OFFICIAL COPY VIA EMAIL: bowconstruction@aol.com

January 31, 2025

Owner
Brandon Williams
King's Landing
2985 Boutin Drive
Cape Girardeau, MO 63701

RE: King's Landing Wastewater Treatment Facility, MO-New, Cape Girardeau County, Facility Plan Approval

Dear Brandon Williams:

The Missouri Department of Natural Resources (department) reviews facility plans to ensure well-planned projects for wastewater sewer systems and treatment facilities that protect and preserve water quality and human health. The department has reviewed the King's Landing facility plan submitted by Heartland Engineering, LLC on behalf of the Cape Land & Development, LLC on December 01, 2024.

The facility plan identified the need to treat the domestic wastewater flows to be generated from the King's Landing subdivision once construction is completed and houses are sold. The facility is designed to treat 99,800 gallons per day (gpd) with a peak flow of 199,600 gpd.

The facility plan recommends Alternative No. 3 Sequencing Batch Reactor (SBR) with a Aqua CamD Combination Aerator/Mixer/Decanter capable of meeting current Missouri water quality ammonia concentrations. This option was chosen due to its versatility and the familiarity with the chosen operator.

A geohydrologic evaluation was completed by Missouri Geological Survey on October 25, 2024, as required by 10 CSR 20-6.010(7)(B)2, 10 CSR 20-6.010(4)(A)5.D., and 10 CSR 20-8.110(5)(E)6.G., and 10 CSR 20-8.200(2)(B). The geohydrologic evaluation identified that the mechanical treatment plant did not have collapse potential and that the slope onsite ranged from 0 to 4 percent. The site is flat with surface water draining east into a tributary of Juden Creek. The site has slight geologic limitations due to the proximity of the Jackson fault zone.

A homeowner's association must be formed to become the continuing authority of the King's Landing WWTF. Cape Land & Development, LLC can be the only member in the HOA until houses are sold, but the development company itself should not be the continuing authority. The City of Cape Girardeau was not contacted regarding this project due to the districts strict stance on only maintaining systems within city boundaries

The facility plan proposed 6 alternatives to handle domestic wastewater flows generated at the King's Landing subdivision. All treatment technologies would include a collection system comprised of 8,450 linear feet (lf). of 8-inch PVC gravity sewer with 26 manholes.

Alternative No. 1 is to regionalize with another nearby treatment facility. The proposed facility is located approximately 2 miles from the nearest POTW, the Cape Girardeau WWTP. The city sewer district does not accept flows or become the continuing authority for projects outside the incorporated city limits. The nearest plant with capacity is the Fruitland WWTF which is approximately 10 miles from the King's Landing site. The location exceeds 2,000 feet to a nearby facility required by 10 CSR 20-6.010(2)(C)3.

Alternative No. 2 is to land apply the wastewater via surface application. It was calculated that at an application rate of 24 inches/acre/year, 56 acres would be necessary to treat the wastewater. Additionally, a storage basin would need to be constructed with capacity for at least 75 days of storage. The total size of the land being developed is 70 acres, so the space required for land application makes this option unreasonable. The land around the subdivision location is used for agriculture and is not for sale.

Alternative No. 3 is to construct a Sequencing Batch Reactor (SBR) with a Aqua CamD Combination Aerator/Mixer/Decanter capable of meeting current Missouri water quality ammonia concentrations. This option was chosen due to its performance history in the area, and the operator's familiarity with the technology and layout. This option would include a flow equalization chamber, mechanical headworks, dual SBR basins split into several sub-basins, an aerated sludge basin, electromagnetic flow meter, and UV disinfection. The final sizing of the flow equalization chamber is still being determined, but all other components are rated for the design flow, with a peaking factor of 2. The SBR works at many operating points to allow for flexibility while full design flow is achieved. The total present worth of this option was estimated to be $2,789,322.

Alternative No 4. is to construct an SBR system in a more traditional orientation with additional aeration. This design would be able to meet current Missouri water quality ammonia concentrations. The performance and operation of the more traditional system would be very similar to Alternative No. 3, with less customizability. The aeration equipment would be upsized to accommodate shorter retention times. This option would include a flow equalization chamber, mechanical headworks, dual SBR basins, additional blowers, an aerated sludge basin, electromagnetic flow meter, and UV disinfection. The final sizing of the flow equalization chamber is still being determined, but all other components are rated for the design flow, with a peaking factor of 2. The total present worth of this option was estimated to be $3,486,292.

