STATE OF MISSOURI

DEPARTMENT OF NATURAL RESOURCES

MISSOURI CLEAN WATER COMMISSION

CONSTRUCTION PERMIT

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

City of Clarksville
111 North Howard Steet
P.O. Box 530
Clarksville, MO 63336

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.

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.

July 7, 2025
Effective Date

June 26, 2026
Modification Date

December 31, 2027
Expiration Date

Heather S. Peters, Director, Water Protection Program

CONSTRUCTION PERMIT

I. CONSTRUCTION DESCRIPTION

This project extends the Clarksville Wastewater Treatment Facility (WWTF) outfall so that it discharges directly to the Mississippi River. Updated effluent limitations have been established for the new outfall location, which will go into effect following construction completion. The project includes the installation and construction of a submersible lift station (6 feet by 7 feet, 15.5-foot depth) with a duplex submersible pumping system rated at 200 gallons per minute (GPM) at 150 feet total dynamic head (TDH), a minimum 30 HP motor, valve vault, and outfall check valve. The project also includes approximately 3,550 linear feet of 4-inch diameter polyvinyl chloride (PVC) Standard Dimension Ratio (SDR)-26 force main and associated fittings. The force main alignment follows the same general route as the previously approved gravity main design, within the existing road right of way. The project will also include general site work appropriate for the scope and purpose of the project.

II. COST ANALYSIS FOR COMPLIANCE

Pursuant to Section 644.145, RSMo., when issuing permits under this chapter that incorporate a new requirement for discharges from publicly owned combined or separate sanitary or storm sewer systems or publicly owned treatment works, or when enforcing provisions of this chapter or the Federal Water Pollution Control Act, 33 U.S.C. 1251 et seq., pertaining to any portion of a publicly owned combined or separate sanitary or storm sewer system or [publicly owned] treatment works, the Department of Natural Resources shall make a "finding of affordability" on the costs to be incurred and the impact of any rate changes on ratepayers upon which to base such permits and decisions, to the extent allowable under this chapter and the Federal Water Pollution Control Act. This process is completed through a cost analysis for compliance. Permits that do not include new requirements may be deemed affordable.

The department is not required to determine cost analysis for compliance because the permit contains no new conditions or requirements that convey a new cost to the facility.

III. CONSTRUCTION PERMIT CONDITIONS

The permittee is authorized to construct subject to the following conditions:

1. This construction permit does not authorize discharge.

2. All construction shall be in accordance with the plans and specifications submitted by Klinger & Associates, P.C. on April 14, 2026, and signed and sealed by Mark Bross, P.E. on April 8, 2026, Ryan Stonecipher, P.E. on April 10, 2026, and Joseph Kirby, P.E. on April 14, 2026, and approved by the department on June 26, 2026.

3. Regulation 10 CSR 20-4.040(18)(B)1 requires that projects be publicly advertised, allowing sufficient time for bids to be prepared and submitted. Projects should be advertised at least 30 days prior to bid opening.

4. The department must be contacted in writing prior to making any changes to the approved 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).

5. As per 10 CSR 20-4.040, all changes in contract price or time within the approved scope of work must be by change order in accordance with Section 19 of this rule.

6. 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 electronic Sanitary Sewer Overflow/Bypass Reporting system at https://dnr.mo.gov/mogem/ or the Northeast Regional Office per 10 CSR 20-7.015(9)(G).

7. 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.

8. A United States Army Corps of Engineers (USACE) Section 404 Department of Army permit (§404) along with the department's Section 401 Water Quality Certification or waiver (§401) may be required for the activities described in this permit. This permit is not valid until these requirements are satisfied. If construction activity will disturb any land below the ordinary high water mark of jurisdictional waters of the U.S., then a §404/§401 will likely be required. Since the USACE makes determinations on what is jurisdictional, you must contact the USACE to determine permitting requirements. See https://dnr.mo.gov/water/business-industry-other-entities/permits-certification-engineering-fees/section-401-water-quality for more information or you may contact the department's Water Protection Program at 573-522-4502 or wpsc401cert@dnr.mo.gov.

9. Upon completion of construction:

   A. The City of Clarksville 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 form (https://dnr.mo.gov/document-search/wastewater-construction-statement-work-completed-mo-780-2155) to the department in accordance with 10 CSR 20-6.010(5)(N), with the final effluent limitations in the operating permit going into effect upon approval.

IV. REVIEW SUMMARY

1. CONSTRUCTION PURPOSE

The proposed project includes relocating the existing outfall from the small drainage ditch to the Mississippi River by constructing a submersible lift station with duplex pumping system and a 4-inch PVC SDR-26 force main. The force main follows the same general alignment as the previously approved gravity main design.

2. FACILITY DESCRIPTION

The City of Clarksville currently operates an existing WWTF consisting of a single-cell lagoon fed by a 10-inch diameter vitrified clay pipe from the city's main lift station. The treatment facility uses ultraviolet treatment for disinfection. Sludge is retained in the lagoon. Treated effluent discharges to an unnamed tributary to the Mississippi River, which is classified as a stream; it reaches the Mississippi River via a channel along County Road 209. The WWTF has a design flow of 106,000 gallons per day (gpd) and the estimated peak flow is 352,980 gpd. Design sludge production is currently 15.9 dry tons/year. The City of Clarksville has approximately 198 in-town customers and 19 out-of-town customers.

The WWTF is undergoing improvements by adding a new effluent lift station and force main to extend the outfall to the Mississippi River directly. The project includes a submersible lift station with duplex pumping system rated at 200 GPM at 150 feet TDH and approximately 3,550 linear feet of 4-inch diameter PVC SDR-26 force main. With the new outfall discharging to the Mississippi River, the effluent limits will change following construction.

The City of Clarksville, Missouri, is located in the northeastern Missouri county of Pike along Missouri Highway 79. The existing WWTF is located 0.6 miles southeast of County Road 209 and Highway 79 intersection.

3. COMPLIANCE PARAMETERS

The existing facility permit limits are being updated as a part of the project, due to relocating the outfall. The new outfall will discharge directly to the Mississippi River, rather than a tributarty to the Mississippi River, and the new limits for MO-0039632 reflect this change, as established in the Water Quailty and Antidegradation Review dated October 2024. The applicable limits following the completion of construction to the facility will be:

Parameter	Units	Daily Maximum Limit	Weekly Average Limit	Monthly Average Limit
Biochemical Oxygen Demand$_5$	mg/L		45	30
Total Suspended Solids	mg/L		67.5	45
Ammonia as N (Jan-Mar)	mg/L	12.0		8.0

Ammonia as N (Apr-Jun)	mg/L	6.0		4.0
Ammonia as N (Jul-Sep)	mg/L	6.0		4.0
Ammonia as N (Oct-Dec)	mg/L	12.0		8.0

4. **ANTIDEGRADATION**

The department has reviewed the antidegradation report for this facility and issued the Water Quality and Antidegradation Review dated October 2024, due to relocation of the facility outfall. See **APPENDIX – ANTIDEGRADATION**.

5. **REVIEW OF MAJOR TREATMENT DESIGN CRITERIA**

The WWTF has a design flow of 106,000 GPD and the estimated peak flow is 352,980 GPD. Design sludge production is currently 15.9 dry tons/year and sludge is retained in the lagoon. The design population of the facility is 1,060 people. This project will reduce the impact on the current discharge stream by eliminating the outfall. The discharge will impact the Mississippi River, but due to the flows and mixing zones in the Mississippi River the impact will be less than the impact on the current discharge stream.

Construction is to be completed in accordance with the requirements in 10 CSR 20 Chapter 8, Minimum Design Standards.

6. **OPERATING PERMIT**

Operating permit MO-0039632 for the Clarksville WWTF was modified to reflect the construction activities. The operating permit was successfully public noticed from January 24, 2025, to February 24, 2025, with no comments received. The operating permit issued March 1, 2025, includes the effluent limitations that will become effective after the department receives and approves the statement of work complete for this construction.

Mustahsin Reasad
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APPENDICES

- Antidegradation
- Summary of Design
- Project Location Map

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 Performance Based Discharge Level Determination

Mississippi River

Requested by
Abra Spisso, P.E.
Klingner & Associates, P.C.

For
Clarksville Lagoon Improvements
City of Clarksville

October 2024

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1. PURPOSE OF ANTIDEGRADATION REVIEW REPORT

The Clarksville Wastewater Treatment Facility (WWTF) is a 106,000 gallons per day (gpd) facility currently receiving actual flows of about 118,000 gpd based on Discharge Monitoring Report (DMR) data from the past five years of operation. The treatment facility consists of a single cell lagoon that is fed by a 10-inch vitrified clay pipe from the city's main lift station. Effluent is disinfected with an ultraviolet (UV) disinfection system prior to discharge, and sludge is stored in the lagoon. The current operating permit includes limits for ammonia as nitrogen that the facility is not reliably equipped to meet. An Antidegradation Review Request was submitted by Abra Spisso, P.E. with Klingner & Associates, P.C. on behalf of the City of Clarksville to evaluate alternatives to enable the Clarksville WWTF to reliably comply with the effluent limitations of the operating permit. An antidegradation review was previously conducted in 2018, with the preliminary determination issued in July 2018. Because the project did not move forward in the years following this previous review, the prior antidegradation preliminary determination expired. This review is therefore conducted to analyze the same proposal and to provide an updated preliminary determination.

In accordance with Missouri's Water Quality Standards [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 that 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 Antidegradation Implementation Procedure (AIP) for new and expanded wastewater discharges.

The AIP specifies that when the proposed activity results in a reduction by 10 percent or more of the:

- facility assimilative capacity for any pollutant as a result of any single discharge;
- segment assimilative capacity for any pollutant as a result of all discharges combined after existing water quality (EWQ); or
- any new or expanded discharge that the department determines will likely result in the increased accumulation of pollutants or their degradation products in sediment or fish tissue,

then a demonstration of necessity (i.e., alternatives analysis) and a determination of social and economic importance are required.

The applicant elected to determine that all pollutants of concern (POC) require a demonstration of necessity (i.e., alternatives analysis) and a determination of social and economic importance in the absence of existing water quality data for the receiving stream. An alternatives analysis was conducted to fulfill the requirements of the Antidegradation Implementation Policy (AIP).

The preferred alternative is the relocation of the outfall by the construction of gravity sewer main to extend the outfall to the Mississippi River. The receiving waterbody is currently an unnamed Tributary to Mississippi River, but the preferred alternative would relocate the outfall to a direct discharge to the Mississippi River. The design flow is unchanged at 106,000 gpd.

The following is a review of the *Antidegradation Review Report for Clarksville Lagoon Improvements* for the Clarksville WWTF prepared by Mark Bross, P.E. of Klingner & Associates dated May 24, 2018, and with the new application and document summarizing changes since the previous review received May 7, 2024.

2. PERFORMANCE BASED LIMITS

Table 2-1: Performance Based Limits

PARAMETER	Unit	Basis	Daily Maximum	Weekly Average	Monthly Average
Flow	MGD	FSR	*		*
BOD_5	mg/L	PBL		45	30
TSS	mg/L	PBL		67.5	45
*Escherichia coli***	#/100mL	FSR		630	126**
Ammonia as N					
(January)			12.0		8.0
(February)			12.0		8.0
(March)			12.0		8.0
(April)			6.0		4.0
(May)			6.0		4.0
(June)	mg/L	PBL	6.0		4.0
(July)			6.0		4.0
(August)			6.0		4.0
(September)			6.0		4.0
(October)			12.0		8.0
(November)			12.0		8.0
(December)			12.0		8.0
Oil & Grease	mg/L	FSR	15		10
Total Phosphorus	mg/L	FSR	*		*
Total Kjeldahl Nitrogen	mg/L	FSR	*		*
Nitrite + Nitrate	mg/L	FSR	*		*
PARAMETER	Unit	Basis for Limits	Minimum		Maximum
pH	SU	PBL	6.5		9.0
PARAMETER	Unit	Basis for Limits			Monthly Avg. Min
BOD_5 Percent Removal	%	FSR			65
TSS Percent Removal	%	FSR			65

* - 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
PBL – Performance Based Limit
BPJ – Best Professional Judgment
TBEL – Technology-Based Effluent Limit
WQBEL – Water Quality-Based Effluent Limit
FSR – Federal or State Regulation

3. FACILITY INFORMATION

Table A-2 of the current operating permit includes final effluent limitations and monitoring requirements that became effective for the facility on April 1, 2022. In contrast to the previous limit set, the Table A-2 requirements includes limitations for ammonia as nitrogen which include a monthly average limit of 1.4 mg/L from April 1st through September 30th, and a monthly average limit of 2.8 mg/L from October 1st through March 31st, which are based on the U.S. Environmental Protection Agency's (EPA) 1999 Update of Ambient Water Quality Criteria for Ammonia. Based on historical DMR data, the facility averages approximately 2.7 mg/L and 3.5 mg/L in the summer and winter seasons, respectively. The facility as currently designed and operated is therefore not equipped to reliably meet the new limits for ammonia.

