construction of the regional WWTF. Ultimately, the Kinder Farms subdivision development will be connected to the proposed regional WWTF.

At present, the subdivision development would like to move forward with Phase 1. To facilitate Phase 1, the CGCRCSD will transfer an existing facility to be decommissioned (Arbor Trails WWTF) to the Phase 1 site. This facility will be an intermediary facility until the regional WWTF is complete.

9. ADDITIONAL REQUIREMENTS

Complete and submit the following with this submittal:

III Copy of the Geohydrologic Evaluation - Submit request through the Missouri Geological Survey website

III Copy of the Missouri Natural Heritage from the Missouri Department of Conservation website

III Attach your Antidegradation Review Report and all supporting documentation as these forms are only a summary.

D If applicable, submit a copy of any Existing Water Quality data used in this process. Include the date range of the data, source(s) of the data, and location of data collection relative to the outfall. If using your own collected water quality data, submit a copy of the Quality Assurance Project Plan (QAPP) approved by the department's Watershed Protection Section. For more detailed information, see the Missouri Antidegradation Implementation Procedure (AIP), Section I1.A.1.

10. PATH/ TIER REVIEW ATTACHMENTS ENCLOSED

Path B: Tier 2 - Minimal Degradation	■ Yes	■ No
Path C: Tier 2 - Significant Degradation	■ Yes	■ No
Path D: Tier 1 - Preliminary Review Request	■ Yes	■ No
Path E: Temporary Degradation	■ Yes	■ No

11. APPLICANT PROPOSED ANTIDEGRADATION REVIEW EFFLUENT LIMITS

Preliminary effluent limits for the proposed project are dependent upon the path selected:

Applicable Pollutants of Concern	Concentration* mg/L	Concentration* µg/L	Path/ Tier Review Attachment Used for POC Evaluation	Average Monthly Limit	Daily Maximum Limit or Average Weekly Limit
BODs	X		Significant Degradation	10	15
TSS	X		Significant Degradation	10	15
Ammonia (Summer)	X				
Ammonia (Winter)	X				
Total Phosphorus	X				
pH	X			6.5 - 9.0	6.5 - 9.0
E.coli	X		Significant Degradation	206	1,030
Ammonia (Qtr 1)	X		Significant Degradation	3.1	12.1
Ammonia (Qtr 2)	X		Significant Degradation	1.5	10.1
Ammonia (Qtr 3)	X		Significant Degradation	1.0	8.4
Ammonia (Qtr 4)	X		Significant Degradation	2.2	8.4

* Place an X in appropriate box for the concentration units for each Pollutant of Concern.

12. PROPOSED PROJECT SUMMARY

The proposed project includes the construction of an influent pump station and relocation of the CGCRCSD, Arbor Trails WWTF and an ultraviolet disinfection unit as an intermediary treatment facility to serve Kinder Farms subdivision Phase 1.

Applicants choosing to use a new wastewater technology that are considered an "unproven technology" in Missouri must comply with the requirements set forth in the *New Technology Definitions and Requirements fact sheet.*

13. CONTINUING AUTHORITY WAIVER (For New Discharges)

In accordance with 10 CSR 20-6.010(2)(C), applicants proposing use of a lower preference continuing authority, when the higher level authority is available, must submit a waiver from the existing higher authority one or other documentation for the department's review, provided it does not conflict with any area-wide management plan approved under section 208 of the Federal Clean Water Act or by the Missouri Clean Water Commission. Is the waiver necessary? D Yes Ill No
If yes, provide a copy.

14. APPLICATION FEE

OcHECK NUMBER OJETPAY CONFIRMATION NUMBER

15. SIGNATURE

I am authorized and hereby certify that I am familiar with the information contained in this document and to the best of my knowledge and belief such information is true, complete and accurate.

