MISSOURI DEPARTMENT OF NATURAL RESOURCES

# PUBLIC NOTICE

## DRAFT WATER QUALITY AND ANTIDEGRADATION REVIEW

DATE: July 2, 2026

In accordance with Missouri's Water Quality Standards [10 CSR 20-7.031(3)], the *Missouri Antidegradation Implementation Procedure,* and federal antidegradation policy at Title 40 Code of Federal Regulation Section 131.12(a), the applicants listed herein have applied for a Water Quality and Antidegradation Review to evaluate a proposed new domestic wastewater discharge.

On the basis of preliminary staff review and the application of applicable standards and regulations, the Missouri Department of Natural Resources, as administrative agent for the Missouri Clean Water Commission, proposes to issue the Antidegradation Review Preliminary Determination. The proposed determination is tentative pending public comment. The Antidegradation Review Preliminary Determination does not authorize discharge, nor construction of the proposed wastewater facilities.

Persons wishing to comment on the proposed Antidegradation Review Preliminary Determination are invited to submit comments in writing to: Department of Natural Resources, Water Protection Program, P.O. Box 176, Jefferson City, MO 65102-0176, ATTN: Engineering Section/Antidegradation Comments. **Please include the activity number in all comment letters (ACT#1930).**

Comments should be confined to the issues relating to the proposed Antidegradation Review Preliminary Determination and the effect on water quality. The department may not consider as relevant comments or objections to a permit based on issues outside the authority of the Missouri Clean Water Commission, (see Curdt v. Mo. Clean Water Commission, 586 S.W.2d 58 Mo. App. 1979).

All comments must be received or postmarked by 5 p.m. on **August 3, 2026**. The department will consider all written comments including emails, faxes, and letters in the formulation of all final determinations regarding the applications. Email comments will be accepted at the following address: publicnoticenpdes@dnr.mo.gov. If response to this notice indicates significant public interest and a request for public hearing with significant technical merit and concern related to the responsibilities of the Missouri Clean Water Law, then a public meeting or hearing may be held after due notice for the purpose of receiving public comment on the proposed permit or determination. Public hearings and/or issuance of the permit will be conducted or processed according to 10 CSR 20-6.020.

Copies of all documents on public notice are available for inspection and copying at the department's website at https://dnr.mo.gov/water/what-were-doing/public-notices, or at Department of Natural Resources, Water Protection Program, 1101 Riverside Drive, Jefferson City, MO 65101, between the hours of 8 a.m. and 5 p.m. on Monday through Friday.

# Water Quality and Antidegradation Review

# Department's Alternatives Analysis for Domestic Wastewater Facilities with Design Flow Less Than 50,000 Gallons per Day

*For Protection of Water Quality*
*and Determination of Effluent Limits at*

*Project Green Domestic WWTP*

Date

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## 1. WATER QUALITY INFORMATION

In accordance with Missouri's Water Quality Standard [10 CSR 20-7.031(3)] and federal antidegradation policy at Title 40 Code of Federal Regulation (CFR) Section 131.12 (a), the Missouri Department of Natural Resources (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.

## 2. APPLICABILITY

This Water Quality and Antidegradation Review is for facilities that produce primarily domestic wastewater and discharge less than 50,000 gallons per day. This General Antidegradation Review is not applicable to facilities where the receiving waterbody, or downstream waterbodies, have a Total Maximum Daily Load (TMDL) or are 303(d) or 305(b) listed for the pollutants of concern (POCs) addressed in this alternatives analysis, with an exception for waterbodies that are listed for *E. coli* since disinfection will be required. For receiving waters that are impaired for pollutants other than *E. coli*, the Antidegradation Implementation Procedure requires a Tier 1 approach and the applicant must demonstrate that the discharge will not "cause or contribute" to the impairment. For these site-specific mixed tier reviews (where some POCs are Tier 1 and others are Tier 2) applicants may use the alternative analysis presented in this document for the Tier 2 pollutants.

Facilities that are currently under enforcement will need to coordinate with the Water Protection Program's compliance and enforcement section to determine applicability for the Department's Alternatives Analysis. This review will not include mixing for receiving waterbodies. If the applicant would like to have effluent limitation derivation include mixing considerations, a site-specific alternatives analysis will need to be completed.

## 3. TIER DETERMINATION

Below is a list of pollutants of concern reasonably expected to be in a domestic wastewater treatment facility discharge. Pollutants of concern are defined as those pollutants "proposed for discharge that affects beneficial use(s) in waters of the state. POCs include pollutants that create conditions unfavorable to beneficial uses in the water body receiving the discharge or proposed to receive the discharge" (AIP, Page 7). No existing water quality data is required because all POCs were considered to be Tier 2 and significantly degrading in the absence of existing water quality. Assumed uses for the receiving waterbody are General Criteria, Protection of Warm Water Aquatic Life (AQL), Human Health Protection (HHP), Irrigation (IRR), and Livestock & Wildlife Protection (LWP). If any Tier 1 Pollutants of Concern not addressed in this alternatives analysis will be discharged, the applicant must submit the *Path D: Tier 1 Preliminary Review Request form* for those pollutants.

Table 1. Pollutants of Concern and Tier Determination

| POLLUTANTS OF CONCERN | TIER* | DEGRADATION | COMMENT**** |
|---|---|---|---|
| Biochemical Oxygen Demand ($BOD_5$)/DO | 2 | Significant | |
| Total Suspended Solids (TSS) | ** | Significant | |
| Ammonia | 2 | Significant | |
| pH | *** | Significant | Permit limits applied |
| *Escherichia coli* (*E. coli*) | 2 | Significant | |
| Total Phosphorus (TP) | 2 | Significant | |

* Tier assumed.

** Tier determination not possible: No in-stream standard for this parameter.

*** The standard for this parameter is a range.

**** Permit limits for other parameters including Oil & Grease, Total Residual Chlorine, and Nitrates will be applied based on water quality standards and criteria as applicable.

Total Residual Chlorine (TRC) effluent limits of 0.017 mg/L daily maximum, 0.008 mg/L monthly average are recommended if chlorine is used as a disinfectant. Standard compliance language for TRC, including the minimum level (ML), may be included in the operating permit.

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## 4. Demonstration Of Necessity And Social And Economic Importance

Missouri's Antidegradation Implementation Procedures (AIP) specify that if the proposed activity results in significant degradation then a demonstration of necessity (i.e., alternatives analysis) and a determination of social and economic importance are required. The applicant must submit the Antidegradation Review Submittal: Voluntary Tier 2 – Significant Degradation for Domestic Wastewater Facilities with Design Flow Less Than 50,000 Gallons per Day form. This analysis will serve as the applicant's alternatives analysis to fulfill the requirements of the AIP.

A Geohydrologic Evaluation must be submitted with the Antidegradation Review Request.

A Missouri Department of Conservation Natural Heritage Review Report must be obtained by the applicant. The applicant should review the Natural Heritage Review and contact the U.S. Fish and Wildlife Service and the Missouri Department of Conservation for further coordination if necessary.

### 4.1 No Discharge Evaluation

According to 10 CSR 20-6.010(4)(A)5.B., facility plans must include an evaluation of the feasibility of constructing and operating a facility with no discharge to waters of the state if the report is for a new or modified wastewater treatment facility. Per the Antidegradation Implementation Procedure Section II.B.1, for discharges likely to cause significant degradation, applicants must provide an analysis of non-degrading alternatives. No-discharge alternatives may include surface land application, subsurface land application, and connection to a regional treatment facility.

The applicant must submit the *Antidegradation: Regionalization and No-Discharge Evaluation* form to demonstrate that a no-discharge facility is not feasible for this site. If the information provided on the form is not sufficient to demonstrate that a no-discharge facility is not feasible, a more detailed evaluation of no discharge options will be required before the Department can complete its determination.

### 4.2 Demonstration of Necessity

The Department has used available data to complete an alternatives analysis of previously evaluated treatment technologies and expected performance. Data from fifty-four Water Quality and Antidegradation Reviews (WQARs) completed between March 2011 and April 2018 was evaluated and results are presented in Figure 1, Figure 2, and Table 2 below.

The data include eleven facilities designed to provide a high level of treatment to meet more stringent potential future ammonia as N effluent limits based on the 2013 EPA Ammonia criteria for the protection of mussels and gill-breathing snails. The data available to date indicates that the cost of facilities of this size range designed to meet these more stringent ammonia criteria is not substantively higher than other facilities designed to meet the current ammonia criteria.

The data include sixteen facilities designed to meet BOD and TSS effluent limits of 10 mg/L monthly average and 15 mg/L daily maximum or weekly average. The data available to date indicates that the cost of facilities designed to meet BOD and TSS effluent limits of 10 mg/L monthly average and 15 mg/L daily maximum or weekly average is not substantively higher than other facilities of this size range designed to meet less stringent BOD and TSS effluent limits.

The data include 28 facilities that will discharge to lakes. Of those facilities, 12 received ammonia limits in line with water quality based effluent limits for discharges to streams without mixing of around 3.7 mg/L summer daily maximum, 1.4 mg/L summer monthly average and 7.5 mg/L winter daily max, 2.9 mg/L winter monthly average. Two of the lake-discharging facilities received more stringent ammonia limits of 1.7 mg/L daily maximum, 0.6 mg/L monthly average; and one received ammonia limits of 1.7 mg/L summer daily maximum, 0.6 mg/L summer monthly average and 5.6 mg/L winter daily max, 2.1 mg/L winter monthly average. The data

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available indicate that the cost for facilities designed to meet ammonia limits in line with water quality based effluent limits for streams without mixing (3.7/1.4, 7.5/2.9) is not higher than other facilities of this size range designed to meet less stringent ammonia limits. These limits are more protective than existing water quality based effluent limits for discharges to lakes where the acute criteria is used to determine the baseline (12.1 mg/L daily maximum, 4.6 mg/L monthly average).

Facilities that were designed to meet limits based on the 2013 EPA ammonia criteria included a membrane bioreactor, extended aeration package plant, recirculating textile filter, recirculating sand filter, recirculating sand filter with moving bed biofilm reactor, sequencing batch reactor, integrated fixed film activated sludge system, and a proprietary aeration system.

Membrane bioreactor (MBR) systems combine a suspended growth biological reactor with solids removal via filtration across a membrane. The membranes can be designed for and operated in small spaces and with high removal efficiency of contaminants such as nitrogen, phosphorus, bacteria, biochemical oxygen demand, and total suspended solids. Membrane filtration allows a higher biomass concentration to be maintained in the treatment tank, thereby allowing smaller bioreactors to be used for a smaller footprint. MBR systems provide operational flexibility with respect to flow rates, as well as the ability to readily add or subtract units as needed, but that flexibility has limits. Membranes typically require that the water surface be maintained above a minimum elevation so that the membranes remain wet during operation. Throughput limitations are dictated by the physical properties of the membrane, and the result is that peak design flows generally should be no more than 1.5 to 2 times the average design flow. If peak flows exceed that limit, additional membranes may be needed to process the peak flow, or equalization may need to be included in the design. MBR systems typically have higher capital and operating costs than conventional systems.

The extended aeration process is a modification of the activated sludge process that provides biological treatment for the removal of biodegradable organic wastes under aerobic conditions. Wastewater in the aeration tank is mixed and oxygen is provided to the microorganisms. The mixed liquor then flows to a clarifier or settling chamber where most microorganisms settle to the bottom of the clarifier and a portion are pumped back to the beginning of the plant. The clarified wastewater flows over a weir and into a collection channel before being disinfected and discharged. Extended aeration is often used in smaller prefabricated package-type plants where lower operating efficiency is offset by mechanical simplicity and minimized design costs. In comparison to traditional activated sludge, longer mixing time with aged sludge and light loading (low F:M) offers a stable biological ecosystem better adapted for effectively treating waste load fluctuations from variable occupancy situations. Although the process is stable and easier to operate, extended aeration systems may discharge higher effluent suspended solids than found under conventional loadings.

Moving Bed Biofilm reactor (MBBR) systems may be a single aerated reactor, or several in series, with a buoyant free-moving plastic biofilm carrier media. MBBR systems can be designed to be capable of meeting more stringent total nitrogen limits. They produce significantly reduced solids loading to the liquid-solids separation unit, the biofilm improves process stability, they offer flexibility to meet specific treatment objectives, and they are well suited for retrofit into existing treatment systems. MBBR systems require a smaller tank volume than a conventional activated sludge system and therefore have a smaller footprint. Adequate mixing must be provided to ensure that free-floating media remains uniformly distributed and screens must be provided to retain the media within the reactors.

Integrated fixed film activated sludge (IFAS) systems add fixed or free-floating media to an activated sludge basin. The process gets its name from combining a conventional activated sludge process with a fixed film system. This treatment system is similar to an MBBR; however, MBBR systems do not recycle sludge. IFAS systems are often installed as a retrofit solution to conventional activated sludge systems. They require a smaller tank volume than a conventional activated sludge system and therefore have a smaller footprint. The biofilm combines aerobic, anaerobic, and anoxic zones promoting better nitrification compared to conventional activated sludge systems and the biofilm improves process stability. Adequate mixing must be provided to ensure that free-floating media remains uniformly distributed and to slough biomass from the media. Higher

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dissolved oxygen concentrations may be required as compared to conventional activated sludge. Screens must be provided to retain the media within the reactors.

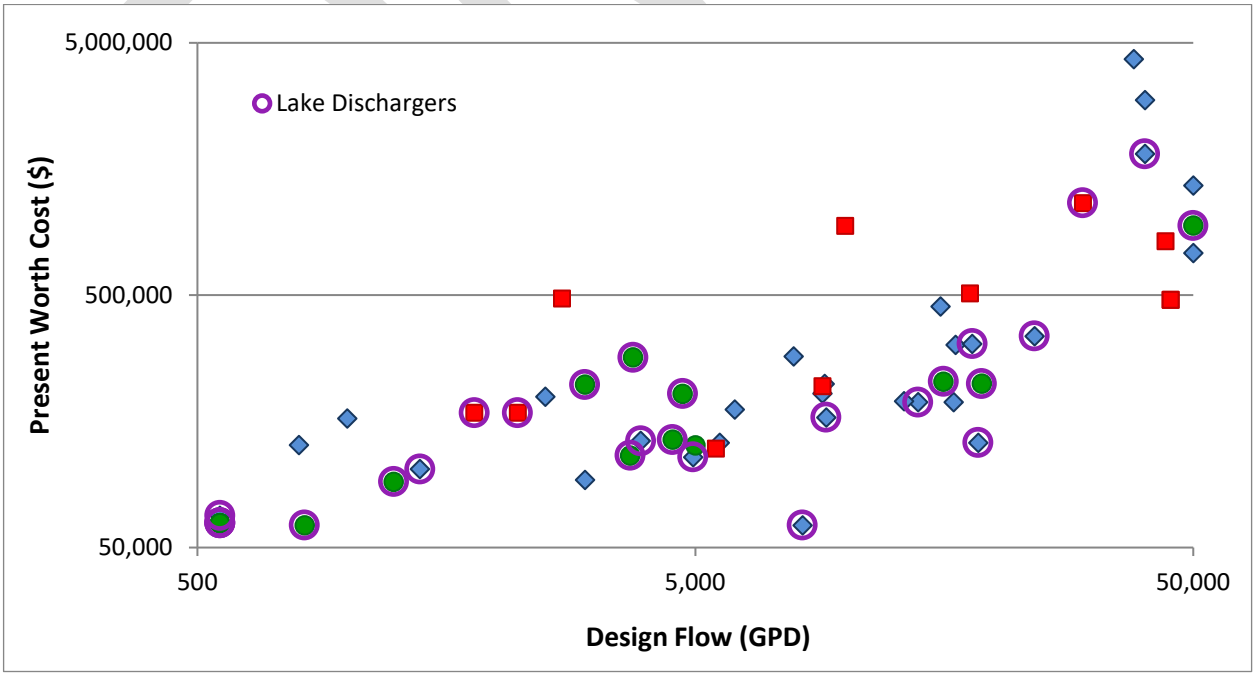
Recirculating sand filters (RSF) remove contaminants in wastewater through physical, chemical, and, most importantly, biological processes. The three common components are a pretreatment unit (generally a septic tank), a recirculation tank, and a sand filter. In the recirculation tank, raw effluent from the septic tank and the sand filter filtrate are mixed and pumped back to the sand filter bed. RSFs are effective in applications with high levels of BOD and can provide good effluent quality with 85 - 95% removal of BOD and TSS. They can be designed to provide nitrification, but this requires increased surface area. Treatment is affected by extremely cold weather. Treatment capacity can be expanded through modular design. RSFs require routine maintenance, although the complexity of maintenance is generally minimal.

Recirculating textile filters systems are configured similar to an RSF except the filter media is an engineered fabric textile. They can be configured to provide nitrification, but this may require additional treatment units. They have a small operating footprint, are more aesthetically pleasing than some other treatment options, produce minimal noise, have the ability to handle variable flows, and have simple maintenance.

In addition to the treatment technologies listed above, all of which had previous WQARs that established advanced ammonia limits, there are other technology alternatives that can meet the advanced ammonia limits including conventional activated sludge, oxidation ditch, and lagoon retrofits. To obtain this level of performance, all technologies must be properly designed to accommodate nitrification and de-nitrification and they must be properly and actively operated.

The above treatment system descriptions were adapted from EPA technology fact sheets and *Design of Municipal Wastewater Treatment Plants: WEF Manual of Practice No. 8 ASCE Manuals and Reports on Engineering Practice No. 76; Fifth Edition*, as well as other readily available sources and previous Water Quality and Antidegradation Reviews.

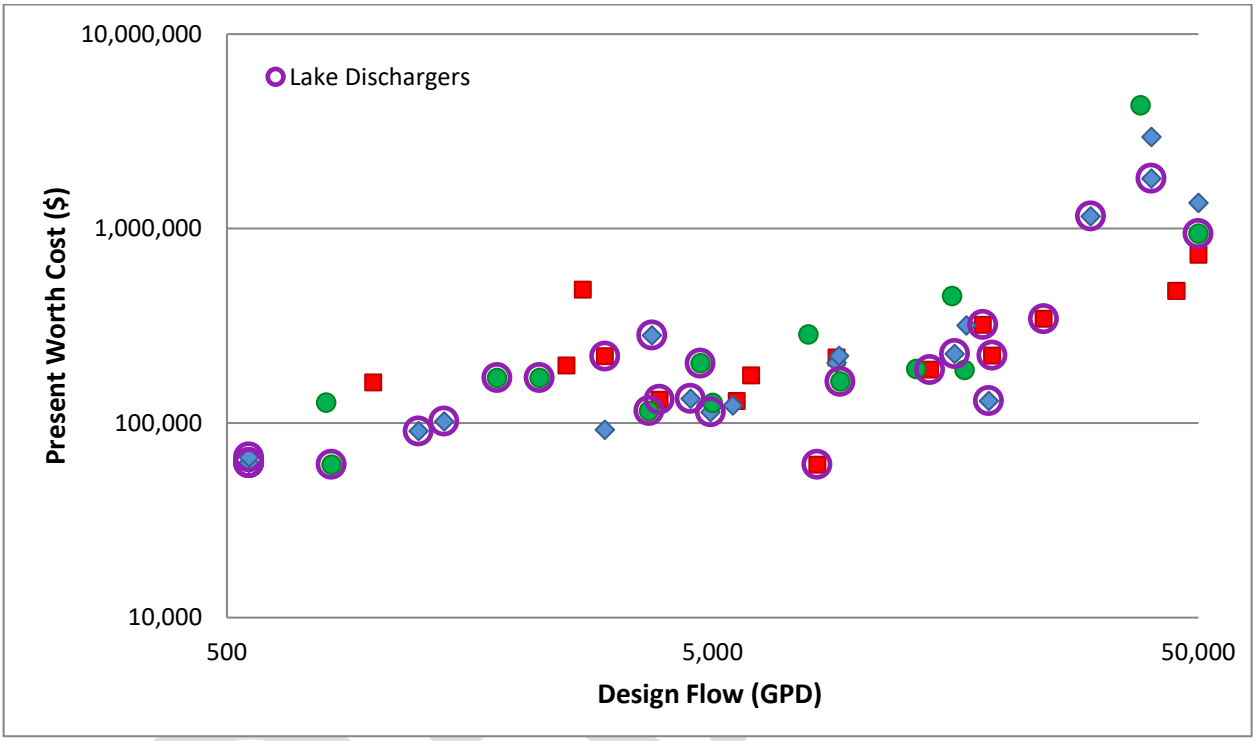
FIGURE 1. DESIGN FLOW VS. PRESENT WORTH COST VS. AMMONIA LIMITS




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| LEGEND | | Summer Ammonia (mg/L) | | Winter Ammonia (mg/L) | |
|---|---|---|---|---|---|
| | | Daily Max | Monthly Avg. | Daily Max | Monthly Avg. |
| 2013 EPA Criteria | ■ | ≤1.7 | ≤0.6 | ≤5.6 | ≤2.1 |
| Existing Aquatic Life Criteria (no mixing) | ◆ | approx. 3.7 | approx. 1.4 | approx. 7.5 | approx. 2.9 |
| Less Stringent (mixing) | ● | >3.7 | >1.4 | >7.5 | >2.9 |

FIGURE 2. DESIGN FLOW VS. PRESENT WORTH COST VS. BOD & TSS LIMITS




| LEGEND | BOD (mg/L) | | TSS (mg/L) | |
|---|---|---|---|---|
| | Daily Max | Monthly Avg. | Daily Max | Monthly Avg. |
| ■ | 15 | 10 | 15 | 10 |
| ◆ | 15 | 10 | >15 | >10 |
| ● | >15 | >10 | >15 | >10 |