Facility Name:	Clarksville Wastewater Treatment Facility
Address:	0.6 miles SE of CR 209 on Hwy 79 Intersection, Clarksville, MO 63336
Permit #:	MO-0039632
County:	Pike
Facility Type:	Domestic, POTW
Owner:	City of Clarksville
Continuing Authority:	Same as owner
UTM Coordinates:	X = 682505, Y = 4358746
Legal Description:	Landgrant 01758
12 digit watershed:	07110004-1002
Ecological Drainage Unit:	Central Plains/Cuivre/Salt

A. FACILITY PERFORMANCE HISTORY:

A review of the past 5 years of Discharge Monitoring Report data show exceedances in the following parameters:
-BOD % Removal (3/31/2020, 6/30/2020, 9/30/2020, 12/31/2020, 3/31/2022, 6/30/2022)
-TSS % Removal (3/31/2020, 6/30/2020, 9/30/2020, 12/31/2020, 3/31/2022, 6/30/2022)
-Chloride (6/30/20, 9/30/2020)
-*E. coli* (5/31/2020, 7/31/2020, 6/30/2022, 9/30/2022)
-Ammonia as Nitrogen (9/30/2022)
-pH (3/31/2022, 6/30/2022, 9/30/2022)

According to inspection reports, the exceedances for BOD and TSS removal percentage may be due to flood water from the Mississippi River entering the collection system and diluting the influent wastewater. Per special condition #8 of the Operating Permit, the city must continue to work on addressing inflow and infiltration issues in the collection system and shall submit a report annually to provide a summary of the efforts from the past year and to discuss future planned maintenance and repairs.

A routine compliance inspection was conducted by Mike Smith on February 17, 2016, and found the facility to be in noncompliance with the Missouri Clean Water Law, the Clean Water Commission Regulations, and Missouri State Operating Permit #MO-0039632. The following unsatisfactory findings were listed in the inspection report:

- Failed to comply with the percent removal efficiency limits contained in the operating permit.
- Failed to conduct operational monitoring twice per week to ensure adequate wastewater systems in-plant operational control.
- Failed to provide adequate fencing to discourage trespassing and prevent entering of livestock, as required by Special Condition #10 of the operating permit.
- Failed to provide proper warning signs on all sides of facility.

An engineering and compliance inspection was conducted by Scott Adams on February 12 and February 15, 2021, and found the facility to be in noncompliance with the Missouri Clean Water Law, the Clean Water Commission Regulations, and Missouri State Operating Permit #MO-0039632. The following unsatisfactory findings were listed in the inspection report:

- Failed to comply with permitted effluent limits for *E. coli* and the permitted minimum required 65-percent removal for BOD and TSS.
- Failed to consistently sample for all parameters and failed to accurately report all sample results and monitoring as required by Table A-1 and Standard Conditions Part 1, Section A, of the operating permit.
- Failed to submit complete operational monitoring reports using the eDMR system as specified in Special Conditions #1 and #7 and Standard Conditions, Part 1, Section B, of the operating permit.

B. NATURAL HERITAGE REVIEW

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

- Revegetate disturbed areas to minimize erosion, preferably with native plant species compatible with the local landscape.
- Avoid entry or disturbance of any cave inhabited by gray bats and when possible, retain forest vegetation along the stream.
- Check the project site for any karst features and make every effort to protect groundwater in the project area.
- Be alert for Bald Eagles nesting areas and follow federal guidelines if eagle nests are seen.
- 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.
- Inspect and clean equipment thoroughly before moving between project sites.
- Remove any mud, soil, trash, plants (or plant material) or animals from equipment before leaving any water body or work area.
- Drain water from boats and machinery that have operated in water.
- When possible, wash and rinse equipment thoroughly with hard spray or hot water (≥140° F) and dry in the sun before using again.

C. GEOHYDROLOGIC EVALUATION

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

4. RECEIVING WATERBODY INFORMATION

A. RECEIVING WATERBODY

Table 4-1: Outfalls Table

OUTFALL	DESIGN FLOW (CFS)	TREATMENT LEVEL	EFFLUENT TYPE
001	0.164	Equivalent to Secondary	Domestic

Table 4-2: Receiving Stream(s)

WATER-BODY NAME	CLASS	WBID	DESIGNATED USES*	12-DIGIT HUC	DISTANCE TO CLASSIFIED SEGMENT (MI)
Mississippi River	P	3699	AHP-WWH, WBC-A, SCR, HHP, IRR, LWP, IND	07110004-1002	Direct Discharge

* **AHP** = Aquatic Habitat Protection - To ensure the protection and propagation of fish, shellfish, and wildlife. AHP is further subcategorized as: **WWH** = Warm Water Habitat; **CLH** = Cool Water Habitat; **CDH**= Cold Water Habitat; **EAH** = Ephemeral Aquatic Habitat; **MAH** = Modified Aquatic Habitat; **LAH** = Limited Aquatic Habitat; **DWS** = Drinking water supply; **GRW** = Groundwater; **HHP** = Human Health Protection as it relates to the consumption of fish; **IND** = Industrial water supply; **IRR** = Irrigation - Application of water to cropland or directly to cultivated plants that may be used for human or livestock consumption; **LWP =** Livestock and wildlife protection - Maintenance of conditions in waters to support health in livestock and wildlife; **WBC** = Whole Body Contact recreation where the entire body is capable of being submerged. WBC is further subcategorized as: **WBC-A** = Whole body contact recreation that supports swimming uses and has public access; **WBC-B** = Whole body contact recreation that supports swimming; **SCR** = Secondary Contact Recreation (like fishing, wading, and boating).

Table 4-3: Receiving Stream Segments

Receiving Water Body Segment Outfall #1:		
Upper end segment* UTM coordinates:	X = 682505; Y = 4358746	Outfall
Lower end segment* UTM coordinates:	X = 683563; Y = 4358048	Confluence with Fox Creek (Presumed Use Stream) (C) (WBID = 5020)

*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.

B. MIXING CONSIDERATIONS AND LOW FLOW VALUES

The proposed receiving waterbody is the Mississippi River, which is a class P stream. The applicant used data from USGS Gaging Station 05587450 (Mississippi River at Grafton, Illinois), which is approximately 65 miles downstream from the outfall, taken from June 5, 2009, to June 5, 2024, to determine low-flow values.

Table 4-4: Receiving Stream(s) Low-Flow Values

RECEIVING STREAM	LOW-FLOW VALUES (CFS)		
	1Q10	7Q10	30Q10
Mississippi River	20,487	27,708	32,776

Table 4-5: Mixing Considerations

MIXING ZONE (CFS) [10 CSR 20-7.031(5)(A)4.B.(II)(a)]			ZONE OF INITIAL DILUTION (CFS) [10 CSR 20-7.031(5)(A)4.B.(II)(b)]		
1Q10	7Q10	30Q10	1Q10	7Q10	30Q10
5,122	6,927	8,194	1.64	1.64	N/A

C. EXISTING WATER QUALITY

No existing water quality data was submitted. The facility will discharge to the Mississippi River. To determine receiving stream low-flow values, data from USGS Gaging Station 05587450 (Mississippi River at Grafton, Illinois) was used. While this gaging station is located approximately 65 miles downstream of the Clarksville outfall, it represents the nearest gaging station for which total flow data is available. There are additional USGS gaging stations located closer to Clarksville, but the Grafton gaging station is the closest gaging station that records flow data.

The applicant was not able to utilize USGS gaging station data to establish existing water quality due to the lack of water quality data in the location of the facility discharge. The nearest downstream gaging station is the Mississippi R. at Lock & Dam 25 (Lower) (Corps) [Site Number 390019090412801]. This station is approximately 30 miles downstream of the Clarksville outfall and does not record data for concentrations of pollutants to establish existing water quality (e.g., dissolved oxygen concentration, TSS concentration, ammonia as nitrogen concentration). Stations that are further downstream are in the St. Louis metropolitan region and incorporate discharges from several significant facilities and therefore may not be representative of water quality near Clarksville. The nearest upstream gaging station is the Mississippi River at Hannibal station [Site Number 05501600], which is located approximately 35 miles upstream of Clarksville. Due to the distance and the presence of several significant dischargers in between Hannibal and Clarksville along the Mississippi River, the data taken from the Hannibal gaging station may not be representative of water quality near Clarksville. Therefore, in the absence of data to establish existing water quality near the discharge location, the applicant assumed that the discharge will result in a reduction by 10 percent or more of the pollutant assimilative capacity of the Mississippi River.

A TMDL is a calculation of the maximum amount of a given pollutant that a body of water can absorb before its water quality is affected. If a water body is determined to be impaired as listed on the 303(d) list, then a watershed management plan will be developed that shall include the TMDL calculation. The proposed facility will discharge to the Mississippi River with a TMDL for chlordane and polychlorinated biphenyls (PCBs) approved by the EPA on November 3, 2006. (https://dnr.mo.gov/document-search/mississippi-river-chlordane-pcb-total-maximum-daily-load).

- This facility would not be considered to be a contributing source to the impairment.

D. RECEIVING WATER MONITORING REQUIREMENTS

No receiving water monitoring requirements recommended at this time.

5. ANTIDEGRADATION REVIEW INFORMATION

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. According to the AIP, the waters may receive the POCs that are causing impairments if 1) the discharge would not cause or contribute to a violation of the WQS, 2) all other conditions of the state permitting requirements are met (i.e., no discharge options are explored and technology based requirements (including ELGs) are met); and 3) the permit is issued with the highest statutory and regulatory requirements.

- While the receiving waterbody, the Mississippi River, has a TMDL for chlordane and PCBs, these are not pollutants of concern for this discharge. Therefore, there are no Tier 1 pollutants for this review.

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 2 Pollutants for this review include: biochemical oxygen demand (BOD), total suspended solids (TSS), *E. coli,* ammonia, oil and grease, total phosphorus, total Kjeldahl nitrogen, nitrite + nitrate, and pH.

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.

- As this proposed discharge is located at the Mississippi River, the receiving waterbody is not an Outstanding National Resource Water or an Outstanding State Resource Water, and as such Tier 3 is not applicable.

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).

Table 5-1: Pollutants of Concern and Tier Determinations

Pollutants of Concern	Tier	Review Type	Comment
Biological Oxygen Demand (BOD_5)/DO	2*	Alternatives Analysis	
Total Suspended Solids (TSS)	**	Alternatives Analysis	
Escherichia coli (E. coli)	2*	Alternatives Analysis	Disinfection required, UV proposed
Ammonia as N	2*	Alternatives Analysis	
Oil & Grease	2*	Alternatives Analysis	Permit limits applied
Total Phosphorus	2*	Alternatives Analysis	10 CSR 20-7.015(9)(D)8.
Total Kjeldahl Nitrogen	2*	Alternatives Analysis	10 CSR 20-7.015(9)(D)8.
Nitrite + Nitrate	2*	Alternatives Analysis	10 CSR 20-7.015(9)(D)8.
pH	***	Alternatives Analysis	Permit limits applied

* Tier assumed.
** Tier determination not possible: No in-stream standards for these parameters.
*** Standards for these parameters are ranges.

B. NECESSITY OF DEGRADATION

The AIP specifies that if the proposed activity does result in a reduction by 10 percent or more of the assimilative capacity 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 result in a reduction by 10 percent or more of the assimilative capacity 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

Regionalization eliminates the need to maintain an operating permit by diverting wastewater flows to be treated at a capable regional facility. There are no regional facilities with sufficient capacity to accept the flows within several miles of the Clarksville. The nearest communities with publicly owned treatment works are Louisiana, about 10 miles away, and Eolia, about 11 miles away. Neither the Louisiana WWTP (MO-0023124) nor the Eolia WWTF (MO-0112470), have sufficient excess capacity to accommodate the full wastewater flows from Clarksville. The nearest treatment facility with sufficient capacity to treat the flows is the Northeast Correctional Center WWTF (MO-0118966), which is located approximately 18 miles from Clarksville. This distance means that the regionalization alternative is not a practicable option.

II. NO DISCHARGE EVALUATION

To assess the feasibility of converting to a non-discharging form of treatment, the construction of a land application system was evaluated. This alternative would necessitate attainment of acreage for the land application system, and the construction of additional storage volume, an irrigation system, and a pumping system to feed effluent to the irrigation system. The current lagoon cell can hold

approximately 5.2 million gallons of water at the design depth. Based on the requirement in 10 CSR 20-8.200(6)(C)1.C. to provide at least 105 days of storage of the design flows and net rainfall minus evaporation for a 1 in 10 year 24-hour return frequency for land application systems, the engineer estimated that this alternative would require the construction of a cell to provide about 7.52 million gallons of storage in addition to the existing lagoon cell. Furthermore, it would require the attainment of 59 acres of suitable land for application, and construction of a 560 gallons per minute effluent pumping station. Because the existing facility is located within the 100-year flood plain of the Mississippi River, this alternative may necessitate that the land application fields are located such that the facility would need to pump the effluent across Highway 79, presenting an additional engineering challenge for this option. At an estimated present worth of approximately $4.4 million, this alternative was deemed impracticable because it is not economically efficient in comparison with the base case alternative.

III. ALTERNATIVES TO NO DISCHARGE

I. ALTERNATIVE #1: LEMNA ENVIRONMENTAL TECHNOLOGIES LEMTEC POLISHING REACTOR

The first alternative considered was the installation of a Lemna Environmental Technologies LemTec™ Polishing Reactor system. This option would utilize the existing lagoon with the addition of two 5-HP aspirators, and the installation of a LemTec Polishing Reactor (LPR). The LPR consists of submerged attached growth media modules and a cover to retain heat. In addition to the LPR installation, this alternative would include supplementary piping and electrical work. With an estimated present worth value of $1,707,841, this alternative is 223.3 percent the value of the base case alternative and is deemed economically inefficient and therefore impracticable.