SIGNATURE	DATE
	7/25/2022
PRINT NAME	TITLE
Brian Strickland	Engineer

PLEASE IDENTIFY YOUR STATUS FOR THIS PROJECT: OWNER CONTINUING AUTHORITY IIICONSULTANT

MO 780-2025 (03-19) Page J

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM, WATER POLLUTION CONTROL BRANCH

ANTIDEGRADATION REVIEW SUMMARY

PATH C: TIER 2 □ SIGNIFICANT DEGRADATION

1. FACILITY

NAME	COUNTY
Kinder Farms WWTF	Cape Girardeau

2. SUMMARY OF THE POLLUTANTS OF CONCERN

Pollutants of Concern to be considered include those pollutants reasonably expected to be present in the discharge per the Antidegradation Implementation Procedure Section II.A. and assumed or demonstrated to cause significant degradation. The tier protection levels are specified and defined in rule at 10 CSR 20-7.031(2).

What are the proposed pollutants of concern and their respective effluent limits that the selected treatment option will comply with:

Pollutants of Concern*	Concentration*		Base Case Limit	Basis (WQS, WLA, ELG, Other)**
	mg/L	µg/L		
BOD_5	X		10/15	ELG
TSS	X		10/15	ELG
Ammonia (Summer)	X			
Ammonia (Winter)	X			
Total Nitrogen	X			WQS
Total Phosphorus	X			WQS
pH	X		6.5 - 9.0	ELG
E. coli	X		206/1,030	WQS
Ammonia (Qtr 1)	X		3.1/12.1	WLA
Ammonia (Qtr 2)	X		1.5/10.1	WLA
Ammonia (Qtr 3)	X		1.0/8.4	WLA
Ammonia (Qtr 4)	X		2.2/8.4	WLA

* Place an X in appropriate box for the concentration units for each Pollutant of Concern

** Provide the Basis for the Base Case Limit: WQS □ Water Quality Standard, WLA □ Wasteload Allocation, ELG □ Effluent Limit Guideline, or describe other.

3. IDENTIFYING ALTERNATIVES

Supply a summary of the non-discharging alternatives considered. □For Discharges likely to cause significant degradation, an analysis of non-degrading and less-degrading alternatives must be provided,□ as stated in the Antidegradation Implementation Procedure Section II.B.1. These alternatives include no-discharge. Attach all supportive documentation in the Antidegradation Review report.

Feasibility of non-discharging alternatives (regionalization, land application, subsurface irrigation, and recycling or reuse):

Currently, the CGCRCSD is planning a regional WWTF west of the city of Jackson. This regional WWTF would eliminate four existing WWTFs and connect a number of surrounding unsewered homes. The developer has provided CGCRCSD with the property for construction of the regional WWTF. Ultimately, the Kinder Farms subdivision development will be connected to the proposed regional WWTF.

At present, the subdivision development would like to move forward with Phase 1. To facilitate Phase 1, the CGCRCSD will transfer an existing facility (Arbor Trails WWTF) to the Phase 1 treatment site. This facility will be an intermediary facility until the regional WWTF is complete.

Minimum of three (preferably five or more) discharging alternatives* ranging from less-degrading to degrading including Preferred Alternative (All treatment levels for POCs must at a minimum meet water quality standards):

Discharging Alternative #	Treatment Type	Description
1	Extended Aeration	Relocate CGCRCSD, Arbor Trails WWTF
2		
3		
4		
5		
6		

* Same technology may be multiple alternatives as you have the base unit and add to it with more capacity to provide additional treatment.

4. DETERMINATION OF THE REASONABLE ALTERNATIVE

Per the Antidegradation Implementation Procedure Section II.B.2, □a reasonable alternative is one that is practicable, economically efficient and affordable.□ Provide basis and supporting documentation in the Antidegradation Review report. **Please do not write □See Report□ for any box below.**

Practicability Summary:

□The practicability of an alternative is considered by evaluating the effectiveness, reliability, and potential environmental impacts,□ according to the Antidegradation Implementation Procedure Section II.B.2.a. Examples of factors to consider, including secondary environmental impacts, are given in the Antidegradation Implementation Procedure Section II.B.2.a.