TABLE 2. DESIGN FLOW VS. PRESENT WORTH COST

| DATE | Design Flow (MGD) | Technology | BOD (mg/L) | | TSS (mg/L) | | Summer Ammonia (mg/L) | | Winter Ammonia (mg/L) | | Present Worth Cost ($) | $ PW/gpd |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Daily Max or Weekly Average | Monthly Average | Daily Max or Weekly Average | Monthly Average | Daily Maximum | Monthly Average | Daily Maximum | Monthly Average | | |
| 4/16/2018 | *0.000450 | Recirculating Textile Filter | 15 | 10 | 20 | 15 | 3.7 | 1.4 | 7.5 | 2.9 | 66,838 | 149 |
| 5/2/2012 | *0.000555 | Recirculating Textile Filter | 15 | 10 | 20 | 15 | 12.1 | 4.6 | 12.1 | 4.6 | 62,506 | 113 |
| 4/2/2013 | *0.000555 | Recirculating Textile Filter | 15 | 10 | 20 | 15 | 12.1 | 4.6 | 12.1 | 4.6 | 62,506 | 113 |
| 10/1/2014 | *0.000555 | Extended Aeration Package Plant | 15 | 10 | 22.5 | 15 | 7.8 | 3 | 7.8 | 3 | 62,506 | 113 |
| 4/17/2017 | *0.000555 | Recirculating Textile Filter | 15 | 10 | 20 | 15 | 3.7 | 1.4 | 7.5 | 2.9 | 66,838 | 120 |
| 4/4/2012 | 0.000800 | Recirculating Textile Filter | 30 | 15 | 30 | 15 | 4 | 1.5 | 7.7 | 2.9 | 127,427 | 159 |
| 12/1/2013 | *0.000821 | Membrane Bioreactor | 30 | 20 | 30 | 20 | 12.1 | 4.6 | 12.1 | 4.6 | 61,240 | 75 |
| 9/2/2012 | 0.001000 | Recirculating Textile Filter | 15 | 10 | 15 | 10 | 3.7 | 1.4 | 7.5 | 2.9 | 162,007 | 162 |
| 7/6/2011 | *0.001240 | Recirculating Textile Filter | 15 | 10 | 22 | 15 | 6 | 3 | 6 | 3 | 91,000 | 73 |
| 1/1/2015 | *0.001400 | Recirculating Textile Filter | 15 | 10 | 23 | 15 | 3.7 | 1.4 | 7.6 | 2.9 | 102,174 | 73 |
| 9/8/2017 | *0.001800 | Recirculating Textile Filter | 30 | 20 | 30 | 20 | 1.7 | 0.6 | 1.7 | 0.6 | 170,879 | 95 |
| 9/5/2017 | *0.002200 | Recirculating Textile Filter | 30 | 20 | 30 | 20 | 1.7 | 0.6 | 1.7 | 0.6 | 170,879 | 78 |
| 5/5/2011 | 0.002500 | Extended Aeration | 15 | 10 | 15 | 10 | 3.7 | 1.4 | 7.5 | 2.9 | 198,000 | 79 |
| 8/31/2017 | 0.002700 | New Technology Primary Tank with Aeration | 15 | 10 | 15 | 10 | 1.7 | 0.6 | 5.6 | 2.1 | 485,000 | 180 |
| 9/1/2011 | *0.003000 | Recirculating Textile Filter | 15 | 10 | 15 | 10 | 12.1 | 4.6 | 12.1 | 4.6 | 220,915 | 74 |
| 3/1/2012 | 0.003000 | Extended Aeration Package Plant | 15 | 10 | 20 | 15 | 3.7 | 1.4 | 7.5 | 2.9 | 92,604 | 31 |
| 2/22/2016 | *0.003700 | Recirculating Rock Filter | 30 | 20 | 30 | 20 | 7.3 | 2.8 | 7.3 | 2.8 | 115,688 | 31 |
| 7/4/2011 | *0.003750 | Recirculating Textile Filter | 15 | 10 | 20 | 15 | 12.1 | 4.6 | 12.1 | 4.6 | 283,000 | 75 |
| 4/1/2014 | *0.003885 | Recirculating Sand Filter | 15 | 10 | 15 | 10 | 3.7 | 1.4 | 7.5 | 2.9 | 132,185 | 34 |
| 12/1/2012 | *0.004500 | Recirculating Sand Filter | 15 | 10 | 23 | 15 | 12.1 | 4.6 | 12.1 | 4.6 | 133,676 | 30 |
| 6/3/2013 | *0.004718 | Recirculating Sand Filter | 30 | 20 | 30 | 20 | 12.1 | 4.6 | 12.1 | 4.6 | 203,060 | 43 |
| 11/2/2011 | *0.004950 | Recirculating Sand Filter | 15 | 10 | 20 | 15 | 3.5 | 1.4 | 7.5 | 2.9 | 114,058 | 23 |
| 6/4/2011 | 0.005000 | Moving Bed Biofilm Reactor | 45 | 30 | 45 | 30 | 5.7 | 2.2 | 8.2 | 3.2 | 127,000 | 25 |
| 8/22/2017 | 0.005500 | Recirculating Sand Filter | 15 | 10 | 20 | 15 | 1.7 | 0.6 | 5.6 | 2.1 | 123,224 | 22 |
| 9/6/2012 | 0.005600 | Extended Aeration with Filtration and Aerated Holding Tanks | 15 | 10 | 15 | 10 | 3.7 | 1.4 | 7.5 | 2.9 | 130,000 | 23 |

| DATE | Design Flow (MGD) | Technology | BOD (mg/L) | | TSS (mg/L) | | Summer Ammonia (mg/L) | | Winter Ammonia (mg/L) | | Present Worth Cost ($) | $ PW/gpd |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Daily Max or Weekly Average | Monthly Average | Daily Max or Weekly Average | Monthly Average | Daily Maximum | Monthly Average | Daily Maximum | Monthly Average | | |
| 6/1/2011 | 0.006000 | Recirculating Sand Filter | 15 | 10 | 15 | 10 | 3.7 | 1.4 | 7.5 | 2.9 | 176,239 | 29 |
| 3/1/2011 | 0.007875 | Modular Fixed Film Activated Sludge with Constructed Wetlands | 30 | 20 | 30 | 20 | 3.7 | 1.4 | 7.5 | 2.9 | 285,780 | 36 |
| 4/3/2012 | *0.008210 | Membrane Bioreactor | 15 | 10 | 15 | 10 | 2.6 | 1 | 2.6 | 1 | 61,240 | 7 |
| 8/5/2014 | 0.009000 | Recirculating Sand Filter | 15 | 10 | 20 | 15 | 3.1 | 1.2 | 7.5 | 2.9 | 203,698 | 23 |
| 1/1/2014 | 0.009000 | Membrane Bioreactor | 15 | 10 | 15 | 10 | 1.6 | 0.6 | 5.5 | 2.1 | 217,739 | 24 |
| 4/6/2012 | 0.009100 | Membrane Bioreactor | 15 | 10 | 20 | 15 | 3.7 | 1.4 | 7.5 | 2.9 | 222,160 | 24 |
| 3/7/2012 | *0.009158 | Recirculating Gravel filter | 30 | 20 | 30 | 20 | 3.7 | 1.5 | 6.5 | 2.5 | 163,681 | 18 |
| 3/6/2017 | 0.010000 | Extended aeration | 33 | 22 | 33 | 22 | 1.7 | 0.6 | 5.6 | 2.1 | 941,800 | 94 |
| 6/1/2014 | 0.013125 | Recirculating Sand Filter | 45 | 30 | 45 | 30 | 3 | 1.1 | 6 | 2.3 | 189,985 | 14 |
| 8/4/2012 | *0.014000 | Extended Aeration | 15 | 10 | 15 | 10 | 3.7 | 1.4 | 7.5 | 2.8 | 188,208 | 13 |
| 7/1/2014 | 0.015540 | Recirculating Sand Filter | 23 | 15 | 23 | 15 | 3.9 | 1.5 | 7.8 | 3 | 450,986 | 29 |
| 7/5/2011 | *0.015750 | Recirculating Sand Filter | 15 | 10 | 20 | 15 | 7.8 | 2.5 | 7.8 | 2.5 | 226,969 | 14 |
| 2/27/2015 | 0.016500 | Extended Aeration Package Plant | 45 | 30 | 45 | 30 | 3.7 | 1.4 | 7.5 | 2.9 | 187,957 | 11 |
| 7/1/2012 | 0.016650 | Extended Aeration | 15 | 10 | 20 | 15 | 3.7 | 1.4 | 7.5 | 2.9 | 317,750 | 19 |
| 9/3/2014 | 0.017800 | Extended Aeration Package Plant | 45 | 30 | 45 | 30 | 1.4 | 0.6 | 2.9 | 2.1 | 507,618 | 29 |
| 5/11/2015 | *0.018000 | Recirculating Sand Filter, Polishing Reactor, Chemical Phosphorus Removal | 15 | 10 | 15 | 10 | 3.7 | 1.4 | 6.5 | 2.1 | 320,318 | 18 |
| 7/3/2013 | *0.018500 | Recirculating Textile Filter with Chemical & Filter Phosphorus Removal | 15 | 10 | 20 | 15 | 3.7 | 1.4 | 7.5 | 2.9 | 130,000 | 7 |
| 12/7/2017 | *0.018800 | Recirculating Sand Filter | 15 | 10 | 15 | 10 | 6 | 2.3 | 6 | 2.3 | 222,901 | 12 |
| 2/27/2015 | *0.024000 | Recirculating Gravel Filter and Chemical Phosphorus Removal | 15 | 10 | 15 | 10 | 3.7 | 1.4 | 6.5 | 2.1 | 343,816 | 14 |
| 9/1/2014 | *0.030000 | Recirculating Sand Filter and Moving Bed Biofilm Reactor with Chemical Phosphorus Removal | 15 | 10 | 20 | 15 | 1.7 | 0.6 | 5.6 | 2.1 | 1,157,390 | 39 |
| 6/2/2012 | 0.038000 | Aerated Lagoon with Recirculating Sand Filter | 45 | 30 | 45 | 30 | 3.7 | 1.4 | 7.5 | 2.9 | 4,309,665 | 113 |
| 2/3/2013 | 0.040000 | Moving Bed Biofilm Reactor (can be operated as IFAS) | 15 | 10 | 20 | 15 | 3.7 | 1.4 | 7.5 | 2.9 | 2,963,181 | 74 |

| DATE | Design Flow (MGD) | Technology | BOD (mg/L) | | TSS (mg/L) | | Summer Ammonia (mg/L) | | Winter Ammonia (mg/L) | | Present Worth Cost ($) | $ PW/gpd |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Daily Max or Weekly Average | Monthly Average | Daily Max or Weekly Average | Monthly Average | Daily Maximum | Monthly Average | Daily Maximum | Monthly Average | | |
| 8/20/2015 | *0.040000 | Recirculating Sand Filter and Moving Bed Biofilm Reactor | 15 | 10 | 20 | 15 | 3.7 | 1 | 5.6 | 2.1 | 1,812,000 | 45 |
| 12/1/2016 | 0.044000 | Fixed Film Extended Aeration | 30 | 20 | 45 | 30 | 1.7 | 0.6 | 5.6 | 2.1 | 816,367 | 19 |
| 6/4/2013 | 0.045000 | Moving Bed Biofilm Reactor | 15 | 10 | 15 | 10 | 1.7 | 0.6 | 5.6 | 2.1 | 479,344 | 11 |
| 3/9/2016 | 0.045000 | Moving Bed Biofilm Reactor | 15 | 10 | 15 | 10 | 1.7 | 0.6 | 5.6 | 2.1 | 479,344 | 11 |
| 6/4/2012 | *0.050000 | New Technology Package Plant | 30 | 20 | 30 | 20 | 7.5 | 2.9 | 7.5 | 2.9 | 942,050 | 19 |
| 7/3/2011 | 0.050000 | Extended Aeration Package Plant | 15 | 10 | 20 | 15 | 3.7 | 1.4 | 7.5 | 2.9 | 1,357,506 | 27 |
| 8/3/2014 | 0.050000 | Recirculating Sand Filter | 15 | 10 | 15 | 10 | 3.7 | 1.4 | 7.5 | 2.9 | 733,723 | 15 |

* Lake Dischargers

Additionally, the table of wastewater treatment technologies in the *Ammonia Criteria: New EPA Recommended Criteria* factsheet includes several technologies that have demonstrated capability in meeting ammonia effluent limits of less than 0.7 mg/L when designed appropriately.

The EPA has approved the nutrient water quality standards at 10 CSR 20-7.031. Numeric water quality standards for specific lakes are listed in Table N of 10 CSR 20-7.031. Nutrient standards at 10 CSR 20-7.031(5)(N) apply to all other lakes that are waters of the state and have an area of at least ten acres during normal pool conditions, with the exception of the lakes located in the Big River Floodplain ecoregion (see 10 CSR 20-7.031(5)(N)2.). Waters that are 303(d) listed for nutrients will need to complete a site-specific antidegradation review to determine appropriate limits.

The base case treatment option for total phosphorus to ensure that water quality standards will be protected is assumed to be conventional secondary treatment. Total phosphorus effluent levels from conventional secondary treatment typically range from 1 to 4 mg/L. Three less degrading options that were considered are chemical addition for precipitation and settling, biological nutrient removal (BNR), and enhanced nutrient removal (ENR). Chemical addition is a common practice for phosphorus removal and has been used for a number of years in Southwest Missouri for discharges to lakes that are subject to the 0.5 mg/L effluent limits required at 10 CSR 20-7.015. An effluent limit of 0.5 mg/L was therefore determined to be a reasonable and economically efficient treatment level for the Department's Alternatives Analysis. The cost to treat beyond this level may not be economically efficient for facilities with a design flow less than 50,000 gallons per day.

As a result of this alternatives analysis, the Department has determined that for a facility that discharges less than 50,000 gallons per day, depending on site-specific conditions, there are technologies available that may be economically efficient and practicable, and that are capable of meeting the effluent limitations in Table 3 or Table 4. If the facility owners do not believe that there is a treatment technology that is both economically efficient and practicable for their facility to meet the limits in Table 3 or Table 4, a site-specific alternatives analysis may be required.

### 4.3 DESIGN FLOW DETERMINATION

As part of the Department's alternatives analysis, facilities up to 50,000 gallons per day were evaluated. A design flow maximum of 50,000 gallons per day was chosen for applicability of this alternatives analysis for a variety of reasons. As facilities increase in size, site-specific factors may require a more site-specific alternatives analysis. For example, larger facilities are more likely to have wet weather flows that must be addressed and are more likely to need Whole Effluent Toxicity testing or nutrient monitoring. Larger facilities are also more likely to discharge a larger variety of pollutants of concern, which may not be addressed in this review. Larger facilities also benefit from an economy of scale; smaller facilities tend to have a higher cost per gallon of wastewater treated, which is distributed over fewer paying customers. Finally, as we are working with a limited amount of data, limiting the design flow applicability for the Department's alternatives analysis ensures a factor of safety in our review.

### 4.4 REGIONALIZATION ALTERATIVE

Within Section II B 1. of the AIP, discussion of the potential for discharge to a regional wastewater collection system is mentioned. The applicant must provide justification for not pursuing regionalization on the *Regionalization and No-Discharge Evaluation* form. If the information provided on the form is not sufficient to demonstrate that a regionalization alternative is not feasible, a more detailed evaluation will be required before the Department can complete its determination.

The applicant needs to fully evaluate regionalization and consolidation options when deciding on ways to comply with existing and future regulatory requirements. This includes evaluating connecting or selling their utility to a larger public or private utility. With the rising costs of compliance and often-limited resources available to smaller facilities, not owning and operating a small utility may be the most beneficial and cost-effective alternative for achieving consistent compliance.

### 4.5 LOSING STREAM ALTERATIVE DISCHARGE LOCATION

Under 10 CSR 20-7.015(4)(A), *prior to discharging to a losing stream, alternatives such as relocating the discharge to a gaining stream, and connection to a regional wastewater treatment facility are to be evaluated and determined to be unacceptable for environmental and/or economic reasons*.

Information provided by the applicant on the *No Discharge Evaluation* form must include evaluation and justification for why the owner is not pursuing land application, or connection to a regional facility.

### 4.6 SOCIAL AND ECONOMIC IMPORTANCE EVALUATION

Missouri's antidegradation implementation procedures specify that if the proposed activity results in significant degradation then a determination of social and economic importance is required.

Information provided by the applicant in the *Antidegradation Review Submittal: Voluntary Tier 2 – Significant Degradation for Domestic Wastewater Facilities with Design Flow Less Than 50,000 Gallons per Day* form must include a detailed social and economic importance evaluation. If the information provided on the form is not sufficient to demonstrate important social and economic importance, then a more detailed evaluation will be required before the Department can complete its determination.

## 5. GENERAL ASSUMPTIONS OF THE WATER QUALITY AND ANTIDEGRADATION REVIEW

1. 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., evaluation of no discharge] has been or will be addressed in a Missouri State Operating Permit or Construction Permit Application.
2. 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.
3. Changes to Federal and State Regulations made after the drafting of this WQAR may alter Water Quality Based Effluent Limits (WQBEL).
4. Effluent limitations derived from Federal or Missouri State Regulations (FSR) may be WQBEL or Effluent Limit Guidelines (ELG).
5. WQBEL supersede ELG only when they are more stringent. Mass limits derived from technology based limits are still appropriate.
6. A WQAR does not allow discharges to waters of the state, and shall not be construed as a National Pollution Discharge Elimination System or Missouri State Operating Permit to discharge or a permit to construct, modify, or upgrade.
7. Limitations and other requirements in a WQAR may change as Water Quality Standards, Methodology, and Implementation procedures change.
8. Nothing in this WQAR removes any obligations to comply with county or other local ordinances or restrictions.
9. If the proposed treatment technology is not covered in 10 CSR 20-8 Minimum Design Standards, the treatment process may be considered a new technology. As a new technology, the permittee will need to work with the review engineer to ensure equipment is sized properly. 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.

## 6. PERMIT LIMITS AND MONITORING INFORMATION

TABLE 3. EFFLUENT LIMITS – ALL OUTFALLS

| PARAMETER | | UNITS | DAILY MAXIMUM | WEEKLY AVERAGE | MONTHLY AVERAGE | BASIS FOR LIMIT (NOTE 1) | MONITORING FREQUENCY |
|---|---|---|---|---|---|---|---|
| FLOW | | MGD | * | | * | FSR | ONCE/QUARTER |
| BIOCHEMICAL OXYGEN DEMAND$_5$ ** | | MG/L | | 15 | 10 | PEL | ONCE/QUARTER |
| TOTAL SUSPENDED SOLIDS ** | | MG/L | | 15 | 10 | PEL | ONCE/QUARTER |
| PH | | SU | 6.5– 9.0 | | 6.5 – 9.0 | FSR | ONCE/QUARTER |
| AMMONIA AS N (APR 1 – SEPT 30) | | MG/L | 1.7 | | 0.6 | PEL | ONCE/QUARTER |
| AMMONIA AS N (OCT 1 – MAR 31) | | MG/L | 5.6 | | 2.1 | PEL | ONCE/QUARTER |
| TOTAL PHOSPHORUS (NOTE 2) | | MG/L | * | | 0.5 | PEL | ONCE/QUARTER |
| *ESCHERICHIA COLIFORM* (*E. COLI*) | WBC(A) AND WBC (B) (NOTE 3) | #/100ML | 630*** | | 126 | FSR | ONCE/QUARTER |
| | LOSING STREAM (NOTE 4) | #/100ML | 126*** | | * | FSR | ONCE/QUARTER |

TABLE 4. EFFLUENT LIMITS – OUTFALLS TO LAKES

| PARAMETER | UNITS | DAILY MAXIMUM | WEEKLY AVERAGE | MONTHLY AVERAGE | BASIS FOR LIMIT (NOTE 1) | MONITORING FREQUENCY |
|---|---|---|---|---|---|---|
| FLOW | MGD | * | | * | FSR | ONCE/QUARTER |
| BIOCHEMICAL OXYGEN DEMAND$_5$ ** | MG/L | | 15 | 10 | PEL | ONCE/QUARTER |
| TOTAL SUSPENDED SOLIDS ** | MG/L | | 20 | 15 | PEL | ONCE/QUARTER |
| PH | SU | 6.5– 9.0 | | 6.5 – 9.0 | FSR | ONCE/QUARTER |
| AMMONIA AS N (APR 1 – SEPT 30) | MG/L | 3.6 | | 1.4 | PEL | ONCE/QUARTER |
| AMMONIA AS N (OCT 1 – MAR 31) | MG/L | 7.5 | | 2.9 | PEL | ONCE/QUARTER |
| TOTAL PHOSPHORUS (NOTE 2) | MG/L | * | | 0.5 | PEL | ONCE/QUARTER |
| *ESCHERICHIA COLIFORM* (*E. COLI*) | #/100ML | 630*** | | 126 | FSR | ONCE/QUARTER |

* Monitoring requirements only.

** Publicly owned treatment works will be required to meet a removal efficiency of 85% or more for $BOD_5$ and TSS. Influent $BOD_5$ and TSS data should be reported to ensure removal efficiency requirements are met.

*** Publicly owned treatment works will receive a weekly average *E. coli* limit and private facilities will receive a daily maximum *E. coli* limit.

NOTE 1 – Preferred Alternative Effluent Limit – PEL; or Federal/State Regulation – FSR. Water Quality-Based Effluent Limitation – WQBEL Also, please see the **GENERAL ASSUMPTIONS OF THE WQAR #4 & #5.**

NOTE 2 – Total Phosphorus limits are only applicable to discharges to a lake or watershed of a lake that is a water of the state and has an area of at least ten acres during normal pool conditions

NOTE 3 - Effluent limitations and monitoring requirements for *E. coli* for WBC(A) and WBC(B) are applicable only during the recreational season from April 1 through October 31. The Monthly Average Limit for *E. coli* is expressed as a geometric mean. The Weekly Average for *E. coli* will be expressed as a geometric mean if more than one (1) sample is collected during a calendar week (Sunday through Saturday).

NOTE 4 – Effluent limits and monitoring requirements for *E. coli* are applicable year round for designated losing streams. No more than 10% of samples over the course of a calendar year shall exceed the 126 #/100 mL daily maximum.

Permit limits or monitoring requirements for other applicable parameters, including Oil & Grease, Total Residual Chlorine, Dissolved Oxygen, Nitrates, Total Recoverable Aluminum, and Total Recoverable Iron, may be included in the operating permit based on water quality standards and criteria as applicable.

## 7. RECEIVING WATER MONITORING REQUIREMENTS

No receiving water monitoring requirements recommended at this time.

## 8. DERIVATION AND DISCUSSION OF LIMITS

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

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

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

Chronic wasteload allocations were determined using applicable chronic water quality criteria (CCC: criteria continuous concentration). Acute wasteload allocations were determined using applicable water quality criteria (CMC: criteria maximum concentration).

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).

Note: 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 that could be achievable through proper operation and maintenance of the treatment works, and 2) new facilities if the permitting authority determines that the 30-day average and 7-day average $BOD_5$ and TSS effluent values that could be achievable through proper operation and maintenance of the treatment works, considering the design capability of the treatment process.

### 8.1 LIMIT DERIVATION

- **Flow**. In accordance with [40 CFR Part 122.44(i)(1)(ii)] the volume of effluent discharged from each outfall is needed to assure compliance with permitted effluent limitations. 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.

- **Biochemical Oxygen Demand ($BOD_5$).** $BOD_5$ limits of 10 mg/L monthly average and 15 mg/L average weekly were determined by the Department to be achievable and protective of beneficial uses and existing water quality.

  As per the *DO Modeling & BOD Effluent Limit Development Administrative Guidance for the Purpose of Conducting Water Quality Assistance Reviews*, facilities less than 100,000 gallons per day, and proposing BOD treatment less than or equal to an average monthly of 10 mg/L and average weekly of 15 mg/L as demonstrated by performance specifications from a manufacturer or effluent sampling of an existing facility with the same treatment facility are exempt from the DO modeling requirement.

  Influent monitoring may be required for this facility in its Missouri State Operating Permit.

- **Total Suspended Solids (TSS).**
  **Table 3**: TSS limits of 10 mg/L monthly average and 15 mg/L average weekly were determined by the Department to be achievable and protective of beneficial uses and existing water quality. According to EPA, because TSS and BOD are closely correlated, we apply the same limits for TSS as BOD.

  **Table 4**: For lake discharging facilities, TSS limits of 15 mg/L monthly average and 20 mg/L average weekly were determined by the Department to be achievable and protective of beneficial uses and existing water quality for discharges to lakes where mixing would apply. These limits are more protective than the TSS limitations designated at 10 CSR 20-7.015(3)(A)1.A. for lakes and reservoirs.

  Influent monitoring may be required for this facility in its Missouri State Operating Permit.

- **pH**. – 6.5-9.0 SU. Technology based effluent limitations of 6.0-9.0 SU [10 CSR 20-7.015] are not protective of the Water Quality Standard, which states that water contaminants shall not cause pH to be outside the range of 6.5-9.0 SU. No mixing zone is allowed when using the Department's Alternatives Analysis, therefore the water quality standard must be met at the outfall.

- **Total Ammonia Nitrogen for Table 3**. The Department has determined that the alternatives analysis-based technology limits of 0.6 mg/L monthly average and 1.7 mg/L daily maximum in summer, and 2.1 mg/L monthly average and 5.6 mg/L daily maximum in winter are achievable by some treatment technologies. Because these limits are more protective than the water quality-based limits calculated below for a stream with no mixing, the technology-based limits were used.