II. ALTERNATIVE #2: WASTEWATER COMPLIANCE SYSTEM, INC. – BIO DOMES

The second alternative considered was the installation of a Wastewater Compliance Systems (WCS) Bio-Domes system. This option utilizes the existing lagoon with the installation of 48 Bio-Dome units, a 400-foot baffle curtain, two 10-HP blowers, and self-sinking aeration feed lines. In addition, this alternative would include the construction of a structure to house the blowers, additional electric lines, and SCADA system. Bio-Domes are considered by the department to be an innovative technology, and this alternative would therefore include additional requirements as found in 10 CSR 20-8.110(6). With an estimated present worth value of $1,169,116, this alternative is 152.8 percent the value of the base case alternative and is deemed economically inefficient and therefore impracticable.

III. ALTERNATIVE #3: VEOLIA ANOXKALDNES LAGOON GUARD MBBR

The third alternative considered was the installation of an AnoxKaldnes Lagoon Guard Moving Bed Biofilm Reactor (MBBR) by Veolia. This option consists of a process train with one MBBR reactor, a clarifier equipped with weirs and air lift, a sludge holding tank, and two 5-HP blowers, and additional piping and a lift station, and will also include electrical work. With an estimated present worth value of $1,441,701, this alternative is 188.5 percent the value of the base case alternative and is deemed economically inefficient and therefore impracticable.

IV. ALTERNATIVE #4: NEXCOM OPTAER SAGR

The fourth alternative considered was the installation of a submerged attached growth reactor (SAGR) system by Nexcom. This option consists of the construction of a SAGR unit with two 7.5-HP blowers. The SAGR would consist of two units with aeration and rock filtration covered with soil. In addition to the SAGR installation, this alternative would include additional piping, a new lift station, and electrical work. With an estimated present worth value of $2,077,446, this alternative is 271.6 percent the value of the base case alternative and is deemed economically inefficient and therefore impracticable.

V. ALTERNATIVE #5: LAND APPLICATION
See 5.B.II. NO DISCHARGE EVALUATION above for discussion of the land application alternative.

VI. ALTERNATIVE #6: OUTFALL RELOCATION TO MISSISSIPPI RIVER (GRAVITY FLOW) [PREFERRED ALTERNATIVE]
The sixth alternative considered was to maintain the existing treatment train but to construct a new gravity main to direct the final treated effluent to discharge directly to the Mississippi River. With an estimated present worth value of $773,971, this alternative is 101.2 percent the value of the base case alternative and is therefore deemed economically efficient. This option is the preferred alternative.

VII. ALTERNATIVE #7: OUTFALL RELOCATION TO MISSISSIPPI RIVER (PUMPED FLOW) [BASE CASE]
The seventh alternative considered was to maintain the existing treatment train but to construct an effluent pump station and force main to direct the final treated effluent to discharge directly to the Mississippi River. With an estimated present worth value of $764,988, this alternative has the lowest estimated present worth value and is therefore the base case alternative. While this option is considered economically efficient and practicable, it was not selected in favor of Alternative 6.

VIII. ALTERNATIVE #8: TRIPLEPOINT NITROX
The eighth alternative considered was the installation of a Triplepoint NitrOx system. This option consists of the construction of two basins filled with media with two 15-HP blowers installed near the east side of the existing lagoon, and a tertiary filtration unit. Additional piping and electrical work would also be required. With an estimated present worth value of $1,648,887, this alternative is 215.5 percent the value of the base case alternative and is deemed economically inefficient and therefore impracticable.

Table 5-2: Alternatives Analysis Comparison

Pollutant	Alternative 1 – LEMTEC Polishing Reactor	Alternative 2 – Bio Domes	Alternative 3 – MBBR	Alternative 4 - SAGR
BOD_5	≤ 20 mg/l	≤ 20 mg/l	≤ 20 mg/l	≤ 20 mg/l
TSS	≤ 20 mg/l	≤ 20 mg/l	≤ 20 mg/l	≤ 20 mg/l
Escherichia coli (E. coli)	≤ 126 CFU/100ml	≤ 126 CFU/100ml	≤ 126 CFU/100ml	≤ 126 CFU/100ml
Ammonia as N	≤ 1.4 mg/l	≤ 1.4 mg/l	≤ 1.4 mg/l	≤ 1.4 mg/l
Oil & Grease	≤ 10 mg/l	≤ 10 mg/l	≤ 10 mg/l	≤ 10 mg/l
Total Phosphorus	*	*	*	*
Total Kjeldahl Nitrogen	*	*	*	*
Nitrite + Nitrate	*	*	*	*
pH	6.5 ≤ SU ≤ 9.0	6.5 ≤ SU ≤ 9.0	6.5 ≤ SU ≤ 9.0	6.5 ≤ SU ≤ 9.0
Life Cycle Cost**	$1,707,841	$1,169,116	$1,441,701	$2,077,446
Ratio of Cost vs Base Case	223.3%	152.8%	188.5%	271.6%

* Monitoring requirement
**Life cycle cost at 20-year design life and 3 percent interest rate

Table 5-3: Alternatives Analysis Comparison

Pollutant	Alternative 5 – Land Application	Alternative 6 – Relocated Outfall (Gravity Main)	Alternative 7 – Relocated Outfall (Force Main)	Alternative 8 – Triplepoint NitrOx
BOD_5	N/A	≤ 30 mg/l	≤ 30 mg/l	≤ 20 mg/l
TSS	N/A	≤ 45 mg/l	≤ 45 mg/l	≤ 20 mg/l
Escherichia coli (E. coli)	N/A	≤ 126 CFU/100ml	≤ 126 CFU/100ml	≤ 126 CFU/100ml
Ammonia as N	N/A	≤ 4.0 mg/l (summer) ≤ 8.0 mg/l (winter)	≤ 4.0 mg/l (summer) ≤ 8.0 mg/l (winter)	≤ 1.4 mg/l
Oil & Grease	N/A	≤ 10 mg/l	≤ 10 mg/l	≤ 10 mg/l
Total Phosphorus	N/A	*	*	*
Total Kjeldahl Nitrogen	N/A	*	*	*
Nitrite + Nitrate	N/A	*	*	*
pH	N/A	6.5 ≤ SU ≤ 9.0	6.5 ≤ SU ≤ 9.0	6.5 ≤ SU ≤ 9.0
Life Cycle Cost**	$4,404,010	$773,971	$764,988	$1,648,887
Ratio of Cost vs Base Case	575.7%	101.2%	100%	215.5%

* Monitoring requirement
**Life cycle cost at 20-year design life and 3 percent interest rate

C. SOCIAL AND ECONOMIC IMPORTANCE

The Clarksville WWTF requires changes to meet new ammonia effluent limitations that became effective April 1, 2022. The City of Clarksville is a small community that has been experiencing a decrease in its population and loss of businesses, which the submitted report attributes to Mississippi River flooding and high utility rates. Therefore, further increases in rates which would be spread over a shrinking customer base are expected to exacerbate the existing issues with population growth in the community. As of 2018, the sewer rates are at approximately 2.58 percent of median household income. For this reason, the applicant is seeking options to maintain compliance with the new ammonia effluent limitations that will minimize the need to increase rates. The preferred alternative is therefore the relocation of the outfall, and two options for relocation of the outfall were evaluated. Alternative #6, which is to relocate the outfall by construction of gravity main, and Alternative #7, which is to relocate the outfall by construction of a pump station and force main, were determined to be very similar in terms of estimated present worth. While the pumped effluent alternative was estimated to be slightly less expensive, both options were deemed economically efficient, and the gravity flow option represents the preferred alternative. While the treatment level is not being increased because of the proposed improvements, it is expected that the new discharge location will be more protective of aquatic life due to the increased mixing and buffering capacity of the Mississippi River in comparison with the small tributary stream the facility currently discharges to.

Based on United States Census Bureau data, the population of the City of Clarksville was approximately 472 in 2022. The city has experienced a decline of about 3.7 percent in its population between 2000 and 2022, which is significantly lower than the state average rate of growth of 10 percent for the same period. The data shows that the median household income, median age, change in median age, unemployment rate, percent of population below poverty level, and percent of households receiving food stamps are similar to the state average figures. The community has experienced a change in the median household income in between 2000 and 2022 and that was significantly higher than the state average, at around 33.5 percent.

No.	Administrative Unit	Clarksville City	Missouri State	United States	Comparison (Community vs. State)
1	Population (2022)	472	6,154,422	331,097,593	
2	Percent Change in Population (2000-2022)	-3.7%	10.0%	17.7%	Slightly lower than state average
3	2022 Median Household Income (in 2023 Dollars)	$57,636	$68,634	$78,242	Slightly lower than state average
4	Percent Change in Median Household Income (2000-2022)	33.5%	-1.1%	1.9%	Significantly higher than state average
5	Median Age (2022)	37.5	38.8	38.8	Slightly younger than state average
6	Change in Median Age in Years (2000-2022)	1.5	2.7	3.5	Slightly lower than state average
7	Unemployment Rate (2022)	6.9%	4.3%	5.3%	Slightly higher than state average
8	Percent of Population Below Poverty Level (2022)	7.8%	12.8%	12.5%	Slightly lower than state average
9	Percent of Household Received Food Stamps (2022)	13.0%	10.0%	11.5%	Slightly higher than state average
10	(Primary) County Where the Community Is Located	Pike County			

6. DERIVATION AND DISCUSSION OF PARAMETERS, LIMITS, AND PERFORMANCE BASED EFFLUENT LEVELS

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:

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

$$C_e = \frac{(Q_e + Q_s)C - (C_s \times Q_s)}{Q_e}$$

Where C = downstream concentration (mg/L)
C_S = upstream concentration (mg/L)
Q_S = upstream flow (cfs)
C_e = effluent concentration (mg/L)
Q_e = effluent flow (cfs)

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 performance based 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: Performance based 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 BOD5 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 30 mg/L average monthly and 45 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(2)(A)3.A.

  Dissolved Oxygen Modeling:
  To protect beneficial uses within the waterbody, dissolved oxygen modeling analysis was submitted for review. The applicant utilized a Streeter-Phelps analysis, and staff believes that the results of the model are protective of the water quality standards for dissolved oxygen. Information that was provided by the applicant in the submitted report and summary forms in Appendix E was used to develop this review document, with some changes to the model inputs, which are summarized in Appendix D. 50 mg/L $CBOD_5$, and 54.84 mg/L NBOD was used as input to the Streeter Phelps analysis based on the least stringent proposed effluent limits for BOD_5 and ammonia. Streeter Phelps modeling simulated using the proposed design flow indicated a 3.02 mg/L dissolved oxygen deficit below the calculated dissolved oxygen saturation value. The modeled lowest dissolved oxygen or critical dissolved oxygen sag was 5.59 mg/L. This value is above the water quality standard of 5 mg/L for protection of warmwater and coolwater aquatic habitats.

- **Total Suspended Solids (TSS).** Effluent limits of 45 mg/L average monthly and 67.5 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(2)(A)3.A.

- ***Escherichia coli (E. coli).*** Monthly average of 126 per 100 mL as a geometric mean and weekly average of 630 per 100 mL as a geometric mean during the recreational season (April 1 – October 31), for discharges within two miles upstream of segments or lakes with Whole Body Contact Recreation (A) designated use of the receiving stream, as per 10 CSR 20-7.015(9)(B).

- **Total Ammonia Nitrogen.** Performance based effluent levels were established as a result of a discharging technology alternatives analysis conducted by the applicant.

  The proposed alternative analysis performance-based levels are:

Parameter	Units	AML
Ammonia as N-summer	mg/L	4.0
Ammonia as N-winter	mg/L	8.0

  To verify that the proposed alternative analysis performance-based levels provided by the facility are protective of the water quality-based effluent limits, below is the following calculation of water quality-based effluent limits calculated using both the EPA *1999 Update of Ambient Water Quality Criteria for Ammonia* and the more recent *Aquatic Life Ambient Water Quality Criteria for Ammonia – Freshwater 2013*. The department is currently utilizing EPAs 1999 criteria to calculate water quality-based effluent

limits for ammonia. However, the department is evaluating adoption of the more recent 2013 criteria as part of its current triennial review. The information below demonstrates that the proposed alternative analysis performance-based levels proposed by the applicant are more protective with respect to ammonia than both the current water-quality based effluent limits, and potential future effluent limits if the 2013 criteria is adopted by the department.