The CGCRCSD, Arbor Trails WWTF has proven its effectiveness and reliability since its construction in 2005. This extended aeration package plant has consistently met effluent limits and been found to be in compliance with MDNR. After relocating this facility to the Kinder Farms WWTF phase 1 site, a similar effluent quality can be expected.

This environmental impacts include land disturbance on current farm land and the discharge will likely dominate the tributary to Byrd Creek.

Economic Efficiency Basis:

What is the design life cycle for the comparison?

What interest rate was used in the present worth calculations?

Economic Efficiency Summary:

Alternatives that are deemed practicable must undergo a direct cost comparison in order to determine economic efficiency. Means to determine economic efficiency are provided in the Antidegradation Implementation Procedure Section II.B.2.b.

The relocation of the CGCRCSD, Arbor Trails WWTF is the most economic efficient option for Phase 1 of this development.

TABLE OF THE ALTERNATIVES EVALUATION (Attach additional page if necessary)						
PARAMETERS	**Alternatives #**					
	1	**2**	**3**	**4**	**5**	**6**
BOD_5 □ mg/L	10/15					
TSS □ mg/L	10/15					
Ammonia (Summer) □ mg/L	1.0/8.4					
Ammonia (Winter) □ mg/L	1.5/10.1					
E. Coli □ #/100 mL	206/1,030					
Total Nitrogen □ mg/L						
Total Phosphorus □ mg/L						
Construction Cost □ $	163,000					
Operating Cost □ $						
Present Worth □ $						
Ratio present worth to base case						

Affordability Summary:

Alternatives identified as most practicable and economically efficient are considered affordable if the applicant does not supply an affordability analysis. An affordability analysis per the Antidegradation Implementation Procedure Section II.B.2.c, □may be used to determine if the alternative is too expensive to reasonably implement.□

The relocation of CGCRCSD, Arbor Trails WWTF to serve as a temporary treatment facility for Phase 1 of the Kinder Farms development is the most practicable and economically efficient option.

Justification for Preferred Alternative:

The relocation of CGCRCSD, Arbor Trails WWTF to serve as a temporary treatment facility for Phase 1 of the Kinder Farms development is the most practicable and economically efficient option. This is a intermediary facility until the proposed CGCRCSD regional WWTF can be completed. At that time, the Kinder Farms subdivision will be connected and the temporary facility will be decommissioned.

Reasons for Rejecting the other Evaluated Alternatives:

Constructing a new WWTF to serve Phase 1 of the Kinder Farms development when the District is actively planning and designing a regional WWTF is not practicable nor economically efficient.

Comments/Discussion:

The Kinder Farms developer has provided the District with the land to construct a regional WWTF. The site is a central location for many unsewered homes and four existing small WWTFs.

5. SOCIAL AND ECONOMIC IMPORTANCE OF THE PREFERRED ALTERNATIVE

If the preferred alternative will result in significant degradation, then it must be demonstrated that it will allow important economic and social development in accordance to the Antidegradation Implementation Procedure Section II.E. Social and Economic Importance is defined as the social and economic benefits to the community that will occur from any activity involving a new or expanding discharge.

Identify the affected community:

The affected community is defined in 10 CSR 20-7.031(2)(B) as the community □in the geographical area in which the waters are located. Per the Antidegradation Implementation Procedure Section II.E.1, □the affected community should include those living near the site of the proposed project as well as those in the community that are expected to directly or indirectly benefit from the project.□

The Kinder Farms WWTF will serve approximately 100 new single-family homes in Phase 1 of the Kinder Farms subdivision. Surrounding the Kinder Farms Phase 1 development are unsewered homes which abut tributaries to Byrd Creek.

Identify relevant factors that characterize the social and economic conditions of the affected community:

Examples of social and economic factors are provided in the Antidegradation Implementation Procedure Section II.E.1., but specific community examples are encouraged.

The Median Household Income (MHI) for Cape Girardeau County is $53,776 per the Census from 2016-2020. This is lower than the state average MHI of $57,290.

Describe the important social and economic development associated with the project:

Determining benefits for the community and the environment should be site specific and in accordance with the Antidegradation Implementation Procedure Section II.E.1.