  In choosing to use the Department's alternatives analysis, the facility is electing to build a treatment plant that provides a high level of treatment that meets potential future limits based on the 2013 EPA Ammonia criteria and will potentially reduce the need to upgrade in the near future. If the facility owners do not believe that there is a treatment technology that is both economically efficient and practicable for their facility to meet these limits, a site-specific alternatives analysis may be required.

  Water Quality-Based Effluent Limits (WQBEL):
  Early Life Stages Present Total Ammonia Nitrogen criteria apply
  [10 CSR 20-7.031(5)(B)7.C. & Table B1 and Table B3]. Background total ammonia nitrogen = 0.01 mg/L

| Season | Temp (°C) | pH (SU) | Total Ammonia Nitrogen CCC (mg N/L) | Total Ammonia Nitrogen CMC (mg N/L) |
|---|---|---|---|---|
| Summer | 26 | 7.8 | 1.5 | 12.1 |
| Winter | 6 | 7.8 | 3.1 | 12.1 |

  Summer: April 1 – September 30

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

  Chronic WLA: $C_e = ((Q_e + 0.0)1.5 – (0.0 * 0.01))/Q_e = 1.5$ mg/L

  Acute WLA: $C_e = ((Q_e + 0.0)12.1 – (0.0 * 0.01))/Q_e = 12.1$ mg/L

  $LTA_c$ = 1.5 mg/L (0.780) = **1.17 mg/L** [CV = 0.6, 99th Percentile, 30 day avg.]
  $LTA_a$ = 12.1 mg/L (0.321) = 3.89 mg/L [CV = 0.6, 99th Percentile]

  MDL = 1.17 mg/L (3.11) = 3.6 mg/L [CV = 0.6, 99th Percentile]
  AML = 1.17 mg/L (1.19) = 1.4 mg/L [CV = 0.6, 95th Percentile, n = 30]

Winter: October 1 – March 31
Chronic WLA: $C_e = ((Q_e + 0.0)3.1 – (0.0 * 0.01))/Q_e = 3.1$ mg/L

Acute WLA: $C_e = ((Q_e + 0.0)12.1 – (0.0025 * 0.01))/Q_e = 12.1$ mg/L

$LTA_c$ = 3.1 mg/L (0.780) = **2.42 mg/L** [CV = 0.6, 99th Percentile, 30 day avg.]
$LTA_a$ = 12.1 mg/L (0.321) = 3.89 mg/L [CV = 0.6, 99th Percentile]

MDL = 2.42 mg/L (3.11) = 7.5 mg/L [CV = 0.6, 99th Percentile]
AML = 2.42 mg/L (1.19) = 2.9 mg/L [CV = 0.6, 95th Percentile, n = 30]

| | Maximum Daily Limit (mg/l) | | Average Monthly Limit (mg/l) | |
|---|---|---|---|---|
| | Summer | Winter | Summer | Winter |
| WQBEL | 3.6 | 7.5 | 1.4 | 2.9 |
| Alternatives Analysis Limits | 1.7 | 5.6 | 0.6 | 2.1 |

- **Total Ammonia Nitrogen for Table 4**. The Department has determined that the alternatives analysis-based technology limits for lake discharging facilities of 3.6 mg/L summer daily maximum, 1.4 mg/L summer monthly average and 7.5 mg/L winter daily max, 2.9 mg/L winter monthly average are achievable by some treatment technologies. Because these proposed limits are more protective than the water quality-based limits calculated below for a lake with mixing where acute criteria would be applicable for determining the baseline limits, the alternatives analysis limits were used.

  Water Quality-Based Effluent Limits (WQBEL):
  Early Life Stages Present Total Ammonia Nitrogen criteria apply
  [10 CSR 20-7.031(5)(B)7.C. Table B1 & Table B3]. Background total ammonia nitrogen = 0.01 mg/L

| Season | Temp (°C) | pH (SU) | Total Ammonia Nitrogen CCC (mg N/L) | Total Ammonia Nitrogen CMC (mg N/L) |
|---|---|---|---|---|
| Summer | 26 | 7.8 | 1.5 | 12.1 |
| Winter | 6 | 7.8 | 3.1 | 12.1 |

$C_e = (((Q_e+Q_s)*C) - (Q_s*C_s))/Q_e$
Acute WLA: $C_e = ((Q_e + 0)12.1 – (0 * 0.01))/Q_e$
$C_e = 12.1$ mg/L

$LTA_a$ = 12.1 mg/L (0.321) = **3.88 mg/L** [CV = 0.6, 99th Percentile]
MDL = 3.88 mg/L (3.11) = 12.1 mg/L [CV = 0.6, 99th Percentile]
AML = 3.88 mg/L (1.19) = 4.6 mg/L [CV = 0.6, 95th Percentile, n = 30]

| | Maximum Daily Limit (mg/l) | | Average Monthly Limit (mg/l) | |
|---|---|---|---|---|
| | Summer | Winter | Summer | Winter |
| WQBEL | 12.1 | 12.1 | 4.6 | 4.6 |
| Alternatives Analysis Limits | 3.6 | 7.5 | 1.4 | 2.9 |

- **Total Phosphorus**. Total Phosphorus limits are only applicable to discharges to a lake or watershed of a lake that is a water of the state and has an area of at least ten acres during normal pool conditions. Monthly average of 0.5 mg/L and monitoring only for daily maximum were determined by the Department to be achievable and an appropriate target for the discharge to not cause or contribute to an

instream water quality standard excursion or impairment should future modeling by the department occur.

- ***Escherichia coli (E. coli)***. Limits will be applied based on the receiving stream designated use.

  ***Whole Body Contact:*** Monthly average of 126 per 100 mL as a geometric mean and Daily Maximum or Weekly Average as a geometric mean of 630 per 100 mL during the recreational season (April 1 – October 31), to protect Whole Body Contact Recreation designated use of the receiving water body, as per 10 CSR 20-7.031(5)(C) and 10 CSR 20-7.015 (9)(B)1. An effluent limit for both monthly average and daily maximum or weekly average is required by 40 CFR 122.45(d). Publicly owned treatment works will receive weekly average limits, while non-publicly owned treatment works will receive daily maximum limits.

  ***Losing Stream:*** Discharges to losing streams shall not exceed 126 per 100 mL as a Daily Maximum at any time, as per 10 CSR 20-7.031(5)(C). Monitoring only for a monthly average. No more than 10% of samples over the course of the calendar year shall exceed 126 #/100 mL daily maximum as per 10 CSR 20-7.015(9)(B)1.G.

  Per the effluent regulations, the *E. coli* sampling/monitoring frequency for facilities less than 100,000 gallons per day shall be set to match the monitoring frequency of wastewater and sludge sampling program for the receiving water category in 7.015(1)(B)3. during the recreational season (April 1 – October 31), with compliance to be determined by calculating the geometric mean of all samples collected during the reporting period (samples collected during the calendar week for the weekly average, and samples collected during the calendar month for the monthly average). Please see GENERAL ASSUMPTIONS OF THE WQAR #7

- **Total Residual Chlorine (TRC)**. These limits will apply to facilities that chlorinate. Warm-water Protection of Aquatic Life CCC = 10 µg/L, CMC = 19 µg/L [10 CSR 20-7.031, Table A1]. Background TRC = 0.0 µg/L.

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

  Chronic WLA: $C_e = ((Q_e + 0.0)10 – (0.0 * 0.0))/ Q_e = 10$ µg/L

  Acute WLA: $C_e = ((Q_e + 0.0)19 – (0.0 * 0.0))/ Q_e = 19$ µg/L

  $LTA_c$ = 10 µg/L (0.527) = **5.3 µg/L** [CV = 0.6, 99th Percentile]
  $LTA_a$ = 19 µg/L (0.321) = 6.1 µg/L [CV = 0.6, 99th Percentile]

  MDL = **5.3 µg/L** (3.11) = 16.5 µg/L [CV = 0.6, 99th Percentile]
  AML = **5.3 µg/L** (1.55) = 8.2 µg/L [CV = 0.6, 95th Percentile, n = 4]

  Total Residual Chlorine effluent limits of 0.017 mg/L daily maximum, 0.008 mg/L monthly average are recommended if chlorine is used as a disinfectant. Standard compliance language for TRC, including the minimum level (ML), should be included in the permit.

- **Aluminum, Total Recoverable**. Monitoring only. The facility may use chemicals for phosphorous removal that contain aluminum. Monitoring may be included in the operating permit to determine if reasonable potential exists for this facility's discharge to exceed water quality standards for Aluminum (Total Recoverable).

- **Iron, Total Recoverable.** Monitoring only. This facility may use chemicals for phosphorous removal that contain iron. Monitoring may be included in the operating permit to determine if reasonable potential exists for this facility's discharge to exceed water quality standards for Iron (Total Recoverable).

- **Oil & Grease**. These limits will apply to publicly owned treatment works and may apply to other facilities as appropriate. Conventional pollutant, [10 CSR 20-7.031, Table A1]. Effluent limitation for protection of aquatic life; 10 mg/L monthly average, 15 mg/L daily maximum.

Permit limits for any other applicable parameters may be included in the operating permit based on water quality standards and criteria as applicable.

## 9. ANTIDEGRADATION REVIEW PRELIMINARY DETERMINATION

The proposed new or expanded facility discharge is assumed to result in significant degradation of the receiving waterbody. The Department has used available data to complete a review of available treatment technologies and expected performance. As a result of this review, the Department has determined that, depending on site specific conditions, there may be technologies available which are economically efficient and practicable for a facility that are capable of meeting the effluent limits in Table 3 or Table 4. If the facility owners do not believe that there is a treatment technology that is both economically efficient and practicable for their facility to meet the limits in Table 3 or Table 4, a site specific WQAR may be requested.

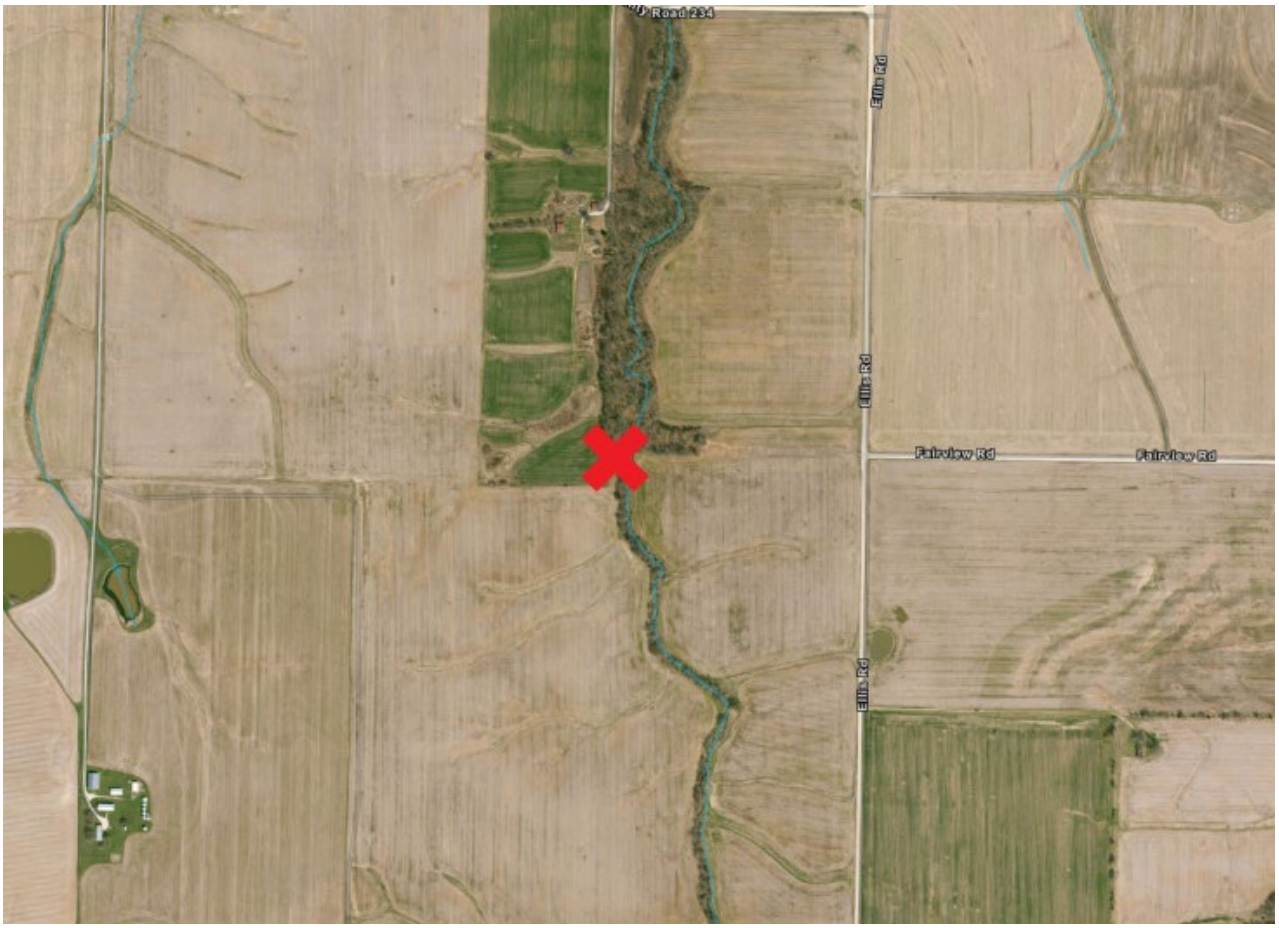
Any treatment option designed to meet these effluent limits may be considered a reasonable alternative in moving forward with the appropriate facility plan, construction permit application, or other future submittals.

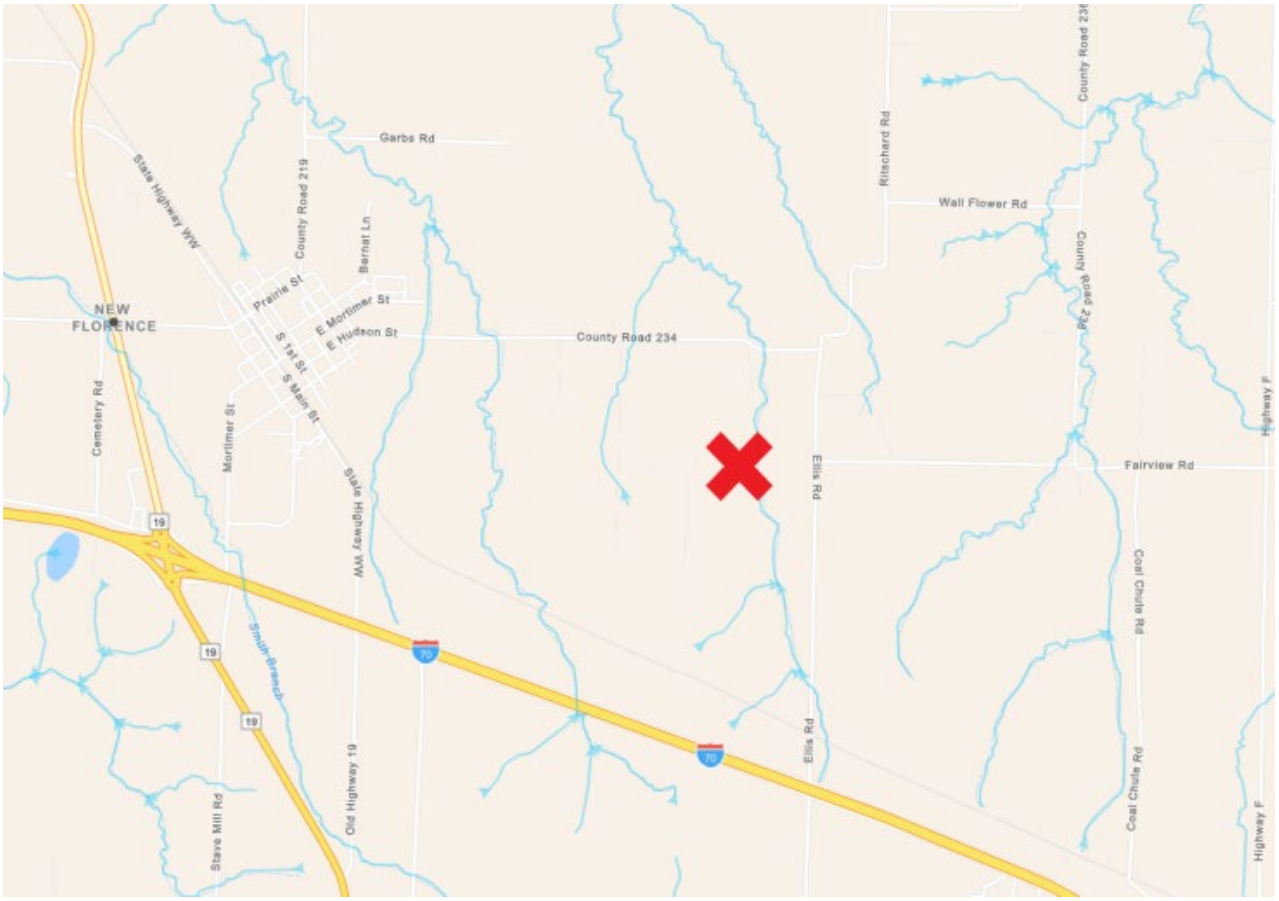
If the proposed treatment system is not covered in 10 CSR 20-8 Minimum Design Standards and is considered a new treatment technology, your construction permit application must address approvability of the technology in accordance with the *Approval Process for Innovative Technology – PUB2453* factsheet. If you have any questions regarding the new technology factsheet, please contact Cindy LePage of the Water Protection Program. The permittee will need to work with the review engineer to ensure equipment is sized properly and that the technology will consistently achieve the proposed effluent limits. The operating permit may contain additional requirements to evaluate the effectiveness of the technology once the facility is in operation.

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.

## APPENDIX A: MAP OF DISCHARGE LOCATION

*Approximate location of outfall shown by red "X" mark*




Garbs Rd
State Highway WW
County Road 219
Bernat Ln
Prairie St
E Mortimer St
E Hudson St
S 1st St
S Main St
NEW
FLORENCE
Cemetery Rd
Mortimer St
Highway WW
Smith Branch
Old Highway 19
Stave Mill Rd
County Road 234
Ritschard Rd
Wall Flower Rd
County Road 23
Ellis Rd
Fairview Rd
Coal Chute Rd
Highway F
19
70

**APPENDIX B: DEMONSTRATION OF APPLICABILITY OF THE DEPARTMENT'S ALTERNATIVES ANALYSIS FOR DOMESTIC WASTEWATER FACILITIES WITH DESIGN FLOW LESS THAN 50,000 GALLONS PER DAY AND DETERMINATION THAT PROPOSED DISCHARGE IS NOT EXPECTED TO CAUSE OR CONTRIBUTE TO THE ELKHORN CREEK DISSOLVED OXYGEN IMPAIRMENT**

# Demonstration of Applicability of the Department's Alternatives Analysis for Domestic Wastewater Facilities with Design Flow Less Than 50,000 Gallons per Day

and Determination that Proposed Discharge Is Not Expected to
Cause or Contribute to the Elkhorn Creek Dissolved Oxygen Impairment for

Project Green Domestic WWTP
NEW FLORENCE OWNER, LLC

Requested by
Geosyntec Consultants

MONTH YYYY

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## 1. PURPOSE OF REPORT

NEW FLORENCE OWNER, LLC is proposing Project Green, which includes a new Amazon Web Services (AWS) data center facility located near New Florence in Montgomery County. Data centers support essential digital services such as email, cloud storage, and search engines by providing data storage and processing capacity. The proposed discharge will include domestic wastewater from employee restrooms and facilities. The *Water Quality and Antidegradation Review Department's Alternatives Analysis for Domestic Wastewater Facilities with Design Flow Less Than 50,000 Gallons per Day* (Water Quality and Antidegradation Review) that composes the main body of this report, to which this report is an appendix, addresses the proposed domestic discharge.

To evaluate the proposed domestic discharge, an Antidegradation Review Request was submitted by Geosyntec Consultants on behalf of NEW FLORENCE OWNER, LLC. 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. For small domestic wastewater systems (i.e., those with design flows up to 50,000 gallons per day) discharging to non-impaired waterbodies which are eligible for a Tier 2 review, the Missouri Department of Natural Resources (department) offers the voluntary general antidegradation review pathway. The general antidegradation review pathway includes an alternatives analysis conducted by the department using available data to complete a review of available treatment technologies and expected performance. The department determined through its alternatives analysis that, depending on site specific conditions, there may be technologies available which are economically efficient and practicable for a facility that are capable of meeting the effluent limits as outlined in Table 3 of the *Department's Alternatives Analysis for Domestic Wastewater Facilities with Design Flow Less Than 50,000 Gallons per Day.* The effluent limits in Table 3 were developed to be more stringent than the minimum regulatory requirements. Applicants using the general antidegradation review pathway must agree to the department's alternatives analysis and the associated effluent treatment levels, or a site-specific alternatives analysis conducted by the applicant must be supplied for review. For this review, the applicant has agreed to accept the effluent limits required by the department's alternatives analysis. The purpose of this document is to provide additional site-specific information to justify the proposed discharge meets the conditions of the *Department's Alternatives Analysis for Domestic Wastewater Facilities with Design Flow Less Than 50,000 Gallons per Day* and is not expected to cause or contribute to the dissolved oxygen impairment of Elkhorn Creek approximately six miles downstream from the proposed domestic wastewater system discharge.

## 2. FACILITY INFORMATION

The Project Green Domestic WWTP is a proposed new wastewater treatment plant that will treat domestic wastewater contributed by employees of the data center facilities.

| | |
|---|---|
| Facility Name: | Project Green Domestic WWTP |
| Address: | Hudson Rd, New Florence, MO 63363 |
| Permit #: | MO-NEW |
| County: | Montgomery |
| Facility Type: | Domestics, Non - POTW |
| Owner: | NEW FLORENCE OWNER, LLC |
| Continuing Authority: | Same as owner |
| Sec. of State Charter No: | LC1200310 |
| UTM Coordinates: | X = 637532, Y = 4307393 |
| Legal Description: | Sec. 30, T48N, R04W, Montgomery County |
| 12-digit watershed: | 07110008-0301 |
| Ecoregion: | Central Irregular Plains |

### A. GEOHYDROLOGIC EVALUATION

A Geohydrologic Evaluation Report prepared by the Missouri Geologic Survey was submitted with the request and the receiving stream is gaining for discharge purposes (see Appendix E).

B. RECEIVING WATERBODY INFORMATION

I. RECEIVING WATERBODY

**Table 0-1: Outfalls Table**

| OUTFALL | DESIGN FLOW (CFS) | DESIGN FLOW (MGD) | TREATMENT LEVEL | EFFLUENT TYPE |
|---|---|---|---|---|
| 001 | 0.053 | 0.034 | Secondary | Domestic |

**Table 0-2: Receiving Stream(s)**

| WATER-BODY NAME | CLASS | WBID | DESIGNATED USES* | 12-DIGIT HUC | DISTANCE TO CLASSIFIED SEGMENT (MI) |
|---|---|---|---|---|---|
| **Tributary to Elkhorn Creek (Presumed Use Stream)** | C | 5024 | AHP-WWH, IRR, LWP, WBC-B, SCR, HHP | 07110008-0301 | 0 |

* **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 0-3: Receiving Stream Segments**

| **Receiving Water Body Segment Outfall #1:** | | |
|---|---|---|
| Upper end segment* UTM coordinates: | X = 637532 ; Y = 4307393 | outfall |
| Lower end segment* UTM coordinates: | X = 636633 ; Y = 4310447 | downstream confluence |

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

C. LOSING STREAM ALTERNATIVE DISCHARGE LOCATION

Under 10 CSR 20-7.015(4)(A), discharges to losing stream shall be permitted only after other alternatives including land application, discharge to gaining stream and connection to a regional facility have been evaluated and determined to be unacceptable for environmental and/or economic reasons.