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

Table 6-1: EPA 1999 Ammonia Criteria as of August 20, 2024

Month	Temp (°C)*	pH (SU)*	Total Ammonia Nitrogen CCC (mg N/L)	Total Ammonia Nitrogen CMC (mg N/L)
January	2.8	7.8	3.1	12.1
February	4.4	7.8	3.1	12.1
March	9.4	7.9	2.7	10.1
April	16.1	8.0	2.1	8.4
May	21.0	7.8	2.1	12.1
June	26.0	7.9	1.3	10.1
July	29.4	8.0	0.9	8.4
August	29.3	8.0	0.9	8.4
September	25.6	8.0	1.2	8.4
October	19.0	8.0	1.8	8.4
November	12.0	8.0	2.4	8.4
December	6.9	7.9	2.7	10.1

* Ecoregion Data (Interior River Valleys and Hills)

WBQEL equation
$C_e = (((Q_e+Q_s)*C) - (Q_s*C_s))/Q_e$

January
Chronic WLA: Ce = ((0.164 + 8194)3.1 – (8194 * 0.01)) / 0.164 Ce = 155486.5
Acute WLA: Ce = ((0.164 + 1.64)12.1 – (1.64 * 0.01)) / 0.164 Ce = 133.4
AML = WLAc = 133.4 mg/L
MDL = WLAa = 133.4 mg/L

February
Chronic WLA: Ce = ((0.164 + 8194)3.1 – (8194 * 0.01)) / 0.164 Ce = 155486.5
Acute WLA: Ce = ((0.164 + 1.64)12.1 – (1.64 * 0.01)) / 0.164 Ce = 133.4
AML = WLAc = 133.4 mg/L
MDL = WLAa = 133.4 mg/L

March
Chronic WLA: Ce = ((0.164 + 8194)2.7 – (8194 * 0.01)) / 0.164 Ce = 135973.7
Acute WLA: Ce = ((0.164 + 1.64)10.1 – (1.64 * 0.01)) / 0.164 Ce = 111.3
AML = WLAc = 111.3 mg/L
MDL = WLAa = 111.3 mg/L

April
Chronic WLA: Ce = ((0.164 + 8194)2.1 – (8194 * 0.01)) / 0.164 Ce = 106253.2
Acute WLA: Ce = ((0.164 + 1.64)8.4 – (1.64 * 0.01)) / 0.164 Ce = 92.4
AML = WLAc = 92.4 mg/L
MDL = WLAa = 92.4 mg/L

May
Chronic WLA: Ce = ((0.164 + 8194)2.1 – (8194 * 0.01)) / 0.164 Ce = 102765
Acute WLA: Ce = ((0.164 + 1.64)12.1 – (1.64 * 0.01)) / 0.164 Ce = 133.4
AML = WLAc = 133.4 mg/L
MDL = WLAa = 133.4 mg/L

June
Chronic WLA: Ce = ((0.164 + 8194)1.3 – (8194 * 0.01)) / 0.164 Ce = 65533.2
Acute WLA: Ce = ((0.164 + 1.64)10.1 – (1.64 * 0.01)) / 0.164 Ce = 111.3
AML = WLAc = 111.3 mg/L
MDL = WLAa = 111.3 mg/L

July
Chronic WLA: Ce = ((0.164 + 8194)0.9 – (8194 * 0.01)) / 0.164 Ce = 45903.9
Acute WLA: Ce = ((0.164 + 1.64)8.4 – (1.64 * 0.01)) / 0.164 Ce = 92.4
AML = WLAc = 92.4 mg/L
MDL = WLAa = 92.4 mg/L

August
Chronic WLA: Ce = ((0.164 + 8194)0.9 – (8194 * 0.01)) / 0.164 Ce = 46191.5
Acute WLA: Ce = ((0.164 + 1.64)8.4 – (1.64 * 0.01)) / 0.164 Ce = 92.4
AML = WLAc = 92.4 mg/L
MDL = WLAa = 92.4 mg/L

September
Chronic WLA: Ce = ((0.164 + 8194)1.2 – (8194 * 0.01)) / 0.164 Ce = 58248.1
Acute WLA: Ce = ((0.164 + 1.64)8.4 – (1.64 * 0.01)) / 0.164 Ce = 92.4
AML = WLAc = 92.4 mg/L
MDL = WLAa = 92.4 mg/L

October
Chronic WLA: Ce = ((0.164 + 8194)1.8 – (8194 * 0.01)) / 0.164 Ce = 88379
Acute WLA: Ce = ((0.164 + 1.64)8.4 – (1.64 * 0.01)) / 0.164 Ce = 92.4
AML = WLAc = 92.4 mg/L
MDL = WLAa = 92.4 mg/L

November
Chronic WLA: Ce = ((0.164 + 8194)2.4 – (8194 * 0.01)) / 0.164 Ce = 117503
Acute WLA: Ce = ((0.164 + 1.64)8.4 – (1.64 * 0.01)) / 0.164 Ce = 92.4
AML = WLAc = 92.4 mg/L
MDL = WLAa = 92.4 mg/L

December
Chronic WLA: Ce = ((0.164 + 8194)2.7 – (8194 * 0.01)) / 0.164 Ce = 135973.7
Acute WLA: Ce = ((0.164 + 1.64)10.1 – (1.64 * 0.01)) / 0.164 Ce = 111.3
AML = WLAc = 111.3 mg/L
MDL = WLAa = 111.3 mg/L

Table 6-2: EPA 2013 Ammonia Criteria as of August 20, 2024

Month	Temp (°C)*	pH (SU)*	Total Ammonia Nitrogen CCC (mg N/L)	Total Ammonia Nitrogen CMC (mg N/L)
January	2.8	7.8	2.3	12.7
February	4.4	7.8	2.3	12.7
March	9.4	7.9	1.8	10.6
April	16.1	8.0	1.0	5.4
May	21.0	7.8	1.0	5.2
June	26.0	7.9	0.6	2.9
July	29.4	8.0	0.4	1.8
August	29.3	8.0	0.4	1.8
September	25.6	8.0	0.5	2.5
October	19.0	8.0	0.8	4.2
November	12.0	8.0	1.3	7.6
December	6.9	7.9	2.1	10.6

* Ecoregion Data (Interior River Valley and Hills

WBQEL equation

$C_e = (((Q_e+Q_s)*C) - (Q_s*C_s))/Q_e$

January

Chronic WLA: Ce = ((0.164 + 8194)2.3 – (8194 * 0.01)) / 0.164 Ce = 114209.6
Acute WLA: Ce = ((0.164 + 1.64)12.7 – (1.64 * 0.01)) / 0.164 Ce = 139.6

Chronic LTA: WLA_c * LTA_c multiplier = 114209.6 * 0.7803 = 89117.8
Acute LTA: WLA_a * LTA_a multiplier = 139.6 * 0.3211 = 44.823
Use most protective LTA: 44.823

AML = LTA * MDL multiplier = 44.823 * 1.19 = 53.3 mg/L
MDL = LTA * AML multiplier = 44.823 * 3.114 = 139.6 mg/L

February

Chronic WLA: Ce = ((0.164 + 8194)2.3 – (8194 * 0.01)) / 0.164 Ce = 114209.6
Acute WLA: Ce = ((0.164 + 1.64)12.7 – (1.64 * 0.01)) / 0.164 Ce = 139.6

Chronic LTA: WLA_c * LTA_c multiplier = 114209.6 * 0.7803 = 89117.8
Acute LTA: WLA_a * LTA_a multiplier = 139.6 * 0.3211 = 44.823
Use most protective LTA: 44.823

AML = LTA * MDL multiplier = 44.823 * 1.19 = 53.3 mg/L
MDL = LTA * AML multiplier = 44.823 * 3.114 = 139.6 mg/L

March

Chronic WLA: Ce = ((0.164 + 8194)1.8 – (8194 * 0.01)) / 0.164 Ce = 89273
Acute WLA: Ce = ((0.164 + 1.64)10.6 – (1.64 * 0.01)) / 0.164 Ce = 116.5

Chronic LTA: WLA_c * LTA_c multiplier = 89273 * 0.7803 = 37.406
Acute LTA: WLA_a * LTA_a multiplier = 116.5 * 0.3211 = 69659.7
Use most protective LTA: 37.406

AML = LTA * MDL multiplier = 37.406 * 1.19 = 44.5 mg/L
MDL = LTA * AML multiplier = 37.406 * 3.114 = 116.5 mg/L

April
Chronic WLA: Ce = ((0.164 + 8194)1.0 – (8194 * 0.01)) / 0.164 Ce = 49374.4
Acute WLA: Ce = ((0.164 + 1.64)5.4 – (1.64 * 0.01)) / 0.164 Ce = 59.3

Chronic LTA: WLA_c * LTA_c multiplier = 49374.4 * 0.7803 = 38526.9
Acute LTA: WLA_a * LTA_a multiplier = 59.3 * 0.3211 = 19.04
Use most protective LTA: 19.04

AML = LTA * MDL multiplier = 19.04 * 1.19 = 22.7 mg/L
MDL = LTA * AML multiplier = 19.04 * 3.114 = 59.3 mg/L

May
Chronic WLA: Ce = ((0.164 + 8194)1.0 – (8194 * 0.01)) / 0.164 Ce = 49374.4
Acute WLA: Ce = ((0.164 + 1.64)5.2 – (1.64 * 0.01)) / 0.164 Ce = 57.1

Chronic LTA: WLA_c * LTA_c multiplier = 49374.4 * 0.7803 = 38526.9
Acute LTA: WLA_a * LTA_a multiplier = 57.1 * 0.3211 = 18.334
Use most protective LTA: 18.334

AML = LTA * MDL multiplier = 18.334 * 1.19 = 21.8 mg/L
MDL = LTA * AML multiplier = 18.334 * 3.114 = 57.1 mg/L

June
Chronic WLA: Ce = ((0.164 + 8194)0.6 – (8194 * 0.01)) / 0.164 Ce = 29425.2
Acute WLA: Ce = ((0.164 + 1.64)2.9 – (1.64 * 0.01)) / 0.164 Ce = 31.8

Chronic LTA: WLA_c * LTA_c multiplier = 29425.2 * 0.7803 = 22960.5
Acute LTA: WLA_a * LTA_a multiplier = 31.8 * 0.3211 = 10.21
Use most protective LTA: 10.21

AML = LTA * MDL multiplier = 10.21 * 1.19 = 12.1 mg/L
MDL = LTA * AML multiplier = 10.21 * 3.114 = 31.8 mg/L

July
Chronic WLA: Ce = ((0.164 + 8194)0.4 – (8194 * 0.01)) / 0.164 Ce = 19450.6
Acute WLA: Ce = ((0.164 + 1.64)1.8 – (1.64 * 0.01)) / 0.164 Ce = 19.7

Chronic LTA: WLA_c * LTA_c multiplier = 19450.6 * 0.7803 = 15177.3
Acute LTA: WLA_a * LTA_a multiplier = 19.7 * 0.3211 = 6.325
Use most protective LTA: 6.325

AML = LTA * MDL multiplier = 6.325 * 1.19 = 7.5 mg/L
MDL = LTA * AML multiplier = 6.325 * 3.114 = 19.7 mg/L

August
Chronic WLA: Ce = ((0.164 + 8194)0.4 – (8194 * 0.01)) / 0.164 Ce = 19450.6
Acute WLA: Ce = ((0.164 + 1.64)1.8 – (1.64 * 0.01)) / 0.164 Ce = 19.7

Chronic LTA: WLA_c * LTA_c multiplier = 19450.6 * 0.7803 = 15177.3
Acute LTA: WLA_a * LTA_a multiplier = 19.7 * 0.3211 = 6.325
Use most protective LTA: 6.325

AML = LTA * MDL multiplier = 6.325 * 1.19 = 7.5 mg/L
MDL = LTA * AML multiplier = 6.325 * 3.114 = 19.7 mg/L

September
Chronic WLA: Ce = ((0.164 + 8194)0.5 – (8194 * 0.01)) / 0.164 Ce = 24437.9
Acute WLA: Ce = ((0.164 + 1.64)2.5 – (1.64 * 0.01)) / 0.164 Ce = 27.4

Chronic LTA: WLA_c * LTA_c multiplier = 24437.9 * 0.7803 = 19068.9
Acute LTA: WLA_a * LTA_a multiplier = 27.4 * 0.3211 = 8.798
Use most protective LTA: 8.798

AML = LTA * MDL multiplier = 8.798 * 1.19 = 10.5 mg/L
MDL = LTA * AML multiplier = 8.798 * 3.114 = 27.4 mg/L

October
Chronic WLA: Ce = ((0.164 + 8194)0.8 – (8194 * 0.01)) / 0.164 Ce = 39399.8
Acute WLA: Ce = ((0.164 + 1.64)4.2 – (1.64 * 0.01)) / 0.164 Ce = 46.1

Chronic LTA: WLA_c * LTA_c multiplier = 39399.8 * 0.7803 = 30743.7
Acute LTA: WLA_a * LTA_a multiplier = 46.1 * 0.3211 = 14.802
Use most protective LTA: 14.802

AML = LTA * MDL multiplier = 14.802 * 1.19 = 17.6 mg/L
MDL = LTA * AML multiplier = 14.802 * 3.114 = 46.1 mg/L

November
Chronic WLA: Ce = ((0.164 + 8194)1.3 – (8194 * 0.01)) / 0.164 Ce = 64336.4
Acute WLA: Ce = ((0.164 + 1.64)7.6 – (1.64 * 0.01)) / 0.164 Ce = 83.5

Chronic LTA: WLA_c * LTA_c multiplier = 64336.4 * 0.7803 = 50201.7
Acute LTA: WLA_a * LTA_a multiplier = 83.5 * 0.3211 = 26.81
Use most protective LTA: 26.81

AML = LTA * MDL multiplier = 26.81 * 1.19 = 31.9 mg/L
MDL = LTA * AML multiplier = 26.81 * 3.114 = 83.5 mg/L

December
Chronic WLA: Ce = ((0.164 + 8194)2.1 – (8194 * 0.01)) / 0.164 Ce = 104235
Acute WLA: Ce = ((0.164 + 1.64)10.6 – (1.64 * 0.01)) / 0.164 Ce = 116.5

Chronic LTA: WLA_c * LTA_c multiplier = 104235 * 0.7803 = 81334.5
Acute LTA: WLA_a * LTA_a multiplier = 116.5 * 0.3211 = 37.406
Use most protective LTA: 37.406

AML = LTA * MDL multiplier = 37.406 * 1.19 = 44.5 mg/L
MDL = LTA * AML multiplier = 37.406 * 3.114 = 116.5 mg/L

Table 6-3: Comparison of WQBEL and Performance Based Levels

Month	Monthly Average Limit		
	WQBEL [2013 Criteria] (mg/L)	WQBEL [1999 Criteria] (mg/L)	PBL (mg/L)
January	53.3	133.4	**8.0**
February	53.3	133.4	**8.0**
March	44.5	111.3	**8.0**
April	22.7	92.4	**4.0**
May	21.8	133.4	**4.0**
June	12.1	111.3	**4.0**
July	7.5	92.4	**4.0**
August	7.5	92.4	**4.0**
September	10.5	92.4	**4.0**
October	17.6	92.4	**8.0**
November	31.9	92.4	**8.0**
December	44.5	111.3	**8.0**

  - **Ammonia as N, Influent Monitoring.** As the proposed facility design flow is greater than 0.1 MGD, influent monitoring is required per 10 CSR 20-7.015(9)(D)8.