Alternative No. 5 is to construct an SBR designed to treat to 2013 EPA ammonia concentration levels. The performance and operation of this system is in line with a more traditional system. The aeration equipment would be upsized to accommodate shorter retention times. This option would include a flow equalization chamber, mechanical headworks, dual SBR basins, caustic dosing pump, and additional blowers, an aerated sludge basin, electromagnetic flow meter, and UV disinfection. The final sizing of the flow equalization chamber is still being determined, but all other components are rated for the design flow, with a peaking factor of 2. The total present worth of this option was estimated to be $3,337,571.

Alternative No 6. is to construct an extended aeration basin. This option would allow for ease of operation and would also accommodate the potential slow build-out to full design flow. This option would include an equalization basin, mechanical headworks, aeration basin, aerated sludge holding basin, electromagnetic flow meter, UV disinfection, and dual secondary clarifiers. This option would perform similarly to the preferred alternative but was not selected due to the higher present worth cost. The final sizing of the flow equalization chamber is still being determined, but all other components are rated for the design flow, with a peaking factor of 2. The total present worth of this option was estimated to be $3,972,902.

Compliance with all Missouri Minimum Design Standards, 10 CSR 20-8, as well as accepted design standards or guidance for wastewater systems to protect the public health and the environment is established during review of the construction permit application and supporting documentation.

The facility plan regarding the King's Landing WWTF submitted by Heartland Engineering, LLC on behalf of the Cape Land & Development, LLC on December 1, 2024, is hereby approved. Any changes to the scope of work as shown in this facility plan will require an addendum to the facility plan and may require additional environmental review. Construction, installation, expansion or modification of any collection system or wastewater treatment facility is prohibited until a construction permit is issued by the department, per 10 CSR 20-6.010(4)(A).

The department recommends you continue to consider land application as an alternative. The treatment method would benefit both the landowner and the subdivision as the irrigation would provide some nutrients to the fields and could be a cost-effective solution for the subdivision. The upcoming U.S. Environmental Protection Agency (EPA) ammonia limits as well as any other lower limits that may be adopted in the future would not apply to a land application facility. Land application would also remove the facility's disinfection requirements provided that the facility was not applying on public land.

The department's review of the engineer's cost estimate associated with this project is not rigorous. It serves only as a basis for project scope and general comparison of alternatives. Since the estimate is a preliminary cost to help the owner or community decide which option to pursue, the department does not independently verify costs, nor does it determine whether selected alternatives represent financially prudent decisions. It is important to understand that it is the

community's or owner's responsibility to make sure that all planned expenditures are reasonable. For comparison purposes the department recommends using a 20-year present worth analysis to provide a reasonable basis for lifetime cost comparisons.

Following the department's public notice of draft Missouri State Operating Permit including the antidegradation review and preliminary determination, the department will review any public notice comments received. Significant comments have the potential to require an antidegradation report and facility plan amendment submittal for department approval and an additional public notice.

After receipt of this approval letter, please submit –

- Application for Construction Permit - Wastewater Treatment Facility, Form--MO 780-2189, https://dnr.mo.gov/document-search/application-construction-permit-wastewater-treatment-facility-mo-780-2189 and an application fee of $1,000;
- Construction plans and specifications for both the treatment and collection system: one electronic copy;
- Summary of design: one electronic copy; and
- If a discharging option is chosen,
    - Form B - Application *for* Operating Permit for Domestic Wastewater (≤ 100,000 gallons per day), Form--MO 780-1512, https://dnr.mo.gov/document-search/form-b-application-operating-permit-facilities-receive-primarily-domestic-waste-have-design-flow-less-or-equal-100000-gallons-day-mo-780-1512
    - an application fee of $3,000.

For questions related to technical issues such as the facility plan, construction permit, or plans and specifications, please contact Alex Bielefeldt, review engineer, by phone at 573-751-1714, by email at alex.bielefeldt@dnr.mo.gov or by mail at Department of Natural Resources, P.O. Box 176, Jefferson City, MO 65102. Thank you.

Sincerely,

WATER PROTECTION PROGRAM

Cindy LePage, P.E., Chief
Engineering Section

CL:abj

c: Bob Summers, P.E., Heartland Engineering, LLC
Brian Strickland, P.E., Strickland Engineering

Process Flow Diagram: Recommended Alternative No. 4