The development of the Kinder Farms subdivision will provide improved housing for Cape Girardeau County and increase the tax base for the county.

PROPOSED PROJECT SUMMARY:

The Kinder Farms Phase 1 development will have a beneficial impact on Cape Girardeau County by increasing the number of quality homes in the area. Housing is in a limited supply currently and the ability for people to find quality homes is a necessity for growth.

Attach the Antidegradation Review report and all supporting documentation. This is a technical document, which must be signed, sealed and dated by a registered professional engineer of Missouri.

Appendix D: Natural Heritage Review

Missouri Department of Conservation

Missouri Department of Conservation's Mission is to protect and manage the forest, fish, and wildlife resources of the state and to facilitate and provide opportunities for all citizens to use, enjoy and learn about these resources.

Natural Heritage Review Level One Report: No Known Records

Foreword: Thank you for accessing the Missouri Natural Heritage Review Website developed by the Missouri Department of Conservation with assistance from the U.S. Fish and Wildlife Service, the U.S. Army Corps of Engineers, Missouri Department of Transportation and NatureServe. The purpose of this website is to provide information to federal, state and local agencies, organizations, municipalities, corporations and consultants regarding sensitive fish, wildlife, plants, natural communities and habitats to assist in planning, designing and permitting stages of projects.

PROJECT INFORMATION

Project Name and ID Number: Byrd Creek Holdings Subdivision #10202
User Project Number: Strickland 21-232
Project Description: Proposed single family subdivision in Cape Girardeau County (Township 31 N, Range 12 E). Western property line borders Byrd Creek. (37-23-10 N 89-44-16W)
Project Type: Residential, Commercial and Governmental Building Development
Contact Person: Marc Mahnke
Contact Information: mmahnke@stricklandengineering.com or 5732434080

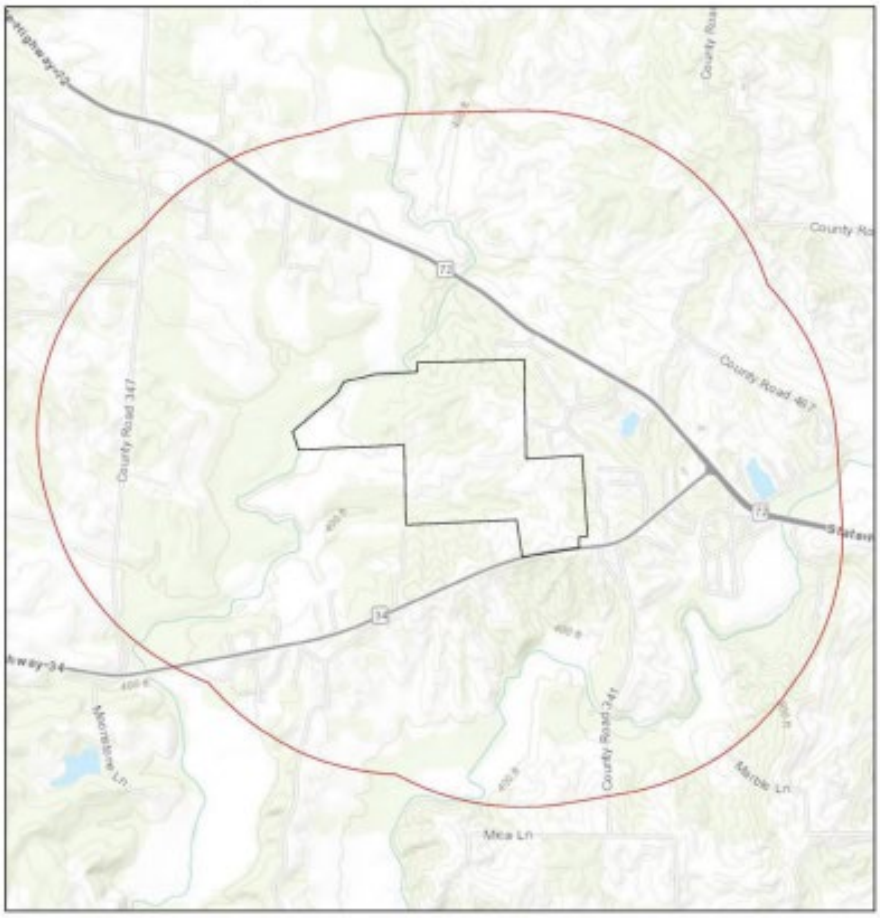
Disclaimer: The NATURAL HERITAGE REVIEW REPORT produced by this website identifies if a species tracked by the Natural Heritage Program is known to occur within or near the area submitted for your project, and shares suggested recommendations on ways to avoid or minimize project impacts to sensitive species or special habitats. If an occurrence record is present, or the proposed project might affect federally listed species, the user must contact the Department of Conservation or U.S. Fish and Wildlife Service for more information. The Natural Heritage Program tracks occurrences of sensitive species and natural communities where the species or natural community has been found. Lack of an occurrence record does not mean that a sensitive plant, animal or natural community is not present on or near the project area. Depending on the project, current habitat conditions, and geographic location in the state, surveys may be necessary. Additionally, because land use conditions change and animals move, the existence of an occurrence record does not mean the species/habitat is still present. Therefore, Reports include information about records near but not necessarily on the project site.