- **Oil & Grease.** Conventional pollutant, [10 CSR 20-7.031(4)(B)]. Waters shall be free from oil, scum, and floating debris in sufficient amounts to be unsightly or prevent full maintenance of beneficial uses.

- **Total Phosphorus**. Effluent monitoring for Total Phosphorus is required per 10 CSR 20-7.015(9)(D)8.
  - **Total Phosphorus, Influent Monitoring.** As the proposed facility is greater than 0.1 MGD, influent monitoring will be required per 10 CSR 20-7.015(9)(D)8.

- **Total Kjeldahl Nitrogen, & Nitrate + Nitrite.** Effluent monitoring for Total Kjeldahl Nitrogen, and Nitrate + Nitrite are required per 10 CSR 20-7.015(9)(D)8.
  - **Total Kjeldahl Nitrogen, & Nitrate + Nitrite, Influent Monitoring.** As the proposed facility is greater than 0.1 MGD, influent monitoring will be required per 10 CSR 20-7.015(9)(D)8.

- **pH.** Previous permit limits of 6.5-9.0 SU are retained. The relocation of the outfall to the Mississippi River means that limits of 6.0-9.0 would be protective of the water quality standard due to the buffering capacity of the mixing zone. However, the facility has demonstrated the capability to reliably meet the minimum pH level of 6.5 and therefore the previous limits are retained. A review of DMR data since 2007 shows the facility has never had an excursion below the minimum pH level of 6.5.

- **Biochemical Oxygen Demand (BOD5) 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 BOD_5 and TSS for Publicly Owned Treatment Works (POTWs)/municipals. This facility is required to meet 65 percent removal efficiency for BOD_5.

- **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 BOD_5 and TSS for Publicly Owned Treatment Works (POTWs)/municipals. This facility is required to meet 65 percent removal efficiency for TSS.

7. 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.

8. ANTIDEGRADATION REVIEW PRELIMINARY DETERMINATION

The applicant elected to assume that the proposed relocated discharge will result in a reduction by 10 percent or more of the pollutant assimilative capacity of the Mississippi River. Relocation of the effluent line by extending the gravity main to the Mississippi River for direct discharge is the preferred alternative. The antidegradation report included an alternatives analysis which evaluated regionalization, land application, and several discharging treatment alternatives. However, options other than the relocation of the outfall to a direct discharge to the Mississippi River were determined to be economically inefficient and were therefore deemed impracticable.

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: Thomas Silkwood
Date: October 2024
Reviewer: Cailie Carlile, P.E.

APPENDIX A: MAP OF DISCHARGE LOCATION

Approximate locations of existing and new outfall indicated by red "X" and red star, respectively.


Mississippi River
Lim Long
Dalman Pond
Lim Long Ln
The Sny
Highway 79
79
N 6th St
CLARKSVILLE
Kentucky St
Pike 238
Pike 236
Mississippi River
Mississippi River
Mississippi River
Mississippi River
County Road 134
Pike 235
Eagles Bluff Golf Course
79
Highway W
Fox Creek
Pike 220
Fox Creek
County Road 134

APPENDIX B: GEOHYDROLOGIC EVALUATION

MISSOURI DEPARTMENT OF NATURAL RESOURCES

Michael L. Parson
Governor

Dru Buntin
Director

LWE24096
Pike County

June 18, 2024

Abra Spisso
3622 Endeavor Ave
Columbia, MO 65201

RE: Clarksville Lagoon Improvements

Dear Abra Spisso:

On May 07, 2024, the Missouri Geological Survey received a request to perform a geohydrologic evaluation for the above referenced project located in Pike 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

Andrew Herrera
Geologist
Environmental Geology Section

c: Abra Spisso
WPP
Northeast Regional Office

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

Project ID Number
LWE24096
County
Pike County

Request Details

Project: Clarksville Lagoon Improvements

Legal Description: Land Grant 01758

Quadrangle: CLARKSVILLE
Latitude: 39 21 25.76
Longitude: -90 53 12.06

Organization Official
Name: Abra Spisso
Address: 3622 Endeavor Ave
City: Columbia
State: MO Zip: 65201
Phone: 573-355-5988
Email:

Preparer
Name: Abra Spisso
Address: 3622 Endeavor Ave
City: Columbia
State: MO Zip: 65201
Phone: 573-355-5988
Email: aspisso@klingner.com

Project Details

Report Date:
Date of Field Visit: 06/06/2024

Previous Reports: Not Applicable

Facility Type
- [ ] Mechanical treatment plant
- [ ] Recirculating filter bed
- [ ] Land application
- [X] 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
- [ ] Not applicable
- [X] Slight
- [ ] Moderate
- [ ] Severe

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

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

Bedrock: The uppermost bedrock Ordovician-age Maquoketa shale.

Surficial Materials: The surficial materials are alluvium including silt loam.

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

Project ID Number
LWE24096
County
Pike County

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

Remarks:

On June 6, 2024, a geologist with the Missouri Geological Survey Conducted a geohydrologic evaluation for an existing, discharging storage basin located at longitude -90.8927845 degrees, latitude 39.3568036 degrees in Clarksville, Missouri. The facility's current storage basin is greater than 4 acres in size and discharges wastewater generated by the city of Clarksville to a tributary of Mississippi River but will be converted to discharge directly into Mississippi River. The purpose of the site visit is to observe the geologic and hydrologic characteristics and to determine the potential for groundwater contamination in the event of wastewater treatment failure.

Surface water from the site will generally drain east to northeast to a tributary of Mississippi River and subsequently into Mississippi River. On the day of the site visit, a portion of Mississippi was classified as gaining for approximately 2.0 miles downstream from the proposed discharge point.

Measurement of surficial materials onsite using a handheld auger was inhibited due to extreme flooding conditions of Mississippi River. However, according to areal geologic mapping and USDA's Web Soil Survey, surficial materials consist of low to moderately permeable alluvium including silt loam. According to nearby geologic well logs, surficial materials may be up to 70 feet deep.

No bedrock was observed onsite; however, areal geologic mapping and nearby geologic wells indicate the uppermost bedrock is low permeability Ordovician-age Maquoketa shale.

There are no known sinkholes, springs, or geologic structures located within 1 mile of the site. Additionally, there are no known domestic water wells located within 1/4 mile from the site.

Based on the characteristics observed, the site receives a slight overall geologic limitations rating and a slight collapse potential. In the event of storage basin collapse or wastewater treatment failure, local shallow groundwater resources, and surface waters of the tributary of Mississippi River and Mississippi River may be adversely impacted.

APPENDIX C: NATURAL HERITAGE REVIEW

Missouri Department of Conservation

Natural Heritage Review Report

May 30, 2024

Science Branch
P. O. Box 180
Jefferson City, MO 65102
Prepared by: Dorothy Butler
NaturalHeritageReview@mdc.mo.gov
(573) 522 - 4115 ext. 3639

Abra Spisso Podoliak
Klingner & Associates
aspisso@klingner.com

NHR ERT ID:	8387	NHR ERT Level:	2
Project type:	Waste Transfer, Treatment, and Disposal, Liquid waste/Effluent, Sewer line		
Location/Scope:	Clarksville		
County:	Pike		
Project Title:	Clarksville Wastewater System Improvements		
Query received:	5/7/2024		

This NATURAL HERITAGE REVIEW is not a site clearance letter. Rather, it identifies public lands and records of sensitive resources located close to and/or potentially affected by the proposed project. If project plans or location change, this report may no longer be valid. 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. Lack of an occurrence record does not mean that a sensitive species or natural community is not present on or near the project area. On-site verification is the responsibility of the project. These records serve as one reference and additional information (e.g. wetland or soils maps, on-site inspections or surveys) should be considered. Look for additional information about the biological and habitat needs of records listed to avoid or minimize impacts. More information is at Natural Areas | Missouri Department of Conservation (mo.gov) and Missouri Fish and Wildlife Information System (MOFWIS).

Level 3: Records of federal-listed (also state-listed) species or critical habitats near the project site:

Natural Heritage records identify Myotis sodalis and Myotis septentrionalis 2.2 miles from the project area.

- **Indiana Bats and Northern Long-eared Bats: If this project has the potential to alter habitat (e.g. tree removal, projects in karst habitat) or cause direct mortality of bats, please coordinate directly with 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.**

  Indiana and Northern Long-eared bats are known to occur in the project area, these species should be assumed present wherever there is habitat. Indiana Bats *(Myotis sodalis*, federal and state-listed endangered) and Northern Long-eared Bats (*Myotis septentrionalis,* federal-listed endangered) hibernate during winter months in caves and mines. During the summer months, they roost and raise young under the bark of trees in 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 and/or Northern Long-eared Bats, especially from September to April.

The project is adjacent to the Mississippi River.

- **Mississippi River:** The Mississippi River (together with its tributary mouths) is home to many aquatic species of state and federal concern, including federal-listed Pallid Sturgeon, several mussel species in the pooled reaches upstream of the Missouri confluence and mainstem; and state-listed Lake Sturgeon, and Flathead Chubs; and Interior least terns in the lower Mississippi. All these are sampled at points but must be assumed to be present in suitable habitats through extended river reaches. Bluffs, banks, and floodplains may also include habitat used by listed Gray bats, Indiana bats and Bald Eagles.

- Terrestrial projects that manage construction and include operation plans to avoid runoff of sediment or pollutants are unlikely to affect the aquatic species.
- Regulations enforced by other agencies to protect water quality and human health are generally adequate to protect the needs of wildlife as well.
- Projects that place fill in or discharge water to the river are subject to federal permits, and strict observance of conditions required in those permits is important to minimize risk of damage to endangered species.

See General Recommendations for additional information on minimizing impacts to aquatic resources.

FEDERAL LIST species/habitats are protected under the Federal Endangered Species Act. **Contact U.S. Fish & Wildlife Service** (101 Park Deville Drive Suite A, Columbia, Missouri 65203-0007; 573-234-2132) for Endangered Species Act coordination and concurrence information).

Level 2: Records of state-listed (not federal-listed) endangered species AND / OR state-ranked (not state-listed endangered) species and natural communities of conservation concern. The Department tracks these species and natural communities due to population declines and/or apparent vulnerability.

Natural Heritage records identify no state-listed endangered species within the project area.

Natural Heritage records indicate the following state-ranked species near the project area:

Scientific Name	Common Name	State Rank	Proximity (miles)	Primary Habitat
Wolffia columbiana	Columbia Water-meal	SU	Unknown	Pond/lake/deep oxbows & slough, River/stream, Wet ditches

State Rank Definitions:

- S1: Critically imperiled in the state because of extreme rarity of or because of some factor(s) making it especially vulnerable to extirpation from the state. Typically, 5 or fewer occurrences or very few remaining individuals (<1,000).
- S2: Imperiled in the state because of rarity or because of some factor(s) making it very vulnerable to extirpation from the state (6 to 20 occurrences or few remaining individuals).
- S3: Vulnerable in the state either because rare and uncommon, or found only in a restricted range (even if abundant at some locations), or because of other factors making it vulnerable to extirpation. Typically 21 to 100 occurrences or between 3,000 and 10,000 individuals.
- S4: Uncommon but not rare, and usually widespread in the nation or state. Possible cause of long-term concern. Usually more than 100 occurrences and more than 10,000 individuals.
- S#S#: Range Rank: A numeric range rank (e.g., S2S3) is used to indicate the range of uncertainty about the exact status.
- ?: Denotes inexact or uncertain numeric rank.
- SU: Currently unrankable due to lack of information or due to substantially conflicting information about status or trends.

There are no regulatory requirements associated with this status, however we encourage voluntary stewardship to minimize the risk of further decline that could lead to listing.

STATE ENDANGERED species are protected under the Wildlife Code of Missouri (3CSR10-4.111).
See the Missouri Species And Communities Of Conservation Concern Checklist (mo.gov) for a complete list.