The proposed outfall will discharge to the tributary to Elkhorn Creek, which is classified as gaining based on the 2025 geohydrologic evaluation.

D. MIXING CONSIDERATIONS AND LOW FLOW VALUES

The proposed receiving waterbody is the tributary to Elkhorn Creek, which is a class C stream. The applicant elected to use United States Geologic Survey StreamStats model to establish low flow values. See Appendix D for StreamStats summary.

**Table 0-4: Receiving Stream(s) Low-Flow Values (CFS)**

| RECEIVING STREAM | LOW-FLOW VALUES (CFS) | | |
|---|---|---|---|
| | 1Q10 | 7Q10 | 30Q10 |
| Tributary to Elkhorn Creek (Presumed Use Stream) | 0.0 | 0.0 | 0.0 |

**Table 0-5: Mixing Considerations**

| | 1Q10 | 7Q10 | 30Q10 |
|---|---|---|---|
| MIXING ZONE (CFS) [10 CSR 20-7.031(5)(A)4.B.(I)(a)] | 0 | 0 | 0 |
| ZONE OF INITIAL DILUTION (CFS) [10 CSR 20-7.031(5)(A)4.B(I)(b)] | 0 | 0 | N/A |

## 3. JUSTIFICATION OF DISCHARGE NECESSITY

Per the Antidegradation Implementation Procedure (AIP), Tier 2 protection requires a Tier 2 review designed to prohibit degrading the quality of a surface water unless a review of discharge necessity and social and economic considerations justifies the degradation of water quality. For Tier 2 antidegradation reviews, establishing the necessity of discharge includes an analysis to determine whether any non-discharging wastewater treatment alternatives are feasible. To this end, the applicant evaluated the alternatives of regionalizing to an existing regional wastewater treatment facility and installing a no-discharge wastewater treatment facility. A discussion of the alternatives analysis is provided below. The justification of the social and economic importance of the proposed discharge is discussed in the following section *4. Justification of Social and Economic Importance*.

A. REGIONALIZATION EVALUATION

Regionalization eliminates the need to attain a discharge permit by sending wastewater flows to an existing regional facility for treatment. There are two regional treatment facilities located within a five-mile radius of the project site, the New Florence WWTF (MO0110817) and the High Hill WWTF (MO0102083). Neither of these facilities have sufficient excess capacity to accept the full domestic wastewater flows from Project Green. The Jonesburg WWTF (MO0040851) and the Montgomery City Clear Creek Wastewater Treatment Plant (MO0127124) likely have sufficient capacity but are approximately six miles away. In addition to the prohibitive distance, connection to one of these facilities would involve significant engineering challenges due to the fact that the new sewer lines would be miles long and would cross streams and highways. The regionalization alternative has been deemed impracticable because suitable facilities are too far away to make regionalization practicable.

B. NO DISCHARGE EVALUATION

Construction of a storage lagoon with a land application system was evaluated as a non-discharging alternative to the proposed discharge. For this alternative, wastewater would be stored in a lagoon until it can be applied to suitable land at an agronomic rate. The consultant estimated that about 30 acres of land would be necessary to implement this alternative. This estimate accounts for the space necessary for the storage lagoon and the land application site itself. The consultant also noted that soils in the vicinity of the project site are high in clay. The 2025 geohydrologic evaluation states, “Surficial materials are primarily dark brown clay loam and silt loam with low overall permeability”. Soils with low permeability can restrict the soil’s ability to absorb water, which can lead to ponding, surface runoff, and other environmental issues. Due to the amount of land required to implement this alternative and the high clay content in local soils, the no discharge alternative using land application was deemed impracticable.

C. DISCHARGING ALTERNATIVES EVALUATION

The applicant utilized the *Department’s Alternatives Analysis for Domestic Wastewater Facilities with Design Flow Less Than 50,000 Gallons Per Day* to satisfy the requirements of the AIP with respect to the discharging alternatives analysis.

## 4. JUSTIFICATION OF SOCIAL AND ECONOMIC IMPORTANCE

The affected community consists of the citizens of New Florence City and those living in the vicinity of the project location in Montgomery County. Based on data compiled from the United States Census Bureau and the United States Bureau of Labor Statistics, the population of New Florence City as of 2023 was 784. The median household income, percent change in median household income, and percent change in population from 2000 to 2023 are all lower than the state and national averages. The percent of population below poverty level is slightly higher than the state and national averages, and the percent of households receiving food stamps is substantially higher than the state and national averages.

| No. | Administrative Unit | New Florence City | Missouri State | United States | Comparison (Community vs. State) |
|---|---|---|---|---|---|
| 1 | Population (2023) | 784 | 6,168,181 | 332,387,540 | |
| 2 | Percent Change in Population (2000-2023) | 2.6% | 10.2% | 18.1% | Slightly lower than state average |
| 3 | 2023 Median Household Income (in 2024 Dollars) | $49,544 | $70,567 | $80,011 | Slightly lower than state average |
| 4 | Percent Change in Median Household Income (2000-2023) | -12.7% | -1.2% | 1.2% | Slightly lower than state average |
| 5 | Median Age (2023) | 47.0 | 38.9 | 38.7 | Slightly older than state average |
| 6 | Change in Median Age in Years (2000-2023) | 9.0 | 2.8 | 3.4 | Slightly higher than state average |
| 7 | Unemployment Rate (2023) | 1.8% | 4.1% | 5.2% | Slightly lower than state average |
| 8 | Percent of Population Below Poverty Level (2023) | 19.2% | 12.6% | 12.4% | Slightly higher than state average |
| 9 | Percent of Household Received Food Stamps (2023) | 27.2% | 9.9% | 11.8% | Significantly higher than state average |
| 10 | (Primary) County Where the Community Is Located | Montgomery County | | | |

The construction of the Project Green Domestic WWTP is necessary to provide wastewater treatment capacity for employees and workers at the proposed data center. Data centers provide a benefit to individuals, governments, and private companies by their function in providing storage and processing capacity to support digital services such as email, cloud storage, and search engines. The applicant believes Project Green will be the largest private capital investment project in Montgomery County as of the writing of this antidegradation review. Project Green is expected to create a social and economic benefit to the community by creating jobs, supporting local businesses, increasing local tax revenues, and attracting future investments in the local economy.

The applicant anticipates that construction of Project Green will create thousands of construction jobs in addition to 400 permanent jobs. The average salary for the permanent jobs is expected to be $85,000, which is higher than the median household income for New Florence City, Montgomery County, the State of Missouri, and the United States. In addition to the permanent jobs and construction jobs, the applicant anticipates that hundreds of full-time equivalent contractor positions will be required to support the facility maintenance and operation needs. Further, AWS provides programs aimed to promote workforce development. AWS provides a pre-apprenticeship program to promote workforce development for job seekers with little to no experience, as well as programs for elementary through high school students in which students gain technical knowledge and develop leadership skills through hands on learning. The applicant intends to partner with the Montgomery County R-II School District to promote these opportunities.

The Project Green data center is expected to generate between $400,000,000 and $1,800,000,000 in combined real property tax revenue and personal property payments in lieu of tax for Montgomery County political subdivisions over 25 years, which is a significant increase from the estimate that the current land use will generate approximately $200,000 in tax revenue across the same time frame. This increase in tax revenue will provide funding for public schools, roads, emergency services, and essential health services in Montgomery County. In addition to the increased tax revenue, AWS has pledged to invest $7,000,000 in community contributions including $1,000,000 for a new gathering space on the Montgomery County Fairgrounds, community grants for teachers and non-profit organizations, and $3,000,000 in Montgomery County's 911 and emergency response system through 2027. This investment is expected to result in modernized and improved 911 systems, radio communication systems, and other infrastructure and equipment.

The applicant has provided letters signed by representatives from the City of Montgomery, Montgomery County, the Montgomery County Health Department, the Greater Montgomery County Economic Development Council, the Greater Montgomery County Port Authority, and the Developmental Disabilities Assistance Board of Montgomery County in support of Project Green. These letters discuss the anticipated social and economic benefits to the community (see Appendix H). In summary, Project Green is anticipated to bolster and support the local job market, increase local tax revenues, and provide investment into the community both with direct investment from AWS and by attracting future investments.

## 5. NATURAL HERITAGE REVIEW

A Missouri Department of Conservation Natural Heritage Review was obtained by the applicant (see Appendix F). The report identifies that two species of bats, Indiana and Northern Long-Eared, may be present in the project area. The following recommendations were made for construction activities:

- Manage construction to minimize sedimentation and run-off to nearby streams.
- At stream and drainage crossings, avoid erosion, silt introduction, petroleum or chemical pollution, and disruption or realignment of stream banks and beds.
- Revegetate disturbed areas to minimize erosion.
- Remove mud, soil, plants, and animals from equipment before leaving site.

The applicant also obtained an Information for Planning and Consultation (IPaC) report from the U.S. Fish and Wildlife Service (see Appendix G). The species list included with the IPaC report identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of the proposed project and may be affected by the proposed project. The identified species include Gray Bat, Indiana Bat, Tricolored Bat, and Monarch Butterfly. Project Green does not overlap with designated critical habitat for these listed species, and no tree clearing is planned for the domestic WWTP. The land has been cleared for decades from production of agricultural row crops, therefore no impact to threatened or endangered species is anticipated.

## 6. DOWNSTREAM IMPAIRMENT AND QUAL2K MODEL

The proposed Project Green Domestic WWTP will discharge to an unnamed tributary to Elkhorn Creek in the vicinity of the intersection of Fairview Road and Ellis Road, in New Florence. A 21.4-mile segment of Elkhorn Creek, which is approximately six miles downstream of the proposed discharge location, was added to the 2002 United States Environmental Protection Agency (EPA) Approved Section 303(d) list due to not meeting Missouri's minimum dissolved oxygen (DO) criterion of 5.0 mg/L. Section 303(d) of the federal Clean Water Act requires that each state identify waters that are not meeting water quality standards and for which adequate water pollution controls have not been required. Water quality standards protect such beneficial uses of water as whole-body contact (such as swimming), maintaining fish and other aquatic life, and providing drinking water for people, livestock and wildlife. The 303(d) list helps state and federal agencies keep track of waters that are impaired but not addressed by normal water pollution control programs. DO measures the conditions of the receiving waters and is not itself a pollutant of concern, so the 2002 303(d) listing specified BOD and non-volatile suspended solids (NVSS) as the primary causes for the DO impairment.

A total maximum daily load (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. In a letter to the EPA, the department stated its intent to correct the dissolved oxygen impairment through permit limits in lieu of a TMDL. The letter states, "[Montgomery City's] northeast WWTP is located near the headwaters of Elkhorn Creek. There are no other treatment plants upstream and the land is sparse rural development…Montgomery City is designing a new WWTP and…new final limits [will] take effect on March 28, 2008. These limits ensure stream water quality standards (WQS) will be met." In 2006, the U.S. EPA approved the Montgomery City Northeast WWTP permit submitted by the department to serve in lieu of a TMDL. (https://dnr.mo.gov/document-search/elkhorn-creek-permit-lieu-total-maximum-daily-load). However, water quality monitoring conducted in 2018 found the segment of Elkhorn Creek is still impaired due to not meeting Missouri's minimum DO criterion. Therefore, Elkhorn Creek was included on Missouri's 2022 303(d) list with an unknown source.

The department conducted QUAL2K modeling to determine effluent concentrations for the proposed Project Green discharge that are not expected to cause or contribute to the downstream DO impairment in Elkhorn Creek. The model considers the critical low-flow conditions when low dissolved oxygen conditions are likely to occur. The QUAL2K modeling report (see Appendix C) demonstrates that when the domestic WWTP effluent concentrations are consistent with the requirements of Table C of the general permit for domestic treatment works discharging less than or equal to 50,000 gallons per day into rivers or streams (MO-GDS0000), then the modeled concentration of DO in downstream Elkhorn Creek was greater than 5.0 mg/L in all modeled scenarios.

## 7. JUSTIFICATION OF APPLICABILITY OF GENERAL ANTIDEGRADATION

The department offers a voluntary general antidegradation review pathway for small domestic wastewater systems discharging to non-impaired waterbodies which are eligible for a Tier 2 review. The proposed domestic discharge is to the unnamed non-impaired tributary to Elkhorn Creek. The impaired segment of Elkhorn Creek is approximately six miles downstream. One of the purposes of QUAL2K modeling discussed above in section *6. Downstream Impairment and QUAL2K Model,* was to evaluate whether effluent limits as required by the general permit for domestic treatment works discharging less than or equal to 50,000 gallons per day into rivers or streams (MO-GDS0000) would be protective of the instream DO criterion, and as such, whether the proposed discharge could be eligible for a Tier 2 review. The model results indicate that when the domestic discharge has effluent concentrations which are consistent with the requirements of the MO-GDS general permit, the expected resulting concentration of DO in Elkhorn Creek meets the instream DO criterion. This fact supports that all POCs in the proposed domestic discharge can be classified as Tier 2 pollutants which are not expected to cause or contribute to the downstream impairment of DO in Elkhorn Creek, and that the discharge can be permitted under the MO-GDS general permit.

Based on industry standard references, typical untreated domestic wastewater has total nitrogen concentrations of approximately 40 mg/L. The EPA's *Nutrient Control Design Manual (2010)* states that 15 to 30% of influent nitrogen can be removed via biomass synthesis and sludge wasting. However, for QUAL2K model input purposes a conservative effluent total nitrogen value of 51.3 mg/L was assumed. The modeling demonstrated that the effluent total nitrogen concentration should not exceed 35 mg/L at any time to maintain the downstream DO criterion.

To confirm that the proposed domestic discharge is not anticipated to have effluent concentrations exceeding 35 mg/L total nitrogen, the department reviewed the antidegradation application and supporting documentation, available effluent concentration data from permitted facilities in Missouri utilizing a similar treatment design through the Discharge Monitoring Report system, and technical design guidance. For the domestic discharge, the applicant is proposing to install a membrane bioreactor (MBR) treatment technology equipped with a pre-anoxic zone to operate as a modified Ludzack-Ettinger (MLE) process. The applicant supplied a Facility Plan identifying operational and maintenance requirements for the proposed treatment system and detailing the preliminary design, including design parameters and assumptions. MBRs utilizing the MLE process are capable of a high degree of treatment and are designed to provide denitrification for removal of total nitrogen. The Facility Plan supplied by the applicant states, "the system will include provisions in the design to maintain total nitrogen concentrations below 25 mg/L in the effluent." Guidance from the EPA, as well as technical design guidance resources such as the *Wastewater Engineering Treatment and Reuse, 4th Edition (Metcalf & Eddy, 2002),* the *Membrane Bioreactors, MOP 36 (Water Environment Federation, 2024)* and *The MBR Book, 2nd Edition (Simon Judd, 2011)* support that a properly designed and operated MBR utilizing the MLE process with a pre-anoxic zone is capable of achieving a typical effluent concentration for total nitrogen of less than 10 mg/L. Further, in a review of existing MBRs permitted in Missouri which are using a similar configuration and for which effluent concentration data was available, the department determined that these facilities are consistently achieving total nitrogen effluent concentrations below 35 mg/L.

Therefore, based upon a review of the available information, the department anticipates the proposed Project Green Domestic WWTP will provide adequate treatment and would not exceed a total nitrogen concentration of 35 mg/L.

## 8. SUMMARY

Based on department review, the proposed new Project Green domestic discharge meets the applicability conditions of the *Department's Alternatives Analysis for Domestic Wastewater Facilities with Design Flow Less Than 50,000 Gallons per Day* and is not expected to cause or contribute to the dissolved oxygen impairment of Elkhorn Creek approximately six miles downstream. This determination is valid only when the domestic discharge will utilize the MBR treatment alternative as proposed in the applicant submitted Facility Plan. If the applicant elects to pursue installation of a different treatment alternative, or if the applicant proposes changes to the MBR process design affecting capacity, flow, system layout, operation of units, or point of discharge, further department review will be necessary to determine if the proposed discharge qualifies for the *Department's Alternatives Analysis for Domestic Wastewater Facilities with Design Flow Less Than 50,000 Gallons per Day*, or if a site-specific antidegradation review is necessary instead.

Reviewer: Thomas Silkwood
Date: June 2026
Reviewer: Cailie Carlile, P.E.

## APPENDIX C: QUAL2K MODEL

### QUAL2K Modeling Report for Elkhorn Creek


**Summary**

A 21.4-mile segment of Elkhorn Creek, water body identification (WBID) 189, was first placed on Missouri's 2002 303(d) List of Impaired Waters due to violations of Missouri's minimum dissolved oxygen (DO) criterion of 5.0 milligram per liter (mg/L).[1] Because DO is a response to pollution rather than a discreet pollutant itself, the 2002 303(d) list specified biochemical oxygen demand (BOD) and non-volatile suspended solids (NVSS) as the primary causes of the low DO impairment. Due to its impaired status, a Permit in Lieu of a Total Maximum Daily Load (TMDL) was developed and approved by the U.S. Environmental Protection Agency on April 6, 2006. The Permit in Lieu of a TMDL established concentration targets for Montgomery City's Wastewater Treatment Plant (Permit number MO-0084158) for BOD, ammonia, and total suspended solids (TSS) using a QUAL2E model at levels necessary to attain and maintain applicable water quality standards. Water quality monitoring conducted on Elkhorn Creek in 2018 found that the stream is still impaired due to violations of Missouri's minimum DO criterion and therefore Elkhorn Creek was put back on Missouri's 303(d) list. It has remained there is currently listed on the most recent 2024-2026 303(d) List of Impaired Waters with an unknown source.

Due to a new proposed domestic discharge to Elkhorn Creek near New Florence, the TMDL and Modeling Unit conducted QUAL2K modeling to determine effluent concentrations that are not expected to cause or contribute to the DO impairment in Elkhorn Creek. Resulting modeled effluent concentrations are expected to result in DO concentrations greater than 5.0 mg/L in all modeled scenarios. Modeled effluent concentrations for temperature are expected to maintain attainment of Missouri temperature criteria in all modeled scenarios.

Discussion of the QUAL2K modeling process, data, and all relevant inputs for the proposed discharge can be found in the following sections. Effluent concentrations were modeled for 5-day biochemical oxygen demand ($BOD_5$), total phosphorus (TP), total nitrogen (TN), ammonia as nitrogen (ammonia-N), and TSS. Minimum effluent DO concentrations are also specified and are required to meet the model assumptions for attainment of water quality standards. Additional DO monitoring is also recommended to account for uncertainty in model calibration. Final modeled effluent concentrations are provided in Tables 1 and 2, which cover a range of modeled scenarios for a proposed design flow range of 24,000 - 34,000 gpd for the domestic system. These effluent concentrations will be protective of critical low-flow conditions (May through October) when low dissolved oxygen conditions are likely to occur.


[1]The department maintains current and past 303(d) lists and corresponding assessment worksheets online at dnr.mo.gov/water/what-were-doing/water-planning/quality-standards-impaired-waters-total-maximum-daily-loads/impaired-waters.

**Table 1. First Scenario QUAL2K Modeled Effluent Concentrations for Project Green**

| Effluent Parameters | Domestic System* |
|---|---|
| Flow (gpd) | 24,000 |
| TN (mg/L) | - |
| TP (mg/L) | - |
| Ammonia-N (mg/L) | 0.6 |
| $BOD_5$ (mg/L) | 10 |
| Temperature (Fahrenheit) | - |
| TSS (milligrams per Liter) | 10 |
| Minimum DO requirement | - |
| Monitoring recommendations | Quarterly effluent DO monitoring |

*The modeled effluent concentrations for the domestic system shown here are consistent with Table C in the general domestic permit (MO-GDS0000).

**Table 2. Second Scenario QUAL2K Modeled Effluent Concentrations for Project Green**

| Effluent Parameters | Domestic System |
|---|---|
| Flow (gpd) | 34,000 |
| TN (mg/L) | 35* |
| TP (mg/L) | - |
| Ammonia-N (mg/L) | 0.6 |
| $BOD_5$ (mg/L) | 10 |
| Temperature (Fahrenheit) | - |
| TSS (milligrams per Liter) | 10 |
| Minimum DO requirement | - |
| Monitoring recommendations | Quarterly effluent DO monitoring |

* If the effluent does not exceed the modeled TN effluent concentration of 35 mg/L at any time, then modeled concentrations shown here are consistent with Table C in the general domestic permit (MO-GDS0000) and are not expected to cause or contribute to the DO impairment.

## Background

Elkhorn Creek is located in east central Missouri in Montgomery County within the Cuivre River subbasin, that is cataloged by the U.S. Geological Survey (USGS) as the 8-digit hydrologic unit code (HUC) 07110008. Missouri's 2024-2026 303(d) list cites unknown sources as the cause of the low DO impairment. Project Green consists of a proposed domestic system near New Florence. The location of the Montgomery City WWTP, the proposed Project Green discharge, and the impaired segment of Elkhorn Creek are depicted in Figure 1.

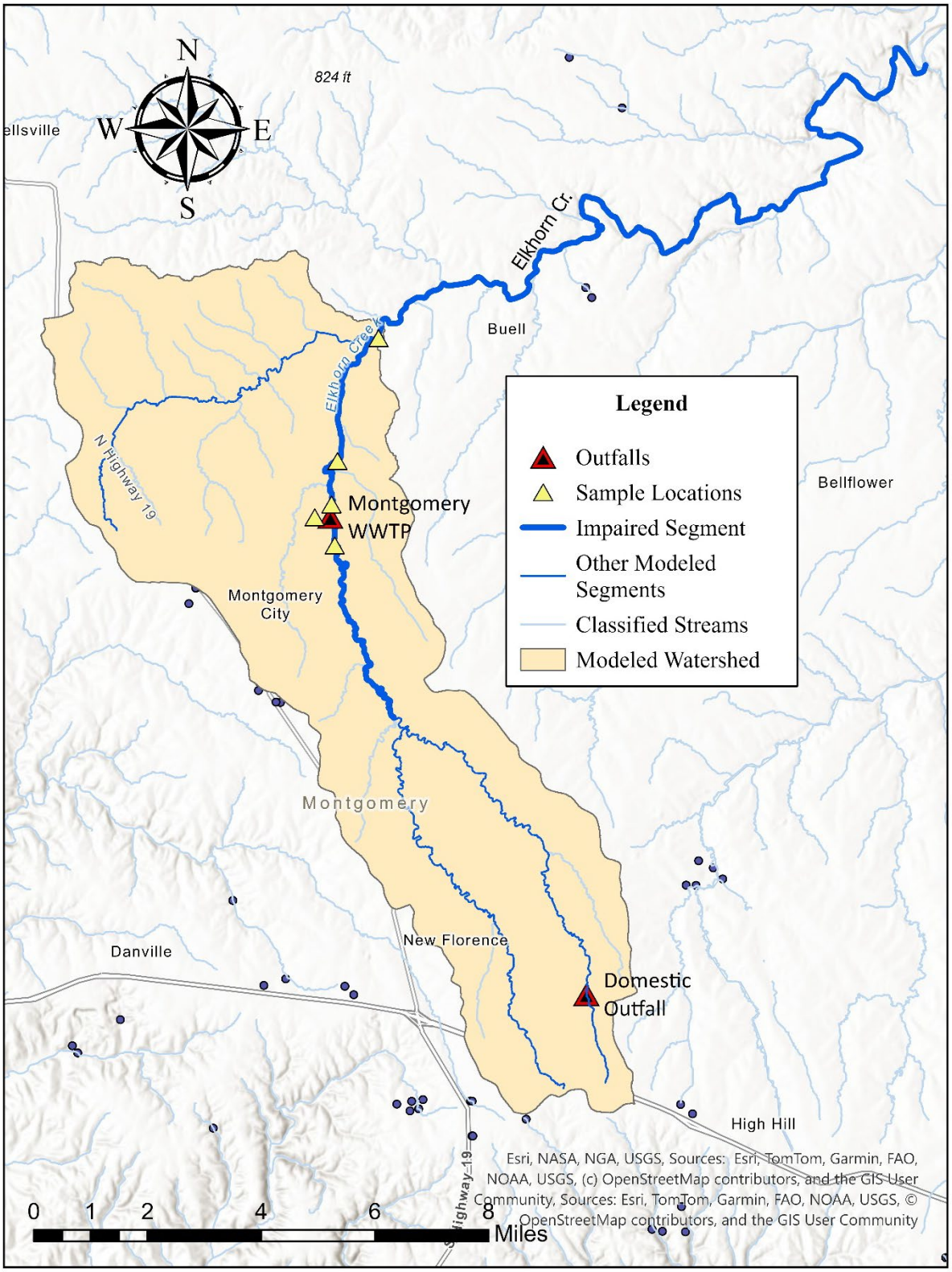



**Figure 1. Location of the Proposed Project Green Discharge and the Modeled Portion of the Elkhorn Creek Watershed**

**Elkhorn Creek Stream Sampling**

The department's Environmental Services Program staff conducted stream sampling on Elkhorn Creek on July 10-12, 2018, to develop a Waste Load Allocation (WLA) Study for the Montgomery City WWTP outfall. The WLA study was conducted to assess the potential contribution(s) to the DO impairment in Elkhorn Creek that arise from discharge from the Montgomery City WWTP. The relevant stream sample locations are summarized in Table 3 and depicted in Figure 2.