The Natural Heritage Report is not a site clearance letter for the project. It provides an indication of whether or not public lands and sensitive resources are known to be (or are likely to be) located close to the proposed project. Incorporating information from the Natural Heritage Program into project plans is an important step that can help reduce unnecessary impacts to Missouri's sensitive fish, forest and wildlife resources. However, the Natural Heritage Program is only one reference that should be used to evaluate potential adverse project impacts. Other types of information, such as wetland and soils maps and on-site inspections or surveys, should be considered. Reviewing current landscape and habitat information, and species' biological characteristics would additionally ensure that Missouri Species of Conservation Concern are appropriately identified and addressed in planning efforts.

U.S. Fish and Wildlife Service – Endangered Species Act (ESA) Coordination: Lack of a Natural Heritage Program occurrence record for federally listed species in your project area does not mean the species is not present, as the area may never have been surveyed. Presence of a Natural Heritage Program occurrence record does not mean the project will result in negative impacts. The information within this report is not intended to replace Endangered Species Act consultation with the U.S. Fish and Wildlife Service (USFWS) for listed species. Direct contact with the USFWS may be necessary to complete consultation and it is required for actions with a federal connection, such as federal funding or a federal permit; direct contact is also required if ESA concurrence is necessary. Visit the USFWS Information for Planning and Conservation (IPaC) website at https://ecos.fws.gov/ipac/ for further information. This site was developed to help streamline the USFWS environmental review process and is a first step in ESA coordination. The Columbia Missouri Ecological Field Services Office may be reached at 573-234-2132, or by mail at 101 Park Deville Drive, Suite A, Columbia, MO 65203.

Transportation Projects: If the project involves the use of Federal Highway Administration transportation funds, these recommendations may not fulfill all contract requirements. Please contact the Missouri Department of Transportation at 573-526-4778 or visit https://www.modot.org/ for additional information on recommendations.

Byrd Creek Holdings Subdivision



January 4, 2022

Project Boundary

Buffered Project Boundary

1:28,728

0 0.25 0.5 1 mi

0 0.375 0.75 1.5 km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Species or Communities of Conservation Concern within the Area:

There are no known records of Species or Natural Communities of Conservation Concern within the defined Project Area.

Other Special Search Results:

No results have been identified for this project location.