General recommendations related to this project or site, or based on information about the historic range of species (unrelated to any specific Natural Heritage records):

- **Wastewater:** Clean Water Act permits issued by other agencies (Missouri DNR or US Army Corps of Engineers) regulate both construction and operation of wastewater systems, and provide many important protections for fish and wildlife resources throughout the project area and at some distance downstream. Fish and wildlife almost always benefit when unnatural pollutants are removed from water, and concerns are minimal if construction is managed to minimize erosion and sedimentation/runoff to nearby streams and lakes, including adherence to any Clean Water Act permit conditions.
  - Revegetation of disturbed areas is recommended to minimize erosion, as is restoration with of native plant species compatible with the local landscape and for wildlife needs. Annuals like ryegrass may be combined with native perennials for quicker green-up. Avoid aggressive exotic perennials such as crown vetch and sericea lespedeza.
  - Please see Best Management Practices for Construction and Development Projects Affecting Missouri Rivers and Streams (mo.gov).

- **Gray Bats:** Gray Bats (*Myotis grisescens*, federal and state-listed endangered) occur in Pike County and could occur in the project area, as they forage over streams, rivers, and reservoirs. Avoid entry or disturbance of any cave inhabited by gray bats and when possible retain forest vegetation along the stream and from the gray bat cave opening to the stream. Please see Best Management Practices for Construction and Development Projects Gray bat (mo.gov).

- **Tri-colored Bats:** Tri-colored bats (*Perimyotis subflavus*, federally proposed endangered) occur in Pike County and could occur in the project area. In Missouri, most tri-colored bats hibernate in winter in the most humid and warm parts of caves. In summer, they roost in trees, in crannies about cliffs or buildings, in barns, or sometimes in high domes of caves. Tri-colored bats have been significantly impacted by White-nose syndrome. Please contact 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.

- **Karst:** Pike County has known karst geologic features (e.g. caves, springs, and sinkholes, all characterized by subterranean water movement). Few karst features are recorded in Natural Heritage records, and ones not noted here may be encountered at the project site or affected by the project. Cave fauna (many of which are species of conservation concern) are influenced by changes to water quality, so check your project site for any karst features and make every effort to protect groundwater in the project area. Please see Management Recommendations for Construction and Development Projects Affecting Missouri Karst Habitat (mo.gov).

- **Bald Eagles:** Bald Eagles (*Haliaeetus leucocephalus*) nest near streams or water bodies in the project area. Nests are large and fairly easy to identify. While no longer listed as endangered, eagles continue to be protected by the federal government under the Bald and Golden Eagle Protection Act. Work managers should be alert for nesting areas within 1500 meters of project activities, and follow federal guidelines at: Do I need an eagle take permit? | U.S. Fish & Wildlife Service (fws.gov) if eagle nests are seen.

- **Stream Reach Opportunities:** The project is within Mississippi River Stream Reach Reference Watershed Conservation Opportunity Area. COAs are key landscapes that represent the greatest

opportunities for sustainable conservation of the Missouri's diverse flora and fauna and the natural communities they depend upon, including: grasslands (including prairie and savanna), glades, forests and woodlands, wetlands, caves and karst, and rivers and streams. COAs have been identified based on several factors, including the diversity and rarity of species and natural communities present, and the comparative likelihood/importance of projects to maintain them in the area over time. COAs have no regulatory role, but do reflect interest as a planning tool from multiple government agencies, non-governmental organizations and citizen groups to facilitate conservation in the area. Maintenance of high quality natural terrestrial and aquatic communities will help provide important habitat for the COA's biodiversity. Funding might be available to manage for important habitats within the COA. Please contact Missouri Department of Conservation for more information.

- Invasive exotic species are a significant issue for fish, wildlife and agriculture in Missouri. Seeds, eggs, larvae, and aquatic plant material may be moved to new sites on boats or construction equipment, so inspect and clean equipment thoroughly before moving between project sites.
- Remove any mud, soil, trash, plants (or plant material) or animals from equipment before leaving any water body or work area.
- Drain water from boats and machinery that has 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 carwash sites), and dry in the hot sun before using again.

These recommendations are ones project managers might prudently consider based on a general understanding of species needs and landscape conditions. Natural Heritage records largely reflect sites visited by specialists in the last 30 years. Many privately owned tracts have not been surveyed and could host remnants of species once but no longer common.

APPENDIX D: DISSOLVED OXYGEN MODELING

INPUT

1. EFFLUENT CHARACTERISTICS	
Discharge (cfs):	0.164
CBOD5 (mg/L):	50
Ammonia as Nitrogen (mg/L):	12
NBOD (mg/L):	54.84
Dissolved Oxygen (mg/L):	2.5
Temperature (deg C):	26
https://apps5.mo.gov/mocwis_public/wqa/sampleDetail.do?sampleId=361668	
2. RECEIVING WATER CHARACTERISTICS	
Upstream Discharge (cfs):	27708
Upstream CBOD5 (mg/L):	2
Upstream NBOD (mg/L):	0.921
Upstream Dissolved Oxygen (mg/L):	8.612
Upstream Temperature (deg C):	26
Elevation (ft NGVD):	441.6
Downstream Average Channel Slope (ft/ft):	0.0001
Downstream Average Channel Depth (ft):	0.083
Downstream Average Channel Velocity (fps):	1.218157884
3. REAERATION RATE (Base e) AT 20 deg C (day^-1 **Applicable value below here:**	0.28

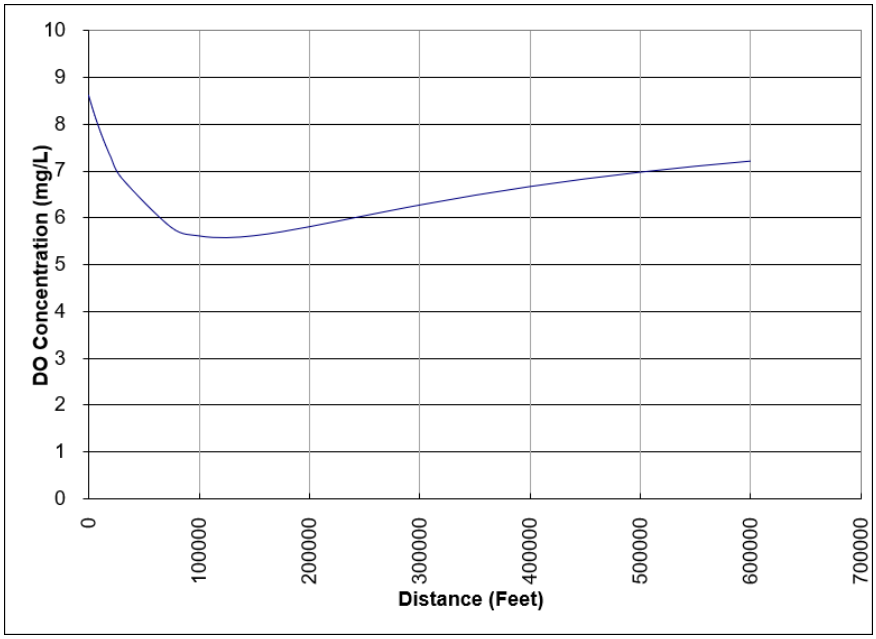
Reference	Applic. Vel (fps)	Applic. Dep (ft)	Suggested Values
Churchill	1.5 - 6	2 - 50	903.41
O'Connor and Dobbins	.1 - 1.5	2 - 50	598.19
Owens	.1 - 6	1 - 2	2463.66
Tsivoglou-Wallace	.1 - 6	.1 - 2	0.28

4. BOD DECAY RATE (Base e) AT 20 deg C (day^-1):	2.18

Reference	Suggested Value
Wright and McDonnell, 1979	2.18

OUTPUT

1. INITIAL MIXED RIVER CONDITION	
CBOD5 (mg/L):	2.0
NBOD (mg/L):	0.9
Dissolved Oxygen (mg/L):	8.6
Temperature (deg C):	26.0
2. TEMPERATURE ADJUSTED RATE CONSTANTS (Base e)	
Reaeration (day^-1):	0.32
BOD Decay (day^-1):	2.87
3. CALCULATED INITIAL ULTIMATE CBODU AND TOTAL BODU	
Initial Mixed CBODU (mg/L):	2.9
Initial Mixed Total BODU (CBODU + NBOD, mg/L):	3.9
4. INITIAL DISSOLVED OXYGEN DEFICIT	
Saturation Dissolved Oxygen (mg/L):	7.986
Initial Deficit (mg/L):	-0.63
5. TRAVEL TIME TO CRITICAL DO CONCENTRATION (days):	0.918353
6. DISTANCE TO CRITICAL DO CONCENTRATION (feet):	96655.63
7. CRITICAL DO DEFICIT (mg/L):	2.46
8. CRITICAL DO CONCENTRATION (mg/L):	5.53



a. Several changes were made to the model inputs from the modeling originally submitted by the applicant. An email reply from Abra Spisso on June 14, 2024, confirmed the applicant did not have concerns with the changes, which are summarized below. These changes are intended to show that the dissolved oxygen criterion is still protected during the expected "worst case scenario" for the discharge.
   i. Discharge: 0.16 cfs → 0.164 cfs
      -Revised to reflect the unit conversion more accurately from the design flow rate of 106,000 gpd.
   ii. $CBOD_5$: 38.602 mg/L → 60 mg/L
      -Derived from the least stringent proposed BOD limit of 65 mg/L
   iii. Ammonia: 1.4 mg/L → 12 mg/L
      -Represents the least stringent proposed ammonia limit of 12 mg/L
   iv. Dissolved Oxygen: 5 mg/L → 2.5 mg/L
      -In the absence of sampling data to confirm the concentration of DO in the effluent, a typical value of 2.5 mg/L is assumed
   v. Upstream Discharge: 180,300 cfs → 27,708 cfs
      -Revised to 7Q10 low flow value determined by USGS gaging station data
   vi. Upstream $CBOD_5$: 0.0 mg/L → 2.0 mg/L
      -In the absence of sampling data to confirm the upstream concentration of $CBOD_5$, a concentration of 2.0 mg/L is assumed based on department guidance
   vii. Upstream Temperature: 22.278 deg C → 26.0 deg C
      -In the absence of sampling data to confirm the upstream temperature, a summer maximum of 26 degrees Celsius is assumed based on department guidance
   viii. Downstream Average Channel Slope: 0.002 → 0.0001
      -The submitted modeling did not provide a basis for the slope. The revised figure was derived via the elevation profile tool on the USGS National Map Viewer
   ix. Reaeration Rate: 16.83 day^{-1} → 0.28 day^{-1}
      -After the changes to the other model inputs, the reaeration rate was revised based on the new rate suggested by the model.

APPENDIX E: ANTIDEGRADATION REVIEW SUMMARY ATTACHMENTS

The attachments that follow contain summary information provided by the applicant.

2) Antidegradation Review Summary Request:

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
Clarksville WWTF			Pike
ADDRESS (PHYSICAL)	CITY	STATE	ZIP CODE
111 N. Howard, P.O. Box 530		MO	63336
PERMIT NUMBER	PROPOSED DESIGN FLOW	SIC / NAICS CODE	
MO-0039632			

2. OWNER

NAME			
Jo Anne Smiley, Mayor			
ADDRESS	CITY	STATE	ZIP CODE
111 N. Howard, P.O. Box 530	Clarksville	MO	63336
EMAIL ADDRESS		TELEPHONE NUMBER WITH AREA CODE	
jsmiley@tcip.net		5732423336	

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

NAME	SECRETARY OF STATE CHARTER NUMBER		
Jo Anne Smiley, Mayor			
ADDRESS	CITY	STATE	ZIP CODE
111 N. Howard, P.O. Box 530	Clarksville	MO	63336
EMAIL ADDRESS		TELEPHONE NUMBER WITH AREA CODE	
jsmiley@tcip.net		5732423336	

4. CONSULTANT

PREPARER NAME	COMPANY NAME		
Abra Spisso	Klingner & Associates, P.C.		
ADDRESS	CITY	STATE	ZIP CODE
3622 Endeavor Ave, Suite 117		MO	
EMAIL ADDRESS		TELEPHONE NUMBER WITH AREA CODE	
aspisso@klingner.com		5733555988	

5. RECEIVING WATER BODY SEGMENT #1

NAME: Mississippi River

5.1 Upper end of segment – Location of discharge
UTM: X= _____, Y= _____ OR Lat 39.3, Long -90.9

5.2 Lower end of segment –
UTM: X= _____, Y= _____ 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?

☑ Yes ☐ No – What is the proposed method of disinfection?

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.

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

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.

9. ADDITIONAL REQUIREMENTS

Complete and submit the following with this submittal:

- ☑ Copy of the Geohydrologic Evaluation – Submit request through the Missouri Geological Survey website
- ☑ Copy of the Missouri Natural Heritage from the Missouri Department of Conservation website
- ☑ Attach your Antidegradation Review Report and all supporting documentation as these forms are only a summary.
- ☐ 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 II.A.1.

10. PATH / TIER REVIEW ATTACHMENTS ENCLOSED

Path A: Tier 2 – Non-Degradation Mass Balance	☐ Yes	☐ No
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*		Path / Tier Review Attachment Used for POC Evaluation	Average Monthly Limit	Daily Maximum Limit or Average Weekly Limit
	mg/L	µg/L			
BOD_5	X			45	65
TSS	X			80	120
Ammonia (Summer)	X			8	8
Ammonia (Winter)	X			12	12
Total Phosphorus	X				

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

12. PROPOSED PROJECT SUMMARY

The proposed project is to relocate the existing outfall of the Clarksville WWTF from an unnamed tributary of the Mississippi River to the Mississippi River about 0.6 miles away. This will be accomplished through construction of a 100 GPM lift station and 3" PVC force main.