**Table 3. Elkhorn Creek Sample Sites**

| Site Description | Site ID |
|---|---|
| Elkhorn Creek, 0.45 miles upstream of Outfall #001 | EC-01 |
| Outfall - Montgomery City WWTP | WWTP |
| Elkhorn Creek, 0.29 miles downstream of Outfall #001 | EC-02 |
| Elkhorn Creek, 1.10 miles downstream of Outfall #001 | EC-03 |
| Elkhorn Creek, 3.00 miles downstream of Outfall #001 | EC-04 |

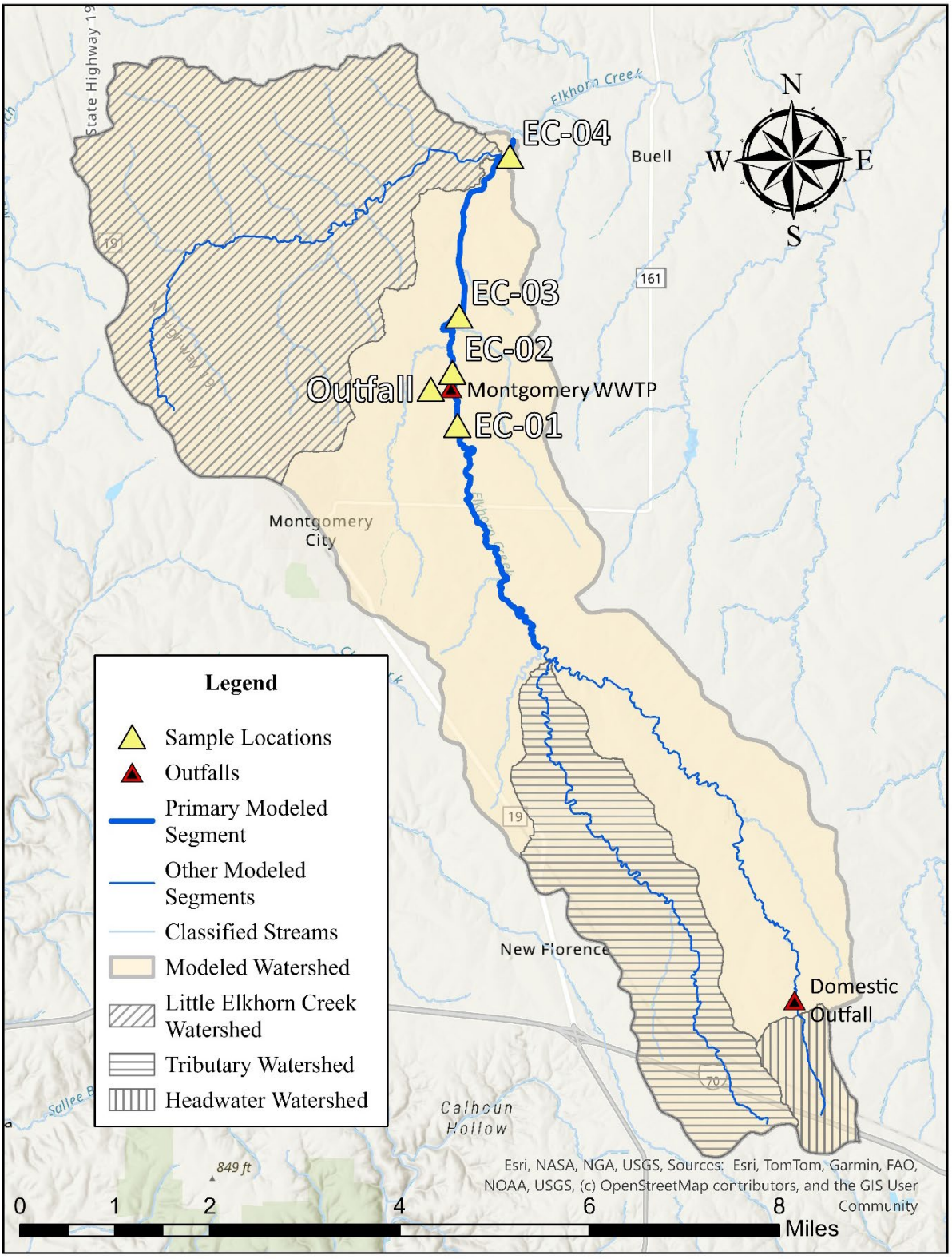



**Figure 2. Elkhorn Creek 2018 Stream Survey Sample Points and Subwatersheds Used in this Analysis.**

Elkhorn Creek was divided into four reaches based on stream and watershed characteristics. The QUAL2k model simulates 27.3 km of Elkhorn creek and encompasses the proposed Project Green discharge and the Montgomery City WWTP. Little Elkhorn Creek and an unnamed tributary were also included in the model to improve calibration. The distance, diffuse sources, diffuse abstractions (losses to groundwater), point sources, sample sites, and tributaries for each of the reaches, with distances in km to maintain consistency with the QUAL2K model, are shown in Figure 3.

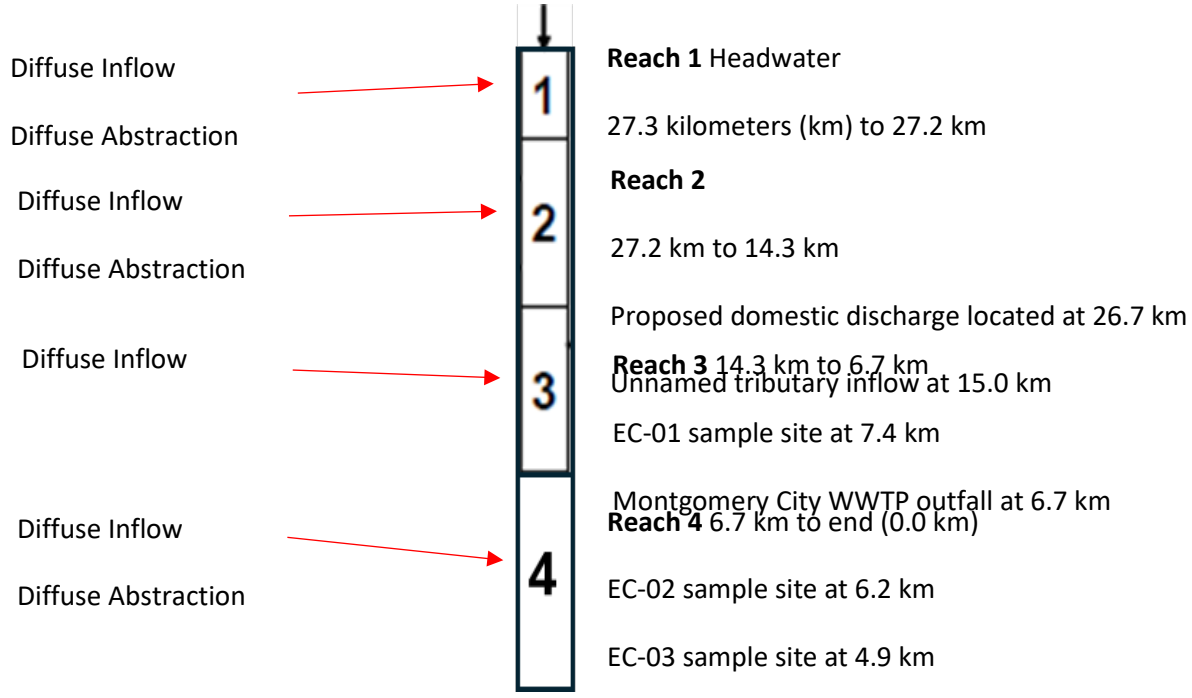



**Figure 3. Elkhorn Creek QUAL2K Model Schematic**

**Modeled Flow**

Stream flow and Montgomery City WWTP discharge measured during the 2018 stream survey were used to inform flow values in the calibration model. Diffuse inflows and abstractions were added (or subtracted, as necessary) to all four study reaches to aid in calibration of flow, temperature, specific conductivity, carbonaceous biochemical oxygen demand (CBOD), DO, ammonia-N, TN, TP, and pH.

**Rating Curves**

Rating curves were used to model velocity and depth based on observed flows. Power regression equations were developed using the observed flow, velocity, and depth values measured on July 11, 2018. The rating curve coefficients were then manually adjusted for each reach individually to improve the depth and velocity calibration. The rating curve variables for each reach are shown in Table 4.

**Table 4. Rating Curve Variables Used in Model**

| | Velocity Rating Curve | | Depth Rating Curve | |
|---|---|---|---|---|
| | Coefficient | Exponent | Coefficient | Exponent |
| **Reach 1** | 0.800 | 0.5900 | 0.0200 | 0.0010 |
| **Reach 2** | 0.800 | 0.5900 | 0.0350 | 0.0010 |
| **Reach 3** | 0.800 | 0.5900 | 0.0500 | 0.0010 |
| **Reach 4** | 0.600 | 0.5900 | 0.1000 | 0.0010 |

## Calibration Data

The QUAL2K model was calibrated to data collected on July 11, 2018, by the department's Environmental Services Program staff. The 2018 records are the most recent data where morning (low) DO concentrations were recorded in addition to afternoon (high) DO concentrations. The data used for the Elkhorn Creek QUAL2K calibration model and additional data collected during the 2018 stream survey are summarized in Table 5. Relevant calibration model outputs are displayed in Figures 4 through 8.

**Table 5. 2018 Grab Sample Data Used for the Elkhorn Creek QUAL2K Calibration**

| Site ID | Sample # | Date/Time | DO (mg/L) | pH | Cond. (µS/cm) | Temp. (°C) | CBOD (mg/L) | BOD Ultimate (mg/L) | $NH_3$ (mg/L) | TKN (mg/L) | TN (mg/L) | $NO_3 + NO_2$ (mg/L) | TP (mg/L) | Chl-a (µg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Montgomery City WWTP** | | | | | | | | | | | | | | |
| WWTP[1] | AD30434 | 7/10/2018 13:08 | 6.10 | 7.40 | 2224 | 25.00 | -- | -- | -- | -- | -- | -- | -- | 9.80 |
| WWTP[1] | AD30440 | 7/11/2018 06:42 | 5.50 | 7.57 | 2166 | 23.60 | -- | -- | -- | -- | -- | -- | -- | -- |
| WWTP[2] | AD30446 | 7/11/2018 09:43 | -- | -- | -- | -- | 4.35 | 6.74 | 0.05 | 1.30 | 1.98 | 1.41 | 4.09 | -- |
| WWTP[1] | AD30478 | 7/11/2018 13:00 | 6.30 | 7.35 | 2194 | 25.2 | -- | -- | -- | -- | -- | -- | -- | 4.00 |
| WWTP[1] | AD30484 | 7/12/2018 06:28 | 5.80 | 7.54 | 2177 | 23.4 | -- | -- | -- | -- | -- | -- | -- | -- |
| WWTP[2] | AD30489 | 7/12/2018 10:23 | -- | -- | -- | -- | 3.50 | -- | 0.04 | 1.67 | 1.80 | 1.36 | 4.42 | -- |
| **Elkhorn Creek, 0.45 miles upstream of Outfall #001** | | | | | | | | | | | | | | |
| EC-01 | AD30435 | 7/10/2018 14:35 | 6.40 | 7.25 | 330 | 28.80 | <2 | -- | 0.07 | 0.88 | 0.77 | 0.15 | 0.11 | 9.20 |
| EC-01 | AD30441 | 7/11/2018 06:17 | 2.60 | 7.20 | 340 | 25.20 | <2 | 4.96 | 0.09 | 0.78 | 0.71 | 0.10 | 0.12 | -- |
| EC-01 | AD30479 | 7/11/2018 12:45 | 5.10 | 7.21 | 338 | 27.70 | <2 | -- | 0.07 | 1.19 | 0.70 | 0.08 | 0.15 | 18.60 |
| EC-01[3] | AD30483 | 7/11/2018 12:45 | 5.10 | 7.21 | 339 | 27.70 | <2 | -- | 0.07 | 1.15 | 0.76 | 0.08 | 0.11 | 18.70 |
| EC-01 | AD30485 | 7/12/2018 06:10 | 2.40 | 7.24 | 347 | 23.60 | <2 | -- | 0.07 | 1.06 | 0.69 | 0.07 | 0.11 | -- |
| **Elkhorn Creek, 0.29 miles downstream of Outfall #001** | | | | | | | | | | | | | | |
| EC-02 | AD30436 | 7/10/2018 13:30 | 10.70 | 7.88 | 1405 | 29.90 | <2 | -- | <0.02 | 0.87 | 1.03 | 0.44 | 1.76 | 13.60 |
| EC-02[3] | AD30439 | 7/10/2018 13:30 | 10.70 | 7.88 | 1405 | 29.90 | <2 | -- | <0.02 | 0.88 | 1.04 | 0.44 | 1.77 | 13.90 |
| EC-02 | AD30442 | 7/11/2018 06:30 | 8.20 | 7.66 | 1448 | 26.70 | <2 | 4.16 | 0.05 | 0.93 | 1.00 | 0.37 | 1.83 | -- |
| EC-02 | AD30480 | 7/11/2018 13:15 | 11.90 | 8.09 | 1520 | 29.10 | 2.06 | -- | 0.02 | 1.31 | 0.88 | 0.23 | 1.99 | 40.40 |
| EC-02 | AD30486 | 7/12/2018 06:25 | 10.50 | 7.94 | 1557 | 25.70 | 2.19 | -- | 0.04 | 1.44 | 0.78 | 0.11 | 2.21 | -- |
| **Elkhorn Creek, 1.10 miles downstream of Outfall #001** | | | | | | | | | | | | | | |
| EC-03 | AD30437 | 7/10/2018 12:15 | 9.40 | 7.98 | 554 | 28.80 | <2 | -- | 0.04 | 0.75 | 1.01 | 0.47 | 0.20 | 10.20 |
| EC-03 | AD30443 | 7/11/2018 06:05 | 6.60 | 7.71 | 554 | 26.40 | <2 | -- | <0.02 | 0.82 | 0.98 | 0.48 | 0.18 | -- |
| EC-03[3] | AD30445 | 7/11/2018 06:05 | 6.60 | 7.70 | 555 | 26.40 | <2 | -- | 0.03 | 0.84 | 0.96 | 0.49 | 0.20 | -- |
| EC-03 | AD30481 | 7/11/2018 12:30 | 8.50 | 7.97 | 571 | 27.70 | -- | -- | 0.03 | 1.12 | 0.97 | 0.40 | 0.20 | 19.90 |
| EC-03 | AD30487 | 7/12/2018 06:00 | 6.90 | 7.78 | 584 | 25.50 | <2 | -- | <0.02 | 1.38 | 0.83 | 0.29 | 0.19 | -- |
| **Elkhorn Creek, 3.00 miles downstream of Outfall #001** | | | | | | | | | | | | | | |
| EC-04 | AD30438 | 7/10/2018 12:42 | 9.10 | 7.96 | 362 | 29.20 | <2 | -- | 0.04 | 0.82 | 0.73 | 0.10 | 0.10 | 14.00 |
| EC-04 | AD30444 | 7/11/2018 05:50 | 4.70 | 7.87 | 369 | 27.10 | <2 | -- | 0.05 | 0.79 | 0.64 | 0.09 | 0.10 | -- |
| EC-04 | AD30482 | 7/11/2018 12:08 | 7.40 | 7.92 | 369 | 27.60 | <2 | -- | 0.09 | 1.24 | 0.61 | 0.07 | 0.10 | 9.40 |
| EC-04 | AD30488 | 7/12/2018 05:40 | 4.80 | 7.42 | 372 | 25.70 | <2 | -- | 0.04 | 1.18 | 0.56 | 0.06 | 0.09 | -- |