Project Type Recommendations:
New construction, maintenance and remodeling, including government, commercial and residential buildings and other structures. Fish, forest, and wildlife impacts can be avoided by siting projects in locations that have already been disturbed or previously developed, where and when feasible, and by avoiding alteration of areas providing existing habitat, such as wetlands, streams, forest, native grassland, etc. The project should be managed to minimize erosion and sedimentation/runoff to nearby wetlands, streams and lakes, including adherence to any "Clean Water Act Permit" conditions. Project design should include stormwater management elements that assure storm discharge rates to streams for heavy rain events will not increase from present levels. Revegetate areas in which the natural cover is disturbed to minimize erosion using native plant species compatible with the local landscape and wildlife needs. Annual ryegrass may be combined with native perennials for quicker green-up. Avoid aggressive exotic perennials such as crownvetch and sericea lespedeza. Pollutants, including sediment, can have significant impacts far downstream. Use silt fences and/or vegetative filter strips to buffer streams and drainages, and monitor the site after rain events and until a well-rooted ground cover is reestablished.

Project Location and/or Species Recommendations:

Endangered Species Act Coordination - Indiana bats (*Myotis sodalis*, federal- and state-listed endangered) and **Northern long-eared bats** (*Myotis septentrionalis*, federal-listed threatened) may occur near the project area. Both of these species of bats hibernate during winter months in caves and mines. During the summer months, they roost and raise young under the bark of trees in wooded areas, often riparian forests and upland forests near perennial streams. During project activities, avoid degrading stream quality and where possible leave snags standing and preserve mature forest canopy. Do not enter caves known to harbor Indiana bats or Northern long-eared bats, especially from September to April. **If any trees need to be removed for your project, please contact the U.S. Fish and Wildlife Service (Ecological Services, 101 Park Deville Drive, Suite A, Columbia, Missouri 65203-0007; Phone 573-234-2132 ext. 100 for Ecological Services) for further coordination under the Endangered Species Act.**

The submitted project location is within the range of the Gray Myotis (i.e., Gray Bat) in Missouri. Depending on habitat conditions of your project's location, Gray Myotis (*Myotis grisescens*, federal and state-listed endangered) could occur within the project area, as they forage over streams, rivers, lakes, and reservoirs. Avoid entry or disturbance of any cave inhabited by Gray Myotis and when possible retain forest vegetation along the stream and from the cave opening to the stream.

Invasive exotic species are a significant issue for fish, wildlife and agriculture in Missouri. Seeds, eggs, and larvae may be moved to new sites on boats or construction equipment. Please inspect and clean equipment thoroughly before moving between project sites. See https://mdc.mo.gov/community-conservation/managing-invasive-species-your-community for more information.

- Remove any mud, soil, trash, plants or animals from equipment before leaving any water body or work area.
- Drain water from boats and machinery that have operated in water, checking motor cavities, live-well, bilge and transom wells, tracks, buckets, and any other water reservoirs.
- When possible, wash and rinse equipment thoroughly with hard spray or HOT water (>140° F, typically available at do-it-yourself car wash sites), and dry in the hot sun before using again.

Streams and Wetlands – Clean Water Act Permits: Streams and wetlands in the project area should be protected from activities that degrade habitat conditions. For example, soil erosion, water pollution, placement of fill, dredging, in-stream activities, and riparian corridor removal, can modify or diminish aquatic habitats. Streams and wetlands may be protected under the Clean Water Act and require a permit for any activities that result in fill or other modifications to the site. Conditions provided within the U.S. Army Corps of Engineers (USACE) Clean Water Act Section 404 permit (http://www.nwk.usace.army.mil/Missions/RegulatoryBranch.aspx) and the Missouri Department of Natural Resources (DNR) issued Clean Water Act Section 401 Water Quality Certification (http://dnr.mo.gov/env/wpp/401/index.html), if required, should help minimize impacts to the aquatic organisms and aquatic habitat within the area. Depending on your project type, additional permits may be required by the Missouri Department of Natural Resources, such as permits for stormwater, wastewater treatment facilities, and confined animal feeding operations. Visit http://dnr.mo.gov/env/wpp/permits/index.html for more information on DNR permits. Visit both the USACE and DNR for more information on Clean Water Act permitting.