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? ☐ Yes ☐ No
If yes, provide a copy.

14. APPLICATION FEE

☐ CHECK NUMBER ☐ JETPAY 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
Abra D. Spisso	5/7/24
PRINT NAME	**TITLE**
Abra Spisso	P.E.

PLEASE IDENTIFY YOUR STATUS FOR THIS PROJECT: ☐ OWNER ☐ CONTINUING AUTHORITY ☑ CONSULTANT

MO 780-2025 (03-19) Page 3

a. Items 2. Owner and 3. Continuing Authority
    i. The submitted application indicates that the owner and continuing authority for the project is Jo Anne Smiley, Mayor of Clarksville. An email response from Abra Spisso on June 14, 2024, clarified that the intended owner and continuing authority is the City of Clarksville.
b. Item 5. Receiving Water Body Segment #1
    i. An email response from Abra Spisso on June 14, 2024, clarified the UTM coordinates for the outfall as: X = 682505 / Y = 4358746
c. Item 11. Applicant Proposed Antidegradation Review Effluent Limits
    i. The submitted application includes limits based on the existing operating permit. Proposed limits based on the performance capabilities of the facility were submitted by Abra Spisso via email on June 19, 2024.
d. Item 12. Proposed Project Summary
    i. The submitted application indicates that the preferred alternative is the outfall relocation with force main and pump station. An email response from Abra Spisso on June 14, 2024, clarified the preferred alternative is relocation with gravity main.

3) Antidegradation Review Summary Path C: Tier 2 - Significant Degradation

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

ANTIDEGRADATION REVIEW SUMMARY FOR PUBLIC NOTICE
ATTACHMENT A: TIER 2 – SIGNIFICANT DEGRADATION

1. FACILITY

NAME			TELEPHONE NUMBER WITH AREA CODE
Clarksville WWTF			(573) 242-3336
ADDRESS (PHYSICAL)	**CITY**	**STATE**	**ZIP CODE**
0.6 mile southeast of Rte. 79 and CR 209 intersection	Clarksville	MO	63336

2. OWNER

NAME AND OFFICIAL TITLES			
Jo Anne Smiley, Mayor			
ADDRESS	**CITY**	**STATE**	**ZIP CODE**
111 N. Howard, P.O. Box 530	Clarksville	MO	63336
TELEPHONE NUMBER WITH AREA CODE	**E-MAIL ADDRESS**		
(573) 242-3336	jsmiley@tcip.net		

3. CONTINUING AUTHORITY The regulatory requirement regarding continuing authority is found in 10 CSR 20-6.010(3) available at www.sos.mo.gov/adrules/csr/current/10csr/10c20-6a.pdf.

NAME AND OFFICIAL TITLES			
Jo Anne Smiley, Mayor			
ADDRESS	**CITY**	**STATE**	**ZIP CODE**
111 N. Howard, P.O. Box 530	Clarksville	MO	63336
TELEPHONE NUMBER WITH AREA CODE	**E-MAIL ADDRESS**		
(573) 242-3336	jsmiley@tcip.net		

4. RECEIVING WATER BODY SEGMENT #1

NAME: Mississippi River

4.1 UPPER END OF SEGMENT (Location of discharge)
UTM _____ OR Lat 39.3, Long -90.9

4.2 LOWER END OF SEGMENT
UTM _____ OR Lat _____, Long _____

Per the Missouri Antidegradation Implementation Procedure, or 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."

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

NAME

5.1 UPPER END OF SEGMENT
UTM _____ OR Lat _____, Long _____

5.2 LOWER END OF SEGMENT
UTM _____ OR Lat _____, Long _____

6. WET WEATHER ANTICIPATIONS

If an applicant anticipates excessive inflow or infiltration and pursues approval from the department to bypass secondary treatment, a feasibility analysis is required. The feasibility analysis must comply with the criteria of all applicable state and federal regulations including 40 CFR 122.41(m)(4). Attach the feasibility analysis to the antidegradation review report.

What is the Wet Weather Flow Peaking Factor in relation to design flow? 3.33

Wet Weather Design Summary:

This facility has had no issues with wet weather over the past several years.

7. EXISTING WATER QUALITY DATA OR MODEL SUMMARY

Obtaining Existing Water Quality is possible by three methods according to the Antidegradation Implementation Procedure Section II.A.1.: (1) using previously collected data with an appropriate Quality Assurance Project Plan, or QAPP (2) collecting water quality data approved by the Missouri Department of Natural Resources methodology or (3) using an appropriate water quality model. QAPPs must be submitted to the department for approval well in advance (six months) of the proposed activity. Provide all the appropriate corresponding data and reports which were approved by the department Watershed Protection Section. **Additional information needed with the EWQ data includes**: 1) Date existing water quality data was provided by the Watershed Protection Section, 2) Approval date by the Watershed Protection Section of the QAPP, project sampling plan, and data collected for all appropriate POCs.

Comments/Discussion: No water quality available to consultant. DNR should have water quality info on Mississippi River

8. SUMMARY OF THE POLLUTANTS OF CONCERN AND THE PROPOSED EFFLUENT LIMITS

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*	Units	Wasteload Allocation	Average Monthly Limit	Daily Maximum Limit
BOD5	MG/L		45	65
TSS	MG/L		80	120
DISSOLVED OXYGEN	MG/L		n/a	n/a
AMMONIA	MG/L		12	12
BACTERIA (E. COLI)	CFUS		126	630
Ammonia (Winter)			12	12
Oils and Grease	mg/L		10	15

Proposed limits must not violate water quality standards, be protective of beneficial uses, and achieve the highest statutory and regulatory requirements.

*Assumed Tier 2.

9. IDENTIFYING ALTERNATIVES

Supply a summary of the alternatives considered and the level of treatment attainable with regards to the alternative. "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. Per 10 CSR 20-6.010(4)(D)1., the feasibility of a no-discharge system must be considered. Attach all supportive documentation in the Antidegradation Review report.

Applicants choosing to use a new wastewater technology that are considered an "unproven technology" in Missouri in their Tier 2 Reviews with alternative analysis must comply with the requirements set forth in the *New Technology Definitions and Requirements Factsheet* that can be found at: http://dnr.mo.gov/pubs/pub2453.pdf.

Non-degrading alternatives: No - discharge land application

Alternatives ranging from less-degrading to degrading including Preferred Alternative
(All treatment levels for POCs must at a minimum meet water quality standards):

Alternatives	**Level of Treatment Attainable for each Pollutant of Concern**					
	BOD5	TSS	AMMONIA AS N	E. Coli		
	(MG/L)	MG/L	MG/L	#/100 ml		
Lemna Cover/Polishing React	20	20	1.4	126		
Bio Domes	20	20	1.4	126		
Veolia Lagoon Guard	20	20	1.4	126		
Optaer SAGR	20	20	1.4	126		
Triple Point Nitrox	20	20	1.4	126		
Relocate Outfall to Miss Rvr	45	80	12/12	126/630		

10. 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.

All of the options above are practical in terms of system reliability and relative certainty of achieving technology-based requirements. The proposed stream is not sensitive in terms of its beneficial uses. The proposed discharge from any of the options above should not impact groundwater. There are no known groundwater wells in the vicinity of this location and the residents of the area are all on public water supply. No Discharge has the least impact on the environment. Options for lagoon retrofit require the most energy and have the highest maintenance and replacement costs. The options for relocating the discharge are practical but future effluent limits may make those options short-lived.

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.

All lagoon retrofit options have an economic efficiency of over 153% of the base line option (relocate lagoon outfall to Mississippi River). Only two options (both relocate the outfall to the Mississippi River) are economically efficient.

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."

Customers on the sewer system pay approximately $83.25 for 5,000 gallons of sewer. The existing sewer rates are already at 2.58% of MHI, which is considered a high cost burden (over 2% MHI). If grant funds are not able to be secured to pay for this project, the cost burden will increase to at least 2.93% of MHI. This is not considered affordable. All other options would take the cost burden for sewer rates in excess of 3.13% of MHI.

Preferred Chosen Alternative:

The preferred chosen alternative is to relocate the existing lagoon outfall from the unnamed tributary ditch to the Mississippi River. All other options are not economically efficient.

Reasons for Rejecting the other Evaluated Alternatives:

All other options are not economically efficient or affordable.

Comments/Discussion:

11. 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 affordability analysis above provides much of the justification for the Social and Economic Importance for this preferred alternative (Option 7). The City of Clarksville has been losing population and businesses due to Mississippi River flooding (they have no flood protection) and high utility rates. Increasing rates further and spreading the cost over fewer customers will likely encourage more people to move away from town. This would only exacerbate the problem.

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 sewer rates are extremely high relative to median household income. Increased cost only raises the burden.

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 proposed alternative does not harm the environment any further. The existing receiving stream is mostly a stream because of flow from the lagoon. By relocating the discharge outfall, this section of stream will improve in quality.

PROPOSED PROJECT SUMMARY:

The proposed project is to relocate the existing outfall of the Clarksville WWTF from an unnamed tributary of the Mississippi River to the Mississippi River about 0.6 miles away. This will be accomplished through construction of a 100 GPM lift station and 3" PVC force main.

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.

CONSULTANT: I have prepared or reviewed this form and all attached reports and documentation. The conclusion proposed is consistent with the Antidegradation Implementation Procedure and current state and federal regulations.

SIGNATURE	DATE
Mark C Bross	6/4/18

NAME AND OFFICIAL TITLES / LICENSE #	COMPANY NAME
Mark C. Bross, PE - MO2001004562	Klingner & Associates, PC

ADDRESS	CITY	STATE	ZIP CODE
4510 Paris Gravel Road	Hannibal	MO	63401

TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
(573) 221-0020	mcb@klingner.com

OWNER: I have read and reviewed the prepared documents and agree with this submittal.

SIGNATURE	DATE
Anne Smiley	6-22-2018

CONTINUING AUTHORITY: I have read and reviewed the prepared documents and agree with this submittal.

SIGNATURE	DATE
Anne Smiley	6-22-2018

Summary of Design

Hydraulic and Organic Loadings:

- Design PE: 1060 PE
- Design Flow: 106,000 GPD
- Average Flow: 65,000 GPD
- Peak Flow: 352,980 GPD (Estimated)
- Design Influent BOD: 194.49 lb/day (220mg/L x 8.34lb/gal x 0.106 MGD)
- Average Influent BOD: 119.26 lb/day (220mg/L x 8.34lb/gal x 0.065 MGD)
- Design Influent TSS: 221.01 lb/day (250mg/L x 8.34lb/gal x 0.106 MGD)
- Average Influent TSS: 135.53 lb/day (250mg/L x 8.34lb/gal x 0.065 MGD)
- Monthly Average BOD Limit: 45 mg/L
- Weekly Average BOD Limit: 65 mg/L
- Monthly Average TSS Limit: 80 mg/L
- Weekly Average TSS Limit: 120 mg/L
- Effluent BOD Range: 4.9 – 36.2 mg/L
- 2-Year Effluent BOD Avg: 16.77 mg/L
- Effluent TSS Range: 4 – 72 mg/L
- 2-Year Effluent TSS Avg: 35.746 mg/L
- Effluent Ammonia Range: 0.04-10.3 mg/L
- 2-Year Effluent Ammonia Avg: 4.156 mg/L

Distribution Network

- 4" PVC SDR-26 Forcemain and fittings
- 150 GPM Submersible Lift Station and valve vault
- Outfall check valve
- Submersible pump
    - Pump Capacity 200 gpm @ 150 ft TDH
    - Maximum Allowable Pump Speed – 1800 rpm
    - Minimum Motor – 30 hp
    - Pump Discharge Connections – 4"
    - Maximum Allowable NPSHr – 11.5 ft
    - Minimum Allowable Efficiency @ duty point – 38%
    - The pump will be clockwise rotation when viewed from the driver end looking at the pump.

The existing lagoon has over 1 million gallons of total storage. Flow is controlled at the intake structure in the lagoon and flow can be adjusted as needed through valves that got to the UV system and to the effluent lift station. The lagoon has surge storage for large rainfall events.

The proposed lift station is 6 feet by 7 feet with a top to bottom depth of 15.5 feet, with a duplex submersible pimping system. The total depth of the lift station avoids extreme shoring and dewatering concerns during construction, as it is only 3 feet below the existing concrete UV structure.

The anticipated holding capacity is approximately 4,800 gallons. This is less than the 2 hour peak storage capacity as outlined in 10 CSR 20-8.130(8)(A), however, the flow into the lift station is controlled at the lagoon, the proposed lift station does not function as a traditional lift station that requires wet well storage capacity in the same manner.