1. Grab sample 2. 24-hour composite sample 3. Duplicate sample

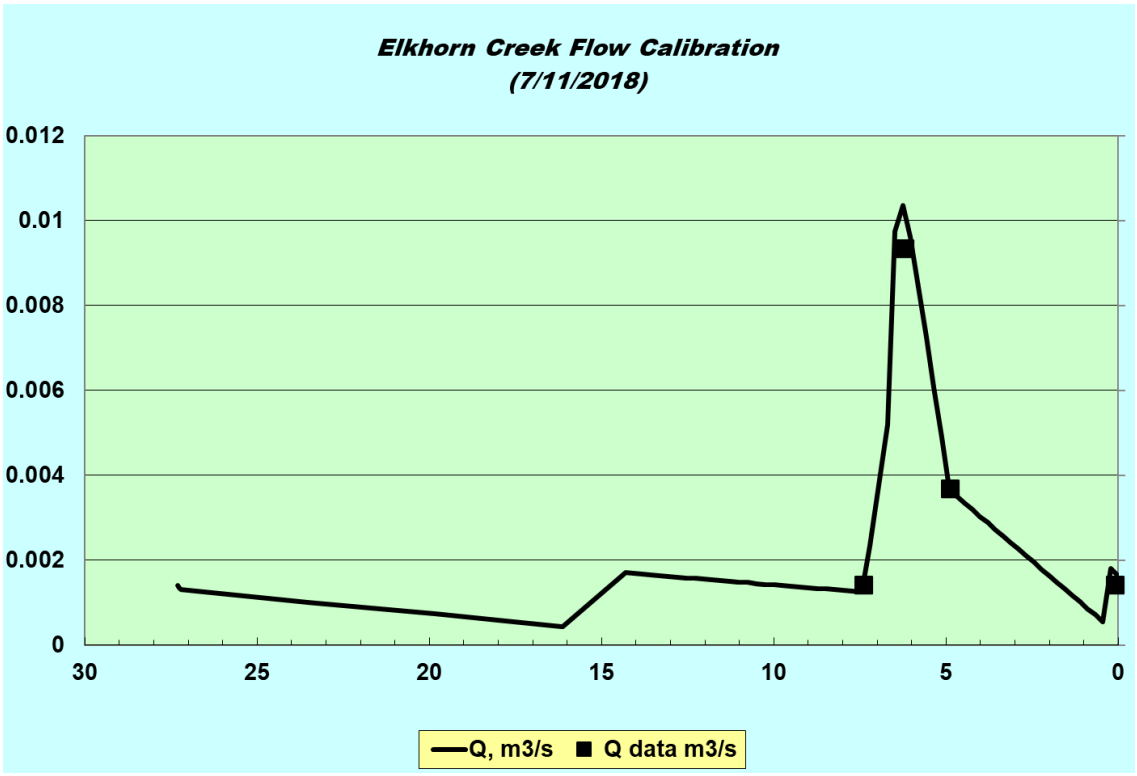



**Figure 4. Elkhorn Creek QUAL2K Calibration Flow Model Output**

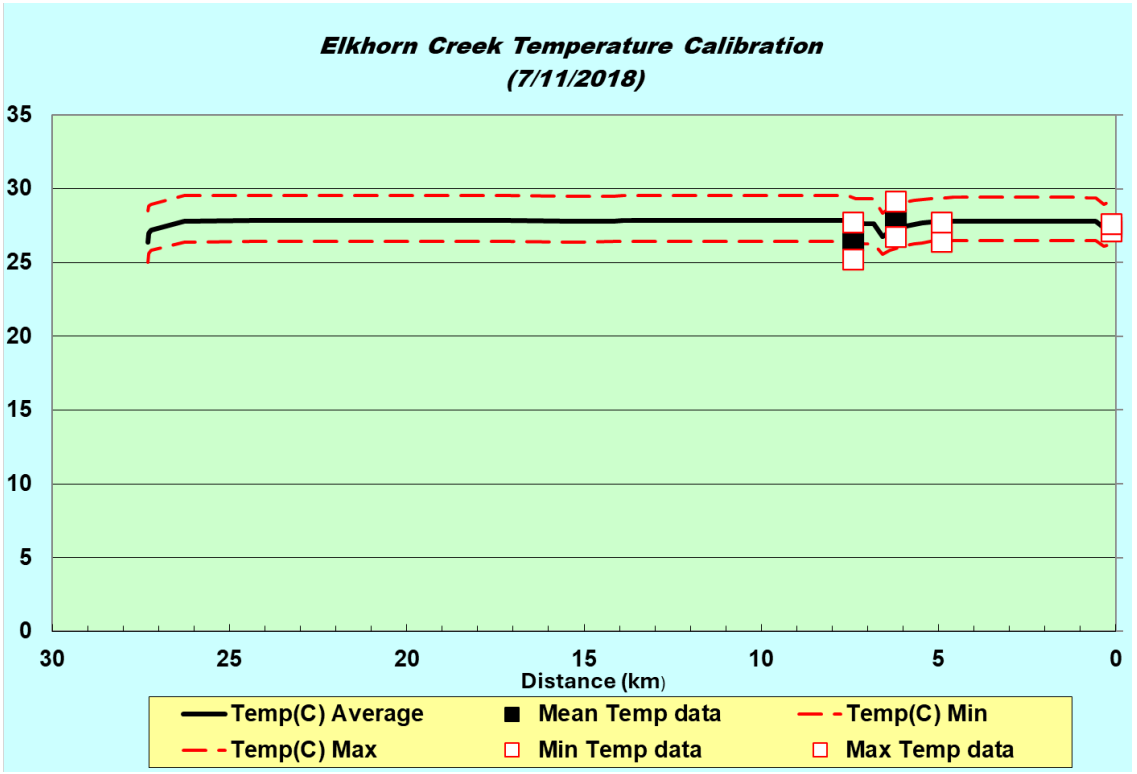



**Figure 5. Elkhorn Creek QUAL2K Calibration Temperature Model Output**

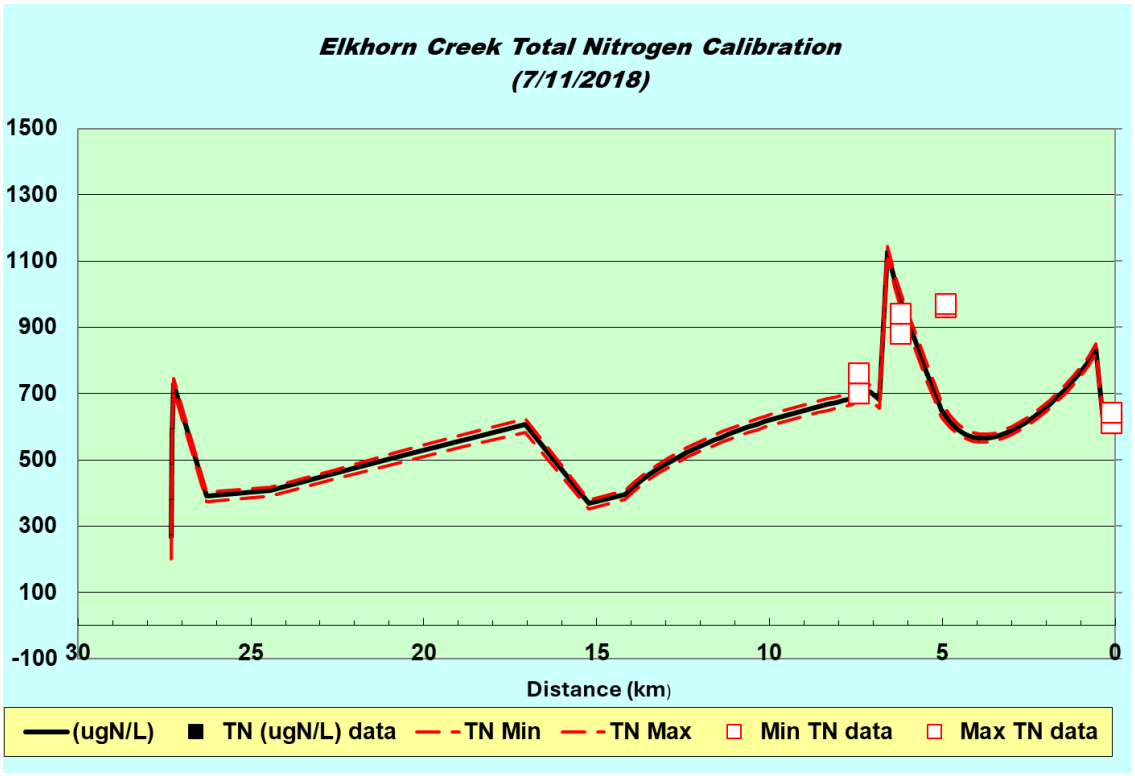



**Figure 6. Elkhorn Creek QUAL2K Calibration TN Model Output**

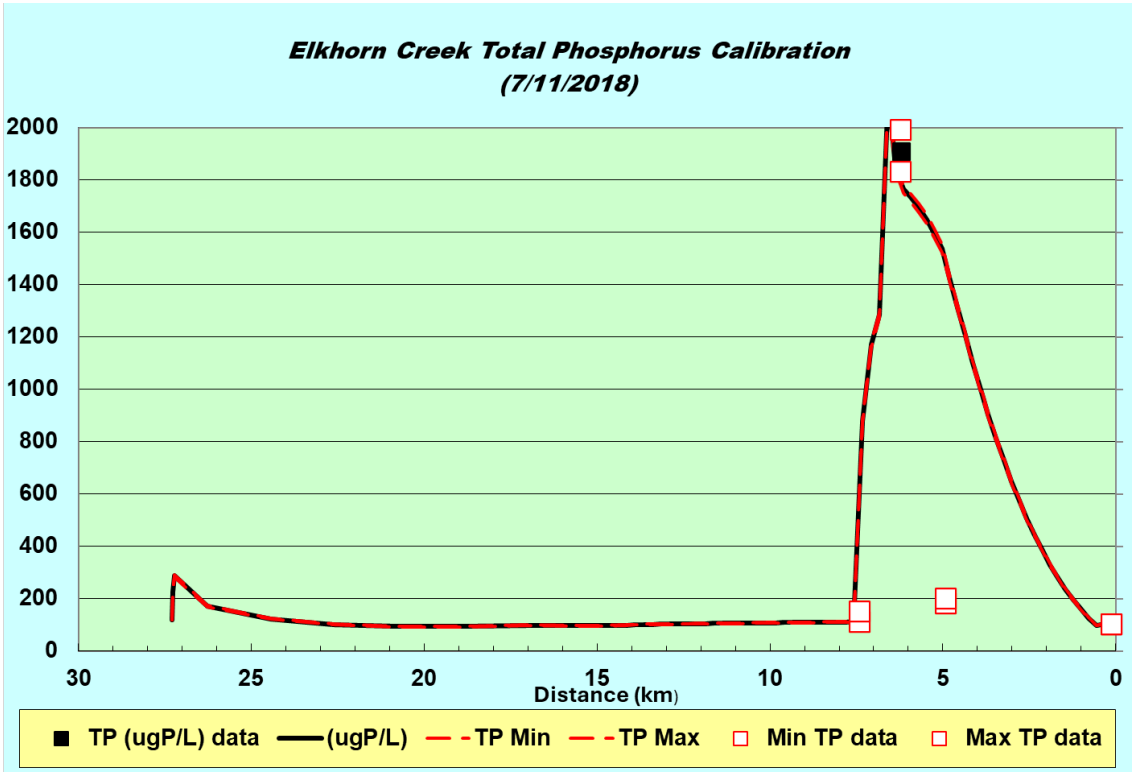



**Figure 7. Elkhorn Creek QUAL2K Calibration TP Model Output**

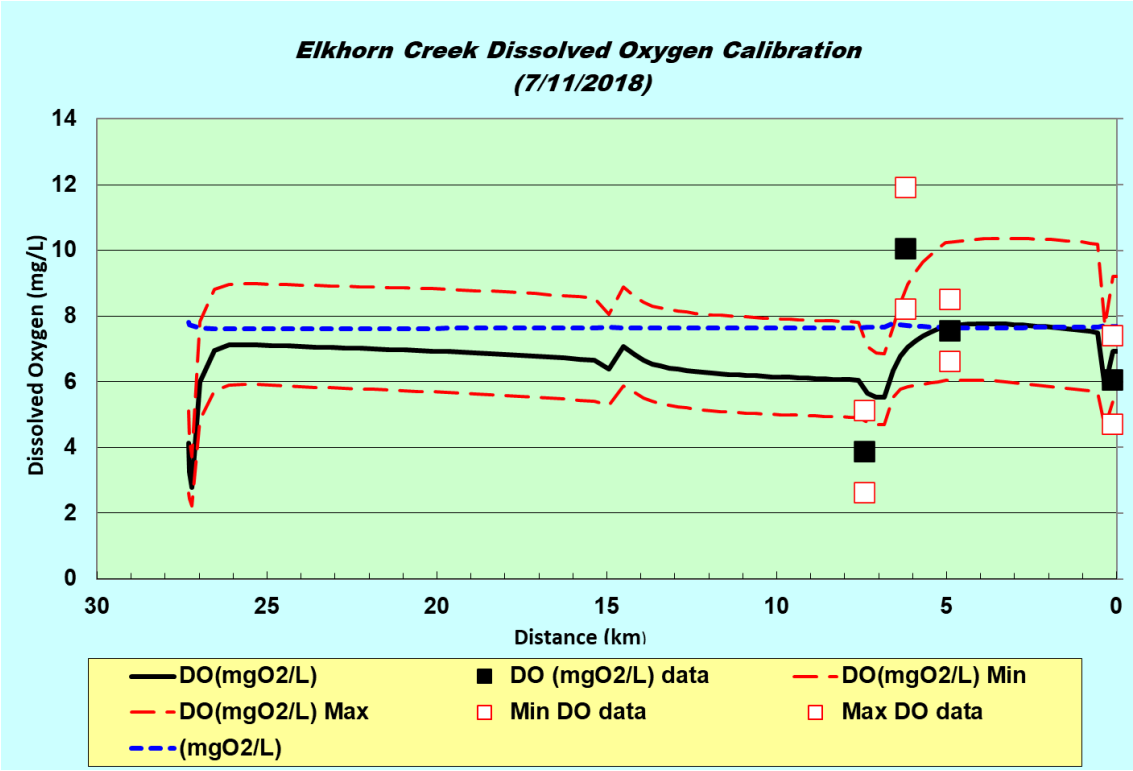



**Figure 8. Elkhorn Creek QUAL2K Calibration Dissolved Oxygen Model Output**

**Critical Condition Model for Effluent Concentration Recommendations**

Effluent concentration recommendations are based on critical condition model outputs. The critical condition model represents water quality when effluent from the proposed Project Green outfall discharges at design flow, Elkhorn Creek is at 7Q10 low flow conditions and water temperatures are at levels typical for the warmest month of the year. Critical condition water temperatures at the headwaters were based on the sample data collected on July 11, 2018. Inflow values for the headwater reach, unnamed tributary, and Little Elkhorn Creek were adjusted to 7Q10 levels acquired from the USGS StreamStats website for each subwatershed (shown earlier in Figure 2). All other rates and formulae were retained from the calibration model except for a reduction in the diffuse abstraction in Reach 1 needed to avoid a negative flow error.

Multiple critical condition models were developed to capture the proposed design flow range of 24,000 - 34,000 gpd for the domestic system. Effluent concentration inputs for these models are summarized in Table 6. The final modeled effluent concentrations shown earlier in Tables 1 and 2 are derived from these model inputs. Effluent concentrations of 51.3 mg/L TN and 12.6 mg/L TP are representative of untreated domestic wastewater; if the effluent does not exceed these modeled effluent concentrations, then the discharge will not cause or contribute to the DO impairment.

**Table 6. Critical Condition QUAL2k Model Inputs and DO Results for Project Green Proposed Discharge**

| Relevant Table (pages 2-3 of this report) | Modeled Effluent Concentrations | | | | | Resultant In-stream Minimum DO mg/L |
|---|---|---|---|---|---|---|
| | Flow GPD | DO mg/L | $CBOD_u$* mg/L | TN mg/L | TP mg/L | |
| Table 1 | 24,000 | 5 | 19.7 | 51.3 | 12.6 | 5.09 |
| Table 2 | 34,000 | 5 | 19.7 | 35 | 12.6 | 5.00 |

* QUAL2K requires inputs be entered as ultimate CBOD ($CBOD_u$). For this analysis the following conversions were used: [$CBOD_5 = BOD_5/1.29$] [$CBOD_u = CBOD_5/(1-e^{-kt})$] where k = 0.1 and t = 5 days.

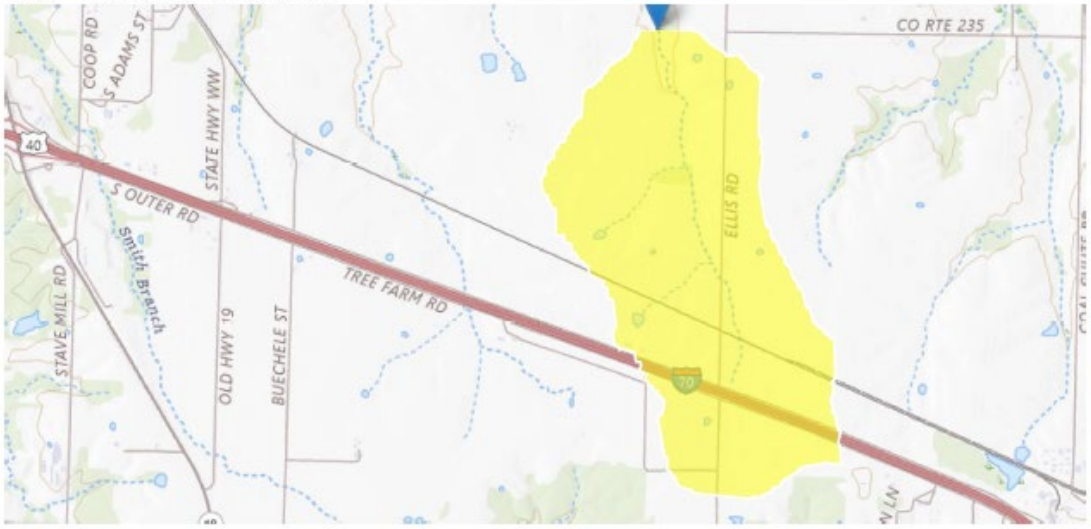
The critical condition models also indicated that an effluent temperature of 80.6 F° for the domestic system will be protective of temperature criteria in Elkhorn Creek. These effluent concentrations are expected to be protective of Missouri's water quality standards and result in attainment of Missouri's DO criterion and temperature criteria. This is confirmed by the QUAL2K models producing results showing DO equal to or greater than 5.0 mg/L across all stream reaches during critical low-flow conditions in all modeled scenarios. These recommended effluent concentrations were developed using appropriate conservative assumptions and best professional judgement. The department will maintain copies of all modeled scenarios and can provide them upon request.

# APPENDIX D: STREAMSTATS LOW FLOW REPORT



## StreamStats Report

**Region ID:** MO
**Clicked Point (Latitude, Longitude):** 38.90513, -91.41397
**Time:** 2026-03-02 11:11:59 -0600




### StreamStats Update

Starting with version 4.30.0, the StreamStats application uses services that were redeveloped with open-source software components. Users may observe minor variations in computed results when compared to those from previous versions. These differences are expected and do not reflect errors in the underlying data or analytical methods. Users are advised to consider these potential variations when interpreting or comparing results generated across different versions of StreamStats. Please email streamstats@usgs.gov with any questions or concerns. A full list of changes can be found at **https://www.usgs.gov/streamstats/news/streamstats-data-updates-open-source-code-release (https://www.usgs.gov/streamstats/news/streamstats-data-updates-open-source-code-release)** .

Collapse All

### Basin Characteristics

| Parameter Code | Parameter Description | Value | Unit |
|---|---|---|---|
| DRNAREA | Area that drains to a point on a stream | 1.07 | square miles |
| LFPLENGTH | Length of longest flow path | 1.916 | miles |
| STREAM_VARG | Streamflow variability index as defined in WRIR 02-4068, computed from regional grid | 0.71 | dimensionless |

## Low-Flow Statistics

### Low-Flow Statistics Parameters [LowFlow Region 1 SIR 2013 5090]

| Parameter Code | Parameter Name | Value | Units | Min Limit | Max Limit |
|---|---|---|---|---|---|
| DRNAREA | Drainage Area | 1.07 | square miles | 0.34 | 4320 |
| LFPLENGTH | LFP length | 1.916 | miles | 1.28 | 268 |
| STREAM_VARG | Streamflow Variability Index from Grid | 0.71 | dimensionless | 0.376 | 1.03 |

### Low-Flow Statistics Flow Report [LowFlow Region 1 SIR 2013 5090]

| Statistic | Value | Unit |
|---|---|---|
| 1 Day 10 Year Low Flow | 0.000151 | ft^3/s |
| 2 Day 10 Year Low Flow | 0.000159 | ft^3/s |
| 3 Day 10 Year Low Flow | 0.000186 | ft^3/s |
| 7 Day 10 Year Low Flow | 0.000217 | ft^3/s |
| 10 Day 10 Year Low Flow | 0.000271 | ft^3/s |
| 30 Day 10 Year Low Flow | 0.00138 | ft^3/s |
| 60 Day 10 Year Low Flow | 0.00243 | ft^3/s |

*Low-Flow Statistics Citations*

**Southard, R.E.,2013, Computed statistics at streamgages, and methods for estimating low-flow frequency statistics and development of regional regression equations for estimating low-flow frequency statistics at ungaged locations in Missouri: U.S. Geological Survey Scientific Investigations Report 2013–5090, 28 p. (http://pubs.usgs.gov/sir/2013/5090/)**

USGS Data Disclaimer: Unless otherwise stated, all data, metadata and related materials are considered to satisfy the quality standards relative to the purpose for which the data were collected. Although these data and associated metadata have been reviewed for accuracy and completeness and approved for release by the U.S. Geological Survey (USGS), no warranty expressed or implied is made regarding the display or utility of the data for other purposes, nor on all computer systems, nor shall the act of distribution constitute any such warranty.

USGS Software Disclaimer: This software has been approved for release by the U.S. Geological Survey (USGS). Although the software has been subjected to rigorous review, the USGS reserves the right to update the software as needed pursuant to further analysis and review. No warranty, expressed or implied, is made by the USGS or the U.S. Government as to the functionality of the software and related material nor shall the fact of release constitute any such warranty. Furthermore, the software is released on condition that neither the USGS nor the U.S. Government shall be held liable for any damages resulting from its authorized or unauthorized use.

USGS Product Names Disclaimer: Any use of trade, firm, or product names is for descriptive purposes only and does not imply endorsement by the U.S. Government.

Application Version: 4.31.1
SSHydro Services Version: 1.1.1
SSDelineate Services Version: 1.0.1
NSS Services Version: 2.2.1
GageStats Services Version: 1.2.1
Pourpoint Services Version: 1.2.0
Batch Processor Version: 1.6.1

## APPENDIX E: GEOHYDROLOGIC EVALUATION

MISSOURI DEPARTMENT OF NATURAL RESOURCES

Mike Kehoe
Governor

Kurt U. Schaefer
Director

LWE26016
Montgomery County

September 26, 2025

Cody Luebbering
2009 East McCarty St.
Jefferson City, MO 65101

**RE: Elkhorn WWTP**

Dear Cody Luebbering :

On August 12, 2025 , the Missouri Geological Survey received a request to perform a geohydrologic evaluation for the above referenced project located in Montgomery 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

Molly A Starkey

Molly Starkey
Geologist
Environmental Geology Section

c: NorthPoint Development
WPP
St. Louis Regional Office

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

Project ID Number
**LWE26016**
County
**Montgomery County**

**Request Details**

Project: Elkhorn WWTP

Legal Description: 30 T48N R04W
Quadrangle: NEW FLORENCE
Latitude: 38 54 5.46
Longitude: -91 24 42.63

**Organization Official**

Name: NorthPoint Development
Address: 3315 North Oak Trafficway
City: Kansas City
State: MO Zip: 64116
Phone: 573-825-4383
Email: bsherar@northpointkc.com

**Preparer**

Name: Cody Luebbering
Address: 2009 East McCarty St.
City: Jefferson City
State: MO Zip: 65101
Phone: 573-694-8620
Email: cluebbering@geosyntec.com

**Project Details**

**Report Date:** 09/26/2025
**Date of Field Visit:** 09/24/2025

**Previous Reports:** Not Applicable

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

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

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

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

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

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

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

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

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

**Bedrock:** Pennsylvanian-age Desmoinesian Stage

**Surficial Materials:** Dark brown silt loam to clay loam and loess

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

Project ID Number
**LWE26016**
County
**Montgomery County**

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

**Remarks:**

On September 24, 2025, a geologist with the Missouri Geological Survey conducted a geohydrologic evaluation for a proposed mechanical treatment plant in Montgomery County. The proposed facility will discharge to waters of the state. The purpose of the site visit was to observe the geologic and hydrologic characteristics of the site and to determine the potential impacts in the event of wastewater treatment failure.

The site is located in a broad upland, approximately one and a half miles east of New Florence. Surface water at the site is drained by Elkhorn Creek, which runs from south to north across the site. This will also be the receiving stream for discharge from the facility.

Surficial materials on site were observed in situ in the banks of the creek. Surficial materials are primarily dark brown clay loam and silt loam with low overall permeability. Surficial materials are estimated to be approximately 80 feet thick at this location.

Bedrock was not observed on site or in the surrounding area. This is consistent with thick sequences of surficial materials in the area. According to geologic mapping, the uppermost bedrock in this area is the Pennsylvanian-age Desmoinesian Stage, which is the basal Pennsylvanian strata. In this area, the bedrock is refractory clays of the Cheltenham Formation. This material has low permeability.

Overall the site receives a slight geologic limitations rating. In the event of wastewater treatment failure, the surface waters of Elkhorn Creek may be adversely impacted.

STATE OF MISSOURI
MOLLY A. STARKEY
RG
2017014886
REGISTERED GEOLOGIST

09/26/2025

# APPENDIX F: NATURAL HERITAGE REVIEW

## Missouri Department of Conservation

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

### Natural Heritage Review Level One Report: No Known Records

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

PROJECT INFORMATION

**Project Name and ID Number:** New Florence Project #17016
**Project Description:** Industrial Wastewater Treatment Facility
**Project Type:** Residential, Commercial and Governmental Building Development
**Contact Person:** Cody Luebbering
**Contact Information:** cluebbering@geosyntec.com or 5734434100

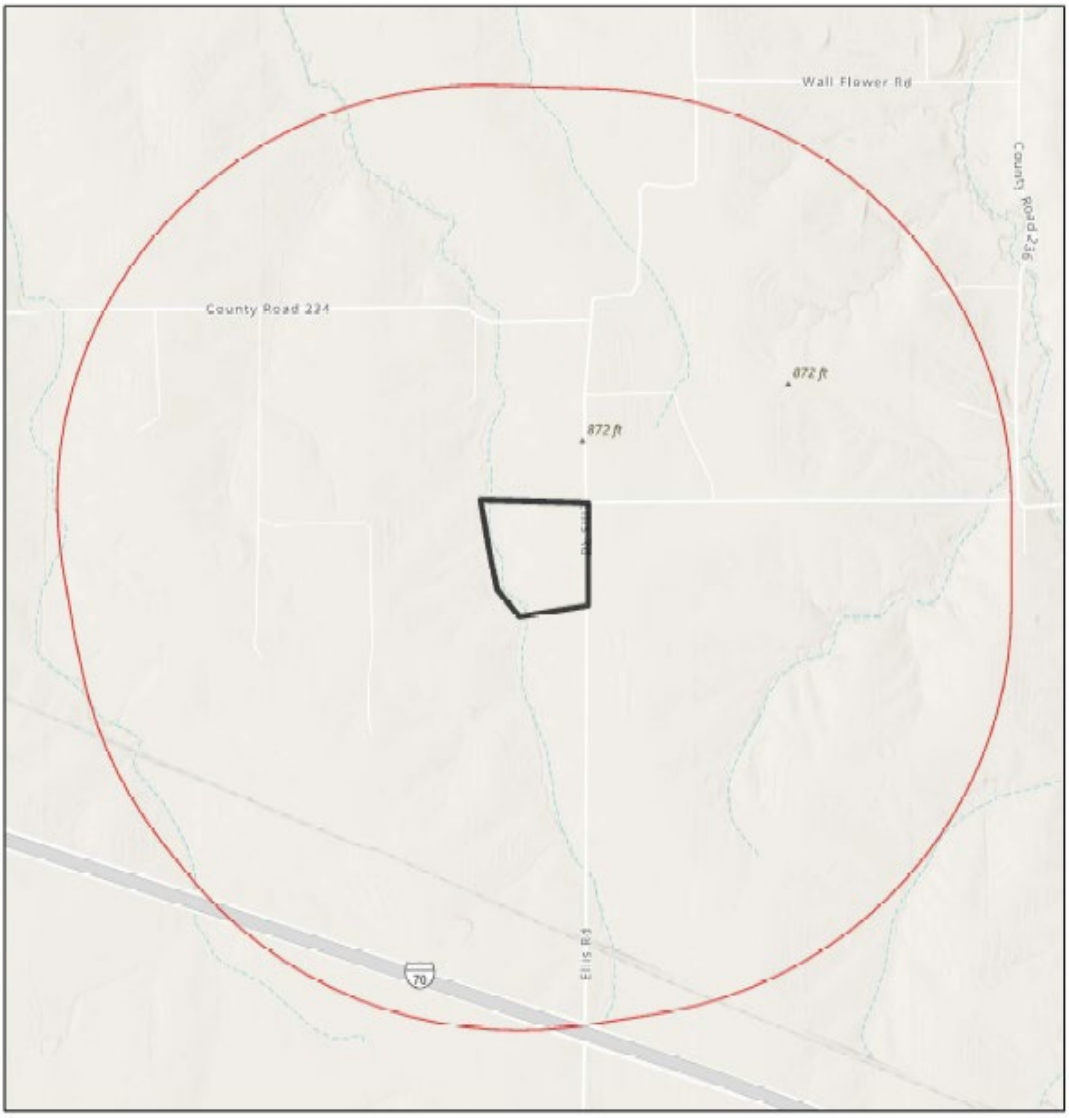
**Disclaimer:** This NATURAL HERITAGE REVIEW REPORT identifies if a species or natural community tracked by the Natural Heritage Program is known to occur within or near the project area submitted, and shares recommendations to avoid or minimize project impacts to sensitive species or natural habitats. Incorporating information from the Natural Heritage Program into project plans is an important step in reducing impacts to Missouri's sensitive natural resources. If an occurrence record is present, or the proposed project might affect federally listed species, the user must contact the Department of Conservation or U.S. Fish and Wildlife Service for more information.