For further coordination with the Missouri Department of Conservation and the U.S. Fish and Wildlife Services, please see the contact information below:

Email (preferred): NaturalHeritageReview@mdc.mo.gov
MDC Natural Heritage Review
Science Branch
P.O. Box 180
Jefferson City, MO
65102-0180
Phone: 573-522-4115 ext. 3182

U.S. Fish and Wildlife Service
Ecological Service
101 Park Deville Drive
Suite A
Columbia, MO
65203-0007
Phone: 573-234-2132

Miscellaneous Information
FEDERAL Concerns are species/habitats protected under the Federal Endangered Species Act and that have been known near enough to the project site to warrant consideration. For these, project managers must contact the U.S. Fish and Wildlife Service Ecological Services (101 Park Deville Drive Suite A, Columbia, Missouri 65203-0007; Phone 573-234-2132; Fax 573-234-2181) for consultation.
STATE Concerns are species/habitats known to exist near enough to the project site to warrant concern and that are protected under the Wildlife Code of Missouri (RSMo 3 CSR 1 0). "State Endangered Status" is determined by the Missouri Conservation Commission under constitutional authority, with requirements expressed in the Missouri Wildlife Code, rule 3CSR 1 0-4.111. Species tracked by the Natural Heritage Program have a "State Rank" which is a numeric rank of relative rarity. Species tracked by this program and all native Missouri wildlife are protected under rule 3CSR 10-4.110 General Provisions of the Wildlife Code.

See https://mdc.mo.gov/sites/default/files/mo_nature/downloads/2021_SOCC.pdf for a complete list of species and communities of conservation concern. Detailed information about the animals and some plants mentioned may be accessed at https://mdc12.mdc.mo.gov/applications/mofwis/mofwis_search1.aspx. If you would like printed copies of best management practices cited as internet URLs, please contact the Missouri Department of Conservation.

Appendix D: Signed Variance Order CWC-V-3-23

BEFORE THE
MISSOURI CLEAN WATER COMMISSION

In The Matter Of:	)	
Cape Girardeau County Reorganized Common	)	
Sewer District	)	No. CWC-V-3-23
Kinder Farms Wastewater Treatment Facility	)	
Clarifier Side Water Depth Variance	)	
	)	

ORDER GRANTING VARIANCE NO. CWC-V-3-23

The Missouri Clean Water Commission (Commission) hereby grants variance request CWC-V-3-23 to the Cape Girardeau County Reorganized Common Sewer District (CGCRCSD). Specifically, the Commission approves a variance from the requirement contained in 10 CSR 20-8.160(3)(A) mandating a minimum of 12 feet of side water depth for secondary clarifiers following an activated sludge process. This variance allows CGCRCSD to install the Kinder Farms Wastewater Treatment Facility (WWTF) with a side water depth of 3 feet in the secondary clarifiers.

On May 10, 2023, the Commission issued a public notice and provided an opportunity for public comment on the requested variance. The Commission has determined that based on the administrative record the variance request satisfies the requirements of Section 644.061, Revised Statutes of Missouri (RSMo) and, if properly maintained and operated, the Kinder Farms WWTF should provide a comparable level of treatment and protection against violations of effluent requirements as the protection intended by the complete side water depth requirement.

The Missouri Clean Water Commission directs staff to implement Variance No. CWC-V-3-23 as presented by revising construction permit CP0002358. The term of this variance is until the construction and permitting of the proposed Starlight WWTF is completed and the CGCRCSD, Kinder Farms flow is sent to the future Starlight WWTF. The CGCRCSD, Kinder Farms WWTF shall then obtain Department approval for closure.

This decision of the Commission is subject to appeal to the Administrative Hearing Commission pursuant to Sections 644.061.5, 640.013, and 621.250, RSMo.

SO ORDERED on July 12, 2023.

Order Granting Variance No. CWC-V-3-23
Cape Girardeau County Reorganized Common Sewer District
Kinder Farms Wastewater Treatment Facility
Clarifier Side Water Depth Variance
July 12, 2023

Missouri Clean Water Commission

Chair

Vice-Chair

Commissioner

Commissioner

Commissioner

Commissioner

Commissioner