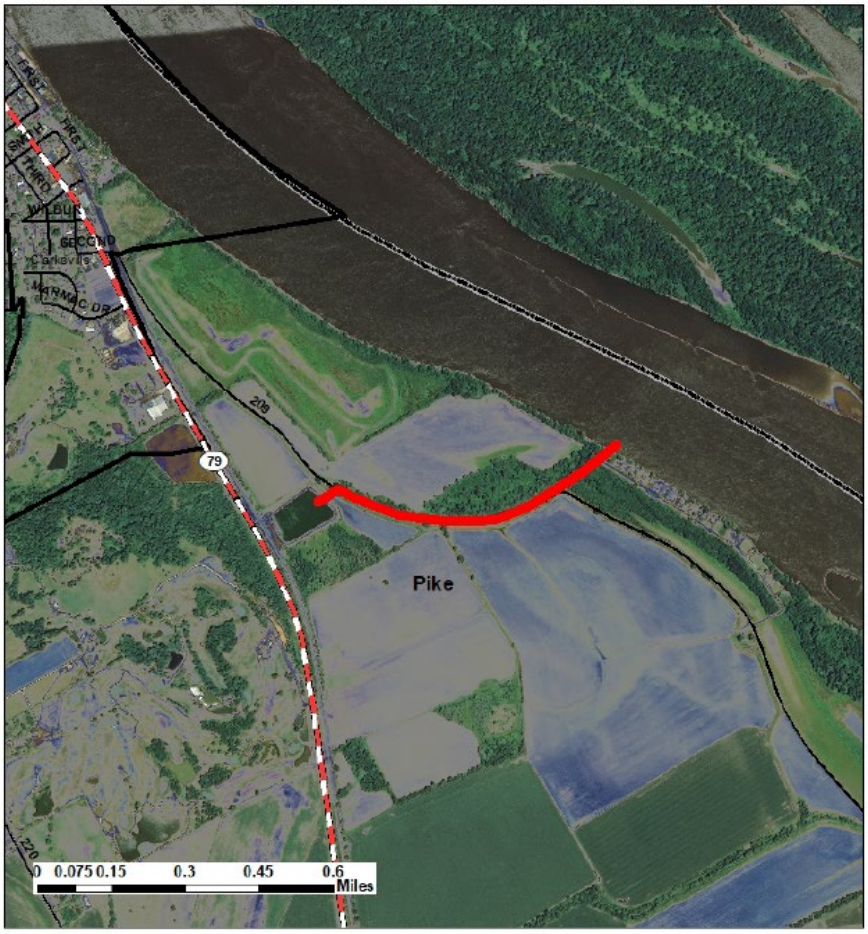
Flow Metering

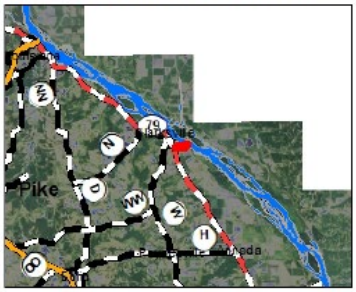
Flow metering is through existing manhole before the lagoon with Parshall-flume.

Project Location Map

Project Location Map

Clarksville Treatment Facility Improvements





MISSOURI
DEPARTMENT OF
NATURAL RESOURCES
Division of Environmental Quality
Water Protection Program
Financial Assistance Center

MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM

APPLICATION FOR CONSTRUCTION PERMIT – WASTEWATER TREATMENT FACILITY

FOR DEPARTMENT USE ONLY	
APP NO.	CP NO.
FEE RECEIVED $1000	CHECK NO. 15821
DATE RECEIVED 3/18/24 JB	

APPLICATION OVERVIEW

The Application for Construction Permit – Wastewater Treatment Facility form has been developed in a modular format and consists of Part A and B. **All applicants must complete Part A.** Part B should be completed for applicants who currently land-apply wastewater or propose land application for wastewater treatment. **Please read the accompanying instructions before completing this form. Submittal of an incomplete application may result in the application being returned.**

PART A – BASIC INFORMATION

1.0 APPLICATION INFORMATION (Note – If any of the questions in this section are answered NO, this application may be considered incomplete and returned.)

1.1 Is this a Federal/State funded project? ☑ YES ☐ N/A Funding Agency: DNR SRF Project #: _____

1.2 Has the Missouri Department of Natural Resources approved the proposed project's antidegradation review?
☑ YES Date of Approval: _____ ☐ N/A

1.3 Has the department approved the proposed project's facility plan*?
☑ YES Date of Approval: _____ ☐ NO (If No, complete No. 1.4.)

1.4 [Complete only if answered No on No. 1.3.] Is a copy of the facility plan* for wastewater treatment facilities included with this application?
☐ YES ☐ NO ☐ Exempt because _____

1.5 Is a copy of the appropriate plans* and specifications* included with this application?
☑ YES Denote which form is submitted: ☐ Hard copy ☑ Electronic copy (See instructions.) ☐ NO

1.6 Is a summary of design* included with this application? ☑ YES ☐ NO

1.7 Has the appropriate operating permit application (A, B, or B2) been submitted to the department?
☐ YES Date of submittal: _____
☐ Enclosed is the appropriate operating permit application and fee submittal. Denote which form: ☐ A ☐ B ☐ B2
☑ N/A: However, In the event the department believes that my operating permit requires revision to permit limitation such as changing equivalent to secondary limits to secondary limits or adding total residual chlorine limits, please share a draft copy prior to public notice? ☑ YES ☐ NO

1.8 Is the facility currently under enforcement with the department or the Environmental Protection Agency? ☑ YES ☐ NO

1.9 Is the appropriate fee or JetPay confirmation included with this application? ☑ YES ☐ NO
See Section 7.0

* Must be affixed with a Missouri registered professional engineer's seal, signature and date.

2.0 PROJECT INFORMATION

2.1 NAME OF PROJECT
Clarksville WWTF Outfall Relocation

2.2 ESTIMATED PROJECT CONSTRUCTION COST
$ 550,000

2.3 PROJECT DESCRIPTION
Relocate outfall from the tributary to the Mississippi River to the Mississippi River through the extension of a gravity sewer main to the Mississippi River

2.4 SLUDGE HANDLING, USE AND DISPOSAL DESCRIPTION
sludge retained in lagoon

2.5 DESIGN INFORMATION
A. Current population: 490 ; Design population: 1060

B. Actual Flow: 46k gpd; Design Average Flow: 106k gpd;
Actual Peak Daily Flow: 200k gpd; Design Maximum Daily Flow: 106k gpd; Design Wet Weather Event: _____

2.6 ADDITIONAL INFORMATION
A. Is a topographic map attached? ☑ YES ☐ NO

B. Is a process flow diagram attached? ☑ YES ☐ NO

3.0 WASTEWATER TREATMENT FACILITY

NAME	TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
Clarksville Wastewater Treatment Facility	573-242-3336	cityhall@clarksvillemo.us

ADDRESS (PHYSICAL)	CITY	STATE	ZIP CODE	COUNTY
0.6 mi SE of CR 209/Hwy 79 Intersection	Clarksville	MO	63336	Pike

Wastewater Treatment Facility: Mo- 0039632 (Outfall 001 Of 001)

3.1 Legal Description: _____ ¼, _____ ¼, _____ ¼, Sec. 15, T 53N, R 1E
(Use additional pages if construction of more than one outfall is proposed.)

3.2 UTM Coordinates Easting (X): 39212 Northing (Y): 090533
For Universal Transverse Mercator (UTM), Zone 15 North referenced to North American Datum 1983 (NAD83)

3.3 Name of receiving streams: Unnamed Tributary to Mississippi River

4.0 PROJECT OWNER

NAME	TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
City of Clarksville	573-242-3336	cityhall@clarksvillemo.us

ADDRESS	CITY	STATE	ZIP CODE
111 N. Howard, P.O. Box 530	Clarksville	MO	63336

5.0 CONTINUING AUTHORITY: A continuing authority is a company, business, entity or person(s) that will be operating the facility and/or ensuring compliance with the permit requirements.

NAME	TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
City of Clarksville	573-242-3336	cityhall@clarksvillemo.us

ADDRESS	CITY	STATE	ZIP CODE
111 N. Howard, P.O. Box 530	Clarksville	MO	63336

5.1 A letter from the continuing authority, if different than the owner, is included with this application. ☐ YES ☐ NO ☑ N/A

5.2 COMPLETE THE FOLLOWING IF THE CONTINUING AUTHORITY IS A MISSOURI PUBLIC SERVICE COMMISSION REGULATED ENTITY.

A. Is a copy of the certificate of convenience and necessity included with this application? ☐ YES ☐ NO

5.3 COMPLETE THE FOLLOWING IF THE CONTINUING AUTHORITY IS A PROPERTY OWNERS ASSOCIATION.

A. Is a copy of the as-filed restrictions and covenants included with this application? ☐ YES ☐ NO

B. Is a copy of the as-filed warranty deed, quitclaim deed or other legal instrument which transfers ownership of the land for the wastewater treatment facility to the association included with this application? ☐ YES ☐ NO

C. Is a copy of the as-filed legal instrument (typically the plat) that provides the association with valid easements for all sewers included with this application? ☐ YES ☐ NO

D. Is a copy of the Missouri Secretary of State's nonprofit corporation certificate included with this application? ☐ YES ☐ NO

6.0 ENGINEER

ENGINEER NAME / COMPANY NAME	TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
Mark C. Bross, PE/Klingner & Associates, PC	573-221-0020	mcb@klingner.com

ADDRESS	CITY	STATE	ZIP CODE
4510 Paris Gravel Road	Hannibal	MO	63401

7.0 APPLICATION FEE

☑ CHECK NUMBER ☐ JETPAY CONFIRMATION NUMBER

8.0 PROJECT OWNER: I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

PROJECT OWNER SIGNATURE: Jo Anne Smiley

PRINTED NAME	DATE
Jo Anne Smiley	3/4/2024

TITLE OR CORPORATE POSITION	TELEPHONE NUMBER WITH AREA CODE	E-MAIL ADDRESS
Mayor	573-242-3336	cityhall@clarksvillemo.us

Mail completed copy to:
MISSOURI DEPARTMENT OF NATURAL RESOURCES
WATER PROTECTION PROGRAM
P.O. BOX 176
JEFFERSON CITY, MO 65102-0176

END OF PART A.
REFER TO THE APPLICATION OVERVIEW TO DETERMINE WHETHER PART B NEEDS TO BE COMPLETE.

PART B – LAND APPLICATION ONLY
(Submit only if the proposed construction project includes land application of wastewater.)

8.0 FACILITY INFORMATION

8.1 Type of wastewater to be irrigated: ☐ Domestic ☐ State/National Park ☐ Seasonal business
☐ Municipal ☐ Municipal with a pretreatment program or significant industrial users
☐ Other (explain) _____

8.2 Months when the business or enterprise will operate or generate wastewater:
☐ 12 months per year ☐ Part of the year (list months): _____

8.3 This system is designed for:
☐ No-discharge.
☐ Partial irrigation when feasible and discharge rest of time.
☐ Irrigation during recreational season, April – October, and discharge during November – March.
☐ Other (explain) _____.

9.0 STORAGE BASINS

9.1 Number of storage basins: _____ (Use additional pages if greater than three basins.)

9.2 Type of basins: ☐ Steel ☐ Concrete ☐ Fiberglass ☐ Earthen ☐ Earthen with membrane liner

9.3 Storage basin dimensions at inside top of berm (feet). Report freeboard as feet from top of berm to emergency spillway or overflow pipe.
Basin #1: Length _____ Width _____ Depth _____ Freeboard _____ Depth _____ Safety _____ % Slope _____
Basin #2: Length _____ Width _____ Depth _____ Freeboard _____ Depth _____ Safety _____ % Slope _____
Basin #3: Length _____ Width _____ Depth _____ Freeboard _____ Depth _____ Safety _____ % Slope _____

9.4 Storage Basin operating levels (report as feet below emergency overflow level).
Basin #1: Maximum operating water level _____ ft Minimum operating water level _____ ft
Basin #2: Maximum operating water level _____ ft Minimum operating water level _____ ft
Basin #3: Maximum operating water level _____ ft Minimum operating water level _____ ft

9.5 Design depth of sludge in storage basins.
Basin #1: _____ ft Basin #2: _____ ft Basin #3: _____ ft

9.6 Existing sludge depth, if the basins are currently in operation.
Basin #1: _____ ft Basin #2: _____ ft Basin #3: _____ ft

9.7 Total design sludge storage: _____ dry tons and _____ cubic feet

10.0 LAND APPLICATION SYSTEM

10.1 Number of irrigation sites _____ Total Acres _____ Maximum % field slopes _____
Location: _____ ¼, _____ ¼, _____ ¼, _____ Sec. _____ T _____ R _____ County _____ Acres
Location: _____ ¼, _____ ¼, _____ ¼, _____ Sec. _____ T _____ R _____ County _____ Acres
Location: _____ ¼, _____ ¼, _____ ¼, _____ Sec. _____ T _____ R _____ County _____ Acres
(Use additional pages if greater than three irrigation sites.)

10.2 Type of vegetation: ☐ Grass hay ☐ Pasture ☐ Timber ☐ Row crops
☐ Other (describe) _____

10.3 Wastewater flow (dry weather) gallons per day: Average annual _____ Seasonal _____ Off-season _____

10.4 Land application rate (design flow including 1-in-10 year storm water flows):
Design: _____ inches/year _____ inches/hour _____ inches/day _____ inches/week
Actual: _____ inches/year _____ inches/hour _____ inches/day _____ inches/week

10.5 Total irrigation per year (gallons): Design: _____ gal Actual: _____ gal

10.6 Actual months used for irrigation (check all that apply):
☐ Jan ☐ Feb ☐ Mar ☐ Apr ☐ May ☐ Jun ☐ Jul ☐ Aug ☐ Sep ☐ Oct ☐ Nov ☐ Dec

10.7 Land application rate is based on:
☐ Hydraulic Loading ☐ Other (describe) _____
☐ Nutrient Management Plan (N&P) If N&P is selected, is the plan included? ☐ YES ☐ NO