This Natural Heritage Review Report is not a site clearance letter for the project. 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. However, the Natural Heritage Program is only one reference that should be used to evaluate potential adverse project impacts and additional information (e.g. wetland or soils maps, on-site inspections or surveys) should be considered. Reviewing current landscape and habitat information, and species' biological characteristics would additionally ensure that Missouri Species of Conservation Concern are appropriately identified and addressed in planning efforts.

**U.S. Fish and Wildlife Service – Endangered Species Act (ESA) Coordination:** Lack of a Natural Heritage Program occurrence record for federally listed species in your project area does not mean the species is not present, as the area may never have been surveyed. Presence of a Natural Heritage Program occurrence record does not mean the project will result in negative impacts. This report does not fulfill Endangered Species Act consultation with the U.S. Fish and Wildlife Service (USFWS) for listed species. Direct contact with the USFWS may be necessary to complete consultation and it is required for actions with a federal connection, such as federal funding or a federal permit; direct contact is also required if ESA concurrence is necessary. Visit IPaC: Home (fws.gov) to initiate USFWS Information for Planning and Conservation (IPaC) consultation. Contact the Columbia Missouri Ecological Field Services Office (573-234-2132, or by mail at 101 Park Deville Drive, Suite A, Columbia, MO 65203) for more information.

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

# New Florence Project




September 30, 2025

1:21,146

0 0.17 0.35 0.7 mi

0 0.28 0.55 1.1 km

Buffered Project Boundary

Project Boundary

Missouri Dept. of Conservation, Missouri DNR, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, Esri, NASA, NGA, USGS, FEMA

**Species or Communities of Conservation Concern within the Area:**

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

**Other Special Search Results:**

No results have been identified for this project location.

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

**Project Location and/or Species Recommendations:**

**Endangered Species Act Coordination - 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 bats** *(Myotis sodalis*, federal- and state-listed endangered) and **Northern long-eared bats** (*Myotis septentrionalis,* federal-listed endangered) may occur near the project area. Both of these species of bats hibernate during winter months in caves and mines. During the summer months, they roost and raise young under the bark of trees in wooded areas, often riparian forests and upland forests near perennial streams. During project activities, avoid degrading stream quality and where possible leave snags standing and preserve mature forest canopy. Do not enter caves known to harbor Indiana bats or Northern long-eared bats, especially from September to April.

**Karst**: This 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; please check your project site for any karst features and make every effort to protect groundwater in the project area. Additional information and specific recommendations are available at Management Recommendations for Construction and Development Projects Affecting Missouri Karst Habitat (mo.gov).

**Invasive exotic species** are a significant issue for fish, wildlife and agriculture in Missouri. Seeds, eggs, and larvae may be moved to new sites on boats or construction equipment. Please inspect and clean equipment thoroughly before moving between project sites. See Managing Invasive Species in Your Community | Missouri Department of Conservation (mo.gov) for more information.

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

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

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

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

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

**Miscellaneous Information**

FEDERAL Concerns are species/habitats protected under the Federal Endangered Species Act and that have been known near enough to the project site to warrant consideration. For these, project managers must contact the U.S. Fish and Wildlife Service Ecological Services (101 Park Deville Drive Suite A, Columbia, Missouri 65203-0007; Phone 573-234-2132; Fax 573-234-2181) for consultation.

STATE Concerns are species/habitats known to exist near enough to the project site to warrant concern and that are protected under the Wildlife Code of Missouri (RSMo 3 CSR 1 0). "State Endangered Status" is determined by the Missouri Conservation Commission under constitutional authority, with requirements expressed in the Missouri Wildlife Code, rule 3CSR 1 0-4.111. Species tracked by the Natural Heritage Program have a "State Rank" which is a numeric rank of relative rarity. Species tracked by this program and all native Missouri wildlife are protected under rule 3CSR 10-4.110 General Provisions of the Wildlife Code.

See Missouri Species and Communities of Conservation Concern Checklist (mo.gov) for a complete list of species and communities of conservation concern, and visit mdc.mo.gov/your-property/responsible-construction/species-impact-best-practices for all species-specific Best Management Practices. Detailed information about the animals and some plants mentioned may be accessed at Missouri Fish and Wildlife Information System (MOFWIS) and MDC Field Guides . Please contact the Missouri Department of Conservation to request printed copies of any materials linked in this document.

## APPENDIX G: U.S. FISH & WILDLIFE SERVICE INFORMATION FOR PLANNING AND CONSULTATION REPORT

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Missouri Ecological Services Field Office
101 Park Deville Drive
Suite A
Columbia, MO 65203-0057
Phone: (573) 234-2132 Fax: (573) 234-2181

In Reply Refer To: 09/30/2025 14:28:55 UTC
Project Code: 2025-0156429
Project Name: New Florence Project Resource List

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

**Threatened and Endangered Species**

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and may be affected by your proposed project. The species list fulfills the requirement for obtaining a Technical Assistance Letter from the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).
New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. **Note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days.** The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

**Consultation Technical Assistance**

Refer to the Midwest Region S7 Technical Assistance website for step-by-step instructions for making species determinations and for specific guidance on the following types of projects: projects in developed areas, HUD, pipelines, buried utilities, telecommunications, and requests

for a Conditional Letter of Map Revision (CLOMR) from FEMA. Please contact the appropriate POC at Missouri Ecological Services for any additional consultation needs.

**Federally Listed Bat Species**

Indiana bats, gray bats, and northern long-eared bats occur throughout Missouri and the information below may help in determining if your project may affect these species.

*Gray bats* - Gray bats roost in caves or mines year-round and use water features and forested riparian corridors for foraging and travel. If your project will impact caves, mines, associated riparian areas, or will involve tree removal around these features – particularly within stream corridors, riparian areas, or associated upland woodlots –gray bats could be affected.
*Indiana and northern long-eared bats* - These species hibernate in caves or mines only during the winter. In Missouri the inactive season is considered to be October 15 to March 31 unless the project is located within a 1/2 mile of a hibernacula. During the active season in Missouri they roost in forest and woodland habitats. Suitable summer habitat for Indiana bats and northern long-eared bats consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥5 inches diameter at breast height (dbh) for Indiana bat, and ≥3 inches dbh for northern long-eared bat, that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Tree species often include, but are not limited to, shellbark or shagbark hickory, white oak, cottonwood, and maple. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet (305 meters) of other forested/wooded habitat. Northern long-eared bats have also been observed roosting in human-made structures, such as buildings, barns, bridges, and bat houses; therefore, these structures should also be considered potential summer habitat and evaluated for use by bats. If your project will impact caves or mines or will involve clearing forest or woodland habitat containing suitable roosting habitat, Indiana bats or northern long-eared bats could be affected.
Examples of unsuitable habitat include:

- Individual trees that are greater than 1,000 feet from forested or wooded areas;
- Trees found in highly-developed urban areas (e.g., street trees, downtown areas);
- A pure stand of less than 3-inch dbh trees that are not mixed with larger trees; and
- A stand of eastern red cedar shrubby vegetation with no potential roost trees.

**Using the IPaC Official Species List to Make No Effect and May Affect Determinations for Listed Species**

1. If IPaC returns a result of "There are no listed species found within the vicinity of the project," then project proponents can conclude the proposed activities will have **no effect** on any federally listed species under Service jurisdiction. Concurrence from the Service is not required for **No Effect** determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records. An example "No Effect" document also can be found on the S7 Technical Assistance website.

2. If IPaC returns one or more federally listed, proposed, or candidate species as potentially present in the action area of the proposed project – other than bats (see #3 below) – then project proponents can conclude the proposed activities **may affect** those species. For assistance in determining if suitable habitat for listed, candidate, or proposed species occurs within your project area or if species may be affected by project activities, you can obtain Life History Information for Listed and Candidate Species through the Species website.
3. If IPac returns a result that one or more federally listed bat species (Indiana bat, northern long-eared bat, or gray bat) are potentially present in the action area of the proposed project, project proponents can conclude the proposed activities **may affect** these bat species **IF** one or more of the following activities are proposed:
    a. Clearing or disturbing suitable roosting habitat, as defined above, at any time of year;
    b. Any activity in or near the entrance to a cave or mine;
    c. Mining, deep excavation, or underground work within 0.5 miles of a cave or mine;
    d. Construction of one or more wind turbines; or
    e. Demolition or reconstruction of human-made structures that are known to be used by bats based on observations of roosting bats, bats emerging at dusk, or guano deposits or stains.

If none of the above activities are proposed, project proponents can conclude the proposed activities will have **no effect** on listed bat species. Concurrence from the Service is not required for **No Effect** determinations. No further consultation or coordination is required. Attach this letter to the dated IPaC species list report for your records. An example "No Effect" document also can be found on the S7 Technical Assistance website.
If any of the above activities are proposed in areas where one or more bat species may be present, project proponents can conclude the proposed activities **may affect** one or more bat species. We recommend coordinating with the Service as early as possible during project planning. If your project will involve removal of over 5 acres of suitable forest or woodland habitat, we recommend you complete a Summer Habitat Assessment prior to contacting our office to expedite the consultation process. The Summer Habitat Assessment Form is available in Appendix A of the most recent version of the Range-wide Indiana Bat Summer Survey Guidelines.

**Other Trust Resources and Activities**

*Bald and Golden Eagles* - Although the bald eagle has been removed from the endangered species list, this species and the golden eagle are protected by the Bald and Golden Eagle Act and the Migratory Bird Treaty Act. Should bald or golden eagles occur within or near the project area please contact our office for further coordination. For communication and wind energy projects, please refer to additional guidelines below.

*Migratory Birds* - The Migratory Bird Treaty Act (MBTA) prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Service. The Service has the responsibility under the MBTA

to proactively prevent the mortality of migratory birds whenever possible and we encourage implementation of recommendations that minimize potential impacts to migratory birds. Such measures include clearing forested habitat outside the nesting season (generally March 1 to August 31) or conducting nest surveys prior to clearing to avoid injury to eggs or nestlings.

*Communication Towers* - Construction of new communications towers (including radio, television, cellular, and microwave) creates a potentially significant impact on migratory birds, especially some 350 species of night-migrating birds. However, the Service has developed voluntary guidelines for minimizing impacts.

*Transmission Lines* - Migratory birds, especially large species with long wingspans, heavy bodies, and poor maneuverability can also collide with power lines. In addition, mortality can occur when birds, particularly hawks, eagles, kites, falcons, and owls, attempt to perch on uninsulated or unguarded power poles. To minimize these risks, please refer to guidelines developed by the Avian Power Line Interaction Committee and the Service. Implementation of these measures is especially important along sections of lines adjacent to wetlands or other areas that support large numbers of raptors and migratory birds.

*Wind Energy* - To minimize impacts to migratory birds and bats, wind energy projects should follow the Service's Wind Energy Guidelines. In addition, please refer to the Service's Eagle Conservation Plan Guidance, which provides guidance for conserving bald and golden eagles in the course of siting, constructing, and operating wind energy facilities.

**Next Steps**

Should you determine that project activities **may affect** any federally listed species or trust resources described herein, please contact our office for further coordination. Letters with requests for consultation or correspondence about your project should include the Consultation Tracking Number in the header. Electronic submission is preferred.

If you have not already done so, please contact the Missouri Department of Conservation (Policy Coordination, P. O. Box 180, Jefferson City, MO 65102) for information concerning Missouri Natural Communities and Species of Conservation Concern.
We appreciate your concern for threatened and endangered species. Please feel free to contact our office with questions or for additional information.

John Weber

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Wetlands

# OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

**Missouri Ecological Services Field Office**
101 Park Deville Drive
Suite A
Columbia, MO 65203-0057
(573) 234-2132

# PROJECT SUMMARY

Project Code: 2025-0156429
Project Name: New Florence Project Resource List
Project Type: Commercial Development
Project Description: New development and industrial WWTF discharge
Project Location:

The approximate location of the project can be viewed in Google Maps: https://www.google.com/maps/@38.90205415,-91.42510884679879,14z




Counties: Montgomery County, Missouri

## ENDANGERED SPECIES ACT SPECIES

There is a total of 5 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries[1], as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

---

1. NOAA Fisheries, also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

## MAMMALS

| NAME | STATUS |
|---|---|
| Gray Bat *Myotis grisescens*<br>No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/6329<br>General project design guidelines:<br>https://ipac.ecosphere.fws.gov/project/JL5IVP2P2JEY3KMUR3SNMEEOBY/documents/generated/9456.pdf | Endangered |
| Indiana Bat *Myotis sodalis*<br>There is **final** critical habitat for this species. Your location does not overlap the critical habitat.<br>Species profile: https://ecos.fws.gov/ecp/species/5949<br>General project design guidelines:<br>https://ipac.ecosphere.fws.gov/project/JL5IVP2P2JEY3KMUR3SNMEEOBY/documents/generated/9456.pdf | Endangered |
| Northern Long-eared Bat *Myotis septentrionalis*<br>No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/9045<br>General project design guidelines:<br>https://ipac.ecosphere.fws.gov/project/JL5IVP2P2JEY3KMUR3SNMEEOBY/documents/generated/9456.pdf | Endangered |
| Tricolored Bat *Perimyotis subflavus*<br>No critical habitat has been designated for this species.<br>Species profile: https://ecos.fws.gov/ecp/species/10515<br>General project design guidelines:<br>https://ipac.ecosphere.fws.gov/project/JL5IVP2P2JEY3KMUR3SNMEEOBY/documents/generated/9456.pdf | Proposed Endangered |

## INSECTS

| NAME | STATUS |
|---|---|
| Monarch Butterfly *Danaus plexippus*<br>There is **proposed** critical habitat for this species. Your location does not overlap the critical habitat.<br>Species profile: https://ecos.fws.gov/ecp/species/9743 | Proposed Threatened |

## CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

# USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

# WETLANDS

Impacts to NWI wetlands and other aquatic habitats may be subject to regulation under Section 404 of the Clean Water Act, or other State/Federal statutes.

For more information please contact the Regulatory Program of the local U.S. Army Corps of Engineers District.

Please note that the NWI data being shown may be out of date. We are currently working to update our NWI data set. We recommend you verify these results with a site visit to determine the actual extent of wetlands on site.

FRESHWATER FORESTED/SHRUB WETLAND

- PFO1C
- PFO1A

FRESHWATER EMERGENT WETLAND

- PEM1C
- PEM1A

RIVERINE

- R4SBCx
- R5UBH
- R4SBC

FRESHWATER POND

- PUBGh
- PUBFh
- PUBFx

## IPAC USER CONTACT INFORMATION


| | |
|---|---|
| Agency: | Geosyntec Consultants |
| Name: | Cody Luebbering |
| Address: | 2009 East McCarty Street |
| Address Line 2: | SUITE 1 |
| City: | Jefferson City |
| State: | MO |
| Zip: | 65101 |
| Email | cluebbering@geosyntec.com |
| Phone: | 5734434100 |

## APPENDIX H: LETTERS OF SUPPORT FOR PROJECT GREEN

**CITY of MONTGOMERY**

City Hall: Phone (573) 564-3160 • Fax (573) 564-3802

723 North Sturgeon • Montgomery City • MO • 63361

January 7, 2026

Cailie Carlile, P.E.
Antidegradation Unit Chief, Water Protection Program
Missouri Department of Natural Resources
1101 Riverside Drive
PO Box 176
Jefferson City, MO 65102-0176

On behalf of the City of Montgomery, Missouri, we would like to give our full support to the proposed data center project by Amazon Data Services, Inc, and real estate development firm NorthPoint Development, better known as Project Green. This project represents an amazing opportunity for Montgomery County and its residents and could vastly improve our quality of life here for the foreseeable future.

I have been at the City of Montgomery for almost 29 years, and this is the best economic development opportunity the County has ever had. It would be transformational for all of our County taxing entities, especially our schools. If we could design the perfect industry for our community, it would be this type of project. They are a massive boon to our revenue streams, low impact on our environment, quiet, clean, great community partners, and provide hundreds of excellent, high paying jobs that we desperately need. It would allow us to attract/retain many other businesses and residents and add many new amenities to our community. Instead of fighting to get enough teachers and workers for our vital public entities, we would become an attractive destination. We would have opportunities for more of our youth to stay here and have prosperous lives. The possibilities are endless for a great rural area like ours. This is the kind of slower, sustainable growth that we will benefit from for years to come.

In addition to creating the great full-time jobs, the project will also generate thousands of construction jobs and will add valuable water, solid waste, and other infrastructure improvements to the entire area with no cost to the community. This will improve all these services while allowing us future growth opportunities in the area as well. The billions of dollars in new taxes will help all the County's taxing jurisdictions improve their service to our constituents and lead to many other retail and service industries locating to our community. This property currently only generates approximately $9,000 a year in taxes and is located along I-70, the railroad, and Ameren's large substation making it an ideal spot for this type of Industrial development.

Project Green is an amazing opportunity to change the financial outlook for our County without an overwhelming, burdening amount of immediate population growth. It offers high-paying jobs, large new revenues for our County's servicing entities, great opportunities for economic growth, and a great prospect for the quality of life for our residents while having a low impact on the environment. Thank you in advance for your consideration of this great project for our collective future and please let us know if you have any questions.

Sincerely,

Steven W. Deves
City Administrator, Montgomery City, MO

**Greater Montgomery County Economic Development Council**
723 N. Sturgeon
Montgomery City, MO 63361

January 6, 2026

Callie Carlile, P.E.
Antidegradation Unit Chief
Water Protection Program
Missouri Department of Natural Resources
1101 Riverside Drive
PO Box 176
Jefferson City, MO 65102-0176

The Montgomery County EDC supports Project Green, the proposed data center project by Amazon Data Services, Inc, and real estate development firm NorthPoint Development. We are convinced that this project represents a transformative opportunity for the economic future of Montgomery County.

Project Green is a catalyst for widespread, long-term prosperity for Montgomery County. The project brings construction of a state-of-the-art data center campus, representing a capital investment of potentially up to $42.5 billion—comprising as much as $7.5 billion in real property improvements and $35 billion in personal property and equipment. An investment of this magnitude is a generational opportunity that will redefine our county's economic landscape.

The direct economic benefits to Montgomery County and its residents are substantial and immediate:

Job Creation and High-Quality Wages: The project commits to creating a minimum of 150 new, permanent jobs with an average annual wage of at least 150% of the county's average wage. These are the high-paying, stable careers our community needs to attract and retain talent. Furthermore, the construction phase will generate thousands of additional jobs, providing a significant boost to our local and regional workforce and suppliers.

Unprecedented Growth in Tax Revenue: A critical and commendable aspect of this plan is that there is no abatement on real property taxes. The project site currently generates a mere $8,901 in annual real property taxes. With the proposed improvements the site could generate over $1.5 billion in new, non-abated real property tax revenue at full build out of the project. This revenue will be a game-changer for vital public services, including the Montgomery County R-II School District, the Ambulance District, the Fire Protection District, and general county operations.

Significant PILOT and Direct Payments: In addition to the full real property taxes, the project could contribute up to $308 million in Payments in Lieu of Taxes (PILOTs) on personal property over the 25-year abatement period. It also includes $3 million in direct contractual payments in 2026 and 2027, specifically designated to enhance our county's 911 emergency response and dispatch services.

Beyond these direct financial contributions, Project Green will stimulate ancillary economic growth by creating opportunities for local businesses and suppliers during its multi-year construction phase. The associated public infrastructure improvements will modernize our county's foundation for future growth without the expenditure of public funds.

In conclusion, Project Green offers an unparalleled opportunity to secure a prosperous future for Montgomery County. It brings high-paying jobs, creates a massive and stable new tax base for our schools, emergency services, health and developmental disabilities support services to residents and stimulate broad economic activity.

Thank you for your review and please let us know if you have any questions.

Sincerely,

Brent Speight, Chairman
Greater Montgomery County Economic Development Council

January 6, 2026

Cailie Carlile, P.E.
Antidegradation Unit Chief
Water Protection Program
Missouri Department of Natural Resources
1101 Riverside Drive
PO Box 176
Jefferson City, MO 65102-0176

The Montgomery County R-II School District supports Project Green, the proposed data center project by Amazon Data Services, Inc, and real estate development firm NorthPoint Development. We are convinced that this project represents a transformative opportunity for the economic future of Montgomery County.

Project Green is a catalyst for widespread, long-term prosperity for Montgomery County. The project brings construction of a state-of-the-art data center campus, representing a capital investment of potentially up to $42.5 billion—comprising as much as $7.5 billion in real property improvements and $35 billion in personal property and equipment. An investment of this magnitude is a generational opportunity that will redefine our county's economic landscape.

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In conclusion, Project Green offers an unparalleled opportunity to secure a prosperous future for Montgomery County. It brings high-paying jobs, creates a massive and stable new tax base for our schools, emergency services, health and developmental disabilities support services to residents and stimulate broad economic activity.

Thank you for your review and please let us know if you have any questions.

Sincerely,



Dr. Brian White

Montgomery County R-II

Montgomery County
Developmental Disabilities Assistance Board

230 EAST NORMAN STREET
P.O. BOX 63
MONTGOMERY CITY, MO 63361
Phone: 573-564-5045
Fax: 573-564-3662
Daniel Cole, Executive Director

January 8, 2026

Cailie Carlile, P.E.
Antidegradation Unit Chief
Water Protection Program
Missouri Department of Natural Resources
1101 Riverside Drive
PO Box 176
Jefferson City, MO 65102-0176

The Developmental Disabilities Assistance Board of Montgomery County/Montgomery County SB 40 Board supports Project Green, the proposed data center project by Amazon Data Services, Inc, and real estate development firm NorthPoint Development. We are convinced that this project represents a transformative opportunity for the economic future of Montgomery County.

Project Green is a catalyst for widespread, long-term prosperity for Montgomery County. The project brings construction of a state-of-the-art data center campus, representing a capital investment of potentially up to $42.5 billion—comprising as much as $7.5 billion in real property improvements and $35 billion in personal property and equipment. An investment of this magnitude is a generational opportunity that will redefine our county's economic landscape.

The direct economic benefits to Montgomery County and its residents are substantial and immediate:
Job Creation and High-Quality Wages; Unprecedented Growth in Tax Revenue; Significant PILOT and Direct Payments. In addition to the full real property taxes, the project could contribute up to $308 million in Payments in Lieu of Taxes (PILOTs) on personal property over the 25-year abatement period. It also includes $3 million in direct contractual payments in 2026 and 2027, specifically designated to enhance our county's 911 emergency response and dispatch services.

Beyond these direct financial contributions, Project Green will stimulate ancillary economic growth by creating opportunities for local businesses and suppliers during its multi-year construction phase. The associated public infrastructure improvements will modernize our county's foundation for future growth without the expenditure of public funds.

In conclusion, Project Green offers an incredible opportunity to secure a prosperous future for Montgomery County. It brings high-paying jobs, creates a massive and stable new tax base for our schools, emergency services, health and developmental disabilities support services to residents and stimulate broad economic activity.

Thank you for your review and please let us know if you have any questions.

Sincerely,

Daniel Cole, Executive Director
Developmental Disabilities Assistance Board of Montgomery County

# GREATER MONTGOMERY COUNTY PORT AUTHORITY

January 6, 2026

Cailie Carlile, P.E.
Antidegradation Unit Chief
Water Protection Program
Missouri Department of Natural Resources
1101 Riverside Drive
PO Box 176
Jefferson City, MO 65102-0176

The Greater Montgomery County Port Authority supports Project Green, the proposed data center project by Amazon Data Services, Inc, and real estate development firm NorthPoint Development. We are convinced that this project represents a transformative opportunity for the economic future of Montgomery County.

Project Green is a catalyst for widespread, long-term prosperity for Montgomery County. The project brings construction of a state-of-the-art data center campus, representing a capital investment of potentially up to $42.5 billion—comprising as much as $7.5 billion in real property improvements and $35 billion in personal property and equipment. An investment of this magnitude is a generational opportunity that will redefine our county's economic landscape.

The direct economic benefits to Montgomery County and its residents are substantial and immediate:

Job Creation and High-Quality Wages: The project commits to creating a minimum of 150 new, permanent jobs with an average annual wage of at least 150% of the county's average wage. These are the high-paying, stable careers our community needs to attract and retain talent. Furthermore, the construction phase will generate thousands of additional jobs, providing a significant boost to our local and regional workforce and suppliers.

Unprecedented Growth in Tax Revenue: A critical and commendable aspect of this plan is that there is no abatement on real property taxes. The project site currently generates a mere $8,901 in annual real property taxes. With the proposed improvements the site could generate over $1.5 billion in new, non-abated real property tax revenue at full build out of the project. This revenue will be a game-changer for vital public services, including the Montgomery County R-II School District, the Ambulance District, the Fire Protection District, and general county operations.

Significant PILOT and Direct Payments: In addition to the full real property taxes, the project could contribute up to $308 million in Payments in Lieu of Taxes (PILOTs) on personal property over the 25-year abatement period. It also includes $3 million in direct contractual payments in 2026 and 2027, specifically designated to enhance our county's 911 emergency response and dispatch services.

Beyond these direct financial contributions, Project Green will stimulate ancillary economic growth by creating opportunities for local businesses and suppliers during its multi-year construction phase. The associated public infrastructure improvements will modernize our county's foundation for future growth without the expenditure of public funds.

In conclusion, Project Green offers an unparalleled opportunity to secure a prosperous future for Montgomery County. It brings high-paying jobs, creates a massive and stable new tax base for our schools, emergency services, health and developmental disabilities support services to residents and stimulate broad economic activity.

Thank you for your review and please let us know if you have any questions.

Sincerely,

John Noltensmeyer, Chairman

January 6, 2026

Cailie Carlile, P.E.
Antidegradation Unit Chief
Water Protection Program
Missouri Department of Natural Resources
1101 Riverside Drive
PO Box 176
Jefferson City, MO 65102-0176

The Montgomery County Health Department supports Project Green, the proposed data center project by Amazon Data Services, Inc, and real estate development firm NorthPoint Development. We are convinced that this project represents a transformative opportunity for the economic future of Montgomery County.

Project Green is a catalyst for widespread, long-term prosperity for Montgomery County. The project brings construction of a state-of-the-art data center campus, representing a capital investment of potentially up to $42.5 billion—comprising as much as $7.5 billion in real property improvements and $35 billion in personal property and equipment. An investment of this magnitude is a generational opportunity that will redefine our county's economic landscape.

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Thank you for your review and please let us know if you have any questions.

Sincerely,

Laura Yelton, RN Administrator

Laura Yelton, RN Administrator
Montgomery County Health Department
Montgomery City, MO

## APPENDIX I: ANTIDEGRADATION REVIEW SUMMARY FORMS

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

1) 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 |
|---|---|---|---|
| Project Green Domestic WWTP | | | Montgomery |
| ADDRESS (PHYSICAL) | CITY | STATE | ZIP CODE |
| Hudson Rd | New Florence | MO | 63363 |
| PERMIT NUMBER | PROPOSED DESIGN FLOW | SIC / NAICS CODE | |
| MO-GDS0000 | 34,000 gallons per day (gpd) | 4952 | |

**2. OWNER**

| NAME | | | |
|---|---|---|---|
| NorthPoint Development | | | |
| ADDRESS | CITY | STATE | ZIP CODE |
| 3315 North Oak Trafficway | Kansas City | MO | 64116 |
| EMAIL ADDRESS | | | TELEPHONE NUMBER WITH AREA CODE |
| bsherar@northpointkc.com | | | 573-825-4383 |

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

| NAME | SECRETARY OF STATE CHARTER NUMBER | | |
|---|---|---|---|
| NorthPoint Development | LC1200310 | | |
| ADDRESS | CITY | STATE | ZIP CODE |
| 3315 North Oak Trafficway | Kansas City | MO | 64116 |
| EMAIL ADDRESS | | | TELEPHONE NUMBER WITH AREA CODE |
| bsherar@northpointkc.com | | | 573-825-4383 |

**4. CONSULTANT**

| PREPARER NAME | COMPANY NAME | | |
|---|---|---|---|
| Nick Muenks | Geosyntec Consultants | | |
| ADDRESS | CITY | STATE | ZIP CODE |
| 2009 East McCarty Street, Suite 1 | Jefferson City | MO | 65101 |
| EMAIL ADDRESS | | | TELEPHONE NUMBER WITH AREA CODE |
| NMuenks@Geosyntec.com | | | 573-499-5447 |

**5. RECEIVING WATER BODY SEGMENT #1**

NAME: Elkhorn Creek

5.1 Upper end of segment – Location of discharge
UTM: X= 637532, Y= 4307393 OR Lat _____, Long _____

5.2 Lower end of segment – Downstream end of the segment (WBID 5024, reach code 07110008001158)
UTM: X= 636633, Y= 4310447 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: N/A

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? Ultraviolet

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

## 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.

The City of New Florence has existing sanitary sewer mains within close proximity to Project Green. However, the City of New Florence WWTF does not have capacity to accept the anticipated 34,000 gpd of domestic wastewater flow from Project Green. The only nearby POTW with capacity to accept 34,000 gpd of additional flow is located in Montgomery City, though a sewer connection to Project Green would require approximately 6 miles of conveyance, lift stations, and would cross jurisdictional waters of the United States and highways. Therefore, regionalization is not a practicable alternative.

An estimated 30 acres of land would be required for a storage lagoon and land application to be implemented for Project Green domestic wastewater. This amount of land is not practicable for NorthPoint Development to acquire for this alternative. Additionally, land application systems generally provide a lower level of treatment to applied wastewater and are prone to operational issues leading to treatment uncertainty. Therefore, land application is not considered practicable.

Subsurface discharge was also evaluated as a potential alternative. Soils in the vicinity of Project Green are generally composed of clay, which is not conducive to subsurface application. As a result, this is not practicable.

## 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 | | 2 | 10 | 15 |
| TSS | X | | 2 | 10 | 15 |
| Ammonia (Summer) | X | | 2 | 0.6 | 1.7 |
| Ammonia (Winter) | X | | 2 | 2.1 | 5.6 |
| Total Phosphorus | X | | Not applicable, Note 1 | NA | NA |
| E. Coli | #/100ML | | 2 | 126 | 630 |
| pH | SU | | 2 | 6.5-9.0 | 6.5-9.0 |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |

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



Note 1: Per MO-GDS0000, total phosphorus effluent limitations are only applicable to facilities discharging to specific lake watersheds.

## 12. PROPOSED PROJECT SUMMARY

Project Green will be located near New Florence, Missouri. NorthPoint Development is planning to install a domestic WWTP that will discharge treated effluent to the nearby Elkhorn Creek through a single proposed outfall. The WWTP will treat domestic waste to the levels prescribed in the general permit for systems less than 50,000 gpd discharging to a gaining stream.

The design flow for the proposed WWTP is 34,000 gpd. Therefore, the regulations outlined in Missouri Department of Natural Resource's "Department's Alternatives Analysis for Domestic Wastewater Facilities with Design Flow Less Than 50,000 Gallons per Day" were used to complete the associated permit documents.

The proposed WWTP will be operated under general permit MO-GDS0000 for domestic wastewater treatment facilities that discharge less than 50,000 gpd. A package treatment plant such as the Newterra Pre-Engineered Modular MBR Sewage Treatment System or Smith & Loveless, Inc. (S&L) FAST® package plant will provide treatment to meet discharge limitations for the general permit prescribed above.

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 |
|---|---|
| Nick Muenks | 01/15/2026 |
| **PRINT NAME** | **TITLE** |
| Nick Muenks | Principal Scientist |

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

2) Antidegradation Review Submittal: Voluntary Tier 2 – Significant Degradation for Domestic Wastewater Facilities with Design Flow Less Than 50,000 Gallons Per Day:

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

**ANTIDEGRADATION REVIEW SUBMITTAL**
**VOLUNTARY TIER 2 – SIGNIFICANT DEGRADATION FOR DOMESTIC WASTEWATER FACILITIES WITH DESIGN FLOW LESS THAN 50,000 GALLONS PER DAY**

| FOR DEPARTMENT USE ONLY | |
|---|---|
| APP NO. | |
| CHECK NO. | CHECK NO. |
| DATE RECEIVED | |

**1. APPLICABILITY**

**If you answer "Yes" to any of the below questions, a site-specific alternatives analysis may be required.**

**The Missouri Department of Natural Resources' alternatives analysis is *not* applicable to facilities that have a Total Maximum Daily Load (TMDL) or are 303(d) or 305(b) listed for the pollutants of concern addressed in this alternatives analysis, with an exception for *E. coli* since disinfection will be required.**

**Facilities currently under enforcement will need to coordinate with the Water Protection Program's compliance and enforcement section to determine applicability for the department's alternatives analysis.**

1.1 Does the receiving waterbody or downstream waterbody have a Total Maximum Daily Load (TMDL)? ☐ Yes ☑ No

1.2 Is the receiving waterbody or downstream waterbody 303(d) or 305(b) listed as impaired or potentially impaired? ☐ Yes ☑ No

1.3 Is the facility currently under enforcement with the department or the U.S. Environmental Protection Agency? ☐ Yes ☑ No

1.4 Is the design flow 50,000 gallons per day or more? ☐ Yes ☑ No

1.5 Is a non-discharging system a viable option? ☐ Yes ☑ No

**Submit the following with this form:**

☒ Regionalization and No Discharge Evaluation Form – Available on the department's website

☒ Copy of the Geohydrologic Evaluation – Submit request through the Missouri Geological Survey website

☒ Copy of the Missouri Natural Heritage Review from the Missouri Department of Conservation website

**2. FACILITY**

| NAME | | COUNTY | |
|---|---|---|---|
| Project Green Domestic WWTP | | Montgomery | |
| **ADDRESS (PHYSICAL)** | **CITY** | **STATE** | **ZIP CODE** |
| Hudson Rd | New Florence | MO | 63363 |

**3. OWNER**

| NAME | | | |
|---|---|---|---|
| NorthPoint Development | | | |
| **ADDRESS** | **CITY** | **STATE** | **ZIP CODE** |
| 3315 North Oak Trafficway | Kansas City | MO | 64116 |
| **EMAIL ADDRESS** | **TELEPHONE NUMBER WITH AREA CODE** | | |
| bsherar@northpointkc.com | 573-825-4383 | | |

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

| NAME | SECRETARY OF STATE CHARTER NUMBER | | |
|---|---|---|---|
| NorthPoint Development | LC1200310 | | |
| **ADDRESS** | **CITY** | **STATE** | **ZIP CODE** |
| 3315 North Oak Trafficway | Kansas City | MO | 64116 |
| **EMAIL ADDRESS** | **TELEPHONE NUMBER WITH AREA CODE** | | |
| bsherar@northpointkc.com | 573-825-4383 | | |

## 5. RECEIVING WATER BODY SEGMENT #1

NAME
Elkhorn Creek

5.1 Upper end of segment – Location of discharge
UTM: X= 637532, Y= 4307393 OR Lat _____, Long _____

5.2 Lower end of segment –
UTM: X= 636633, Y= 4310447 OR Lat _____, Long _____ Per the Missouri Antidegradation Implementation Procedure (AIP), the definition of 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 Necessary)

NAME
N/A

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. SOCIAL AND ECONOMIC IMPORTANCE OF THE PREFERRED ALTERNATIVE

This section must be completed with adequate and thorough descriptions of the social and economic importance associated with the proposed project in accordance with the Antidegradation Implementation Procedure Section II.E. for discharge to be allowed.

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.

**7.1 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 nearby communities affected by the project would be the City of New Florence and Montgomery City, Missouri. According to the United States Census Bureau social and economic factors that are relevant to the affected community are: 1) the median household income (MHI) in Montgomery County is approximately $61,042 compared to the state of Missouri MHI of $71,589, 2) the percentage of people in poverty in Montgomery County is approximately 14.5% compared to the state average of 12.3%, 3) the percentage of people over the age of 25 with a bachelor's degree or higher is approximately 16.5% compared to the state average of 33.5%, and 4) the median age of Montgomery County residents is 43.8 years compared to the state median of 39.4 years of age.

**7.2 Identify the important social and economic development associated with the project:**

**Will the proposed discharging activity:**

| | | | | |
|---|---|---|---|---|
| Create or expand employment? | ☑ Yes | ☐ No | ☐ Don't know | ☐ N/A |
| Increase median family income? | ☑ Yes | ☐ No | ☐ Don't know | ☐ N/A |
| Reduce the number of households below the poverty line? | ☑ Yes | ☐ No | ☐ Don't know | ☐ N/A |
| Increase the community tax base? | ☑ Yes | ☐ No | ☐ Don't know | ☐ N/A |
| Increase needed housing supply? | ☐ Yes | ☑ No | ☐ Don't know | ☐ N/A |
| Provide necessary public services (e.g., school, infrastructure, fire department, etc.)? | ☑ Yes | ☐ No | ☐ Don't know | ☐ N/A |
| Correct a public health, safety, or environmental problem? | ☐ Yes | ☑ No | ☐ Don't know | ☐ N/A |

Other:

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

The applicant must describe the expected changes in the factors identified in question 7.2 that are associated with the project and provide information on any additional items demonstrating important social and economic development. The applicant should first describe the existing condition of the affected community. This base condition should then be compared to the predicted change (benefit) in social and economic condition after the discharge is allowed. The social and economic measures identified above do not constitute a comprehensive list. Each situation and community is different and will require an analysis of unique social and economic factors in accordance with the Antidegradation Implementation Procedure Section II.E.1.

Construction of Project Green (data center the domestic WWTP will serve) will create thousands of construction jobs, as well as a committed minimum of 150 permanent jobs. It is projected that Project Green will generate between $400,000,000 to $1,800,000,000 in combined real property tax revenue and personal property payments in lieu of tax for Montgomery County political subdivisions over twenty-five years, whereas the current land use will only generate approximately $200,000 over that same timeframe. Project Green has pledged to invest $1,500,000 in Montgomery County's 911 and emergency response system in 2026, with an additional $1,500,000 in 2027 for other County needs. These revenues will expand emergency services to serve the immediate area and county-wide by providing modern 911 systems, emergency radio communications systems for first responders, and other physical infrastructure and equipment.

**7.4 Is any other written correspondence or documentation included with this application to provide further evidence of social and economic importance:**

☐ No

☑ Yes

- ☑ Letter(s) from the mayor or community in support of the proposed project
- ☐ Rezoning approval
- ☐ Other:

Letters of social and economic support are provided with the application.

## 8. NO DISCHARGE ALTERNATIVES EVALUATION

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

**You must submit the *Regionalization and No-Discharge Evaluation Form* (780-2805) to demonstrate that a non-discharging alternative is not feasible.** If sufficient information is not provided on the *No-Discharge Evaluation Form* to demonstrate that a non-discharging facility is not feasible, a more detailed evaluation of no discharge options must be submitted.

## 9. IDENTIFY PREFERRED TREATMENT ALTERNATIVE

Describe your preferred treatment alternative that has been recommended or approved by a registered professional engineer licensed to practice in Missouri. The preferred treatment alternative must be capable of meeting the effluent limits in the table under item 10 of this form.

Applicants choosing to use a new wastewater technology considered an "unproven technology" in Missouri must comply with the requirements set forth in the Innovative Technology factsheet found on the department's website.

A package treatment plant evaluated for a surface water discharge to Elkhorn Creek is the preferred alternative. The MDNR has a general permit, MO-GDS0000, for domestic wastewater treatment facilities that discharge less than 50,000 gpd. Examples of package treatment plant systems currently being evaluated include Newterra Pre-Engineered Modular MBR Sewage Treatment System and Smith & Loveless, Inc. (S&L) FAST® package plant. These systems (or similar) provide treatment for the design flow and are anticipated to meet the general permit's effluent limitations.


| ENGINEERING CONSULTANT NAME | | COMPANY NAME | |
|---|---|---|---|
| Mike Hayes | | Geosyntec Consultants | |
| ADDRESS | STATE | ZIP CODE | TELEPHONE NUMBER WITH AREA CODE |
| 5313 Campbells Run Road, Suite 150, Pittsburgh | PA | 15205 | +1 412-275-8012 |
| SIGNATURE  | | EMAIL ADDRESS MHayes@Geosyntec.com | |

## 10. SUMMARY OF THE POLLUTANTS OF CONCERN AND 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). All POCs in this alternatives analysis were considered to be Tier 2 and significantly degrading in the absence of existing water quality.

As a result of this alternatives analysis review, the department has determined, depending on site specific conditions, there are treatment technologies available that may be economically efficient and practicable, which are capable of meeting the effluent limitations below. If the facility owners do not believe there is a treatment technology that is economically efficient, affordable, or practicable for their facility to meet these limits, a site-specific alternatives analysis will be required.

**The chosen alternative must be capable of meeting the following effluent limitations:**

### EFFLUENT LIMITS – OUTFALLS TO LAKES

| Pollutant of Concern* | Units | Daily Maximum | Weekly Average | Monthly Average |
|---|---|---|---|---|
| $BOD_5$ | MG/L | | 15 | 10 |
| TSS | MG/L | | 20 | 15 |
| pH | SU | 6.5– 9.0 | | 6.5 – 9.0 |
| Ammonia as N Summer | MG/L | 3.6 | | 1.4 |
| Ammonia as N Winter | MG/L | 7.5 | | 2.9 |
| Total Phosphorus**** | MG/L | * | | 0.5 |
| *Escherichia coli* (*E. coli*) | #/100ML | 630*** | | 126 |

### EFFLUENT LIMITS – ALL OTHER OUTFALLS

| | | | | | |
|---|---|---|---|---|---|
| $BOD_5$ | | mg/L | | 15 | 10 |
| TSS | | mg/L | | 15 | 10 |
| pH | | SU | 6.5– 9.0 | | 6.5 – 9.0 |
| Ammonia as N Summer | | mg/L | 1.7 | | 0.6 |
| Ammonia as N Winter | | mg/L | 5.6 | | 2.1 |
| Total Phosphorus**** | | mg/L | * | | 0.5 |
| *Escherichia coli* (*E. coli*) | WBC(A) AND WBC (B) | #/100 ML | 630*** | | 126 |
| | Losing Stream** | #/100 ML | 126*** | | Monitoring only |

* Permit limits for other parameters, including oil and grease, total residual chlorine and nitrates, will be included in the operating permit based on applicable water quality standards and criteria.

Total residual chlorine (TRC) effluent limits of 0.017 mg/L daily maximum, 0.008 mg/L monthly average are recommended if chlorine is used as a disinfectant. Standard compliance language for TRC, including the minimum level (ML), may be included in the operating permit.

** For any facility that will discharge to a waterbody designated as a losing stream or within two miles flow distance upstream of a losing stream.

*** Publicly owned treatment works will receive a weekly average limit and private facilities will receive a daily maximum limit.

**** Total Phosphorus limits are only applicable to discharges to a lake or watershed of a lake that is a water of the state and has an area of at least 10 acres during normal pool conditions

If any Tier 1 Pollutants of Concern not addressed in this alternatives analysis will be discharged, the applicant must submit *Attachment D: Tier 1 Review* for those pollutants.

| 11. APPLICATION FEE | |
|---|---|
| ☐ CHECK NUMBER | ☐ JETPAY CONFIRMATION NUMBER |

**12. 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 |
|---|---|
| Nick Muenks | 01/15/2026 |
| **PRINT NAME** | **TITLE** |
| Nick Muenks | Prinicpal Scientist |

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

3) Antidegradation: Regionalization and No-Discharge Evaluation:

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

## ANTIDEGRADATION: REGIONALIZATION AND NO-DISCHARGE EVALUATION

### REGIONALIZATION AND NO-DISCHARGE EVALUATION

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

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

Additional pages may be attached if more room is needed.

### 1. FACILITY:

| NAME | COUNTY |
|---|---|
| Project Green Domestic WWTP | Montgomery |

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

**2.1 Regionalization Feasibility:**

A. What is the distance to connect to the closest municipality's line or other facility's line? Approximately 2 miles

B. List facilities contacted about possible regionalization. City of New Florence WWTF

C. Is there any planning or zoning in the area regarding development and services? No

D. Who would have the responsibility to maintain the sewer connection line? Not applicable - regionalization is not practicable

E. What is the estimated cost for piping and pumps to regionalize? Not applicable - regionalization is not practicable

F. Explain any engineering challenges with the regionalization connection – topography, rivers, highways, or other issues.
New Florence WWTF does not have capacity and Montgomery City WWTP is over 6 miles away

G. Does a regional facility have the capacity to treat the additional effluent from this project? No

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

I. Describe the easement issues:
N/A

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

The City of New Florence has existing sanitary sewer mains within approximately 2 mile of Project Green. However, the City of New Florence WWTF does not have capacity to accept the 34,000 gpd of domestic wastewater from Project Green. According to the MDNR NPDES permit that is effective for the City of New Florence WWTP, the City of New Florence WWTP was found to not be compliance for failure to not maintain land application field for risk of wastewater flowing off site.

The only nearby POTW with capacity to accept 34,000 gpd of additional flow is located in Montgomery City, approximately 6 miles from the Facility. As a result, sewer connection from Project Green to Montgomery City WWTF would require approximately 6 miles of conveyance pipe, lift stations, and would cross jurisdictional water of the United States and roads. Therefore, regionalization is not a practicable alternative.

## 3. EVALUATION OF NO-DISCHARGE LAND APPLICATION

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

☑ **3.1 Land Availability and Cost:**

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

If not, explain: An estimated 30 acres of land would be required for a lagoon and land application. This is not available.

If yes, answer the following:

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

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

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

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

F. Describe the easement issues:
Land is very valuable for development compared to the application of wastewater.

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

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

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

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

D. Are there other steps or considerations that can be made?
Soils in the area consist of clay and are not conducive to subsurface application. See MDNR Geohydrologic Evaluation Report.

☑ **3.3 Unsuitability of Geology or Soils**

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

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

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

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

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

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

No-discharge land application is not practicable as the land available/owned is inadequate for storage and application.

Soils in the vicinity of Project Green are composed of clay which is not conducive to subsurface application; therefore, subsruface application is not practicable.

Regionalization is not practicable due to lack of available capacity (City of New Florence) and more than 6.0 miles to a facility with capacity (Montgomery City) requiring conveyance to cross streams, highways, etc.

## 4. DOCUMENTATION

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

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